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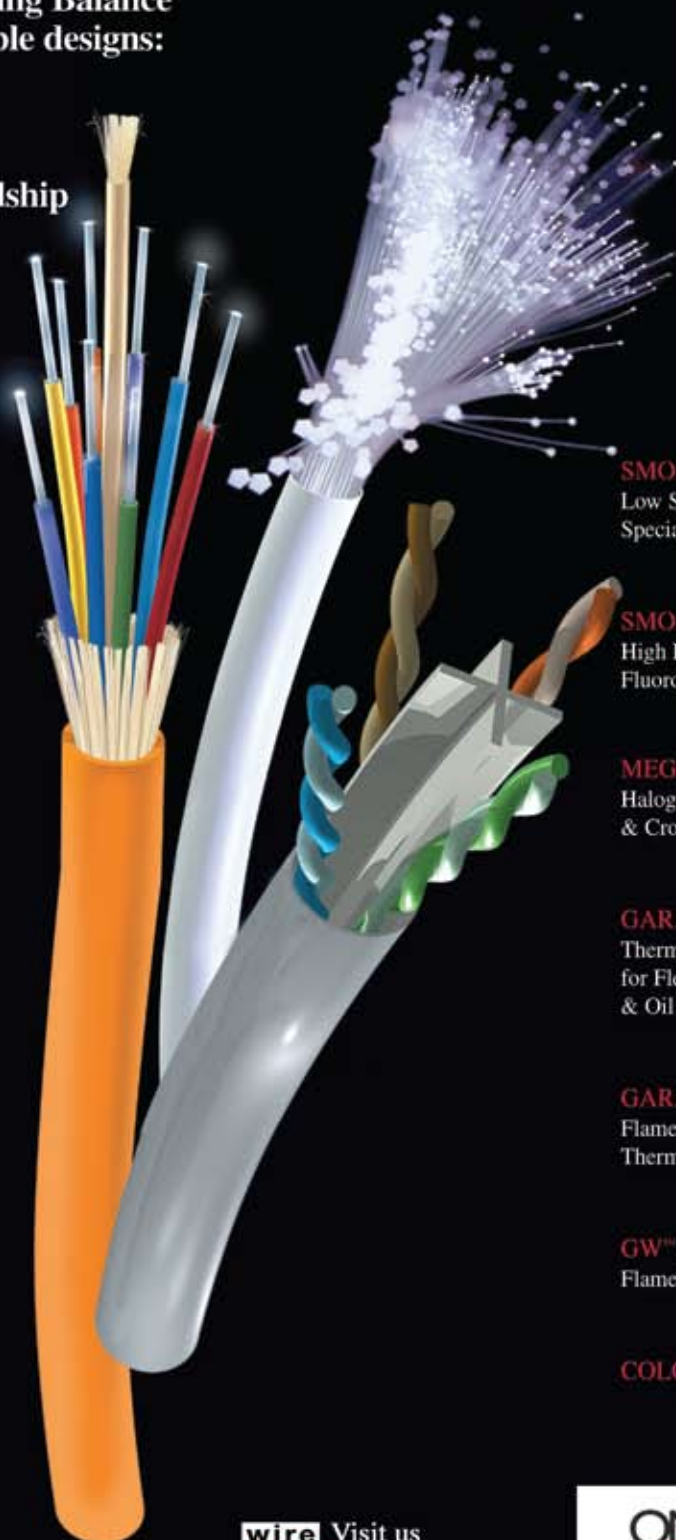
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Future homes – future industry

Much of the wire and cable industry will be attending wire China this month.

The previous wire China followed the 2008 Olympic Games. Not to be outdone, this year's exhibition will be held at the same time and in the same city as the World Expo 2010 (described as "the Olympic Games of the economy, science and technology"). Running from 1st May to 31st October the Expo expects 200 participating nations, and up to 70 million visitors.

The theme of Expo 2010 is "Better City, Better Life," representing "the common wish of all mankind for a better living in future urban environments."

It's not just the timing and the location that link these two events. Despite a recession, demand for wire and cable, and research into both conductors and insulators, has been relentless. With better city living focused on environment, work and communication it's easy to see the relevance of wire, cable and fibre optics. Energy, however generated, will always be needed for heat, light and to keep computers and machinery running; and energy demands fast, rugged, reliable cables to distribute it.

For work, leisure and education fast broadband Internet connection has become widely expected and almost essential. In certain countries – Finland, for example, where there is a large rural population – it has even been made a human right.

Expo 2010's promotional website (www.expo2010.cn) explains that, for its 184 days, "Participants will display urban civilisation to the full extent, exchange their experiences of urban development, disseminate advanced notions on cities and explore new approaches to human habitat, lifestyle and working conditions in the new century. They will learn how to create an eco-friendly society and [how to] maintain the sustainable development of human beings."

A visit to World Expo 2010 would be a day to remember, and should serve to remind the industry that future opportunities for wire and cable must be almost endless.



Gill Watson

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See page 103 for further details

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Plastic Tubing
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IWCS Technical Conference

November 2010

7–10: **59th IWCS** –
technical conference –
Providence, Rhode Island, USA
Organisers: IWCS Inc
Fax: +1 732 389 0991
Email: phudak@iwcs.org
Website: www.iwcs.org

November 2010

18–20: **Wire & Cable India** –
trade exhibition – Mumbai, India
Organisers: Messe Düsseldorf GmbH
Fax: +49 211 4560 7740
Email:
ryfischd@messe-duesseldorf.de
Website: www.wire-india.com

2011

May 2011

3–5: **Interwire** – trade exhibition –
Atlanta, Georgia, USA
Organisers: Wire Association
International (WAI)
Fax: +1 203 453 8384
Email: info@wirenet.org
Website: www.wirenet.org

23–26: **wire Russia 2011** –
trade exhibition –
Moscow, Russia
Organisers:
Messe Düsseldorf GmbH
Fax: +49 211 4560 7740
Email: info@wire-russia.com
Website: www.wire-russia.com

June 2011

19–23: **JICABLE** –
conference and trade
exhibition – Versailles, France
Organisers: SEE
Email: jicable@see.assoc.fr
Website:
www.jicable.org

September 2011

13–15: **wire Southeast Asia** –
trade exhibition – BITEC,
Bangkok, Thailand
Organisers:
Messe Düsseldorf Asia Pte Ltd
Email: wire@mda.com.sg
Website:
www.wire-southeastasia.com

October 2011

4–6: **WiCAB 2011** – trade exhibition
– Centro de Exposições Imigrantes,
Sao Paulo, Brazil
Organisers: Grupo Cipa, Brazil
Fax: +55 11 5585 4359
Email: feira@cipanet.com.br
Website: www.cipanet.com.br

2012

March 2012

26–30: **wire/Tube Düsseldorf** –
trade exhibition – Düsseldorf,
Germany
Organisers: Messe Düsseldorf
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TECHNOLOGIES FOR EXCELLENCE



▲ Dr Horace Pops led the Production Solutions demonstration on wire breaks at the Properzi International booth

Co-located Wire Expo

The Wire Association International's Wire Expo 2010 and WAI's 80th Annual Convention were co-located with the National Electrical Wire Processing Technology Expo in Milwaukee, Wisconsin in May 2010. A total of 2,931 participants attended the combined event, enjoying crossover access between shows.

Wire Expo registration showed 1,457 participants from 38 states and 21 countries. Early reports suggest that the concentrated agenda (exhibit days were condensed from three to two) and the coordinated scheduling with the American Wire Producers Association's new Long Product Supply Chain Symposium, had a very positive reception.

WAI president, Dane G Armendariz noted: "Scheduling three industry events within the same week helped a lot of visitors justify their trip to Milwaukee.

"The two-day exhibit format worked very well and with the convenience of the co-location we saw a steady flow of traffic between the shows on both days."

Highlights of the event included:

- Guided facility tours of the Rockwell Automation and Charter Steel plants
- 30 technical paper presentations and the Phosphating 101 class
- The Annual Awards Breakfast honouring the Donnellan Memorial Award winner Brian Bouvier, and the Mordica Memorial Award winner Professor Javier Gil Sevillano, as well as technical paper authors
- The Fundamentals of Wire Manufacturing course
- Live production solutions demonstrations
- WAI's 5th Annual 5K road race, sponsored by Leoni Wire Inc

Steven J Fetteroll, WAI executive director commented: "We're also especially gratified by the early feedback from a number of key exhibitors and the positive responses we've received from local attendees."

Wire Association International – USA
Fax: +1 203 453 8384
Website: www.wirenet.org

Rope and wire acquisition confirmed

Houston Wire & Cable Company has completed its acquisition of both Southwest Wire Rope LP, a supplier of custom fabricated lifting equipment, and Southern Wire LLC, a supplier of industrial wire rope. The purchase price for the acquisition of both companies was \$50 million.

Mitch Hausman, president of Southwest Wire Rope and Southern Wire, commented, "This is an exciting time for Southwest Wire Rope LP and Southern Wire LLC. We look forward to working with the experienced and dedicated management of Houston Wire & Cable Company and with their established national distribution network."

Houston Wire & Cable Company – USA
Website: www.houwire.com

Southwest Wire Rope LP – USA
Website: www.southwestwirerope.com



Recognition for reel producer

Euromadem, located in Calaf, Spain was officially recommended by Det Norske Veritas (DNV) to receive the ISO 9001 designation for the manufacture of wooden and plywood reels.

Euromadem launched operations in 2006 and today is one of the largest reels suppliers in Spain and Portugal, providing logistics, just-in-time delivery and recycling services.

Leandro Mazzocato, corporate sales and marketing director, said: "The ISO 9001 designation is an important tool for excellence in service for our customers in Spain and Portugal. We will practice continual improvement in our quality system for the benefit of our valued customers."

Roger Santasusana, general manager of Euromadem, agreed: "We are very satisfied to have implanted ISO standards in record time, a sign that we were on the right track.

"Now we will be sure to maintain our quality system and continual improvement processes to ensure a quality product and satisfied customers."

Euromadem Spain is a subsidiary company of Madem SA Brazil.

Madem SA – Brazil
Fax: +55 54 3462 5900
Email: sales@madem.com.br
Website: www.madem.com.br

Niehoff will represent HFSAB

As from 1st April 2010 Maschinenfabrik Niehoff assumed representation (outside of the European Community) of HFSAB, a leading supplier of lead sheathing equipment to the cable industry.

HFSAB, known as H Folke Sandelin AB and Hansson Robertson, is part of the Canadian mining company Teck Cominco Metals Ltd and is headquartered in Motala, Sweden. It specialises in the manufacture of horizontal continuous lead extruders and in cable repair and recovery systems.

Horizontal continuous lead extruders developed and built by HFSAB are used to apply lead sheaths to submarine and underground power, communication and fibre optic cables. The lead sheathing provides an excellent barrier to chemicals, oils, water and sulphides and lengthens the service life of cables.

Maschinenfabrik Niehoff GmbH & Co KG – Germany
Fax: +49 9122 977155
Email: info@niehoff.de
Website: www.niehoff.de

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Fibre to the Home event announced for Italy

The Fibre to the Home Council Europe has announced that Milan has been selected to host the world's largest Fibre to the Home (FTTH) event next year.

The FTTH Conference 2011 will take place at the Milano Convention Centre in Fiera Milano on 9th and 10th February 2011.

The city of Milan was among the first cities where FTTH was deployed. In 2000 the alternative operator Fastweb started to roll out a fibre network across the city that now passes some 2 million homes and has nearly 300,000 subscribers. This early success made Italy the first major European economy to break into the FTTH ranking – a league table of nations where more than 1% of households are fibre subscribers.

Despite the promising start, FTTH deployment in Italy appears to have stalled. In December 2008, the country was in eighth position in the European rankings, but by December 2009 it had slipped to tenth place with an unchanged 1.3%.

“Early fibre deployments in Italy took place at a time when copper connections only offered speeds slower than 1 Mbps and could not support TV services. With fibre access the Milanese had access to advanced services such as video communications in the early 2000s, but since then no real progress has been made,” explained Chris Holden, president of the FTTH Council Europe.

“Italy was a pioneer in fibre deployment,” said Hartwig Tauber, director general of the FTTH Council Europe. “We hope that



Photo copyright Fernando Picarra

▲ Vasco Tigo (standing) moderator of the FTTH – The Service and Application Enabler plenary session during the Lisbon 2010 conference

the presence of the FTTH Conference in Milan will inspire the Italians and encourage them to renew their efforts to roll out fibre, such as the Italian operators' recent plans to connect the largest Italian cities. The conference provides an unparalleled opportunity to find out, first hand, how fibre can benefit all sectors of society, including service providers, the local community and the national economy.”

FTTH Council Europe – Belgium

Website: www.ftthcouncil.eu

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Aircraft cable manufacturing plant in Morocco

Nexans has opened a new manufacturing plant in Mohammedia (Morocco), entirely dedicated to aircraft cables. The plant is the result of an agreement between Nexans and Airbus for the supply of advanced cables for the A320, A350 and A380 aircraft.

This investment of nearly €10 million strengthens Nexans' aeronautical business as well as the core business of its Moroccan subsidiary, which already has strong expertise in manufacturing cables for the automotive, building and infrastructure industries. This is Nexans' third plant dedicated to aircraft cables; similar facilities are based in France and the United States.

Nexans has redeveloped the Mohammedia plant to accommodate a production area of 3,000m² designed to manufacture 21,000km of cables per year, of which 70% will be exported.

...and a submarine cable contract in UK

In the UK, Nexans has been awarded a major contract by Lincs Wind Farm Ltd to supply the medium voltage submarine array cables and associated accessories for the 270MW Lincs offshore wind farm to be constructed off the east coast of England.

The contract for the Lincs wind farm medium voltage array cables covers the design, manufacture and supply of 64.8km of 3-core cable with a conductor cross-section of 185mm² and 20.5km of 3-core cable with a conductor cross-section of 630mm². The cables will also incorporate fibre optic cables for the monitoring and control of the wind farm.

The array cables will be produced at the Nexans plants in Germany and Norway. Accessories are scheduled for delivery at the end of 2010, while delivery of the cables will start in March 2011.

Nexans – France
Fax: +33 15669 8484
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▲ Nexans' dedicated aircraft cable facility in Morocco



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Precision Rolling acquired by ASMAG UK

Precision Rolling has been acquired by ASMAG UK Ltd. Precision Rolling specialises in equipment for the manufacture of simple and complex profiles in low to high-carbon steels and non-ferrous materials.

David Liddle, managing director of ASMAG UK Ltd, commented: "We are delighted to extend our product range through this acquisition. Precision Rolling offers an extensive range of profile manufacturing equipment, together with ancillary machinery, that enables complete production lines to be designed, built and installed.

"The Precision Rolling product lines complement ASMAG's existing tube manufacturing machinery."

Mr Liddle explained: "Following the takeover of a German supplier some years ago, and now the recent acquisition, ASMAG UK Ltd can offer a complete and comprehensive solution to the wire industry."



▲ Turks head from ASMAG UK

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- Machine upgrades

ASMAG UK Ltd – UK

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Continuous casting agent in Iraq

Rautomead of Scotland has appointed an agent in the Middle East.

Mr Majeed A Al-Rawi of the El-Tech Energies and Technologies Company will be representing Rautomead's interests in Iraq and Jordan, servicing Rautomead's existing continuous casting technology customers in the region and identifying potential new customers in the wire and cable and metal processing industries.

Mr Al-Rawi will be promoting Rautomead's entire product range, including fully automated machines for the production of quantities of up to 30,000 tonnes per year. For smaller scale wire rod production, a new range is capable of producing between 1,000 and 3,600 tonnes.

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Rautomead sales and marketing manager Guy Henderson remarked: "The appointment of Mr Al-Rawi is another example of the company's commitment to emerging markets, following on from the launch of our Russian and Chinese language websites."

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Email: sales@rautomead.com
Website: www.rautomead.com

El Tech Energies and Technologies – Jordan
Email: majeed@ei-techno.com

ABB to build new cable factory in US

ABB has announced that it will construct a new factory in the United States to manufacture high-voltage land cables for power transmission.

The new plant will manufacture land cables for use in both AC and DC applications. ABB will invest approximately \$90 million in the new manufacturing facility, which is expected to employ around 100 people. The selection process for the site of the factory is already under way.

"Cables play a key role in the efficiency and reliability of long-distance power transmission," said Peter Leupp, head of ABB's power systems division. "The need to upgrade the existing transmission infrastructure in the United States, to provide grid interconnections and integrate more renewable power into the grid is driving demand for cables."

ABB has been manufacturing polymeric insulated cables since the early 1970s and is among leading suppliers of cable systems for a range of voltage levels. The company's offering includes XLPE (cross-linked polyethylene) insulated cables for use in high-voltage applications, up to 500kV, said to provide opportunities for energy-efficient power transmission. Around the world, ABB has delivered more than 7,200km of XLPE cables for voltage levels above 100kV.

In the 1950s ABB delivered the world's first commercial HVDC (high-voltage direct current) power link. The company developed HVDC Light in the 1990s, delivered the world's longest underwater power link in 2008 and is currently connecting the world's most remote offshore wind farm (Bard, located 128 kilometres off the German mainland).

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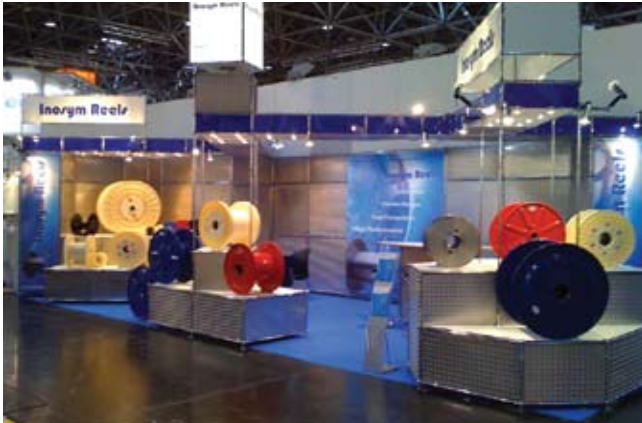
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Reeling in the contracts



▲ Inosym's stand brought success at Düsseldorf

Philip Young, managing director of Inosym, was delighted with the success of wire Düsseldorf in April, and has announced the signing of two large contracts – both secured during the show.

The contracts are for the supply of steel and plastic reels. The first is for large de-gassing reels for a customer in Egypt, and the second to supply ABS plastic reels to a client in Europe.

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Fax: +64 3 341 668
Website: www.inosym.com

Sify Technologies in pact with Gulf Bridge

Sify Technologies, a specialist in enterprise and consumer Internet services, has signed an agreement with Middle East-based submarine cable operator Gulf Bridge International to lay international undersea cable in India by 2011.

Sify will provide a landing station for Gulf Bridge International cable in Mumbai, Sify Technologies confirmed in a statement. The cable connectivity will also allow telecom operators and other communication companies to connect in the region.

“Access to an undersea cable system will allow Sify Technologies to serve the emerging markets in the Middle East as well as African regions, which are also amongst the fastest growing economies in the world. This allows Sify to enable a reliable and secure information superhighway to connect the Middle East to Asia Pacific and the Americas,” said Sify Technologies CEO and managing director Raju Vegesna.

The laying of the cable system is scheduled to begin in 2011 and will connect all the Gulf countries via a core ring.

Sify Technologies Ltd – India
Website: www.sifycorp.com

Gulf Bridge International – Qatar
Website: www.gulfbridgeinternational.com/gbil

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New manufacturer in Canada a possibility

Discussions are taking place between Deyang Dongjiagang Mechanical and Electrical Co Ltd, Progressive Machinery Inc and Niagara Composites Industries Inc for the foundation of a company to be called Panther Wire and Cable Inc.

The negotiations follow a delegation that visited China last summer to develop a business relationship with a high-quality wire and cable manufacturer. Out of the many firms visited, Dongjiagang and Progressive reached a tentative agreement in Deyang for a joint venture. It could eventually amount to millions of dollars of machinery produced every year.

Roy Rymer, president of both Progressive Machinery and Niagara Composites, hopes to have final details agreed shortly. If all goes well, it will take at least a year to get the company built and operating in St Catharines, Canada but, he said: "It looks very promising at this point."

Panther Wire and Cable, expected to employ around 30 to 40 people, would make high quality wire and cable machinery and market its products internationally. The company would also assemble and manufacture parts originally made in China. Roy Rymer added: "Down the road, we'll get more initiative in manufacturing the smaller parts right here in Canada."

Products would include power and telecommunications cables.

Niagara Composites Industries Inc – Canada
Website: www.niagaracomposites.com

Progressive Machinery Inc – Canada
Website: www.progmach.com

Deyang Dongjiagang Mechanical and Electrical – China
Website: www.ebp.cn

Representative for Turkey



▲ Ali Serpen of Metalin

PWM, the UK-based designer and manufacturer of cold pressure welding equipment and dies, has appointed Ali Serpen of Metalin as its exclusive representative in Turkey.

Mr Serpen, who has over twenty years' experience within the international wire and cable industry, will manage sales of PWM's manual and powered cold welders, dies and spare parts and provide customer service support.

Steve Mepsted, managing director of PWM said: "Turkey is an important and expanding market for PWM."

"Ali's expertise and extensive knowledge of cold welding technology and its applications will ensure that we continue to provide a reliable, responsive service to our existing and new customers."

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The oil spill

▶ The historian's-eye view: American history abounds with longer-term catastrophes than the Deepwater Horizon

In the US, the effort to stem the flow of crude oil into the Gulf of Mexico has been accompanied by lively commentary on whether or not it is the worst environmental disaster America has ever faced. President Obama declared that it is. But the *Washington Post*, among others, points out that the national past is littered with oil spills, explosions, toxic dumps, extinctions, and at least one river on fire. On 22nd June – Day 63 since the explosion of the Deepwater Horizon rig – David A Fahrenthold and Ylan Q Mui wrote that historians, predictably, say an evaluation of the president's words depends on what he meant by "worst" and "disaster." The Dust Bowl of the 1930s caused more social upheaval. The Exxon Valdez oil spill in 1989 had a higher wildlife death toll. The pesticide DDT affected a wider swathe of the country.

The *Post* reporters observed, "From the perspective of a bison or a (now-extinct) passenger pigeon, the whole thing might look like one long disaster." ("Historians Debate Designation of 'Worst Environmental Disaster' in US"). At this writing, the cap-and-capture effort that has riveted public attention to the gulf appears to be gaining on the problem. While we wait, it might be worthwhile to consider a letter to the editor of the Beaufort (South Carolina) *Gazette* that was cited by syndicated columnist Thomas L Friedman as the best reaction he has seen to the oil spill ("This Time Is Different," 11th June):

"I'd like to join in on the blame game that has come to define our national approach to the ongoing environmental disaster in the Gulf of Mexico. This isn't BP's or Transocean's fault. It's not the government's fault. It's my fault. I'm the one to blame and I'm sorry.

"It's my fault because I haven't digested the world's in-your-face hints that maybe I ought to think about the future and change the unsustainable way I live my life. If the geopolitical, economic, and technological shifts of the 1990s didn't do it; if the terrorist attacks of Sept. 11 didn't do it; if the current economic crisis didn't do it; perhaps this oil spill will be the catalyst for me, as a citizen, to wean myself off of my petroleum-based lifestyle.

"Citizen' is the key word. It's what we do as individuals that counts. For those on the left, government regulation will not solve this problem. Government's role should be to create an environment of opportunity that taps into the innovation and entrepreneurialism that define us as Americans. For those on the right, if you want less government and taxes, then decide what you'll give up and what you'll contribute.

"Here's the bottom line: If we want to end our oil addiction, we, as citizens, need to pony up: bike to work, plant a garden, do something. So again, the oil spill is my fault. I'm sorry. I haven't done my part. Now I have to convince my wife to give up her SUV." Mark Mykleby

Steel

▶ Newly optimistic Midwestern steel processing centres wager that demand for steel will continue to rise with the US economy

As demand for flat-rolled and bar steel picks up in the American Midwest, the steel processing centres that serve auto makers, appliance manufacturers, and the light-manufacturing industries are bellwethers of the progress of the US steel industry back toward pre-recession health. The centres – variously known as distributors, stockists, and service centres – suffered along with the steel producers which at their lowest point were operating at only 40% of capacity. Now, the steel makers are at about 70% of capacity and feeling much better about their prospects. Accordingly, so are the steel processing centres. Writing in the *Southtown Star* (Tinley Park, Illinois), Mike Nolan profiled one of them: the cavernous Sun Steel plant, in Chicago Heights, sold to Russia's OAO Severstal in 2008 and re-acquired by the original American owners in May of this year.

Together with Sun, the brothers James and Craig Bouchard have bought back another Chicago Heights steel centre, Century, from Severstal. Their Chicago-based company Esmark, through its Esmark Steel Group subsidiary, had already begun reassembling a core group of steel service centres. With a \$100 million line of credit from GE Capital, the financial services unit of the multinational conglomerate General Electric (Schenectady, New York), Esmark is also considering other acquisitions. ("Brothers Banking on Steel Rebound," 13th June). "It's going to be a slow climb out" for the steel processing centres, the Esmark Steel Group chief executive Tom Modrowski told the local newspaper. But an account of the Bouchard brothers' recent activities suggests speed and nimbleness beyond the ordinary.

Until about two years ago, the Bouchards operated a network of ten steel service centres around the Midwest, as well as the producer Wheeling-Pittsburgh Steel Corp (Wheeling, West Virginia). They bought Sun in 2004, followed by Century in early 2005. In the summer of 2008 – just months before the collapse of the financial markets – they sold the whole bundle to Severstal for \$1.2 billion, with the Russian producer assuming outstanding Esmark loans and debt. A noncompete agreement kept the Bouchards on the sidelines for a year, according to Mr Nolan. Then, last fall, they plunged back in, paying \$10 million for Amtex Steel, a service centre in nearby University Park that has been renamed Chicago Steel & Iron.

✱ "Along with Sun and Century, the Bouchards also picked up an Ohio steel service center they had sold to Severstal," Mr Nolan wrote. "Esmark didn't say how much it paid for the assets. Combined, the service centers annually ship about 300,000 tons of flat-rolled steel, according to Esmark."

Good judgment and good timing obviously figure in the Esmark story to this point. So does good luck. And the company evidently expects more of the same.

Esmark Steel Group CEO Tom Modrowski told the *Southtown Star*, "We're excited about what lies ahead."

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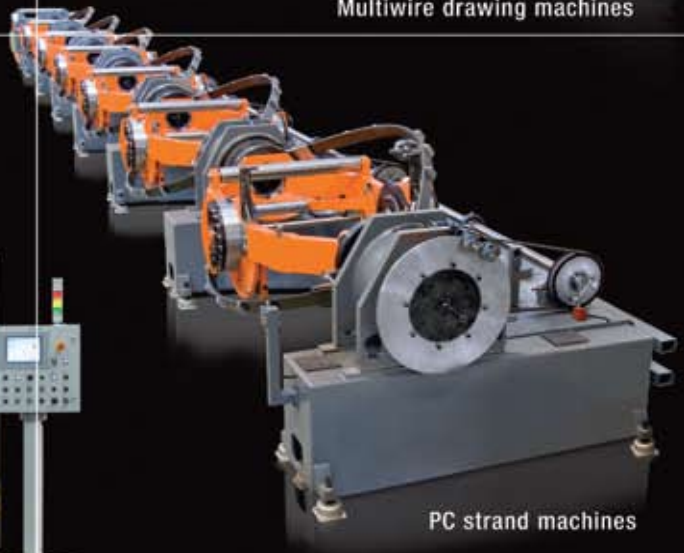
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Let nothing be lost:
spinning gold from scrap metal

Wresting value from scrap is a painstaking business that can also be strikingly profitable. The Seattle (Washington) *Times* for 13th June reported on Schnitzer Steel (Portland, Oregon), founded more than a century ago as Alaska Junk. The company makes finished steel products from scrap and sells used auto parts; but the core of its business – accounting for 75% of income – is scrap. Schnitzer is expected by DA Davidson analyst Brent Thielman to post revenues approaching \$2.4 billion in fiscal 2010, with a net profit of around \$63 million.

The company collects old autos, railcars, construction elements and other metal debris at facilities it maintains in four states. There the scrap is shredded, loaded into ships and sent to China, South Korea, Turkey and a number of other countries whose reviving steel mills must be fed. "We [the United States] are the biggest reservoir of junk metal in the world, by far," Mr Thielman said. "That's something I think these guys can leverage." Leveraging is a concept that Schnitzer would appear to understand very well. The company's Oregon minimill buys steel from the scrap division, melts it in a 108-ton capacity electric arc furnace, and turns it into rebar, wire rod and other products. Moreover, according to the *Times*, "At Schnitzer's more than three dozen US and Canadian auto-parts yards, customers pay to scavenge usable parts from junked cars. What's left goes to Schnitzer's scrap division, if feasible, or is sold elsewhere."

Elsewhere in metals . . .

* Steel companies were prominent supporters of a failed Senate resolution aimed at blocking a broadened "tailpipe rule" that strengthens the hand of the US Environmental Protection Agency in the regulation of greenhouse gas emissions. As of January, EPA oversight of auto emissions would be expanded to include emissions from stationary sources, such as steel production facilities. Endangerment findings and subsequent regulations could impose more stringent EPA requirements on over 6 million stationary sources, including 200,000 manufacturing facilities. Thomas J Gibson, president and CEO of the American Iron and Steel Institute, on 11th June expressed the AISI view on such EPA activism under the Clean Air Act: "This regulatory path will be economically detrimental to American manufacturing, and will not result in a reduction in greenhouse gas emission, as overseas competitors will continue to increase their emissions. Climate change is a global problem that can only be addressed effectively on a global basis."

* On 17th June the Dutch-German-British group Urenco inaugurated the second phase of its uranium enrichment plant in Eunice, New Mexico, in the US Southwest. According to the owners, the first new uranium enrichment plant in the country in decades will by 2014 have sufficient capacity to meet the needs of half the nuclear power reactors in the United States. The centrifuges utilised by the \$3 billion plant are reported to consume only about 5% as much electricity, per unit of enrichment, as the gaseous diffusion technology employed by USEC Inc (Bethesda, Maryland). While USEC works on a new centrifuge-based enrichment technology, the US Energy Department in May extended a \$2 billion loan guarantee to another prospective European rival –



Paris-based Areva – to build a centrifuge enrichment plant in southern Idaho. A domestic competitor is General Electric (Fairfield, Connecticut), now working on a laser-based enrichment system at its Wilmington, North Carolina, plant. *World Nuclear News* reported (10th June) that the Noble Group recently acquired a 5.13% stake in USEC for \$30.2 million. The Hong Kong-based global supply chain manager is new to the nuclear field.

Construction at Blue Spring was 90% complete in December 2008 when Toyota halted the project in response to plunging sales of its vehicles in the North American market. Most of the remaining work reportedly involves equipment installation. "Now it's time to fulfill Toyota's promise in Mississippi," Yoshimi Inaba, the president and chief operating officer of Toyota Motor North America, said in a statement. "Toyota remains committed to making vehicles where we sell them and to maintaining a substantial manufacturing presence in North America."

Automotive

▶ Onetime partners Toyota and General Motors both give strong indications of a rapidly improving US auto market

Taking a vigorously proactive approach to repairing its fortunes in North America, Toyota Motor Corp on 17th June announced that it would resume construction of a plant in Mississippi, put on hold 18 months before. The Japanese auto maker said its \$1.3 billion plant in Blue Spring, 90 miles southeast of Memphis, is scheduled to start up in the fall of 2011. Delivering the good news all at once, Toyota said the plant would create 2,000 jobs, precisely the number in its original estimate.

Production plans for Blue Spring have been adjusted yet again. The plant was initially intended to produce sport utility vehicles. Then, in mid-2008, as surging gas prices were generating demand for fuel-efficient vehicles, Toyota said it would build Prius hybrid cars there. (This was not to be; and Toyota on 17th June did not address whether it would eventually build the Prius, now imported from Japan, in North America.)

The latest candidate is the Corolla, the popular compact now in its tenth generation. Toyota might do well to let this one make it to the finish line in Mississippi. According to the auto buying guide Edmunds.com, the Corolla is "the quintessential economy car" and the best-selling nameplate in automotive history. Toyota said the opening of the Blue Spring plant would mean that nearly all Corollas sold in North America will be built in the US and Canada.

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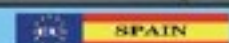
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Some Corolla production was moved to Japan in April, when Toyota closed an assembly plant in Fremont, California. The California plant had been a joint venture of Toyota and General Motors, but GM withdrew after its bankruptcy filing last year, and Toyota said it could not operate the plant without a partner. Toyota now plans to build electric cars there in partnership with another auto maker, Tesla.

✳ GM, too, has been busy – and forward-looking. The company announced it is committing an initial \$100 million to form a venture capital firm to invest in start-up companies in such fields as advanced materials and renewable fuels. The subsidiary, General Motors Ventures, will scout companies specialising in innovative technologies and, in some cases, may take an equity position in the firms. GM has since 2008 held equity stakes in two companies working on ethanol fuel development. While it is the sole Detroit auto maker to have a venture capital arm, some large companies in other industries – including the Internet search engine operator Google and the computer chip maker Intel – have such units of their own. In addition to new technologies, GM will look for innovative business models, such as more efficient distribution systems. The company, 61% owned by the US taxpayer since its bankruptcy last year, has been increasingly energetic in advance of a public stock offering as early as the fourth quarter, when the federal government can begin to recover the \$43 billion of its investment in GM that still is outstanding.

Other news of General Motors . . .

✳ On the same day in June on which Toyota announced the resumption of its Mississippi project, GM said that in response to brisk demand it would skip the annual summer shutdown at all but two of its US auto plants. Traditionally the Detroit auto makers shut their plants in early July to re-tool in preparation for building the next year's models. GM said that operating nine of its 11 assembly plants in the US for two extra weeks – perhaps with the help of some temporary workers – would allow it to build 56,000 additional vehicles.

Immigration reform

Arizona seizes the initiative in a hot-button issue – but at what cost to itself?

Of the 154 million working people in the United States, an estimated 8.3 million, or 5.4%, are unauthorised residents. As calculated by the Pew Hispanic Center, the percentage is up from 4.3% in 2003, but the increase has levelled off since the financial crisis hit the US economy in 2007. With an estimated 500,000 undocumented residents, Arizona falls behind California, Texas, Florida, New York, and New Jersey in attracting illegal migrants. Even so, it was Arizona which on 23rd April enacted the controversial new SB 1070 immigration law which, as of 27th July, requires police officers to detain anyone they suspect is in the country illegally. The police must verify the detainee's status, whereupon individuals found without documentation are to be charged with a misdemeanor punishable by up to six months in jail and a \$2,500 fine, followed by deportation.



The immediate and strong response to the new legislation, accurately termed "a furor," ran from jubilation to revulsion in a society built up by immigrants but now under stress brought on by the economic downturn. Media emphasis on defiant gestures – the Phoenix Suns basketball team wore jerseys reading "Los Suns" during a game on 5th May, the Mexican holiday Cinco de Mayo – works against a considered early evaluation. But Knowledge@Wharton, the online business journal of the Wharton School of the University of Pennsylvania, has performed a service by assessing some possible effects on Arizona of the rules that Governor Jan Brewer triumphantly signed into law in her state. ("Not a Positive Signal: the Economic Impact of Arizona's New Immigration Law," 21st May)

These observations are abstracted from Wharton's report:

✱ Americans for Immigration Reform, a business group which opposes "destructive measures" on immigration, estimates that, if all unauthorised immigrants were to be expelled from Arizona, the state would lose \$26.4 billion in economic activity and approximately 140,324 jobs. And, while the new law may work as a deterrent to illegal immigration, it could in the long run harm Arizona's already ailing economy with its implicit suggestion that the state is inhospitable to newcomers. "This is not a positive signal to be sending in a globalized world," observed Albert Saiz, a Wharton real estate professor who does research on immigration.

✱ The Arizona immigration measure prompted calls for economic boycotts of the state, and officials in Phoenix, the state capital, are fearful that the city could lose \$90 million in revenue if organisers of 19 large scheduled events take their business elsewhere. Deputy City Manager David Krietor told the *Arizona Republic*, "We have an image and public relations problem of what might be unprecedented proportions."

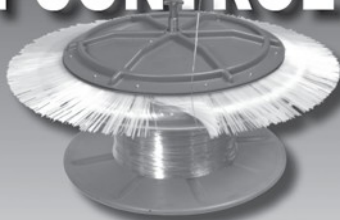
✱ The new law has already been challenged in federal court by two Arizona police officers who are seeking injunctions to block enforcement of provisions which they argue are unconstitutional. With Arizona likely to face further legal tests, defending itself could become expensive. Wendy Sefsaf, the director of communications for the American Immigration Council (Washington, DC), asserted that immigration is a federal responsibility and that state and local measures typically fail. She said, "This brings up the issue of how far a state can go without federal support – which is not very far." (Access to "Not a Positive Signal" and the rest of the Wharton School article archive is free but requires enrollment at the website Knowledge@Wharton.)

SB 1070 AND CRIME

A topic not addressed by Wharton was taken up by US Attorney General Eric Holder who, on 26th May, met with police chiefs from around the nation to discuss the potential effects of the new Arizona law on communities across America.

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Chiefs of police from Houston, Los Angeles, Maryland, Minneapolis, Philadelphia, San Jose, Salt Lake City, Phoenix and Tucson (Arizona) were present, and expressed unanimous concern about the damage the law could inflict upon the trust they have worked to build between law enforcement and Latinos. Tucson Chief of Police Roberto Villasenor said, "When you enact legislation that makes any subset of that community feel like they are being targeted specifically, or have concerns about coming forward and talking to the police, that damages our capability to obtain information to [solve crimes]." Mr Villasenor also pointed out that implementation of the law poses serious logistical concerns. The requirement that police officers verify the residency status of all arrested individuals would, he said, sap their limited resources. This point was amplified by John Harris, president of the Arizona Association of Chiefs of Police, who said, "We are stretched very thin right now and it's getting nothing but worse in our communities in terms of the budget crises. We don't have enough resources to continue to do this and to take on another responsibility."

In brief...

* In growing numbers, Americans living abroad are renouncing their US citizenship. The *Federal Register*, the government publication that records such decisions, shows that 502 expatriates gave up their US citizenship or

permanent residency status in the last quarter of 2009. While that represents a very small percentage of the 5.2 million Americans estimated by the State Department to be living abroad, it was the largest quarterly total in years. By way of comparison, there were 235 renunciations in all of 2008 and 743 last year. The number of expatriates waiting out the required period of time before meeting with consular officers to formalise their renunciations has also grown. Many American expats resent having to pay "double taxes." The United States is the only industrialised country to tax citizens on income earned abroad when they are taxed as well in their country of residence. These taxpayers are, however, allowed an exclusion on their first \$91,400 in foreign-earned income.

Telecom



Virtuous to a fault, San Francisco passes a cellphone radiation disclosure law

San Francisco is taking no chances. Possibly the most beautiful city in the United States is almost certainly the most cautious, having voted on 15th June to require all retailers of cellphones

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to post the amount of radiation emitted by each model. In 11-point type or larger, the specific absorption rate (SAR) of the instrument must be prominently displayed at the point of sale. The SAR is a value that corresponds to the relative amount of radiofrequency (RF) energy absorbed into the head of a user of a wireless handset. Believed to be the first of its kind in the nation, the law shows San Francisco outdoing the Federal Communications Commission. The FCC, which oversees the \$190 billion wireless industry, limits public exposure from cellular telephones to a SAR level of 1.6 watts per kilogram (1.6 W/kg), but imposes no public notification requirement. A curious aspect of both sets of rules is the absence of proof that cellphone use is hazardous to health. Neither the National Cancer Institute nor the FCC has found scientific evidence that wireless phones are dangerous – a fact probably known to San Francisco's mayor, Gavin Newsom. Because Mr Newsom is technically oriented and a heavy user of the Apple iPhone, his promotion of the new law would seem to have grown out of a dedication to the right to know. "It's information that's out there if you're willing to look hard enough," Tony Winnicker, a spokesman for Mr Newsom, said of the SAR. "And we think that for the consumer for whom this is an area of concern, it ought to be easier to find."

Officials in San Francisco emphasised that the labelling ordinance is intended only to inform – not to disparage cellphones or discourage their use. But the wireless industry takes a jaundiced

view of the initiative, and not only for its potentially chilling effect on sales. John Walls, a spokesman for CTIA - The Wireless Association, said that highlighting SAR information could mislead customers into concluding that some phones are safer than others. "We believe there is an overwhelming consensus of scientific belief that there is no adverse health effect by using wireless devices," Mr Walls said. "This kind of labeling gets away from what the FCC's standard actually represents."

Elsewhere in telecom . . .

✱ Motorola (Schaumburg, Illinois) and the Canadian handset maker Research In Motion said 11th June that they had settled the patent complaint over mobile technology filed by Motorola with the International Trade Commission in January. Research In Motion (Waterloo, Ontario), maker of the BlackBerry, is to give Motorola an initial payment plus continuing royalties for the use of mobile technology. While financial terms were not disclosed, the two handset makers said the deal included an agreement to cross-license various patents related to industry wireless standards and wireless e-mail messaging. The disputed patents cover several cellphone functions, including Wi-Fi access, the management of applications, user interface and power management.

Dorothy Fabian – USA Editor

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Annealing for fasteners

Rad-Con's 100% hydrogen super-high convection™ (H2SHC™) bell-type annealing furnaces (BAF) are said to offer the highest convection flow in the industry to reduce temperature variations in a minimum amount of cycle time, resulting in uniform material properties with low utility costs.

A typical application for the H2SHC™ system is cold heading quality (CHQ) wire for fasteners. The system is said to offer the following advantages:

- Achieve consistent mechanical properties on annealed wire and wire rod
- Spheroidise anneal to produce CHQ wire for automotive-grade products
- Produce a clean surface free of decarburisation of the steel wire
- Reduce overall per ton utility costs

Rad-Con's FlexLoad™ plenum allows a variety of multi-stack configurations. The system includes Rad-Con's patented AC/APEX™ atmosphere control system for regulation of heating rates and atmosphere flows, according to wire quality requirements. AC/APEX™ provides continuous, closed-loop feedback and adjustment of atmosphere conditions and temperature profile to match metallurgical requirements and is designed to produce annealing results free from additional decarburisation.

Rad-Con systems reliably provide the full spheroidisation and protection against decarburisation that ferrous CHQ demands. End-product fastener quality, downstream machine speed and drawing die life, which are all dependent on the uniform properties achieved during annealing, are enhanced.

Rad-Con Inc – USA
Email: sales@rad-con.com

Fax: +1 216 221 1135
Website: www.rad-con.com

Reels for any application

Lightning Reels is a producer and supplier of reels and handling equipment, manufactured in Asia to DIN or other required standards and managed by European engineers.

Steel reels with flange diameters up to 8m can be supplied. The range includes reels suitable for drawing, bunching, stranding and annealing, and single or multi-trip shipping reels. Special sizes, single or double-wall construction and in a range of materials are available for all types of products, such as saw

wire, welding wire, standard and fibre optic cable as well as chains and ropes.

Reels are individually produced and delivered worldwide.

Lightning Reels – Germany
Fax: +49 9568 803 9939
Email: info@lightning-reels.com
Website: www.lightning-reels.com

Versatile quality control

For continuous quality control, lump and neckdown detectors are as important as diameter gauges and spark testers. The new line of KW 13Trio detectors from Zumbach capture even the smallest lumps and neckdowns in wires, conductors, optical fibres and cables both quickly and accurately.

The compact design of the KW 13Trio makes it easily integrated in any extrusion line or rewinding process. The measuring field is dimensioned in such a way that during start-up, even extremely big lumps pass smoothly through. Its open design enables quick and easy threading of the product without stopping production.

A powerful microprocessor and full digital signal processing make this lump and neckdown detector an important tool for quality control. The detector is available as a standalone device. Using a local operating and display unit, the KW 13Trio can be fully operated and configured at the device.

Its features include a minimum detectable fault height of 0.01mm (0.0004") and minimum fault length of 0.2mm (0.008") and full digital signal processing DSP.

The versatile KW 13Trio has multiple interfaces, including serial RS, Profibus DP and Ethernet EN. Via the RS interface port, connection can be made to a USYS data acquisition, processing and display system. The Profibus DP and Ethernet EN versions allow the connection to a higher-level host, such as a PLC or data acquisition system.



▲ Versatile KW 13Trio from Zumbach

The measuring principle and complex optics solution ensure immunity to stray and intense light whilst providing the highest detection accuracy and identification of lumps and neckdowns in the micrometre range.

The KW 13Trio models feature an internal fault database to store the last 100 detected faults, including fault characteristics such as fault number, type, height, position and length of fault. This database can be accessed either via the local operating and display unit or via the optional remote interfaces.

Zumbach Electronic AG – Switzerland

Fax: +41 32 356 0430

Email: sales@zumbach.ch

Website: www.zumbach.com

WIRE & CABLE
INDIA 2010

wire & cable springmaking fastener

3rd International
Exhibition & Conference for
the Wire & Cable Industry

18 – 20 Nov. 2010

The poster features a background of colorful wires and cables. At the top, the title 'WIRE & CABLE INDIA 2010' is displayed in large, stylized letters. Below the title, three icons represent different wire products: 'wire & cable' (a coil of wire), 'springmaking' (two springs), and 'fastener' (a hexagonal nut). The text '3rd International Exhibition & Conference for the Wire & Cable Industry' is written in a blue, sans-serif font. At the bottom, the dates '18 – 20 Nov. 2010' are prominently displayed in red.

**Bombay Exhibition Centre
Goregaon (East)
Mumbai, India**

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RyfishD@messe-duesseldorf.de
www.messe-duesseldorf.de

Messe Düsseldorf
India

The poster for the Bombay Exhibition Centre features a light blue background with a faint image of the exhibition building. It lists the location as 'Bombay Exhibition Centre, Goregaon (East), Mumbai, India'. It includes logos for 'Supported by' (Wire Düsseldorf) and 'Sponsored by' (IWCEA, IMA, AC/MAF, WCISA). It also mentions 'In cooperation with' CII. Contact information for Messe Düsseldorf GmbH is provided, including phone, fax, email, and website details. The Messe Düsseldorf India logo is at the bottom right.

The International Wire and Cable Symposium

Return to Rhode Island

59th IWCS/IICIT Conference - Nov. 7-10th - Rhode Island Convention Center, Providence RI, USA

After nearly 60 years, the International Wire & Cable Symposium and Conference continues as the premier event in the wire and cable industry. The 2010 Technical Symposium event will feature more than 100 technical papers addressing the latest technology in wire, cable and connector design, processing, materials and applications. The symposium sessions are organized in a fashion to allow attendees to assemble their own programs according to their specific interests. The Executive Track presents invited papers on topics of interest to industry executives and marketers. A poster paper session allows review of important new developments in a more informal, intimate manner. In addition, the IWCS offers a Suppliers' Exhibition in which over 100 industry suppliers showcase their latest products and processes. Finally, the IWCS has long taken on the role of professional development for the industry, with up to 10 Professional Development Courses scheduled adjacent to the conference program.

Plan now to attend the 59th IWCS/IICIT Conference in November. More details on the program and registration/hotel information will be available on the IWCS website, www.iwcs.org, as the conference date nears.

59th

IWCS/IICIT
Conference

Exhibiting Schedule*

Monday, November 8th
2:00 PM - 6:00 PM
Tuesday, November 9th
10:00 AM - 6:00 PM
Wednesday, November 10th
8:00 AM - 11:30 AM

Professional Development Courses, Sunday, November 7th, 2010

CN201 - Connectors and Connectorization: Copper
CN203 - Connectors and Connectorization: Fiber
CU101 - Fundamentals of Copper Conductors and Metallic Cable Design & Applications
FO101 - Fundamentals of Optical Fibers and FO Cable Design & Applications
FO206 - Bend-Resistant Fibers (incl. Multimode)
MA101 - Selection & Use of Materials in Wire and Cable
MA201 - The Art and Science of Extrusion for Wire and Cable - Part 1
MA 202 - The Art and Science of Extrusion for Wire and Cable - Part 2

Additional Professional Development Courses are being developed and may be added to the 2010 IWCS program. Please see the IWCS website for updated listings as they become available.

Technical Sessions, Monday, November 8th, 2010

SESSION 1: Executive Track
SESSION 2: Optical Connectivity
SESSION 3: Copper Design, Modeling & Measurement

Technical Sessions, Tuesday, November 9th, 2010

SESSION 4: New FTTH Deployment Technologies
SESSION 5: Optical Fiber design & Manufacturing
SESSION 6: Material Developments
SESSION 7: Special Applications
SESSION 8: Copper Connectivity
SESSION 9: Fiber Coatings
SESSION 10: Animal Protection
POSTER SESSION

Technical Sessions, Wednesday, November 10th, 2010

SESSION 11: Data Center
SESSION 12: Innovations in FTTH Deployment
SESSION 13: Manufacturing Processes
SESSION 14: Emerging Applications & Standards

For more information, please contact Patricia Hudak at:

IWCS, Inc.
174 Main Street
Eatontown, NJ 07724, USA
+1-732-389-0990
Email: phudak@iwcs.org



*Please visit <http://www.iwcs.org> for a listing of exhibitors

Data cables without data loss

The manufacture of data cables demands a consistent control of the cable diameter, eccentricity and capacitance regarding periodic variations. Sikora offers several measuring systems specifically developed for quality control during the data cable production process.



▲ Sikora's Centerview 8000 measuring system

Laser series 2000 and 6000

The diameter gauge heads of the Laser series 2000 and 6000 operate with the patented Laser Shadow projection principle. By evaluating diffraction information for the diameter determination, a single reading precision as high as 0.2µm is achieved. This precision is maintained for years because no moving parts are included in these gauges.

Centerview 8000

The Centerview 8000 combines a diameter and eccentricity measurement, using optical and inductive measuring technologies.

The generated cloud diagram is an innovative display format of the ongoing measurement at the processor system Ecocontrol. It provides information on distribution of short term variation of eccentricity in graphical form. Each dot corresponds to one single measuring value of the eccentricity in relation to the amount and direction. The extension of the cloud diagram is the indicator for the standard deviation of the eccentricity.

Capacitance 2000

In the Capacitance 2000, a short and a long measuring electrode are integrated in one tube. The short sensing electrode of 10mm length allows for a reliable measurement of fast periodic capacitance fluctuations (FFT analysis). The long electrode measures the capacitance precisely. Structural Return Loss (SRL) predictions up to 3GHz are feasible at line speeds up to 2.4m per minute.

Sikora AG – Germany

Fax: +49 421 48900 90

Email: sales@sikora.net

Website: www.sikora.net

Heavy duty tapers and binders

The capabilities of tangential tapers and yarn binders can limit the productivity of production lines. In this context Stolberger KMB-Maschinenfabrik GmbH has updated and reconstructed its range of tangential tapers and yarn binders.

Using the new heavy-duty tangential taper, products with a diameter up to 600mm can be taped. With the heavy-duty yarn binder, a maximum of 160 yarns can be applied. The diameter of each of the 160 cops is 500mm.

It can be profitable to consider replacing existing, less productive, tangential tapers and yarn binders. Simply the replacement of the rotor bodies and tape guide is often extremely beneficial.

Stolberger KMB-Maschinenfabrik GmbH – Germany

Fax: +49 2402 86558 129

Email: info@stolberger.com

Website: www.stolberger.com

Boron-free salt carrier coatings

In wire manufacturing, salt carriers are frequently part of the coating system that is applied before drawing. On high carbon wire salt carriers are used as a basis for the drawing process, on top of conversion coatings or on a bare surface. Their function is the separation of die and wire, and transfer of lubricant into the forming die.

The sophisticated composition of the products gives a reduced sensitivity against humidity and so low water pick up on the coated wire. This provides a good corrosion protection even during long storage periods.

Traditionally borax, or formulations containing borax, are used for this application. Recent investigation of the toxicology of borax and boric acid initiated by the European Union has shown that borax acts as a reproduction-toxic substance. Borax has since been classified as a toxic substance with a Reprotox category 2 (or according to the GHS System: Repr. 1B). This reclassification presents a new situation for the wire drawing industry. New handling techniques are required for these toxic substances and stricter environmental regulations have to be applied in the production plants.

Reducing borax content in salt carriers to below the limit of declaration could, perhaps, be an interim solution. However, such a measure is questionable, not only because future legal regulations can hardly be predicted.

The challenge for Chemetall was to formulate salt carrier coating products completely free of boron. The result of Chemetall's R&D efforts is a range of new boron-free carrier coatings for different applications. First formulations have been tested successfully in industrial applications in Europe.

Among the newly developed and tested products is Gardolube® SC 6226. Its properties are at least comparable to carriers containing borax that are still in use in the market.

Chemetall GmbH – Germany

Website: www.chemetall.com

Precision wrapping of conductors

The development of wind power generators has led to the further development of flat conductors, mostly to save space.

One solution is to optimise the insulation layer by precisely placing several layers of insulating tape. This is obtained by placing the tape exactly edge-to-edge, and then setting the next layer in the same direction and with an exact and controlled displacement over the previous layer.

WTM Srl has developed its Visio system, that overlaps using two separated but perfectly synchronised concentric taping heads. Visio system is said to offer higher production speed, shorter downtime for tape refilling and the possibility of using cross-wound spools instead of pads. This means a significant increase of line efficiency, avoiding frequent stops due to running out of tape on the pads or due to tape breaks caused by frequent stops and starts.

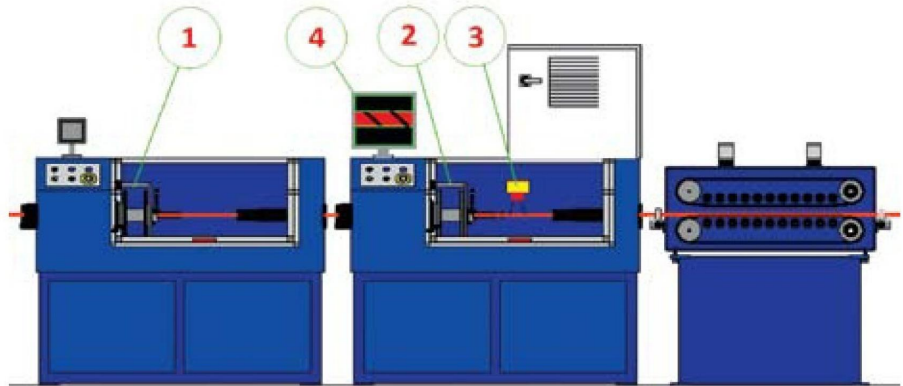
After the first head (1) has laid the initial tape edge-to-edge, completely covering the conductor, the Visio system intervenes using sophisticated software: it uses a camera (3) to control the taping process, generating a feedback signal (4). This acts on the taping pitch to maintain the correct displacement of the tape with extreme precision by regulating the rotation speed of the second head (2).

The second head is perfectly synchronised with the first and lays the tape to provide a full and exact covering of the layer beneath while keeping the edge of the first tape under its middle line, achieving secure dielectric insulation.

This level of accuracy is possible with highly sensitive direct control of the tape tensioning. Precision within a few hundredths of a millimetre is achieved on every tape layer.

The precision of this tensioning control is said to make WTM heads suitable for the most critical taping materials, for wrapping standard and custom wires and cables.

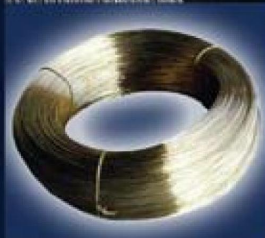
WTM Srl – Italy
Fax: +39 049 870 5599
Email: info@wtmachinery.com
Website: www.wtmachinery.com



▲ Diagram of WTM's Visio system in action

If You've Got the Wire, MAC Has the Tester.

MAC instruments can handle a range of metal wire including cut lengths, continuous production, stranded, multi conductor and insulated cable.



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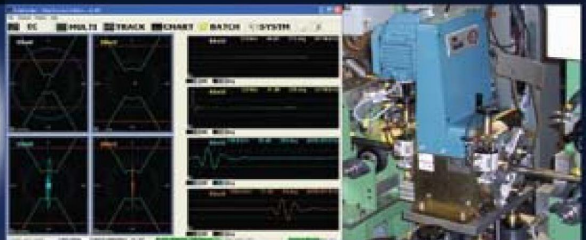
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Wide range of new and secondhand equipment



▲ Flymca offers a wide range of cable, wire and rope equipment

Flymca is a Spanish manufacturer of machinery and equipment for the production of cables, including electrical cables, submarine, offshore and umbilical cables and steel rope.

The company's product portfolio includes:

- Rigid stranders: high speed and efficient lines for bobbins 630mm and 800mm DIN or to American standards. Carriages from 6 to 36 bobbins with fast loading systems. These machines can produce high quality compacted conductors, either by rollers or by die. This machine type can also be used or adapted for screening purposes with bobbins containing multi-wires
- Tubular stranders: robust, high-speed machines working in configurations such as 1+6; 1+12 or 1+6+12, and specials such as 1+6+(6+1) which can also produce as 1+12 in a tandem operation. Standard bobbins of 630mm, 800mm, 900mm or 1,000mm diameter. Lines can be used for ACSR, AAAC, copper strands and for steel wire ropes of low, medium or high carbon
- Skip stranders: for Al or Cu bare wire stranding and for steel wire ropes on PC-lines
- Bow cabling: for fast laying-up of insulated conductors
- Double twist bunchers: for bobbins of 1,250mm, 1,600mm and 2,000mm diameter. High-speed production of Al and Cu conductors, with or without compacting (by die or rollers)
- Drum twisters for conductor laying-up, armouring and screening.

Also for cabling high and very high power cables such as Milliken. Machines for drums up to 4.5m diameter and 40-ton capacity have been supplied

- Planetary: for OPGW, steel wire ropes, umbilical and offshore solutions, also for armouring of multiple numbers of enamelled wires. Machinery can work with 100% back twist or variable from 0%. Drums for diameter 630mm, 760mm and 900mm for OPGW, steel or armouring, and from 1,000mm up to 2.5m for umbilicals, offshore and submarine cables
- CTC lines: complete lines and individual items for production of continuously transposed cables

Also included in the portfolio are all types of payoffs and take-ups for drums as heavy as 200-tons and 7m diameter; pulley capstans up to 5m diameter, pulling caterpillars, greasing units, taping and binding heads and double automatic coilers.

Flymca machinery is produced entirely in-house by an experienced and skilled technical team, without sub-contracting of any part to low-cost labour countries.

Flyro, the sister company of Flymca, deals with second hand machinery for the wire and cable industry, providing complete solutions or individual machines to suit any project.

Flymca & Flyro – Spain
Fax: + 34 942 55 98 65
Email: flymca@flymca.com
Website: www.flymca.com

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 Steel wire drawing machine

Beijing Holland Tech. Co., Ltd

Add: Rm. A1001, Vanouze Bldg.
 2# Fowai Str. Beijing 100037 China
 Email: webmaster@bjholland.com
 Tel/Fax: +86 10 68032755/ 68032878
 Contact: Mr. River Qi, Sales Manager

New compounds suit the harshest conditions

The vinyl division of Teknor Apex Company has announced two new Apex® PVC compounds to withstand the harsh conditions suffered by wind turbine and other outdoor control and power cable applications.

Apex 70001 and 70002 jacketing compounds are said to exhibit low brittle points of -46°C and -56°C , respectively, pass stringent tests for oil resistance, and meet appropriate UL and CSA standards for flame performance.

"The low-temperature flexibility of Apex 70001 and 70002 compounds provide the cold-bend and low temperature impact performance required in wind turbine nacelle applications in extremely cold environments," said Mike Patel, wire and cable industry manager. "Their durability under extremely harsh conditions enables cable manufacturers to supply the growing market for alternate energy sources such as wind power."

Teknor Apex Company – USA
Fax: +1 401 729 0166
Email: vinyl@teknorapex.com
Website: www.teknorapex.com

Drums for ropes and cables



▲ Drums of all sizes are available from GMP Slovakia

GMP Slovakia products include standard large drums for ropes and cables (a reinforced version is available for process and a lightweight version for transportation) and special large drums for individual applications.

GMP Slovakia had recently supplied disassembled drums with a flange diameter of 8,600mm, for easy reassembling at the customer's plant with GMP Slovakia technical assistance.

A wide range of large drums is available, to suit any application. Drums for offshore and submarine cables are in especially high demand.

Larger drums can be supplied in knock-down condition to save transport costs. Depending on the application and diameter, drums can be supplied balanced, with hardened changeable bushings, reinforced barrel and flanges for heavy duty processes (such as for a drum twister), lifting hooks, slots for fixing the cable and much more. GMP Slovakia is also specialised in the production of lifting, tilting and rolling equipment for these drums.

The GMP Slovakia range of products includes every kind of metal reel, for process or one-way, take-apart reels and handling equipment, baskets, pallets and stands.

GMP Slovakia – Italy
Email: sales@gmp-slovakia.com

Fax: +39 030 957 96 89
Website: www.gmp-slovakia.com

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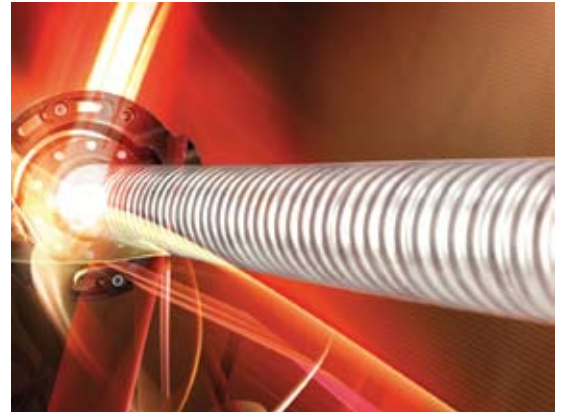
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Metal tape forming and welding technology

Rosendahl has broadened its portfolio to offer welding and corrugation equipment for power cable applications following the demand of the industry for alternative solutions, and based on experience of successful projects in the field of metal tape forming, welding and corrugation for high-end RF cables.



▲ Welding and corrugation equipment for power cables

Cable manufacturers require this technology for products such as cables for wind farms, offshore power stations or cables for submarine applications. The LV segment also includes a number of products (oil-pump, shipboard, signal cables), which use the Rosendahl technology to improve product properties or to increase productivity during the manufacturing process.

- Welding processes – to ensure perfect weld seams with minimal heat affected zones and best mechanical properties
- High speed corrugators for helical and annular corrugation for copper, aluminium and stainless steel

Compared to other technologies (aluminium or lead extrusion) the metal tape forming and welding system has several advantages. It shows better results for continuous operation, economic use of electric power and water, reduced scrap during production, dimension change and the possibility of using different metallic materials for shielding.

For metal shielding by means of smooth or corrugated aluminium, copper or stainless steel, Rosendahl offers solutions for the tape forming, welding and tube reduction process including adequate down stream equipment.

Cables produced in this way are said to demonstrate superior mechanical stability and water and/or gas tightness.

Depending on the cable design, space availability and product mix, Rosendahl is in the position to serve inline (in combination with the jacketing process) and offline solutions.

Technologies developed and optimised for these applications include:

- Optimised formers for various materials

Rosendahl Maschinen GmbH – Austria
Fax: +43 3113 5100 59
Email: office@rosendahlustria.com
Website: www.rosendahlustria.com

New induction heating systems

At wire 2010, ATE presented two new induction heating systems to complete its range of continuous heating systems for the parallel treatment of wires. The new systems are called IMW and CMW.

The main feature of the IMW system is the simultaneous heating of each wire, even where they have different diameters, by means of a dedicated inductor fed by the related frequency converter.

The CMW system is instead designed for a bundle of wires, heated using a single inductor fed by a single frequency converter.

The advantages of these new systems over traditional systems are in terms of efficiency, energy consumption, quality and compactness. Applications may include annealing, stress relieving, brass-diffusion and pre-heating or other industrial processes requested by the end-user.

ATE Applicazioni TermoElettroniche Srl – Italy
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Electricity from wind farms?

We are ready.

In the future, electricity will be increasingly generated in environmentally compatible wind farms such as »Horns Rev« in Denmark or »alpha ventus« near the isle of Borkum. On its long journey to the consumer, the electricity transmission equipment must seamlessly fit into the concept of sustainable electricity generation.

TROESTER provides innovative cable and core coating solutions of a cutting-edge technological design aimed at efficiently supporting the sustainable and on-demand transmission of the clean energy through HV and EHV cables from anywhere in the world. Expertly protected against all environmental impacts.

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Caterpillar for submarine cable



▲ AGP 300/35 S from Troester

Its product range includes the new AGP 300/35 S belt-type caterpillar (showcased at this year's wire Düsseldorf) which has been designed specifically for the manufacture of large submarine cables with diameters of up to 300mm.

The AGP 300/35 S is maintenance free, compact in design and can be used both as a traction and braking unit. This makes it an economical solution where weights of up to 100kg per cable metre need to be transported and held securely at the end of the submarine cable manufacturing process. The high effectiveness of individual drives and its wide control range underscore the efficiency of the Troester belt-type caterpillar.

According to the German Renewable Energy Sources Act (EEG), renewable energy should constitute a 30% share of overall power generation by the year 2020. Unlike conventional power stations, which are often sited near consumers in an effort to keep transmission losses low, electricity from renewable sources is generated most effectively at locations where the ideal environmental conditions prevail. Electricity from offshore wind farms and solar electricity from desert locations are typical.

Troester is well prepared for this development of increased power generation from renewable energy.

Cables destined to be laid along the ocean bed are produced in single segments of up to 36km in length. After the cable has been produced, belt-type caterpillars also have the task of transporting the cable to coiling stations or directly to a nearby river or seaport onto cable-laying ships, which lay the power cable onto the ocean floor directly from the sea.

Troester GmbH & Co KG – Germany

Fax: +49 511 864028

Email: info@troester.de

Website: www.troester.de

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Cooperation in CTC expertise

Continuous transposed conductors (CTC) require sophisticated knowledge for the implementation of production. To this end, Pourtier – Gauder Group and Proteco have signed a contractual agreement joining their specific expertise in this area to offer a high quality integrated solution.

Both companies have a strong background in the power field. Pourtier has manufactured a comprehensive range of rotating machines dedicated to LV and EHV cables for 150 years; Proteco has produced equipment for the production of high power transformer conductors since 1993.

This new alliance offers a complete planetary assembly line with Pourtier planetary strander type DRG560 (cage available from 24 up to 96 bobbins with reel dimensions 500, 560, 630 as option) and Proteco transposing head type TH5 (transposing frequency up to 250tpm). It is possible to upgrade the strander with more bays.

Peripheral equipment, such as payoffs, taping heads, caterpillars and take-ups, is also available from Pourtier.



▲ Proteco transposing head TH5

Pourtier sas – France
Fax: +33 4 77 71 10 85
Email: sales.pourtier@gaudergroup.com
Website: www.gaudergroup.com

Proteco sas – Italy
Fax: +39 015 9842044
Email: proteco@proteco-europe.it
Website: www.proteco-europe.it

High-precision C, L & tan δ measuring bridge



▲ Dielectric-loss analysis from Haefely

The dielectric-loss analyzing system 2840 from Haefely is designed for measurement of very low dielectric losses and impedances (dissipation factor and power factor) of high-voltage apparatus.

The instrument works on the principle of a combined bridge-vector-meter and is capable of analysing capacitive and inductive loads – especially shunt reactors – with accuracy (capacitance 0.02%, tan δ 1x10⁻⁵) and stability.

The graphical user interface of the instrument is highly intuitive, focused on convenience with built-in useful programs, and uses a large colour touch screen as the input device.

While the manual mode provides quick measurements, the automatic test mode supports complete automated test sequences.

Advanced software functionalities such as insulation temperature correction, programmable test sequences with pass/fail limits or graphical visualisation of measured data, make this instrument a powerful tool for analysis of high-voltage equipment.

The instrument incorporates standard interfaces (such as USB) that enable easy exchange of measurement results and related settings for further analysis or reporting.

Haefely Test AG – Switzerland
Email: sales@haefely.com

Fax: +41 61 373 4912
Website: www.haefely.com

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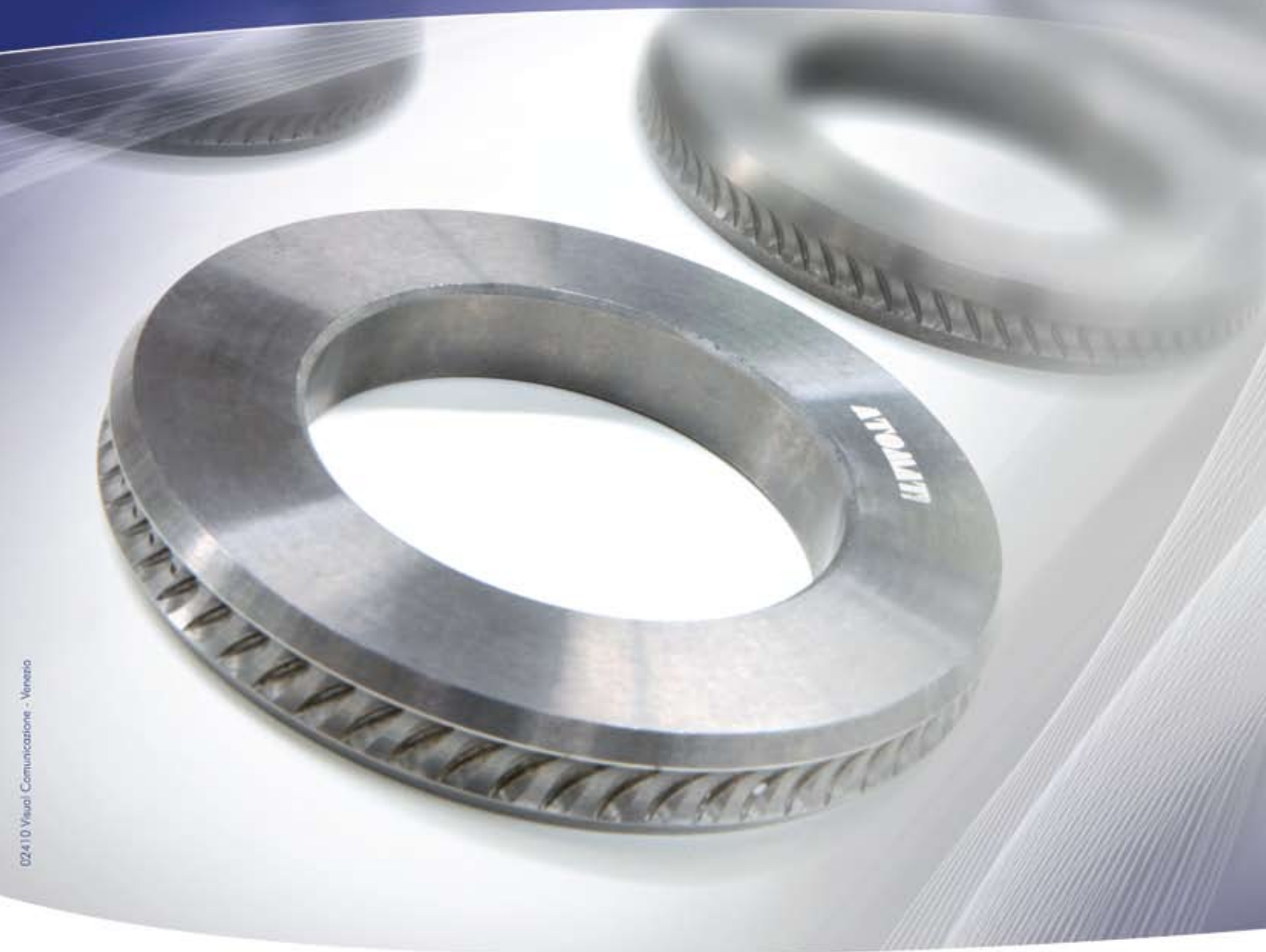


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More wizardry for dies

The Esteves Group is releasing a major update to its Drawing Die Wizard computer program, a free to download design tool for wire dies.

The Esteves Group believes it is the only wire die manufacturer to enable its customers to understand the logic behind the design of the ideal die for each application, and the selection of the most cost-effective die blank.

Highlights of the new version include:

- Real-time 3D view of the inner profile of the designed die
- Computer generated microscope view with realistic light reflections that simulates looking at an actual die with a real microscope. This makes it easy to view and discuss various profile shapes before the die is manufactured
- Animated simulation of wire drawn through the die makes it possible to see the location and growth of a wear ring for the particular profile
- Supports ten languages
- Improved reduction cone angle and blank suggestions

With over 100 years of experience the Esteves Group produces a comprehensive range of standard and custom diamond and carbide tools and dies for drawing, stranding, bunching, compacting, tube calibration and extrusion; also split and shaped dies in both diamond and carbide.

Esteves Group – Brazil

Email: sales@estevesgroup.com

Website: www.estevesgroup.com

Energy efficient, super heat treatment furnaces

CPA Wire Technologies GmbH has developed a furnace technology for the heat treatment of steel goods and high carbon wires and bands. The project was partnered by the Austrian research funding agency.

Under the brand name CPA-AEOX Industrial Furnaces the company has launched a patented furnace series which is aimed in particular at the perceived weaknesses of the products currently available in the market. Apart from energy savings, said to be up to 40%, and low emission combustion of gases, the series offers a part-load capacity of 25% to 115% of the nominal load for flexible production.

The temperature profile in the furnace and the furnace atmosphere are graphically parameterised via the integrated control and visualisation system. Core of the new technology for austenitisation, patenting, tempering and diffusion is a combination of radiant and convection heat by recirculation and appropriate guiding of the flue gases at multi-phase pre-heating of the combustion air while cooling the exhaust gases as well as recuperation of the heat drag-out by the material to be treated. In contrast to conventional industrial furnaces for the mentioned purpose the furnace pressure and the exhaust gas stream in the furnace are not reached via the instreaming gas/air mixture but via the high circulation of the flue gases generated by a special fan.

The challenge of the furnaces currently offered on the market of an inadmissible change in the furnace atmosphere by a reduction of the furnace pressure and the flue gas flow under part-load is thereby prevented, as well as a reduction of the convection heat ratio that results in a significantly better controllability at varying furnace loads and different product mixes. By increasing the convection heat transfer to the material to be treated, a reduction of the furnace length of around 20% is possible, and a reduction of the heat emission via the outer casing can be achieved. Special fans, designed for temperatures of over 1,000°C and integrated into the furnaces, are provided in addition to the monitoring function of all electrical parameters and the lubricant supply with a flow, pressure and oscillation sensor technology. The process is continuously monitored and diagnosed by the process control and diagnosis system IMPERIO by CPA.

All furnaces can be heated with gas as well as electrically. As an option, gas-heated furnaces can also be equipped with a Wobbe-index measuring unit and a corresponding combustion air control.

A new CPA Do-It-Yourself (DIY) Plug & Play concept simplifies the installation and commissioning of the modularly designed furnaces.

CPA Wire Technologies GmbH – Austria

Email: wiretec@cpa.at

Website: www.cpa.at



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Submarine firm completes installation of cable system

Main One Cable Company, a submarine cable company offering open access, wholesale broadband capacity in West Africa, and its system supplier, Tyco Electronics Subsea Communications SubCom, have completed the first phase of the Main One cable system.

The system will also provide broadband capacity to expand Internet access in the sub-Saharan region, as well as ease the difficulties of switching traffic between African countries without the need to go through Europe.

The installation of the terminal equipment is completed in Seixal, Portugal and is under way at the system's landing sites in Lagos, Nigeria and Accra, Ghana.

Opeke said "We are thrilled that the challenge of completing the marine work for the Main One Cable System is behind us and we will soon be able to concentrate on the critical mission of providing high-capacity bandwidth to regions of the globe where it is long overdue," adding that, "Together with SubCom, we have met our goals on schedule and we eagerly look towards delivering capacity to our customers and executing plans for expansion of the network."

The CEO of Main One, Funke Opeke stated that Phase 1 of the Main One Cable System spans 6,800km and will provide much-needed capacity between the West Coast of Africa and Portugal.

President of SubCom David Coughlan emphasised that, "We consider the work we have done on Main One to be a significant accomplishment and are proud to be associated with this project"

The dual fibre pair, 1.92 terabit per second, dense wave division multiplex project will first connect Lagos, Accra and Seixal with onward connectivity to Europe, Asia and the Americas, while Phase 2 of the project is expected to extend to South Africa.

The cable system, scheduled to go live on 1st July, will provide open access to regional telecoms operators and Internet service providers at rates lower than existing international bandwidth prices in the region.

Tyco Electronics Subsea Communications (SubCom) – USA
Website: www.subcom.com

Main One Cable Company – Mauritius
Website: www.mainonecable.com

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- Greatly improved wire ductility



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China-based, with European outlook



▲ Daloo Machines is backed by the Gauder Group

Launched by the Gauder Group in 2008, Daloo is the first low cost wire and cable machinery manufacturer located in China but backed by European experience. Daloo offers rotating machines with basic functions, of simple design and steady quality.

The company will exhibit a rigid frame strander at wire China 2010, as well as components such as a payoff/take-up and pulling caterpillar.

Daloo Machines – PR China
Email: sales@daloo-machines.com

Fax: +86 519 8548 3557
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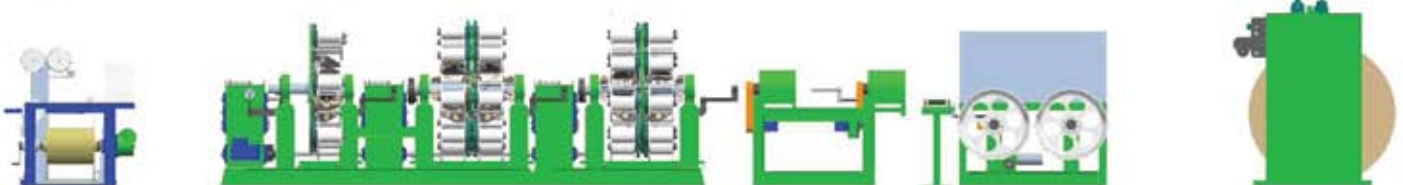
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Wire Stranding Machine



Gauder presence at wire China

Gauder Group supplies new and secondhand machinery to the wire and cable industry worldwide.

Pourtier designs and manufactures rotating machines for the production of medium and high voltage insulated power cables, overhead conductors, flat conductors for transformers, telephone and control cables while Setic offer covers equipment for low voltage conductors and cables, automotive cables, communication cables (LAN, FO), telephone and control cables.

Gauder, a specialist in resale equipment, enables the build-up of smart solutions from a large stock of machines. Sales, training and service are available from China for all products in the range.

In 1999 the group established a subsidiary in Changzhou, to serve the Chinese market with locally made machines at full European quality standards.

Setic – Gauder Group – France
Email: sales.setic@gaudergroup.com

Pourtier – Gauder Group – France
Email: sales.pourtier@gaudergroup.com

Gauder Group China – China
Email: sales.china@gaudergroup.com
Website: www.gaudergroup.com

Monitoring melt temperature

Ultratemp 6000 is Sikora's latest development for the power cable sector. It is a non-contact polyethylene melt temperature measurement system, based on non-invasive ultrasonic technology. It is specifically tailored to the production of medium voltage (MV) and high voltage (HV) XLPE insulated power cables.

The system precisely measures the melt temperature during production without influencing the melt flow properties, as the ultrasonic sensors are positioned outside of the flow channel. Melt shear heating effects do not occur.

Besides temperature measurement, the Ultratemp 6000 detects discontinuities in the melt. Early cross-linking after screens, which may lead to ambers and scorches in the polyethylene material, is avoided. The extremely high measuring rate allows a fast response time as well as the registration of small temperature variations.

Ultratemp 6000 is described as an important step for further process optimisation and cost reduction during the production of MV and HV cables.

Sikora AG – Germany
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Sovizzo (Vicenza - Italy)
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Taihan Electric to replace copper rod mill

Siemens VAI Metals Technologies has received an order from the Southwire Company, USA to supply a copper rod rolling mill and the associated coil handling system. The end customer is Taihan Electric Wire Co Ltd of Seoul, Korea.

The new mill will replace the existing 30-year-old system in Anyang, originally built by Morgan Construction Company, a Siemens VAI business, as a subcontractor to Southwire. The new mill will be delivered by the end of 2010.

In 1955, the Taihan Electric Wire Co became the first wire and cable manufacturer to be established in Korea. Taihan is the leading domestic cable manufacturer and a major supplier of power transmission cables to the Asian market. Southwire Company is constructing a completely new production line for Taihan Electric, including melting and casting plants with a production output of 40 tonnes of copper rod per hour, in diameters ranging from 8mm to 25mm.

Siemens VAI is responsible for the engineering, manufacturing and commissioning of all the equipment for the rolling mill. This includes a roughing mill with one 18", one 16" and two 12" stands, as well as a finishing mill comprising eight 8" stands. The rolling mill is completed by a pickling line, two pinch rolls, a rollerised downturn, coiler and conveyor.

Siemens AG – Germany

Website: www.siemens.com/metals

Wire friction, wear and lubrication

Advertorial on behalf of Decalub

The PDH lubrication system is used in the most demanding drawing applications, allowing the highest drawing speeds, with all carbon steel rods/wires, mechanically descaled or acid cleaned, bare or pre-coated, bright or galvanized, including spring, high-tensile rope, PC strand, stainless steel spring, galvanised H/C and L/C wire, plating wire and CO₂ welding wire.

The PDH system uses a unique multi-way interaction of lubricant pressure, temperature and viscosity to convert a solid lubricant into a liquefied solution and maintain its thermal stability at all drawing speeds, eliminating conventional wet pre-coatings for all drawing applications form rod, including mechanically descaled 0.90%C rod drawn without pre-coating chemicals.



▲ Wire lubrication by GP/PDH system

coat with adjustable coating weight up to 8–10g/m², at will, completely eliminating the need for phosphate and borax wet pre-coating chemicals.

A typical application consists in drawing 5.5mm 0.83/0.88% C, mechanically descaled rod, without wet pre-coating, with an output of 2.2 tonne/hour and a die life of 200 tonnes/die in the first draft and 40 to 60 tonnes of wire drawn in last draft, with superior surface quality and improved wire ductility.

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Shown above is Reel-O-Matic's model RR50 diesel powered Re-Reever. Supports up to 120" O.D. reels x 50,000 lbs. capacities. Capable of 400,000 in/lbs. of torque. Larger capacities available.

Introducing Reel-O-Matic's Re-Reeving Series. Referred to as the "RR Series", the Re-Reever is popular with riggers during rope inspection and replacement operations. The company's exclusive Re-Reeving machinery easily transfers old rope onto empty reels and new rope onto main lift line drums, and boom hoist sheaves by utilizing tension-controlled pay-out and take-up drive systems (gasoline, diesel, or electric/hydraulic drive systems are available) when high torque/tension is required. The unit is also ideal for inspecting material. The machinery's special slide coupling disconnect feature enables riggers to load and unload empty or full reels of material safely and quickly. It's free-wheeling capability enhances user friendliness.



Shown above is Reel-O-Matic's model CRS24 to support small reels up to 24" O.D. x 1,000 lbs. capacity. Available in powered and non-powered modes.

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Measurement & control of wire temperature

The AUTAC 250S system provides a reliable, fast, non-contact temperature measurement, control and display for preheating or post-annealing in extrusion or wire drawing applications.

The non-contact principle offers a long life span and accurate measuring results without danger of marring the product.

A closed loop control to the preheater of the wire temperature guarantees better product uniformity and a uniform bonding of the insulation. By mounting the sensor close to the extruder, any heat loss occurring between the preheater and the extruder can automatically be compensated for.

AUTAC 250S can also be connected to Zumbach's universal USYS processors and be used as a standalone temperature measuring and control system.

An integrated SIGMA Expert controller can be interfaced to a preheater or to a post-annealing station in order to keep the material temperature on target at all times.



▲ AUTAC 250S temperature measuring sensor

The technical advantages of the system are said to include:

- A slotted design, so no threading required
- Fast response time, < 1s
- Compact
- Unaffected by air draught
- Wire break protection
- Immunity to dirt

Main data:

- Product diameter measuring range: 0.32mm–6mm (0.012–0.24")
- Temperature measuring range: up to 160° C (320°F)

Zumbach Electronic AG – Switzerland
Fax: +41 32 356 0430
Email: sales@zumbach.ch
Website: www.zumbach.com

New implementation deal for CableBuilder®

InnoVites BV has announced that Siechem Technologies of India, has selected CableBuilder® to further boost the efficiency and quality of its design and quotation processes. Siechem designs and produces a wide variety of specialised cables utilising state-of-the-art technology that includes an electron beam irradiation facility.

InnoVites BV – Netherlands
Email: info@innovites.com
Website: www.innovites.com

Siechem Technologies Pvt Ltd – India
Website: www.siechem.com

Automated production

U Gear Automatic Machinery produces wire and cable-related machinery and materials. The micro computer circular object taping machine, UG 832, is the company's main product.

U Gear's efficiency analysis shows that, done manually, this activity involves up to six people, but can produce only up to 500 units per eight hours without 100% identical output. However, the UG 832 will guarantee to produce up to 3,000 volumes per eight hours with 100% identical output and needs only one person to operate the machine.

The UG 832 can produce one set in 8 seconds. In contrast, using manual labour will take up to 48 seconds per set.

U Gear Automatic Machinery Co Ltd – Taiwan
Fax: +886 2 22405083
Email: ugear899@gmail.com
Website: www.a1a1a.com

Wire drawing sector stays wired

The absence on the Internet of an international reference point, from raw materials to finished products, for the wire drawing industry – and demand from operators in the sector for a communication medium – are among the reasons why www.wiredrawing.net was founded.

www.wiredrawing.net is said to be the first international online fair in the wire working field; a fair that can be visited in five different languages, English, German, Italian, French and Spanish.

Established in Italy five years ago in cooperation with the University Politecnico of Milan, the platform is continuously renewed and upgraded in content and site structure, often in response to suggestions from exhibiting companies.

Access to 500,000 content pages, 160 international online exhibitors and 3,500 registered firms is completely free and wiredrawing.net is currently recording 20,000 certified visits every month.

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wire Chi

Shanghai's SNIEC opens its doors to wire & Tube China 2010



From 21st to 24th September 2010, the Shanghai New International Expo Centre (SNIEC) will again be hosting the concurrent wire and tube trade shows, wire & Tube China 2010. Joint-organisers Messe Düsseldorf China Ltd and Shanghai Electric Cable Research Institute will be hoping to exceed 2008's record visitor numbers, when 1,098 exhibitors welcomed 31,585 visitors over the four days of the exhibition. All space has been sold in the original six allocated halls and a seventh has been made available; 1,200 exhibitors are anticipated.

For the wire and cable industry, experiencing increasing demand after the economic downturn of recent months, wire China 2010 will provide an important trade and exchange platform for China and Asia.

On the following pages is a complete listing of exhibitors participating at wire China 2010, correct at time of going to press.

For more information on wire China 2010 and the latest exhibitor list, please visit the official website. The site also includes comprehensive information for show visitors and useful travel information.

- **Dates:** 21st – 24th September 2010
- **Website:** www.wirechina.net
- **Location:** SNIEC (Shanghai New International Expo Centre) Shanghai, PR China
- **Organisers:** Messe Düsseldorf China Ltd and Shanghai Electric Cable Research Institute
- **Exhibition times:** 9.00am to 4.30pm every day
- **Entrance fee:** Free by registration, but the show is open solely to trade visitors



na 2010

Alphabetical list of Exhibitors

Listing correct at time of going to press

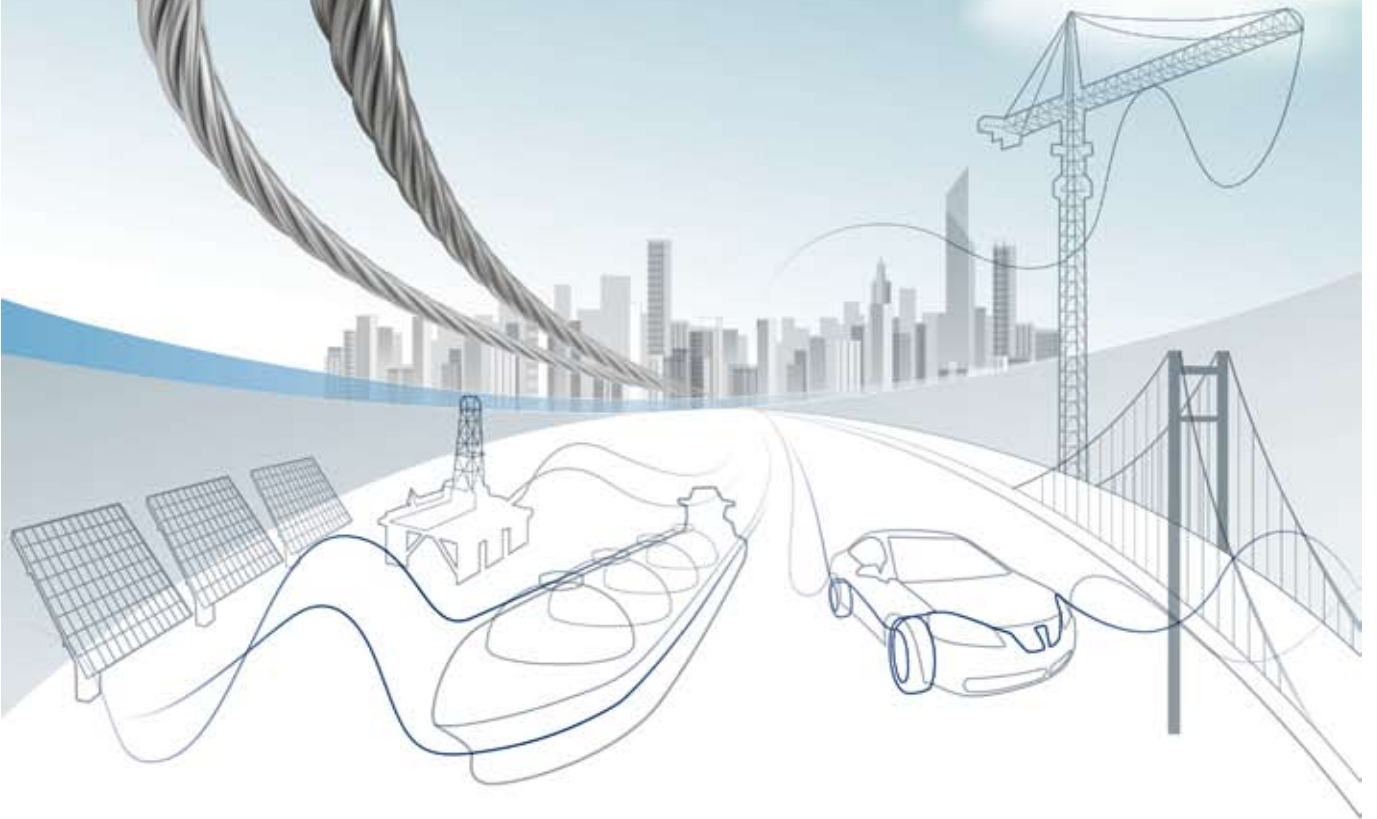
Company	Country	Stand
1st tech, Wujiang Works	China	W3A06
ALMT Corp	Japan	W1D83
AdwanteK Technology Co, Ltd	China	W2D83
AESA SA	Switzerland	W1B57
Agility Fairs & Events GmbH	Germany	W1D33
Alphagary Corporation	USA	W1F05
An Chen Fa Machinery Co, Ltd	Taiwan	W1D21
Anbao (Qinhuangdao) Wire & Mesh Co, Ltd	China	W3E41
Anderson Pass The Tianjin Magnet Wire Equipment Manufacturing Co, Ltd	China	W4C20
Anhui Changjiang Jinggong Wire & Cable Machinery Co, Ltd	China	W2A81
Anhui Hengzheng Cable Coience And Technology Co, Ltd	China	W3C78
Anhui Hubin Machinery Factory	China	W3B51
Anhui Jingde Dewei Machine Co, Ltd	China	W3F69
Anhui Plastics Machinery Factory	China	W2G72
Anhui Race Mechanical Equipment Co, Ltd	China	W4D12
Anqing Huidong Machinery Co, Ltd	China	W3D53
Anqing Yulong Rubber & Plastic Machinery Co, Ltd	China	W3A48
Asaba Co, Ltd	Japan	W1E70
ATE Applicazioni Termoelettroniche Srl	Italy	W1A29
August Strecker GmbH & Co KG Elektro-Schweissmaschinen-Fabrik	Germany	W1E31
Auto Measure Gauge Technology Co, Ltd	China	W2A50
Avic Xinhang Bashan Precision Filter Co, Ltd (No 540 Factory)	China	W3F32
Baicheng Fujia Manufacture Co, Ltd	China	W2A71
Baicheng Miracle Equipment Machinery Co, Ltd	China	W2E73
Baofeng Cable Co, Ltd Jiaozuo City	China	W4B19
Baosheng Science & Technology Innovation Co, Ltd	China	W4E01
Baoying Hengye Electric Equipment Factory	China	W3F45
Beijing CATIC Industry Limited	China	W4D36
Beijing Circular Time Technology Co, Ltd	China	W3D56
Beijing Dmbest Tool & Die Tech Co, Ltd	China	W2C71
Beijing Euro-China Technology Development Co, Ltd	China	W2F53
Beijing Holland Trading Co, Ltd	China	W4C11
Beijing Huimingxun Technology Development Co, Ltd	China	W3A07
Beijing Jinxin Century Electro-technical Machinery Co, Ltd	China	W4B17
Beijing PheiBour Recycled PolyTech Co, Ltd	China	W4F18
Beijing Ridee Technology Co, Ltd	China	W4A27
Beijing Sanxin Wire Drawing Die Co, Ltd	China	W2C51-2
Beijing Xiboer Science and Technology Developing Co, Ltd	China	W3E70
Besel Basim San Tic Ltd Sti	Turkey	W1F68
Beta LaserMike Inc	USA	W1E63
Blachford Corporation	USA	W1F07
Boao (Shenyang) Co, Ltd	China	W3G32
Bongard Trading GmbH & Co KG	Germany	W1F21
Boockmann GmbH	Germany	W1F36
Borouge Sales and Marketing (Shanghai) Co, Ltd	Hong Kong	W1C03
Borun Cable Material Co, Ltd	China	W3G18
Willi Bremer GmbH	Germany	W1E55
Bühler Würz Kaltwalztechnik GmbH	Germany	W1D51
Bwe Shanghai Ltd	China	W2D43-4
Caballé sa	Spain	W1B53
Candor Sweden AB	Sweden	W1E59
Carl Bechem GmbH	Germany	W1G32
Ceeco Bartell Products Bartell Machinery Systems, LLC	Canada	W1A51
CERSA-MCI SARL	France	W1C29
Changsha Xianghong Instrument & Machinery Co, Ltd	China	W2A12
Changsha Xinxiong Instrument Science and Technology Co, Ltd	China	W2A56
Changxing Sincere Automatic Engineering Equipment Co, Ltd	China	W4B20
Changzhou AiBang Machinery & Science Technology Co, Ltd	China	W3B81
Changzhou Changhua Photoelectricity Plastic Co, Ltd	China	W2E41-1
Changzhou Changlang Gearbox Co, Ltd	China	W3G80
Changzhou Duotong Machinery Co, Ltd	China	W3C69
Changzhou Haolin Machine Co, Ltd	China	W3C83
Changzhou Hengfeng Copper Co, Ltd	China	W3C41
Changzhou Hongguang Optical Cable Attachment Manufacturing Co, Ltd	China	W3E61
Changzhou Jiangxin Machinery Co, Ltd	China	W3A36
Changzhou Jiayou Cable-spool Co, Ltd	China	W2G53



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Spring Wire, Steel Cord, Bead Wire, Wire Rope, PC Wire & Strand

wire China 2010 exhibitors

21st - 24th September

<<< Changzhou Jinli Special Wire Factory China W4B27	Daloo Machinery Co, Ltd China W3C01
Changzhou Jinlun Gongchengsuliao Chang China W3G48	Dandong Decheng Plastic & Rubber Science
Changzhou Qifeng	& Technology Co, Ltd China W3C17
Continuous Extrusion Equipment Co, Ltd China W4D17	Danieli Automation SpA Italy W1E05
Changzhou Riyue Machine Co, Ltd China W2F57	Davis-Standard, LLC USA W1G10
Changzhou Suyun Electric Co, Ltd China W3E56	Dayee Wire & Cable Equipment Co, Ltd China W3B67
Changzhou Wujin Hengtong Metal Steel Wires Co, Ltd China W3F38	Deukyoung Co, Ltd Korea W1C63
Changzhou Yongbo Electronics Co, Ltd China W3G68	Deyang Bochuang Electrotechnical Equipment Co, Ltd China W2F82
Changzhou Yongliang Wire & Cable Machinery Co, Ltd China W2A29	Deyang Dedong Electrotechnical
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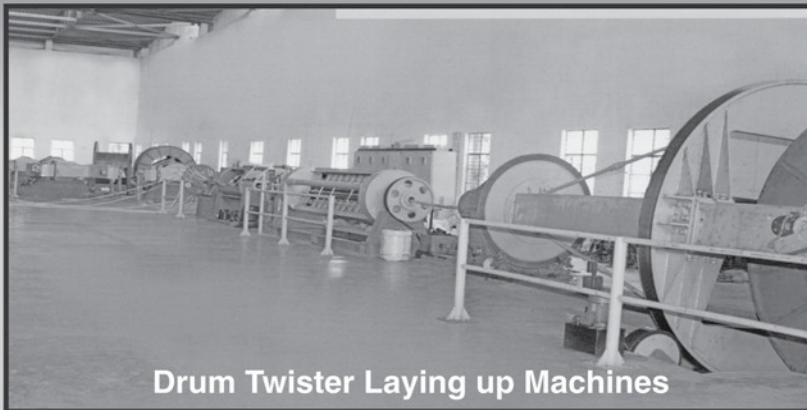
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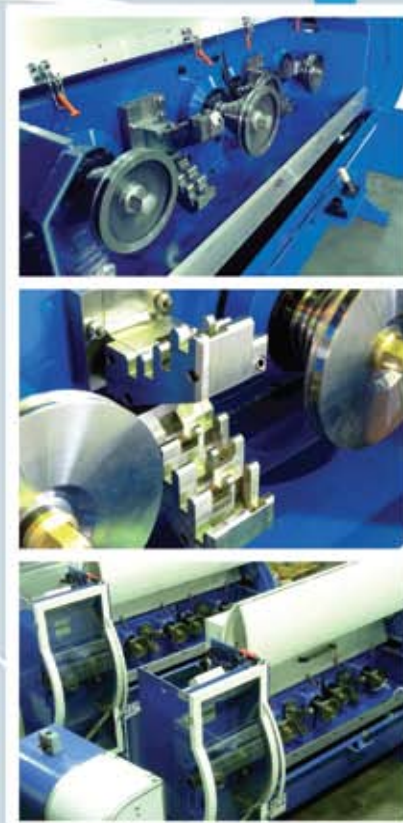
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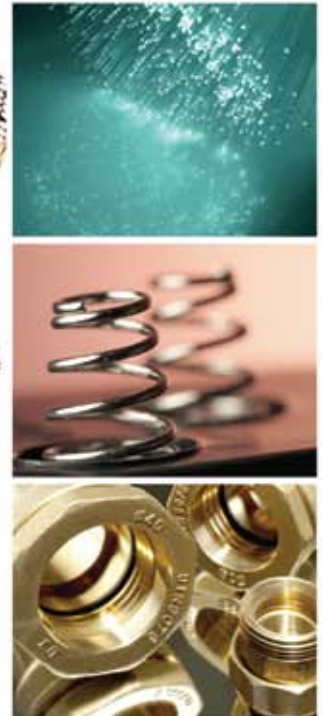
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Fibre optic – machinery & equipment

A shift in emphasis from development and manufacture to installation and deployment takes place with any breakthrough product at the top of its technology. Nowhere is this more striking than in the field of fibre optics.

Consider the first element in the fibre manufacturing process: a preform. Tens of kilometres of optical fibre will be pulled from this cylinder, little larger than a violin case.

Now consider the going live, on 1st July, of the 4,350-mile Main One fibre optic cable running from Portugal to Nigeria and Ghana, with branches under construction to Morocco, the Canary Islands, Senegal and Ivory Coast. Before this could happen the cable had to be laid, and its connectivity assured at mid-ocean depths.

Despite the tremendous differential in scale, the advance from product to application here may seem inevitable – but not to the suppliers reviewed in this section. They know that, in fact, it was won only with the use of machinery and equipment designed, customised and adapted to the changing requirements of their vital and progressive industry.

Software for fibre optic cables

CableBuilder is Cimteq's intelligent rules-based cable design and quotation software tool for cable manufacturing companies. Manufacturing companies using CableBuilder benefit from reduced cable design maintenance times, reduced quotation lead times, automatically generated data-sheets and drawings and accurate manufacturing instructions (resulting in reduced scrap and rework).

CableBuilder is believed particularly suited to the design of fibre optic cables. CableBuilder supports loose tube and tight buffered constructions as well as single and multi-mode fibres. Not only can it calculate dimensions, material utilisation and cost, but it can assess whether the cable is strong enough to handle the required load. It can also assess if the construction is fit for the run length required by the customer.

The benefits of CableBuilder for fibre optic cable manufacturers include:

- Reduction in design effort: fibre optic cable elements can be rapidly assembled to build any construction or size of cable
- Error prevention: materials, including strength members, can be selected either automatically or based on tensile strength simulation, hence increasing the accuracy of the design and the efficiency of the design process

- Immediate and accurate costing: a breakdown of all cost elements such as material utilisation and running speeds
- Quick quotations: new design constructions can be created in seconds by varying the number of buffers, the size of the buffers and the number of fibres
- Quick data-sheet generation: drawings, data-sheets, catalogues and manufacturing instructions can be automatically generated at the touch of a button

CableBuilder provides a platform for continuous improvement, encouraging design engineers to optimise designs.

It is easy to change designs and immediately see the results in terms of technical capabilities such as tensile strength, attenuation, as well as dimensions, material consumption and costs.

Using CableBuilder in the cable design and quotation process releases valuable engineering resource so that more time can be spent on improving and developing products.

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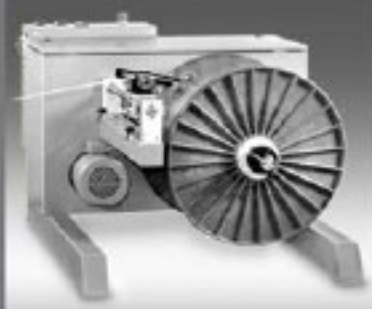
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ABS reels for fibres

A Appiani Srl is an ISO 9001:2008 certified manufacturer and supplier of shipping and process steel reels for the cable and wire industry, including reels suitable for optical fibre.

Appiani's P-type plastic and steel composite reels are suitable for the internal production of optical fibre. The flanges are made of virgin ABS, specifically designed to be stretchable and impact-resistant, and the barrel is made of painted or galvanised steel.

The reel is dynamically balanced for high-speed applications and can be manufactured according to DIN norms or to the customer's specific requirements. Available flange diameters are 400mm, 500mm, 560mm and 630mm.

Structural drums suitable for the shipping of optical fibre are also available. These reels are manufactured with pressed corrugated flanges (BFA type) or with steel plates reinforced by rolled sections (BCS type) and are supplied as per DIN standards or customers' specifications. Various diameters are available according to the requested radius of curvature of the cable.



▲ Appiani's P-type reels for optic fibres

The reels can be provided with rubber coatings for cable protection and all the surfaces are smooth and free from weld spatter to avoid damage to the cable. Capacity tests can be performed on request, and different staving systems are available.

A Appiani Srl – Italy
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Tubular bullhead strander for OPGW cables

An optical ground wire (OPGW) is used in the construction of electric power transmission and distribution lines. Such cable combines the functions of grounding and communications. A typical OPGW cable contains a tubular structure containing one or more optical fibres, surrounded by one or more layers of steel and aluminium wires.

The manufacturing of this cable is divided in two processes:

- Manufacturing of the aluminium central tube with the optical fibres inside
- Stranding of the layer or layers of steel/aluminium wires over the central tube

The first process is the most critical and technological, but the second process also has huge influence on the quality and cost of the final product. Typically the application of the wires over the central tube is made with a planetary strander which, although producing a high quality product, has a low production speed and long bobbin reloading time.



▲ Tubular bullhead strander for OPGW

An alternative to the planetary strander is a tubular strander, which has a much higher stranding speed. The drawback of the tubular strander is that the centre core has to pass through the periphery of the long tube; its rotation can create twists and friction and, finally, damage the aluminium tube with the optical fibres inside.

Caballé believes it has solved the drawbacks of both machines by adding a bullhead feeder at the end of the tubular strander. The feeder consists of a large payoff with bows that turn around it and convey the wires coming from the tube to the closing point.

Features of this bullhead tubular strander include:

- Handles 12 – 24 steel/aluminium wires
- 1,600mm – 2,500mm central tube reel size
- Special wire path for aluminium coated steel wires (ACS)
- Tension control by motor/dancer system
- 500rpm maximum stranding speed

With this system the central aluminium tube payoff is completely straight with no added twist; the quality is the same as with a planetary strander but with a much higher stranding speed.

The productivity of this machine is said to be five times higher than a planetary strander and the machine is already in use with several OPGW cable manufacturers.


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▲ Medek and Schörner optic fibre coating systems

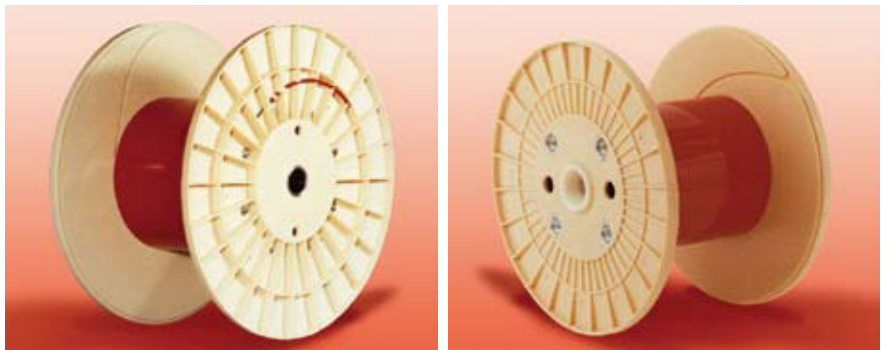
Medek & Schörner offers a wide range of machines for marking cables and coding optical fibres, particularly for power, telecommunications and data cables.

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▲ ABS flanged process reel, (left to right – 1000mm and 450mm)

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Tensor's equipment portfolio includes UV colouring lines, ribbon fibre manufacturing lines, SZ stranding, armouring and tape forming, yarn serving, payoffs, take-ups and complete jacketing lines for both indoor and outdoor fibre optic cables.

Tensor aims to engineer robust equipment that will withstand the daily demand placed on it by high-speed production.

For SZ stranding, line speeds of over 150mpm are achievable while maintaining an accurate lay length and reversal throughout the entire run.



▲ Detail of the Roll former from Tensor Machinery



▲ Roll former from Tensor Machinery



Premise jacketing lines achieve over 300mpm on simplex cables and 100mpm on high-count distribution cables.

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With its capability of stranding flexible strength members around a cable centre at up to 400rpm, the Roblon SE-18HSLT (high speed, low tension) server offers optic fibre cable manufacturers the possibility of doubling capacity.



▲ The SE-18HSLT server from Roblon

The speed of traditional servers is limited by the centrifugal forces that the bobbins can withstand – a limitation that has been eliminated by the use of special materials and protective parts in the Roblon HSLT server.

The Roblon SE-18HSLT server is designed for very high speeds, using a principle of pulling off the yarns over the ends of the non-rotating bobbins.

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As optic fibre technology continues to expand in telecommunications and network transmissions, cable manufacturers are looking for system innovations to increase production but maintain product quality.

For many years, JoeTools has developed solutions for improved performance in wire and cable manufacturing.

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Among these are JoeTools multi-conductor heads.

With this series of crossheads the initial production time for extruding fibre optic cable is substantially reduced, due to a zero core-tube design that allows the operator to easily thread micro-fibres into the die. This maximises operator control and minimises the time and intricacy of the process for less stress on optical fibres.

JoeTools also offers other heads for fibre extrusion, such as RN heads, specifically designed for fine wire and fibre optic applications, and the well-established Metric head.

The RN head offers the ease of a fixed-centre design with high balanced flow and precision concentricity, while the condensed, fixed-centre design of the Metric head reduces set-up time.

JoeTools designs and manufactures extrusion heads for a complete selection of outdoor and indoor fibre optic cables, including:

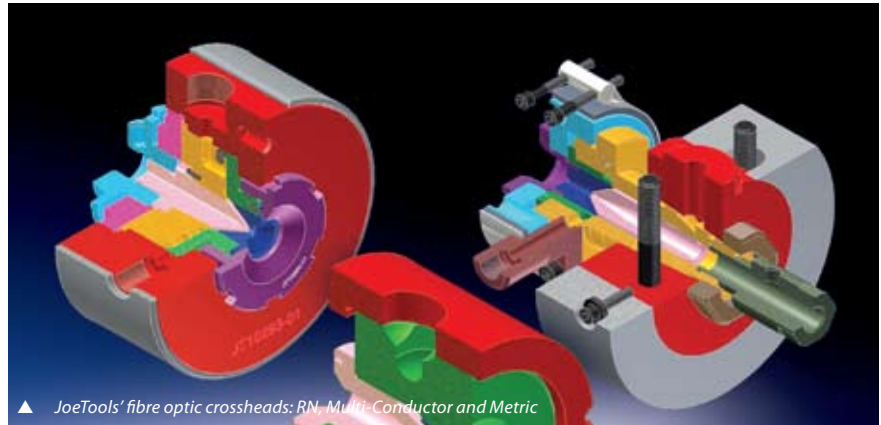
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Sustainability in the development and production of alloys

By Ralf Hojda, Dr Michael Köhler, James Schraml

1 Introduction

The increasing scarcity of resources is steadily impacting on economic success in the private and industrial spheres. Energy supply and raw materials are equally affected.

Manufacturers of copper-alloy semi-finished products have experienced price rises in the three-figure percentage range, so that in recent years the ratio of the value added to the metal value, which was in balance just a few years ago, is now one to three. Although mechanical and technological factors were once the primary criteria for selecting a suitable alloy, the significance of the value of the metal has increased. This also has consequences for the development and manufacture of alloys.

Developers are equally concerned about the recyclability of new alloys and composites as about using stronger alloys to reduce wall thicknesses, and thus conserve resources by using less material.

This article uses two developments to illustrate good recyclability and reduced use of materials. In the first case the described material is a new high-conductivity alloy that can be recycled without any limitations, even when tin coated.

The second concerns a high-strength bronze, which can readily be fed back into the material cycle and, above all, is potentially suitable for use in numerous miniaturisation applications, thus facilitating the conservation of resources.

2 Examples

2.1 Development 1

Connecting elements used in the electrical engineering and electronics sectors have to satisfy numerous requirements.

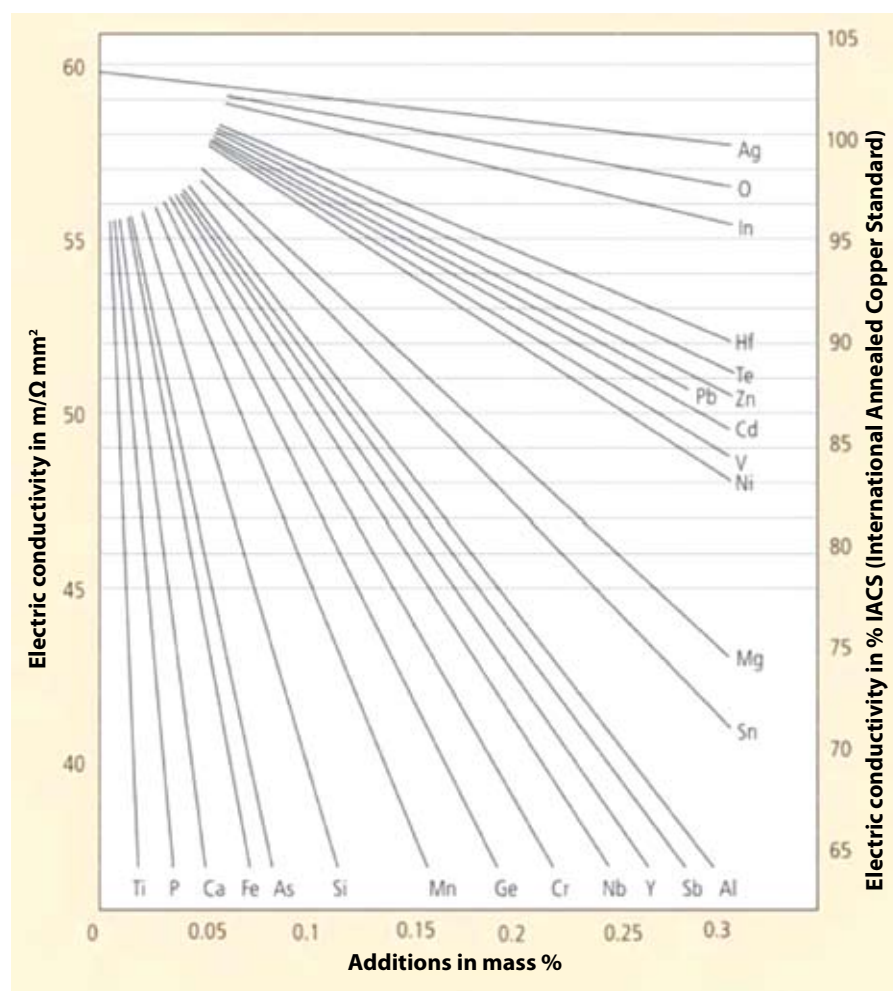
Mechanical strength, electrical conductivity and corrosion resistance are key criteria for the reliable functioning of components during the total lifetime of the whole system.

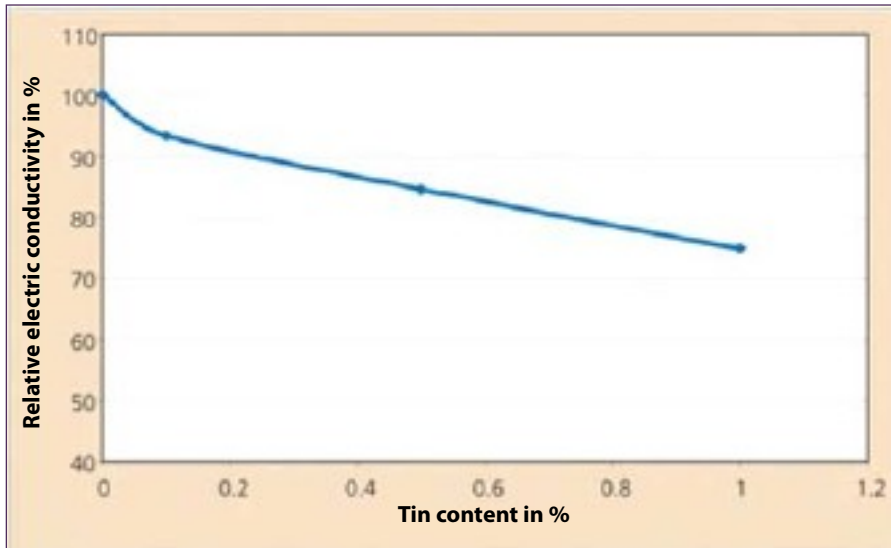
In many cases the required properties are mutually incompatible, as when a combination of good conductivity and excellent resistance to corrosion is specified.

Although components such as nickel and chromium improve a copper alloy's corrosion resistance, they simultaneously bring about a considerable reduction in its conductivity (see Figure 1).

Composites are a frequently adopted solution to this problem, primarily in the form of coatings based on pure tin applied to the surface of copper alloy. With just a few exceptions the RoHS

▼ Figure 1: Influence of alloying elements on the electrical conductivity of copper





▲ **Figure 2:** Influence of the tin content on the conductivity of CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Copper	Balance	Balance	Balance
Tin	0.12	-	0.2 – 0.8
Zinc	<0.10	0.13	<0.05
Iron	<0.02	2.4	<0.02
Nickel	<0.02	-	0.1 – 0.6
Phosphorus	<0.015	0.03	0.008 – 0.05

▲ **Table 1:** Comparison of the chemical composition of various bronzes

(Restriction of Hazardous Substances) directive, which came into force on 1st July 2006, bans the typical lead-tin compounds that were formerly used. The integration of the functional pure tin coating in the material cycle is described in detail below.

The choice of material for connectors is based primarily on physical criteria such as electrical conductivity, modulus of elasticity, thermal relaxation and processing characteristics, ie ductility and bendability, and welding behaviour.

Issues relating to partial or total surface protection are of secondary importance, as are the basic availability of the materials and material costs.

An examination of production and punching waste reveals that, in many cases, it is not given the attention that, on ecological and economic grounds, it deserves. This is illustrated by the following example.

During production from hot-dip tinned CuFe2P (C19400) of large lead frames for ABS and ESP systems about 50% to 70% scrap is produced.

None of this can be directly recycled (fed back into the melting process). It has to go through time-consuming smelting and be electrochemically separated.

It is fed back into the material/production cycles as a cathode. This procedure is energy intensive and is, therefore, expensive relative to direct melting.

Usually a 0.4mm thick strip is provided with a 3µm coating of tin on both sides. When the scrap is directly recycled, the resulting CuFe2P alloy contains an impurity of tin at around 1.5%.

This has a major effect on work hardening behaviour and on the electrical conductivity of the alloy, which falls drastically when the tin content exceeds 0.3% (see Figure 2).

There is, therefore, a need for a new alloy with comparable properties to CuFe2P but which can be recycled without difficulty, even when coated with tin. Pure copper/tin alloys such as CuSn 0.15 have the potential to be used as alternatives. When coated with tin, the scrap can be fed directly into the material cycle (see Table 1).

Moreover, the mechanical and technological properties correspond relatively well to those of CuFe2P.

There are, however, distinct weaknesses in terms of softening behaviour and relaxation resistance (see Tables 2 and 3).

A look at the newly developed alloy BB05xi shows a different situation. The targeted harmonisation of the alloy elements (tin, nickel and phosphorus) gives the material mechanical and technological properties comparable to CuFe2P, together with the softening and relaxation (stress creep of the component at high temperature) properties profile required for further processing (see Figure 3) and for the intended application.

▼ **Table 2:** Comparison of the technological properties of various bronzes

	BB01	SB02	BB05xi
Electric conductivity Soft [% IACS]	>83	63	>62
Thermal conductivity [W/mK]	360	260	250
Coefficient of thermal expansion [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Elastic module [GPa]	128	123	126

▼ **Table 3:** Comparison of the technological properties of various bronzes

Strip thickness 0.3mm	BB01	SB02	BB05xi
R _m [MPa]	450	450	425
R _{p0.2} [MPa]	410	420	380
A ₅₀ [%]	4	9	6
HV	130	145	125
Softening temperature [°C (1 h)]	300	350	350
Bendability [180° GW R/S]	1	0	0.5
Bendability [180° BW R/S]	1	1	0.5

During further processing at high temperatures the thickness of the alloy layer that forms between the base material and the tin coating of tin-coated BB05xi is comparable to that of CuFe2P.

Production lines therefore do not have to be converted to accommodate this new composite material (Figure 4).

Moreover, this new alloy is significant as the tin-plated scrap from the individual stages of the value chain is directly recyclable.

A comparison of the metal values BB05xi and CuFe2P also does not justify the difference between the costs of indirect and direct recycling of production and punching scrap, which in this sector are usually 20% to 25% of the metal value – a factor of considerable importance in times of high and increasing raw material prices.

With a scrap percentage of, for example, 70% the smelting costs can rapidly match the production costs, casting doubts on the economic feasibility of the whole process.

The use of a tin-coated phosphor bronze is therefore a worthwhile alternative to tin-coated copper-iron alloys from both an ecological and an economic point of view (the additional use of electricity and acid for the electrolytic treatment of the scrap is eliminated).

2.2 Development 2

Copper-tin alloys are used for connectors and components for electronic and electrical engineering applications as they have good to very good spring characteristics, good resistance to electrical and thermal stress, low stress relaxation and excellent bendability and solderability.

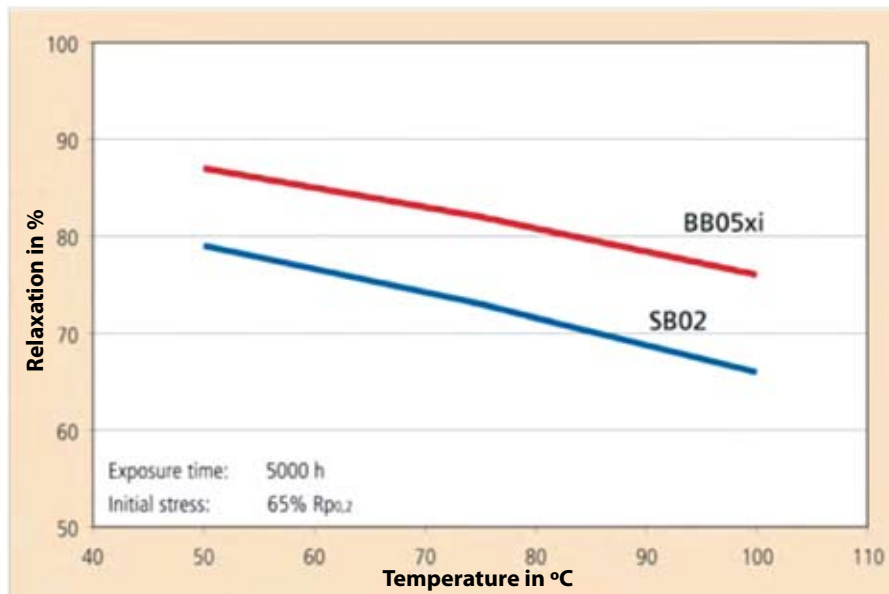
Usually a small amount of phosphorus is added to alloys of this type for the purpose of deoxidation, which is why they are also referred to as phosphor bronzes.

The properties of this group of alloys depend mainly on their tin and phosphorus content, and to a lesser extent on the other added alloy elements.

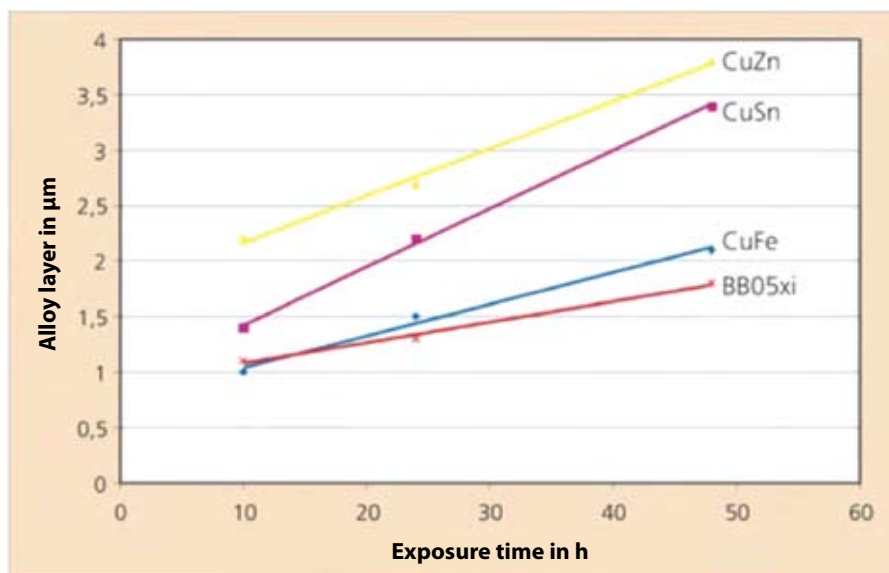
By means of suitable processing they can be adjusted for use in a wide range of applications.

The many industrial applications for these alloys range from high quality connectors and sockets for electronic modules to electrically conductive contact springs.

In the past “downgrading” was carried out as an efficient method of selecting a phosphor bronze. In other words, the technological properties of a low-alloy



▲ Figure 3: Comparison of the relaxation behaviour of CuFe2P and BB05xi



▲ Figure 4: Formation of the alloy layer at 180°C after hot-dip tinning

phosphor bronze were adjusted so that its spring characteristics and processing properties corresponded to those of the original high-alloy phosphor bronze. However, certain constraints had to be taken into consideration.

The tin and phosphorus content influence the work hardening behaviour and ductility of phosphor bronzes to a considerable extent, and a clear relationship has been found between the achievable bendability and the tin content.

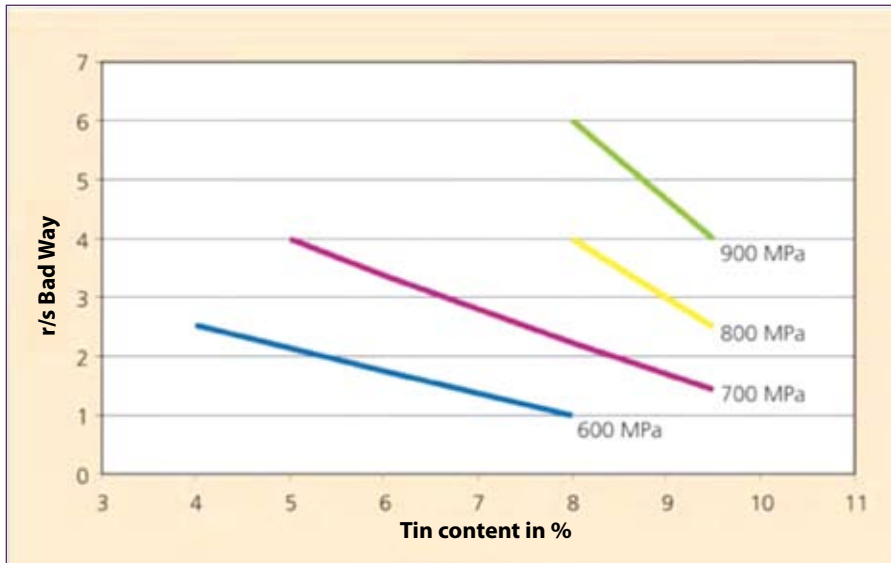
Figure 5 shows how increasing the tin content has a positive influence on the bendability at constant strength.

Against this background it was logical to develop a higher-alloy phosphor bronze.

Another reason to do so was the demand for miniaturisation of connectors, as a reduction in cross-section reduces the contact force at constant deflection of the spring element.

For a defined constant force, therefore, the spring element has to be redesigned – the design stress increases accordingly. One solution for this is the newly developed alloy BB95, a 10% phosphor bronze. At a yield stress level $R_{p0.2} > 720$ MPa, the bendability of BB95 in BW90° R/S is superior to that of an 8% tin bronze by a factor of 2.

Depending on the intended application, BB95 can be hardened to a yield stress level $R_{p0.2}$ of 800 MPa, and the high strength variety to >950 MPa.



▲ **Figure 5:** Bendability of various phosphor bronzes as a function of strength

The difference in electrical conductivity between BB95 and an 8% tin bronze is approximately 1% IACS (International Annealed Copper Standard), ie the tin has a negligible conductivity-reducing influence when present in the alloy at this level.

At SH (spring hard) temper, BB95 exhibits the same softening properties as an 8% phosphor bronze; a significant reduction in hardness is first observed at about 280 °C.

In addition, the relaxation of the new material (<20% at a temperature of 100°C for a test duration of 10,000h) is comparable to that of the above mentioned reference alloy (provided the stress level is identical).

Given the above mentioned contact force, these results suggest that it should be possible to achieve a reduction in the thickness of the material, and therefore a reduction of about 20% in the amount of material needed, by using BB95.

3 Summary

Steep increases in the prices of raw materials, and especially in the price of copper, have drastically changed the relationship between the value added and the metal value in the manufacture of semi-finished copper-alloy products.

Savings in recycling and in the materials used have a greater impact, looked at in the round, than the total finishing expenditure. Using low-alloy copper materials as an example, the influence of a well-planned choice of alloys and

composites is described. The combination of a newly developed, low-alloy phosphor bronze with a tin coating is a worthwhile alternative to tin-coated copper-iron alloys, also from an ecological and economic point of view, and yields a similar properties profile.

An approach to generating added value for customers by reducing the amount of material used is made feasible by the new development of a 10% phosphor bronze.

This has a similar properties profile to an 8% copper-tin alloy but has superior bendability.

Moreover, the new alloy facilitates resource-saving design, as it can withstand higher levels of stress. Material savings of 20% appear to be realisable. ■

This paper was first presented at the 58th International Wire & Cable and Connectivity Symposium held in Charlotte, NC 8th-11th November 2009, and is reproduced with the generous permission of the organisers.

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▲ Universell einsetzbarer KW 13Trio von Zumbach

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Unternehmen aus dem Bereich Unterwassertechnik stellt die Installation eines Kabelsystems fertig

Main One Cable Company, ein Unternehmen aus dem Bereich Unterwassertechnik, das frei zugängliche Großhandel-Breitbandkapazitäten in Westafrika anbietet, und sein Systemlieferant, Tyco Electronics Subsea Communications (SubCom), haben die Installation der ersten Phase ihres Kabelsystems termingerecht beendet.

Die Installation der Ausrüstung für die Endanschlüsse wird in Seixal, Portugal, vervollständigt und ist somit in Vorbereitung die Anschlusspunkte des Systems in Lagos, Nigeria und Accra, Ghana, zu erreichen.

Der CEO von Main One Cable Company, Funke Opeke erklärte, daß die Phase 1 des Main One Cable System sich über 6.800km erstreckt und eine dringend benötigte Kapazität zwischen der Westküste von Afrika und Portugal bieten wird.

Das doppelte Faserpaar - 1,92 Terabit pro Sekunde - dichte Wellenlängenmultiplex-Projekt wird zunächst Lagos, Accra mit Seixal verbinden, mit einem weiteren Anschluß für Europa, Asien und den Doppelkontinent Amerika, während angenommen wird, daß die Phase 2 des Projekts sich bis nach Südafrika ausdehnen wird.

Das Kabelsystem, das voraussichtlich im Juni 2010 betriebsbereit sein sollte, wird einen freien Zugang zu regionalen Telekommunikationsbetreibern und Internetdiensteanbietern liefern, und das zu Raten, die unter den bestehenden internationalen Breitbandpreisen in der Region liegen.

Darüber hinaus wird das System eine Breitbandkapazität bieten um den Internetzugang in der Sub-Sahararegion zu erweitern, sowie die Schwierigkeiten des Schaltverkehrs zwischen den afrikanischen Ländern zu vereinfachen, ohne die Notwendigkeit einer Übertragung durch Europa.

Tyco Electronics Subsea Communications (SubCom) – USA
Website: www.subcom.com

Main One Cable Company – Mauritius
Website: www.mainonecable.com

Anlage zur Herstellung von Flugzeugkabeln



▲ Kabelherstellungsanlage von Nexans in Marokko

Nexans hat ein neues Fertigungswerk in Mohammedia (Marokko) eröffnet, in dem ausschließlich Flugzeugkabel produziert werden. Die Anlage ist das Ergebnis eines Abkommens zwischen Nexans und Airbus für die Lieferung modernster Kabel für die Modelle A320, A350 und A380.

Diese Investition in Höhe von fast 10 Millionen Euro untermauert das Engagement von Nexans im Bereich Luftfahrttechnik sowie das Kerngeschäft seiner marokkanischen Tochtergesellschaft, die bereit über eine hohe Kompetenz im Bereich der Herstellung von Kabeln für die Automobil-, Gebäude- und Infrastrukturindustrie verfügt.

Es handelt sich um die dritte Anlage von Nexans für die Produktion von Flugzeugkabeln; ähnliche Einrichtungen befinden sich in Frankreich und den Vereinigten Staaten.

Nexans – Frankreich

Fax: +33 15669 8484

Email: nexans.web@nexans.com

Website: www.nexans.com

Umform- und Schweißtechnik für Metallband

Rosendahl hat sein Portfolio erweitert um Schweiß- und Wellungsausrüstungen für Stromkabelanwendungen anzubieten.

Der Nachfrage der Industrie nach alternativen Lösungen folgend und auf der Grundlage der Erfahrung erfolgreicher Projekte im Bereich der Umformung, Schweißung und Wellung von Metallband für High-End-RF-Kabel, hat sich Rosendahl entschlossen in dieses Marktsegment vorzudringen.

Kabelhersteller fordern diese Technik für Produkte wie z. B. Kabel für Windparks, Offshore-Kraftwerke oder Kabel für Unterwasseranwendungen. Das NS-Segment schließt auch einige Produkte ein (Kabel für Ölpumpen, Kabel für Schiffe, Signalkabel), bei denen die Rosendahl-Technik eingesetzt wird, um die Produkteigenschaften zu bessern oder die Produktivität während des Herstellungsverfahrens zu steigern.

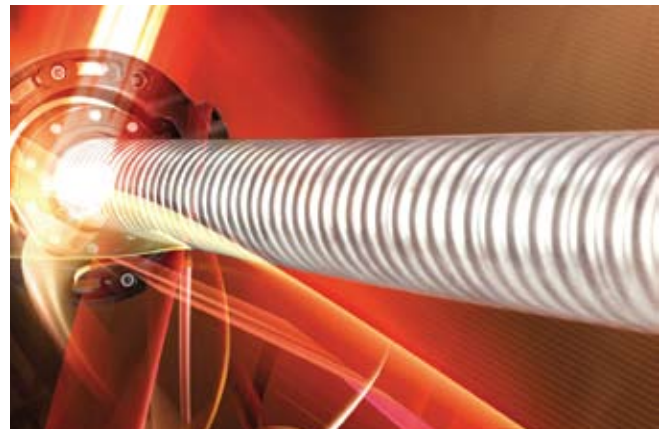
Im Vergleich zu anderen Techniken (Aluminium- oder Bleiextrusion) weist das Umform- und Schweißsystem für Metallband mehrere Vorteile auf. Und zwar zeigt es bessere Ergebnisse für den Dauerbetrieb, wirtschaftlichen Einsatz von Strom und Wasser, weniger Ausfall während der Produktion, Dimensionswechsel und die Möglichkeit verschiedene metallische Materialien für die Abschirmung einzusetzen.

Es gilt gemeinhin, daß die entsprechend dieser Technik hergestellten Kabel, eine überdurchschnittliche mechanische Stabilität sowie Wasser- und/oder Gasdichtigkeit vorweisen.

Zu den für diese Anwendungen entwickelten und optimierten Techniken gehören:

- Optimierte Formen für verschiedene Materialien
- Schweißverfahren – um perfekte Schweißnähte zu sichern mit minimalen wärmebeeinflussten Bereichen und den besten mechanischen Eigenschaften
- Hochgeschwindigkeits-Weller für Schrauben- und Ringwellung, für Kupfer, Aluminium und Edelstahl

Für die Metallabschirmung mittels glattem oder gewelltem Aluminium, Kupfer oder Edelstahl, bietet Rosendahl Lösungen für das Verfahren Umformen, Schweißen und Rohrreduzierung an, einschließlich geeigneter nachgelagerter Ausstattung.



▲ Schweiß- und Wellungsausrüstung für Stromkabel

Vom Kabelaufbau, der Raumverfügbarkeit und dem Produktmix abhängig, ist Rosendahl in der Lage Inline- (in Kombination mit dem Ummantelungsverfahren) und Offline-Lösungen anzubieten.

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Rautomead in Irak

Das britische Unternehmen Rautomead, hat die Ernennung eines neuen Vertreters im Mittleren Osten bekannt gegeben.

Herr Majeed A Al-Rawi von El-Tech Energies and Technologies Company wird die Interessen von Rautomead im Irak und in Jordanien vertreten und die bestehenden Kunden von Rautomead im Bereich Stranggießtechnik in dieser Region bedienen sowie potentielle neue Kunden in der Draht- und Kabel- sowie Metallverarbeitungsindustrie finden.

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Nachhaltigkeit bei der Werkstoffentwicklung und Werkstoffherstellung

Von Ralf Hojda, Dr Michael Köhler, James Schraml

1 Einleitung

Knapper werdende Ressourcen belasten zunehmend den wirtschaftlichen Erfolg im privaten und industriellen Bereich. Betroffen sind die Energieversorgung und Grundstoffe gleichermaßen.

Preissteigerungen im dreistelligen Prozentbereich haben bei den Herstellern von Halbzeugen aus Kupferlegierungen dafür gesorgt, dass sich das Verhältnis zwischen Wertschöpfung und Metallwert in den letzten Jahren von einem ausgewogenen Zustand hin zu einem Faktor von eins zu drei entwickelt hat.

Standen in der Vergangenheit die mechanischen und technologischen Eigenschaften bei der Auswahl einer geeigneten Legierung im Vordergrund, so hat inzwischen der Metallwert an Bedeutung gewonnen. Auswirkungen hat dies auch auf die Entwicklung und Herstellung von Legierungen.

Fragestellungen nach einer guten Recyclierbarkeit von neuen Legierungen und Verbundwerkstoffen beschäftigen die Entwickler ebenso wie der Ansatz, über höherfeste Legierungen eine geringere Wandstärke, sprich einen ressourcenschonenderen Materialeinsatz zu realisieren.

In diesem Artikel werden die Aspekte der guten Recyclierbarkeit und des reduzierten Materialeinsatzes an zwei Entwicklungsbeispielen dargestellt.

Zum einen handelt es sich bei diesen beschriebenen Werkstoffen um eine neue Legierung mit hoher Leitfähigkeit, die auch in verzinneter Form uneingeschränkt recycelbar ist, zum anderen um eine hochfeste Bronze, die neben einer einfachen Rückführung in den Wertstoffkreislauf vor allem ein hohes Potential bietet, das sich für den Einsatz in vielen Miniaturisierungs-Applikationen eignet und daher einen ressourcenschonenden Materialeinsatz bietet.

2 Beispiele

2.1 Entwicklung 1

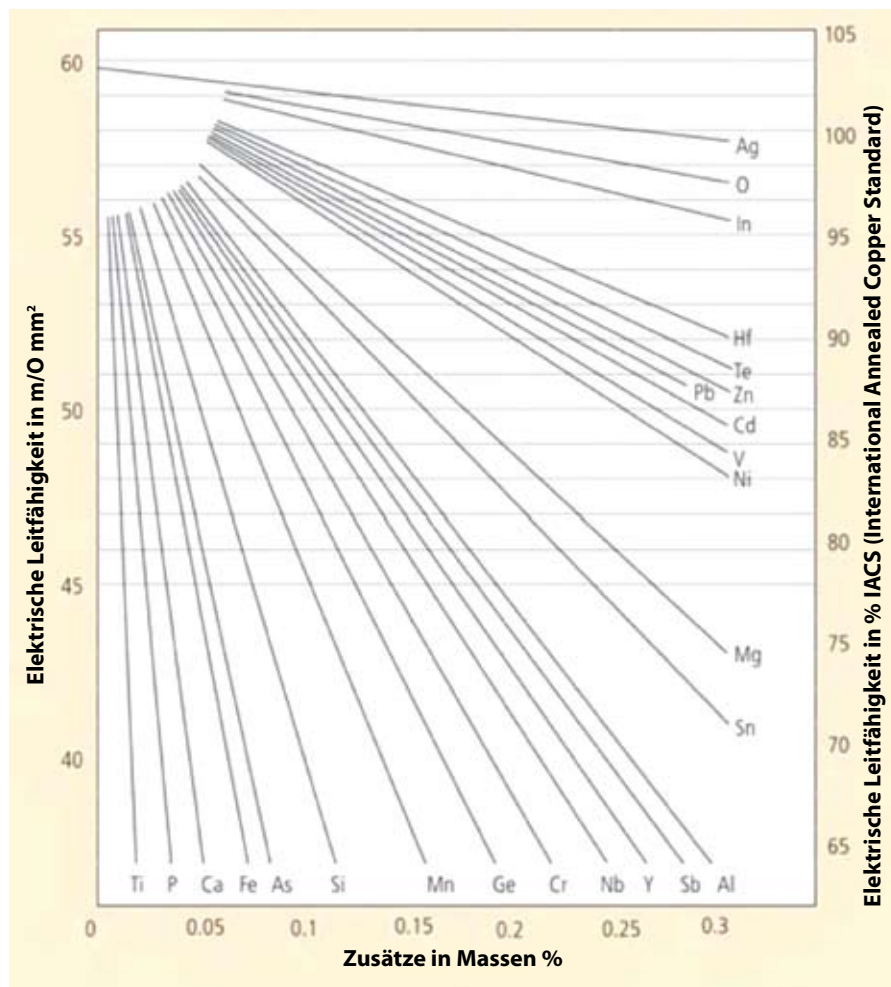
An Verbindungselemente in der Elektrotechnik und Elektronik werden eine Vielzahl von Anforderungen gestellt.

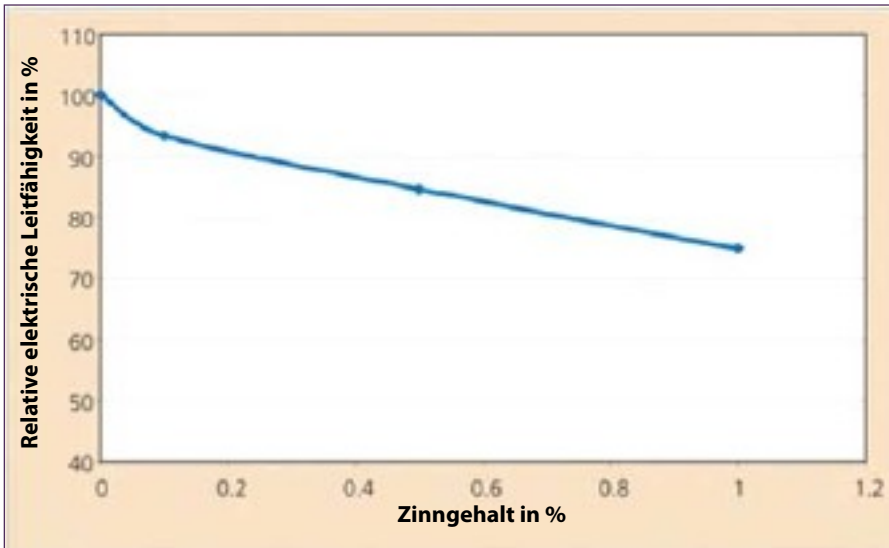
Die mechanische Festigkeit, die elektrische Leitfähigkeit und die Korrosionsbeständigkeit stellen wichtige Kriterien für die sichere Funktion der Bauteile über die Lebensdauer des

Gesamtsystems dar. Oftmals schließen sich die Eigenschaftsanforderungen gegeneinander aus, wie beispielsweise wenn die Kombination einer guten Leitfähigkeit mit hoher Korrosionsbeständigkeit spezifiziert ist.

Verbessern Legierungselemente im Kupfer, wie Nickel und Chrom, einerseits die Korrosionsbeständigkeit, so verringern sie andererseits die Leitfähigkeit erheblich (siehe Bild 1).

▼ Bild 1: Einfluss von Legierungselementen auf die elektrische Leitfähigkeit von Kupfer





▲ Bild 2: Einfluss des Zinngehaltes auf die Leitfähigkeit von CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Kupfer	Ausgleich	Ausgleich	Ausgleich
Zinn	0.12	-	0.2 – 0.8
Zink	<0.10	0.13	<0.05
Eisen	<0.02	2.4	<0.02
Nickel	<0.02	-	0.1 – 0.6
Phosphor	<0.015	0.03	0.008 – 0.05

▲ Tabelle 1: Vergleich der chemischen Zusammensetzung von diversen Bronzen

Einen bereits vielfältig praktizierten Lösungsansatz zu diesem Problem stellen Verbundwerkstoffe dar, in erster Linie Beschichtungen auf Basis von reinem Zinn, das auf den Oberflächen der Kupferlegierung angebracht wird.

Bis auf wenige Ausnahmen, sind die in der Vergangenheit typischen Zinn-Blei-Verbindungen wegen der seit dem 1. Juli 2006 gültigen RoHS-Richtlinie (Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten) nicht mehr im Verkehr.

Die Integration der Funktionsschicht Reinzinn in den Wertstoffkreislauf wird im Folgenden ausführlich behandelt. Bei der Werkstoffauswahl von Steckverbindern treten zunächst die physikalischen Kenngrößen wie elektrische Leitfähigkeit, E-Modul, thermische Relaxation und das Verarbeitungsvermögen in den Vordergrund, also die Umform- und Biegebarkeit sowie das Schweißverhalten.

Fragen in Bezug auf den Oberflächenschutz – sei es ein partieller oder ein vollflächiger – stehen zusammen mit der prinzipiellen Verfügbarkeit der Werkstoffe sowie deren Preise an zweiter Stelle.

Die Untersuchung der Produktion-/ Stanz-Abfälle ergibt allerdings, das es in

vielen Fällen nicht die Aufmerksamkeit erfährt, die ihr aus ökologischen und ökonomischen Gesichtspunkten zukommen sollte. Dazu ein Beispiel.

Bei der Herstellung von großflächigen Leadframes aus feuerverzintten CuFe2P (C19400) für ABS- und ESP-Systeme fallen in der Herstellung rund 50 bis 70% Schrott an. Diese Schrotte können nicht direkt recycelt werden (Rückführung in den Schmelzprozess).

Sie müssen aufwändig verhüttet und elektrochemisch getrennt werden. Die Rückführung in den Wertstoff-/Produktions-Kreislauf erfolgt demnach als Kathode. Dieser Vorgang ist sehr energieintensiv und damit gegenüber dem direkten Einschmelzen sehr teuer.

Üblicherweise wird ein 0,4mm dickes Band beidseitig mit 3µm Zinn beschichtet. Beim direkten Recycling der Schrotte entsteht eine mit rund 1,5% Zinn verunreinigte CuFe2P Legierung.

Dies hat starke Auswirkungen auf das Verfestigungsverhalten und die elektrische Leitfähigkeit der Legierung, welche bereits ab Gehalten oberhalb von 0,3% Zinn drastisch abfällt (siehe Bild 2).

Daraus ergibt sich die Notwendigkeit einer neuen Legierung, die vergleichbare Eigenschaften wie CuFe2P aufweist, aber auch im verzintten Zustand problemlos recycelt werden kann. Reine Kupfer-/Zinnlegierungen wie beispielsweise CuSn 0,15 haben das Potential, als Alternative herangezogen zu werden.

Beschichtet mit Zinn können die Schrotte dem Wertstoffkreislauf direkt zugeführt werden (siehe Tabelle 1).

▼ Tabelle 2: Vergleich der technologischen Eigenschaften von diversen Bronzen

	BB01	SB02	BB05xi
Elektrische Leitfähigkeit weich [%ACS]	>83	63	>62
Thermische Leitfähigkeit (Watt/Meter-Kelvin)	360	260	250
Wärme-Ausdehnungskoeffizient [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Elastizitätsmodul [GPa]	128	123	126

▼ Tabelle 3: Vergleich der technologischen Eigenschaften von diversen Bronzen

	BB01	SB02	BB05xi
Banddicke 0,3mm			
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Einweichungstemperatur [°C (1 h)]	300	350	350
Biegebarkeit [180° GW R/S]	1	0	0.5
Biegebarkeit [180° BW R/S]	1	1	0.5

Ferner entsprechen die mechanischen und technologischen Eigenschaften denen von CuFe2P relativ gut. Deutliche Schwächen treten allerdings beim Erweichungsverhalten und der Relaxationsbeständigkeit auf (siehe Tabellen 2 und 3).

Anders sieht dies bei der neu entwickelten Legierung BB05xi aus. Durch die gezielte Abstimmung der Legierungselemente (Zinn, Nickel und Phosphor) erreicht dieser Werkstoff sowohl zu CuFe2P vergleichbare mechanische und technologische Eigenschaften als auch das für die jeweilige Weiterverarbeitung und Endanwendung erforderliche Eigenschaftsprofil im Bereich des Erweichungsverhaltens und der Relaxation (dem Kriechen des Bauteils unter Spannung bei erhöhter Temperatur) (siehe Bild 3).

Bei dem Einsatz von BB05xi in verzinnter Form bildet sich die Legierungsschicht zwischen Grundwerkstoff und Zinnaufgabe bei einer thermisch belasteten Weiterverarbeitung in einer zu CuFe2P gut vergleichbaren Größenordnung aus.

Eine Anpassung der Fertigungsanlagen ist bei der Umstellung auf diesen neuen Verbundwerkstoff somit nicht erforderlich (Bild 4).

Darüber hinaus zeichnet diese neue Legierung in besonderer Weise die direkte Rückführbarkeit verzinnter Schrotte aus den einzelnen Stufen der Wertschöpfungskette aus.

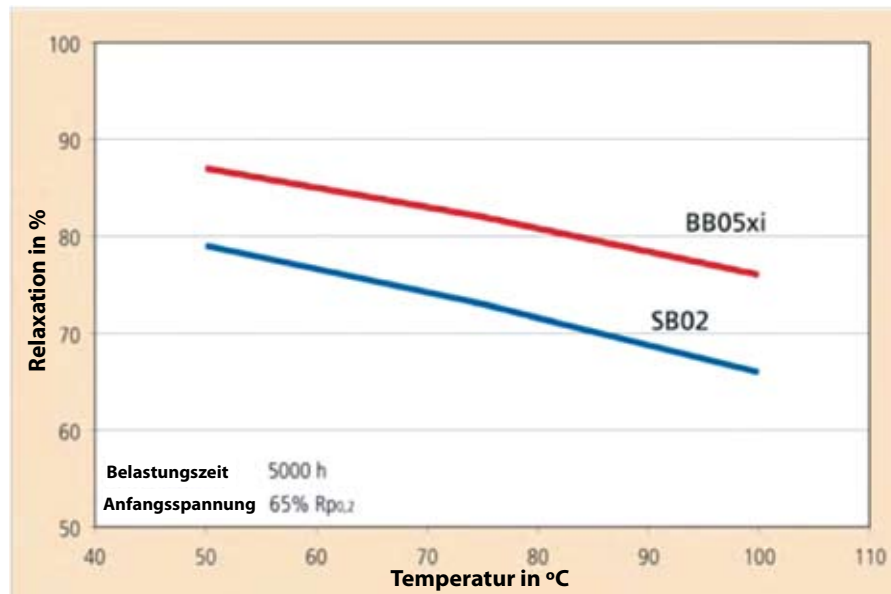
Auch der Vergleich der Metallwerte von BB05xi und CuFe2P rechtfertigt nicht die Differenz der Aufwendungen zwischen indirektem und direktem Recycling von Produktions- und Stanzschrotten, welche branchenüblich bei 20 bis 25% des Metallwertes liegen – ein Faktor, dem speziell bei steigenden und hohen Rohstoffpreisen eine überaus hohe Bedeutung zukommt.

So können die Verhüttungskosten bei einem Schrottanteil von zum Beispiel 70% schnell die Höhe der Fabrikationskosten erreichen und damit die Wirtschaftlichkeit des ganzen Verfahrens in Frage stellen.

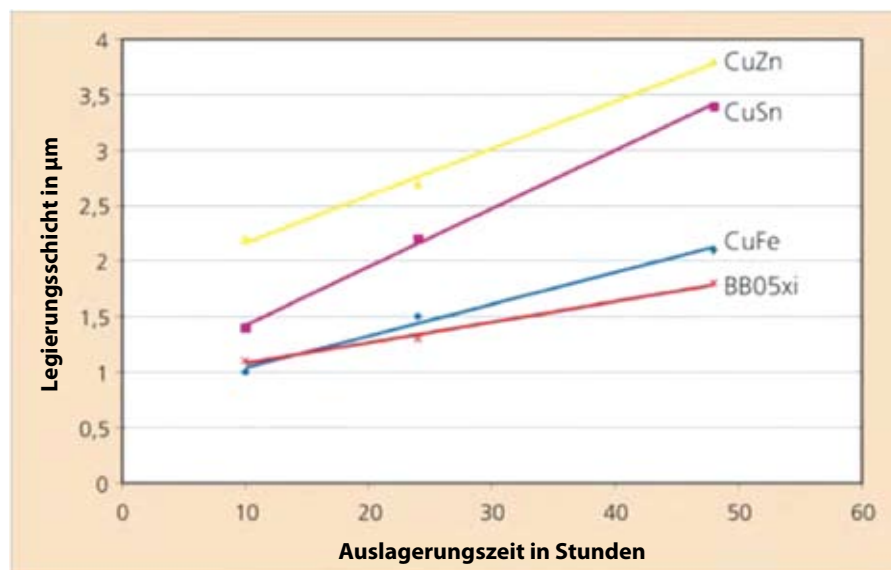
Der Einsatz einer verzinnten Phosphor-Bronze stellt somit sowohl unter ökonomischen als auch ökologischen Gesichtspunkten (der zusätzliche Einsatz von Strom und Säure zur elektrolytischen Aufbereitung der Schrotte entfällt) eine sinnvolle Alternative zu verzinnten Kupfer-Eisen-Legierungen dar.

2.2 Entwicklung 2

Kupfer-Zinn-Legierungen werden für Stecker und Bauelemente in der Elektronik und Elektrotechnik eingesetzt, da sie gute



▲ Bild 3: Relaxationsverhalten von CuFe2P im Vergleich zu BB05xi



▲ Bild 4: Wachstum der Legierungsschicht bei 180°C nach dem Feuerverzinnen

bis sehr gute Federeigenschaften, eine gute elektrische und thermische Belastbarkeit und geringe Spannungsrelaxation sowie eine herausragende Biegebarkeit und Lötbarkeit aufweisen.

Üblicherweise wird dieser Legierungsgruppe etwas Phosphor zur Desoxidation zulegiert, deshalb werden sie auch als Phosphorbronzen bezeichnet.

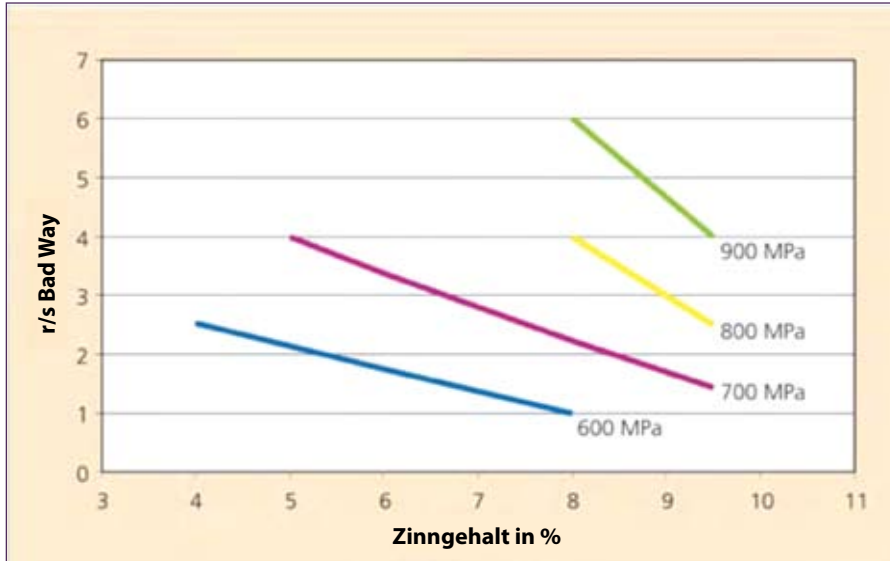
Die Eigenschaften dieser Legierungsgruppe werden vorrangig vom Zinn- und Phosphorgehalt und in zweiter Linie vom Zusatz weiterer Legierungselemente bestimmt.

Durch eine abgestimmte Verarbeitung können sie einem breiten Anwendungsgebiet angepasst werden.

Daraus resultiert auch die große Zahl der industriellen Einsatzbereiche, welche von hochwertigen Steckverbindern und Stecksockeln für Elektronikbaugruppen bis zur Anwendung als stromführende Relaisfeder reichen.

Für eine effizientere Werkstoffauswahl in der Familie der Phosphorbronzen wurde in der Vergangenheit in der Regel ein „Downgrading“ vorgenommen.

Oder anders ausgedrückt, musste eine niedriger legierte Phosphorbronze in ihren technologischen Eigenschaften so abgestimmt werden, dass die Feder- und Verarbeitungseigenschaften der höher legierten ursprünglichen Phosphorbronze entsprachen. Allerdings gab es Grenzen, die beachtet werden mussten.



▲ Bild 5: Biegsamkeit als Funktion der Festigkeit für diverse Phosphor-Bronzen

Zinn- und Phosphorgehalt beeinflussen maßgeblich das Verfestigungsverhalten und die Duktilität der Phosphorbronzen, und als mittelbare Folgeerscheinung ergibt sich, dass die erreichbare Biegsamkeit deutlich vom Zinngehalt abhängt.

Bild 5 zeigt den positiven Einfluss steigender Zinngehalte auf das Biegsamkeitsverhalten bei konstant gehaltenem Festigkeitsniveau. Vor diesem Hintergrund war es nur konsequent, eine höher legierte Phosphorbronze zu entwickeln.

Unterstützt wird dies auch durch die Forderung nach einer Miniaturisierung der Steckverbinder, denn eine Reduktion der Querschnitte führt bei konstanter Auslenkung des Federelementes zu einem Abfall der Kontaktkraft.

Für eine definierte unveränderte Kraft muss das Federelement also umkonstruiert werden – die Designspannung steigt entsprechend an.

Eine Lösung stellt die neu entwickelte Legierung BB95, eine 10%ige Phosphorbronze dar. Im Vergleich zu einer 8%igen Zinnbronze weist BB95 bei einem Streckgrenzeniveau von $R_{p0,2} > 720\text{MPa}$ eine Verbesserung der Biegsamkeit in BW 90° R/S um den Faktor 2 auf.

Verfestigt werden kann BB95 je nach Anwendung auf ein Streckgrenzeniveau $R_{p0,2}$ von 800MPa und in der höchstfesten Form auf $> 950\text{MPa}$.

Der Unterschied in der elektrischen Leitfähigkeit zwischen BB95 und einer 8%igen Zinnbronze beträgt ca. 1% IACS (International Annealed Copper Standard), d. h. der leitfähigkeitssenkende

Einfluss von Zinn ist auf diesem Niveau des Legierungselementgehaltes zu vernachlässigen.

Für den Temperzustand SH (Spring Hard) zeigt BB95 ein Erweichungsverhalten wie eine 8%ige Phosphorbronze – ein signifikanter Festigkeitsabfall tritt erst bei rund 280°C auf.

Zudem ist das Relaxationsverhalten des neuen Werkstoffes ($<20\%$ bei einer Temperatur von 100°C und für einen Prüfzeitraum von 10.000 Stunden) mit der oben genannten Referenzlegierung vergleichbar (identischer Belastungsgrad vorausgesetzt).

Übertragen auf die oben genannte Kontaktkraft erscheint bei dem Einsatz von BB95 eine Verringerung der Materialstärke und die damit einhergehende Materialeinsparung von rund 20% im Bereich des Möglichen zu liegen.

3 Zusammenfassung

Stark steigende Rohstoffkosten – allen voran die des Kupferpreises – haben das Verhältnis von Veredelungstiefe zu Metallwert bei der Halbzeugherstellung aus Kupferlegierungen drastisch verändert.

Einsparungen im Bereich des Recyclings und des Materialeinsatzes wirken sich bei einer ganzheitlichen Betrachtung stärker aus als die Summe der Veredelungsaufwendungen.

An dem Beispiel der niedrig legierten Kupfer-Werkstoffe wird der Einfluss einer vorausschauenden Werkstoff- und Verbundwerkstoff-Auswahl dargestellt.

Die Kombination einer neu entwickelten, niedrig legierten Phosphor-Bronze mit Zinn-Beschichtung stellt sich hier sowohl unter ökologischen als auch unter ökonomischen Gesichtspunkten als sinnvolle Alternative zu verzinneten Kupfer-Eisen-Legierungen dar – und dies bei einem vergleichbaren Eigenschaftsprofil.

Dem Ansatz, über einen höherfesten Werkstoff einen Mehrwert für den Kunden im Bereich des Materialeinsatzes zu generieren, wird mit der Neuentwicklung einer 10%igen Phosphorbronze Rechnung getragen.

Diese weist bei vergleichbarem Eigenschaftsprofil zu einer 8%igen Kupfer-Zinn-Legierung ein verbessertes Biegsamkeitsverhalten auf.

Außerdem ist die neue Legierung ein ressourcensparendes Design, da sie ein höheres Spannungsniveau zulässt. Eine Materialeinsparung von 20% erscheint realisierbar. ■

Diese Unterlage wurde während des in Charlotte, NC vom 8. bis 11. November 2009 stattgefundenen 58. International Wire & Cable and Connectivity Symposiums vorgestellt und ist mit der freundlichen Genehmigung der Veranstalter vervielfältigt worden.

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Универсальный прибор контроля качества



▲ Универсальный детектор KW 13TRIO производства компании «Цумбах»

Для целей непрерывного контроля качества детекторы утолщений и сужений играют такую же важную роль, что и приборы контроля диаметра и искровые пробники. Новая линейка детекторов KW 13TRIO производства компании «Цумбах» (Zumbach) способна быстро и точно обнаружить даже малейшие утолщения и сужения проволоки, токопроводящих жил, оптического волокна и кабелей. Благодаря своей компактной конструкции детектор KW 13TRIO может быть легко установлен на любой экструзионной или перемоточной линии. Размеры поля измерения подобраны таким образом, что в процессе включения прибора обеспечивается свободный проход длинномеров даже с очень большими утолщениями. Открытая конструкция обеспечивает возможность быстрой и простой заправки изделий без остановки производственной линии.

Мощный микропроцессор и полностью цифровая обработка сигналов делают этот детектор утолщений и сужений важным инструментом контроля качества. Детектор поставляется в виде автономного устройства. Эксплуатация и настройка KW 13TRIO может полностью выполняться по месту установки с помощью блока местного управления и индикации. Среди функциональных особенностей прибора – возможность определения дефектов минимальной высотой 0,01 мм (0,0004 дюйма) и минимальной длиной 0,2 мм (0,008 дюйма) и полностью цифровая обработка сигналов.

Универсальный детектор KW 13TRIO снабжен несколькими интерфейсами, включая последовательный интерфейс RS, ДПУ Profibus и Ethernet (версии EN). Через порт интерфейса RS обеспечивается возможность подключения к системе регистрации, обработки и отображения данных USYS. Использование интерфейсов ДПУ Profibus и Ethernet (версии EN) позволяет подключить прибор к компьютеру верхнего уровня, например, к ПЛК или системе регистрации данных.

Благодаря реализации оригинального принципа измерения и использованию сложной оптической системы обеспечивается устойчивость к рассеянному и интенсивному световому излучению при высочайшей точности обнаружения и опознания утолщений и сужений в микрометровом диапазоне. Детекторы серии KW 13TRIO имеют внутреннюю базу данных по дефектам, предназначенную для хранения информации о последних 100 обнаруженных дефектах, включая такие параметры, как порядковый номер дефекта, его вид, высота, местоположение и длина. Доступ к базе данных обеспечивается через пульт местного управления и индикации или через дополнительные интерфейсы удаленного доступа.

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Признание производителя кабельных барабанов

Компания «Юромадем» (Euromadem), расположенная в муниципалитете Калаф в провинции Барселона (Испания), была официально рекомендована Норвежским классификационным обществом Det Norske Veritas (DNV) для получения сертификата соответствия требованиям стандарта ИСО 9001 для производства деревянных и фанерных барабанов.

Компания «Юромадем» начала свою деятельность в 2006 году и сегодня является одним из крупнейших поставщиков кабельных барабанов в Испании и Португалии, предоставляющих услуги оперативного снабжения и утилизации.

Директор по сбыту и маркетингу компании Леандро Маццоккато (Leandro Mazzoccatto) сказал следующее: «Сертификация на соответствие стандарту ИСО 9001 является важным инструментом, подтверждающим высокий уровень услуг, предоставляемых нашим заказчикам в Испании и Португалии.

Мы намерены продолжить практику постоянного совершенствования системы обеспечения качества в интересах наших заказчиков, которыми мы очень дорожим».

С ним согласился генеральный директор «Юромадем» Рожер Сантасусана (Roger Santasusana): «Мы очень довольны тем, что внедрение стандартов ИСО прошло в рекордные сроки, что свидетельствует о правильности выбранного нами пути.

Теперь мы будем стремиться поддерживать функциональность системы управления качеством и практику постоянного совершенствования для обеспечения качества продукции и повышения степени удовлетворенности заказчиков».

«Юромадем Спейн» является дочерним предприятием компании «Мадем СА Бразил» (Madem SA Brazil).

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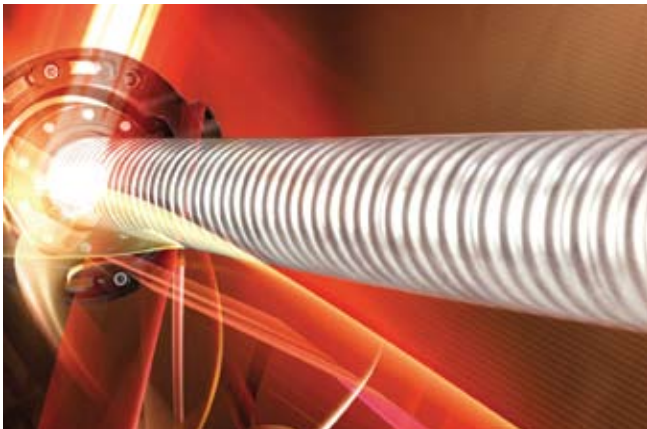
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Технология формования и сварки металлической ленты

Компания «Розендал» (Rosendahl) расширила свой ассортимент оборудования, предложив сварочные и гофрировальные агрегаты для производства силового кабеля. Руководствуясь потребностями предприятий отрасли в альтернативных решениях и основываясь на опыте успешного участия в проектах, связанных с применением технологий формования, сварки и гофрирования металлической ленты в производстве высококачественных ВЧ кабелей, компания «Розендал» приняла решение о выходе на этот сегмент рынка.



▲ Сварочное и гофрировальное оборудование для производства силовых кабелей от компании «Розендал»

Производителям кабельных изделий данная технология необходима для выпуска такой продукции, как кабели для ветровых и морских электростанций и кабели для подводных работ. В сегменте кабелей низкого напряжения также присутствует ряд изделий (кабели для нефтяных насосов, корабельные кабели, кабели для систем передачи сигналов), в которых используется технология компании «Розендал», направленная на улучшение характеристик продукции и повышение эффективности производственного процесса.

По сравнению с другими технологическими решениями (экструзией алюминиевых и свинцовых профилей)

система формования и сварки металлической ленты имеет ряд преимуществ. Она демонстрирует более высокие результаты с точки зрения бесперебойности эксплуатации оборудования, экономичности расходования электроэнергии и воды, уменьшения количества металлических отходов в процессе производства, изменения геометрических параметров и возможностей использования различных металлических материалов для изготовления экранирующей оболочки. Утверждается, что изготовленные таким образом кабельные изделия демонстрируют более высокие показатели механической прочности и водо- и (или) газонепроницаемости.

Среди технических решений, которые разработаны и оптимизированы для указанных сфер применения, можно назвать следующие:

- лентоформирующие агрегаты с оптимизированными характеристиками для обработки различных материалов;
- технологии сварки, обеспечивающие безупречные сварные швы с минимальной протяженностью околошовной зоны и максимальными физико-механическими свойствами;
- высокопроизводительного агрегаты для спирального и кольцевого гофрирования проводников из меди, алюминия или нержавеющей стали.

Для изготовления металлической оболочки из гладкой или гофрированной ленты из алюминия, меди или нержавеющей стали компания «Розендал» предлагает технические решения по формованию, сварке лент и обжатию трубчатых заготовок, включая соответствующее оборудование для последующей обработки.

В зависимости от конструкции выпускаемого кабеля, наличия свободного места и сортамента продукции компания «Розендал» может предложить интегрированные (в сочетании с технологией изготовления оболочки) и автономные технические решения.

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«Раутомед» выходит на иракский рынок

Британская компания «Раутомед лимитед» (Rautomead Limited) из г. Данди объявила о назначении своего нового агента на Ближнем Востоке.

Г-н Маджид А. Аль-Раби (Majeed A Al-Rawi) из компании «Эль-тек энерджиз энд технолоджиз» (El-Tech Energies and Technologies) будет представлять интересы «Раутомед» в Ираке и Иордании, предоставляя услуги существующим клиентам «Раутомед» в регионе, которые используют технологию непрерывного литья, и занимаясь поиском потенциальных заказчиков из числа предприятий проволочно-кабельной и металлообрабатывающей промышленности.

Г-н Аль-Раби будет заниматься продвижением всей линейки выпускаемого компанией «Раутомед» оборудования, включая полностью автоматизированные линии производительностью до 30 000 т продукции в год.

Для производства катанки в меньших объемах предлагают новые модели оборудования производительностью от 1000 до 3600 тонн. Специализированные установки, предназначенные для производства драгоценных металлов, обеспечивают изготовление различного профильного проката из сплавов золота и серебра самого высокого качества.

Директор по сбыту и маркетингу компании «Раутомед» Гай Хендерсон (Guy Henderson) отмечает: «Назначение г-на Аль-Раби служит еще одним, после открытия Web-страниц компании на русском и китайском языках, примером нашей заинтересованности в освоении развивающихся рынков».

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Поставщик систем подводной связи завершает работы по монтажу кабельной сети

Компания «Мейн уан кейбл компани» (Main One Cable Company), предоставляющая услуги связи с использованием подводных кабельных магистралей и осуществляющая оптовые продажи на рынке открытого широкополосного доступа в Западной Африке, и ее системный поставщик – «Тайко электроникс сабси коммьюникейшнз сабком» (Tyco Electronics Subsea Communications SubCom), закончили в соответствии с установленным графиком первую очередь своей кабельной сети.

Завершен монтаж окончательной аппаратуры в Сейшале (Португалия), и сейчас ведутся работы по ее установке на площадках в Лагосе (Нигерия) и Аккре (Гана). По словам главного исполнительного директора «Мейн уан кейбл компани» Функе Опеке (Funke Opeke), первая очередь кабельной сети Main One, протяженность которой составляет 6800 километров, обеспечит столь необходимую пропускную способность между западным побережьем Африки и Португалией.

Сеть, построенная на основе сдвоенной оптоволоконной пары с использованием технологии мультиплексирования с разделением длины волны и уплотнением и обеспечивающая

пропускную способность 1,92 Тбит/с, на начальном этапе соединит Лагос, Аккру и Сейшал, с возможностью последующего подключения к странам Европы, Азии и Америки. Предполагается, что вторая очередь проекта обеспечит соединение со странами Южной Африки.

Кабельная сеть, которая, как ожидается, будет готова к эксплуатации в июне 2010 года, обеспечит открытый доступ региональным телекоммуникационным компаниям и поставщикам интернет-услуг по тарифам ниже существующих в регионе цен на полосу пропускания каналов связи.

Кроме того, система обеспечит широкополосный канал связи, который позволит расширить доступ в сеть Интернет для стран, расположенных к югу от Сахары, а также снять затруднения, связанные с переключением трафика между африканскими странами, без необходимости использования европейских точек обмена трафиком.

«Мы не скрываем радости по поводу того, что сложности, связанные с проведением морских работ по развертыванию кабельной сети Main One, остались позади, и в скором времени мы сможем сосредоточить свои усилия на выполнении главной

задачи по обеспечению линий связи с высокой пропускной способностью для тех регионов мира, в которых они уже давно требуются, – отметил Опеке, добавив: – Вместе с компанией «Сабком» мы выполнили стоящие перед нами задачи по заданному графику и теперь с нетерпением ждем того момента, когда нам удастся обеспечить подачу трафика нашим заказчикам и реализовать планы по расширению сети».

Президент «Сабком» Дэвид Кофлэн (David Coughlan) подчеркнул: «С момента образования нашего союза в 2008 году сооружение первой очереди морских объектов являлось приоритетной задачей компании «Сабком». Завершение программы морских работ максимально приближает нас к тому моменту, когда кабельная сеть Main One станет реальностью. Мы считаем выполненную нами работу по созданию системы Main One значительным достижением и гордимся тем, что участвуем в этом проекте».

Tyco Electronics Subsea Communications (SubCom) (США)
Web-страница: www.subcom.com

Main One Cable Company (Маврикий)
Web-страница: www.mainonecable.com

Завод для производства бортовых авиационных кабелей в Марокко

Компания «Нексанс» (Nexans) открыла в г. Мохаммедия (Марокко) новое предприятие, полностью предназначенное для производства бортовых авиационных кабелей. Строительство завода стало результатом подписанного между компаниями «Нексанс» и «Эйрбас» (Airbus) договора на поставку современных кабелей для самолетов A320, A350 и A380.

Инвестиции в размере почти 10 миллионов евро способствуют укреплению авиационного бизнеса компании «Нексанс», а также основного вида деятельности, которым занята ее марокканское дочернее предприятие, уже накопившее значительный опыт в области производства кабелей для автомобильного, строительного секторов и объектов инфраструктуры. Это – третий завод компании «Нексанс», специализирующийся на выпуске бортовых авиационных кабелей, два других аналогичных предприятия расположены во Франции и США.

Компания «Нексанс» провела реконструкцию завода в г. Мохаммедия под размещение 3000 кв. м производственных площадей, предназначенных для производства 21 тыс. км кабельных изделий в год, из которых 70 % предназначается для экспорта.

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▼ Кабельное производство компании «Нексанс» в Марокко



Вопросы экологической рациональности при разработке и производстве сплавов

Ральф Хойда, д-р Микаэль Кёлер, Джеймс Шрамль

1. Введение

Растущий дефицит природных ресурсов оказывает непрерывное влияние на экономическое процветание в сфере частных интересов и промышленного производства. Это в равной степени относится к источникам энергии и сырья.

Производители полуфабрикатов из медных сплавов столкнулись с тем, что темпы роста цен достигли уровня трехзначных чисел, вследствие чего соотношение показателя добавленной стоимости к стоимости металла, которое всего несколько лет тому назад было равновесным, в последнее время изменилось и теперь составляет один к трем. Несмотря на то что раньше при выборе подходящего сплава основными критериями служили его физико-механические свойства и технологичность, в настоящее время возросло значение фактора стоимости металлов. А это также отражается на разработке и производстве сплавов.

Разработчики в равной степени озабочены вопросами обеспечения пригодности сплавов и композитов к переработке, а также использования более прочных сплавов для уменьшения толщины стенок деталей, способствующих самым рациональному использованию природных ресурсов за счет снижения расхода сырья.

Для иллюстрации высокой пригодности сплавов к переработке и возможности снижения потребления сырья в настоящей работе рассматриваются две разработки. В первом случае описываемый материал представляет собой новый сплав с высокой электропроводностью, который может перерабатываться без каких-либо ограничений – даже при наличии покрытия из олова. Во втором случае это – высокопрочная бронза, которая легко может быть вновь использована в схеме материальных потоков и, что самое главное, потенциально пригодна для

применения в производстве различных миниатюрных изделий, что способствует сохранению природных ресурсов.

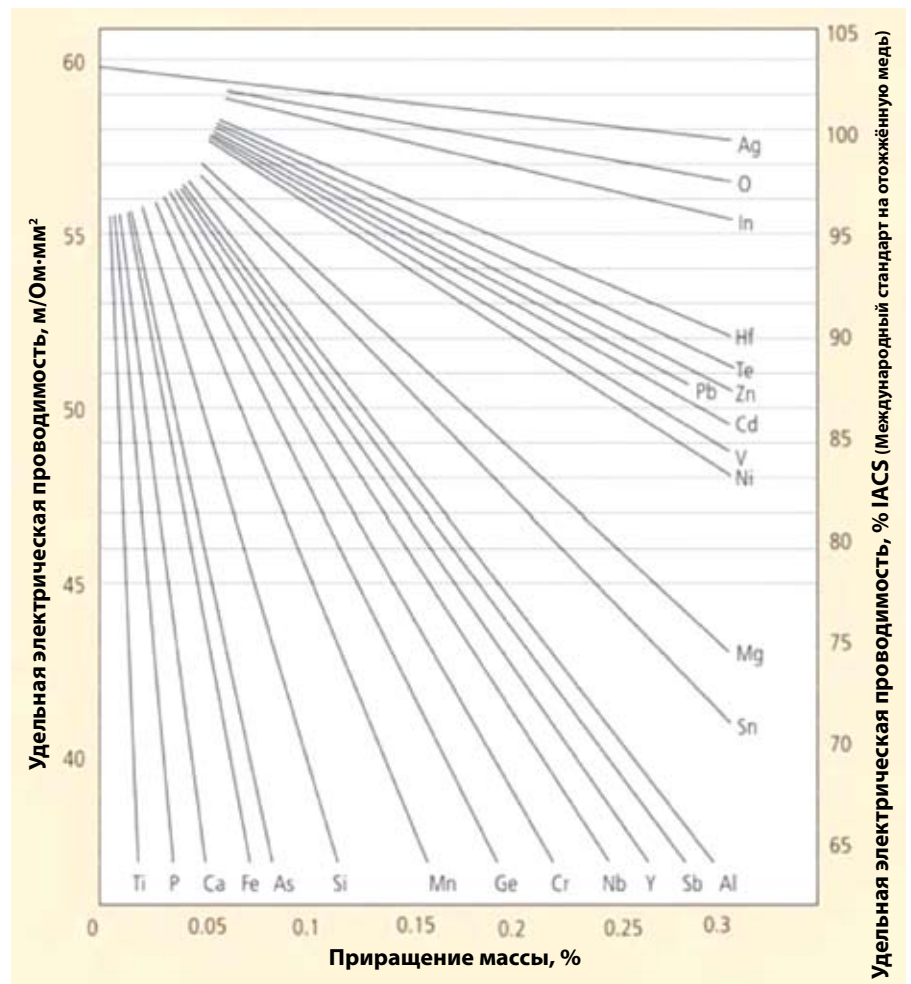
2. Образцы

2.1 Разработка 1

Соединительные элементы, используемые в электротехнике и электронике, должны отвечать целому ряду требований.

Механическая прочность, удельная электрическая проводимость и коррозионная стойкость являются основными критериями надежности функционирования компонентов в течение полного срока службы всей системы. Во многих случаях требуемые характеристики являются взаимоисключающими, как, например, когда в спецификации указывается требование, предусматривающее сочетание хорошей удельной электропроводности и высокой

▼ Рис. 1. Влияние легирующих элементов на величину удельной электрической проводимости меди



коррозионной стойкости. Хотя такие элементы, как никель и хром, улучшают коррозионную стойкость медного сплава, вместе с тем они вызывают существенное снижение его удельной электропроводности (см. рис. 1).

Часто применяемым решением данной проблемы является использование композитных материалов, преимущественно в виде покрытий на основе технически чистого олова, наносимых на поверхность медного сплава. Директива ЕС об ограничении использования опасных материалов в производстве электрического и электронного оборудования (RoHS), которая вступила в силу 1 июля 2006 года, запрещает использование всех ранее применявшихся стандартных свинцово-оловянных сплавов, не считая нескольких исключений. Вопросы введения металлоизделий с функциональным необработанным оловянным покрытием в схему материальных потоков подробно рассматриваются ниже.

При выборе материала для разъемов в первую очередь учитываются такие физические параметры, как удельная электрическая проводимость, модуль упругости, термическая релаксация, технологические свойства, т.е. ковкость и пластичность, а также сварочные характеристики. Вопросы, касающиеся частичной или полной защиты поверхности, менее важны, так же как и базовая доступность и стоимость материалов. Изучение отходов производства и операций выштамповки свидетельствует о том, что во многих случаях вопросам их утилизации не уделяется того внимания, которое они заслуживают с учетом экологических и экономических факторов. Это иллюстрирует приведенный ниже пример.

В процессе производства крупногабаритных выводных рамок для антиблокировочных тормозных систем (ABS) и систем стабилизации курсовой устойчивости (ESP) из луженой горячим способом ленты из сплава меди CuFe2P (С19400) образуется приблизительно 50-70 % отходов. Все эти отходы не могут быть подвергнуты непосредственной утилизации (повторно введены в процесс плавления). Отходы должны пройти требующую больших затрат времени операцию переплавки и быть разделены электрохимическим методом. Они возвращаются в схемы материальных потоков и производства в виде катодов. Данная процедура является энергоемкой и потому требует больших затрат по сравнению с прямой плавкой. Обычно лента толщиной 0,4 мм с обеих сторон покрыта 3-мкм слоем олова. При непосредственной утилизации лома получаемый в результате сплав CuFe2P



▲ Рис. 2. Влияние содержания олова на удельную электропроводность CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Медь	Остальное	Остальное	Остальное
Олово	0.12	-	0.2 – 0.8
Цинк	<0.10	0.13	<0.05
Железо	<0.02	2.4	<0.02
Никель	<0.02	-	0.1 – 0.6
Фосфор	<0.015	0.03	0.008 – 0.05

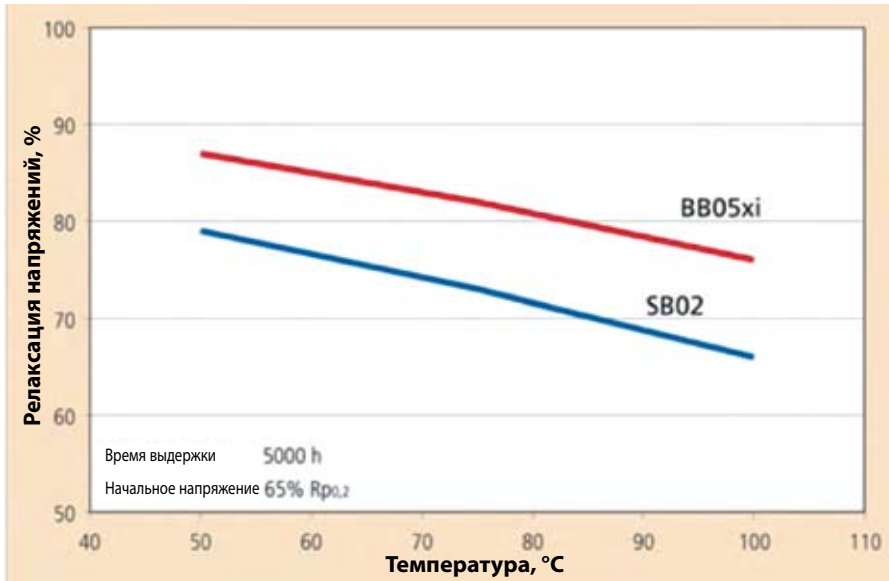
▲ Таблица 1. Сравнительный анализ химического состава различных марок бронзы

	BB01	SB02	BB05xi
Удельная электрическая проводимость в мягко-отожженном состоянии (% IACS)	>83	63	>62
Коэффициент теплопроводности (Вт/м·К)	360	260	250
Коэффициент теплового расширения [Rt при 100 °C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Модуль упругости [ГПа]	128	123	126

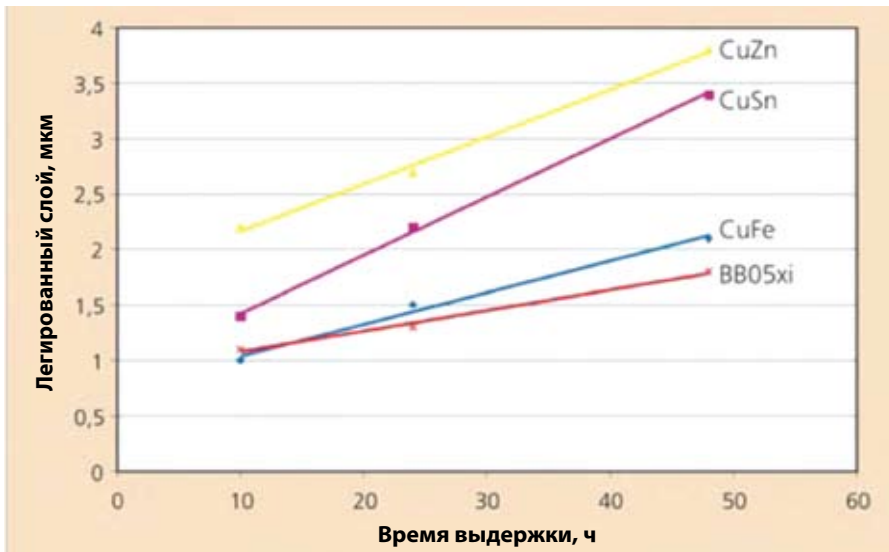
▲ Таблица 2. Сравнительный анализ технологических свойств различных марок бронзы

▼ Таблица 3. Сравнительный анализ технологических свойств различных марок бронзы

	BB01	SB02	BB05xi
Толщина ленты 0,3mm			
Предел прочности на разрыв Rm [МПа]	450	450	425
Предел текучести при растяжении Rp _{0.2} [МПа]	410	420	380
Относительное удлинение A50 [%]	4	9	6
Число твердости по Виккерсу HV	130	145	125
Температура разупрочнения [°C (1 ч)]	300	350	350
Пластичность [холоднокатаная лента, изгиб на 180° перпендикулярно направлению прокатки]	1	0	0.5
Пластичность [холоднокатаная лента, изгиб на 180° параллельно направлению прокатки]	1	1	0.5



▲ Рис. 3. Сравнительный анализ релаксационных свойств сплавов CuFe2P и BB05xi



▲ Рис. 4. Образование легированного слоя при 180 °C после операции горячего лужения

содержит примеси олова в количестве около 1,5 %. Это серьезным образом влияет на параметры деформационного упрочнения и удельной электрической проводимости сплава, которые существенно снижаются при содержании олова выше 0,3 % (см. рис. 2).

Таким образом, существует необходимость в разработке нового сплава, по характеристикам сопоставимого с CuFe2P, но который может быть легко утилизирован, в том числе даже при наличии оловянного покрытия. В качестве альтернативы возможно использовать необработанные медно-оловянные сплавы, такие как CuSn 0,15. При наличии оловянного покрытия лом из этих сплавов может быть непосредственно возвращен в схему материальных потоков (см. таблицу 1). Кроме того, физико-механические и

технологические свойства относительно хорошо согласуются со свойствами CuFe2P. Однако существуют и определенные слабые места, например, с точки зрения интенсивности разупрочнения и релаксационной стойкости (см. таблицы 2 и 3). При изучении разработанного нового сплава BB05xi выявляется иная картина. В результате адресной гармонизации легирующих присадок (олово, никель и фосфор) обеспечиваются физико-механические и технологические свойства материала, сопоставимые со свойствами CuFe2P, наряду с характеристиками разупрочнения и релаксации напряжений (ползучесть компонентов при напряжении под действием высокой температуры), которые требуются для дальнейшей обработки (см. рис. 3) и применения по назначению.

В процессе последующей обработки при высоких температурах толщина легированного слоя, который образуется между основным металлом и оловянным покрытием изделия из луженого сплава BB05xi, сопоставима с аналогичным параметром для сплава CuFe2P. Таким образом, нет необходимости в перенастройке производственных линий для работы с этим новым композитным материалом (см. рис. 4). Более того, новый сплав отличается тем, что луженый лом, получаемый на отдельных этапах цепочки создания добавленной стоимости, поддается прямой утилизации. Сравнительный анализ стоимости металлических компонентов в BB05xi и CuFe2P также не позволяет экономически обосновать разницу между затратами на косвенную и прямую утилизацию отходов производства и операций выштамповки, которые в этом секторе обычно составляют от 20 % до 25 % от стоимости металла, а это – существенно важный фактор в условиях роста и без того высоких цен на сырье. Если принять процентное содержание лома равным, например, 70 %, то оказывается, что затраты на плавку быстро приближаются к себестоимости производства, что ставит под сомнение рентабельность всего технологического процесса. Следовательно, луженая оловом фосфористая бронза является выгодной альтернативой луженым медно-железным сплавам как с экологической, так и с экономической точек зрения (устраняется необходимость в использовании дополнительной электроэнергии и кислоты для электролитической обработки металлолома).

2.2 Разработка 2

Медно-оловянные сплавы используются в разъемах и других компонентах для электронной и электротехнической промышленности, так как они обладают хорошими или очень хорошими упругими свойствами, высокой стойкостью к действию электрических и термических напряжений, характеризуются низким уровнем релаксации напряжений, высокой пластичностью и пригодностью к пайке. Обычно в такие сплавы добавляется небольшое количество фосфора для их раскисления, поэтому они также называются фосфористыми бронзами. Свойства этой группы сплавов зависят главным образом от количества содержащихся в них олова и фосфора и в меньшей степени – от содержания в их составе других легирующих присадок. Путем соответствующей обработки их свойства могут быть скорректированы под использование для широкого спектра практических задач. Такие сплавы имеют множество сфер промышленного применения – от соединительных разъемов и колодок для электронных

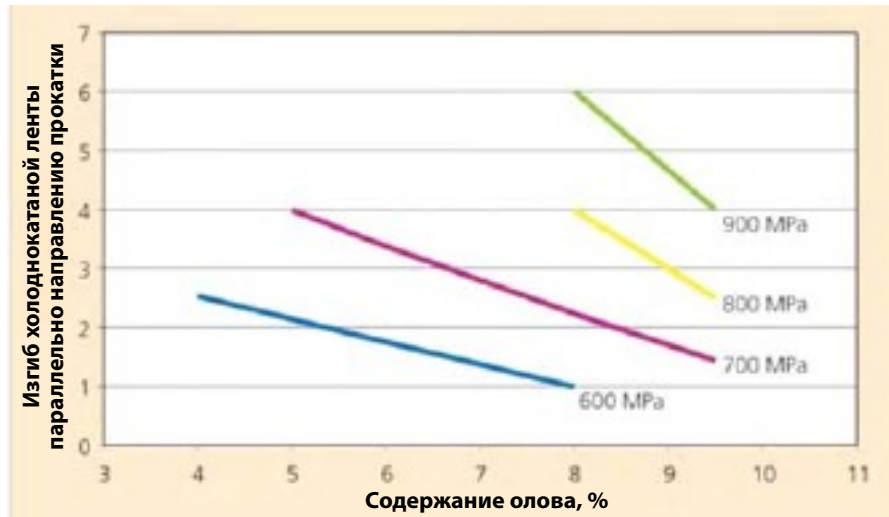
модулей до токопроводящих контактных пружин.

В прошлом в качестве эффективной методики при выборе марки фосфористой бронзы использовалось «снижение сортности». Другими словами, технологические свойства низколегированной фосфористой бронзы корректировались таким образом, чтобы привести ее упругие свойства и обрабатываемость в соответствие с аналогичными параметрами исходной высоколегированной фосфористой бронзы. Однако приходилось учитывать ряд ограничений.

Содержание олова и фосфора оказывает существенное влияние на характеристики деформационного упрочнения и ковкость фосфористых бронз, и между потенциально возможной характеристикой пластичности и содержанием олова установлена четкая взаимосвязь. На рис. 5 показано, каким образом увеличение содержания олова влияет на характеристики пластичности при постоянной величине прочности. На этом фоне представлялось логичным разработать состав фосфористой бронзы с более высокой степенью легированности.

Другая причина для этого заключалась в необходимости миниатюризации разъемов, поскольку уменьшение сечения ведет к снижению усилия контакта при постоянном смещении пружинящего элемента. Таким образом, для заданной величины постоянного усилия необходимо пересмотреть конструкцию пружинящего элемента, так как расчетное напряжение соответствующим образом увеличивается. Одним из решений данной задачи является разработанный новый сплав BV95, представляющий собой 10 % фосфористую бронзу. При величине предела текучести при растяжении $R_{p0.2} > 720$ МПа характеристика пластичности BV95 при изгибе холоднокатаной ленты на 90° параллельно направлению прокатки на два порядка выше, чем у 8 % оловянистой бронзы. В зависимости от предполагаемой сферы практического применения сплав BV95 можно закалить для обеспечения предела текучести при растяжении $R_{p0.2}$, равного 800 МПа, и увеличения прочности до уровня > 950 МПа.

Разница в значениях удельной электрической проводимости между BV95 и 8 % оловянистой бронзой составляет приблизительно 1 % IACS (Международный стандарт на отожженную медь), т. е. при таком содержании олова в сплаве оно



▲ Рис. 5. График зависимости пластичности различных фосфористых бронз от прочности

оказывает ничтожное с точки зрения снижения удельной электропроводности действие. При применении отпуска упругих пружинных сплавов сплав BV95 демонстрирует такие же характеристики разупрочнения, что и 8 % фосфористая бронза; при этом первое значительное снижение твердости наблюдается при температуре порядка 280°C .

Кроме того, релаксация напряжений в новом сплаве ($< 20\%$ при температуре 100°C для испытаний продолжительностью 10 000 ч) сопоставима релаксацией напряжений в выше названном эталонном сплаве (при условии идентичности уровня напряжений).

С учетом вышеупомянутого усилия контакта данные результаты указывают на вероятность того, что применение сплава BV95 позволит обеспечить уменьшение толщины материала и, как следствие, снижение расхода необходимых материалов приблизительно на 20 %.

3. Заключение

Резкий рост цен на сырье и в особенности цен на медь коренным образом изменил соотношение между добавленной стоимостью и стоимостью металла, существующее в производстве полуфабрикатов из медных сплавов. При всестороннем рассмотрении снижение стоимости утилизации и экономия используемых материальных ресурсов имеют большее значение, нежели общие расходы на чистовую обработку. Влияние, которое имеет продуманный отбор сплавов и композитных материалов, описано на основе использования в качестве примера материалов из низколегированной меди. Комбинированное использование разработанного нового низколегированного сплава

из фосфористой бронзы и оловянного покрытия также является выгодной альтернативой луженому медно-железному сплавам с экологической и экономической точек зрения и обеспечивает аналогичные свойства.

Разработка нового сплава из 10 % фосфористой бронзы обеспечивает практическую возможность создания добавленной стоимости для потребителей за счет сокращения количества используемого материала. Этот сплав имеет свойства, аналогичные свойствам 8 % медно-оловянного сплава, но характеризуется более высокой пластичностью. Кроме того, новый сплав позволяет создавать ресурсосберегающие конструкции, поскольку он может выдерживать более высокий уровень напряжений. Обеспечение 20-процентной экономии материальных ресурсов представляется вполне реальной задачей. ■

Настоящая работа была впервые представлена на 58-ой Конференции Международного симпозиума IWCS по кабельно-проводниковой продукции и системам связи, состоявшейся в г. Шарлотте (шт. Северная Каролина) с 8 по 11 ноября 2009 года, и перепечатывается с любезного разрешения организаторов.

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Contrôle de qualité versatile



▲ Détecteur KW 13Trio de Zumbach, un appareil versatile

Pour obtenir un contrôle de qualité continu, les détecteurs de nœuds et d'étranglement sont aussi importants que les jauges de diamètre et les testeurs d'étincelles. La nouvelle ligne de détecteurs KW 13Trio de Zumbach est conçue pour détecter même les nœuds et les étranglements les plus petits dans les fils, dans les conducteurs, dans les fibres optiques et les câbles, avec rapidité et précision.

La conception compacte du détecteur KW 13Trio facilite son intégration dans toute ligne d'extrusion ou tout processus de rembobinage. Le champ de mesure est dimensionné de manière à ce que même des étranglements de dimensions exceptionnelles puissent passer doucement durant le démarrage. Sa conception ouverte permet d'effectuer le filetage du produit aisément et rapidement sans arrêter la production.

L'intégration d'un microprocesseur puissant et le traitement entièrement numérique du signal font de ce détecteur de nœuds et d'étranglements un instrument important pour le contrôle de la qualité. Le détecteur sera disponible comme dispositif autonome. En utilisant une unité opérationnelle et d'affichage locale, le détecteur KW 13Trio peut être totalement configuré et activé directement sur le dispositif.

Il est caractérisé par une tolérance de hauteur de défaut détectable minimale de 0,01mm (0,0004 pouces) et d'une longueur de défaut minimale de 0,2mm (0,008 pouces), et dispose d'un dispositif de traitement des signaux entièrement numérique (DSP).

Le détecteur versatile KW 13Trio présente plusieurs interfaces, comprenant une interface série RS, Profibus DP et Ethernet EN. La connexion peut être effectuée à travers un port d'interface RS à un système USYS d'acquisition des données ainsi qu'à un système de traitement et d'affichage. Les versions avec Profibus DP et Ethernet EN permettent la connexion à un hôte d'un niveau supérieur, tel qu'un API ou un système d'acquisition des données.

Le principe de mesure et la solution optique complexe garantissent l'immunité à la lumière parasite et intense tout en offrant une précision maximale de détection et d'identification des nœuds et des étranglements dans l'ordre de micromètres.

Les modèles KW 13Trio disposent d'une base de données des défauts interne pour stocker les 100 derniers défauts, y compris les caractéristiques de défaut telles que: numéro, type, hauteur, position et longueur du défaut. Il est possible d'accéder à cette base de données à travers l'unité opérationnelle et d'affichage locale ou des interfaces distantes optionnelles.

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Entreprise de câbles sous-marins complète l'installation d'un système de câbles

Main One Cable Company, entreprise spécialisée dans l'installation de câbles sous-marins offrant un accès ouvert et la capacité de bande large en gros en Afrique Occidentale, et son fournisseur de systèmes, Tyco Electronics Subsea Communications SubCom, ont complété l'installation de la première phase de son système de câbles selon les prévisions.

L'installation de l'équipement terminal a été complétée à Seixal (Portugal) et est en cours de réalisation aux points d'atterrissage du système situés à Lagos (Nigeria) et à Accra (Ghana).

Le directeur exécutif de Main One Cable Company, Funke Opeke, a déclaré que la Phase 1 du système Main One Cable comprend 6 800km et fournira la capacité indispensable entre la côte occidentale de l'Afrique et le Portugal.

Le projet concernant le multiplexage dense par répartition en longueurs d'onde (DWDM) de double paire de fibres de 1,92 térabits/s connectera d'abord Lagos, Accra et Seixal avec l'Europe, l'Asie et les Amériques, et ensuite avec l'Afrique du Sud lors de la Phase 2 du projet.

Le système des câbles, dont l'entrée en service était prévue pour juin 2010, offrira l'accès ouvert pour les opérateurs locaux et aux fournisseurs d'accès à l'Internet à des tarifs inférieurs aux prix internationaux actuellement appliqués pour la bande large dans la région.

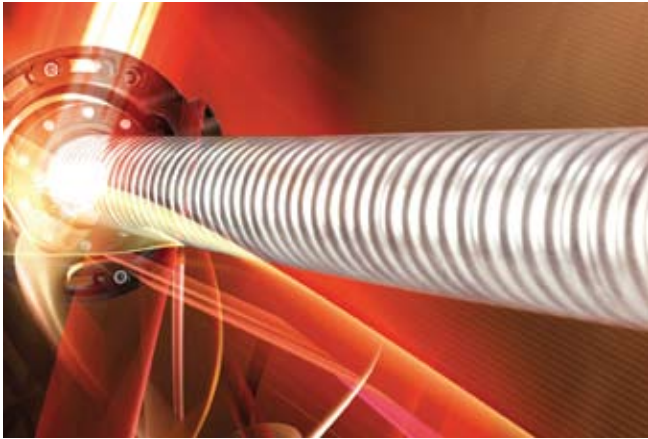
Le système fournira également la capacité de bande large pour étendre l'accès à Internet dans la zone saharienne, ainsi qu'alléger les difficultés de commutation de trafic entre les pays africains sans nécessité de passer par l'Europe.

Le président de SubCom, David Coughlan a remarqué que "depuis le début de notre collaboration en 2008, la société SubCom a été impatiente de compléter l'installation marine de la Phase 1. L'achèvement du programme marin transforme le système Main One Cable en une quasi-réalité."

Tyco Electronics Subsea Communications – États-Unis
Website: www.subcom.com

Main One Cable Company – Île Maurice
Website: www.mainonecable.com

Technologie de façonnage et de soudage de rubans métalliques



▲ Équipements de soudage et d'ondulation pour câbles électriques de Rosendahl

Rosendahl a étendu sa gamme de produits pour offrir des équipements de soudage et d'ondulation pour applications de câbles de puissance.

Suite à la demande de solutions alternatives pour l'industrie, et sur la base de l'expérience acquise dans des projets couronnés de succès dans le secteur du façonnage, du soudage et de l'ondulation pour les câbles RF de pointe, Rosendahl a décidé de pénétrer ce segment du marché.

Les fabricants de câbles exigent cette technologie pour des produits tels que les câbles pour les centrales éoliennes, les centrales nucléaires offshore ou les câbles pour les applications sous-marines. Le secteur de la basse tension comprend également une série de produits (câbles pour pompes à huile, marines, de signalisation), utilisant la technologie de Rosendahl pour améliorer les propriétés des produits ou pour augmenter la productivité durant le processus de fabrication.

Nexans inaugure au Maroc une unité de fabrication de câbles aéronautiques

Nexans a inauguré à Mohammedia (Maroc) une nouvelle unité, entièrement dédiée à la fabrication de câbles aéronautiques. Cette usine est le fruit d'un accord signé entre Nexans et Airbus et porte sur la fourniture de câbles de pointe destinés aux Airbus A320, A350 et A380.

Cet investissement de près de 10 millions d'euros renforce l'activité aéronautique de Nexans et le cœur de métier de sa filiale marocaine, déjà dotée d'une forte expertise dans la fabrication des câbles automobiles, de bâtiment et d'infrastructure.

Cette nouvelle usine est la troisième du Groupe spécialisée en câbles pour l'aéronautique, après celles implantées en France et aux Etats-Unis.

Nexans a ainsi réaménagé sur le site de Mohammedia une superficie de production de 3 000m² afin de produire 21 000km de câbles par an, dont 70% seront exportés.

Nexans – France

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Par rapport à d'autres technologies, telles que l'extrusion d'aluminium ou de plomb, le système de façonnage et de soudage de rubans métalliques offre plusieurs avantages. Cette technologie offre de meilleurs résultats pour le service continu, une utilisation économique de l'énergie électrique et de l'eau, une réduction des déchets durant la production, un changement des dimensions et la possibilité d'utiliser différents matériaux métalliques pour le blindage.

Il est estimé que les câbles fabriqués avec cette technologie présentent des propriétés excellentes de stabilité mécanique et d'étanchéité à l'eau et au gaz.

Les technologies développées et optimisées pour ces applications comprennent :

- Formeurs optimisés pour différents matériaux
- Processus de soudage, pour garantir des joints de soudure parfaits avec des zones caractérisées par une influence thermique minimale, et les meilleures propriétés mécaniques
- Des onduleuses haute vitesse pour l'ondulation hélicoïdale et annulaire de cuivre, aluminium et acier inoxydable

Pour le blindage métallique des câbles avec des matériaux lisses ou ondulés comme l'aluminium, le cuivre ou l'acier inoxydable, Rosendahl offre des solutions pour le façonnage de rubans, le soudage et le processus de réduction des tubes comprenant des équipements adéquats situés en aval de la ligne.

En fonction de la conception du câble, de la disponibilité d'espace et de la gamme de produits, Rosendahl est en mesure d'offrir des solutions en ligne (en combinaison avec le processus de revêtement) et hors ligne.

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Rautomead en Irak

La société britannique Rautomead Limited de Dundee a annoncé la désignation d'un nouvel agent au Moyen Orient.

Majeed A Al-Rawi de la société El-Tech Energies and Technologies représentera Rautomead en Irak et en Jordanie, en offrant ses services aux clients actuels de Rautomead du secteur de la technologie de coulée continue de ces pays et en identifiant des clients potentiels dans les secteurs du fil et du câble et du traitement des métaux.

Al-Rawi va promouvoir la gamme complète de produits de Rautomead, y compris les équipements entièrement automatisés pour la production jusqu'à 30 000 tonnes annuelles. Pour des volumes de fil machine inférieurs, une nouvelle gamme pouvant produire de 1 000 à 3 600 tonnes est disponible.

Les modèles spécialisés en métaux précieux facilitent la production de formes et de sections d'alliages d'or et d'argent de qualité supérieure.

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Soutenabilité dans le développement et dans la production d'alliages

Par Ralf Hojda, Dr Michael Köhler et James Schraml

1 Introduction

Le manque croissant de ressources influence de plus en plus les résultats économiques du secteur privé et du secteur industriel. La fourniture d'énergie et de matières premières en est également affectée. Les fabricants de produits semi-finis d'alliages de cuivre ont enregistré une augmentation des prix en pourcentages à trois chiffres, si bien que, récemment, le taux de la valeur ajouté par rapport à la valeur du métal, qui jusque dernièrement était équilibré, est actuellement de un à trois.

Bien qu'autrefois les facteurs mécaniques et technologiques représentaient les critères principaux dans la sélection d'un alliage adéquat, aujourd'hui le prix du métal est devenu un facteur plus important. Cela entraîne également des conséquences dans le développement et dans la fabrication des alliages.

Les développeurs sont également concernés par la recyclabilité des nouveaux alliages et des composés ainsi que de l'utilisation d'alliages plus résistants pour réduire les épaisseurs des parois et donc de la conservation des ressources en utilisant une quantité inférieure de matériau.

Le présent article décrit deux exemples de développement de matériaux caractérisés par une bonne recyclabilité et permettant de réduire la quantité de matériaux utilisés. Dans le premier exemple, le matériau décrit est un nouvel alliage à haute conductivité pouvant être recyclé sans aucune limitation, même lorsqu'il est revêtu d'étain.

Le deuxième exemple concerne l'utilisation de bronze haute résistance, qui peut être aisément réintroduit dans le cycle du matériau et qui peut surtout être utilisé dans plusieurs applications de miniaturisation, en facilitant ainsi la conservation des ressources.

2 Exemples

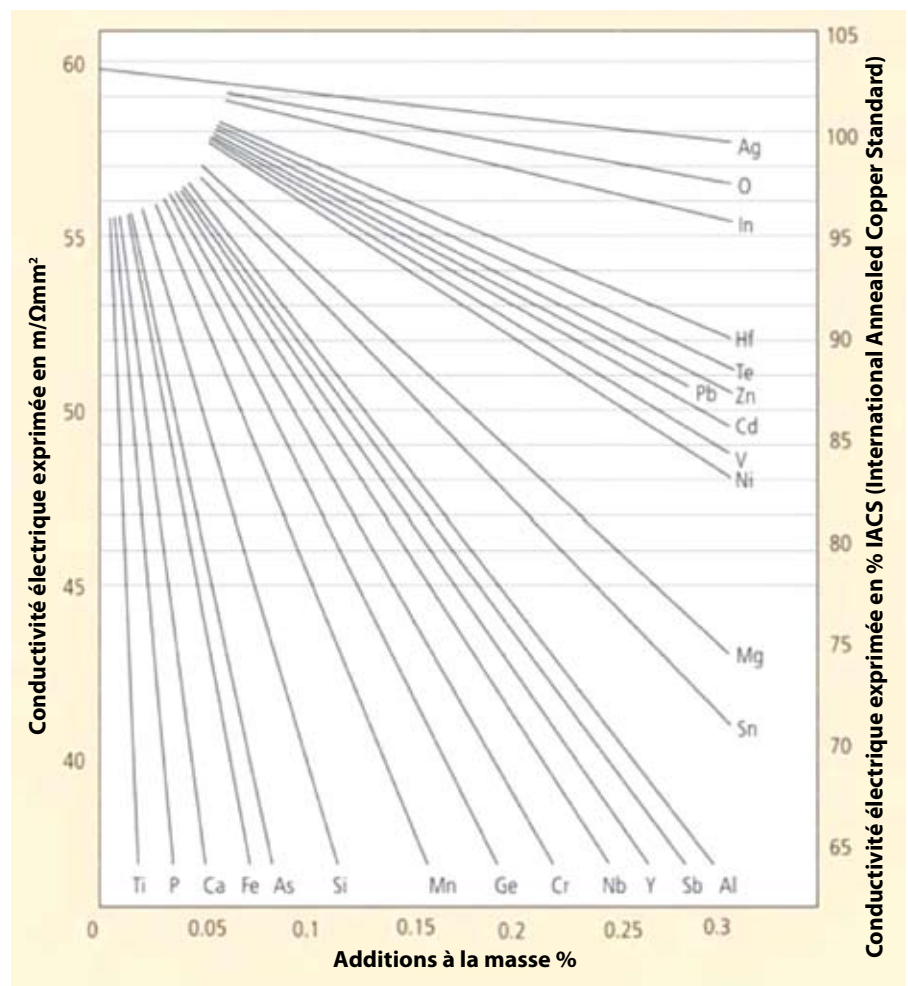
2.1 Développement 1

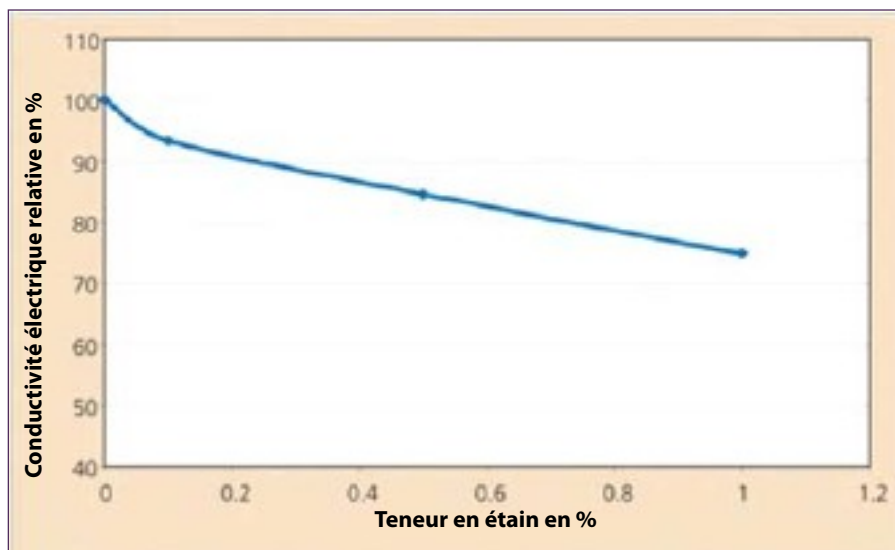
Les éléments de connexion utilisés dans les secteurs de l'ingénierie électrique et électronique doivent répondre à plusieurs exigences. La résistance mécanique, la conductivité électrique et la résistance à la corrosion représentent des critères

clés pour un fonctionnement fiable des composants durant la vie utile de tout le système.

Dans plusieurs cas, les propriétés requises sont réciproquement incompatibles, de même que lorsqu'une combinaison de bonne conductivité et résistance à la corrosion excellente est spécifiée. Bien que des composants tels que le nickel

▼ Figure 1: Influence des éléments liants sur la conductivité électrique du cuivre





▲ **Figure 2:** Influence de la teneur en étain sur la conductivité du CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Cuivre	Balancement	Balancement	Balancement
Étain	0.12	-	0.2 – 0.8
Zinc	<0.10	0.13	<0.05
Fer	<0.02	2.4	<0.02
Nickel	<0.02	-	0.1 – 0.6
Phosphore	<0.015	0.03	0.008 – 0.05

▲ **Tableau 1:** Comparaison de la composition chimique de différents bronzes

et le chrome améliorent la résistance à la corrosion d'un alliage de cuivre, ils en réduisent toutefois considérablement la conductivité (voir Figure 1).

Les éléments composites représentent une solution fréquemment adoptée pour résoudre ce problème, surtout sous forme de revêtements à base d'étain pur appliqués à la surface de l'alliage de cuivre. Seulement dans les cas de rares exceptions, la directive RoHS (Restriction of Hazardous Substances), concernant l'utilisation de certaines substances dangereuses dans l'équipement électronique et électrique, entrée en vigueur le 1^{er} juillet 2006, interdit les composés classiques de plomb-étain qui étaient utilisés auparavant. L'intégration du revêtement fonctionnel d'étain pur dans le cycle du matériau est décrit en détail ci-après

La sélection du matériau pour les connecteurs est principalement basée sur des critères physiques tels que la conductivité électrique, le module d'élasticité, la relaxation thermique et les caractéristiques de processus telles que la ductilité et la capacité de pliage ainsi que le comportement au soudage. Les problèmes concernant la protection partielle ou totale de la surface sont d'importance secondaire de même que la disponibilité de base des matériaux et les coûts des ces derniers.

Une analyse des déchets de production et de poinçonnage révèle que, dans plusieurs cas, ces facteurs ne sont pas suffisamment considérés ni du point de vue écologique

▼ **Tableau 2:** Comparaison des propriétés technologiques de différents bronzes

	BB01	SB02	BB05xi
Conductivité électrique douce [% IACS]	>83	63	>62
Conductivité thermique (watts/mètres Kelvin)	360	260	250
Coefficient d'expansion thermique [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Module d'élasticité [GPa]	128	123	126

▼ **Tableau 3:** Comparaison des propriétés technologiques de différents bronzes

Épaisseur de la bande 0,3mm	BB01	SB02	BB05xi
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Température de ramollissement [°C (1 h)]	300	350	350
Capacité de pliage [180° GW R/S]	1	0	0.5
Capacité de pliage [180° BW R/S]	1	1	0.5

ni du point de vue économique ainsi que l'illustre l'exemple suivant. Durant la production de grille de connexion de grandes dimensions réalisées en CuFe2P (C19400) étamé par immersion à chaud pour les systèmes ABS et ESP, on produit environ de 50% à 70% de ferraille.

Cette dernière ne peut pas être directement recyclée (réintroduite dans le processus de fusion), elle doit être soumise à des processus de fusion et de séparation électrolytique exigeant beaucoup de temps.

La ferraille est ensuite réintroduite dans le cycle de matériau et de production sous forme de cathode. Ce procédé est caractérisé par une forte intensité d'énergie et est donc coûteux quant à la fusion directe.

Généralement, une bande d'une épaisseur de 0,4mm est pourvue d'un revêtement d'étain de 3µm sur les deux côtés. Lorsque la ferraille est recyclée directement, l'alliage de CuFe2P en résultant contient environ 1,5% d'impuretés d'étain. Cela influence considérablement le comportement durant l'érouissage et la conductivité électrique de l'alliage, qui diminue drastiquement lorsque la teneur en étain dépasse 0,3% (voir la Figure 2).

Il est donc nécessaire d'avoir un nouvel alliage avec des propriétés comparables à celles du CuFe2P, mais pouvant être recyclé sans difficulté, même lorsqu'il est revêtu d'étain. Les alliages de cuivre pur et d'étain tels que le CuSn 0.15 offrent la possibilité

d'être utilisés comme des alternatives. Lorsqu'elle est revêtue d'étain, la ferraille peut être réintroduite directement dans le cycle du matériau (voir Tableau 1).

En outre, ses propriétés mécaniques et technologiques correspondent relativement bien à celles du CuFe2P. Toutefois, il existe d'évidents points de faiblesse en termes de comportement au ramollissement et de résistance à la relaxation (voir Tableaux 2 et 3).

Une analyse de l'alliage BB05xi récemment développé montre une situation différente. Grâce à l'harmonisation ciblée des éléments liants (étain, nickel et phosphore) ce matériau offre des propriétés mécaniques et technologiques comparables à celles du CuFe2P, ainsi qu'à celles du profil des propriétés requises pour le processus supplémentaire et pour l'application finale, en ce qui concerne le comportement durant le ramollissement et la relaxation (fluage du composant sous tension à haute température) (voir la Figure 3).

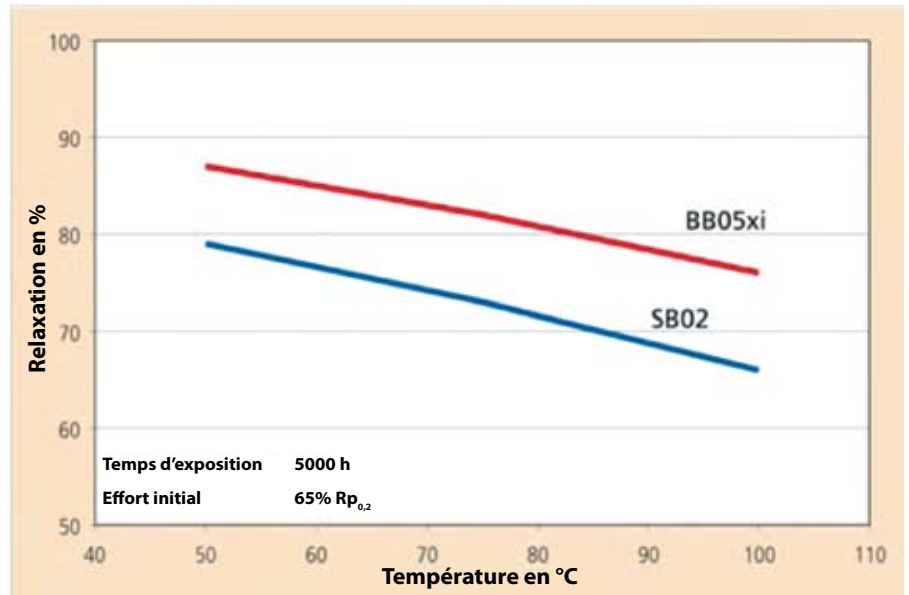
Durant le traitement complémentaire à hautes températures, l'épaisseur de la couche liante se formant entre le matériau de base et le revêtement d'étain du BB05xi étamé est comparable à celui du CuFe2P.

Par conséquent, les lignes de production ne doivent pas être converties pour l'introduction de ce nouveau matériau composite (Figure 4).

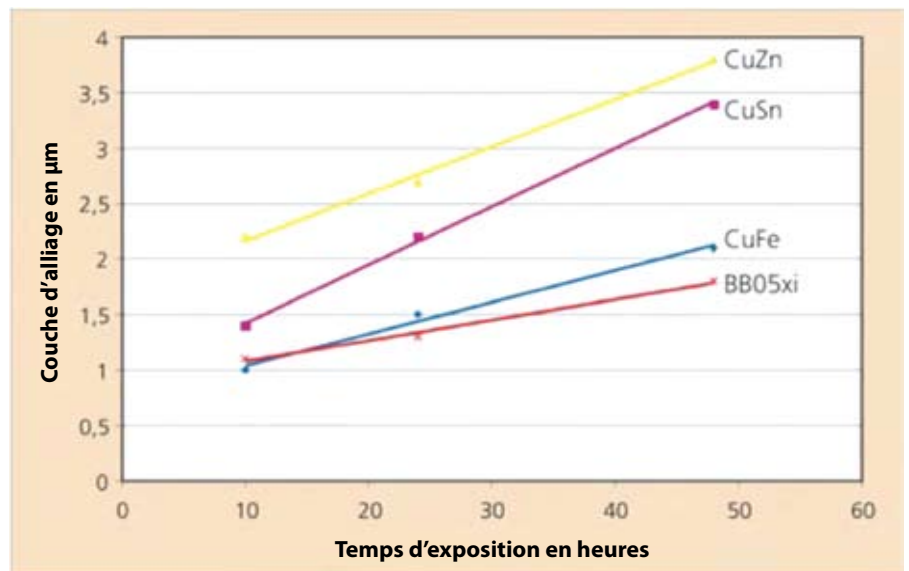
En outre, ce nouvel alliage est particulièrement significatif puisque la ferraille étamée résultant de différentes phases de la chaîne de la valeur ajoutée est directement recyclable. En plus, une comparaison des valeurs des métaux BB05xi et CuFe2P ne justifie pas la différence entre les coûts du recyclage indirect et direct de la ferraille de production et de poinçonnage qui généralement, dans ce secteur, s'attestent de 20% à 25% environ de la valeur du métal – ce dernier étant un facteur d'importance fondamentale à une époque où le prix des matières premières est élevé et à la hausse.

Par exemple, avec un pourcentage de ferraille de 70%, les coûts de fusion peuvent rapidement s'aligner aux coûts de production, en générant ainsi des doutes quant à la faisabilité économique de la totalité du processus.

L'utilisation d'un bronze phosphoreux revêtu d'étain représente donc une alternative valable aux alliages de cuivre-fer étamés tant du point de vue écologique qu'économique (l'utilisation supplémentaire de l'électricité et de l'acide pour le traitement électrolytique de la ferraille est éliminée).



▲ Figure 3: Comparaison du comportement de relaxation entre le CuFe2P et le BB05xi



▲ Figure 4: Formation de la couche d'alliage à 180°C après étamage par immersion à chaud

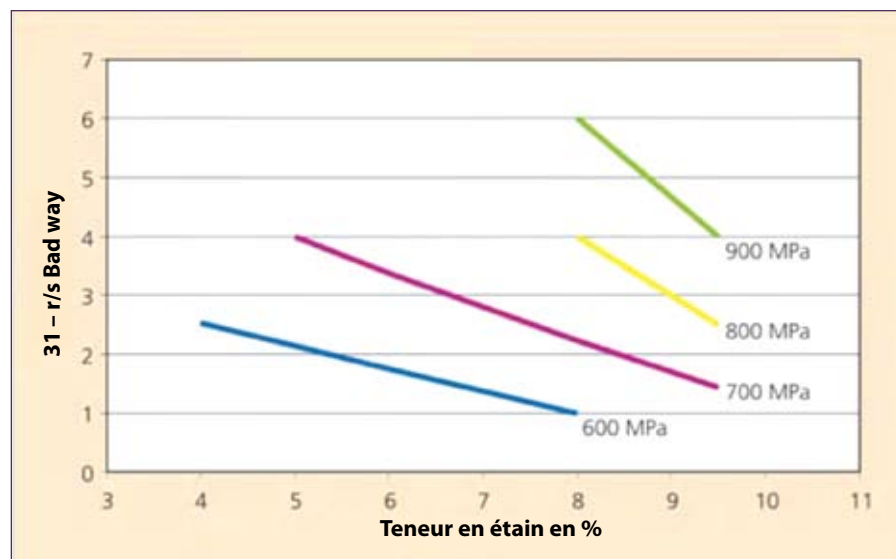
2.2 Développement 2

Les alliages d'aluminium sont utilisés pour les connecteurs et les composants dans des applications d'ingénierie électronique et électrique attendu qu'ils présentent des caractéristiques d'élasticité excellentes, une bonne résistance aux tensions thermiques et électriques, un relâchement réduit de la tension et une excellente capacité de pliage et de soudabilité.

Normalement, aux alliages de ce type on ajoute une petite quantité de phosphore pour la désoxydation: c'est pourquoi ils sont également appelés bronzes phosphoreux. Les propriétés de ce groupe d'alliages dépendent principalement de la teneur en étain et en phosphore, et dans une moindre mesure, de l'addition d'autres éléments liants. Grâce à un processus

adéquat, les propriétés de ces alliages peuvent être adaptées pour être utilisés dans une ample gamme d'applications. Les nombreuses applications industrielles de cette gamme d'alliages comprennent des connecteurs et des prises de haute qualité pour modules électroniques à ressorts de contact conductifs.

Dans le passé, on utilisait le "déclassement" comme moyen de sélection efficace pour un bronze phosphoreux. En d'autres termes, les propriétés technologiques d'un bronze phosphoreux à teneur d'alliage réduite étaient modifiées dans le but de faire correspondre les caractéristiques d'élasticité et de processus avec celles du bronze phosphoreux original à teneur d'alliage élevé. Toutefois, il a été nécessaire de considérer quelques contraintes.



▲ **Figure 5:** Capacité de pliage de différents bronzes phosphoreux en fonction de la résistance

La teneur en étain et en phosphore influence considérablement le comportement de durcissement et la ductilité des bronzes phosphoreux, et une relation évidente a été observée entre la capacité de pliage et la teneur en étain.

La Figure 5 illustre comme l'augmentation de la teneur en étain influence positivement la capacité de pliage avec un effort constant.

Dans ce contexte, il apparaît logique de développer un bronze phosphoreux avec une teneur en alliage supérieure.

Une autre raison justifiant le développement de ce matériau était la requête de miniaturisation des connecteurs, la réduction de sections transversales réduisant la force de contact à une déflexion constante de l'élément élastique.

Par conséquent, pour une force constante définie, il est nécessaire de reconcevoir l'élément élastique en augmentant simultanément la contrainte admissible.

Une solution pour ce problème est représentée par le nouvel alliage BB95, un bronze phosphoreux à 10%. Par rapport au bronze étamé à 8%, le BB95 présente une limite d'élasticité de $R_{p0,2} > 720$ MPa, une amélioration de la capacité de pliage en $BW90^\circ R/S$ selon le facteur 2.

En fonction de l'application requise, le BB95 peut être durci jusqu'à la limite d'élasticité $R_{p0,2}$ de 800MPa, et la gamme de résistance élevée jusqu'à >950 MPa.

La différence de conductivité électrique entre le BB95 et un bronze étamé à 8% est d'environ 1% IACS (International Annealed Copper Standard), c'est-à-dire que l'étain a

une influence négligeable sur la réduction de conductivité lorsqu'il est présent dans les alliages dans ces pourcentages. Durant la trempe SH (spring hard) le BB95 présente les mêmes caractéristiques de ramollissement qu'un bronze phosphoreux à 8%; une réduction de dureté significative n'est observée qu'à environ 280°C.

En outre, la relaxation du nouveau matériau (<20% à une température de 100°C dans un essai continu de 10.000 heures) est comparable à celui de l'alliage de référence mentionné ci-dessus (à condition que le niveau de tension soit identique).

Étant donné la force de contact citée plus haut, ces résultats indiquent qu'en utilisant le BB95, l'on peut obtenir une réduction d'épaisseur du matériau, et donc une réduction de 20% environ de la quantité de matériau requise.

3 Résumé

Les augmentations soudaines du prix des matières premières, et notamment le prix du cuivre, ont drastiquement modifiée la relation entre la valeur ajoutée et la valeur du métal dans la fabrication des produits de cuivre semi-finis.

Les économies réalisées au moyen du recyclage et en limitant la quantité de matériaux utilisés, ont un impact général supérieur par rapport au coût de processus total.

L'utilisation de matériaux de cuivre à teneur en alliage réduite est un exemple qui permet de décrire l'influence d'une sélection bien programmée d'alliages et de composites.

La combinaison d'un bronze phosphoreux récemment développé à teneur en alliages réduite avec un revêtement de cuivre, représente une alternative valable aux alliages de cuivre-fer étamés également d'un point de vue écologique et économique, permettant de maintenir un profil de propriétés similaires.

Grâce au nouveau développement d'un bronze phosphoreux à 10%, il est possible de générer de la valeur ajoutée pour le client en réduisant la quantité de matériau utilisé. Ce matériau présente un profil de propriétés similaire à celui d'un alliage de cuivre-étain à 8%, mais avec une capacité de pliage supérieure.

En outre, le nouvel alliage facilite l'économie de ressources puisqu'il est en mesure de résister aux tensions plus élevées. Épargner 20% des matériaux semble être ainsi faisable. ■

Cet article a été présenté au cours du 58^e Séminaire International Wire & Cable and Connectivity Symposium qui s'est tenu à Charlotte, NC, du 8 au 11 novembre 2009, et a été reproduit avec l'autorisation des organisateurs.

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Controllo di qualità versatile



▲ Rilevatore versatile KW 13Trio di Zumbach

Per ottenere un controllo di qualità continuo, i rilevatori di nodi e strozzature sono altrettanto importanti dei misuratori di diametro e degli spark-tester. La nuova linea di rilevatori KW 13Trio di Zumbach è progettata per rilevare con rapidità e precisione persino i nodi e le strozzature di più piccole dimensioni nei fili, nei conduttori, nelle fibre ottiche e nei cavi.

La struttura compatta del rilevatore KW 13Trio ne facilita l'integrazione in qualsiasi linea di estrusione o processo di riavvolgimento. Il campo di misura è dimensionato in modo da consentire un passaggio fluido anche a strozzature di dimensioni eccezionali durante l'avviamento. La concezione aperta permette di effettuare la filettatura del prodotto facilmente e rapidamente senza arrestare la produzione.

L'integrazione di un potente microprocessore ed il trattamento e l'elaborazione completamente digitale dei dati rendono questo rilevatore di nodi e strozzature uno strumento importante per il controllo e la qualità. Il rilevatore sarà disponibile come dispositivo autonomo. Utilizzando un'unità operativa e di visualizzazione locale, il rilevatore KW 13Trio può essere interamente configurato e attivato direttamente sul dispositivo.

Caratterizzato da una tolleranza di altezza d'errore rilevabile minima di 0,01mm (0,0004 pollici) e da una lunghezza d'errore minima di 0,2mm (0,008 pollici), ed è provvisto di un dispositivo di elaborazione digitale dei segnali (DSP).

Il rilevatore versatile KW 13Trio presenta molteplici interfacce, comprendenti un'interfaccia seriale RS, Profibus DP e Ethernet EN. La connessione può essere effettuata attraverso una porta di interfaccia RS ad un sistema USYS di acquisizione dati e ad un sistema di elaborazione e visualizzazione. Le versioni con Profibus DP e Ethernet EN consentono la connessione ad un host di livello superiore come un PLC o un sistema di acquisizione dati.

Il principio di misurazione e la complessa soluzione ottica garantiscono l'immunità alla luce parassita e offrono contemporaneamente la più elevata precisione di rilevazione e di identificazione di nodi e strozzature nell'ordine di micrometri.

I modelli KW 13Trio dispongono di una banca dati dei difetti interni per l'archiviazione di almeno 100 difetti rilevati, incluse caratteristiche dei difetti quali: numero, tipo, altezza, posizione e lunghezza del difetto. È possibile accedere a questa banca dati attraverso l'unità operativa e di visualizzazione locale o attraverso interfacce remote opzionali.

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Società specializzata in cavi sottomarini completa l'installazione di un sistema di cavi

Main One Cable Company, società specializzata nell'installazione di cavi sottomarini che offre accesso aperto e capacità di banda larga all'ingrosso in Africa Occidentale, ed il suo fornitore di sistemi, Tyco Electronics Subsea Communications SubCom, hanno completato l'installazione della prima fase del suo sistema di cavi come da programma.

Il direttore esecutivo di Main One Cable Company, Funke Opeke, ha dichiarato che la Fase 1 del sistema Main One Cable comprende 6.800km e fornirà la capacità indispensabile fra la costa occidentale dell'Africa ed il Portogallo.

Il progetto relativo alla tecnologia DWDM a doppia fibra da 1,92 terabit/s prevede prima il collegamento di Lagos, Accra e Seixal con l'Europa, l'Asia e le Americhe, mentre la Fase 2 del progetto prevede di estendere il collegamento al Sud Africa.

Il sistema di cavi, la cui entrata in servizio era prevista per giugno 2010, offrirà l'accesso aperto agli operatori locali di telecomunicazioni e ai fornitori di servizi Internet a tariffe inferiori ai prezzi internazionali attualmente applicati per la banda larga nella regione.

Il sistema fornirà inoltre la capacità a banda larga di estendere l'accesso a Internet nella zona sahariana e alleggerirà le difficoltà di commutazione del traffico fra i paesi africani senza che sia necessario passare per l'Europa.

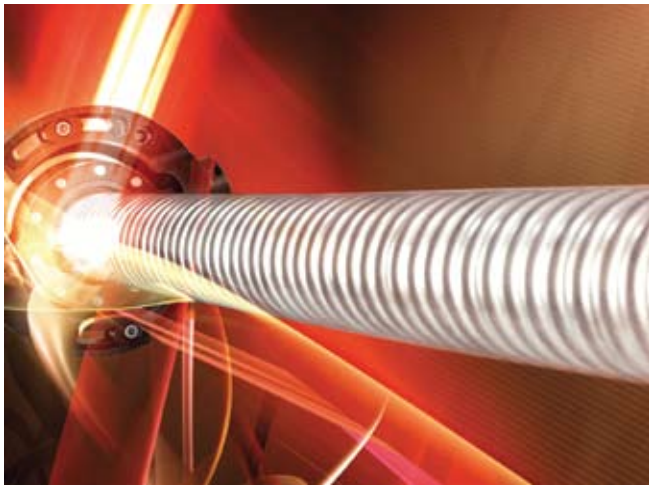
Il presidente di SubCom, David Coughlan ha sottolineato: "dall'inizio della nostra collaborazione nel 2008, la società SubCom è stata desiderosa di completare l'installazione marina della Fase 1.

"Il completamento del programma marino sta trasformando il sistema Main One Cable System Cable in realtà. A nostro avviso il lavoro che abbiamo realizzato su Main One rappresenta un risultato molto importante e siamo fieri di fare parte di questo progetto."

Tyco Electronics Subsea Communications – Stati Uniti
Website: www.subcom.com

Main One Cable Company – Isola di Mauritius
Website: www.mainonecable.com

Tecnologia di formatura e di saldatura di nastri metallici



▲ Equipaggiamenti di saldatura e di ondulazione per cavi elettrici di Rosendahl

Rosendahl ha ampliato la sua gamma di prodotti per offrire equipaggiamenti di saldatura e di corrugazione per applicazioni di cavi di potenza.

In seguito alla richiesta di soluzioni alternative per l'industria, e sulla base dell'esperienza acquisita in progetti con esito positivo nel settore della formatura, della saldatura e della corrugazione per cavi RF high-end, Rosendahl ha deciso di penetrare questo segmento di mercato.

I fabbricanti di cavi richiedono questa tecnologia per prodotti quali cavi per centrali eoliche, centrali nucleari offshore o cavi per le applicazioni sottomarine. Il settore della bassa tensione comprende inoltre una serie di prodotti (cavi per pompe ad olio, marini e di segnalazione), che utilizzano la tecnologia di Rosendahl per migliorare le proprietà dei prodotti o per aumentare la produttività durante il processo di fabbricazione.

Unità di produzione di cavi aeronautici in Marocco

Nexans ha inaugurato a Mohammedia (Marocco) una nuova unità, completamente dedicata alla produzione di cavi aeronautici.

Questa fabbrica è il risultato di un accordo fra Nexans e Airbus per la fornitura di cavi all'avanguardia destinati agli aeromobili A320, A350 e A380.

L'investimento di quasi 10 milioni di euro rafforza l'attività aeronautica di Nexans e l'attività di base della filiale marocchina, già provvista di una notevole competenza nella fabbricazione di cavi per il settore automobilistico, edile e delle infrastrutture.

Si tratta della terza unità di Nexans specializzata in cavi per aeromobili; impianti simili sono stati installati in Francia e negli Stati Uniti.

Nexans ha così riorganizzato l'impianto di Mohammedia per ospitare una superficie di produzione di 3.000m² progettata per la produzione di 21.000km di cavi l'anno, il 70% dei quali è destinato all'esportazione.

Nexans – Francia

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Rispetto ad altre tecnologie, quali l'estrusione di alluminio o di piombo, il sistema di formatura e di saldatura di nastri metallici offre numerosi vantaggi.

Questa tecnologia offre risultati migliori per il servizio continuo, l'utilizzo economico dell'energia elettrica e dell'acqua, la riduzione di scarti durante la produzione, la possibilità di variare le dimensioni e di utilizzare diversi materiali metallici per la schermatura.

Si ritiene che i cavi fabbricati con questa tecnologia presentino proprietà eccellenti di stabilità meccanica e di impermeabilità all'acqua e al gas.

Le tecnologie sviluppate e ottimizzate per queste applicazioni comprendono:

- Formatori ottimizzati per diversi materiali
- Processo di saldatura, per garantire cordoni di saldatura perfetti con zone caratterizzate da una minima influenza termica, e le migliori proprietà meccaniche
- Corrugatori ad alta velocità per la corrugazione elicoidale e anulare del rame, dell'alluminio e dell'acciaio inossidabile

Per la schermatura metallica con materiali lisci o corrugati quali l'alluminio, il rame o l'acciaio inossidabile, Rosendahl offre soluzioni per la formatura, la saldatura e il processo di riduzione dei tubi, inclusi adeguati equipaggiamenti posti a valle della linea.

In base alla struttura del cavo, alla disponibilità di spazio e alla gamma di prodotti, Rosendahl è in grado di offrire soluzioni in linea (combinata con il processo di rivestimento) e fuori linea.

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Rautomead in Iraq

Majeed A Al-Rawi della società El-Tech Energies and Technologies rappresenterà Rautomead in Iraq e in Giordania, offrendo servizi ai clienti attuali di Rautomead del settore della tecnologia della colata continua del proprio paese e identificando potenziali clienti nei settori del filo e del cavo e del trattamento dei metalli.

Al-Rawi promuoverà la gamma completa di prodotti di Rautomead, compresi i macchinari completamente automatizzati per la produzione fino a 30.000 tonnellate l'anno. Per volumi di vergella inferiori, è disponibile una nuova gamma in grado di produrre da 1.000 a 3.600 tonnellate. I modelli speciali in metalli preziosi facilitano la produzione di forme e sezioni di leghe d'oro e d'argento di qualità superiore.

Il direttore delle vendite e del marketing di Rautomead, Guy Henderson, ha dichiarato: "La nomina di Al-Rawi rappresenta un altro esempio dell'impegno della società rispetto ai mercati emergenti, che segue il lancio delle nostre nuove pagine web in russo e in cinese".

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Sostenibilità nello sviluppo e nella produzione di leghe

A cura di Ralf Hojda, Dr Michael Köhler, James Schraml

1 Introduzione

La crescente scarsità di risorse sta influenzando sempre più i risultati economici sia nel settore privato che nel settore industriale. Anche la fornitura di energia e di materie prime ne risentono.

I fabbricanti di prodotti semi-finiti di leghe di rame hanno registrato un aumento dei prezzi in percentuali di tre cifre cosicché, recentemente, il rapporto tra il tasso di valore aggiunto e il valore del metallo, che era in equilibrio fino solo pochi anni fa, è ora di uno a tre.

Sebbene le caratteristiche meccaniche e tecnologiche siano sempre state considerate i criteri principali per selezionare una lega adeguata, attualmente il prezzo del metallo è diventato un fattore più importante. Ciò ha inoltre conseguenze nello sviluppo e nella fabbricazione delle leghe.

I progettatori sono ugualmente preoccupati della riciclabilità delle nuove leghe e dei composti nonché dell'utilizzo di leghe più resistenti per ridurre gli spessori delle pareti e, conseguentemente, della conservazione delle risorse utilizzando meno materiale.

Il presente articolo descrive due esempi di sviluppo di materiali che presentano una buona riciclabilità e consentono di ridurre la quantità di materiali utilizzati.

Nel primo esempio, il materiale descritto è una nuova lega ad alta conduttività che può essere riciclata senza alcuna limitazione, anche quando è rivestita di stagno.

Il secondo esempio riguarda l'utilizzo di bronzo ad elevata resistenza, che può essere facilmente reintrodotta nel ciclo del materiale e che è soprattutto particolarmente indicato per l'uso in numerose applicazioni di miniaturizzazione, facilitando in questo modo la conservazione delle risorse.

2 Esempi

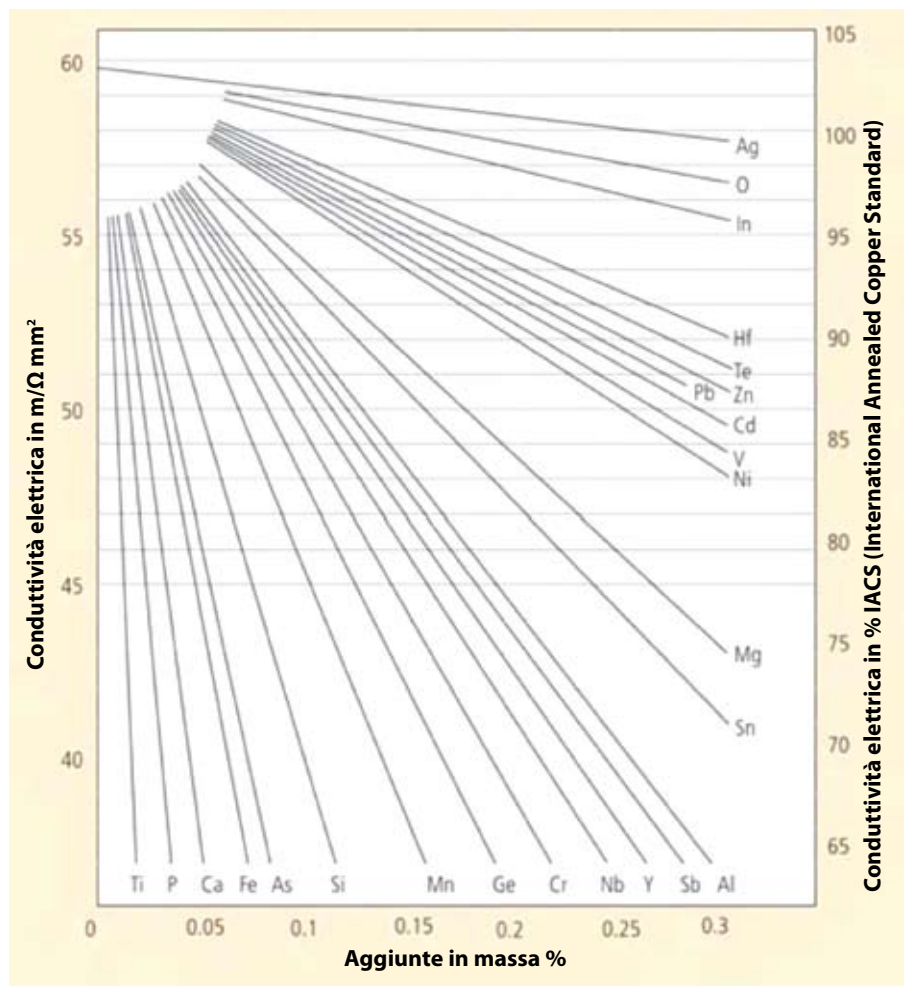
2.1 Sviluppo 1

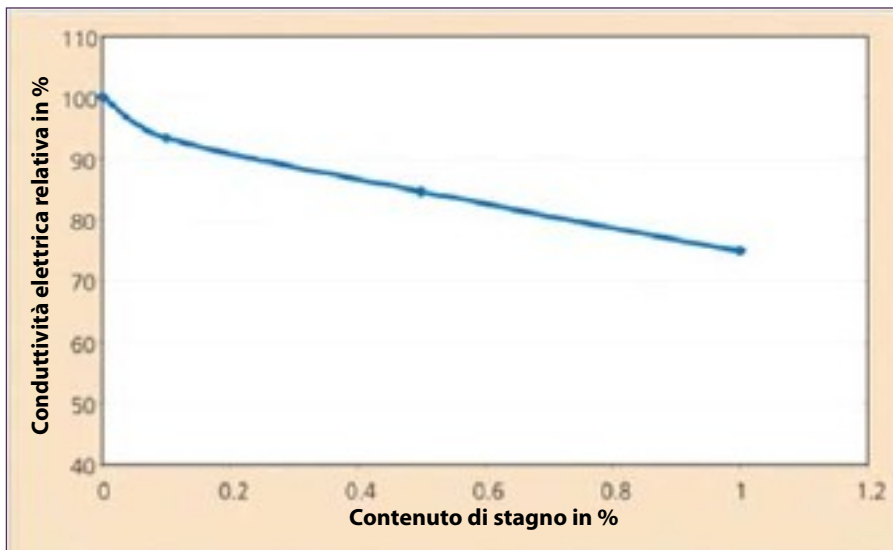
Gli elementi di connessione utilizzati nei settori dell'ingegneria elettrica ed elettronica devono soddisfare numerosi requisiti. La resistenza meccanica, la conduttività elettrica e la resistenza alla corrosione costituiscono dei criteri chiave per un funzionamento affidabile dei componenti durante la vita utile

dell'intero sistema. In numerosi casi, le proprietà richieste sono reciprocamente incompatibili, come quando viene specificata una combinazione di buona conduttività ed eccellente resistenza alla corrosione.

Nonostante componenti di una lega di rame, come il nichel e il cromo, migliorino la resistenza alla corrosione, al tempo stesso ne riducono notevolmente la conduttività (cfr. Figura 1).

▼ **Figura 1:** Influenza degli elementi leganti sulla conduttività elettrica del rame





▲ **Figura 2:** Influenza del contenuto di stagno sulla conducibilità del CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Rame	Bilanciamento	Bilanciamento	Bilanciamento
Stagno	0.12	-	0.2 – 0.8
Zinco	<0.10	0.13	<0.05
Ferro	<0.02	2.4	<0.02
Nichel	<0.02	-	0.1 – 0.6
Fosforo	<0.015	0.03	0.008 – 0.05

▲ **Tabella 1:** Comparazione della composizione chimica di vari bronzi

Gli elementi composti sono una soluzione frequentemente adottata per risolvere questo problema, soprattutto sotto forma di rivestimenti a base di stagno puro applicati alla superficie della lega di rame.

Solo con poche eccezioni, la direttiva RoHS (Restriction of Hazardous Substances), entrata in vigore il 1° luglio 2006, vieta i tipici composti di piombo-stagno che si utilizzavano precedentemente.

Qui di seguito, viene descritta in dettaglio l'integrazione del rivestimento funzionale di stagno puro nel ciclo di materiale.

La selezione del materiale per connettori si basa principalmente su criteri fisici come la conducibilità elettrica, il modulo di elasticità, il rilassamento termico e le caratteristiche di processo quali la duttilità e la capacità di piegamento, ed il comportamento durante la saldatura.

I problemi relativi alla protezione parziale o totale della superficie sono di importanza secondaria come pure la disponibilità di base dei materiali ed i costi dei materiali.

Un esame degli scarti di produzione e di punzonatura rivela che, in molti casi, questi fattori non ricevono l'attenzione che meriterebbero né da un punto di vista ecologico né economico, come illustrato dal seguente esempio.

Durante la produzione di ampi leadframe composti da CuFe2P (C19400) stagnati per immersione a caldo per sistemi ABS ed ESP, si produce approssimativamente dal

50% al 70% di rottame. Questo non può essere riciclato direttamente (reintrodotto nel processo di fusione), ma deve essere sottoposto a lunghi processi di fusione e separazione elettrochimica.

Quindi viene reintrodotta nel ciclo del materiale e di produzione sotto forma di catodo. Questo procedimento è caratterizzato da una forte intensità di energia ed è pertanto costoso per quanto riguarda la fusione diretta.

Normalmente, un nastro dello spessore di 0,4mm è provvisto di un rivestimento di stagno di 3µm su entrambi i lati. Quando il rottame viene riciclato direttamente, la lega di CuFe2P risultante contiene circa l'1,5% di impurità di stagno.

Ciò influenza notevolmente il comportamento durante l'incrudimento e la conducibilità elettrica della lega, che si riduce drasticamente quando il contenuto di stagno supera lo 0,3% (cfr. Figura 2).

Pertanto è necessaria una nuova lega con proprietà comparabili a quelle del CuFe2P, ma che possa essere riciclata senza difficoltà anche quando è rivestita di stagno. Le leghe di rame puro e di stagno come il CuSn 0,15 offrono la possibilità di essere utilizzate come alternative.

Quando è rivestito con stagno, il rottame può essere reintrodotta direttamente nel ciclo del materiale riciclabile (cfr. Tabella 1).

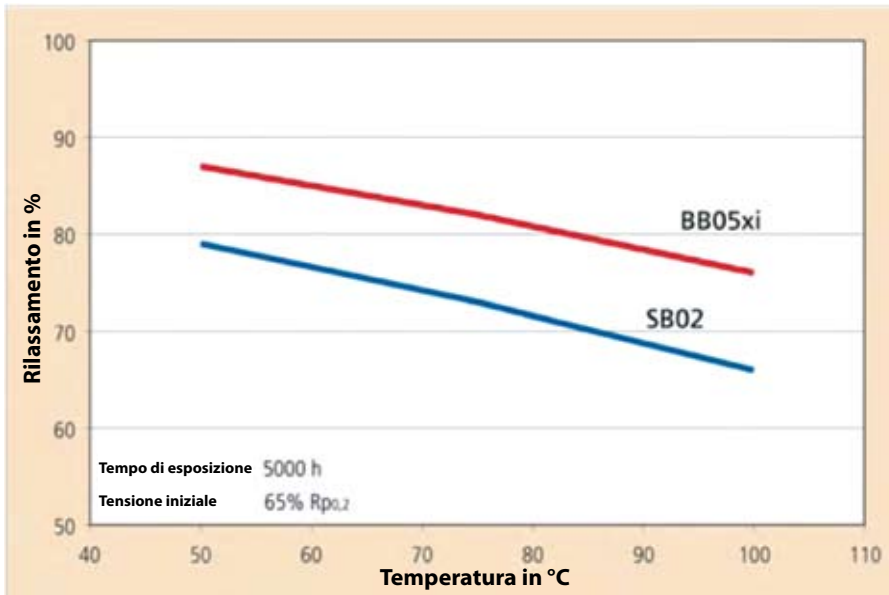
Inoltre, le proprietà meccaniche e tecnologiche corrispondono relativamente

▼ **Tabella 2:** Comparazione delle proprietà tecnologiche di vari bronzi

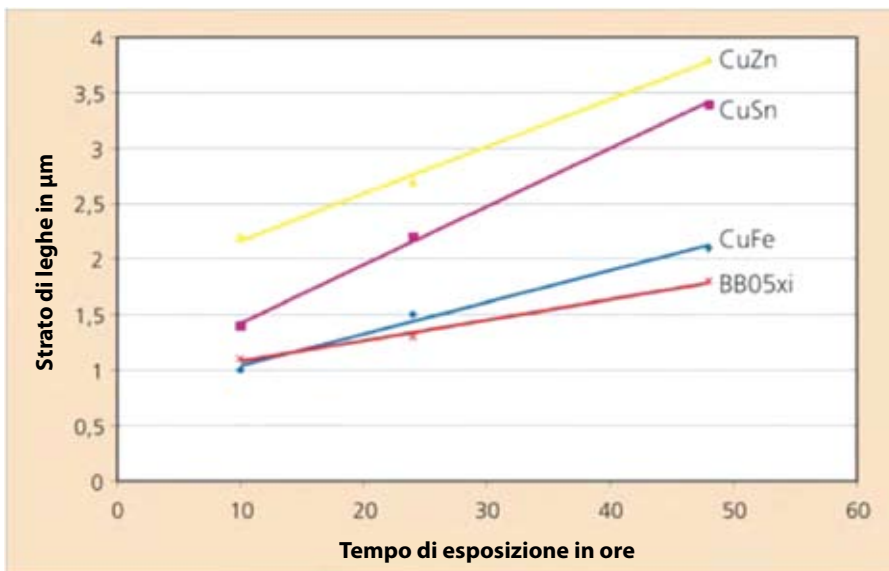
	BB01	SB02	BB05xi
Conducibilità elettrica morbida Soft [% IACS]	>83	63	>62
Conducibilità termica (watt/metri Kelvin)	360	260	250
Coefficiente di dilatazione termica [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Modulo di elasticità [GPa]	128	123	126

▼ **Tabella 3:** Comparazione delle proprietà tecnologiche di vari bronzi

	BB01	SB02	BB05xi
Spessore del nastro 0,3mm			
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Temperatura di rammollimento [°C (1 h)]	300	350	350
Capacità di piegamento [180° GW R/S]	1	0	0.5
Capacità di piegamento [180° BW R/S]	1	1	0.5



▲ **Figura 3:** Comparazione del comportamento di rilassamento tra CuFe2P e BB05xi



▲ **Figura 4:** Formazione dello strato di leghe a 180°C dopo stagnatura per immersione a caldo

bene a quelle del CuFe2P. Tuttavia esistono evidenti punti deboli in termini di comportamento durante il rammollimento e di resistenza al rilassamento (cfr. Tabelle 2 e 3).

Un'analisi della lega BB05xi sviluppata recentemente rivela una situazione diversa. Mediante l'armonizzazione mirata degli elementi leganti (stagno, nickel e fosforo) questo materiale raggiunge proprietà meccaniche e tecnologiche comparabili sia con quelle del CuFe2P sia con quelle del profilo delle proprietà richiesto per la rispettiva lavorazione successiva e per l'applicazione finale per quanto riguarda il comportamento durante il rammollimento ed il rilassamento (scorrimento del componente sotto tensione a temperatura elevata) (cfr. Figura 3).

Durante la lavorazione successiva ad alte temperature, lo spessore dello strato legante che si viene a formare tra il materiale di base e il rivestimento di stagno del BB05xi stagnato è comparabile con quello del CuFe2P. Pertanto non è necessario un adattamento delle linee di produzione per introdurre questo nuovo materiale composto (Figura 4).

Inoltre, questa nuova lega si distingue soprattutto perché il rottame stagnato prodotto durante le varie fasi della catena di creazione del valore aggiunto è direttamente riciclabile.

Una comparazione dei valori dei metalli BB05xi e CuFe2P non giustifica inoltre la differenza di costi fra il riciclo indiretto e diretto del rottame di produzione e di

punzonatura, che in questo settore si attestano normalmente dal 20% al 25% del valore del metallo – un fattore di notevole importanza in tempi in cui i prezzi delle materie prime sono elevati e in aumento.

Ad esempio, con una percentuale di rottame del 70%, i costi di fusione possono rapidamente allinearsi ai costi di produzione, sollevando dubbi circa la fattibilità economica dell'intero processo.

L'utilizzo di un bronzo fosforoso rivestito di stagno costituisce pertanto una valida alternativa alle leghe di rame-ferro stagnate sia dal punto di vista ecologico che economico (si elimina l'utilizzo aggiuntivo di elettricità e acido per il trattamento elettrolitico del rottame).

2.2 Sviluppo 2

Le leghe di rame-stagno si utilizzano per connettori e componenti in applicazioni di ingegneria elettronica ed elettrica in quanto presentano caratteristiche di elasticità che vanno da buone a molto buone, una buona resistenza alle tensioni termiche ed elettriche, un ridotto rilassamento della tensione ed un'eccellente capacità di piegamento e di saldabilità.

Normalmente, alle leghe di questo tipo viene aggiunta una piccola quantità di fosforo per la disossidazione, motivo per il quale sono anche definiti bronzi fosforosi.

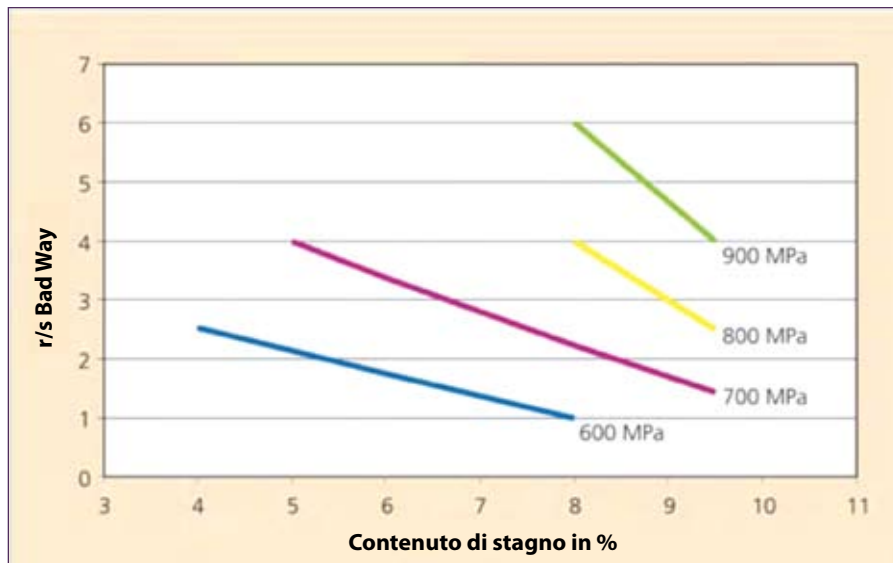
Le proprietà di questo gruppo di leghe dipendono principalmente dal contenuto di stagno e fosforo, e in grado minore, dall'aggiunta di altri elementi leganti.

Mediante un processo adeguato, le proprietà di queste leghe possono essere modificate per l'utilizzo in un'ampia gamma di applicazioni. Le numerose applicazioni industriali di questa gamma di leghe comprendono connettori e prese di alta qualità per moduli elettronici e molle di contatto elettricamente conduttive.

In passato si utilizzava il "declassamento" come efficace metodo di selezione per un bronzo fosforoso.

In altre parole, si modificavano le proprietà tecnologiche di un bronzo fosforoso a basso contenuto di leghe in modo tale che le caratteristiche di elasticità e di lavorazione corrispondessero a quelle del bronzo fosforoso originale ad elevato contenuto di leghe. Tuttavia, dovevano essere considerate alcune restrizioni.

Il contenuto di stagno e fosforo influenza notevolmente il comportamento di incrudimento e la duttilità dei bronzi fosforosi, ed è stata riscontrata una chiara relazione fra la capacità di piegamento ed il contenuto di stagno.



▲ **Figura 5:** Capacità di piegamento di vari bronzi fosforosi in funzione della resistenza

La Figura 5 illustra come un maggiore contenuto di stagno influenzi positivamente la capacità di piegamento sotto sforzo costante. Alla luce di ciò, appariva logico sviluppare un bronzo fosforoso con un contenuto di leghe più elevato.

Un'altra ragione che giustificava lo sviluppo di questo materiale era la richiesta per la miniaturizzazione dei connettori, poiché la riduzione delle sezioni trasversali riduce la forza di contatto ad una flessione costante dell'elemento elastico.

Pertanto, per una forza costante definita, è necessario riprogettare l'elemento elastico aumentando contemporaneamente la tensione ammissibile.

Una soluzione per questo problema è costituita dalla nuova lega BB95, un bronzo fosforoso al 10%. Rispetto al bronzo stagnato all'8%, il BB95 presenta un limite di snervamento di $R_{p0,2} > 720$ MPa, un miglioramento della capacità di piegamento in BW90° R/S secondo il fattore 2.

In base all'applicazione richiesta, il BB95 può essere indurito fino ad un limite di snervamento $R_{p0,2}$ di 800MPa, e il tipo di resistenza elevata fino a >950MPa.

La differenza di conduttività elettrica fra il BB95 e un bronzo stagnato all'8% è approssimativamente dell'1% IACS (International Annealed Copper Standard), cioè lo stagno presenta un'influenza trascurabile sulla riduzione di conduttività quando è presente in leghe a queste percentuali. Durante la tempra SH (spring hard) il BB95 presenta le stesse proprietà di rammollimento di un bronzo fosforoso all'8%; una significativa riduzione di durezza si osserva solo a circa 280°C.

Inoltre, il rilassamento del nuovo materiale (<20% ad una temperatura di 100°C in una prova continua di 10.000 ore) è comparabile a quello della lega di riferimento sopra citata (a condizione che il livello di tensione sia identico).

Considerata la forza di contatto di cui sopra, questi risultati suggeriscono che, utilizzando il BB95, si può ottenere una riduzione di spessore del materiale, e pertanto una riduzione di circa il 20% della quantità di materiale richiesta.

3 Riassunto

I rapidi aumenti di prezzo delle materie prime, e specialmente il prezzo del rame, hanno drasticamente mutato la relazione fra il valore aggiunto e il valore del metallo nella fabbricazione dei prodotti di lega di rame semi-finiti.

I risparmi realizzati mediante il riciclo e limitando la quantità di materiali utilizzati hanno un notevole impatto generale rispetto alla spesa di lavorazione totale.

L'utilizzo di materiali di rame a basso contenuto di leghe è un esempio che consente di descrivere l'influenza di una selezione ben programmata di leghe e composti.

La combinazione di un bronzo fosforoso recentemente sviluppato con bassi contenuti di leghe con un rivestimento di stagno rappresenta una valida alternativa alle leghe di rame-ferro stagnate anche da un punto di vista ecologico ed economico che consente di mantenere un profilo di proprietà similari.

Grazie al nuovo sviluppo di un bronzo fosforoso al 10%, è possibile pensare di generare valore aggiunto per il cliente, riducendo la quantità di materiale utilizzato.

Questo materiale presenta un profilo di proprietà simile ad una lega di rame-stagno all'8%, ma con una capacità di piegamento superiore. Inoltre, la nuova lega facilita il risparmio di risorse poiché in grado di resistere a tensioni più elevate. Risparmiare il 20% dei materiali sembra essere dunque fattibile. ■

Il presente articolo è stato presentato per la prima volta nel corso del 58° Seminario International Wire & Cable and Connectivity Symposium, tenutosi a Charlotte, NC, dall'8 all'11 novembre 2009 ed è stato riprodotto con l'autorizzazione degli organizzatori.

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Control de calidad versátil



▲ Detector KW 13Trio de Zumbach, una herramienta versátil

Para conseguir un control de calidad continuo, los detectores de abultamiento o estrechamiento son tan importantes como los medidores de diámetro o los probadores de chispa. La nueva línea de detectores KW 13Trio de Zumbach son capaces de capturar incluso minúsculos abultamientos y estrechamientos en hilos, conductores, fibra óptica y cables con rapidez y precisión.

El diseño compacto del detector KW 13Trio facilita su integración en cualquier línea de extrusión o proceso de rebobinado. El campo de medida está dimensionado de manera que durante el arranque pasen desapercibidos incluso abultamientos consistentes. Su diseño abierto permite trenzar el producto con facilidad y rapidez sin detener la producción.

La integración de un potente microprocesador y el procesamiento de las señales totalmente digital convierten al detector de abultamiento y estrechamiento en una herramienta importante para el control de calidad. El detector está disponible como dispositivo independiente. Usando una unidad operativa y de visualización local, el detector KW 13Trio puede ser totalmente configurado y activado en el dispositivo.

Tiene una tolerancia de altura de fallo detectable mínima de 0,01mm (0,0004 pulgadas) y de longitud de fallo mínima de 0,2mm (0,008 pulgadas), y dispone de un procesador de señales totalmente digital.

El versátil detector KW 13Trio tiene varias interfaces, que comprenden un enlace RS serie, Profibus DP y Ethernet EN. Puede conectarse, a través de un puerto de interfaz RS, a un sistema USYS de adquisición de datos, procesamiento y visualización. Las versiones con Profibus DP y Ethernet EN permiten conectarlo a un host de nivel más alto, como un PLC o un sistema de adquisición de datos.

El principio de medida y la compleja solución óptica garantizan inmunidad a la luz difusa e intensa, ofreciendo máxima precisión de detección y localización de abultamiento y estrechamiento del orden de micrómetros.

Los modelos KW 13Trio disponen de una base de datos de fallos interna donde se guardan los últimos 100 fallos detectados, que incluyen características de fallo como número de fallo, tipo, altura, posición y longitud de fallo. Es posible acceder a esta base de datos a través de la unidad operativa y de visualización local o de las interfaces remotas opcionales.

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Empresa de cable submarino completa instalación

Main One Cable Company, empresa de instalación de cables submarinos que ofrece acceso abierto, capacidad de banda ancha mayorista en África occidental, y su proveedor de sistemas, Tyco Electronics Subsea Communications SubCom, han finalizado la instalación de la primera fase de su sistema de cable según la programación prevista.

La instalación del equipo terminal ha sido finalizada ya en Seixal (Portugal) y está en fase de realización en los puntos de amarre del sistema ubicados en Lagos (Nigeria) y Accra (Ghana).

El director ejecutivo de Main One Cable Company, Funke Opeke, afirmó que la Fase 1 del sistema Main One Cable abarca 6.800km y proveerá la tan necesaria capacidad entre la costa occidental de África y Portugal.

El proyecto de multiplexación por división de longitud de onda densa (DWDM) de doble par de fibra de 1,92 terabits/s primero conectará Lagos, Accra y Seixal con Europa, Asia y América, y más tarde, cuando se implemente la Fase 2, con Suráfrica.

El sistema de cable, cuya entrada en servicio estaba prevista para junio de 2010, proveerá acceso abierto a las operadoras de la zona y proveedores de Internet a tarifas inferiores a las internacionales de ancho de banda aplicadas actualmente allí.

El sistema también proveerá capacidad de banda ancha para ampliar el acceso a Internet en la zona subsahariana, además de paliar las dificultades de conmutación de tráfico entre los países africanos sin necesidad de pasar por Europa.

El presidente de SubCom, David Coughlan remarcó que "desde el inicio de nuestra alianza en 2008, SubCom esperaba con ansia terminar la instalación marina de la Fase 1. La finalización del programa marino convierte al sistema Main One Cable en casi una realidad." Para nosotros el trabajo que hemos hecho en Main One es un logro importante y estamos orgullosos de formar parte de este proyecto".

Tyco Electronics Subsea Communications (SubCom) – EE.UU.
Website: www.subcom.com

Main One Cable – Isla Mauricio
Website: www.mainonecable.com

Tecnología de conformado y soldado de cintas metálicas



▲ Equipo de soldado y corrugado para cables eléctricos de Rosendahl

Rosendahl ha ampliado su gama de productos con la oferta de equipos de soldado y corrugado para aplicaciones en cables de suministro de energía.

Tras la demanda de soluciones alternativas para la industria, y basándose en la experiencia adquirida en proyectos de éxito en el sector del conformado, soldado y corrugado de cintas metálicas para cables de RF de alta calidad, Rosendahl decidió entrar en este sector de mercado.

Los fabricantes de cables necesitan esta tecnología para productos como cables para parques eólicos, estaciones de suministro eléctrico costa fuera o cables para aplicaciones submarinas. El sector de baja tensión también comprende una serie de productos (cables para sistemas de bombeo de aceite, marinos, señales), que usan la tecnología de Rosendahl para mejorar las propiedades de los productos o para incrementar la productividad durante el proceso de fabricación.

Fábrica de cables para aviones en Marruecos

Nexans ha abierto una planta nueva en Mohammedia (Marruecos), dedicada exclusivamente a la fabricación de cables para aviones.

La planta es fruto de un acuerdo entre Nexans y Airbus. En ella se fabricarán cables avanzados para aeronaves A320, A350 y A380.

Esta inversión de unos 10 millones de Euros consolida la actividad de Nexans en el sector aeronáutico, además de la actividad principal de su subsidiaria marroquí, que ya tiene una sólida experiencia en la fabricación de cables para los sectores del automóvil, construcción e infraestructuras.

Ésta es la tercera planta de Nexans dedicada a los cables para aviones. Las otras dos plantas se encuentran en Francia y Estados Unidos.

Nexans ha desarrollado nuevamente la planta de Mohammedia para dar cabida a un área productiva de 3.000m² diseñada para fabricar 21.000km de cables al año, de los que un 70% irá a exportación.

Nexans – Francia

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Comparada con otras tecnologías, como la extrusión de aluminio o plomo, el sistema de conformado y soldado de cintas metálicas ofrece varias ventajas.

Da mejores resultados en funcionamiento continuo, ahorro de electricidad y agua, menor producción de desechos, cambio de dimensiones y posibilidad de usar distintos materiales metálicos para el blindaje.

Los cables fabricados de este modo suelen tener excelentes propiedades de estabilidad mecánica e impermeabilidad al agua o al gas.

Las tecnologías desarrolladas y optimizadas para estas aplicaciones comprenden:

- Conformadores optimizados para varios materiales
- Procesos de soldado, para garantizar soldaduras perfectas con zonas afectadas por el calor mínimamente y las mejores propiedades mecánicas
- Corrugadores de alta velocidad para corrugado helicoidal y anular de cobre, aluminio y acero inoxidable

Para el blindaje de cables con materiales metálicos como el aluminio, cobre o acero inoxidable liso o corrugado, Rosendahl ofrece soluciones para el conformado y soldado de cintas, y procesos de reducción de tubos que comprenden los equipos montados a continuación.

Dependiendo del diseño del cable, disponibilidad de espacio y gama de productos, Rosendahl puede ofrecer soluciones en línea (en combinación con el proceso de recubrimiento) y fuera de línea.

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Rautomead en Irak

Majeed A Al-Rawi de la sociedad El-Tech Energies and Technologies representará a Rautomead en Irak y Jordania, ofreciendo sus servicios a los clientes actuales de Rautomead del sector de la tecnología de colada continua de esos países y buscando potenciales clientes nuevos en los sectores del hilo y cable y del procesamiento de metales.

El Sr. Al-Rawi promocionará toda la gama de productos de Rautomead, incluidas las máquinas totalmente automatizadas para la producción de hasta 30.000 toneladas anuales. Para volúmenes de alambroñ menores existe una gama nueva capaz de producir de 1.000 a 3.600 toneladas. Los modelos especializados en metales preciosos facilitan la producción de formas y secciones de aleaciones de oro y plata de máxima calidad.

El director de ventas y marketing de Rautomead, Guy Henderson, observó: "El nombramiento del Sr. Al-Rawi representa otro ejemplo del compromiso contraído por la empresa con los mercados emergentes, que sigue al lanzamiento de nuestras páginas web en ruso y chino".

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Sostenibilidad en el desarrollo y producción de aleaciones

Por Ralf Hojda, Michael Köhler, James Schraml

1 Introducción

La creciente escasez de recursos está afectando de forma constante al éxito económico en el sector particular e industrial.

El suministro energético y las materias primas también se están viendo afectados.

Los fabricantes de productos semiacabados de aleaciones de cobre han experimentado aumentos de precios en porcentajes de tres cifras, así que en los últimos años la proporción del valor añadido respecto al valor del metal, que estaba equilibrada hace sólo unos años, ahora es de uno a tres.

Aunque las características mecánicas y tecnológicas hayan sido siempre los factores principales considerados para seleccionar una aleación adecuada, ahora el precio del metal es un factor cada vez más importante. Y esto tiene consecuencias en el desarrollo y fabricación de aleaciones.

A los desarrolladores les preocupa también la reciclabilidad de las nuevas aleaciones y compuestos y están buscando aleaciones más resistentes que permitan reducir los espesores de las paredes con el fin de administrar mejor los recursos usando menos material.

Este artículo describe dos ejemplos de desarrollo de materiales que presentan buena reciclabilidad y permiten reducir la cantidad de materiales usados.

En el primer ejemplo, el material descrito es una nueva aleación de alta conductividad que puede ser reciclada sin ninguna limitación, incluso cuando está revestida de estaño. En el segundo

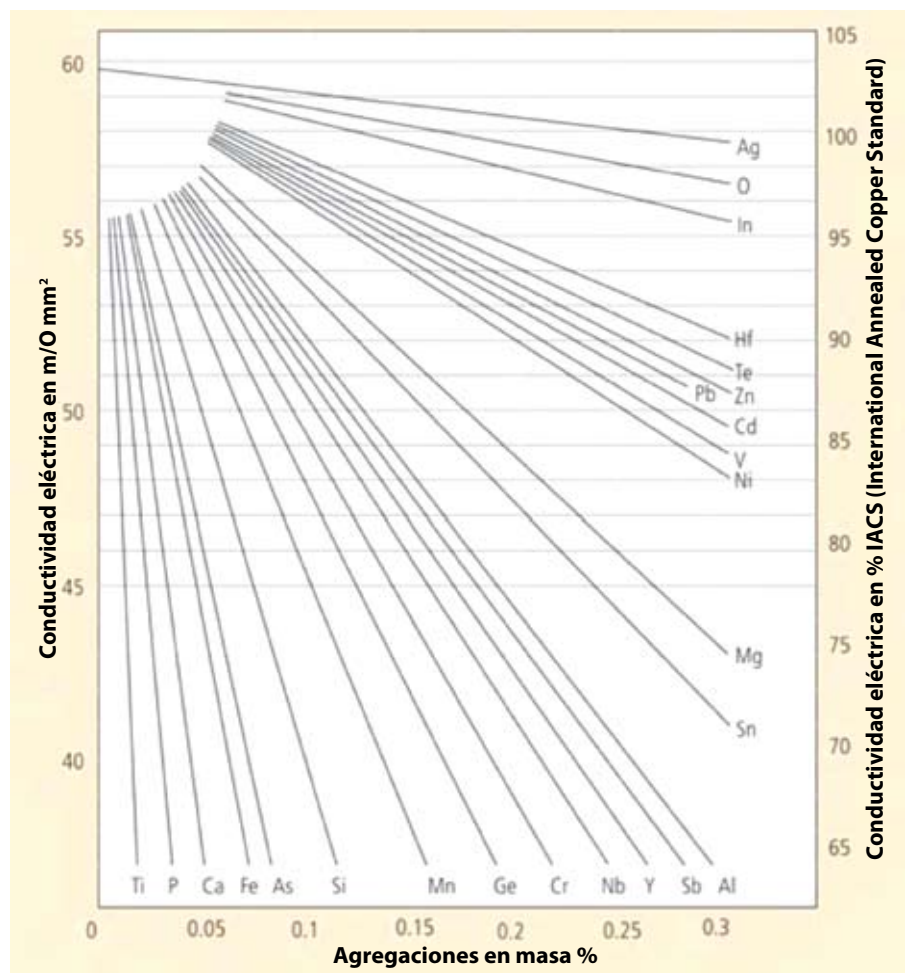
ejemplo, el material considerado es bronce de alta resistencia, que puede ser fácilmente reintroducido en el ciclo del material reciclable, y, sobre todo, está muy indicado para numerosas aplicaciones de miniaturización, facilitando de esta manera la conservación de los recursos.

2 Ejemplos

2.1 Desarrollo 1

Los elementos de conexión usados en ingeniería eléctrica y electrónica deben cumplir numerosos requisitos.

▼ **Figura 1:** Influencia de los elementos de aleación en la conductividad eléctrica del cobre





▲ **Figura 2:** Influencia del contenido de estaño en la conductividad del CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Cobre	Equilibrio	Equilibrio	Equilibrio
Estaño	0.12	-	0.2 – 0.8
Cinc	<0.10	0.13	<0.05
Hierro	<0.02	2.4	<0.02
Níquel	<0.02	-	0.1 – 0.6
Fósforo	<0.015	0.03	0.008 – 0.05

▲ **Tabla 1:** Comparación de la composición química de varios bronce

La resistencia mecánica, la conductividad eléctrica y la resistencia a la corrosión son criterios clave para el funcionamiento fiable de los componentes durante la vida útil de todo el sistema. En muchos casos, las propiedades requeridas son incompatibles recíprocamente como, por ejemplo, cuando se especifica una combinación de buena conductividad y excelente resistencia a la corrosión.

Aunque algunos componentes como el níquel y el cromo mejoren la resistencia a la corrosión de una aleación de cobre, sucede que también reducen considerablemente su conductividad (véase la Figura 1).

Los compuestos son una solución adoptada a menudo para resolver este problema, sobre todo aplicados como revestimientos a base de estaño puro sobre la superficie de la aleación de cobre.

Con poquísimas excepciones, la directiva RoHS (Restriction of Hazardous Substances), que entró en vigor el 1 de julio de 2006, prohíbe los compuestos de plomo-estaño que se usaban antes. La integración del revestimiento funcional de estaño puro en el ciclo del material reciclable está descrita detalladamente a continuación.

La selección del material para conectores se basa principalmente en criterios físicos

como la conductividad eléctrica, el módulo de elasticidad, la relajación térmica y las características de procesamiento, es decir su ductilidad y capacidad de doblado, además de su comportamiento durante el

▼ **Tabla 2:** Comparación de las propiedades tecnológicas de varios bronce

	BB01	SB02	BB05xi
Conductividad eléctrica suave [% IACS]	>83	63	>62
Conductividad térmica (Wattios/metro Kelvin)	360	260	250
Coefficiente de dilatación térmica [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Módulo de elasticidad [GPa]	128	123	126

▼ **Tabla 3:** Comparación de las propiedades tecnológicas de varios bronce

	BB01	SB02	BB05xi
Espesor de la tira 0,3mm			
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Temperatura de ablandamiento [°C (1 h)]	300	350	350
Capacidad de doblado [180° GW R/S]	1	0	0.5
Capacidad de doblado [180° BW R/S]	1	1	0.5

soldado. Los problemas relacionados con la protección parcial o total de la superficie son de importancia secundaria, como también la disponibilidad de base de materiales y el coste de éstos.

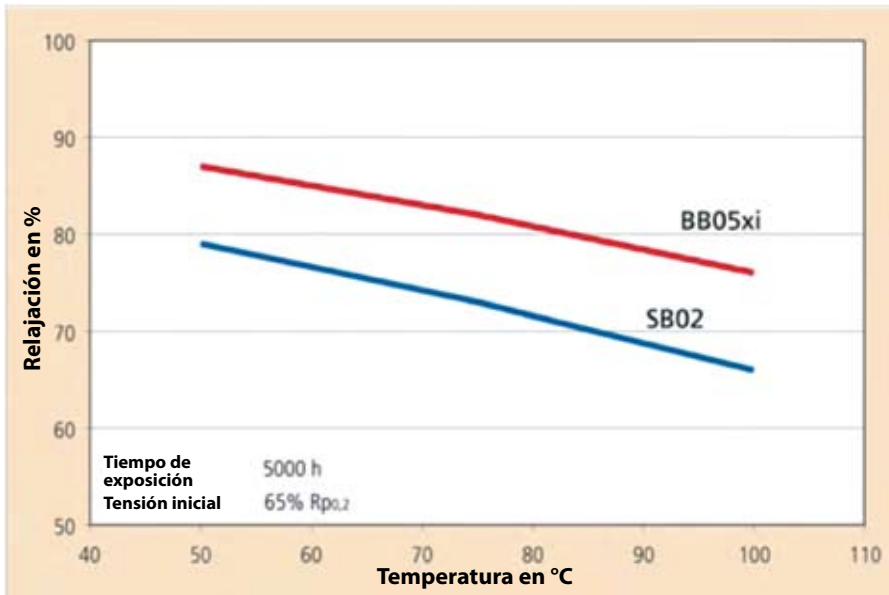
Un análisis de los desechos de producción y troquelado revela que, en muchos casos, no se presta la debida atención a estos factores desde un punto de vista ecológico y económico, como se ilustra en el ejemplo siguiente.

Durante la producción de grandes leadframes compuestos por CuFe2P estañados por inmersión en baño caliente para sistemas ABS y ESP, se produce aproximadamente entre un 50% y un 70% de chatarra, que no puede ser reciclada directamente (reenviada al proceso de fusión), sino que debe ser sometida a largos procesos de fusión y separación electroquímicos.

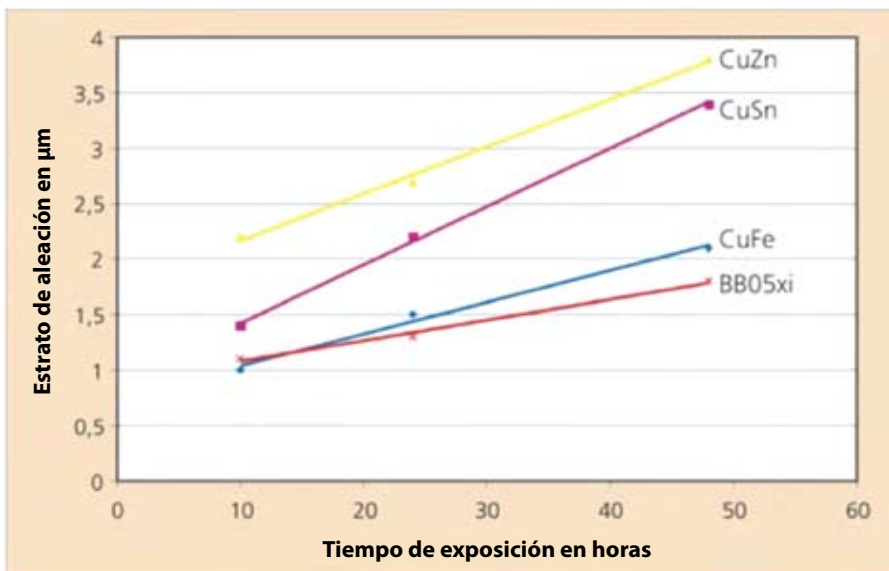
Luego, es realimentada en el ciclo del material reciclable y de producción como cátodo. Este procedimiento consume una gran cantidad de energía y, por lo tanto, resulta costoso por lo que se refiere a la fusión directa.

Normalmente, una tira de 0,4mm de espesor es revestida con una capa de estaño de 3µm por ambos lados. Cuando la chatarra es reciclada directamente, la aleación de CuFe2P resultante contiene aproximadamente un 1,5% de impureza de estaño.

Esto afecta principalmente al comportamiento durante el endurecimiento por



▲ **Figura 3:** Comparación del comportamiento de relajación del CuFe2P y del BB05xi



▲ **Figura 4:** Formación del estrato de aleación a 180°C después del estañado por inmersión en baño caliente

acritud de la aleación y su conductividad eléctrica, que se reduce drásticamente cuando el contenido de estaño excede el 0,3% (véase la Figura 2).

Por lo tanto, se necesita otra aleación con propiedades comparables a las del CuFe2P, pero que pueda ser reciclada sin dificultad, incluso cuando está revestida de estaño.

Las aleaciones de cobre puro y estaño, como el CuSn 0,15, tienen características que permiten usarlas como alternativa. Cuando está revestida de estaño, la chatarra puede ser reintroducida directamente en el ciclo del material reciclable (véase la Tabla 1).

Además, sus propiedades mecánicas y tecnológicas corresponden bastante bien a las del CuFe2P. Sin embargo,

presenta varios puntos débiles por lo que se refiere al comportamiento durante el ablandamiento y la resistencia a la relajación (véase la Tablas 1 y 3).

Un examen de la aleación BB05xi recién desarrollada muestra una situación diferente.

La normalización buscada de los elementos de la aleación (estaño, níquel y fósforo) ofrece propiedades mecánicas y tecnológicas del material comparables ya sea con las del CuFe2P, ya sea con el perfil de las propiedades requeridas para el procesamiento siguiente y para la aplicación final por lo que se refiere al comportamiento de ablandamiento y relajación (fluencia del componente bajo tensión a alta temperatura) (véase la Figura 3).

Durante el procesamiento siguiente a alta temperatura, el espesor del estrato de aleación que se forma entre el material de base y el revestimiento de estaño del BB05xi estañado es comparable al del CuFe2P. Por lo tanto, las líneas de producción no deben ser convertidas para trabajar con este nuevo material compuesto (Figura 4).

Además, esta nueva aleación es significativa porque la chatarra estañada generada en cada fase de la cadena de creación del valor añadido es directamente reciclable. Una comparación de los valores de los metales BB05xi y CuFe2P tampoco justifica la diferencia entre los costes del reciclaje indirecto y directo de la chatarra de producción y del troquelado, que en este sector son normalmente de un 20% a un 25% del valor del metal, un factor de considerable importancia en tiempos en que los precios de las materias primas son altos y están aumentando.

Por ejemplo, con un porcentaje de chatarra de un 70%, los costes de fusión pueden igualarse rápidamente a los costes de producción, poniendo en duda en la viabilidad económica de todo el proceso. El uso de un bronce fosforoso revestido de estaño es, por lo tanto, una alternativa válida a las aleaciones cobre-hierro estañadas, tanto del punto de vista ecológico como económico (se evita el uso de electricidad y ácido para el tratamiento electrolítico de la chatarra).

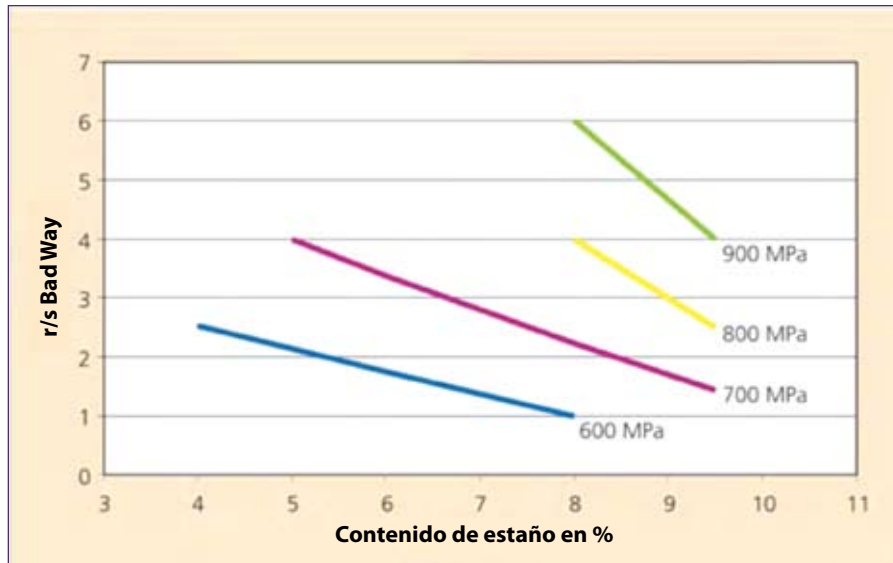
2.2 Desarrollo 2

Las aleaciones de cobre-estaño se usan para los conectores y los componentes en las aplicaciones de ingeniería electrónica y eléctrica porque tienen propiedades de elasticidad muy buenas, buena resistencia a los esfuerzos eléctricos y térmicos, baja relajación de la tensión y una excelente capacidad de doblado y soldabilidad.

Normalmente, se añade una pequeña cantidad de fósforo a este tipo de aleaciones para la desoxidación, y por esto se denominan también bronce fosforosos. Las propiedades de este grupo de aleaciones dependen principalmente de su contenido de estaño y fósforo, y en grado menor, de otros elementos de aleación añadidos.

Por medio de un procesamiento adecuado, las propiedades de estas aleaciones pueden ser ajustadas para usarlas en una amplia gama de aplicaciones. Las numerosas aplicaciones industriales de esta gama de aleaciones comprenden desde conectores y tomas de alta calidad para módulos electrónicos hasta resortes de contacto eléctricamente conductores.

Antes se utilizaba la "degradación" como método eficaz para seleccionar un bronce fosforoso.



▲ **Figura 5:** Capacidad de doblado de varios bronce fosforosos en función de la resistencia

En otras palabras, se ajustaban las propiedades tecnológicas de un bronce fosforoso de baja aleación para igualar sus características de elasticidad y propiedades de procesamiento a las del bronce fosforoso original de alta aleación. Sin embargo, se debían considerar algunas limitaciones.

El contenido de estaño y fósforo influyen considerablemente el comportamiento durante el endurecimiento por acritud y la ductilidad de los bronce fosforosos, y se ha encontrado una clara relación entre la capacidad de doblado alcanzable y el contenido de estaño.

La *Figura 5* muestra cómo se ve influenciada positivamente la capacidad de doblado bajo esfuerzo constante por un mayor contenido de estaño. Por consiguiente, era lógico desarrollar un bronce fosforoso de mayor aleación.

Otra razón del desarrollo de este material era la demanda de miniaturización de los conectores, dado que la reducción de sección transversal reduce la fuerza de contacto bajo una flexión constante del elemento elástico. Por lo tanto, para una fuerza constante determinada es necesario rediseñar el elemento elástico, aumentando también la tensión de proyecto admisible.

Una solución para este problema es la aleación recién desarrollada BB95, un bronce fosforoso (10%). Respecto al bronce estañado (8%), el BB95 presenta un límite elástico $R_{p0,2} > 720$ MPa y una mejor capacidad de doblado en BW90° R/S por un factor de 2. Según la aplicación requerida, el BB95 puede ser endurecido hasta un límite elástico $R_{p0,2}$ de 800 MPa, y el tipo de alta resistencia hasta >950 MPa.

La diferencia de conductividad eléctrica entre el BB95 y un bronce estañado (8%) es aproximadamente un 1% IACS (International Annealed Copper Standard), es decir, que el estaño tiene una influencia despreciable en la reducción de conductividad cuando se encuentra en la aleación en este porcentaje. Durante el temple SH (spring hard temper), el BB95 muestra las mismas propiedades de ablandamiento que un bronce fosforoso (8%); se observa primero una significativa pérdida de dureza a aproximadamente 280°C.

Además, la relajación del nuevo material (<20% a una temperatura de 100°C en una prueba continua de 10.000h) es comparable a la de la aleación de referencia citada arriba (a condición de que el nivel de tensión sea idéntico).

Con la fuerza de contacto citada, estos resultados indican que, usando el BB95, se puede obtener una reducción de espesor del material y, por lo tanto, una reducción de aproximadamente un 20% de la cantidad de material requerida.

3 Resumen

Los rápidos aumentos de precios de las materias primas, y especialmente el precio del cobre, han cambiado drásticamente la relación entre el valor añadido y el valor del metal en la fabricación de productos de cobre aleado semiacabados.

Los ahorros conseguidos reciclando y limitando la cantidad de materiales utilizados tienen un gran impacto, en general, respecto al gasto total final. El uso de materiales de cobre de baja aleación es un ejemplo que permite

describir la influencia de una selección de aleaciones y compuestos bien planificada. La combinación de un bronce fosforoso recién desarrollado de baja aleación con un revestimiento de estaño es una alternativa válida a las aleaciones de cobre-hierro estañadas, incluso desde un punto de vista ecológico y económico, que permite mantener un perfil de propiedades similares.

Gracias al nuevo desarrollo de un bronce fosforoso (10%) es posible generar valor añadido para el cliente, reduciendo la cantidad de material utilizado. Este material tiene un perfil de propiedades similares al de una aleación de cobre-estaño (8%), pero con capacidad de doblado superior.

Además, la nueva aleación facilita el ahorro de recursos porque puede soportar tensiones mayores. Gracias a estos nuevos desarrollos, ahorros de material de un 20% son algo factible. ■

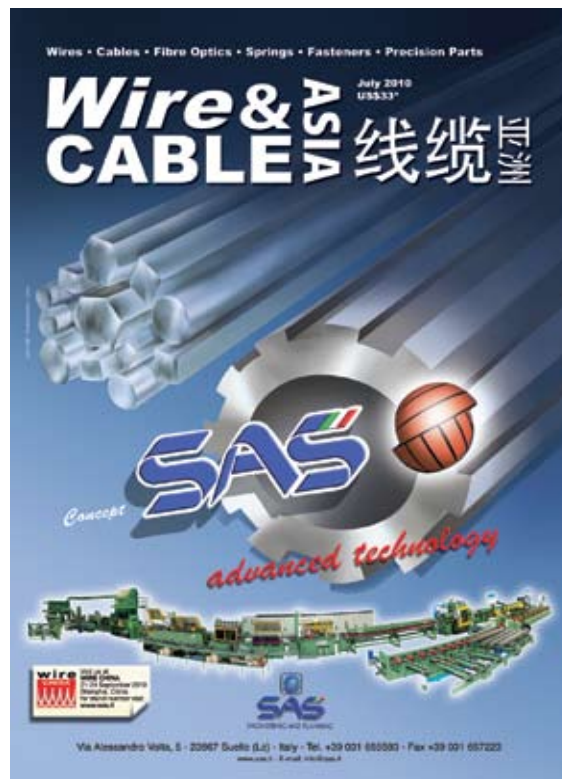
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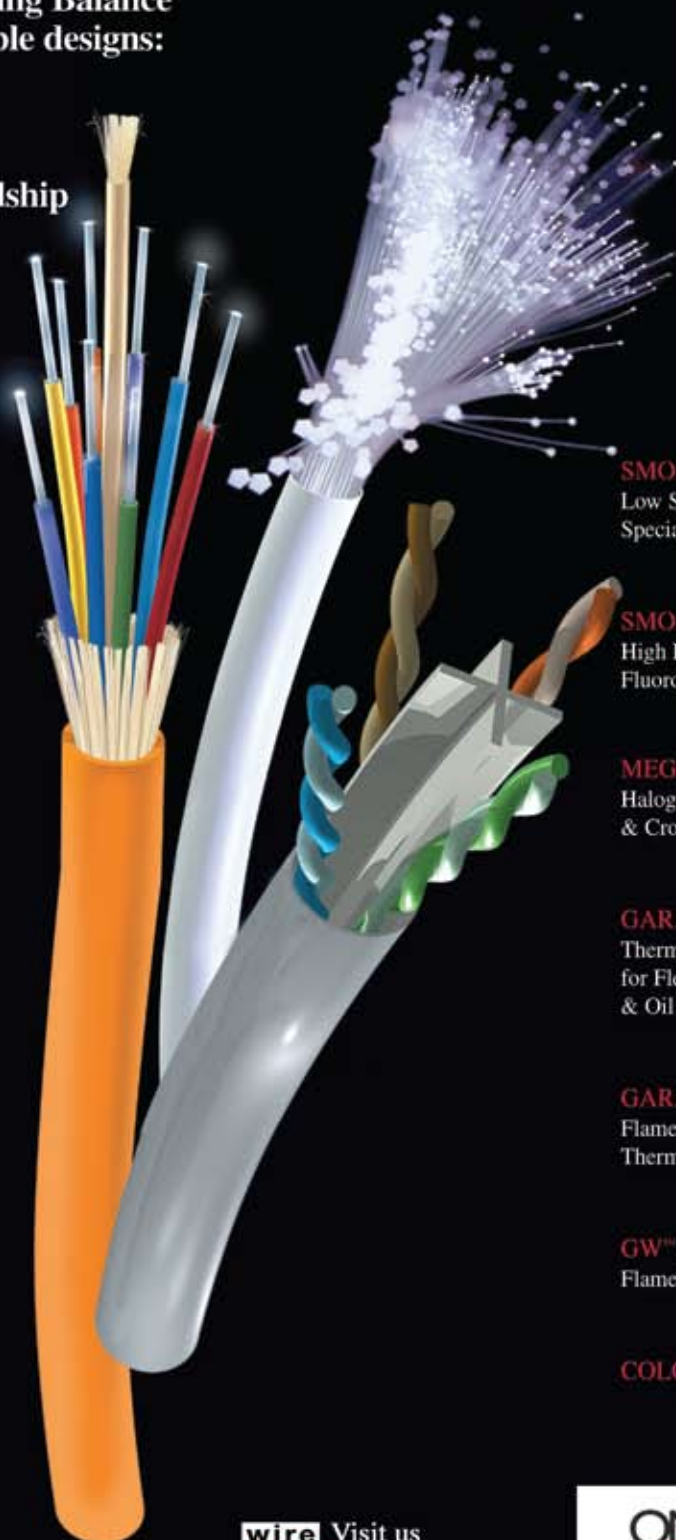
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Future homes – future industry

Much of the wire and cable industry will be attending wire China this month.

The previous wire China followed the 2008 Olympic Games. Not to be outdone, this year's exhibition will be held at the same time and in the same city as the World Expo 2010 (described as "the Olympic Games of the economy, science and technology"). Running from 1st May to 31st October the Expo expects 200 participating nations, and up to 70 million visitors.

The theme of Expo 2010 is "Better City, Better Life," representing "the common wish of all mankind for a better living in future urban environments."

It's not just the timing and the location that link these two events. Despite a recession, demand for wire and cable, and research into both conductors and insulators, has been relentless. With better city living focused on environment, work and communication it's easy to see the relevance of wire, cable and fibre optics. Energy, however generated, will always be needed for heat, light and to keep computers and machinery running; and energy demands fast, rugged, reliable cables to distribute it.

For work, leisure and education fast broadband Internet connection has become widely expected and almost essential. In certain countries – Finland, for example, where there is a large rural population – it has even been made a human right.

Expo 2010's promotional website (www.expo2010.cn) explains that, for its 184 days, "Participants will display urban civilisation to the full extent, exchange their experiences of urban development, disseminate advanced notions on cities and explore new approaches to human habitat, lifestyle and working conditions in the new century. They will learn how to create an eco-friendly society and [how to] maintain the sustainable development of human beings."

A visit to World Expo 2010 would be a day to remember, and should serve to remind the industry that future opportunities for wire and cable must be almost endless.



Gill Watson

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Plastic Tubing
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IWCS Technical Conference

November 2010

7–10: **59th IWCS** –
technical conference –
Providence, Rhode Island, USA
Organisers: IWCS Inc
Fax: +1 732 389 0991
Email: phudak@iwcs.org
Website: www.iwcs.org

November 2010

18–20: **Wire & Cable India** –
trade exhibition – Mumbai, India
Organisers: Messe Düsseldorf GmbH
Fax: +49 211 4560 7740
Email:
ryfischd@messe-duesseldorf.de
Website: www.wire-india.com

2011

May 2011

3–5: **Interwire** – trade exhibition –
Atlanta, Georgia, USA
Organisers: Wire Association
International (WAI)
Fax: +1 203 453 8384
Email: info@wirenet.org
Website: www.wirenet.org

23–26: **wire Russia 2011** –
trade exhibition –
Moscow, Russia
Organisers:
Messe Düsseldorf GmbH
Fax: +49 211 4560 7740
Email: info@wire-russia.com
Website: www.wire-russia.com

June 2011

19–23: **JICABLE** –
conference and trade
exhibition – Versailles, France
Organisers: SEE
Email: jicable@see.assoc.fr
Website:
www.jicable.org

September 2011

13–15: **wire Southeast Asia** –
trade exhibition – BITEC,
Bangkok, Thailand
Organisers:
Messe Düsseldorf Asia Pte Ltd
Email: wire@mda.com.sg
Website:
www.wire-southeastasia.com

October 2011

4–6: **WiCAB 2011** – trade exhibition
– Centro de Exposições Imigrantes,
Sao Paulo, Brazil
Organisers: Grupo Cipa, Brazil
Fax: +55 11 5585 4359
Email: feira@cipanet.com.br
Website: www.cipanet.com.br

2012

March 2012

26–30: **wire/Tube Düsseldorf** –
trade exhibition – Düsseldorf,
Germany
Organisers: Messe Düsseldorf
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TECHNOLOGIES FOR EXCELLENCE



▲ Dr Horace Pops led the Production Solutions demonstration on wire breaks at the Properzi International booth

Co-located Wire Expo

The Wire Association International's Wire Expo 2010 and WAI's 80th Annual Convention were co-located with the National Electrical Wire Processing Technology Expo in Milwaukee, Wisconsin in May 2010. A total of 2,931 participants attended the combined event, enjoying crossover access between shows.

Wire Expo registration showed 1,457 participants from 38 states and 21 countries. Early reports suggest that the concentrated agenda (exhibit days were condensed from three to two) and the coordinated scheduling with the American Wire Producers Association's new Long Product Supply Chain Symposium, had a very positive reception.

WAI president, Dane G Armendariz noted: "Scheduling three industry events within the same week helped a lot of visitors justify their trip to Milwaukee.

"The two-day exhibit format worked very well and with the convenience of the co-location we saw a steady flow of traffic between the shows on both days."

Highlights of the event included:

- Guided facility tours of the Rockwell Automation and Charter Steel plants
- 30 technical paper presentations and the Phosphating 101 class
- The Annual Awards Breakfast honouring the Donnellan Memorial Award winner Brian Bouvier, and the Mordica Memorial Award winner Professor Javier Gil Sevillano, as well as technical paper authors
- The Fundamentals of Wire Manufacturing course
- Live production solutions demonstrations
- WAI's 5th Annual 5K road race, sponsored by Leoni Wire Inc

Steven J Fetteroll, WAI executive director commented: "We're also especially gratified by the early feedback from a number of key exhibitors and the positive responses we've received from local attendees."

Wire Association International – USA
Fax: +1 203 453 8384
Website: www.wirenet.org

Rope and wire acquisition confirmed

Houston Wire & Cable Company has completed its acquisition of both Southwest Wire Rope LP, a supplier of custom fabricated lifting equipment, and Southern Wire LLC, a supplier of industrial wire rope. The purchase price for the acquisition of both companies was \$50 million.

Mitch Hausman, president of Southwest Wire Rope and Southern Wire, commented, "This is an exciting time for Southwest Wire Rope LP and Southern Wire LLC. We look forward to working with the experienced and dedicated management of Houston Wire & Cable Company and with their established national distribution network."

Houston Wire & Cable Company – USA
Website: www.houwire.com

Southwest Wire Rope LP – USA
Website: www.southwestwirerope.com



Recognition for reel producer

Euromadem, located in Calaf, Spain was officially recommended by Det Norske Veritas (DNV) to receive the ISO 9001 designation for the manufacture of wooden and plywood reels.

Euromadem launched operations in 2006 and today is one of the largest reels suppliers in Spain and Portugal, providing logistics, just-in-time delivery and recycling services.

Leandro Mazzocato, corporate sales and marketing director, said: "The ISO 9001 designation is an important tool for excellence in service for our customers in Spain and Portugal. We will practice continual improvement in our quality system for the benefit of our valued customers."

Roger Santasusana, general manager of Euromadem, agreed: "We are very satisfied to have implanted ISO standards in record time, a sign that we were on the right track.

"Now we will be sure to maintain our quality system and continual improvement processes to ensure a quality product and satisfied customers."

Euromadem Spain is a subsidiary company of Madem SA Brazil.

Madem SA – Brazil
Fax: +55 54 3462 5900
Email: sales@madem.com.br
Website: www.madem.com.br

Niehoff will represent HFSAB

As from 1st April 2010 Maschinenfabrik Niehoff assumed representation (outside of the European Community) of HFSAB, a leading supplier of lead sheathing equipment to the cable industry.

HFSAB, known as H Folke Sandelin AB and Hansson Robertson, is part of the Canadian mining company Teck Cominco Metals Ltd and is headquartered in Motala, Sweden. It specialises in the manufacture of horizontal continuous lead extruders and in cable repair and recovery systems.

Horizontal continuous lead extruders developed and built by HFSAB are used to apply lead sheaths to submarine and underground power, communication and fibre optic cables. The lead sheathing provides an excellent barrier to chemicals, oils, water and sulphides and lengthens the service life of cables.

Maschinenfabrik Niehoff GmbH & Co KG – Germany
Fax: +49 9122 977155
Email: info@niehoff.de
Website: www.niehoff.de

HFSAB (H Folke Sandelin AB) – Sweden
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Fibre to the Home event announced for Italy

The Fibre to the Home Council Europe has announced that Milan has been selected to host the world's largest Fibre to the Home (FTTH) event next year.

The FTTH Conference 2011 will take place at the Milano Convention Centre in Fiera Milano on 9th and 10th February 2011.

The city of Milan was among the first cities where FTTH was deployed. In 2000 the alternative operator Fastweb started to roll out a fibre network across the city that now passes some 2 million homes and has nearly 300,000 subscribers. This early success made Italy the first major European economy to break into the FTTH ranking – a league table of nations where more than 1% of households are fibre subscribers.

Despite the promising start, FTTH deployment in Italy appears to have stalled. In December 2008, the country was in eighth position in the European rankings, but by December 2009 it had slipped to tenth place with an unchanged 1.3%.

“Early fibre deployments in Italy took place at a time when copper connections only offered speeds slower than 1 Mbps and could not support TV services. With fibre access the Milanese had access to advanced services such as video communications in the early 2000s, but since then no real progress has been made,” explained Chris Holden, president of the FTTH Council Europe.

“Italy was a pioneer in fibre deployment,” said Hartwig Tauber, director general of the FTTH Council Europe. “We hope that



Photo copyright Fernando Picarra

▲ Vasco Tigo (standing) moderator of the FTTH – The Service and Application Enabler plenary session during the Lisbon 2010 conference

the presence of the FTTH Conference in Milan will inspire the Italians and encourage them to renew their efforts to roll out fibre, such as the Italian operators' recent plans to connect the largest Italian cities. The conference provides an unparalleled opportunity to find out, first hand, how fibre can benefit all sectors of society, including service providers, the local community and the national economy.”

FTTH Council Europe – Belgium
Website: www.ftthcouncil.eu

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Aircraft cable manufacturing plant in Morocco

Nexans has opened a new manufacturing plant in Mohammedia (Morocco), entirely dedicated to aircraft cables. The plant is the result of an agreement between Nexans and Airbus for the supply of advanced cables for the A320, A350 and A380 aircraft.

This investment of nearly €10 million strengthens Nexans' aeronautical business as well as the core business of its Moroccan subsidiary, which already has strong expertise in manufacturing cables for the automotive, building and infrastructure industries. This is Nexans' third plant dedicated to aircraft cables; similar facilities are based in France and the United States.

Nexans has redeveloped the Mohammedia plant to accommodate a production area of 3,000m² designed to manufacture 21,000km of cables per year, of which 70% will be exported.

...and a submarine cable contract in UK

In the UK, Nexans has been awarded a major contract by Lincs Wind Farm Ltd to supply the medium voltage submarine array cables and associated accessories for the 270MW Lincs offshore wind farm to be constructed off the east coast of England.

The contract for the Lincs wind farm medium voltage array cables covers the design, manufacture and supply of 64.8km of 3-core cable with a conductor cross-section of 185mm² and 20.5km of 3-core cable with a conductor cross-section of 630mm². The cables will also incorporate fibre optic cables for the monitoring and control of the wind farm.

The array cables will be produced at the Nexans plants in Germany and Norway. Accessories are scheduled for delivery at the end of 2010, while delivery of the cables will start in March 2011.

Nexans – France
Fax: +33 15669 8484
Email: nexans.web@nexans.com
Website: www.nexans.com



▲ Nexans' dedicated aircraft cable facility in Morocco



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Precision Rolling acquired by ASMAG UK

Precision Rolling has been acquired by ASMAG UK Ltd. Precision Rolling specialises in equipment for the manufacture of simple and complex profiles in low to high-carbon steels and non-ferrous materials.

David Liddle, managing director of ASMAG UK Ltd, commented: "We are delighted to extend our product range through this acquisition. Precision Rolling offers an extensive range of profile manufacturing equipment, together with ancillary machinery, that enables complete production lines to be designed, built and installed.

"The Precision Rolling product lines complement ASMAG's existing tube manufacturing machinery."

Mr Liddle explained: "Following the takeover of a German supplier some years ago, and now the recent acquisition, ASMAG UK Ltd can offer a complete and comprehensive solution to the wire industry."



▲ Turks head from ASMAG UK

ASMAG UK Ltd is the UK division of ASMAG – Anlagenplanung und Sondermaschinenbau GmbH, a leading Austrian supplier of copper, brass, steel, stainless steel and aluminium tube manufacturing equipment.

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ASMAG UK Ltd – UK

Email: info@asmaguk.com

Website: www.asmaguk.com

Continuous casting agent in Iraq

Rautomead of Scotland has appointed an agent in the Middle East.

Mr Majeed A Al-Rawi of the El-Tech Energies and Technologies Company will be representing Rautomead's interests in Iraq and Jordan, servicing Rautomead's existing continuous casting technology customers in the region and identifying potential new customers in the wire and cable and metal processing industries.

Mr Al-Rawi will be promoting Rautomead's entire product range, including fully automated machines for the production of quantities of up to 30,000 tonnes per year. For smaller scale wire rod production, a new range is capable of producing between 1,000 and 3,600 tonnes.

Specialist precious metal models facilitate the production of the highest quality gold and silver alloy shapes and sections.

Rautomead sales and marketing manager Guy Henderson remarked: "The appointment of Mr Al-Rawi is another example of the company's commitment to emerging markets, following on from the launch of our Russian and Chinese language websites."

Rautomead Ltd – UK
Fax: +44 1382 622941
Email: sales@rautomead.com
Website: www.rautomead.com

El Tech Energies and Technologies – Jordan
Email: majeed@ei-techno.com

ABB to build new cable factory in US

ABB has announced that it will construct a new factory in the United States to manufacture high-voltage land cables for power transmission.

The new plant will manufacture land cables for use in both AC and DC applications. ABB will invest approximately \$90 million in the new manufacturing facility, which is expected to employ around 100 people. The selection process for the site of the factory is already under way.

"Cables play a key role in the efficiency and reliability of long-distance power transmission," said Peter Leupp, head of ABB's power systems division. "The need to upgrade the existing transmission infrastructure in the United States, to provide grid interconnections and integrate more renewable power into the grid is driving demand for cables."

ABB has been manufacturing polymeric insulated cables since the early 1970s and is among leading suppliers of cable systems for a range of voltage levels. The company's offering includes XLPE (cross-linked polyethylene) insulated cables for use in high-voltage applications, up to 500kV, said to provide opportunities for energy-efficient power transmission. Around the world, ABB has delivered more than 7,200km of XLPE cables for voltage levels above 100kV.

In the 1950s ABB delivered the world's first commercial HVDC (high-voltage direct current) power link. The company developed HVDC Light in the 1990s, delivered the world's longest underwater power link in 2008 and is currently connecting the world's most remote offshore wind farm (Bard, located 128 kilometres off the German mainland).

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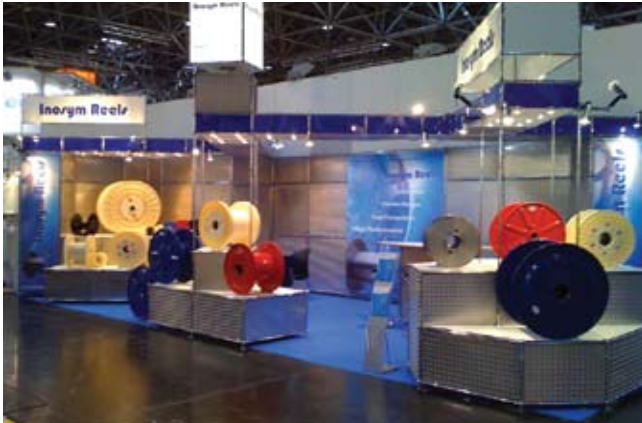
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Reeling in the contracts



▲ Inosym's stand brought success at Düsseldorf

Philip Young, managing director of Inosym, was delighted with the success of wire Düsseldorf in April, and has announced the signing of two large contracts – both secured during the show.

The contracts are for the supply of steel and plastic reels. The first is for large de-gassing reels for a customer in Egypt, and the second to supply ABS plastic reels to a client in Europe.

Inosym Ltd – New Zealand
Email: inosym@inosym.com

Fax: +64 3 341 668
Website: www.inosym.com

Sify Technologies in pact with Gulf Bridge

Sify Technologies, a specialist in enterprise and consumer Internet services, has signed an agreement with Middle East-based submarine cable operator Gulf Bridge International to lay international undersea cable in India by 2011.

Sify will provide a landing station for Gulf Bridge International cable in Mumbai, Sify Technologies confirmed in a statement. The cable connectivity will also allow telecom operators and other communication companies to connect in the region.

“Access to an undersea cable system will allow Sify Technologies to serve the emerging markets in the Middle East as well as African regions, which are also amongst the fastest growing economies in the world. This allows Sify to enable a reliable and secure information superhighway to connect the Middle East to Asia Pacific and the Americas,” said Sify Technologies CEO and managing director Raju Vegesna.

The laying of the cable system is scheduled to begin in 2011 and will connect all the Gulf countries via a core ring.

Sify Technologies Ltd – India
Website: www.sifycorp.com

Gulf Bridge International – Qatar
Website: www.gulfbridgeinternational.com/gbil

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New manufacturer in Canada a possibility

Discussions are taking place between Deyang Dongjiagang Mechanical and Electrical Co Ltd, Progressive Machinery Inc and Niagara Composites Industries Inc for the foundation of a company to be called Panther Wire and Cable Inc.

The negotiations follow a delegation that visited China last summer to develop a business relationship with a high-quality wire and cable manufacturer. Out of the many firms visited, Dongjiagang and Progressive reached a tentative agreement in Deyang for a joint venture. It could eventually amount to millions of dollars of machinery produced every year.

Roy Rymer, president of both Progressive Machinery and Niagara Composites, hopes to have final details agreed shortly. If all goes well, it will take at least a year to get the company built and operating in St Catharines, Canada but, he said: "It looks very promising at this point."

Panther Wire and Cable, expected to employ around 30 to 40 people, would make high quality wire and cable machinery and market its products internationally. The company would also assemble and manufacture parts originally made in China. Roy Rymer added: "Down the road, we'll get more initiative in manufacturing the smaller parts right here in Canada."

Products would include power and telecommunications cables.

Niagara Composites Industries Inc – Canada
Website: www.niagaracomposites.com

Progressive Machinery Inc – Canada
Website: www.progmach.com

Deyang Dongjiagang Mechanical and Electrical – China
Website: www.ebp.cn

Representative for Turkey



▲ Ali Serpen of Metalin

PWM, the UK-based designer and manufacturer of cold pressure welding equipment and dies, has appointed Ali Serpen of Metalin as its exclusive representative in Turkey.

Mr Serpen, who has over twenty years' experience within the international wire and cable industry, will manage sales of PWM's manual and powered cold welders, dies and spare parts and provide customer service support.

Steve Mepsted, managing director of PWM said: "Turkey is an important and expanding market for PWM."

"Ali's expertise and extensive knowledge of cold welding technology and its applications will ensure that we continue to provide a reliable, responsive service to our existing and new customers."

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Transatlantic Cable

The oil spill

▶ The historian's-eye view: American history abounds with longer-term catastrophes than the Deepwater Horizon

In the US, the effort to stem the flow of crude oil into the Gulf of Mexico has been accompanied by lively commentary on whether or not it is the worst environmental disaster America has ever faced. President Obama declared that it is. But the *Washington Post*, among others, points out that the national past is littered with oil spills, explosions, toxic dumps, extinctions, and at least one river on fire. On 22nd June – Day 63 since the explosion of the Deepwater Horizon rig – David A Fahrenthold and Ylan Q Mui wrote that historians, predictably, say an evaluation of the president's words depends on what he meant by "worst" and "disaster." The Dust Bowl of the 1930s caused more social upheaval. The Exxon Valdez oil spill in 1989 had a higher wildlife death toll. The pesticide DDT affected a wider swathe of the country.

The *Post* reporters observed, "From the perspective of a bison or a (now-extinct) passenger pigeon, the whole thing might look like one long disaster." ("Historians Debate Designation of 'Worst Environmental Disaster' in US"). At this writing, the cap-and-capture effort that has riveted public attention to the gulf appears to be gaining on the problem. While we wait, it might be worthwhile to consider a letter to the editor of the Beaufort (South Carolina) *Gazette* that was cited by syndicated columnist Thomas L Friedman as the best reaction he has seen to the oil spill ("This Time Is Different," 11th June):

"I'd like to join in on the blame game that has come to define our national approach to the ongoing environmental disaster in the Gulf of Mexico. This isn't BP's or Transocean's fault. It's not the government's fault. It's my fault. I'm the one to blame and I'm sorry.

"It's my fault because I haven't digested the world's in-your-face hints that maybe I ought to think about the future and change the unsustainable way I live my life. If the geopolitical, economic, and technological shifts of the 1990s didn't do it; if the terrorist attacks of Sept. 11 didn't do it; if the current economic crisis didn't do it; perhaps this oil spill will be the catalyst for me, as a citizen, to wean myself off of my petroleum-based lifestyle.

"Citizen' is the key word. It's what we do as individuals that counts. For those on the left, government regulation will not solve this problem. Government's role should be to create an environment of opportunity that taps into the innovation and entrepreneurialism that define us as Americans. For those on the right, if you want less government and taxes, then decide what you'll give up and what you'll contribute.

"Here's the bottom line: If we want to end our oil addiction, we, as citizens, need to pony up: bike to work, plant a garden, do something. So again, the oil spill is my fault. I'm sorry. I haven't done my part. Now I have to convince my wife to give up her SUV." Mark Mykleby

Steel

▶ Newly optimistic Midwestern steel processing centres wager that demand for steel will continue to rise with the US economy

As demand for flat-rolled and bar steel picks up in the American Midwest, the steel processing centres that serve auto makers, appliance manufacturers, and the light-manufacturing industries are bellwethers of the progress of the US steel industry back toward pre-recession health. The centres – variously known as distributors, stockists, and service centres – suffered along with the steel producers which at their lowest point were operating at only 40% of capacity. Now, the steel makers are at about 70% of capacity and feeling much better about their prospects. Accordingly, so are the steel processing centres. Writing in the *Southtown Star* (Tinley Park, Illinois), Mike Nolan profiled one of them: the cavernous Sun Steel plant, in Chicago Heights, sold to Russia's OAO Severstal in 2008 and re-acquired by the original American owners in May of this year.

Together with Sun, the brothers James and Craig Bouchard have bought back another Chicago Heights steel centre, Century, from Severstal. Their Chicago-based company Esmark, through its Esmark Steel Group subsidiary, had already begun reassembling a core group of steel service centres. With a \$100 million line of credit from GE Capital, the financial services unit of the multinational conglomerate General Electric (Schenectady, New York), Esmark is also considering other acquisitions. ("Brothers Banking on Steel Rebound," 13th June). "It's going to be a slow climb out" for the steel processing centres, the Esmark Steel Group chief executive Tom Modrowski told the local newspaper. But an account of the Bouchard brothers' recent activities suggests speed and nimbleness beyond the ordinary.

Until about two years ago, the Bouchards operated a network of ten steel service centres around the Midwest, as well as the producer Wheeling-Pittsburgh Steel Corp (Wheeling, West Virginia). They bought Sun in 2004, followed by Century in early 2005. In the summer of 2008 – just months before the collapse of the financial markets – they sold the whole bundle to Severstal for \$1.2 billion, with the Russian producer assuming outstanding Esmark loans and debt. A noncompete agreement kept the Bouchards on the sidelines for a year, according to Mr Nolan. Then, last fall, they plunged back in, paying \$10 million for Amtex Steel, a service centre in nearby University Park that has been renamed Chicago Steel & Iron.

✱ "Along with Sun and Century, the Bouchards also picked up an Ohio steel service center they had sold to Severstal," Mr Nolan wrote. "Esmark didn't say how much it paid for the assets. Combined, the service centers annually ship about 300,000 tons of flat-rolled steel, according to Esmark."

Good judgment and good timing obviously figure in the Esmark story to this point. So does good luck. And the company evidently expects more of the same.

Esmark Steel Group CEO Tom Modrowski told the *Southtown Star*, "We're excited about what lies ahead."

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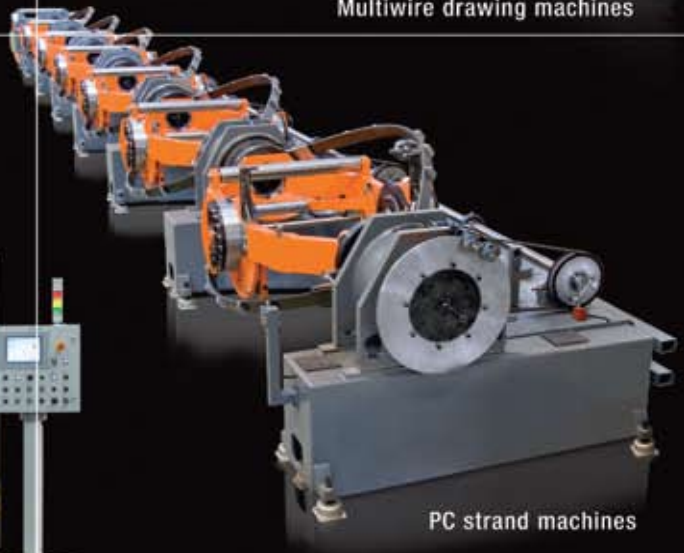
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▶ **Let nothing be lost:
spinning gold from scrap metal**

Wresting value from scrap is a painstaking business that can also be strikingly profitable. The Seattle (Washington) *Times* for 13th June reported on Schnitzer Steel (Portland, Oregon), founded more than a century ago as Alaska Junk. The company makes finished steel products from scrap and sells used auto parts; but the core of its business – accounting for 75% of income – is scrap. Schnitzer is expected by DA Davidson analyst Brent Thielman to post revenues approaching \$2.4 billion in fiscal 2010, with a net profit of around \$63 million.

The company collects old autos, railcars, construction elements and other metal debris at facilities it maintains in four states. There the scrap is shredded, loaded into ships and sent to China, South Korea, Turkey and a number of other countries whose reviving steel mills must be fed. "We [the United States] are the biggest reservoir of junk metal in the world, by far," Mr Thielman said. "That's something I think these guys can leverage." Leveraging is a concept that Schnitzer would appear to understand very well. The company's Oregon minimill buys steel from the scrap division, melts it in a 108-ton capacity electric arc furnace, and turns it into rebar, wire rod and other products. Moreover, according to the *Times*, "At Schnitzer's more than three dozen US and Canadian auto-parts yards, customers pay to scavenge usable parts from junked cars. What's left goes to Schnitzer's scrap division, if feasible, or is sold elsewhere."

Elsewhere in metals . . .

- * Steel companies were prominent supporters of a failed Senate resolution aimed at blocking a broadened "tailpipe rule" that strengthens the hand of the US Environmental Protection Agency in the regulation of greenhouse gas emissions. As of January, EPA oversight of auto emissions would be expanded to include emissions from stationary sources, such as steel production facilities. Endangerment findings and subsequent regulations could impose more stringent EPA requirements on over 6 million stationary sources, including 200,000 manufacturing facilities. Thomas J Gibson, president and CEO of the American Iron and Steel Institute, on 11th June expressed the AISI view on such EPA activism under the Clean Air Act: "This regulatory path will be economically detrimental to American manufacturing, and will not result in a reduction in greenhouse gas emission, as overseas competitors will continue to increase their emissions. Climate change is a global problem that can only be addressed effectively on a global basis."
- * On 17th June the Dutch-German-British group Urenco inaugurated the second phase of its uranium enrichment plant in Eunice, New Mexico, in the US Southwest. According to the owners, the first new uranium enrichment plant in the country in decades will by 2014 have sufficient capacity to meet the needs of half the nuclear power reactors in the United States. The centrifuges utilised by the \$3 billion plant are reported to consume only about 5% as much electricity, per unit of enrichment, as the gaseous diffusion technology employed by USEC Inc (Bethesda, Maryland). While USEC works on a new centrifuge-based enrichment technology, the US Energy Department in May extended a \$2 billion loan guarantee to another prospective European rival –



Paris-based Areva – to build a centrifuge enrichment plant in southern Idaho. A domestic competitor is General Electric (Fairfield, Connecticut), now working on a laser-based enrichment system at its Wilmington, North Carolina, plant. *World Nuclear News* reported (10th June) that the Noble Group recently acquired a 5.13% stake in USEC for \$30.2 million. The Hong Kong-based global supply chain manager is new to the nuclear field.

Construction at Blue Spring was 90% complete in December 2008 when Toyota halted the project in response to plunging sales of its vehicles in the North American market. Most of the remaining work reportedly involves equipment installation. "Now it's time to fulfill Toyota's promise in Mississippi," Yoshimi Inaba, the president and chief operating officer of Toyota Motor North America, said in a statement. "Toyota remains committed to making vehicles where we sell them and to maintaining a substantial manufacturing presence in North America."

Automotive

▶ Onetime partners Toyota and General Motors both give strong indications of a rapidly improving US auto market

Taking a vigorously proactive approach to repairing its fortunes in North America, Toyota Motor Corp on 17th June announced that it would resume construction of a plant in Mississippi, put on hold 18 months before. The Japanese auto maker said its \$1.3 billion plant in Blue Spring, 90 miles southeast of Memphis, is scheduled to start up in the fall of 2011. Delivering the good news all at once, Toyota said the plant would create 2,000 jobs, precisely the number in its original estimate.

Production plans for Blue Spring have been adjusted yet again. The plant was initially intended to produce sport utility vehicles. Then, in mid-2008, as surging gas prices were generating demand for fuel-efficient vehicles, Toyota said it would build Prius hybrid cars there. (This was not to be; and Toyota on 17th June did not address whether it would eventually build the Prius, now imported from Japan, in North America.)

The latest candidate is the Corolla, the popular compact now in its tenth generation. Toyota might do well to let this one make it to the finish line in Mississippi. According to the auto buying guide Edmunds.com, the Corolla is "the quintessential economy car" and the best-selling nameplate in automotive history. Toyota said the opening of the Blue Spring plant would mean that nearly all Corollas sold in North America will be built in the US and Canada.

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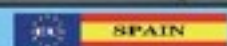
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Some Corolla production was moved to Japan in April, when Toyota closed an assembly plant in Fremont, California. The California plant had been a joint venture of Toyota and General Motors, but GM withdrew after its bankruptcy filing last year, and Toyota said it could not operate the plant without a partner. Toyota now plans to build electric cars there in partnership with another auto maker, Tesla.

✱ GM, too, has been busy – and forward-looking. The company announced it is committing an initial \$100 million to form a venture capital firm to invest in start-up companies in such fields as advanced materials and renewable fuels. The subsidiary, General Motors Ventures, will scout companies specialising in innovative technologies and, in some cases, may take an equity position in the firms. GM has since 2008 held equity stakes in two companies working on ethanol fuel development. While it is the sole Detroit auto maker to have a venture capital arm, some large companies in other industries – including the Internet search engine operator Google and the computer chip maker Intel – have such units of their own. In addition to new technologies, GM will look for innovative business models, such as more efficient distribution systems. The company, 61% owned by the US taxpayer since its bankruptcy last year, has been increasingly energetic in advance of a public stock offering as early as the fourth quarter, when the federal government can begin to recover the \$43 billion of its investment in GM that still is outstanding.

Other news of General Motors . . .

✱ On the same day in June on which Toyota announced the resumption of its Mississippi project, GM said that in response to brisk demand it would skip the annual summer shutdown at all but two of its US auto plants. Traditionally the Detroit auto makers shut their plants in early July to re-tool in preparation for building the next year's models. GM said that operating nine of its 11 assembly plants in the US for two extra weeks – perhaps with the help of some temporary workers – would allow it to build 56,000 additional vehicles.

Immigration reform

Arizona seizes the initiative in a hot-button issue – but at what cost to itself?

Of the 154 million working people in the United States, an estimated 8.3 million, or 5.4%, are unauthorised residents. As calculated by the Pew Hispanic Center, the percentage is up from 4.3% in 2003, but the increase has levelled off since the financial crisis hit the US economy in 2007. With an estimated 500,000 undocumented residents, Arizona falls behind California, Texas, Florida, New York, and New Jersey in attracting illegal migrants. Even so, it was Arizona which on 23rd April enacted the controversial new SB 1070 immigration law which, as of 27th July, requires police officers to detain anyone they suspect is in the country illegally. The police must verify the detainee's status, whereupon individuals found without documentation are to be charged with a misdemeanor punishable by up to six months in jail and a \$2,500 fine, followed by deportation.



The immediate and strong response to the new legislation, accurately termed "a furor," ran from jubilation to revulsion in a society built up by immigrants but now under stress brought on by the economic downturn. Media emphasis on defiant gestures – the Phoenix Suns basketball team wore jerseys reading "Los Suns" during a game on 5th May, the Mexican holiday Cinco de Mayo – works against a considered early evaluation. But Knowledge@Wharton, the online business journal of the Wharton School of the University of Pennsylvania, has performed a service by assessing some possible effects on Arizona of the rules that Governor Jan Brewer triumphantly signed into law in her state. ("Not a Positive Signal: the Economic Impact of Arizona's New Immigration Law," 21st May)

These observations are abstracted from Wharton's report:

✳ Americans for Immigration Reform, a business group which opposes "destructive measures" on immigration, estimates that, if all unauthorised immigrants were to be expelled from Arizona, the state would lose \$26.4 billion in economic activity and approximately 140,324 jobs. And, while the new law may work as a deterrent to illegal immigration, it could in the long run harm Arizona's already ailing economy with its implicit suggestion that the state is inhospitable to newcomers. "This is not a positive signal to be sending in a globalized world," observed Albert Saiz, a Wharton real estate professor who does research on immigration.

✳ The Arizona immigration measure prompted calls for economic boycotts of the state, and officials in Phoenix, the state capital, are fearful that the city could lose \$90 million in revenue if organisers of 19 large scheduled events take their business elsewhere. Deputy City Manager David Krietor told the *Arizona Republic*, "We have an image and public relations problem of what might be unprecedented proportions."

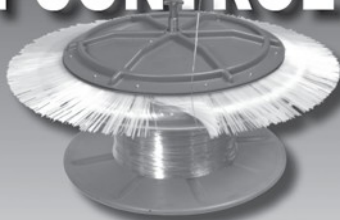
✳ The new law has already been challenged in federal court by two Arizona police officers who are seeking injunctions to block enforcement of provisions which they argue are unconstitutional. With Arizona likely to face further legal tests, defending itself could become expensive. Wendy Sefsaf, the director of communications for the American Immigration Council (Washington, DC), asserted that immigration is a federal responsibility and that state and local measures typically fail. She said, "This brings up the issue of how far a state can go without federal support – which is not very far." (Access to "Not a Positive Signal" and the rest of the Wharton School article archive is free but requires enrollment at the website Knowledge@Wharton.)

SB 1070 AND CRIME

A topic not addressed by Wharton was taken up by US Attorney General Eric Holder who, on 26th May, met with police chiefs from around the nation to discuss the potential effects of the new Arizona law on communities across America.

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Chiefs of police from Houston, Los Angeles, Maryland, Minneapolis, Philadelphia, San Jose, Salt Lake City, Phoenix and Tucson (Arizona) were present, and expressed unanimous concern about the damage the law could inflict upon the trust they have worked to build between law enforcement and Latinos. Tucson Chief of Police Roberto Villasenor said, "When you enact legislation that makes any subset of that community feel like they are being targeted specifically, or have concerns about coming forward and talking to the police, that damages our capability to obtain information to [solve crimes]." Mr Villasenor also pointed out that implementation of the law poses serious logistical concerns. The requirement that police officers verify the residency status of all arrested individuals would, he said, sap their limited resources. This point was amplified by John Harris, president of the Arizona Association of Chiefs of Police, who said, "We are stretched very thin right now and it's getting nothing but worse in our communities in terms of the budget crises. We don't have enough resources to continue to do this and to take on another responsibility."

In brief...

* In growing numbers, Americans living abroad are renouncing their US citizenship. The *Federal Register*, the government publication that records such decisions, shows that 502 expatriates gave up their US citizenship or

permanent residency status in the last quarter of 2009. While that represents a very small percentage of the 5.2 million Americans estimated by the State Department to be living abroad, it was the largest quarterly total in years. By way of comparison, there were 235 renunciations in all of 2008 and 743 last year. The number of expatriates waiting out the required period of time before meeting with consular officers to formalise their renunciations has also grown. Many American expats resent having to pay "double taxes." The United States is the only industrialised country to tax citizens on income earned abroad when they are taxed as well in their country of residence. These taxpayers are, however, allowed an exclusion on their first \$91,400 in foreign-earned income.

Telecom



Virtuous to a fault, San Francisco passes a cellphone radiation disclosure law

San Francisco is taking no chances. Possibly the most beautiful city in the United States is almost certainly the most cautious, having voted on 15th June to require all retailers of cellphones

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to post the amount of radiation emitted by each model. In 11-point type or larger, the specific absorption rate (SAR) of the instrument must be prominently displayed at the point of sale. The SAR is a value that corresponds to the relative amount of radiofrequency (RF) energy absorbed into the head of a user of a wireless handset. Believed to be the first of its kind in the nation, the law shows San Francisco outdoing the Federal Communications Commission. The FCC, which oversees the \$190 billion wireless industry, limits public exposure from cellular telephones to a SAR level of 1.6 watts per kilogram (1.6 W/kg), but imposes no public notification requirement. A curious aspect of both sets of rules is the absence of proof that cellphone use is hazardous to health. Neither the National Cancer Institute nor the FCC has found scientific evidence that wireless phones are dangerous – a fact probably known to San Francisco's mayor, Gavin Newsom. Because Mr Newsom is technically oriented and a heavy user of the Apple iPhone, his promotion of the new law would seem to have grown out of a dedication to the right to know. "It's information that's out there if you're willing to look hard enough," Tony Winnicker, a spokesman for Mr Newsom, said of the SAR. "And we think that for the consumer for whom this is an area of concern, it ought to be easier to find."

Officials in San Francisco emphasised that the labelling ordinance is intended only to inform – not to disparage cellphones or discourage their use. But the wireless industry takes a jaundiced

view of the initiative, and not only for its potentially chilling effect on sales. John Walls, a spokesman for CTIA - The Wireless Association, said that highlighting SAR information could mislead customers into concluding that some phones are safer than others. "We believe there is an overwhelming consensus of scientific belief that there is no adverse health effect by using wireless devices," Mr Walls said. "This kind of labeling gets away from what the FCC's standard actually represents."

Elsewhere in telecom . . .

✱ Motorola (Schaumburg, Illinois) and the Canadian handset maker Research In Motion said 11th June that they had settled the patent complaint over mobile technology filed by Motorola with the International Trade Commission in January. Research In Motion (Waterloo, Ontario), maker of the BlackBerry, is to give Motorola an initial payment plus continuing royalties for the use of mobile technology. While financial terms were not disclosed, the two handset makers said the deal included an agreement to cross-license various patents related to industry wireless standards and wireless e-mail messaging. The disputed patents cover several cellphone functions, including Wi-Fi access, the management of applications, user interface and power management.

Dorothy Fabian – USA Editor

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A powerful microprocessor and full digital signal processing make this lump and neckdown detector an important tool for quality control. The detector is available as a standalone device. Using a local operating and display unit, the KW 13Trio can be fully operated and configured at the device.

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▲ Versatile KW 13Trio from Zumbach

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The International Wire and Cable Symposium

Return to Rhode Island

59th IWCS/IICIT Conference - Nov. 7-10th - Rhode Island Convention Center, Providence RI, USA

After nearly 60 years, the International Wire & Cable Symposium and Conference continues as the premier event in the wire and cable industry. The 2010 Technical Symposium event will feature more than 100 technical papers addressing the latest technology in wire, cable and connector design, processing, materials and applications. The symposium sessions are organized in a fashion to allow attendees to assemble their own programs according to their specific interests. The Executive Track presents invited papers on topics of interest to industry executives and marketers. A poster paper session allows review of important new developments in a more informal, intimate manner. In addition, the IWCS offers a Suppliers' Exhibition in which over 100 industry suppliers showcase their latest products and processes. Finally, the IWCS has long taken on the role of professional development for the industry, with up to 10 Professional Development Courses scheduled adjacent to the conference program.

Plan now to attend the 59th IWCS/IICIT Conference in November. More details on the program and registration/hotel information will be available on the IWCS website, www.iwcs.org, as the conference date nears.

59th

IWCS/IICIT
Conference

Exhibiting Schedule*

Monday, November 8th
2:00 PM - 6:00 PM
Tuesday, November 9th
10:00 AM - 6:00 PM
Wednesday, November 10th
8:00 AM - 11:30 AM

Professional Development Courses, Sunday, November 7th, 2010

CN201 - Connectors and Connectorization: Copper
CN203 - Connectors and Connectorization: Fiber
CU101 - Fundamentals of Copper Conductors and Metallic Cable Design & Applications
FO101 - Fundamentals of Optical Fibers and FO Cable Design & Applications
FO206 - Bend-Resistant Fibers (incl. Multimode)
MA101 - Selection & Use of Materials in Wire and Cable
MA201 - The Art and Science of Extrusion for Wire and Cable - Part 1
MA 202 - The Art and Science of Extrusion for Wire and Cable - Part 2

Additional Professional Development Courses are being developed and may be added to the 2010 IWCS program. Please see the IWCS website for updated listings as they become available.

Technical Sessions, Monday, November 8th, 2010

SESSION 1: Executive Track
SESSION 2: Optical Connectivity
SESSION 3: Copper Design, Modeling & Measurement

Technical Sessions, Tuesday, November 9th, 2010

SESSION 4: New FTTH Deployment Technologies
SESSION 5: Optical Fiber design & Manufacturing
SESSION 6: Material Developments
SESSION 7: Special Applications
SESSION 8: Copper Connectivity
SESSION 9: Fiber Coatings
SESSION 10: Animal Protection
POSTER SESSION

Technical Sessions, Wednesday, November 10th, 2010

SESSION 11: Data Center
SESSION 12: Innovations in FTTH Deployment
SESSION 13: Manufacturing Processes
SESSION 14: Emerging Applications & Standards

For more information, please contact Patricia Hudak at:

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174 Main Street
Eatontown, NJ 07724, USA
+1-732-389-0990
Email: phudak@iwcs.org



*Please visit <http://www.iwcs.org> for a listing of exhibitors

Data cables without data loss

The manufacture of data cables demands a consistent control of the cable diameter, eccentricity and capacitance regarding periodic variations. Sikora offers several measuring systems specifically developed for quality control during the data cable production process.



▲ Sikora's Centerview 8000 measuring system

Laser series 2000 and 6000

The diameter gauge heads of the Laser series 2000 and 6000 operate with the patented Laser Shadow projection principle. By evaluating diffraction information for the diameter determination, a single reading precision as high as 0.2µm is achieved. This precision is maintained for years because no moving parts are included in these gauges.

Centerview 8000

The Centerview 8000 combines a diameter and eccentricity measurement, using optical and inductive measuring technologies.

The generated cloud diagram is an innovative display format of the ongoing measurement at the processor system Ecocontrol. It provides information on distribution of short term variation of eccentricity in graphical form. Each dot corresponds to one single measuring value of the eccentricity in relation to the amount and direction. The extension of the cloud diagram is the indicator for the standard deviation of the eccentricity.

Capacitance 2000

In the Capacitance 2000, a short and a long measuring electrode are integrated in one tube. The short sensing electrode of 10mm length allows for a reliable measurement of fast periodic capacitance fluctuations (FFT analysis). The long electrode measures the capacitance precisely. Structural Return Loss (SRL) predictions up to 3GHz are feasible at line speeds up to 2.4m per minute.

Sikora AG – Germany

Fax: +49 421 48900 90

Email: sales@sikora.net

Website: www.sikora.net

Heavy duty tapers and binders

The capabilities of tangential tapers and yarn binders can limit the productivity of production lines. In this context Stolberger KMB-Maschinenfabrik GmbH has updated and reconstructed its range of tangential tapers and yarn binders.

Using the new heavy-duty tangential taper, products with a diameter up to 600mm can be taped. With the heavy-duty yarn binder, a maximum of 160 yarns can be applied. The diameter of each of the 160 cops is 500mm.

It can be profitable to consider replacing existing, less productive, tangential tapers and yarn binders. Simply the replacement of the rotor bodies and tape guide is often extremely beneficial.

Stolberger KMB-Maschinenfabrik GmbH – Germany

Fax: +49 2402 86558 129

Email: info@stolberger.com

Website: www.stolberger.com

Boron-free salt carrier coatings

In wire manufacturing, salt carriers are frequently part of the coating system that is applied before drawing. On high carbon wire salt carriers are used as a basis for the drawing process, on top of conversion coatings or on a bare surface. Their function is the separation of die and wire, and transfer of lubricant into the forming die.

The sophisticated composition of the products gives a reduced sensitivity against humidity and so low water pick up on the coated wire. This provides a good corrosion protection even during long storage periods.

Traditionally borax, or formulations containing borax, are used for this application. Recent investigation of the toxicology of borax and boric acid initiated by the European Union has shown that borax acts as a reproduction-toxic substance. Borax has since been classified as a toxic substance with a Reprotox category 2 (or according to the GHS System: Repr. 1B). This reclassification presents a new situation for the wire drawing industry. New handling techniques are required for these toxic substances and stricter environmental regulations have to be applied in the production plants.

Reducing borax content in salt carriers to below the limit of declaration could, perhaps, be an interim solution. However, such a measure is questionable, not only because future legal regulations can hardly be predicted.

The challenge for Chemetall was to formulate salt carrier coating products completely free of boron. The result of Chemetall's R&D efforts is a range of new boron-free carrier coatings for different applications. First formulations have been tested successfully in industrial applications in Europe.

Among the newly developed and tested products is Gardolube® SC 6226. Its properties are at least comparable to carriers containing borax that are still in use in the market.

Chemetall GmbH – Germany

Website: www.chemetall.com



Precision wrapping of conductors

The development of wind power generators has led to the further development of flat conductors, mostly to save space.

One solution is to optimise the insulation layer by precisely placing several layers of insulating tape. This is obtained by placing the tape exactly edge-to-edge, and then setting the next layer in the same direction and with an exact and controlled displacement over the previous layer.

WTM Srl has developed its Visio system, that overlaps using two separated but perfectly synchronised concentric taping heads. Visio system is said to offer higher production speed, shorter downtime for tape refilling and the possibility of using cross-wound spools instead of pads. This means a significant increase of line efficiency, avoiding frequent stops due to running out of tape on the pads or due to tape breaks caused by frequent stops and starts.

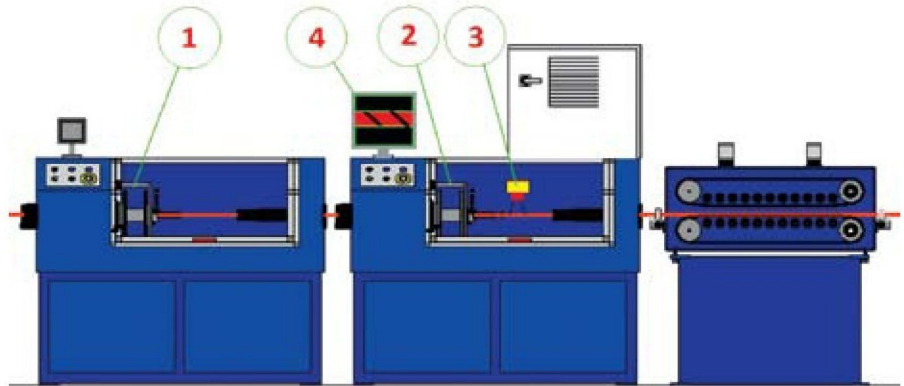
After the first head (1) has laid the initial tape edge-to-edge, completely covering the conductor, the Visio system intervenes using sophisticated software: it uses a camera (3) to control the taping process, generating a feedback signal (4). This acts on the taping pitch to maintain the correct displacement of the tape with extreme precision by regulating the rotation speed of the second head (2).

The second head is perfectly synchronised with the first and lays the tape to provide a full and exact covering of the layer beneath while keeping the edge of the first tape under its middle line, achieving secure dielectric insulation.

This level of accuracy is possible with highly sensitive direct control of the tape tensioning. Precision within a few hundredths of a millimetre is achieved on every tape layer.

The precision of this tensioning control is said to make WTM heads suitable for the most critical taping materials, for wrapping standard and custom wires and cables.

WTM Srl – Italy
Fax: +39 049 870 5599
Email: info@wtmachinery.com
Website: www.wtmachinery.com



▲ Diagram of WTM's Visio system in action

If You've Got the Wire, MAC Has the Tester.

MAC instruments can handle a range of metal wire including cut lengths, continuous production, stranded, multi conductor and insulated cable.

WIRE TYPES:

- Cold Drawn
- Fine Diameter
- Insulated Cable & Wire

MATERIALS:

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- Titanium
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Wide range of new and secondhand equipment



▲ Flymca offers a wide range of cable, wire and rope equipment

Flymca is a Spanish manufacturer of machinery and equipment for the production of cables, including electrical cables, submarine, offshore and umbilical cables and steel rope.

The company's product portfolio includes:

- Rigid stranders: high speed and efficient lines for bobbins 630mm and 800mm DIN or to American standards. Carriages from 6 to 36 bobbins with fast loading systems. These machines can produce high quality compacted conductors, either by rollers or by die. This machine type can also be used or adapted for screening purposes with bobbins containing multi-wires
- Tubular stranders: robust, high-speed machines working in configurations such as 1+6; 1+12 or 1+6+12, and specials such as 1+6+(6+1) which can also produce as 1+12 in a tandem operation. Standard bobbins of 630mm, 800mm, 900mm or 1,000mm diameter. Lines can be used for ACSR, AAAC, copper strands and for steel wire ropes of low, medium or high carbon
- Skip stranders: for Al or Cu bare wire stranding and for steel wire ropes on PC-lines
- Bow cabling: for fast laying-up of insulated conductors
- Double twist bunchers: for bobbins of 1,250mm, 1,600mm and 2,000mm diameter. High-speed production of Al and Cu conductors, with or without compacting (by die or rollers)
- Drum twisters for conductor laying-up, armouring and screening.

Also for cabling high and very high power cables such as Milliken. Machines for drums up to 4.5m diameter and 40-ton capacity have been supplied

- Planetary: for OPGW, steel wire ropes, umbilical and offshore solutions, also for armouring of multiple numbers of enamelled wires. Machinery can work with 100% back twist or variable from 0%. Drums for diameter 630mm, 760mm and 900mm for OPGW, steel or armouring, and from 1,000mm up to 2.5m for umbilicals, offshore and submarine cables
- CTC lines: complete lines and individual items for production of continuously transposed cables

Also included in the portfolio are all types of payoffs and take-ups for drums as heavy as 200-tons and 7m diameter; pulley capstans up to 5m diameter, pulling caterpillars, greasing units, taping and binding heads and double automatic coilers.

Flymca machinery is produced entirely in-house by an experienced and skilled technical team, without sub-contracting of any part to low-cost labour countries.

Flyro, the sister company of Flymca, deals with second hand machinery for the wire and cable industry, providing complete solutions or individual machines to suit any project.

Flymca & Flyro – Spain
Fax: + 34 942 55 98 65
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Beijing Holland Tech. Co., Ltd

Add: Rm. A1001, Vanouze Bldg.
 2# Fowai Str. Beijing 100037 China
 Email: webmaster@bjholland.com
 Tel/Fax: +86 10 68032755/ 68032878
 Contact: Mr. River Qi, Sales Manager

New compounds suit the harshest conditions

The vinyl division of Teknor Apex Company has announced two new Apex® PVC compounds to withstand the harsh conditions suffered by wind turbine and other outdoor control and power cable applications.

Apex 70001 and 70002 jacketing compounds are said to exhibit low brittle points of -46°C and -56°C , respectively, pass stringent tests for oil resistance, and meet appropriate UL and CSA standards for flame performance.

"The low-temperature flexibility of Apex 70001 and 70002 compounds provide the cold-bend and low temperature impact performance required in wind turbine nacelle applications in extremely cold environments," said Mike Patel, wire and cable industry manager. "Their durability under extremely harsh conditions enables cable manufacturers to supply the growing market for alternate energy sources such as wind power."

Teknor Apex Company – USA

Fax: +1 401 729 0166

Email: vinyl@teknorapex.com

Website: www.teknorapex.com

Drums for ropes and cables



▲ Drums of all sizes are available from GMP Slovakia

GMP Slovakia products include standard large drums for ropes and cables (a reinforced version is available for process and a lightweight version for transportation) and special large drums for individual applications.

GMP Slovakia had recently supplied disassembled drums with a flange diameter of 8,600mm, for easy reassembling at the customer's plant with GMP Slovakia technical assistance.

A wide range of large drums is available, to suit any application. Drums for offshore and submarine cables are in especially high demand.

Larger drums can be supplied in knock-down condition to save transport costs. Depending on the application and diameter, drums can be supplied balanced, with hardened changeable bushings, reinforced barrel and flanges for heavy duty processes (such as for a drum twister), lifting hooks, slots for fixing the cable and much more. GMP Slovakia is also specialised in the production of lifting, tilting and rolling equipment for these drums.

The GMP Slovakia range of products includes every kind of metal reel, for process or one-way, take-apart reels and handling equipment, baskets, pallets and stands.

GMP Slovakia – Italy

Email: sales@gmp-slovakia.com

Fax: +39 030 957 96 89

Website: www.gmp-slovakia.com



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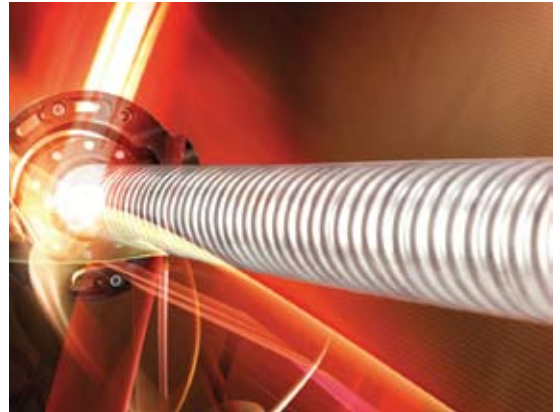
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Metal tape forming and welding technology

Rosendahl has broadened its portfolio to offer welding and corrugation equipment for power cable applications following the demand of the industry for alternative solutions, and based on experience of successful projects in the field of metal tape forming, welding and corrugation for high-end RF cables.



▲ Welding and corrugation equipment for power cables

Cable manufacturers require this technology for products such as cables for wind farms, offshore power stations or cables for submarine applications. The LV segment also includes a number of products (oil-pump, shipboard, signal cables), which use the Rosendahl technology to improve product properties or to increase productivity during the manufacturing process.

- Welding processes – to ensure perfect weld seams with minimal heat affected zones and best mechanical properties
- High speed corrugators for helical and annular corrugation for copper, aluminium and stainless steel

Compared to other technologies (aluminium or lead extrusion) the metal tape forming and welding system has several advantages. It shows better results for continuous operation, economic use of electric power and water, reduced scrap during production, dimension change and the possibility of using different metallic materials for shielding.

For metal shielding by means of smooth or corrugated aluminium, copper or stainless steel, Rosendahl offers solutions for the tape forming, welding and tube reduction process including adequate down stream equipment.

Cables produced in this way are said to demonstrate superior mechanical stability and water and/or gas tightness.

Depending on the cable design, space availability and product mix, Rosendahl is in the position to serve inline (in combination with the jacketing process) and offline solutions.

Technologies developed and optimised for these applications include:

- Optimised formers for various materials

Rosendahl Maschinen GmbH – Austria
Fax: +43 3113 5100 59
Email: office@rosendahlustria.com
Website: www.rosendahlustria.com

New induction heating systems

At wire 2010, ATE presented two new induction heating systems to complete its range of continuous heating systems for the parallel treatment of wires. The new systems are called IMW and CMW.

The main feature of the IMW system is the simultaneous heating of each wire, even where they have different diameters, by means of a dedicated inductor fed by the related frequency converter.

The CMW system is instead designed for a bundle of wires, heated using a single inductor fed by a single frequency converter.

The advantages of these new systems over traditional systems are in terms of efficiency, energy consumption, quality and compactness. Applications may include annealing, stress relieving, brass-diffusion and pre-heating or other industrial processes requested by the end-user.

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Electricity from wind farms?

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In the future, electricity will be increasingly generated in environmentally compatible wind farms such as »Horns Rev« in Denmark or »alpha ventus« near the isle of Borkum. On its long journey to the consumer, the electricity transmission equipment must seamlessly fit into the concept of sustainable electricity generation.

TROESTER provides innovative cable and core coating solutions of a cutting-edge technological design aimed at efficiently supporting the sustainable and on-demand transmission of the clean energy through HV and EHV cables from anywhere in the world. Expertly protected against all environmental impacts.

TROESTER is ready for the future of energy production. The cable machines and systems are »made in Germany« to contribute to serving the needs of today's generation while giving future generations a chance of developing their own lifestyles. www.troester.de

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Caterpillar for submarine cable



▲ AGP 300/35 S from Troester

Its product range includes the new AGP 300/35 S belt-type caterpillar (showcased at this year's wire Düsseldorf) which has been designed specifically for the manufacture of large submarine cables with diameters of up to 300mm.

The AGP 300/35 S is maintenance free, compact in design and can be used both as a traction and braking unit. This makes it an economical solution where weights of up to 100kg per cable metre need to be transported and held securely at the end of the submarine cable manufacturing process. The high effectiveness of individual drives and its wide control range underscore the efficiency of the Troester belt-type caterpillar.

According to the German Renewable Energy Sources Act (EEG), renewable energy should constitute a 30% share of overall power generation by the year 2020. Unlike conventional power stations, which are often sited near consumers in an effort to keep transmission losses low, electricity from renewable sources is generated most effectively at locations where the ideal environmental conditions prevail. Electricity from offshore wind farms and solar electricity from desert locations are typical.

Troester is well prepared for this development of increased power generation from renewable energy.

Cables destined to be laid along the ocean bed are produced in single segments of up to 36km in length. After the cable has been produced, belt-type caterpillars also have the task of transporting the cable to coiling stations or directly to a nearby river or seaport onto cable-laying ships, which lay the power cable onto the ocean floor directly from the sea.

Troester GmbH & Co KG – Germany

Fax: +49 511 864028

Email: info@troester.de

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Cooperation in CTC expertise

Continuous transposed conductors (CTC) require sophisticated knowledge for the implementation of production. To this end, Pourtier – Gauder Group and Proteco have signed a contractual agreement joining their specific expertise in this area to offer a high quality integrated solution.

Both companies have a strong background in the power field. Pourtier has manufactured a comprehensive range of rotating machines dedicated to LV and EHV cables for 150 years; Proteco has produced equipment for the production of high power transformer conductors since 1993.

This new alliance offers a complete planetary assembly line with Pourtier planetary strander type DRG560 (cage available from 24 up to 96 bobbins with reel dimensions 500, 560, 630 as option) and Proteco transposing head type TH5 (transposing frequency up to 250tpm). It is possible to upgrade the strander with more bays.

Peripheral equipment, such as payoffs, taping heads, caterpillars and take-ups, is also available from Pourtier.



▲ Proteco transposing head TH5

Pourtier sas – France
Fax: +33 4 77 71 10 85
Email: sales.pourtier@gaudergroup.com
Website: www.gaudergroup.com

Proteco sas – Italy
Fax: +39 015 9842044
Email: proteco@proteco-europe.it
Website: www.proteco-europe.it

High-precision C, L & tan δ measuring bridge



▲ Dielectric-loss analysis from Haefely

The dielectric-loss analyzing system 2840 from Haefely is designed for measurement of very low dielectric losses and impedances (dissipation factor and power factor) of high-voltage apparatus.

The instrument works on the principle of a combined bridge-vector-meter and is capable of analysing capacitive and inductive loads – especially shunt reactors – with accuracy (capacitance 0.02%, tan δ 1x10⁻⁵) and stability.

The graphical user interface of the instrument is highly intuitive, focused on convenience with built-in useful programs, and uses a large colour touch screen as the input device.

While the manual mode provides quick measurements, the automatic test mode supports complete automated test sequences.

Advanced software functionalities such as insulation temperature correction, programmable test sequences with pass/fail limits or graphical visualisation of measured data, make this instrument a powerful tool for analysis of high-voltage equipment.

The instrument incorporates standard interfaces (such as USB) that enable easy exchange of measurement results and related settings for further analysis or reporting.

Haefely Test AG – Switzerland
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Fax: +41 61 373 4912
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clean wire after drawing



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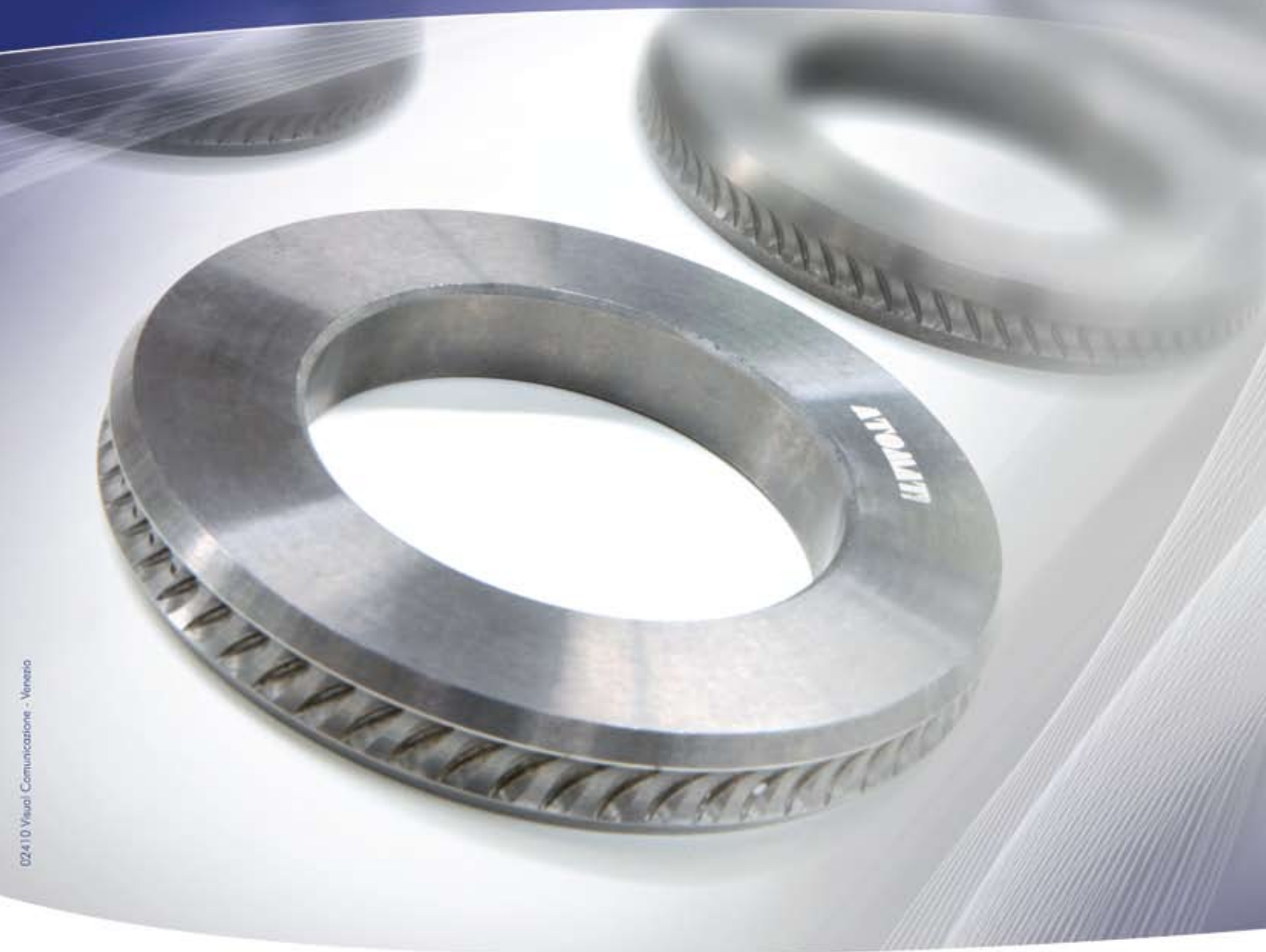


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More wizardry for dies

The Esteves Group is releasing a major update to its Drawing Die Wizard computer program, a free to download design tool for wire dies.

The Esteves Group believes it is the only wire die manufacturer to enable its customers to understand the logic behind the design of the ideal die for each application, and the selection of the most cost-effective die blank.

Highlights of the new version include:

- Real-time 3D view of the inner profile of the designed die
- Computer generated microscope view with realistic light reflections that simulates looking at an actual die with a real microscope. This makes it easy to view and discuss various profile shapes before the die is manufactured
- Animated simulation of wire drawn through the die makes it possible to see the location and growth of a wear ring for the particular profile
- Supports ten languages
- Improved reduction cone angle and blank suggestions

With over 100 years of experience the Esteves Group produces a comprehensive range of standard and custom diamond and carbide tools and dies for drawing, stranding, bunching, compacting, tube calibration and extrusion; also split and shaped dies in both diamond and carbide.

Esteves Group – Brazil

Email: sales@estevesgroup.com

Website: www.estevesgroup.com

Energy efficient, super heat treatment furnaces

CPA Wire Technologies GmbH has developed a furnace technology for the heat treatment of steel goods and high carbon wires and bands. The project was partnered by the Austrian research funding agency.

Under the brand name CPA-AEOX Industrial Furnaces the company has launched a patented furnace series which is aimed in particular at the perceived weaknesses of the products currently available in the market. Apart from energy savings, said to be up to 40%, and low emission combustion of gases, the series offers a part-load capacity of 25% to 115% of the nominal load for flexible production.

The temperature profile in the furnace and the furnace atmosphere are graphically parameterised via the integrated control and visualisation system. Core of the new technology for austenitisation, patenting, tempering and diffusion is a combination of radiant and convection heat by recirculation and appropriate guiding of the flue gases at multi-phase pre-heating of the combustion air while cooling the exhaust gases as well as recuperation of the heat drag-out by the material to be treated. In contrast to conventional industrial furnaces for the mentioned purpose the furnace pressure and the exhaust gas stream in the furnace are not reached via the instreaming gas/air mixture but via the high circulation of the flue gases generated by a special fan.

The challenge of the furnaces currently offered on the market of an inadmissible change in the furnace atmosphere by a reduction of the furnace pressure and the flue gas flow under part-load is thereby prevented, as well as a reduction of the convection heat ratio that results in a significantly better controllability at varying furnace loads and different product mixes. By increasing the convection heat transfer to the material to be treated, a reduction of the furnace length of around 20% is possible, and a reduction of the heat emission via the outer casing can be achieved. Special fans, designed for temperatures of over 1,000°C and integrated into the furnaces, are provided in addition to the monitoring function of all electrical parameters and the lubricant supply with a flow, pressure and oscillation sensor technology. The process is continuously monitored and diagnosed by the process control and diagnosis system IMPERIO by CPA.

All furnaces can be heated with gas as well as electrically. As an option, gas-heated furnaces can also be equipped with a Wobbe-index measuring unit and a corresponding combustion air control.

A new CPA Do-It-Yourself (DIY) Plug & Play concept simplifies the installation and commissioning of the modularly designed furnaces.

CPA Wire Technologies GmbH – Austria

Email: wiretec@cpa.at

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JANUARY 2011

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Include your company in these Special Features:

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If your company is involved in the above industry sectors, we invite you to participate in these special features by sending in editorial about your machinery or products, for FREE publication in the January 2011 edition.

Please send the text as a Word document attached to an email to the address below. Photos should be JPEG 300 dpi and a minimum width of 8cm.

Closing Date: 12 November 2010

Please forward to: **Gill Watson – Editor**

Email: gill@intras.co.uk

Tel: +44 1923 334137

Website: www.read-eurowire.com



Submarine firm completes installation of cable system

Main One Cable Company, a submarine cable company offering open access, wholesale broadband capacity in West Africa, and its system supplier, Tyco Electronics Subsea Communications SubCom, have completed the first phase of the Main One cable system.

The installation of the terminal equipment is completed in Seixal, Portugal and is under way at the system's landing sites in Lagos, Nigeria and Accra, Ghana.

The CEO of Main One, Funke Opeke stated that Phase 1 of the Main One Cable System spans 6,800km and will provide much-needed capacity between the West Coast of Africa and Portugal.

The dual fibre pair, 1.92 terabit per second, dense wave division multiplex project will first connect Lagos, Accra and Seixal with onward connectivity to Europe, Asia and the Americas, while Phase 2 of the project is expected to extend to South Africa.

The cable system, scheduled to go live on 1st July, will provide open access to regional telecoms operators and Internet service providers at rates lower than existing international bandwidth prices in the region.

The system will also provide broadband capacity to expand Internet access in the sub-Saharan region, as well as ease the difficulties of switching traffic between African countries without the need to go through Europe.

Opeke said "We are thrilled that the challenge of completing the marine work for the Main One Cable System is behind us and we will soon be able to concentrate on the critical mission of providing high-capacity bandwidth to regions of the globe where it is long overdue," adding that, "Together with SubCom, we have met our goals on schedule and we eagerly look towards delivering capacity to our customers and executing plans for expansion of the network."

President of SubCom David Coughlan emphasised that, "We consider the work we have done on Main One to be a significant accomplishment and are proud to be associated with this project"

Tyco Electronics Subsea Communications (SubCom) – USA
Website: www.subcom.com

Main One Cable Company – Mauritius
Website: www.mainonecable.com

China-based, with European outlook



▲ Daloo Machines is backed by the Gauder Group

Launched by the Gauder Group in 2008, Daloo is the first low cost wire and cable machinery manufacturer located in China but backed by European experience. Daloo offers rotating machines with basic functions, of simple design and steady quality.

The company will exhibit a rigid frame strander at wire China 2010, as well as components such as a payoff/take-up and pulling caterpillar.

Daloo Machines – PR China
Email: sales@daloo-machines.com

Fax: +86 519 8548 3557
Website: www.daloo-machines.com

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- Zero lubricant waste
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- H/C wire drawn at 18 m/s (3600 ft/min)
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- Exiting wire temp. 45°C (113°F)
- Greatly improved wire ductility



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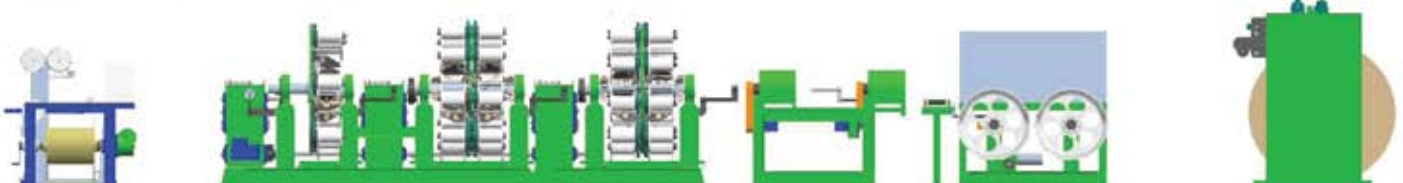
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Wire Stranding Machine



Gauder presence at wire China

Gauder Group supplies new and secondhand machinery to the wire and cable industry worldwide.

Pourtier designs and manufactures rotating machines for the production of medium and high voltage insulated power cables, overhead conductors, flat conductors for transformers, telephone and control cables while Setic offer covers equipment for low voltage conductors and cables, automotive cables, communication cables (LAN, FO), telephone and control cables.

Gauder, a specialist in resale equipment, enables the build-up of smart solutions from a large stock of machines. Sales, training and service are available from China for all products in the range.

In 1999 the group established a subsidiary in Changzhou, to serve the Chinese market with locally made machines at full European quality standards.

Setic – Gauder Group – France

Email: sales.setic@gaudergroup.com

Pourtier – Gauder Group – France

Email: sales.pourtier@gaudergroup.com

Gauder Group China – China

Email: sales.china@gaudergroup.com

Website: www.gaudergroup.com

Monitoring melt temperature

Ultratemp 6000 is Sikora's latest development for the power cable sector. It is a non-contact polyethylene melt temperature measurement system, based on non-invasive ultrasonic technology. It is specifically tailored to the production of medium voltage (MV) and high voltage (HV) XLPE insulated power cables.

The system precisely measures the melt temperature during production without influencing the melt flow properties, as the ultrasonic sensors are positioned outside of the flow channel. Melt shear heating effects do not occur.

Besides temperature measurement, the Ultratemp 6000 detects discontinuities in the melt. Early cross-linking after screens, which may lead to ambers and scorches in the polyethylene material, is avoided. The extremely high measuring rate allows a fast response time as well as the registration of small temperature variations.

Ultratemp 6000 is described as an important step for further process optimisation and cost reduction during the production of MV and HV cables.

Sikora AG – Germany

Fax: +49 421 48900 90

Email: sales@sikora.net

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Sovizzo (Vicenza - Italy)

www.invimec.com

Taihan Electric to replace copper rod mill

Siemens VAI Metals Technologies has received an order from the Southwire Company, USA to supply a copper rod rolling mill and the associated coil handling system. The end customer is Taihan Electric Wire Co Ltd of Seoul, Korea.

The new mill will replace the existing 30-year-old system in Anyang, originally built by Morgan Construction Company, a Siemens VAI business, as a subcontractor to Southwire. The new mill will be delivered by the end of 2010.

In 1955, the Taihan Electric Wire Co became the first wire and cable manufacturer to be established in Korea. Taihan is the leading domestic cable manufacturer and a major supplier of power transmission cables to the Asian market. Southwire Company is constructing a completely new production line for Taihan Electric, including melting and casting plants with a production output of 40 tonnes of copper rod per hour, in diameters ranging from 8mm to 25mm.

Siemens VAI is responsible for the engineering, manufacturing and commissioning of all the equipment for the rolling mill. This includes a roughing mill with one 18", one 16" and two 12" stands, as well as a finishing mill comprising eight 8" stands. The rolling mill is completed by a pickling line, two pinch rolls, a rollerised downturn, coiler and conveyor.

Siemens AG – Germany

Website: www.siemens.com/metals

Wire friction, wear and lubrication

Advertorial on behalf of Decalub

The PDH lubrication system is used in the most demanding drawing applications, allowing the highest drawing speeds, with all carbon steel rods/wires, mechanically descaled or acid cleaned, bare or pre-coated, bright or galvanized, including spring, high-tensile rope, PC strand, stainless steel spring, galvanised H/C and L/C wire, plating wire and CO₂ welding wire.

The PDH system uses a unique multi-way interaction of lubricant pressure, temperature and viscosity to convert a solid lubricant into a liquefied solution and maintain its thermal stability at all drawing speeds, eliminating conventional wet pre-coatings for all drawing applications form rod, including mechanically descaled 0.90%C rod drawn without pre-coating chemicals.



▲ Wire lubrication by GP/PDH system

coat with adjustable coating weight up to 8–10g/m², at will, completely eliminating the need for phosphate and borax wet pre-coating chemicals.

A typical application consists in drawing 5.5mm 0.83/0.88% C, mechanically descaled rod, without wet pre-coating, with an output of 2.2 tonne/hour and a die life of 200 tonnes/die in the first draft and 40 to 60 tonnes of wire drawn in last draft, with superior surface quality and improved wire ductility.

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Shown above is Reel-O-Matic's model RR50 diesel powered Re-Reever. Supports up to 120" O.D. reels x 50,000 lbs. capacities. Capable of 400,000 in/lbs. of torque. Larger capacities available.

Introducing Reel-O-Matic's Re-Reeving Series. Referred to as the "RR Series", the Re-Reever is popular with riggers during rope inspection and replacement operations. The company's exclusive Re-Reeving machinery easily transfers old rope onto empty reels and new rope onto main lift line drums, and boom hoist sheaves by utilizing tension-controlled pay-out and take-up drive systems (gasoline, diesel, or electric/hydraulic drive systems are available) when high torque/tension is required. The unit is also ideal for inspecting material. The machinery's special slide coupling disconnect feature enables riggers to load and unload empty or full reels of material safely and quickly. It's free-wheeling capability enhances user friendliness.



Shown above is Reel-O-Matic's model CRS24 to support small reels up to 24" O.D. x 1,000 lbs. capacity. Available in powered and non-powered modes.

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Measurement & control of wire temperature

The AUTAC 250S system provides a reliable, fast, non-contact temperature measurement, control and display for preheating or post-annealing in extrusion or wire drawing applications.

The non-contact principle offers a long life span and accurate measuring results without danger of marring the product.

A closed loop control to the preheater of the wire temperature guarantees better product uniformity and a uniform bonding of the insulation. By mounting the sensor close to the extruder, any heat loss occurring between the preheater and the extruder can automatically be compensated for.

AUTAC 250S can also be connected to Zumbach's universal USYS processors and be used as a standalone temperature measuring and control system.

An integrated SIGMA Expert controller can be interfaced to a preheater or to a post-annealing station in order to keep the material temperature on target at all times.



▲ AUTAC 250S temperature measuring sensor

The technical advantages of the system are said to include:

- A slotted design, so no threading required
- Fast response time, < 1s
- Compact
- Unaffected by air draught
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Main data:

- Product diameter measuring range: 0.32mm–6mm (0.012–0.24")
- Temperature measuring range: up to 160° C (320°F)

Zumbach Electronic AG – Switzerland
Fax: +41 32 356 0430
Email: sales@zumbach.ch
Website: www.zumbach.com

New implementation deal for CableBuilder®

InnoVites BV has announced that Siechem Technologies of India, has selected CableBuilder® to further boost the efficiency and quality of its design and quotation processes. Siechem designs and produces a wide variety of specialised cables utilising state-of-the-art technology that includes an electron beam irradiation facility.

InnoVites BV – Netherlands
Email: info@innovites.com
Website: www.innovites.com

Siechem Technologies Pvt Ltd – India
Website: www.siechem.com

Automated production

U Gear Automatic Machinery produces wire and cable-related machinery and materials. The micro computer circular object taping machine, UG 832, is the company's main product.

U Gear's efficiency analysis shows that, done manually, this activity involves up to six people, but can produce only up to 500 units per eight hours without 100% identical output. However, the UG 832 will guarantee to produce up to 3,000 volumes per eight hours with 100% identical output and needs only one person to operate the machine.

The UG 832 can produce one set in 8 seconds. In contrast, using manual labour will take up to 48 seconds per set.

U Gear Automatic Machinery Co Ltd – Taiwan
Fax: +886 2 22405083
Email: ugear899@gmail.com
Website: www.a1a1a.com

Wire drawing sector stays wired

The absence on the Internet of an international reference point, from raw materials to finished products, for the wire drawing industry – and demand from operators in the sector for a communication medium – are among the reasons why www.wiredrawing.net was founded.

www.wiredrawing.net is said to be the first international online fair in the wire working field; a fair that can be visited in five different languages, English, German, Italian, French and Spanish.

Established in Italy five years ago in cooperation with the University Politecnico of Milan, the platform is continuously renewed and upgraded in content and site structure, often in response to suggestions from exhibiting companies.

Access to 500,000 content pages, 160 international online exhibitors and 3,500 registered firms is completely free and wiredrawing.net is currently recording 20,000 certified visits every month.

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wire Chi

Shanghai's SNIEC opens its doors to wire & Tube China 2010



From 21st to 24th September 2010, the Shanghai New International Expo Centre (SNIEC) will again be hosting the concurrent wire and tube trade shows, wire & Tube China 2010. Joint-organisers Messe Düsseldorf China Ltd and Shanghai Electric Cable Research Institute will be hoping to exceed 2008's record visitor numbers, when 1,098 exhibitors welcomed 31,585 visitors over the four days of the exhibition. All space has been sold in the original six allocated halls and a seventh has been made available; 1,200 exhibitors are anticipated.

For the wire and cable industry, experiencing increasing demand after the economic downturn of recent months, wire China 2010 will provide an important trade and exchange platform for China and Asia.

On the following pages is a complete listing of exhibitors participating at wire China 2010, correct at time of going to press.

For more information on wire China 2010 and the latest exhibitor list, please visit the official website. The site also includes comprehensive information for show visitors and useful travel information.

- **Dates:** 21st – 24th September 2010
- **Website:** www.wirechina.net
- **Location:** SNIEC (Shanghai New International Expo Centre) Shanghai, PR China
- **Organisers:** Messe Düsseldorf China Ltd and Shanghai Electric Cable Research Institute
- **Exhibition times:** 9.00am to 4.30pm every day
- **Entrance fee:** Free by registration, but the show is open solely to trade visitors



na 2010

Alphabetical list of Exhibitors

Listing correct at time of going to press

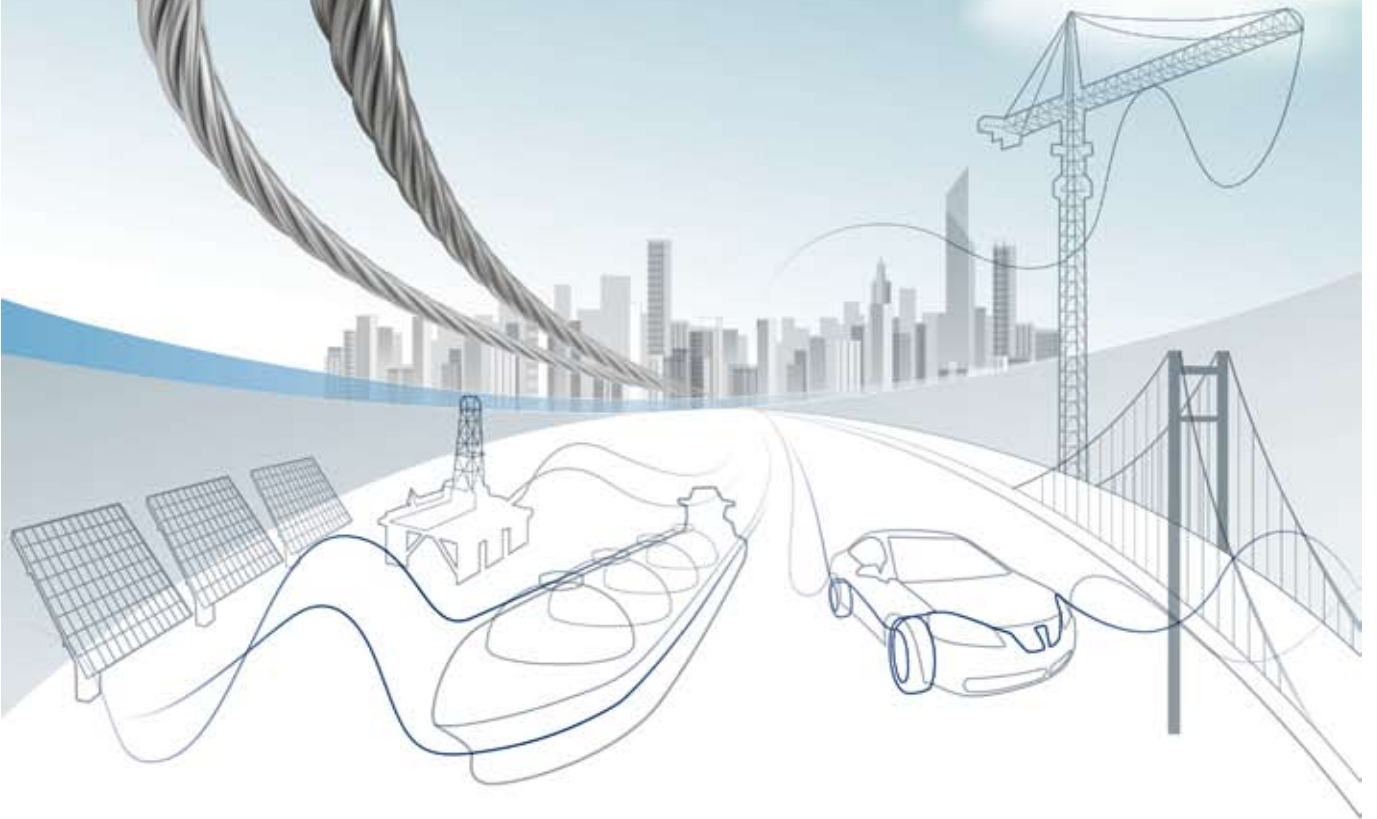
Company	Country	Stand
1st tech, Wujiang Works	China	W3A06
ALMT Corp	Japan	W1D83
AdwanteK Technology Co, Ltd	China	W2D83
AESA SA	Switzerland	W1B57
Agility Fairs & Events GmbH	Germany	W1D33
Alphagary Corporation	USA	W1F05
An Chen Fa Machinery Co, Ltd	Taiwan	W1D21
Anbao (Qinhuangdao) Wire & Mesh Co, Ltd	China	W3E41
Anderson Pass The Tianjin Magnet Wire Equipment Manufacturing Co, Ltd	China	W4C20
Anhui Changjiang Jinggong Wire & Cable Machinery Co, Ltd	China	W2A81
Anhui Hengzheng Cable Coience And Technology Co, Ltd	China	W3C78
Anhui Hubin Machinery Factory	China	W3B51
Anhui Jingde Dewei Machine Co, Ltd	China	W3F69
Anhui Plastics Machinery Factory	China	W2G72
Anhui Race Mechanical Equipment Co, Ltd	China	W4D12
Anqing Huidong Machinery Co, Ltd	China	W3D53
Anqing Yulong Rubber & Plastic Machinery Co, Ltd	China	W3A48
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August Strecker GmbH & Co KG Elektro-Schweissmaschinen-Fabrik	Germany	W1E31
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Avic Xinhang Bashan Precision Filter Co, Ltd (No 540 Factory)	China	W3F32
Baicheng Fujia Manufacture Co, Ltd	China	W2A71
Baicheng Miracle Equipment Machinery Co, Ltd	China	W2E73
Baofeng Cable Co, Ltd Jiaozuo City	China	W4B19
Baosheng Science & Technology Innovation Co, Ltd	China	W4E01
Baoying Hengye Electric Equipment Factory	China	W3F45
Beijing CATIC Industry Limited	China	W4D36
Beijing Circular Time Technology Co, Ltd	China	W3D56
Beijing Dmbest Tool & Die Tech Co, Ltd	China	W2C71
Beijing Euro-China Technology Development Co, Ltd	China	W2F53
Beijing Holland Trading Co, Ltd	China	W4C11
Beijing Huimingxun Technology Development Co, Ltd	China	W3A07
Beijing Jinxin Century Electro-technical Machinery Co, Ltd	China	W4B17
Beijing PheiBour Recycled PolyTech Co, Ltd	China	W4F18
Beijing Ridee Technology Co, Ltd	China	W4A27
Beijing Sanxin Wire Drawing Die Co, Ltd	China	W2C51-2
Beijing Xiboer Science and Technology Developing Co, Ltd	China	W3E70
Besel Basim San Tic Ltd Sti	Turkey	W1F68
Beta LaserMike Inc	USA	W1E63
Blachford Corporation	USA	W1F07
Boao (Shenyang) Co, Ltd	China	W3G32
Bongard Trading GmbH & Co KG	Germany	W1F21
Boockmann GmbH	Germany	W1F36
Borouge Sales and Marketing (Shanghai) Co, Ltd	Hong Kong	W1C03
Borun Cable Material Co, Ltd	China	W3G18
Willi Bremer GmbH	Germany	W1E55
Bühler Würz Kaltwalztechnik GmbH	Germany	W1D51
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Caballé sa	Spain	W1B53
Candor Sweden AB	Sweden	W1E59
Carl Bechem GmbH	Germany	W1G32
Ceeco Bartell Products Bartell Machinery Systems, LLC	Canada	W1A51
CERSA-MCI SARL	France	W1C29
Changsha Xianghong Instrument & Machinery Co, Ltd	China	W2A12
Changsha Xinxiong Instrument Science and Technology Co, Ltd	China	W2A56
Changxing Sincere Automatic Engineering Equipment Co, Ltd	China	W4B20
Changzhou AiBang Machinery & Science Technology Co, Ltd	China	W3B81
Changzhou Changhua Photoelectricity Plastic Co, Ltd	China	W2E41-1
Changzhou Changlang Gearbox Co, Ltd	China	W3G80
Changzhou Duotong Machinery Co, Ltd	China	W3C69
Changzhou Haolin Machine Co, Ltd	China	W3C83
Changzhou Hengfeng Copper Co, Ltd	China	W3C41
Changzhou Hongguang Optical Cable Attachment Manufacturing Co, Ltd	China	W3E61
Changzhou Jiangxin Machinery Co, Ltd	China	W3A36
Changzhou Jiayou Cable-spool Co, Ltd	China	W2G53



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wire China 2010 exhibitors

21st - 24th September

<<< Changzhou Jinli Special Wire Factory China W4B27	Daloo Machinery Co, Ltd China W3C01
Changzhou Jinlun Gongchengsuliao Chang China W3G48	Dandong Decheng Plastic & Rubber Science
Changzhou Qifeng	& Technology Co, Ltd China W3C17
Continuous Extrusion Equipment Co, Ltd China W4D17	Danieli Automation SpA Italy W1E05
Changzhou Riyue Machine Co, Ltd China W2F57	Davis-Standard, LLC USA W1G10
Changzhou Suyun Electric Co, Ltd China W3E56	Dayee Wire & Cable Equipment Co, Ltd China W3B67
Changzhou Wujin Hengtong Metal Steel Wires Co, Ltd China W3F38	Deukyoung Co, Ltd Korea W1C63
Changzhou Yongbo Electronics Co, Ltd China W3G68	Deyang Bochuang Electrotechnical Equipment Co, Ltd China W2F82
Changzhou Yongliang Wire & Cable Machinery Co, Ltd China W2A29	Deyang Dedong Electrotechnical
Changzhou Zhilin Plastic Co, Ltd China W2G15	Machinery Manufacture Co, Ltd China W2A02
Channel Machinery & Equipment Co, Ltd China W3G15	Deyang Hongguang Machine Equipment Co, Ltd China W4C26
Cheng I Machingery Co, Ltd Taiwan W1E22-B	Deyang Jiechuang Wire & Cable Machinery Co, Ltd/
Chengdu Centran Industrial Co, Ltd China W3A03-1	Deyang Dongfang Electrotechnical Control
Chengdu Haite Electric Equipment Co, Ltd China W2G49	Equipment Co, Ltd China W2B71
Chengdu Huijia Machinery Co, Ltd China W2F73	DIELEC-JIATE China W2E83
Chengdu Sanyuan Electrical Machinery	Domino China Ltd UK W1C28
Manufacturing Co, Ltd China W3F78	Dongcheng Metal Treatment (Taicang) Co, Ltd China W3A27
Chengdu Shuhong Machinery Co, Ltd China W3C81	Dongfang Zhuoyue Electrotechnical Equipment Co, Ltd China W2A16
Chengjia Wire & Cable Co, Ltd/Chuangjia Wire	Dongguan Champion Hardware Co, Ltd China W4A10
& Cable Machine Ltd China W2A32	Dongguan Chaur Lung Machinery Ltd China W3D41
China Electronics Technology Group Corporation No 8	Dongguan Chuangkang Electricity Assembly Co, Ltd China W3A63
Research Institute China W4D11	Dongguan Chuangzhan Machinery Co, Ltd China W2C03
China Southern (Group) HK Ltd Hong Kong W1C30	Dongguan Converge Wire Tech Co, Ltd China W3G47
Chnstar Industrial Co, Ltd China W3E31	Dongguan Dewang Electrical Machinery Co, Ltd China W4B31
Clifford Welding Systems (Pty) Ltd South Africa W1G34	Dongguan Fuda Electrical Machinery Co, Ltd China W3B60
Condat Lubrifiants France W1C25	Dongguan Gemwell Electrical Equipment Co, Ltd China W2A41
Conductix Wampfler (Delachaux Group) France W1D26	Dongguan Guanyue Wire & Cable Machinery Co, Ltd China W2D73
Conoptica AS Norway W1F08	Dongguan Henry Electrical Equipment Co, Ltd China W2G28
Consona Shenzhen Company Limited China W1A59	Dongguan Humen Prowess Machinery Manufacturing Co, Ltd China W3G40
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Coperion (Nanjing) Machinery Co, Ltd China W2D61	Dongguan Jingfeng Electrotechnical Machinery Co, Ltd China W2F61
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CPA Computer Process Automation GmbH Austria W1B43/C44	Dongguan Longcheng Cable Electrical Co, Ltd China W3A60
D & S Dies Co, Ltd Korea W1D72	Dongguan New Enshiang Machinery & Fitting Co, Ltd China W3F43
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Dainichiseika (Shanghai) Trading Ltd Japan W1C09	Dongguan Sam-tat Springs Machinery Co, Ltd Hong Kong W1F61
Dalian Huahan Rubber & Plastic Machinery Co, Ltd China W2B73	Dongguan Sun Wire Equipments Co, Ltd China W3E45
Dalian Konform Technical Co, Ltd China W2C01	Dongguan Taizheng Wire Machinery Co, Ltd China W3A69
Dalian Tongda Equipment Technology Development Co, Ltd China W3F23-2	Dongguan Tenghong Electrical Equipment Co, Ltd China W4A23
Dalian TTOFF New Material Development Co, Ltd China W3F23-1	Dongguan Wangshi Electrical Equipment & Material Co, Ltd China W3A61

>>>



Windak's complete Pay-off and Take-up program

Windak is proud to present our complete range of Pay-offs and Take-ups. There are two types of designs, the Windak Premium Line, and the Windak Heavy Duty Line. Both designs are of portal type, with traversing on floor rails.

The Windak Premium Line has tire drive, with floating pintles and a second tire drive as options.

The Windak Heavy Duty Line uses conventional drive pin design.

Efficient production, combined with Windak know-how allows us to provide cost effective solutions that meet or exceed all expectations.

Since its founding in Stockholm, Sweden in 1994 Windak has been providing intelligent material handling and packaging solutions for the Wire and Cable, Tube and Hose, as well as Automotive Industries including Pay-offs, Take-ups, rewind lines, palletizing and pallet handling systems.

For complete specifications of all our products, please see our website.

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Booth W1F83

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	Dongguan Weiyang Electrician Machinery Co, Ltd.....	China	W3C79	Hebei Napixian Moon Jipidic Chemical Co, Ltd	China	W2G39
	Dongguan Xinlong Electrician Machinery Factory	China	W2F21	Hebei New Baofeng Wire & Cable Co, Ltd.....	China	W4E23
	Dongguan Xinmei Precise Mold Co, Ltd	China	W3E83	Hebei Zhonglian Polymer Technology Development Co, Ltd.....	China	W3A17
	Dongguan Xinpeng Xiangsu Co, Ltd.....	China	W3B05	Hefei Hening Electro-Technology Co, Ltd China.....	China	W2A63
	Dongguan Yonghui Mould Factory	China	W3F75	Hefei Jinqi Machinery Co, Ltd	China	W3F57
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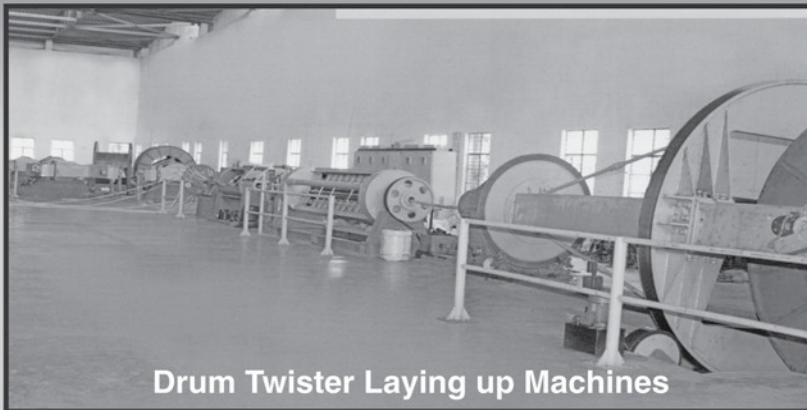
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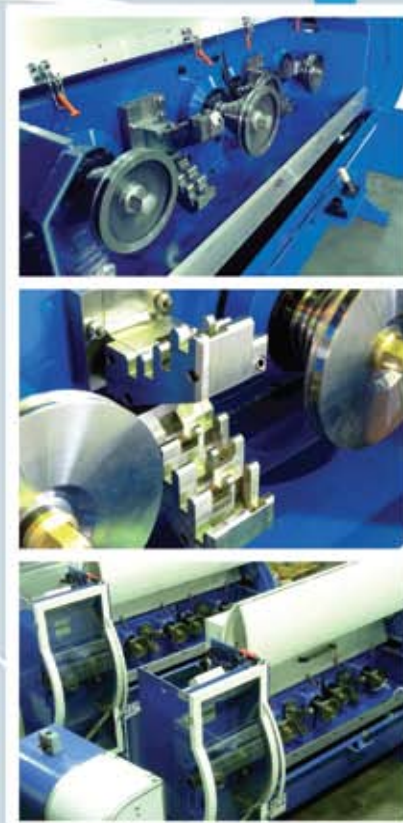
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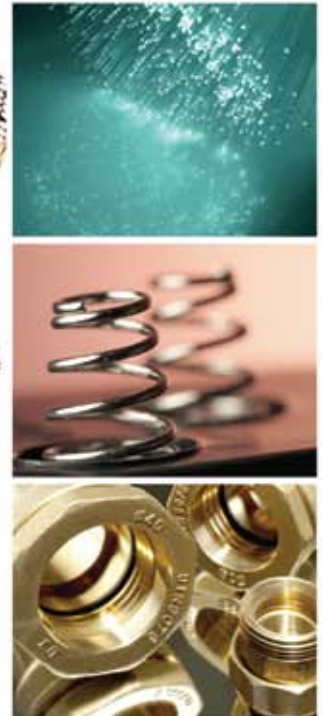
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Shanghai Saini Transmission Equipments Co, Ltd	China	W3F05	Suzhou Ruiyuan Machinery Co, Ltd	China	W4B23-2
Shanghai SDG Electro-technical Machinery Co, Ltd	China	W2A62	Suzhou Zhihong Cable Material Co, Ltd	China	W3C29
Shanghai SECRI Optical & Electric Cable Co, Ltd	China	W2D43-2	Suzuki Garphyttan Wire (Suzhou) Co, Ltd	Japan	W1E68
Shanghai Sendychem Co, Ltd	China	W3C05	Tai Jih Machinery Co, Ltd	China	W2C15
Shanghai Seti Enterprise Int'l Co, Ltd	China	W4C07	Taicang Chenglian Plastic Co, Ltd	China	W3C12
Shanghai Shenchen Wire & Cable Equipment Co, Ltd	China	W2D01	Tainan Chin Chang Electrical Co, Ltd	Taiwan	W1E10
Shanghai Shenghua Cable Group	China	W4D23	Taizhou Hualing Electric Apparatus Co, Ltd	China	W3G49
Shanghai Shenlian Testing Machineries Works Co, Ltd	China	W3E50	Teijin Aramid Asia Co, Ltd	Netherlands	W1D01
Shanghai Shenye Science & Technology Co, Ltd	China	W2B51	Teknor Apex Company	USA	W1G05
Shanghai Shenyuan Hi-Temp Wire Co, Ltd	China	W3E29	Teurema - Eurolls Group Tecnica		
Shanghai Shuangyou Drawing Dies Co, Ltd	China	W3F30	Europa de Maquinaria SL	Spain	W1G53/G67
Shanghai Singcheer Technology Co, Ltd	China	W2D03	ThyssenKrupp VDM GmbH	Germany	W1E53
Shanghai SNLIMA Electric Motors Co, Ltd	China	W2A48	Tian Chen Dies	China	W4D08
Shanghai Success-Forever Chemical Co, Ltd	China	W3C09	Tianchang Tianyi Mold Science Technology Development Co, Ltd	China	W2G35
Shanghai Sumlirs Trading Co, Ltd	China	W4A02	Tianjin Huayuan Times Metal Products Co, Ltd	China	W3D03
Shanghai Sunshine Autocontrol Device Co, Ltd	China	W2G31	Tianjin Pretty Chemical Industry Co, Ltd	China	W3A22
Shanghai Surrey Polymers Co, Ltd	China	W3D30	Tianjin Suli Cable Group Co, Ltd	China	W4D01
Shanghai Taiqin Machinery Fitting Co, Ltd	China	W2B67	Tianjin Tianlan Electrical Machinery Co, Ltd	China	W2B81
Shanghai TDZ Communication Equipment Co, Ltd/ Shanghai TDZ Product & Trade Co, Ltd	China	W3B37	Tien Dat Company Ltd	Vietnam	W1B65
Shanghai Tengjun Machine Factory	China	W2G47	TJK Machinery Co, Ltd	China	W3D01
Shanghai Topcolor Plastics Technology Co, Ltd	China	W3A08	Tokyo Rope MFG Co, Ltd	Japan	W1G84
Shanghai Wangxun New Material Co, Ltd	China	W3C33	Tongcheng Hardware Co, Ltd	China	W3E08
Shanghai Welldone Electrical Equipment Co, Ltd	China	W3F72	Tongling GCE Special Braids Co, Ltd	China	W3G50
Shanghai Wilsun Cable Machinery Co, Ltd	China	W4A31	Tonglu Xingguan Cable Equipment Factory	China	W3F41
Shanghai Xudong Electric Machinery Factory	China	W2E01	Tongming Metalwork (Shenzhen) Co, Ltd	China	W3F26
Shanghai Yessjet Precise Machinery Co, Ltd	China	W2F41	Traxit (Tianjin) Chemical Co, Ltd	China	W1G21
Shanghai Yingong Wire Products Equipment Co, Ltd	China	W2B61	Traxit International GmbH	Germany	W1G21
Shanghai Yitailong Precise Machinery Co, Ltd	China	W2C41	Treflerias Quijano SA	Spain	W1C54
Shanghai Yufeng Electronics Technology Co, Ltd	China	W2E15	Troester GmbH & Co KG	Germany	W1F41
Shanghai Zhenziqin Environmental Technology Co, Ltd	China	W4B15	Twins Micro Technology Corporation	USA	W1F80
Shanghai Zhimohui Machinery Co, Ltd	China	W2A36	Joachim Uhing KG GmbH & Co KG	Germany	W1G20
Shanghai Zhonglian Cable Engineering Co, Ltd	China	W2D43-5	Unience Co, Ltd	Korea	W1C81
Shanghai Zuolin Electric Co, Ltd	China	W3D70	Unitek Maschinenbau- und Handels GmbH	Austria	W1D58
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Shanhai Jiexin Ink Co, Ltd	China	W3A12	Vitari SpA - Eurolls Group	Italy	W1G53/G67
Shanxi Tianxiang Machine Co, Ltd	China	W2E63-1	VÖDKM AWCMA Verband Österreichischer Draht- und Kabelmaschinen-Hersteller	Austria	W1C43/D44
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Sheng Chyeen Enterprise Co, Ltd	Taiwan	W1D03	Wafos Umformtechnik GmbH	Germany	W1D41
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Shengzhou City Hongli Metal Products Factory	China	W3E11	WCISA - Wire and Cable Industry Suppliers Association	USA	W1G09
Shenyang Jinggong Cable Material Co, Ltd	China	W3A41	Weber & Scher Mfg Co, Inc	USA	W1G11
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Shenzhen Delifeng Trading Co, Ltd	China	W3A09	Weifang Sinosun Polymer Co, Ltd	China	W3B27
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Shikaree Stainless Steel Seisen Co, Ltd	China	W3E03	Windak AP	Australia	W1F83
Shunhong Diamond Die Co, Ltd	China	W3F11	Wire & Plastic Machinery Corporation	USA	W1G04
Sichuan Pioneer Technology Co, Ltd	China	W3B61	WKÖ-Wirtschaftskammer Austria Aussenwirtschaft Austria (AWO)	Austria	W1C55/D56
Sichuan Splendor Gauge Co, Ltd	China	W2A28	World BC Co, Ltd	Korea	W1C69
Sichuan Yaxi Rubber & Plastic Machine Co, Ltd	China	W3F76	Wuhan Cable Group Co, Ltd	China	W4E03
Sictra Srl - Eurolls Group	Italy	W1G53/G67	Wuhan Tophua Telecommunication Material Co, Ltd	China	W4B41
Siderex Spanish Association of Steelworks	Spain	W1C56	Wuhu Electrotechnical Machinery Co, Ltd	China	W3C77
Siebe Engineering GmbH	Germany	W1E23	Wuxi Huamei Cable Co, Ltd	China	W4F28
SIEI Sistemi Srl	Italy	W1B30	Wuxi Anber Machine Co, Ltd	China	W3F15
Sikora AG	Germany	W1E51	Wuxi Changxin Electromechanic Science & Technology Co, Ltd	China	W3G02
Sindia Instruments Co Ltd	China	W1G30	Wuxi City Xuhua Electrician Machinery Factory	China	W3D80
Sinoleader Industries Group Co, Ltd	China	W3B71	Wuxi City Yanqiao Cable Accessories Co, Ltd	China	W4D20
Sinwa Printech (Shanghai) Co, Ltd	China	W3A77	Wuxi El Pont Radiation Technology Co, Ltd	China	W3C03
SKET Verseilmaschinenbau GmbH	Germany	W1G22			
SOCIÉTÉ des Filières Balloffet SAS	France	W1D28			
Sojitz (Shanghai) Co, Ltd	Japan	W1D63			

wire China 2010 exhibitors

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Wuxi Golzu Electrical Machinery Co, Ltd	China	W2E81
Wuxi Hengtai Cable Machinery Manufacture Co, Ltd	China	W2C21
Wuxi Huajian Electronics Instrument Research Institute	China	W3E49
Wuxi Jieke Plastic Co, Ltd	China	W3B29
Wuxi Kemaite Optic & Electric Products Co, Ltd	China	W3B33
Wuxi Magna Electrical Machinery Co, Ltd	China	W2G21-1
Wuxi Nanfang Electrotechnical Machinery Co, Ltd	China	W2C43
Wuxi Quantong Cable Material Co, Ltd	China	W3A03-2
Wuxi Shengbao Copper Machinery Works	China	W3F52
Wuxi Sima-Meida Electro-Technical Co, Ltd	China	W2C53
Wuxi Sunan Electrotechnical Machinery Co, Ltd	China	W2D71
Wuxi Tongchuang Machinery & Technology Co, Ltd	China	W2F51
Wuxi Yongling Electric & Electron Appliances Co, Ltd	China	W3G43
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Wuxi Zhongding Electrician Machinery Co, Ltd	China	W2C83
Wuxishi Meiling Machine Co, Ltd	China	W3E84
Xiamen New Form-Tech Enterprise Co, Ltd	China	W4C03
Xinxiang Shenlong Electrical Machinery Co, Ltd	China	W3C71
Xinxiang Yubei Reels Products Co, Ltd	China	W3F71
Xinxiangshi Lifeng Machinery Co, Ltd	China	W3G76
Ya Sih Technology Co, Ltd	Taiwan	W1E22
Yangzhou Chengming Electrician Co, Ltd	China	W4D16
Yangzhou Feichi Electrical Accessories Factory	China	W2E41-2
Yangzhou Qunye Electrical Machinery Factory	China	W2B41
Yangzhou Redsun Industrial Co, Ltd	China	W3D68
Yangzhou Tengfei Electric Cable and Appliance Materials Co, Ltd	China	W3C23
Yangzhou Tianqin Machinery Co, Ltd	China	W3A40
Yangzhou Xin-Qi-Te Cable Material Co, Ltd	China	W3A32
Yangzhou Xingbiao Cable Material Co, Ltd	China	W3B18
Yangzhou Xinyuan Electric Co, Ltd	China	W4C16
Yangzhou Yalong Cable Sample Co, Ltd	China	W3D18
Yangzhou Zhonghua South Technology Co, Ltd	China	W3E27
Yixing DOCERAM Engineered Ceramics Co, Ltd	China	W4A21
Yue Hua Electric Ind Co, Ltd	China	W3A52
Yuncheng City Xinqi CNC Machine Co, Ltd	China	W2G63
Zaonee Heavy Industry Equipment Co, Ltd	China	W3D07
Zhangjiagang City Shengtian Metallic Wire Co, Ltd	China	W3E25
Zhangjiagang Dachen Machinery Manufacture Co, Ltd	China	W4C15
Zhangjiagang Jinqiao Light Industry Machinery Co, Ltd	China	W3G01
Zhangjiagang Longsheng Machinery Manufacturing Co, Ltd	China	W3E42
Zhangjiagang Poly Machinery and Electric Manufacturing Co, Ltd	China	W3F61
Zhangjiagang Sanfeng Machinery & Electric Development Co, Ltd	China	W2E43
Zhangjiagang Zhaolong Machinery Electric Co, Ltd	China	W3E81
Zhangyuan Metalwork (Shenzhen) Co, Ltd	China	W3F28
Zhe Jiang Shaoyang Cable Co, Ltd	China	W4A17
Zhejiang Behua Fiamme Retarded Polymer Materials Co, Ltd	China	W3B01
Zhejiang Juhua Co, Ltd, Fluor-Polymeric Plant	China	W3D04
Zhejiang Litai Guangtai Metal Co, Ltd	China	W4C01
Zhejiang Meili Spring Co, Ltd	China	W3E09
Zhejiang Minmetals Sanhe I/E Co, Ltd	China	W3F06
Zhejiang Province Tonglu Hengfeng Drawing Machine Factory	China	W4D40
Zhejiang Wanma Macromolecule Material Co, Ltd	China	W3B21
Zhejiang Zhongxin Electrician Mechanical Equipment Co, Ltd	China	W3E43-1
Zhengzhou Mercury-Tech Co, Ltd	China	W3E69
Zhengzhou North Star Electrical Equipment Development Co, Ltd	China	W3A50
Zhengzhou VIC Water Blocking Materials Of Cable Co, Ltd	China	W3C30
Zhengzhou Yifang Cable Co, Ltd	China	W3G59
Zhengzhou Suangjinshu Cable Material Co, Ltd	China	W4C28
Zhihan Electrician Machinery Industry Co, Ltd	China	W3C61
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Zhongshan Santa Mechanical Co, Ltd	China	W4B01
Zhongshan Tianhua Machine Manufacturer Co, Ltd	China	W3F55
Zhoushan Huayu Machinery Manufacturing Plant	China	W4D09
Zhoushan Jinjiu Machinery Manufacture Co, Ltd	China	W3C56
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Zhoushan Sitong Plastic Machinery Co, Ltd	China	W3D55
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Fibre optic – machinery & equipment

A shift in emphasis from development and manufacture to installation and deployment takes place with any breakthrough product at the top of its technology. Nowhere is this more striking than in the field of fibre optics.

Consider the first element in the fibre manufacturing process: a preform. Tens of kilometres of optical fibre will be pulled from this cylinder, little larger than a violin case.

Now consider the going live, on 1st July, of the 4,350-mile Main One fibre optic cable running from Portugal to Nigeria and Ghana, with branches under construction to Morocco, the Canary Islands, Senegal and Ivory Coast. Before this could happen the cable had to be laid, and its connectivity assured at mid-ocean depths.

Despite the tremendous differential in scale, the advance from product to application here may seem inevitable – but not to the suppliers reviewed in this section. They know that, in fact, it was won only with the use of machinery and equipment designed, customised and adapted to the changing requirements of their vital and progressive industry.

Software for fibre optic cables

CableBuilder is Cimteq's intelligent rules-based cable design and quotation software tool for cable manufacturing companies. Manufacturing companies using CableBuilder benefit from reduced cable design maintenance times, reduced quotation lead times, automatically generated data-sheets and drawings and accurate manufacturing instructions (resulting in reduced scrap and rework).

CableBuilder is believed particularly suited to the design of fibre optic cables. CableBuilder supports loose tube and tight buffered constructions as well as single and multi-mode fibres. Not only can it calculate dimensions, material utilisation and cost, but it can assess whether the cable is strong enough to handle the required load. It can also assess if the construction is fit for the run length required by the customer.

The benefits of CableBuilder for fibre optic cable manufacturers include:

- Reduction in design effort: fibre optic cable elements can be rapidly assembled to build any construction or size of cable
- Error prevention: materials, including strength members, can be selected either automatically or based on tensile strength simulation, hence increasing the accuracy of the design and the efficiency of the design process

- Immediate and accurate costing: a breakdown of all cost elements such as material utilisation and running speeds
- Quick quotations: new design constructions can be created in seconds by varying the number of buffers, the size of the buffers and the number of fibres
- Quick data-sheet generation: drawings, data-sheets, catalogues and manufacturing instructions can be automatically generated at the touch of a button

CableBuilder provides a platform for continuous improvement, encouraging design engineers to optimise designs.

It is easy to change designs and immediately see the results in terms of technical capabilities such as tensile strength, attenuation, as well as dimensions, material consumption and costs.

Using CableBuilder in the cable design and quotation process releases valuable engineering resource so that more time can be spent on improving and developing products.

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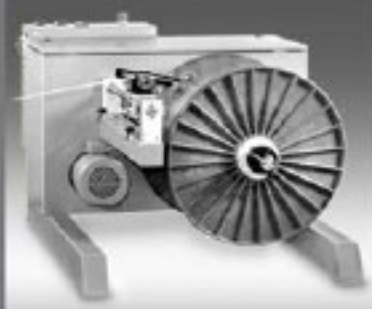
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ABS reels for fibres

A Appiani Srl is an ISO 9001:2008 certified manufacturer and supplier of shipping and process steel reels for the cable and wire industry, including reels suitable for optical fibre.

Appiani's P-type plastic and steel composite reels are suitable for the internal production of optical fibre. The flanges are made of virgin ABS, specifically designed to be stretchable and impact-resistant, and the barrel is made of painted or galvanised steel.

The reel is dynamically balanced for high-speed applications and can be manufactured according to DIN norms or to the customer's specific requirements. Available flange diameters are 400mm, 500mm, 560mm and 630mm.

Structural drums suitable for the shipping of optical fibre are also available. These reels are manufactured with pressed corrugated flanges (BFA type) or with steel plates reinforced by rolled sections (BCS type) and are supplied as per DIN standards or customers' specifications. Various diameters are available according to the requested radius of curvature of the cable.



▲ Appiani's P-type reels for optic fibres

The reels can be provided with rubber coatings for cable protection and all the surfaces are smooth and free from weld spatter to avoid damage to the cable. Capacity tests can be performed on request, and different staving systems are available.

A Appiani Srl – Italy
Email: info@appiani.reels.it

Fax: +39 030 938 2425
Website: www.appiani.reels.it

Tubular bullhead strander for OPGW cables

An optical ground wire (OPGW) is used in the construction of electric power transmission and distribution lines. Such cable combines the functions of grounding and communications. A typical OPGW cable contains a tubular structure containing one or more optical fibres, surrounded by one or more layers of steel and aluminium wires.

The manufacturing of this cable is divided in two processes:

- Manufacturing of the aluminium central tube with the optical fibres inside
- Stranding of the layer or layers of steel/aluminium wires over the central tube

The first process is the most critical and technological, but the second process also has huge influence on the quality and cost of the final product. Typically the application of the wires over the central tube is made with a planetary strander which, although producing a high quality product, has a low production speed and long bobbin reloading time.



▲ Tubular bullhead strander for OPGW

An alternative to the planetary strander is a tubular strander, which has a much higher stranding speed. The drawback of the tubular strander is that the centre core has to pass through the periphery of the long tube; its rotation can create twists and friction and, finally, damage the aluminium tube with the optical fibres inside.

Caballé believes it has solved the drawbacks of both machines by adding a bullhead feeder at the end of the tubular strander. The feeder consists of a large payoff with bows that turn around it and convey the wires coming from the tube to the closing point.

Features of this bullhead tubular strander include:

- Handles 12 – 24 steel/aluminium wires
- 1,600mm – 2,500mm central tube reel size
- Special wire path for aluminium coated steel wires (ACS)
- Tension control by motor/dancer system
- 500rpm maximum stranding speed

With this system the central aluminium tube payoff is completely straight with no added twist; the quality is the same as with a planetary strander but with a much higher stranding speed.

The productivity of this machine is said to be five times higher than a planetary strander and the machine is already in use with several OPGW cable manufacturers.


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Coding optical fibres

Medek & Schörner is known for the development and manufacture of high speed optical fibre processing systems:

- Optical fibre colour coding at speeds up to 3,000m per minute
- Ring marking of optical fibres
- Tight buffering at up to 1,300m per minute
- Fibre ribbon production with excellent ribbon planarity and for speeds up to 1,000m per minute
- CFU production of compact fibre units



▲ Medek and Schörner optic fibre coating systems

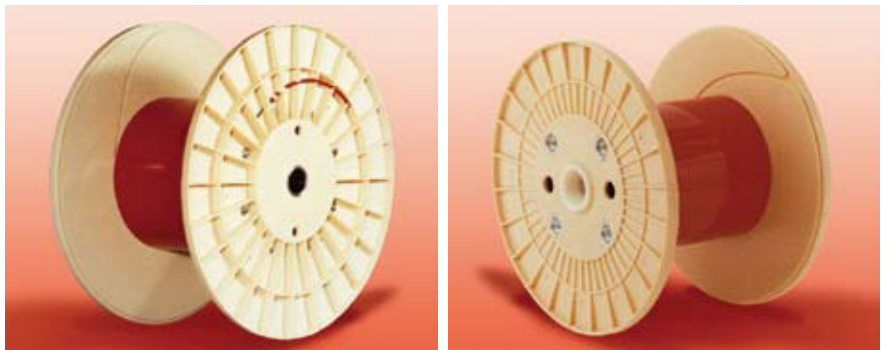
Medek & Schörner offers a wide range of machines for marking cables and coding optical fibres, particularly for power, telecommunications and data cables.

Medek & Schörner GmbH – Austria
Email: m+s@medek.at

Fax: +43 1982 72 96
Website: www.medek.at

Process reels for optical fibre tubing

Pentre Group offers a wide range of ABS (plastic flanged) process reels from 250mm to 1,000mm diameter and specified to both DIN 46395 and imperial standards for optical fibre tubing. These in-process lightweight take-up reels also access the inner end of the optic fibre for test purposes, as well as catering for extrusion process speeds of up to 1,000m per minute, and multi-trip transportation journeys between factories.




▲ ABS flanged process reel, (left to right – 1000mm and 450mm)

The barrels are manufactured from seam-welded aluminium alloy and painted to customers' own specification. These BAS process reels (type PF/OF) are also available with a number of options, including non-standard traverse widths, barrel sizes, materials and surface finishes.

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High speed production

Tensor Machinery has spent over 25 years focusing on equipment for the fibre optic cable market, from individual pieces of equipment to complete cable manufacturing lines ready to produce cable.

Tensor's equipment portfolio includes UV colouring lines, ribbon fibre manufacturing lines, SZ stranding, armouring and tape forming, yarn serving, payoffs, take-ups and complete jacketing lines for both indoor and outdoor fibre optic cables.

Tensor aims to engineer robust equipment that will withstand the daily demand placed on it by high-speed production.

For SZ stranding, line speeds of over 150mpm are achievable while maintaining an accurate lay length and reversal throughout the entire run.



▲ Roll former from Tensor Machinery



Premise jacketing lines achieve over 300mpm on simplex cables and 100mpm on high-count distribution cables.

With roll forming technology for armour tape, speeds over 100mpm are easily obtained without lubrication or heat build-up in the tooling, even with narrow tapes.

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▲ Detail of the Roll former from Tensor Machinery

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Doubling capacity at high speed

With its capability of stranding flexible strength members around a cable centre at up to 400rpm, the Roblon SE-18HSLT (high speed, low tension) server offers optic fibre cable manufacturers the possibility of doubling capacity.



▲ The SE-18HSLT server from Roblon

The speed of traditional servers is limited by the centrifugal forces that the bobbins can withstand – a limitation that has been eliminated by the use of special materials and protective parts in the Roblon HSLT server.

The Roblon SE-18HSLT server is designed for very high speeds, using a principle of pulling off the yarns over the ends of the non-rotating bobbins.

This means that a few twists are added to the strength members during the process and consequently, the Roblon SE-18HSLT server is optimally used when processing lightly coated, flexible strength members.

Tension is individually and precisely controlled down to 0.6N.

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JoeTools also offers other heads for fibre extrusion, such as RN heads, specifically designed for fine wire and fibre optic applications, and the well-established Metric head.

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JoeTools designs and manufactures extrusion heads for a complete selection of outdoor and indoor fibre optic cables, including:

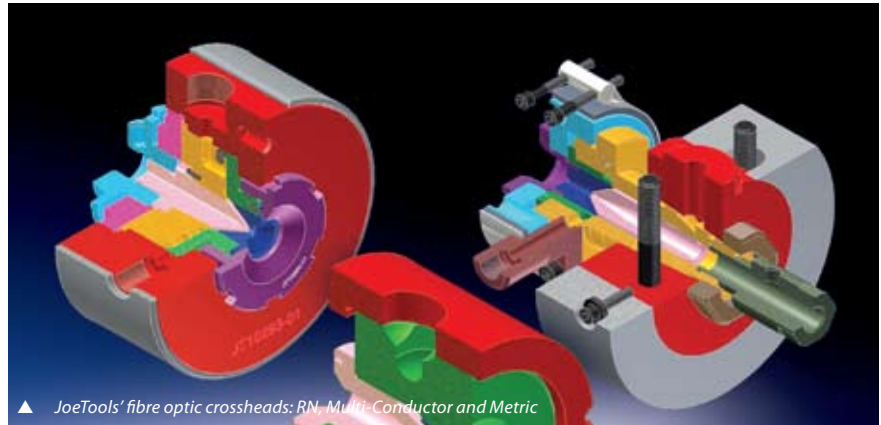
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▲ JoeTools' fibre optic crossheads: RN, Multi-Conductor and Metric

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Sustainability in the development and production of alloys

By Ralf Hojda, Dr Michael Köhler, James Schraml

1 Introduction

The increasing scarcity of resources is steadily impacting on economic success in the private and industrial spheres. Energy supply and raw materials are equally affected.

Manufacturers of copper-alloy semi-finished products have experienced price rises in the three-figure percentage range, so that in recent years the ratio of the value added to the metal value, which was in balance just a few years ago, is now one to three. Although mechanical and technological factors were once the primary criteria for selecting a suitable alloy, the significance of the value of the metal has increased. This also has consequences for the development and manufacture of alloys.

Developers are equally concerned about the recyclability of new alloys and composites as about using stronger alloys to reduce wall thicknesses, and thus conserve resources by using less material.

This article uses two developments to illustrate good recyclability and reduced use of materials. In the first case the described material is a new high-conductivity alloy that can be recycled without any limitations, even when tin coated.

The second concerns a high-strength bronze, which can readily be fed back into the material cycle and, above all, is potentially suitable for use in numerous miniaturisation applications, thus facilitating the conservation of resources.

2 Examples

2.1 Development 1

Connecting elements used in the electrical engineering and electronics sectors have to satisfy numerous requirements.

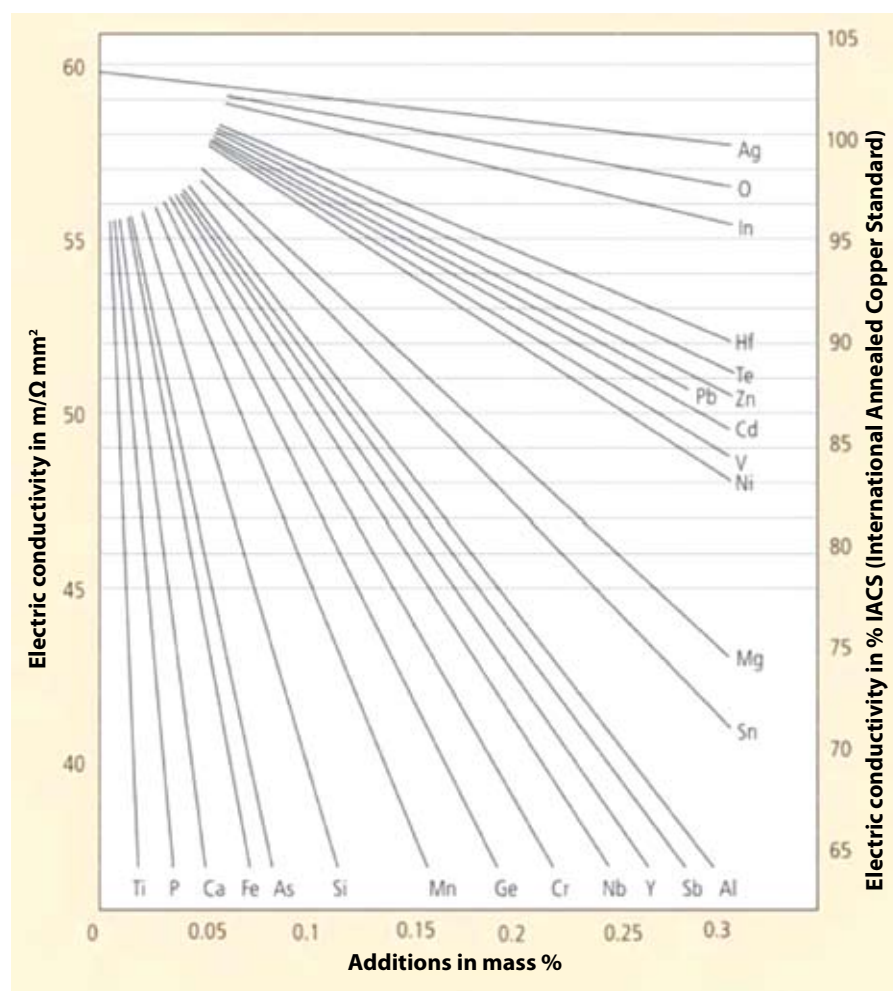
Mechanical strength, electrical conductivity and corrosion resistance are key criteria for the reliable functioning of components during the total lifetime of the whole system.

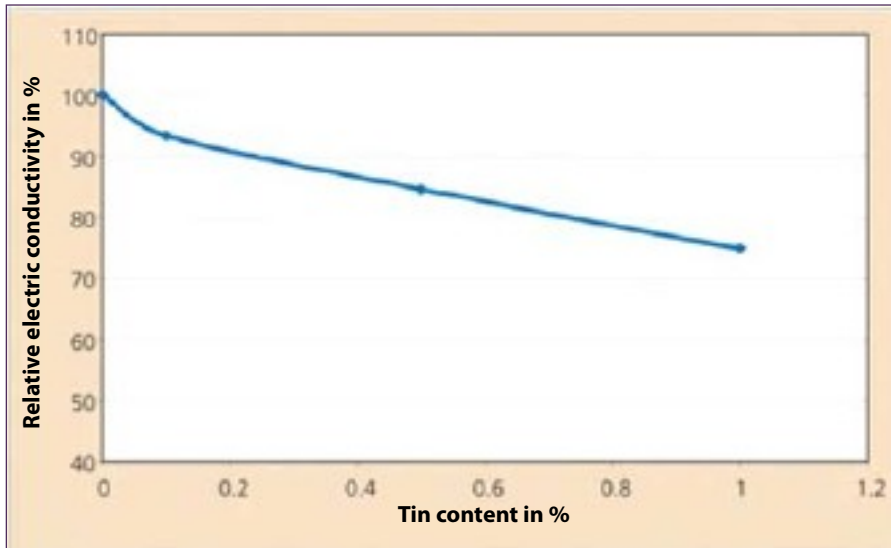
In many cases the required properties are mutually incompatible, as when a combination of good conductivity and excellent resistance to corrosion is specified.

Although components such as nickel and chromium improve a copper alloy's corrosion resistance, they simultaneously bring about a considerable reduction in its conductivity (see Figure 1).

Composites are a frequently adopted solution to this problem, primarily in the form of coatings based on pure tin applied to the surface of copper alloy. With just a few exceptions the RoHS

▼ Figure 1: Influence of alloying elements on the electrical conductivity of copper





▲ **Figure 2:** Influence of the tin content on the conductivity of CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Copper	Balance	Balance	Balance
Tin	0.12	-	0.2 – 0.8
Zinc	<0.10	0.13	<0.05
Iron	<0.02	2.4	<0.02
Nickel	<0.02	-	0.1 – 0.6
Phosphorus	<0.015	0.03	0.008 – 0.05

▲ **Table 1:** Comparison of the chemical composition of various bronzes

(Restriction of Hazardous Substances) directive, which came into force on 1st July 2006, bans the typical lead-tin compounds that were formerly used. The integration of the functional pure tin coating in the material cycle is described in detail below.

The choice of material for connectors is based primarily on physical criteria such as electrical conductivity, modulus of elasticity, thermal relaxation and processing characteristics, ie ductility and bendability, and welding behaviour.

Issues relating to partial or total surface protection are of secondary importance, as are the basic availability of the materials and material costs.

An examination of production and punching waste reveals that, in many cases, it is not given the attention that, on ecological and economic grounds, it deserves. This is illustrated by the following example.

During production from hot-dip tinned CuFe2P (C19400) of large lead frames for ABS and ESP systems about 50% to 70% scrap is produced.

None of this can be directly recycled (fed back into the melting process). It has to go through time-consuming smelting and be electrochemically separated.

It is fed back into the material/production cycles as a cathode. This procedure is energy intensive and is, therefore, expensive relative to direct melting.

Usually a 0.4mm thick strip is provided with a 3µm coating of tin on both sides. When the scrap is directly recycled, the resulting CuFe2P alloy contains an impurity of tin at around 1.5%.

This has a major effect on work hardening behaviour and on the electrical conductivity of the alloy, which falls drastically when the tin content exceeds 0.3% (see Figure 2).

There is, therefore, a need for a new alloy with comparable properties to CuFe2P but which can be recycled without difficulty, even when coated with tin. Pure copper/tin alloys such as CuSn 0.15 have the potential to be used as alternatives. When coated with tin, the scrap can be fed directly into the material cycle (see Table 1).

Moreover, the mechanical and technological properties correspond relatively well to those of CuFe2P.

There are, however, distinct weaknesses in terms of softening behaviour and relaxation resistance (see Tables 2 and 3).

A look at the newly developed alloy BB05xi shows a different situation. The targeted harmonisation of the alloy elements (tin, nickel and phosphorus) gives the material mechanical and technological properties comparable to CuFe2P, together with the softening and relaxation (stress creep of the component at high temperature) properties profile required for further processing (see Figure 3) and for the intended application.

▼ **Table 2:** Comparison of the technological properties of various bronzes

	BB01	SB02	BB05xi
Electric conductivity Soft [% IACS]	>83	63	>62
Thermal conductivity [W/mK]	360	260	250
Coefficient of thermal expansion [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Elastic module [GPa]	128	123	126

▼ **Table 3:** Comparison of the technological properties of various bronzes

Strip thickness 0.3mm	BB01	SB02	BB05xi
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Softening temperature [°C (1 h)]	300	350	350
Bendability [180° GW R/S]	1	0	0.5
Bendability [180° BW R/S]	1	1	0.5

During further processing at high temperatures the thickness of the alloy layer that forms between the base material and the tin coating of tin-coated BB05xi is comparable to that of CuFe2P.

Production lines therefore do not have to be converted to accommodate this new composite material (Figure 4).

Moreover, this new alloy is significant as the tin-plated scrap from the individual stages of the value chain is directly recyclable.

A comparison of the metal values BB05xi and CuFe2P also does not justify the difference between the costs of indirect and direct recycling of production and punching scrap, which in this sector are usually 20% to 25% of the metal value – a factor of considerable importance in times of high and increasing raw material prices.

With a scrap percentage of, for example, 70% the smelting costs can rapidly match the production costs, casting doubts on the economic feasibility of the whole process.

The use of a tin-coated phosphor bronze is therefore a worthwhile alternative to tin-coated copper-iron alloys from both an ecological and an economic point of view (the additional use of electricity and acid for the electrolytic treatment of the scrap is eliminated).

2.2 Development 2

Copper-tin alloys are used for connectors and components for electronic and electrical engineering applications as they have good to very good spring characteristics, good resistance to electrical and thermal stress, low stress relaxation and excellent bendability and solderability.

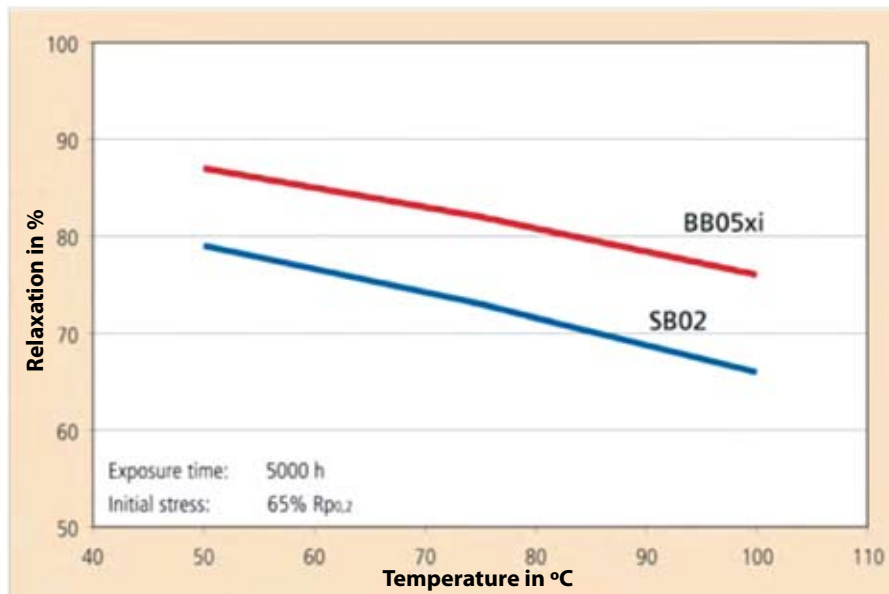
Usually a small amount of phosphorus is added to alloys of this type for the purpose of deoxidation, which is why they are also referred to as phosphor bronzes.

The properties of this group of alloys depend mainly on their tin and phosphorus content, and to a lesser extent on the other added alloy elements.

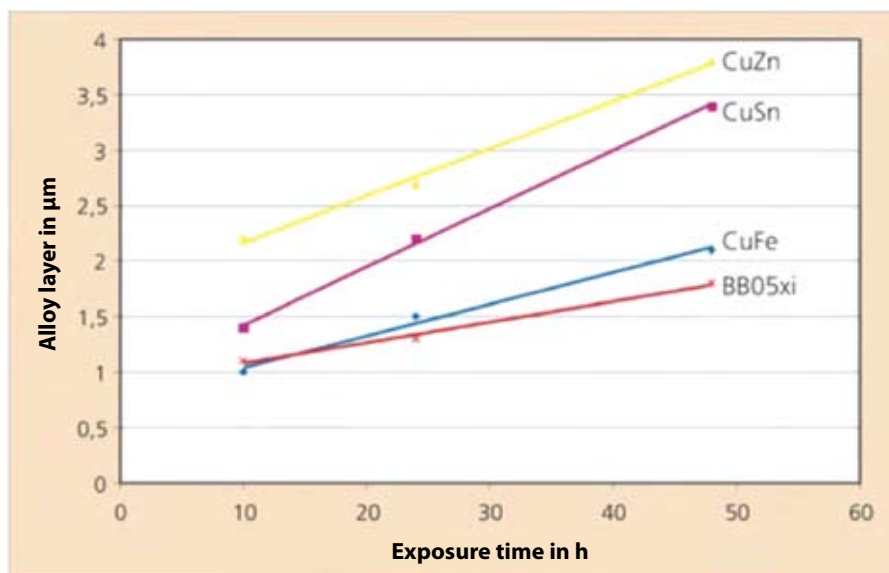
By means of suitable processing they can be adjusted for use in a wide range of applications.

The many industrial applications for these alloys range from high quality connectors and sockets for electronic modules to electrically conductive contact springs.

In the past “downgrading” was carried out as an efficient method of selecting a phosphor bronze. In other words, the technological properties of a low-alloy



▲ Figure 3: Comparison of the relaxation behaviour of CuFe2P and BB05xi



▲ Figure 4: Formation of the alloy layer at 180°C after hot-dip tinning

phosphor bronze were adjusted so that its spring characteristics and processing properties corresponded to those of the original high-alloy phosphor bronze. However, certain constraints had to be taken into consideration.

The tin and phosphorus content influence the work hardening behaviour and ductility of phosphor bronzes to a considerable extent, and a clear relationship has been found between the achievable bendability and the tin content.

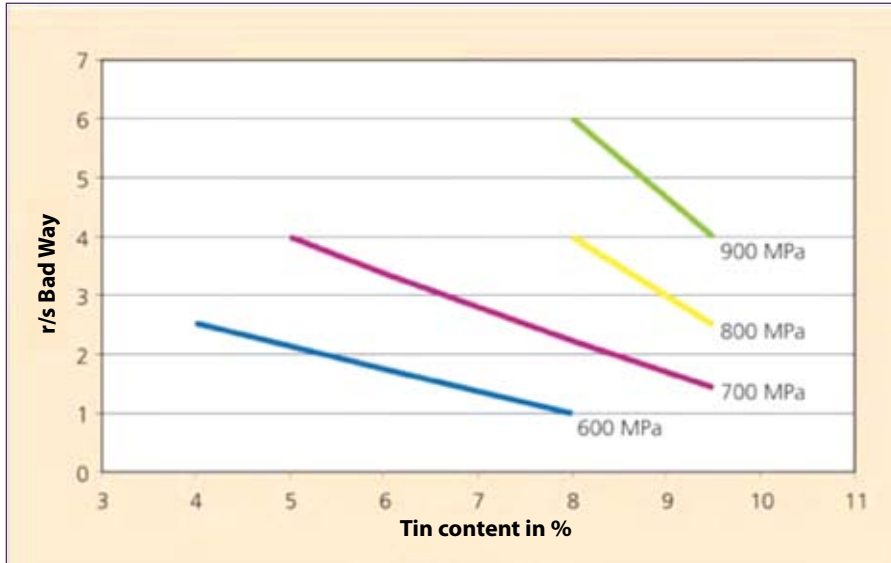
Figure 5 shows how increasing the tin content has a positive influence on the bendability at constant strength.

Against this background it was logical to develop a higher-alloy phosphor bronze.

Another reason to do so was the demand for miniaturisation of connectors, as a reduction in cross-section reduces the contact force at constant deflection of the spring element.

For a defined constant force, therefore, the spring element has to be redesigned – the design stress increases accordingly. One solution for this is the newly developed alloy BB95, a 10% phosphor bronze. At a yield stress level $R_{p0.2} > 720$ MPa, the bendability of BB95 in BW90° R/S is superior to that of an 8% tin bronze by a factor of 2.

Depending on the intended application, BB95 can be hardened to a yield stress level $R_{p0.2}$ of 800 MPa, and the high strength variety to >950 MPa.



▲ Figure 5: Bendability of various phosphor bronzes as a function of strength

The difference in electrical conductivity between BB95 and an 8% tin bronze is approximately 1% IACS (International Annealed Copper Standard), ie the tin has a negligible conductivity-reducing influence when present in the alloy at this level.

At SH (spring hard) temper, BB95 exhibits the same softening properties as an 8% phosphor bronze; a significant reduction in hardness is first observed at about 280 °C.

In addition, the relaxation of the new material (<20% at a temperature of 100°C for a test duration of 10,000h) is comparable to that of the above mentioned reference alloy (provided the stress level is identical).

Given the above mentioned contact force, these results suggest that it should be possible to achieve a reduction in the thickness of the material, and therefore a reduction of about 20% in the amount of material needed, by using BB95.

3 Summary

Steep increases in the prices of raw materials, and especially in the price of copper, have drastically changed the relationship between the value added and the metal value in the manufacture of semi-finished copper-alloy products.

Savings in recycling and in the materials used have a greater impact, looked at in the round, than the total finishing expenditure. Using low-alloy copper materials as an example, the influence of a well-planned choice of alloys and

composites is described. The combination of a newly developed, low-alloy phosphor bronze with a tin coating is a worthwhile alternative to tin-coated copper-iron alloys, also from an ecological and economic point of view, and yields a similar properties profile.

An approach to generating added value for customers by reducing the amount of material used is made feasible by the new development of a 10% phosphor bronze.

This has a similar properties profile to an 8% copper-tin alloy but has superior bendability.

Moreover, the new alloy facilitates resource-saving design, as it can withstand higher levels of stress. Material savings of 20% appear to be realisable. ■

This paper was first presented at the 58th International Wire & Cable and Connectivity Symposium held in Charlotte, NC 8th-11th November 2009, and is reproduced with the generous permission of the organisers.

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Universell einsetzbare Qualitätskontrolle



▲ Universell einsetzbarer KW 13Trio von Zumbach

Für eine kontinuierliche Qualitätskontrolle sind die Detektoren von Knoten und Einschnürungen ebenso wichtig wie Durchmessermeßgeräte und Isolationsprüfgeräte. Mit Zuverlässigkeit und Geschwindigkeit erfaßt die neue Baureihe der KW 13Trio Detektoren von Zumbach selbst kleinste Knoten und Einschnürungen in Drähten, Adern, Glasfasern und Kabeln.

Dank seiner kompakten Bauweise kann der KW 13Trio leicht in jede Extrusionslinie oder Umspulanlage installiert werden. Das Messfeld ist genügend groß ausgelegt, daß selbst extrem, große Knoten während dem Anfahren problemlos durchgehen. Sein offenes Design erlaubt außerdem ein schnelles und komfortables Einführen des Produkts ohne Produktionsstopp.

Ein leistungsstarker Mikroprozessor sowie voll digitalisierte Datenverarbeitung machen diesen Detektor von Knoten und Einschnürungen zum unerlässlichen Hilfsmittel für die Qualitätskontrolle. Dieser Wächter ist als eigenständiges Gerät erhältlich. Dank einer lokalen Bedien- und Anzeigeeinheit kann der KW 13Trio vollständig am Gerät bedient und konfiguriert werden.

Zu seinen Merkmalen gehören die minimale detektierbare Fehlerhöhe von 0,01mm (0,0004 Zoll), die minimale Fehlerlänge von 0,2mm (0,008 Zoll) und die voll digitalisierte Signalverarbeitung DSP.

Dank verschiedenen Schnittstellen, wie serielle RS, Profibus DP oder Ethernet EN, kann der KW 13Trio auch universell eingesetzt werden. So kann er via der RS Schnittstelle an ein USYS-Datenerfassungs-, Verarbeitungs- und Anzeigesysteme angeschlossen werden. Die Profibus DP und Ethernet EN Ausführungen gestatten den Anschluss an übergeordnete Rechnersysteme wie z. B. SPS oder Datenerfassungssysteme.

Ein Messfeldabtastverfahren und die komplexe Optik, garantieren Immunität gegen helles Fremdlicht und bieten höchste Detektionspräzision und Identifizierung von Knoten und Einschnürungen im Mikrometerbereich.

Die KW 13Trio-Modelle verfügen über eine interne Fehlerdatenbank zur Speicherung der letzten 100 detektierten Fehler, inklusive Fehlereigenschaften wie Fehlernummer, Art des Fehlers, Höhe, Position, Länge. Diese Datenbank kann entweder über die lokale Bedien- und Anzeigeeinheit oder über optionale, externe Schnittstellen abgerufen werden.

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Unternehmen aus dem Bereich Unterwassertechnik stellt die Installation eines Kabelsystems fertig

Main One Cable Company, ein Unternehmen aus dem Bereich Unterwassertechnik, das frei zugängliche Großhandel-Breitbandkapazitäten in Westafrika anbietet, und sein Systemlieferant, Tyco Electronics Subsea Communications (SubCom), haben die Installation der ersten Phase ihres Kabelsystems termingerecht beendet.

Die Installation der Ausrüstung für die Endanschlüsse wird in Seixal, Portugal, vervollständigt und ist somit in Vorbereitung die Anschlusspunkte des Systems in Lagos, Nigeria und Accra, Ghana, zu erreichen.

Der CEO von Main One Cable Company, Funke Opeke erklärte, daß die Phase 1 des Main One Cable System sich über 6.800km erstreckt und eine dringend benötigte Kapazität zwischen der Westküste von Afrika und Portugal bieten wird.

Das doppelte Faserpaar - 1,92 Terabit pro Sekunde - dichte Wellenlängenmultiplex-Projekt wird zunächst Lagos, Accra mit Seixal verbinden, mit einem weiteren Anschluß für Europa, Asien und den Doppelkontinent Amerika, während angenommen wird, daß die Phase 2 des Projekts sich bis nach Südafrika ausdehnen wird.

Das Kabelsystem, das voraussichtlich im Juni 2010 betriebsbereit sein sollte, wird einen freien Zugang zu regionalen Telekommunikationsbetreibern und Internetdienstanbietern liefern, und das zu Raten, die unter den bestehenden internationalen Breitbandpreisen in der Region liegen.

Darüber hinaus wird das System eine Breitbandkapazität bieten um den Internetzugang in der Sub-Sahararegion zu erweitern, sowie die Schwierigkeiten des Schaltverkehrs zwischen den afrikanischen Ländern zu vereinfachen, ohne die Notwendigkeit einer Übertragung durch Europa.

**Tyco Electronics Subsea
Communications (SubCom) – USA**
Website: www.subcom.com

Main One Cable Company – Mauritius
Website: www.mainonecable.com

Anlage zur Herstellung von Flugzeugkabeln



▲ Kabelherstellungsanlage von Nexans in Marokko

Nexans hat ein neues Fertigungswerk in Mohammedia (Marokko) eröffnet, in dem ausschließlich Flugzeugkabel produziert werden. Die Anlage ist das Ergebnis eines Abkommens zwischen Nexans und Airbus für die Lieferung modernster Kabel für die Modelle A320, A350 und A380.

Diese Investition in Höhe von fast 10 Millionen Euro untermauert das Engagement von Nexans im Bereich Luftfahrttechnik sowie das Kerngeschäft seiner marokkanischen Tochtergesellschaft, die bereit über eine hohe Kompetenz im Bereich der Herstellung von Kabeln für die Automobil-, Gebäude- und Infrastrukturindustrie verfügt.

Es handelt sich um die dritte Anlage von Nexans für die Produktion von Flugzeugkabeln; ähnliche Einrichtungen befinden sich in Frankreich und den Vereinigten Staaten.

Nexans – Frankreich

Fax: +33 15669 8484

Email: nexans.web@nexans.com

Website: www.nexans.com

Umform- und Schweißtechnik für Metallband

Rosendahl hat sein Portfolio erweitert um Schweiß- und Wellungsausrüstungen für Stromkabelanwendungen anzubieten.

Der Nachfrage der Industrie nach alternativen Lösungen folgend und auf der Grundlage der Erfahrung erfolgreicher Projekte im Bereich der Umformung, Schweißung und Wellung von Metallband für High-End-RF-Kabel, hat sich Rosendahl entschlossen in dieses Marktsegment vorzudringen.

Kabelhersteller fordern diese Technik für Produkte wie z. B. Kabel für Windparks, Offshore-Kraftwerke oder Kabel für Unterwasseranwendungen. Das NS-Segment schließt auch einige Produkte ein (Kabel für Ölpumpen, Kabel für Schiffe, Signalkabel), bei denen die Rosendahl-Technik eingesetzt wird, um die Produkteigenschaften zu bessern oder die Produktivität während des Herstellungsverfahrens zu steigern.

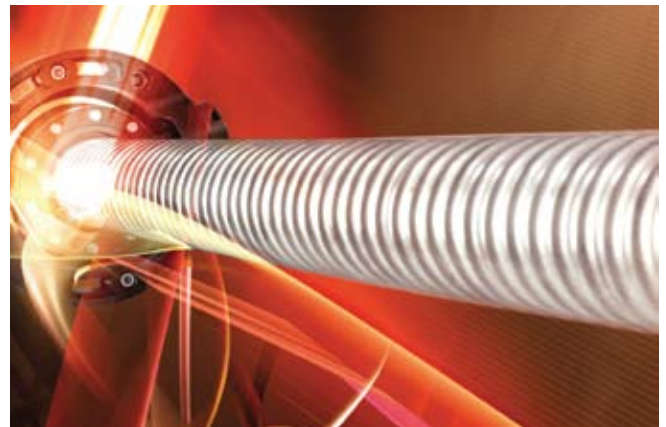
Im Vergleich zu anderen Techniken (Aluminium- oder Bleiextrusion) weist das Umform- und Schweißsystem für Metallband mehrere Vorteile auf. Und zwar zeigt es bessere Ergebnisse für den Dauerbetrieb, wirtschaftlichen Einsatz von Strom und Wasser, weniger Ausfall während der Produktion, Dimensionswechsel und die Möglichkeit verschiedene metallische Materialien für die Abschirmung einzusetzen.

Es gilt gemeinhin, daß die entsprechend dieser Technik hergestellten Kabel, eine überdurchschnittliche mechanische Stabilität sowie Wasser- und/oder Gasdichtigkeit vorweisen.

Zu den für diese Anwendungen entwickelten und optimierten Techniken gehören:

- Optimierte Formen für verschiedene Materialien
- Schweißverfahren – um perfekte Schweißnähte zu sichern mit minimalen wärmebeeinflussten Bereichen und den besten mechanischen Eigenschaften
- Hochgeschwindigkeits-Weller für Schrauben- und Ringwellung, für Kupfer, Aluminium und Edelstahl

Für die Metallabschirmung mittels glattem oder gewelltem Aluminium, Kupfer oder Edelstahl, bietet Rosendahl Lösungen für das Verfahren Umformen, Schweißen und Rohrreduzierung an, einschließlich geeigneter nachgelagerter Ausstattung.



▲ Schweiß- und Wellungsausrüstung für Stromkabel

Vom Kabelaufbau, der Raumverfügbarkeit und dem Produktmix abhängig, ist Rosendahl in der Lage Inline- (in Kombination mit dem Ummantelungsverfahren) und Offline-Lösungen anzubieten.

Rosendahl Maschinen GmbH – Österreich

Fax: +43 3113 5100 59

Email: office@rosendahlaustria.com

Website: www.rosendahlaustria.com

Rautomead in Irak

Das britische Unternehmen Rautomead, hat die Ernennung eines neuen Vertreters im Mittleren Osten bekannt gegeben.

Herr Majeed A Al-Rawi von El-Tech Energies and Technologies Company wird die Interessen von Rautomead im Irak und in Jordanien vertreten und die bestehenden Kunden von Rautomead im Bereich Stranggießtechnik in dieser Region bedienen sowie potentielle neue Kunden in der Draht- und Kabel- sowie Metallverarbeitungsindustrie finden.

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Nachhaltigkeit bei der Werkstoffentwicklung und Werkstoffherstellung

Von Ralf Hojda, Dr Michael Köhler, James Schraml

1 Einleitung

Knapper werdende Ressourcen belasten zunehmend den wirtschaftlichen Erfolg im privaten und industriellen Bereich. Betroffen sind die Energieversorgung und Grundstoffe gleichermaßen.

Preissteigerungen im dreistelligen Prozentbereich haben bei den Herstellern von Halbzeugen aus Kupferlegierungen dafür gesorgt, dass sich das Verhältnis zwischen Wertschöpfung und Metallwert in den letzten Jahren von einem ausgewogenen Zustand hin zu einem Faktor von eins zu drei entwickelt hat.

Standen in der Vergangenheit die mechanischen und technologischen Eigenschaften bei der Auswahl einer geeigneten Legierung im Vordergrund, so hat inzwischen der Metallwert an Bedeutung gewonnen. Auswirkungen hat dies auch auf die Entwicklung und Herstellung von Legierungen.

Fragestellungen nach einer guten Recyclierbarkeit von neuen Legierungen und Verbundwerkstoffen beschäftigen die Entwickler ebenso wie der Ansatz, über höherfeste Legierungen eine geringere Wandstärke, sprich einen ressourcenschonenderen Materialeinsatz zu realisieren.

In diesem Artikel werden die Aspekte der guten Recyclierbarkeit und des reduzierten Materialeinsatzes an zwei Entwicklungsbeispielen dargestellt.

Zum einen handelt es sich bei diesen beschriebenen Werkstoffen um eine neue Legierung mit hoher Leitfähigkeit, die auch in verzinneter Form uneingeschränkt recycelbar ist, zum anderen um eine hochfeste Bronze, die neben einer einfachen Rückführung in den Wertstoffkreislauf vor allem ein hohes Potential bietet, das sich für den Einsatz in vielen Miniaturisierungs-Applikationen eignet und daher einen ressourcenschonenden Materialeinsatz bietet.

2 Beispiele

2.1 Entwicklung 1

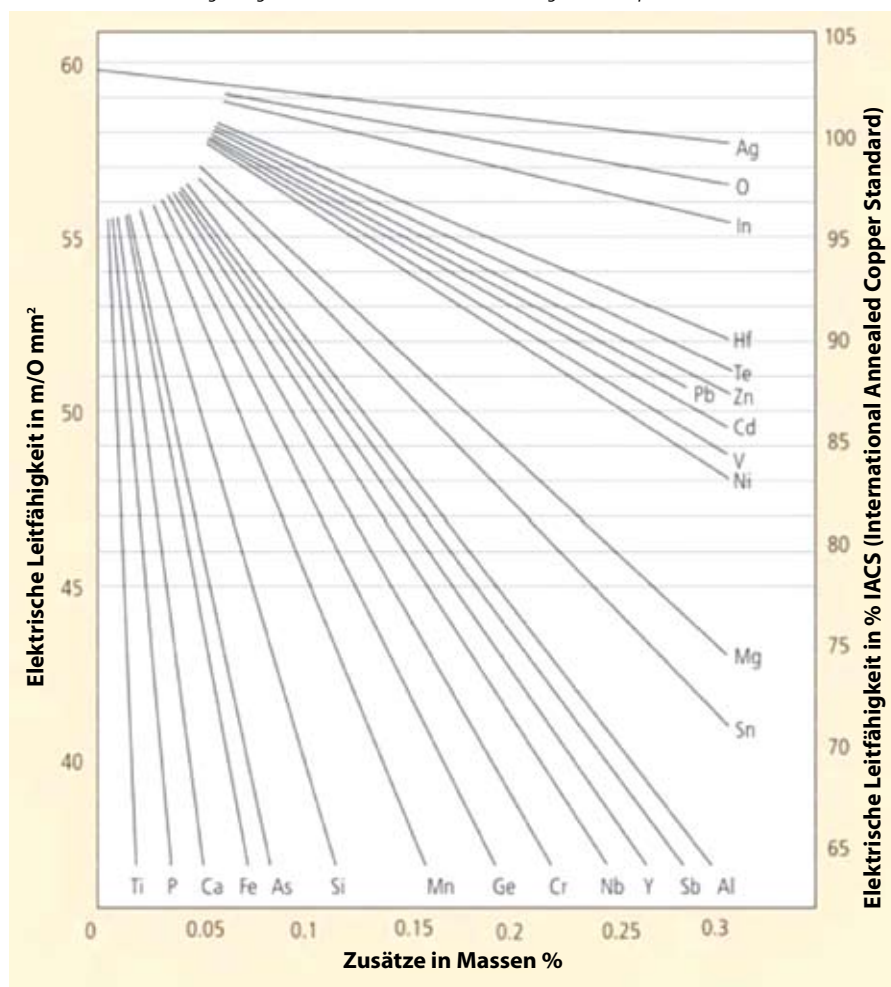
An Verbindungselemente in der Elektrotechnik und Elektronik werden eine Vielzahl von Anforderungen gestellt.

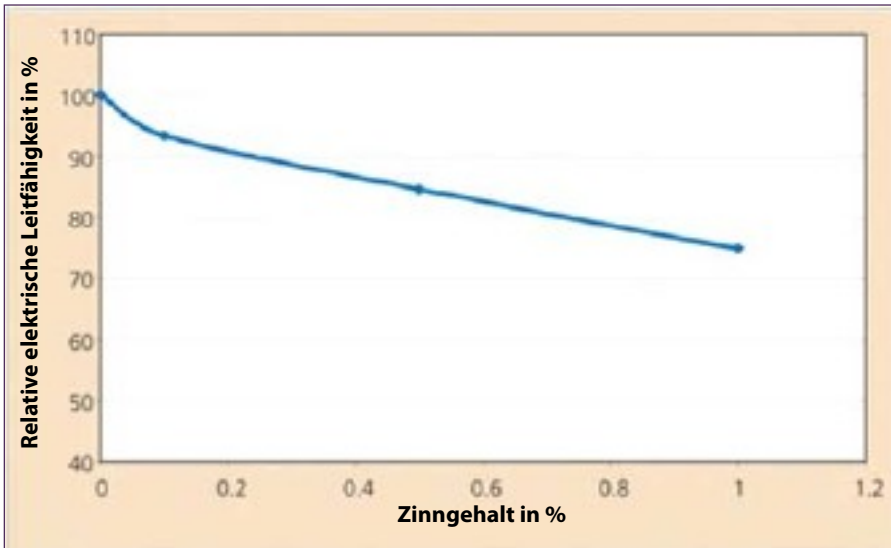
Die mechanische Festigkeit, die elektrische Leitfähigkeit und die Korrosionsbeständigkeit stellen wichtige Kriterien für die sichere Funktion der Bauteile über die Lebensdauer des

Gesamtsystems dar. Oftmals schließen sich die Eigenschaftsanforderungen gegeneinander aus, wie beispielsweise wenn die Kombination einer guten Leitfähigkeit mit hoher Korrosionsbeständigkeit spezifiziert ist.

Verbessern Legierungselemente im Kupfer, wie Nickel und Chrom, einerseits die Korrosionsbeständigkeit, so verringern sie andererseits die Leitfähigkeit erheblich (siehe Bild 1).

▼ Bild 1: Einfluss von Legierungselementen auf die elektrische Leitfähigkeit von Kupfer





▲ Bild 2: Einfluss des Zinngehaltes auf die Leitfähigkeit von CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Kupfer	Ausgleich	Ausgleich	Ausgleich
Zinn	0.12	-	0.2 – 0.8
Zink	<0.10	0.13	<0.05
Eisen	<0.02	2.4	<0.02
Nickel	<0.02	-	0.1 – 0.6
Phosphor	<0.015	0.03	0.008 – 0.05

▲ Tabelle 1: Vergleich der chemischen Zusammensetzung von diversen Bronzen

Einen bereits vielfältig praktizierten Lösungsansatz zu diesem Problem stellen Verbundwerkstoffe dar, in erster Linie Beschichtungen auf Basis von reinem Zinn, das auf den Oberflächen der Kupferlegierung angebracht wird.

Bis auf wenige Ausnahmen, sind die in der Vergangenheit typischen Zinn-Blei-Verbindungen wegen der seit dem 1. Juli 2006 gültigen RoHS-Richtlinie (Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten) nicht mehr im Verkehr.

Die Integration der Funktionsschicht Reinzinn in den Wertstoffkreislauf wird im Folgenden ausführlich behandelt. Bei der Werkstoffauswahl von Steckverbindern treten zunächst die physikalischen Kenngrößen wie elektrische Leitfähigkeit, E-Modul, thermische Relaxation und das Verarbeitungsvermögen in den Vordergrund, also die Umform- und Biegebarkeit sowie das Schweißverhalten.

Fragen in Bezug auf den Oberflächenschutz – sei es ein partieller oder ein vollflächiger – stehen zusammen mit der prinzipiellen Verfügbarkeit der Werkstoffe sowie deren Preise an zweiter Stelle.

Die Untersuchung der Produktion-/ Stanz-Abfälle ergibt allerdings, das es in

vielen Fällen nicht die Aufmerksamkeit erfährt, die ihr aus ökologischen und ökonomischen Gesichtspunkten zukommen sollte. Dazu ein Beispiel.

Bei der Herstellung von großflächigen Leadframes aus feuerverzintten CuFe2P (C19400) für ABS- und ESP-Systeme fallen in der Herstellung rund 50 bis 70% Schrott an. Diese Schrotte können nicht direkt recycelt werden (Rückführung in den Schmelzprozess).

Sie müssen aufwändig verhüttet und elektrochemisch getrennt werden. Die Rückführung in den Wertstoff-/Produktions-Kreislauf erfolgt demnach als Kathode. Dieser Vorgang ist sehr energieintensiv und damit gegenüber dem direkten Einschmelzen sehr teuer.

Üblicherweise wird ein 0,4mm dickes Band beidseitig mit 3µm Zinn beschichtet. Beim direkten Recycling der Schrotte entsteht eine mit rund 1,5% Zinn verunreinigte CuFe2P Legierung.

Dies hat starke Auswirkungen auf das Verfestigungsverhalten und die elektrische Leitfähigkeit der Legierung, welche bereits ab Gehalten oberhalb von 0,3% Zinn drastisch abfällt (siehe Bild 2).

Daraus ergibt sich die Notwendigkeit einer neuen Legierung, die vergleichbare Eigenschaften wie CuFe2P aufweist, aber auch im verzintten Zustand problemlos recycelt werden kann. Reine Kupfer-/Zinnlegierungen wie beispielsweise CuSn 0,15 haben das Potential, als Alternative herangezogen zu werden.

Beschichtet mit Zinn können die Schrotte dem Wertstoffkreislauf direkt zugeführt werden (siehe Tabelle 1).

▼ Tabelle 2: Vergleich der technologischen Eigenschaften von diversen Bronzen

	BB01	SB02	BB05xi
Elektrische Leitfähigkeit weich [%ACS]	>83	63	>62
Thermische Leitfähigkeit (Watt/Meter-Kelvin)	360	260	250
Wärme-Ausdehnungskoeffizient [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Elastizitätsmodul [GPa]	128	123	126

▼ Tabelle 3: Vergleich der technologischen Eigenschaften von diversen Bronzen

	BB01	SB02	BB05xi
Banddicke 0,3mm			
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Einweichungstemperatur [°C (1 h)]	300	350	350
Biegebarkeit [180° GW R/S]	1	0	0.5
Biegebarkeit [180° BW R/S]	1	1	0.5

Ferner entsprechen die mechanischen und technologischen Eigenschaften denen von CuFe2P relativ gut. Deutliche Schwächen treten allerdings beim Erweichungsverhalten und der Relaxationsbeständigkeit auf (siehe Tabellen 2 und 3).

Anders sieht dies bei der neu entwickelten Legierung BB05xi aus. Durch die gezielte Abstimmung der Legierungselemente (Zinn, Nickel und Phosphor) erreicht dieser Werkstoff sowohl zu CuFe2P vergleichbare mechanische und technologische Eigenschaften als auch das für die jeweilige Weiterverarbeitung und Endanwendung erforderliche Eigenschaftsprofil im Bereich des Erweichungsverhaltens und der Relaxation (dem Kriechen des Bauteils unter Spannung bei erhöhter Temperatur) (siehe Bild 3).

Bei dem Einsatz von BB05xi in verzinnter Form bildet sich die Legierungsschicht zwischen Grundwerkstoff und Zinnaufgabe bei einer thermisch belasteten Weiterverarbeitung in einer zu CuFe2P gut vergleichbaren Größenordnung aus.

Eine Anpassung der Fertigungsanlagen ist bei der Umstellung auf diesen neuen Verbundwerkstoff somit nicht erforderlich (Bild 4).

Darüber hinaus zeichnet diese neue Legierung in besonderer Weise die direkte Rückführbarkeit verzinnter Schrotte aus den einzelnen Stufen der Wertschöpfungskette aus.

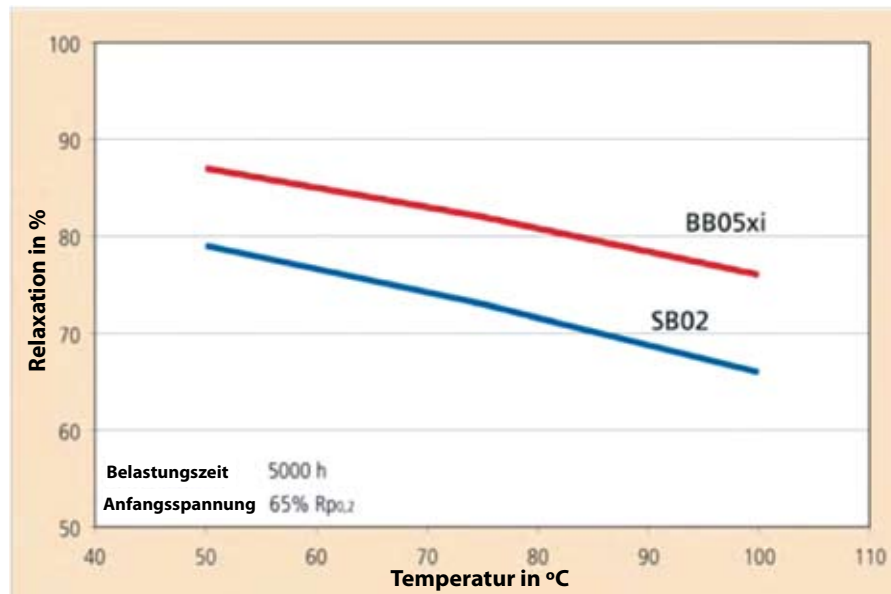
Auch der Vergleich der Metallwerte von BB05xi und CuFe2P rechtfertigt nicht die Differenz der Aufwendungen zwischen indirektem und direktem Recycling von Produktions- und Stanzschrotten, welche branchenüblich bei 20 bis 25% des Metallwertes liegen – ein Faktor, dem speziell bei steigenden und hohen Rohstoffpreisen eine überaus hohe Bedeutung zukommt.

So können die Verhüttungskosten bei einem Schrottanteil von zum Beispiel 70% schnell die Höhe der Fabrikationskosten erreichen und damit die Wirtschaftlichkeit des ganzen Verfahrens in Frage stellen.

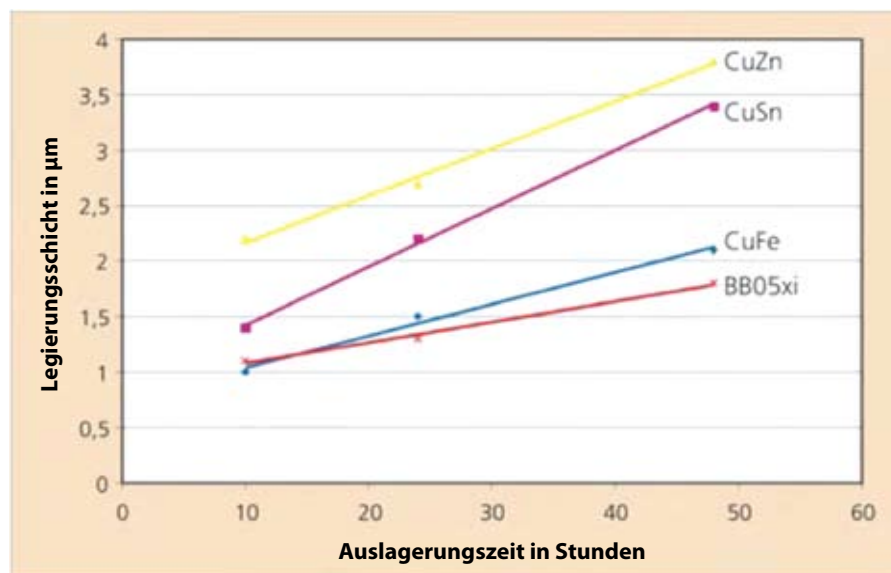
Der Einsatz einer verzinnten Phosphor-Bronze stellt somit sowohl unter ökonomischen als auch ökologischen Gesichtspunkten (der zusätzliche Einsatz von Strom und Säure zur elektrolytischen Aufbereitung der Schrotte entfällt) eine sinnvolle Alternative zu verzinnten Kupfer-Eisen-Legierungen dar.

2.2 Entwicklung 2

Kupfer-Zinn-Legierungen werden für Stecker und Bauelemente in der Elektronik und Elektrotechnik eingesetzt, da sie gute



▲ Bild 3: Relaxationsverhalten von CuFe2P im Vergleich zu BB05xi



▲ Bild 4: Wachstum der Legierungsschicht bei 180°C nach dem Feuerverzinnen

bis sehr gute Federeigenschaften, eine gute elektrische und thermische Belastbarkeit und geringe Spannungsrelaxation sowie eine herausragende Biegebarkeit und Lötbarkeit aufweisen.

Üblicherweise wird dieser Legierungsgruppe etwas Phosphor zur Desoxidation zulegiert, deshalb werden sie auch als Phosphorbronzen bezeichnet.

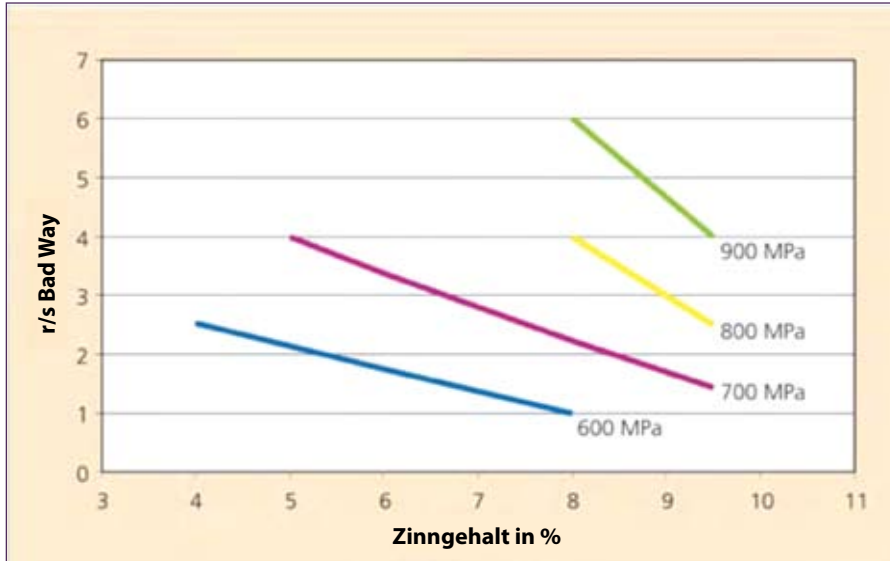
Die Eigenschaften dieser Legierungsgruppe werden vorrangig vom Zinn- und Phosphorgehalt und in zweiter Linie vom Zusatz weiterer Legierungselemente bestimmt.

Durch eine abgestimmte Verarbeitung können sie einem breiten Anwendungsgebiet angepasst werden.

Daraus resultiert auch die große Zahl der industriellen Einsatzbereiche, welche von hochwertigen Steckverbindern und Stecksockeln für Elektronikbaugruppen bis zur Anwendung als stromführende Relaisfeder reichen.

Für eine effizientere Werkstoffauswahl in der Familie der Phosphorbronzen wurde in der Vergangenheit in der Regel ein „Downgrading“ vorgenommen.

Oder anders ausgedrückt, musste eine niedriger legierte Phosphorbronze in ihren technologischen Eigenschaften so abgestimmt werden, dass die Feder- und Verarbeitungseigenschaften der höher legierten ursprünglichen Phosphorbronze entsprachen. Allerdings gab es Grenzen, die beachtet werden mussten.



▲ Bild 5: Biegsamkeit als Funktion der Festigkeit für diverse Phosphor-Bronzen

Zinn- und Phosphorgehalt beeinflussen maßgeblich das Verfestigungsverhalten und die Duktilität der Phosphorbronzen, und als mittelbare Folgeerscheinung ergibt sich, dass die erreichbare Biegsamkeit deutlich vom Zinngehalt abhängt.

Bild 5 zeigt den positiven Einfluss steigender Zinngehalte auf das Biegsamkeitsverhalten bei konstant gehaltenem Festigkeitsniveau. Vor diesem Hintergrund war es nur konsequent, eine höher legierte Phosphorbronze zu entwickeln.

Unterstützt wird dies auch durch die Forderung nach einer Miniaturisierung der Steckverbinder, denn eine Reduktion der Querschnitte führt bei konstanter Auslenkung des Federelementes zu einem Abfall der Kontaktkraft.

Für eine definierte unveränderte Kraft muss das Federelement also umkonstruiert werden – die Designspannung steigt entsprechend an.

Eine Lösung stellt die neu entwickelte Legierung BB95, eine 10%ige Phosphorbronze dar. Im Vergleich zu einer 8%igen Zinnbronze weist BB95 bei einem Streckgrenzeniveau von $R_{p0,2} > 720\text{MPa}$ eine Verbesserung der Biegsamkeit in BW 90° R/S um den Faktor 2 auf.

Verfestigt werden kann BB95 je nach Anwendung auf ein Streckgrenzeniveau $R_{p0,2}$ von 800MPa und in der höchstfesten Form auf $> 950\text{MPa}$.

Der Unterschied in der elektrischen Leitfähigkeit zwischen BB95 und einer 8%igen Zinnbronze beträgt ca. 1% IACS (International Annealed Copper Standard), d. h. der leitfähigkeitssenkende

Einfluss von Zinn ist auf diesem Niveau des Legierungselementgehaltes zu vernachlässigen.

Für den Temperzustand SH (Spring Hard) zeigt BB95 ein Erweichungsverhalten wie eine 8%ige Phosphorbronze – ein signifikanter Festigkeitsabfall tritt erst bei rund 280°C auf.

Zudem ist das Relaxationsverhalten des neuen Werkstoffes (<20% bei einer Temperatur von 100°C und für einen Prüfzeitraum von 10.000 Stunden) mit der oben genannten Referenzlegierung vergleichbar (identischer Belastungsgrad vorausgesetzt).

Übertragen auf die oben genannte Kontaktkraft erscheint bei dem Einsatz von BB95 eine Verringerung der Materialstärke und die damit einhergehende Materialeinsparung von rund 20% im Bereich des Möglichen zu liegen.

3 Zusammenfassung

Stark steigende Rohstoffkosten – allen voran die des Kupferpreises – haben das Verhältnis von Veredelungstiefe zu Metallwert bei der Halbzeugherstellung aus Kupferlegierungen drastisch verändert.

Einsparungen im Bereich des Recyclings und des Materialeinsatzes wirken sich bei einer ganzheitlichen Betrachtung stärker aus als die Summe der Veredelungsaufwendungen.

An dem Beispiel der niedrig legierten Kupfer-Werkstoffe wird der Einfluss einer vorausschauenden Werkstoff- und Verbundwerkstoff-Auswahl dargestellt.

Die Kombination einer neu entwickelten, niedrig legierten Phosphor-Bronze mit Zinn-Beschichtung stellt sich hier sowohl unter ökologischen als auch unter ökonomischen Gesichtspunkten als sinnvolle Alternative zu verzinneten Kupfer-Eisen-Legierungen dar – und dies bei einem vergleichbaren Eigenschaftsprofil.

Dem Ansatz, über einen höherfesten Werkstoff einen Mehrwert für den Kunden im Bereich des Materialeinsatzes zu generieren, wird mit der Neuentwicklung einer 10%igen Phosphorbronze Rechnung getragen.

Diese weist bei vergleichbarem Eigenschaftsprofil zu einer 8%igen Kupfer-Zinn-Legierung ein verbessertes Biegsamkeitsverhalten auf.

Außerdem ist die neue Legierung ein ressourcensparendes Design, da sie ein höheres Spannungsniveau zulässt. Eine Materialeinsparung von 20% erscheint realisierbar. ■

Diese Unterlage wurde während des in Charlotte, NC vom 8. bis 11. November 2009 stattgefundenen 58. International Wire & Cable and Connectivity Symposiums vorgestellt und ist mit der freundlichen Genehmigung der Veranstalter vervielfältigt worden.

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Универсальный прибор контроля качества



▲ Универсальный детектор KW 13TRIO производства компании «Цумбах»

Для целей непрерывного контроля качества детекторы утолщений и сужений играют такую же важную роль, что и приборы контроля диаметра и искровые пробники. Новая линейка детекторов KW 13TRIO производства компании «Цумбах» (Zumbach) способна быстро и точно обнаружить даже малейшие утолщения и сужения проволоки, токопроводящих жил, оптического волокна и кабелей. Благодаря своей компактной конструкции детектор KW 13TRIO может быть легко установлен на любой экструзионной или перемоточной линии. Размеры поля измерения подобраны таким образом, что в процессе включения прибора обеспечивается свободный проход длинномеров даже с очень большими утолщениями. Открытая конструкция обеспечивает возможность быстрой и простой заправки изделий без остановки производственной линии.

Мощный микропроцессор и полностью цифровая обработка сигналов делают этот детектор утолщений и сужений важным инструментом контроля качества. Детектор поставляется в виде автономного устройства. Эксплуатация и настройка KW 13TRIO может полностью выполняться по месту установки с помощью блока местного управления и индикации. Среди функциональных особенностей прибора – возможность определения дефектов минимальной высотой 0,01 мм (0,0004 дюйма) и минимальной длиной 0,2 мм (0,008 дюйма) и полностью цифровая обработка сигналов.

Универсальный детектор KW 13TRIO снабжен несколькими интерфейсами, включая последовательный интерфейс RS, ДПУ Profibus и Ethernet (версии EN). Через порт интерфейса RS обеспечивается возможность подключения к системе регистрации, обработки и отображения данных USYS. Использование интерфейсов ДПУ Profibus и Ethernet (версии EN) позволяет подключить прибор к компьютеру верхнего уровня, например, к ПЛК или системе регистрации данных.

Благодаря реализации оригинального принципа измерения и использованию сложной оптической системы обеспечивается устойчивость к рассеянному и интенсивному световому излучению при высочайшей точности обнаружения и опознания утолщений и сужений в микрометровом диапазоне. Детекторы серии KW 13TRIO имеют внутреннюю базу данных по дефектам, предназначенную для хранения информации о последних 100 обнаруженных дефектах, включая такие параметры, как порядковый номер дефекта, его вид, высота, местоположение и длина. Доступ к базе данных обеспечивается через пульт местного управления и индикации или через дополнительные интерфейсы удаленного доступа.

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Признание производителя кабельных барабанов

Компания «Юромадем» (Euromadem), расположенная в муниципалитете Калаф в провинции Барселона (Испания), была официально рекомендована Норвежским классификационным обществом Det Norske Veritas (DNV) для получения сертификата соответствия требованиям стандарта ИСО 9001 для производства деревянных и фанерных барабанов.

Компания «Юромадем» начала свою деятельность в 2006 году и сегодня является одним из крупнейших поставщиков кабельных барабанов в Испании и Португалии, предоставляющих услуги оперативного снабжения и утилизации.

Директор по сбыту и маркетингу компании Леандро Маццоккато (Leandro Mazzocato) сказал следующее: «Сертификация на соответствие стандарту ИСО 9001 является важным инструментом, подтверждающим высокий уровень услуг, предоставляемых нашим заказчикам в Испании и Португалии.

Мы намерены продолжить практику постоянного совершенствования системы обеспечения качества в интересах наших заказчиков, которыми мы очень дорожим».

С ним согласился генеральный директор «Юромадем» Рожер Сантасусана (Roger Santasusana): «Мы очень довольны тем, что внедрение стандартов ИСО прошло в рекордные сроки, что свидетельствует о правильности выбранного нами пути.

Теперь мы будем стремиться поддерживать функциональность системы управления качеством и практику постоянного совершенствования для обеспечения качества продукции и повышения степени удовлетворенности заказчиков».

«Юромадем Спейн» является дочерним предприятием компании «Мадем СА Бразил» (Madem SA Brazil).

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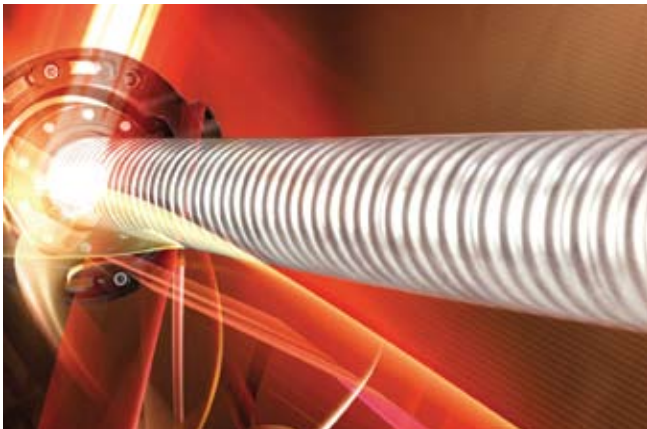
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Технология формования и сварки металлической ленты

Компания «Розендал» (Rosendahl) расширила свой ассортимент оборудования, предложив сварочные и гофрировальные агрегаты для производства силового кабеля. Руководствуясь потребностями предприятий отрасли в альтернативных решениях и основываясь на опыте успешного участия в проектах, связанных с применением технологий формования, сварки и гофрирования металлической ленты в производстве высококачественных ВЧ кабелей, компания «Розендал» приняла решение о выходе на этот сегмент рынка.



▲ Сварочное и гофрировальное оборудование для производства силовых кабелей от компании «Розендал»

Производителям кабельных изделий данная технология необходима для выпуска такой продукции, как кабели для ветровых и морских электростанций и кабели для подводных работ. В сегменте кабелей низкого напряжения также присутствует ряд изделий (кабели для нефтяных насосов, корабельные кабели, кабели для систем передачи сигналов), в которых используется технология компании «Розендал», направленная на улучшение характеристик продукции и повышение эффективности производственного процесса.

По сравнению с другими технологическими решениями (экструзией алюминиевых и свинцовых профилей)

система формования и сварки металлической ленты имеет ряд преимуществ. Она демонстрирует более высокие результаты с точки зрения бесперебойности эксплуатации оборудования, экономичности расходования электроэнергии и воды, уменьшения количества металлических отходов в процессе производства, изменения геометрических параметров и возможностей использования различных металлических материалов для изготовления экранирующей оболочки. Утверждается, что изготовленные таким образом кабельные изделия демонстрируют более высокие показатели механической прочности и водо- и (или) газонепроницаемости.

Среди технических решений, которые разработаны и оптимизированы для указанных сфер применения, можно назвать следующие:

- лентоформирующие агрегаты с оптимизированными характеристиками для обработки различных материалов;
- технологии сварки, обеспечивающие безупречные сварные швы с минимальной протяженностью околошовной зоны и максимальными физико-механическими свойствами;
- высокопроизводительного агрегаты для спирального и кольцевого гофрирования проводников из меди, алюминия или нержавеющей стали.

Для изготовления металлической оболочки из гладкой или гофрированной ленты из алюминия, меди или нержавеющей стали компания «Розендал» предлагает технические решения по формованию, сварке лент и обжатию трубчатых заготовок, включая соответствующее оборудование для последующей обработки.

В зависимости от конструкции выпускаемого кабеля, наличия свободного места и сортамента продукции компания «Розендал» может предложить интегрированные (в сочетании с технологией изготовления оболочки) и автономные технические решения.

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Web-страница: www.rosendahlaustria.com

«Раутомед» выходит на иракский рынок

Британская компания «Раутомед лимитед» (Rautomead Limited) из г. Данди объявила о назначении своего нового агента на Ближнем Востоке.

Г-н Маджид А. Аль-Раби (Majeed A Al-Rawi) из компании «Эль-тек энерджиз энд технолоджиз» (El-Tech Energies and Technologies) будет представлять интересы «Раутомед» в Ираке и Иордании, предоставляя услуги существующим клиентам «Раутомед» в регионе, которые используют технологию непрерывного литья, и занимаясь поиском потенциальных заказчиков из числа предприятий проволочно-кабельной и металлообрабатывающей промышленности.

Г-н Аль-Раби будет заниматься продвижением всей линейки выпускаемого компанией «Раутомед» оборудования, включая полностью автоматизированные линии производительностью до 30 000 т продукции в год.

Для производства катанки в меньших объемах предлагают новые модели оборудования производительностью от 1000 до 3600 тонн. Специализированные установки, предназначенные для производства драгоценных металлов, обеспечивают изготовление различного профильного проката из сплавов золота и серебра самого высокого качества.

Директор по сбыту и маркетингу компании «Раутомед» Гай Хендерсон (Guy Henderson) отмечает: «Назначение г-на Аль-Раби служит еще одним, после открытия Web-страниц компании на русском и китайском языках, примером нашей заинтересованности в освоении развивающихся рынков».

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Поставщик систем подводной связи завершает работы по монтажу кабельной сети

Компания «Мейн уан кейбл компани» (Main One Cable Company), предоставляющая услуги связи с использованием подводных кабельных магистралей и осуществляющая оптовые продажи на рынке открытого широкополосного доступа в Западной Африке, и ее системный поставщик – «Тайко электроникс сабси коммьюникейшнз сабком» (Tyco Electronics Subsea Communications SubCom), закончили в соответствии с установленным графиком первую очередь своей кабельной сети.

Завершен монтаж окончательной аппаратуры в Сейшале (Португалия), и сейчас ведутся работы по ее установке на площадках в Лагосе (Нигерия) и Аккре (Гана). По словам главного исполнительного директора «Мейн уан кейбл компани» Функе Опеке (Funke Opeke), первая очередь кабельной сети Main One, протяженность которой составляет 6800 километров, обеспечит столь необходимую пропускную способность между западным побережьем Африки и Португалией.

Сеть, построенная на основе сдвоенной оптоволоконной пары с использованием технологии мультиплексирования с разделением длины волны и уплотнением и обеспечивающая

пропускную способность 1,92 Тбит/с, на начальном этапе соединит Лагос, Аккру и Сейшал, с возможностью последующего подключения к странам Европы, Азии и Америки. Предполагается, что вторая очередь проекта обеспечит соединение со странами Южной Африки.

Кабельная сеть, которая, как ожидается, будет готова к эксплуатации в июне 2010 года, обеспечит открытый доступ региональным телекоммуникационным компаниям и поставщикам интернет-услуг по тарифам ниже существующих в регионе цен на полосу пропускания каналов связи.

Кроме того, система обеспечит широкополосный канал связи, который позволит расширить доступ в сеть Интернет для стран, расположенных к югу от Сахары, а также снизить затраты, связанные с переключением трафика между африканскими странами, без необходимости использования европейских точек обмена трафиком.

«Мы не скрываем радости по поводу того, что сложности, связанные с проведением морских работ по развертыванию кабельной сети Main One, остались позади, и в скором времени мы сможем сосредоточить свои усилия на выполнении главной

задачи по обеспечению линий связи с высокой пропускной способностью для тех регионов мира, в которых они уже давно требуются, – отметил Опеке, добавив: – Вместе с компанией «Сабком» мы выполнили стоящие перед нами задачи по заданному графику и теперь с нетерпением ждем того момента, когда нам удастся обеспечить подачу трафика нашим заказчикам и реализовать планы по расширению сети».

Президент «Сабком» Дэвид Кофлэн (David Coughlan) подчеркнул: «С момента образования нашего союза в 2008 году сооружение первой очереди морских объектов являлось приоритетной задачей компании «Сабком». Завершение программы морских работ максимально приближает нас к тому моменту, когда кабельная сеть Main One станет реальностью. Мы считаем выполненную нами работу по созданию системы Main One значительным достижением и гордимся тем, что участвуем в этом проекте».

Tyco Electronics Subsea Communications (SubCom) (США)
Web-страница: www.subcom.com

Main One Cable Company (Маврикий)
Web-страница: www.mainonecable.com

Завод для производства бортовых авиационных кабелей в Марокко

Компания «Нексанс» (Nexans) открыла в г. Мохаммедия (Марокко) новое предприятие, полностью предназначенное для производства бортовых авиационных кабелей. Строительство завода стало результатом подписанного между компаниями «Нексанс» и «Эйрбас» (Airbus) договора на поставку современных кабелей для самолетов A320, A350 и A380.

Инвестиции в размере почти 10 миллионов евро способствуют укреплению авиационного бизнеса компании «Нексанс», а также основного вида деятельности, которым занята ее марокканское дочернее предприятие, уже накопившее значительный опыт в области производства кабелей для автомобильного, строительного секторов и объектов инфраструктуры. Это – третий завод компании «Нексанс», специализирующийся на выпуске бортовых авиационных кабелей, два других аналогичных предприятия расположены во Франции и США.

Компания «Нексанс» провела реконструкцию завода в г. Мохаммедия под размещение 3000 кв. м производственных площадей, предназначенных для производства 21 тыс. км кабельных изделий в год, из которых 70 % предназначается для экспорта.

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▼ Кабельное производство компании «Нексанс» в Марокко



Вопросы экологической рациональности при разработке и производстве сплавов

Ральф Хойда, д-р Микаэль Кёлер, Джеймс Шрамль

1. Введение

Растущий дефицит природных ресурсов оказывает непрерывное влияние на экономическое процветание в сфере частных интересов и промышленного производства. Это в равной степени относится к источникам энергии и сырья.

Производители полуфабрикатов из медных сплавов столкнулись с тем, что темпы роста цен достигли уровня трехзначных чисел, вследствие чего соотношение показателя добавленной стоимости к стоимости металла, которое всего несколько лет тому назад было равновесным, в последнее время изменилось и теперь составляет один к трем. Несмотря на то что раньше при выборе подходящего сплава основными критериями служили его физико-механические свойства и технологичность, в настоящее время возросло значение фактора стоимости металлов. А это также отражается на разработке и производстве сплавов.

Разработчики в равной степени озабочены вопросами обеспечения пригодности сплавов и композитов к переработке, а также использования более прочных сплавов для уменьшения толщины стенок деталей, способствующих самым рациональному использованию природных ресурсов за счет снижения расхода сырья.

Для иллюстрации высокой пригодности сплавов к переработке и возможности снижения потребления сырья в настоящей работе рассматриваются две разработки. В первом случае описываемый материал представляет собой новый сплав с высокой электропроводностью, который может перерабатываться без каких-либо ограничений – даже при наличии покрытия из олова. Во втором случае это – высокопрочная бронза, которая легко может быть вновь использована в схеме материальных потоков и, что самое главное, потенциально пригодна для

применения в производстве различных миниатюрных изделий, что способствует сохранению природных ресурсов.

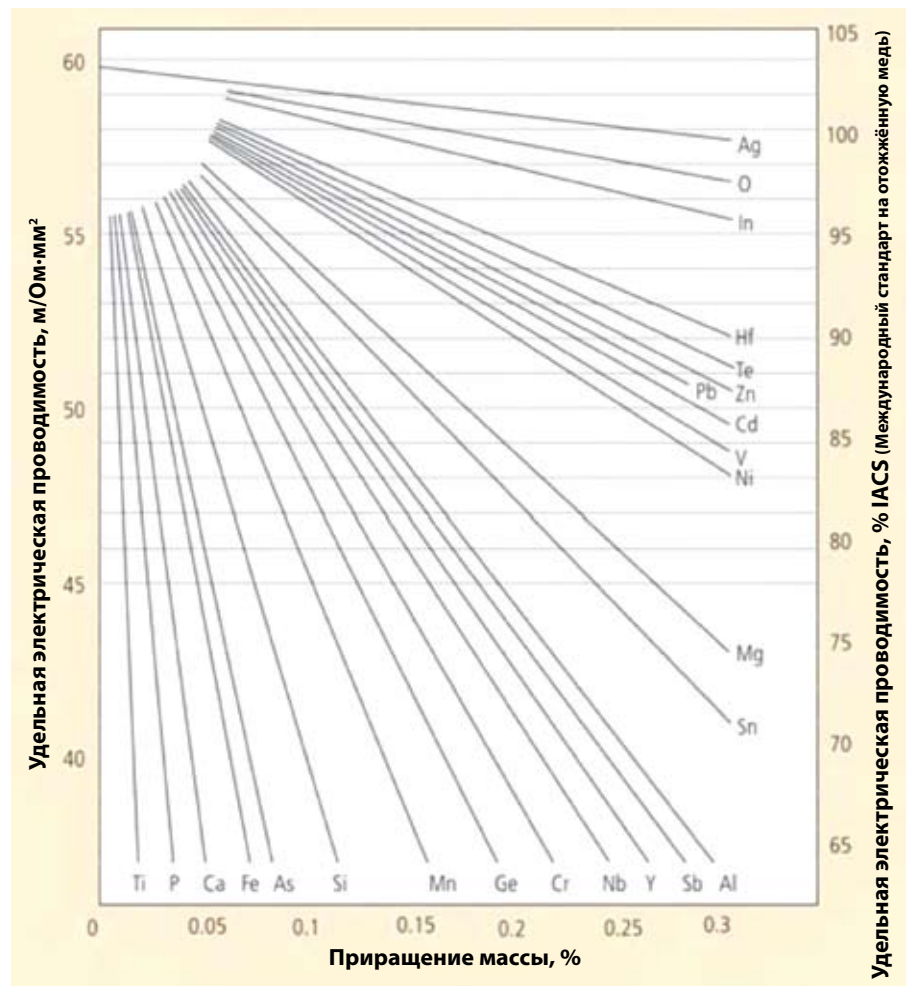
2. Образцы

2.1 Разработка 1

Соединительные элементы, используемые в электротехнике и электронике, должны отвечать целому ряду требований.

Механическая прочность, удельная электрическая проводимость и коррозионная стойкость являются основными критериями надежности функционирования компонентов в течение полного срока службы всей системы. Во многих случаях требуемые характеристики являются взаимоисключающими, как, например, когда в спецификации указывается требование, предусматривающее сочетание хорошей удельной электропроводности и высокой

▼ Рис. 1. Влияние легирующих элементов на величину удельной электрической проводимости меди



коррозионной стойкости. Хотя такие элементы, как никель и хром, улучшают коррозионную стойкость медного сплава, вместе с тем они вызывают существенное снижение его удельной электропроводности (см. рис. 1).

Часто применяемым решением данной проблемы является использование композитных материалов, преимущественно в виде покрытий на основе технически чистого олова, наносимых на поверхность медного сплава. Директива ЕС об ограничении использования опасных материалов в производстве электрического и электронного оборудования (RoHS), которая вступила в силу 1 июля 2006 года, запрещает использование всех ранее применявшихся стандартных свинцово-оловянных сплавов, не считая нескольких исключений. Вопросы введения металлоизделий с функциональным необработанным оловянным покрытием в схему материальных потоков подробно рассматриваются ниже.

При выборе материала для разъемов в первую очередь учитываются такие физические параметры, как удельная электрическая проводимость, модуль упругости, термическая релаксация, технологические свойства, т.е. ковкость и пластичность, а также сварочные характеристики. Вопросы, касающиеся частичной или полной защиты поверхности, менее важны, так же как и базовая доступность и стоимость материалов. Изучение отходов производства и операций выштамповки свидетельствует о том, что во многих случаях вопросам их утилизации не уделяется того внимания, которое они заслуживают с учетом экологических и экономических факторов. Это иллюстрирует приведенный ниже пример.

В процессе производства крупногабаритных выводных рамок для антиблокировочных тормозных систем (ABS) и систем стабилизации курсовой устойчивости (ESP) из луженой горячим способом ленты из сплава меди CuFe2P (С19400) образуется приблизительно 50-70 % отходов. Все эти отходы не могут быть подвергнуты непосредственной утилизации (повторно введены в процесс плавления). Отходы должны пройти требующую больших затрат времени операцию переплавки и быть разделены электрохимическим методом. Они возвращаются в схемы материальных потоков и производства в виде катодов. Данная процедура является энергоемкой и потому требует больших затрат по сравнению с прямой плавкой. Обычно лента толщиной 0,4 мм с обеих сторон покрыта 3-мкм слоем олова. При непосредственной утилизации лома получаемый в результате сплав CuFe2P



▲ Рис. 2. Влияние содержания олова на удельную электропроводность CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Медь	Остальное	Остальное	Остальное
Олово	0.12	-	0.2 – 0.8
Цинк	<0.10	0.13	<0.05
Железо	<0.02	2.4	<0.02
Никель	<0.02	-	0.1 – 0.6
Фосфор	<0.015	0.03	0.008 – 0.05

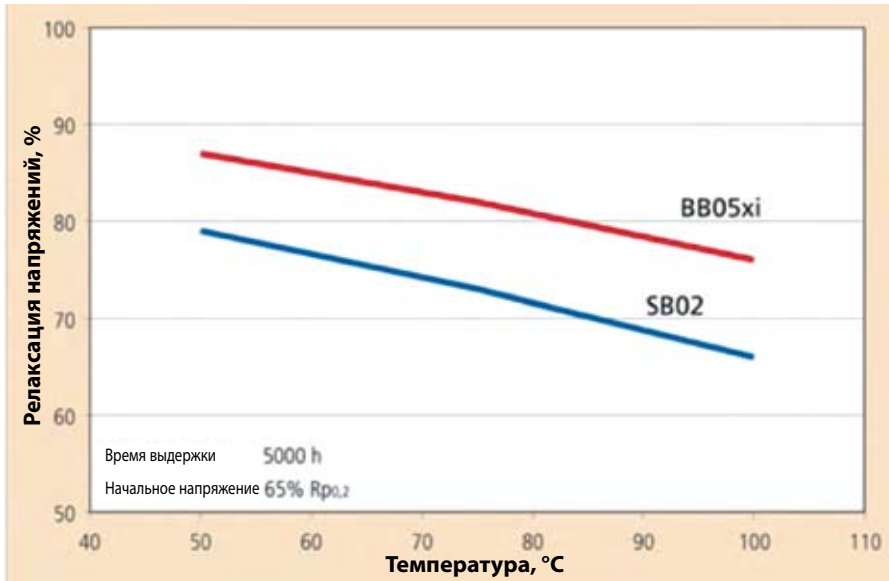
▲ Таблица 1. Сравнительный анализ химического состава различных марок бронзы

	BB01	SB02	BB05xi
Удельная электрическая проводимость в мягко-отожженном состоянии (% IACS)	>83	63	>62
Коэффициент теплопроводности (Вт/м·К)	360	260	250
Коэффициент теплового расширения [Rt при 100 °C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Модуль упругости [ГПа]	128	123	126

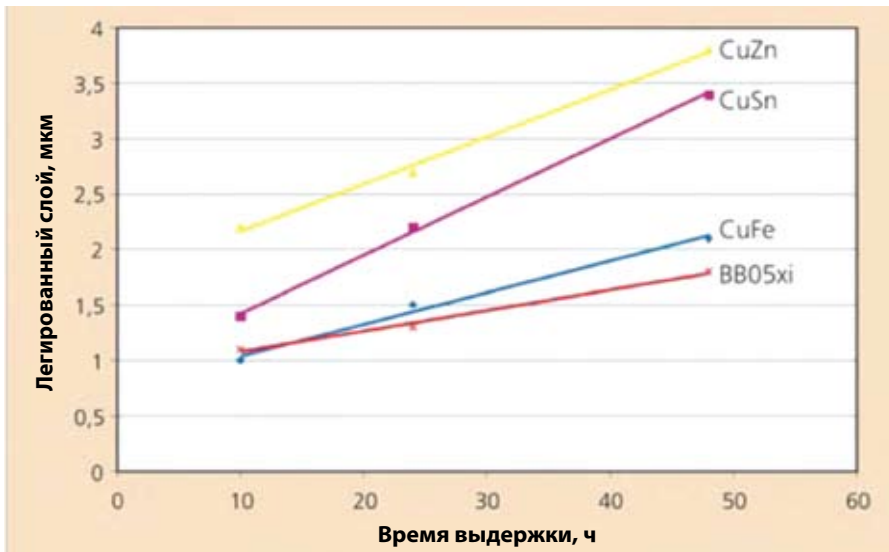
▲ Таблица 2. Сравнительный анализ технологических свойств различных марок бронзы

▼ Таблица 3. Сравнительный анализ технологических свойств различных марок бронзы

	BB01	SB02	BB05xi
Толщина ленты 0,3mm			
Предел прочности на разрыв Rm [МПа]	450	450	425
Предел текучести при растяжении Rp _{0.2} [МПа]	410	420	380
Относительное удлинение A50 [%]	4	9	6
Число твердости по Виккерсу HV	130	145	125
Температура разупрочнения [°C (1 ч)]	300	350	350
Пластичность [холоднокатаная лента, изгиб на 180° перпендикулярно направлению прокатки]	1	0	0.5
Пластичность [холоднокатаная лента, изгиб на 180° параллельно направлению прокатки]	1	1	0.5



▲ Рис. 3. Сравнительный анализ релаксационных свойств сплавов CuFe2P и BB05xi



▲ Рис. 4. Образование легированного слоя при 180 °C после операции горячего лужения

содержит примеси олова в количестве около 1,5 %. Это серьезным образом влияет на параметры деформационного упрочнения и удельной электрической проводимости сплава, которые существенно снижаются при содержании олова выше 0,3 % (см. рис. 2).

Таким образом, существует необходимость в разработке нового сплава, по характеристикам сопоставимого с CuFe2P, но который может быть легко утилизирован, в том числе даже при наличии оловянного покрытия. В качестве альтернативы возможно использовать необработанные медно-оловянные сплавы, такие как CuSn 0,15. При наличии оловянного покрытия лом из этих сплавов может быть непосредственно возвращен в схему материальных потоков (см. таблицу 1). Кроме того, физико-механические и

технологические свойства относительно хорошо согласуются со свойствами CuFe2P. Однако существуют и определенные слабые места, например, с точки зрения интенсивности разупрочнения и релаксационной стойкости (см. таблицы 2 и 3). При изучении разработанного нового сплава BB05xi выявляется иная картина. В результате адресной гармонизации легирующих присадок (олово, никель и фосфор) обеспечиваются физико-механические и технологические свойства материала, сопоставимые со свойствами CuFe2P, наряду с характеристиками разупрочнения и релаксации напряжений (ползучесть компонентов при напряжении под действием высокой температуры), которые требуются для дальнейшей обработки (см. рис. 3) и применения по назначению.

В процессе последующей обработки при высоких температурах толщина легированного слоя, который образуется между основным металлом и оловянным покрытием изделия из луженого сплава BB05xi, сопоставима с аналогичным параметром для сплава CuFe2P. Таким образом, нет необходимости в перенастройке производственных линий для работы с этим новым композитным материалом (см. рис. 4). Более того, новый сплав отличается тем, что луженый лом, получаемый на отдельных этапах цепочки создания добавленной стоимости, поддается прямой утилизации. Сравнительный анализ стоимости металлических компонентов в BB05xi и CuFe2P также не позволяет экономически обосновать разницу между затратами на косвенную и прямую утилизацию отходов производства и операций выштамповки, которые в этом секторе обычно составляют от 20 % до 25 % от стоимости металла, а это – существенно важный фактор в условиях роста и без того высоких цен на сырье. Если принять процентное содержание лома равным, например, 70 %, то оказывается, что затраты на плавку быстро приближаются к себестоимости производства, что ставит под сомнение рентабельность всего технологического процесса. Следовательно, луженая оловом фосфористая бронза является выгодной альтернативой луженым медно-железным сплавам как с экологической, так и с экономической точек зрения (устраняется необходимость в использовании дополнительной электроэнергии и кислоты для электролитической обработки металлолома).

2.2 Разработка 2

Медно-оловянные сплавы используются в разъемах и других компонентах для электронной и электротехнической промышленности, так как они обладают хорошими или очень хорошими упругими свойствами, высокой стойкостью к действию электрических и термических напряжений, характеризуются низким уровнем релаксации напряжений, высокой пластичностью и пригодностью к пайке. Обычно в такие сплавы добавляется небольшое количество фосфора для их раскисления, поэтому они также называются фосфористыми бронзами. Свойства этой группы сплавов зависят главным образом от количества содержащихся в них олова и фосфора и в меньшей степени – от содержания в их составе других легирующих присадок. Путем соответствующей обработки их свойства могут быть скорректированы под использование для широкого спектра практических задач. Такие сплавы имеют множество сфер промышленного применения – от соединительных разъемов и колодок для электронных

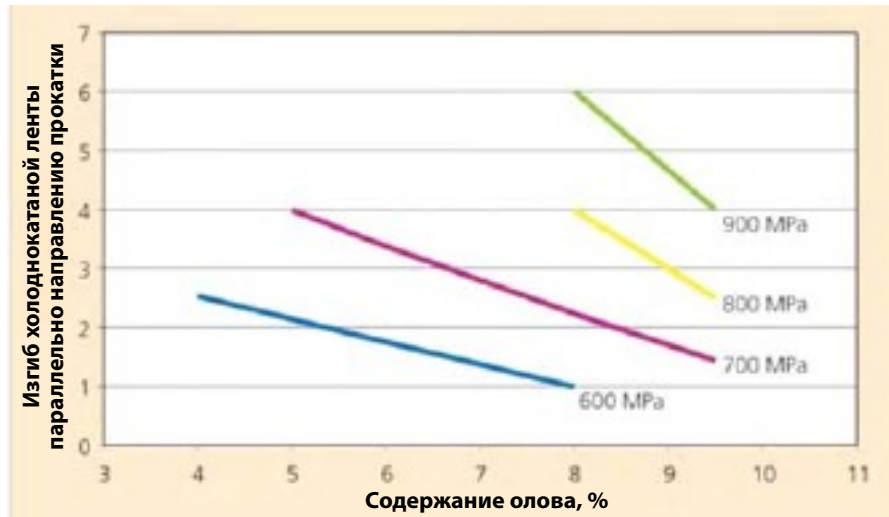
модулей до токопроводящих контактных пружин.

В прошлом в качестве эффективной методики при выборе марки фосфористой бронзы использовалось «снижение сортности». Другими словами, технологические свойства низколегированной фосфористой бронзы корректировались таким образом, чтобы привести ее упругие свойства и обрабатываемость в соответствие с аналогичными параметрами исходной высоколегированной фосфористой бронзы. Однако приходилось учитывать ряд ограничений.

Содержание олова и фосфора оказывает существенное влияние на характеристики деформационного упрочнения и ковкость фосфористых бронз, и между потенциально возможной характеристикой пластичности и содержанием олова установлена четкая взаимосвязь. На рис. 5 показано, каким образом увеличение содержания олова влияет на характеристики пластичности при постоянной величине прочности. На этом фоне представлялось логичным разработать состав фосфористой бронзы с более высокой степенью легированности.

Другая причина для этого заключалась в необходимости миниатюризации разъемов, поскольку уменьшение сечения ведет к снижению усилия контакта при постоянном смещении пружинящего элемента. Таким образом, для заданной величины постоянного усилия необходимо пересмотреть конструкцию пружинящего элемента, так как расчетное напряжение соответствующим образом увеличивается. Одним из решений данной задачи является разработанный новый сплав BV95, представляющий собой 10 % фосфористую бронзу. При величине предела текучести при растяжении $R_{p0.2} > 720$ МПа характеристика пластичности BV95 при изгибе холоднокатаной ленты на 90° параллельно направлению прокатки на два порядка выше, чем у 8 % оловянистой бронзы. В зависимости от предполагаемой сферы практического применения сплав BV95 можно закалить для обеспечения предела текучести при растяжении $R_{p0.2}$, равного 800 МПа, и увеличения прочности до уровня > 950 МПа.

Разница в значениях удельной электрической проводимости между BV95 и 8 % оловянистой бронзой составляет приблизительно 1 % IACS (Международный стандарт на отожженную медь), т. е. при таком содержании олова в сплаве оно



▲ Рис. 5. График зависимости пластичности различных фосфористых бронз от прочности

оказывает ничтожное с точки зрения снижения удельной электропроводности действие. При применении отпуска упругих пружинных сплавов сплав BV95 демонстрирует такие же характеристики разупрочнения, что и 8 % фосфористая бронза; при этом первое значительное снижение твердости наблюдается при температуре порядка 280°C .

Кроме того, релаксация напряжений в новом сплаве ($< 20\%$ при температуре 100°C для испытаний продолжительностью 10 000 ч) сопоставима релаксацией напряжений в выше названном эталонном сплаве (при условии идентичности уровня напряжений).

С учетом вышеупомянутого усилия контакта данные результаты указывают на вероятность того, что применение сплава BV95 позволит обеспечить уменьшение толщины материала и, как следствие, снижение расхода необходимых материалов приблизительно на 20 %.

3. Заключение

Резкий рост цен на сырье и в особенности цен на медь коренным образом изменил соотношение между добавленной стоимостью и стоимостью металла, существующее в производстве полуфабрикатов из медных сплавов. При всестороннем рассмотрении снижение стоимости утилизации и экономия используемых материальных ресурсов имеют большее значение, нежели общие расходы на чистовую обработку. Влияние, которое имеет продуманный отбор сплавов и композитных материалов, описано на основе использования в качестве примера материалов из низколегированной меди. Комбинированное использование разработанного нового низколегированного сплава

из фосфористой бронзы и оловянного покрытия также является выгодной альтернативой луженому медно-железному сплавам с экологической и экономической точек зрения и обеспечивает аналогичные свойства.

Разработка нового сплава из 10 % фосфористой бронзы обеспечивает практическую возможность создания добавленной стоимости для потребителей за счет сокращения количества используемого материала. Этот сплав имеет свойства, аналогичные свойствам 8 % медно-оловянного сплава, но характеризуется более высокой пластичностью. Кроме того, новый сплав позволяет создавать ресурсосберегающие конструкции, поскольку он может выдерживать более высокий уровень напряжений. Обеспечение 20-процентной экономии материальных ресурсов представляется вполне реальной задачей. ■

Настоящая работа была впервые представлена на 58-ой Конференции Международного симпозиума IWCS по кабельно-проводниковой продукции и системам связи, состоявшейся в г. Шарлотте (шт. Северная Каролина) с 8 по 11 ноября 2009 года, и перепечатывается с любезного разрешения организаторов.

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Contrôle de qualité versatile



▲ Détecteur KW 13Trio de Zumbach, un appareil versatile

Pour obtenir un contrôle de qualité continu, les détecteurs de nœuds et d'étranglement sont aussi importants que les jauges de diamètre et les testeurs d'étincelles. La nouvelle ligne de détecteurs KW 13Trio de Zumbach est conçue pour détecter même les nœuds et les étranglements les plus petits dans les fils, dans les conducteurs, dans les fibres optiques et les câbles, avec rapidité et précision.

La conception compacte du détecteur KW 13Trio facilite son intégration dans toute ligne d'extrusion ou tout processus de rembobinage. Le champ de mesure est dimensionné de manière à ce que même des étranglements de dimensions exceptionnelles puissent passer doucement durant le démarrage. Sa conception ouverte permet d'effectuer le filetage du produit aisément et rapidement sans arrêter la production.

L'intégration d'un microprocesseur puissant et le traitement entièrement numérique du signal font de ce détecteur de nœuds et d'étranglements un instrument important pour le contrôle de la qualité. Le détecteur sera disponible comme dispositif autonome. En utilisant une unité opérationnelle et d'affichage locale, le détecteur KW 13Trio peut être totalement configuré et activé directement sur le dispositif.

Il est caractérisé par une tolérance de hauteur de défaut détectable minimale de 0,01mm (0,0004 pouces) et d'une longueur de défaut minimale de 0,2mm (0,008 pouces), et dispose d'un dispositif de traitement des signaux entièrement numérique (DSP).

Le détecteur versatile KW 13Trio présente plusieurs interfaces, comprenant une interface série RS, Profibus DP et Ethernet EN. La connexion peut être effectuée à travers un port d'interface RS à un système USYS d'acquisition des données ainsi qu'à un système de traitement et d'affichage. Les versions avec Profibus DP et Ethernet EN permettent la connexion à un hôte d'un niveau supérieur, tel qu'un API ou un système d'acquisition des données.

Le principe de mesure et la solution optique complexe garantissent l'immunité à la lumière parasite et intense tout en offrant une précision maximale de détection et d'identification des nœuds et des étranglements dans l'ordre de micromètres.

Les modèles KW 13Trio disposent d'une base de données des défauts interne pour stocker les 100 derniers défauts, y compris les caractéristiques de défaut telles que: numéro, type, hauteur, position et longueur du défaut. Il est possible d'accéder à cette base de données à travers l'unité opérationnelle et d'affichage locale ou des interfaces distantes optionnelles.

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Entreprise de câbles sous-marins complète l'installation d'un système de câbles

Main One Cable Company, entreprise spécialisée dans l'installation de câbles sous-marins offrant un accès ouvert et la capacité de bande large en gros en Afrique Occidentale, et son fournisseur de systèmes, Tyco Electronics Subsea Communications SubCom, ont complété l'installation de la première phase de son système de câbles selon les prévisions.

L'installation de l'équipement terminal a été complétée à Seixal (Portugal) et est en cours de réalisation aux points d'atterrissage du système situés à Lagos (Nigeria) et à Accra (Ghana).

Le directeur exécutif de Main One Cable Company, Funke Opeke, a déclaré que la Phase 1 du système Main One Cable comprend 6 800km et fournira la capacité indispensable entre la côte occidentale de l'Afrique et le Portugal.

Le projet concernant le multiplexage dense par répartition en longueurs d'onde (DWDM) de double paire de fibres de 1,92 térabits/s connectera d'abord Lagos, Accra et Seixal avec l'Europe, l'Asie et les Amériques, et ensuite avec l'Afrique du Sud lors de la Phase 2 du projet.

Le système des câbles, dont l'entrée en service était prévue pour juin 2010, offrira l'accès ouvert pour les opérateurs locaux et aux fournisseurs d'accès à l'Internet à des tarifs inférieurs aux prix internationaux actuellement appliqués pour la bande large dans la région.

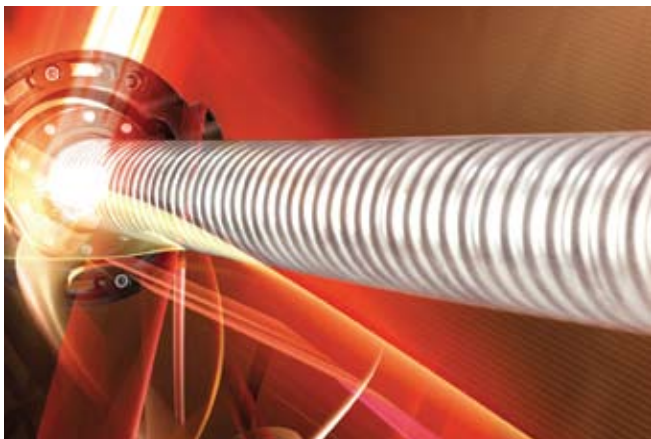
Le système fournira également la capacité de bande large pour étendre l'accès à Internet dans la zone saharienne, ainsi qu'alléger les difficultés de commutation de trafic entre les pays africains sans nécessité de passer par l'Europe.

Le président de SubCom, David Coughlan a remarqué que "depuis le début de notre collaboration en 2008, la société SubCom a été impatiente de compléter l'installation marine de la Phase 1. L'achèvement du programme marin transforme le système Main One Cable en une quasi-réalité."

Tyco Electronics Subsea Communications – États-Unis
Website: www.subcom.com

Main One Cable Company – Île Maurice
Website: www.mainonecable.com

Technologie de façonnage et de soudage de rubans métalliques



▲ Équipements de soudage et d'ondulation pour câbles électriques de Rosendahl

Rosendahl a étendu sa gamme de produits pour offrir des équipements de soudage et d'ondulation pour applications de câbles de puissance.

Suite à la demande de solutions alternatives pour l'industrie, et sur la base de l'expérience acquise dans des projets couronnés de succès dans le secteur du façonnage, du soudage et de l'ondulation pour les câbles RF de pointe, Rosendahl a décidé de pénétrer ce segment du marché.

Les fabricants de câbles exigent cette technologie pour des produits tels que les câbles pour les centrales éoliennes, les centrales nucléaires offshore ou les câbles pour les applications sous-marines. Le secteur de la basse tension comprend également une série de produits (câbles pour pompes à huile, marines, de signalisation), utilisant la technologie de Rosendahl pour améliorer les propriétés des produits ou pour augmenter la productivité durant le processus de fabrication.

Nexans inaugure au Maroc une unité de fabrication de câbles aéronautiques

Nexans a inauguré à Mohammedia (Maroc) une nouvelle unité, entièrement dédiée à la fabrication de câbles aéronautiques. Cette usine est le fruit d'un accord signé entre Nexans et Airbus et porte sur la fourniture de câbles de pointe destinés aux Airbus A320, A350 et A380.

Cet investissement de près de 10 millions d'euros renforce l'activité aéronautique de Nexans et le cœur de métier de sa filiale marocaine, déjà dotée d'une forte expertise dans la fabrication des câbles automobiles, de bâtiment et d'infrastructure.

Cette nouvelle usine est la troisième du Groupe spécialisée en câbles pour l'aéronautique, après celles implantées en France et aux Etats-Unis.

Nexans a ainsi réaménagé sur le site de Mohammedia une superficie de production de 3 000m² afin de produire 21 000km de câbles par an, dont 70% seront exportés.

Nexans – France

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Par rapport à d'autres technologies, telles que l'extrusion d'aluminium ou de plomb, le système de façonnage et de soudage de rubans métalliques offre plusieurs avantages. Cette technologie offre de meilleurs résultats pour le service continu, une utilisation économique de l'énergie électrique et de l'eau, une réduction des déchets durant la production, un changement des dimensions et la possibilité d'utiliser différents matériaux métalliques pour le blindage.

Il est estimé que les câbles fabriqués avec cette technologie présentent des propriétés excellentes de stabilité mécanique et d'étanchéité à l'eau et au gaz.

Les technologies développées et optimisées pour ces applications comprennent :

- Formeurs optimisés pour différents matériaux
- Processus de soudage, pour garantir des joints de soudure parfaits avec des zones caractérisées par une influence thermique minimale, et les meilleures propriétés mécaniques
- Des onduleuses haute vitesse pour l'ondulation hélicoïdale et annulaire de cuivre, aluminium et acier inoxydable

Pour le blindage métallique des câbles avec des matériaux lisses ou ondulés comme l'aluminium, le cuivre ou l'acier inoxydable, Rosendahl offre des solutions pour le façonnage de rubans, le soudage et le processus de réduction des tubes comprenant des équipements adéquats situés en aval de la ligne.

En fonction de la conception du câble, de la disponibilité d'espace et de la gamme de produits, Rosendahl est en mesure d'offrir des solutions en ligne (en combinaison avec le processus de revêtement) et hors ligne.

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Rautomead en Irak

La société britannique Rautomead Limited de Dundee a annoncé la désignation d'un nouvel agent au Moyen Orient.

Majeed A Al-Rawi de la société El-Tech Energies and Technologies représentera Rautomead en Irak et en Jordanie, en offrant ses services aux clients actuels de Rautomead du secteur de la technologie de coulée continue de ces pays et en identifiant des clients potentiels dans les secteurs du fil et du câble et du traitement des métaux.

Al-Rawi va promouvoir la gamme complète de produits de Rautomead, y compris les équipements entièrement automatisés pour la production jusqu'à 30 000 tonnes annuelles. Pour des volumes de fil machine inférieurs, une nouvelle gamme pouvant produire de 1 000 à 3 600 tonnes est disponible.

Les modèles spécialisés en métaux précieux facilitent la production de formes et de sections d'alliages d'or et d'argent de qualité supérieure.

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Soutenabilité dans le développement et dans la production d'alliages

Par Ralf Hojda, Dr Michael Köhler et James Schraml

1 Introduction

Le manque croissant de ressources influence de plus en plus les résultats économiques du secteur privé et du secteur industriel. La fourniture d'énergie et de matières premières en est également affectée. Les fabricants de produits semi-finis d'alliages de cuivre ont enregistré une augmentation des prix en pourcentages à trois chiffres, si bien que, récemment, le taux de la valeur ajouté par rapport à la valeur du métal, qui jusque dernièrement était équilibré, est actuellement de un à trois.

Bien qu'autrefois les facteurs mécaniques et technologiques représentaient les critères principaux dans la sélection d'un alliage adéquat, aujourd'hui le prix du métal est devenu un facteur plus important. Cela entraîne également des conséquences dans le développement et dans la fabrication des alliages.

Les développeurs sont également concernés par la recyclabilité des nouveaux alliages et des composés ainsi que de l'utilisation d'alliages plus résistants pour réduire les épaisseurs des parois et donc de la conservation des ressources en utilisant une quantité inférieure de matériau.

Le présent article décrit deux exemples de développement de matériaux caractérisés par une bonne recyclabilité et permettant de réduire la quantité de matériaux utilisés. Dans le premier exemple, le matériau décrit est un nouvel alliage à haute conductivité pouvant être recyclé sans aucune limitation, même lorsqu'il est revêtu d'étain.

Le deuxième exemple concerne l'utilisation de bronze haute résistance, qui peut être aisément réintroduit dans le cycle du matériau et qui peut surtout être utilisé dans plusieurs applications de miniaturisation, en facilitant ainsi la conservation des ressources.

2 Exemples

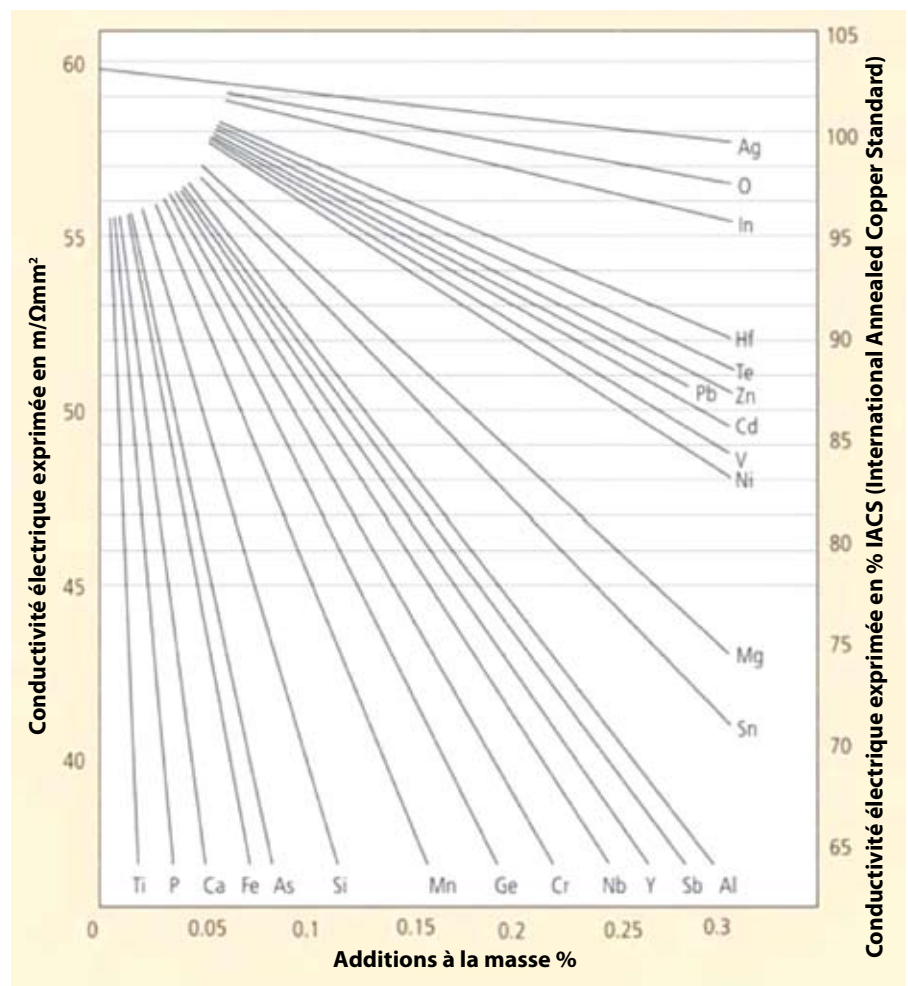
2.1 Développement 1

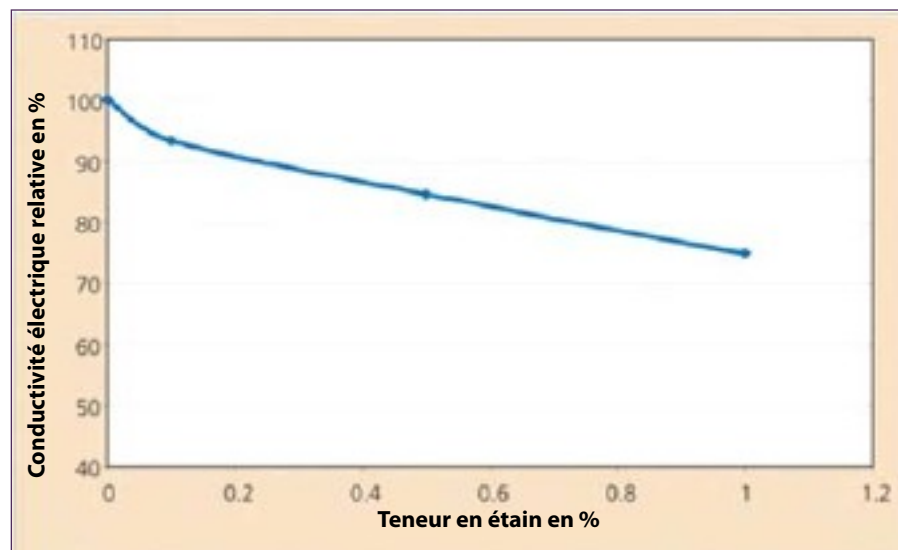
Les éléments de connexion utilisés dans les secteurs de l'ingénierie électrique et électronique doivent répondre à plusieurs exigences. La résistance mécanique, la conductivité électrique et la résistance à la corrosion représentent des critères

clés pour un fonctionnement fiable des composants durant la vie utile de tout le système.

Dans plusieurs cas, les propriétés requises sont réciproquement incompatibles, de même que lorsqu'une combinaison de bonne conductivité et résistance à la corrosion excellente est spécifiée. Bien que des composants tels que le nickel

▼ Figure 1: Influence des éléments liants sur la conductivité électrique du cuivre





▲ **Figure 2:** Influence de la teneur en étain sur la conductivité du CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Cuivre	Balancement	Balancement	Balancement
Étain	0.12	-	0.2 – 0.8
Zinc	<0.10	0.13	<0.05
Fer	<0.02	2.4	<0.02
Nickel	<0.02	-	0.1 – 0.6
Phosphore	<0.015	0.03	0.008 – 0.05

▲ **Tableau 1:** Comparaison de la composition chimique de différents bronzes

et le chrome améliorent la résistance à la corrosion d'un alliage de cuivre, ils en réduisent toutefois considérablement la conductivité (voir Figure 1).

Les éléments composites représentent une solution fréquemment adoptée pour résoudre ce problème, surtout sous forme de revêtements à base d'étain pur appliqués à la surface de l'alliage de cuivre. Seulement dans les cas de rares exceptions, la directive RoHS (Restriction of Hazardous Substances), concernant l'utilisation de certaines substances dangereuses dans l'équipement électronique et électrique, entrée en vigueur le 1^{er} juillet 2006, interdit les composés classiques de plomb-étain qui étaient utilisés auparavant. L'intégration du revêtement fonctionnel d'étain pur dans le cycle du matériau est décrit en détail ci-après

La sélection du matériau pour les connecteurs est principalement basée sur des critères physiques tels que la conductivité électrique, le module d'élasticité, la relaxation thermique et les caractéristiques de processus telles que la ductilité et la capacité de pliage ainsi que le comportement au soudage. Les problèmes concernant la protection partielle ou totale de la surface sont d'importance secondaire de même que la disponibilité de base des matériaux et les coûts des ces derniers.

Une analyse des déchets de production et de poinçonnage révèle que, dans plusieurs cas, ces facteurs ne sont pas suffisamment considérés ni du point de vue écologique

▼ **Tableau 2:** Comparaison des propriétés technologiques de différents bronzes

	BB01	SB02	BB05xi
Conductivité électrique douce [% IACS]	>83	63	>62
Conductivité thermique (watts/mètres Kelvin)	360	260	250
Coefficient d'expansion thermique [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Module d'élasticité [GPa]	128	123	126

▼ **Tableau 3:** Comparaison des propriétés technologiques de différents bronzes

Épaisseur de la bande 0,3mm	BB01	SB02	BB05xi
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Température de ramollissement [°C (1 h)]	300	350	350
Capacité de pliage [180° GW R/S]	1	0	0.5
Capacité de pliage [180° BW R/S]	1	1	0.5

ni du point de vue économique ainsi que l'illustre l'exemple suivant. Durant la production de grille de connexion de grandes dimensions réalisées en CuFe2P (C19400) étamé par immersion à chaud pour les systèmes ABS et ESP, on produit environ de 50% à 70% de ferraille.

Cette dernière ne peut pas être directement recyclée (réintroduite dans le processus de fusion), elle doit être soumise à des processus de fusion et de séparation électrolytique exigeant beaucoup de temps.

La ferraille est ensuite réintroduite dans le cycle de matériau et de production sous forme de cathode. Ce procédé est caractérisé par une forte intensité d'énergie et est donc coûteux quant à la fusion directe.

Généralement, une bande d'une épaisseur de 0,4mm est pourvue d'un revêtement d'étain de 3µm sur les deux côtés. Lorsque la ferraille est recyclée directement, l'alliage de CuFe2P en résultant contient environ 1,5% d'impuretés d'étain. Cela influence considérablement le comportement durant l'érouissage et la conductivité électrique de l'alliage, qui diminue drastiquement lorsque la teneur en étain dépasse 0,3% (voir la Figure 2).

Il est donc nécessaire d'avoir un nouvel alliage avec des propriétés comparables à celles du CuFe2P, mais pouvant être recyclé sans difficulté, même lorsqu'il est revêtu d'étain. Les alliages de cuivre pur et d'étain tels que le CuSn 0.15 offrent la possibilité

d'être utilisés comme des alternatives. Lorsqu'elle est revêtue d'étain, la ferraille peut être réintroduite directement dans le cycle du matériau (voir Tableau 1).

En outre, ses propriétés mécaniques et technologiques correspondent relativement bien à celles du CuFe2P. Toutefois, il existe d'évidents points de faiblesse en termes de comportement au ramollissement et de résistance à la relaxation (voir Tableaux 2 et 3).

Une analyse de l'alliage BB05xi récemment développé montre une situation différente. Grâce à l'harmonisation ciblée des éléments liants (étain, nickel et phosphore) ce matériau offre des propriétés mécaniques et technologiques comparables à celles du CuFe2P, ainsi qu'à celles du profil des propriétés requises pour le processus supplémentaire et pour l'application finale, en ce qui concerne le comportement durant le ramollissement et la relaxation (fluage du composant sous tension à haute température) (voir la Figure 3).

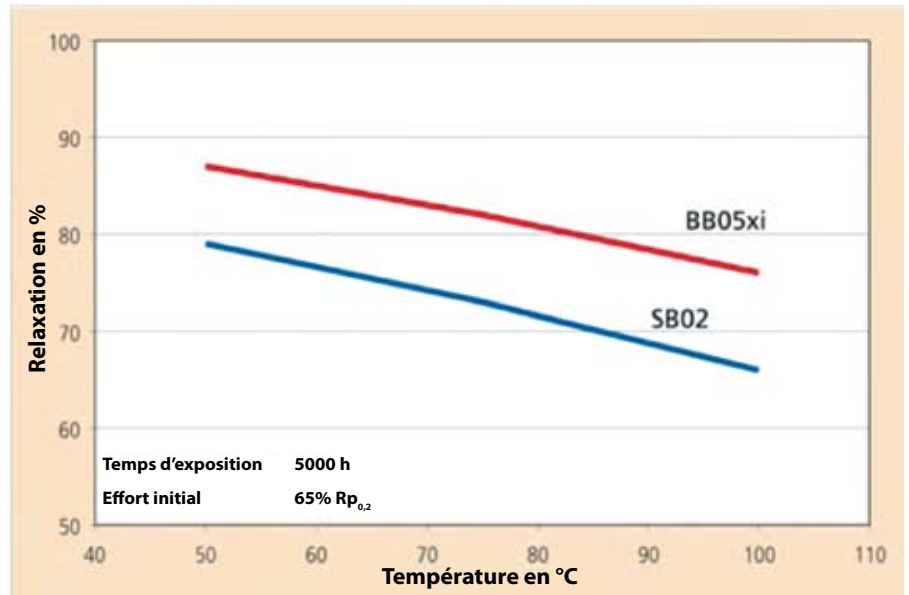
Durant le traitement complémentaire à hautes températures, l'épaisseur de la couche liante se formant entre le matériau de base et le revêtement d'étain du BB05xi étamé est comparable à celui du CuFe2P.

Par conséquent, les lignes de production ne doivent pas être converties pour l'introduction de ce nouveau matériau composite (Figure 4).

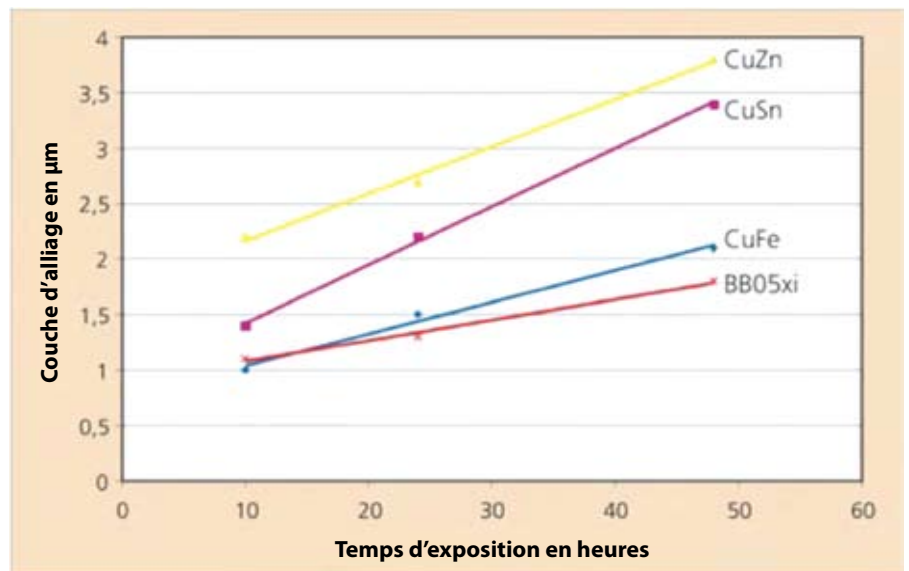
En outre, ce nouvel alliage est particulièrement significatif puisque la ferraille étamée résultant de différentes phases de la chaîne de la valeur ajoutée est directement recyclable. En plus, une comparaison des valeurs des métaux BB05xi et CuFe2P ne justifie pas la différence entre les coûts du recyclage indirect et direct de la ferraille de production et de poinçonnage qui généralement, dans ce secteur, s'attestent de 20% à 25% environ de la valeur du métal – ce dernier étant un facteur d'importance fondamentale à une époque où le prix des matières premières est élevé et à la hausse.

Par exemple, avec un pourcentage de ferraille de 70%, les coûts de fusion peuvent rapidement s'aligner aux coûts de production, en générant ainsi des doutes quant à la faisabilité économique de la totalité du processus.

L'utilisation d'un bronze phosphoreux revêtu d'étain représente donc une alternative valable aux alliages de cuivre-fer étamés tant du point de vue écologique qu'économique (l'utilisation supplémentaire de l'électricité et de l'acide pour le traitement électrolytique de la ferraille est éliminée).



▲ Figure 3: Comparaison du comportement de relaxation entre le CuFe2P et le BB05xi



▲ Figure 4: Formation de la couche d'alliage à 180°C après étamage par immersion à chaud

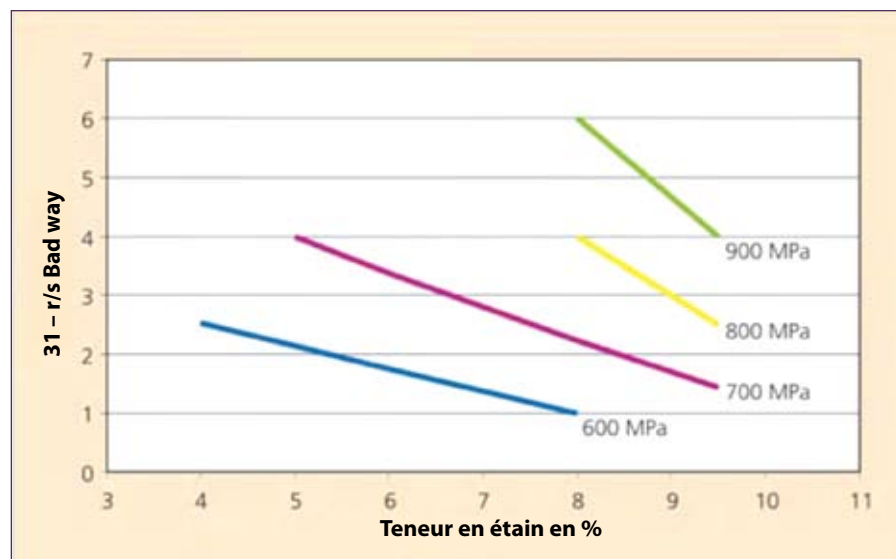
2.2 Développement 2

Les alliages d'aluminium sont utilisés pour les connecteurs et les composants dans des applications d'ingénierie électronique et électrique attendu qu'ils présentent des caractéristiques d'élasticité excellentes, une bonne résistance aux tensions thermiques et électriques, un relâchement réduit de la tension et une excellente capacité de pliage et de soudabilité.

Normalement, aux alliages de ce type on ajoute une petite quantité de phosphore pour la désoxydation: c'est pourquoi ils sont également appelés bronzes phosphoreux. Les propriétés de ce groupe d'alliages dépendent principalement de la teneur en étain et en phosphore, et dans une moindre mesure, de l'addition d'autres éléments liants. Grâce à un processus

adéquat, les propriétés de ces alliages peuvent être adaptées pour être utilisés dans une ample gamme d'applications. Les nombreuses applications industrielles de cette gamme d'alliages comprennent des connecteurs et des prises de haute qualité pour modules électroniques à ressorts de contact conductifs.

Dans le passé, on utilisait le "déclassement" comme moyen de sélection efficace pour un bronze phosphoreux. En d'autres termes, les propriétés technologiques d'un bronze phosphoreux à teneur d'alliage réduite étaient modifiées dans le but de faire correspondre les caractéristiques d'élasticité et de processus avec celles du bronze phosphoreux original à teneur d'alliage élevé. Toutefois, il a été nécessaire de considérer quelques contraintes.



▲ **Figure 5:** Capacité de pliage de différents bronzes phosphoreux en fonction de la résistance

La teneur en étain et en phosphore influence considérablement le comportement de durcissement et la ductilité des bronzes phosphoreux, et une relation évidente a été observée entre la capacité de pliage et la teneur en étain.

La Figure 5 illustre comme l'augmentation de la teneur en étain influence positivement la capacité de pliage avec un effort constant.

Dans ce contexte, il apparaît logique de développer un bronze phosphoreux avec une teneur en alliage supérieure.

Une autre raison justifiant le développement de ce matériau était la requête de miniaturisation des connecteurs, la réduction de sections transversales réduisant la force de contact à une déflexion constante de l'élément élastique.

Par conséquent, pour une force constante définie, il est nécessaire de reconcevoir l'élément élastique en augmentant simultanément la contrainte admissible.

Une solution pour ce problème est représentée par le nouvel alliage BB95, un bronze phosphoreux à 10%. Par rapport au bronze étamé à 8%, le BB95 présente une limite d'élasticité de $R_{p0,2} > 720$ MPa, une amélioration de la capacité de pliage en $BW_{90^\circ} R/S$ selon le facteur 2.

En fonction de l'application requise, le BB95 peut être durci jusqu'à la limite d'élasticité $R_{p0,2}$ de 800MPa, et la gamme de résistance élevée jusqu'à >950 MPa.

La différence de conductivité électrique entre le BB95 et un bronze étamé à 8% est d'environ 1% IACS (International Annealed Copper Standard), c'est-à-dire que l'étain a

une influence négligeable sur la réduction de conductivité lorsqu'il est présent dans les alliages dans ces pourcentages. Durant la trempe SH (spring hard) le BB95 présente les mêmes caractéristiques de ramollissement qu'un bronze phosphoreux à 8%; une réduction de dureté significative n'est observée qu'à environ 280°C.

En outre, la relaxation du nouveau matériau (<20% à une température de 100°C dans un essai continu de 10.000 heures) est comparable à celui de l'alliage de référence mentionné ci-dessus (à condition que le niveau de tension soit identique).

Étant donné la force de contact citée plus haut, ces résultats indiquent qu'en utilisant le BB95, l'on peut obtenir une réduction d'épaisseur du matériau, et donc une réduction de 20% environ de la quantité de matériau requise.

3 Résumé

Les augmentations soudaines du prix des matières premières, et notamment le prix du cuivre, ont drastiquement modifiée la relation entre la valeur ajoutée et la valeur du métal dans la fabrication des produits de cuivre semi-finis.

Les économies réalisées au moyen du recyclage et en limitant la quantité de matériaux utilisés, ont un impact général supérieur par rapport au coût de processus total.

L'utilisation de matériaux de cuivre à teneur en alliage réduite est un exemple qui permet de décrire l'influence d'une sélection bien programmée d'alliages et de composites.

La combinaison d'un bronze phosphoreux récemment développé à teneur en alliages réduite avec un revêtement de cuivre, représente une alternative valable aux alliages de cuivre-fer étamés également d'un point de vue écologique et économique, permettant de maintenir un profil de propriétés similaires.

Grâce au nouveau développement d'un bronze phosphoreux à 10%, il est possible de générer de la valeur ajoutée pour le client en réduisant la quantité de matériau utilisé. Ce matériau présente un profil de propriétés similaire à celui d'un alliage de cuivre-étain à 8%, mais avec une capacité de pliage supérieure.

En outre, le nouvel alliage facilite l'économie de ressources puisqu'il est en mesure de résister aux tensions plus élevées. Épargner 20% des matériaux semble être ainsi faisable. ■

Cet article a été présenté au cours du 58^e Séminaire International Wire & Cable and Connectivity Symposium qui s'est tenu à Charlotte, NC, du 8 au 11 novembre 2009, et a été reproduit avec l'autorisation des organisateurs.

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Controllo di qualità versatile



▲ Rilevatore versatile KW 13Trio di Zumbach

Per ottenere un controllo di qualità continuo, i rilevatori di nodi e strozzature sono altrettanto importanti dei misuratori di diametro e degli spark-tester. La nuova linea di rilevatori KW 13Trio di Zumbach è progettata per rilevare con rapidità e precisione persino i nodi e le strozzature di più piccole dimensioni nei fili, nei conduttori, nelle fibre ottiche e nei cavi.

La struttura compatta del rilevatore KW 13Trio ne facilita l'integrazione in qualsiasi linea di estrusione o processo di riavvolgimento. Il campo di misura è dimensionato in modo da consentire un passaggio fluido anche a strozzature di dimensioni eccezionali durante l'avviamento. La concezione aperta permette di effettuare la filettatura del prodotto facilmente e rapidamente senza arrestare la produzione.

L'integrazione di un potente microprocessore ed il trattamento e l'elaborazione completamente digitale dei dati rendono questo rilevatore di nodi e strozzature uno strumento importante per il controllo e la qualità. Il rilevatore sarà disponibile come dispositivo autonomo. Utilizzando un'unità operativa e di visualizzazione locale, il rilevatore KW 13Trio può essere interamente configurato e attivato direttamente sul dispositivo.

Caratterizzato da una tolleranza di altezza d'errore rilevabile minima di 0,01mm (0,0004 pollici) e da una lunghezza d'errore minima di 0,2mm (0,008 pollici), ed è provvisto di un dispositivo di elaborazione digitale dei segnali (DSP).

Il rilevatore versatile KW 13Trio presenta molteplici interfacce, comprendenti un'interfaccia seriale RS, Profibus DP e Ethernet EN. La connessione può essere effettuata attraverso una porta di interfaccia RS ad un sistema USYS di acquisizione dati e ad un sistema di elaborazione e visualizzazione. Le versioni con Profibus DP e Ethernet EN consentono la connessione ad un host di livello superiore come un PLC o un sistema di acquisizione dati.

Il principio di misurazione e la complessa soluzione ottica garantiscono l'immunità alla luce parassita e offrono contemporaneamente la più elevata precisione di rilevazione e di identificazione di nodi e strozzature nell'ordine di micrometri.

I modelli KW 13Trio dispongono di una banca dati dei difetti interni per l'archiviazione di almeno 100 difetti rilevati, incluse caratteristiche dei difetti quali: numero, tipo, altezza, posizione e lunghezza del difetto. È possibile accedere a questa banca dati attraverso l'unità operativa e di visualizzazione locale o attraverso interfacce remote opzionali.

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Società specializzata in cavi sottomarini completa l'installazione di un sistema di cavi

Main One Cable Company, società specializzata nell'installazione di cavi sottomarini che offre accesso aperto e capacità di banda larga all'ingrosso in Africa Occidentale, ed il suo fornitore di sistemi, Tyco Electronics Subsea Communications SubCom, hanno completato l'installazione della prima fase del suo sistema di cavi come da programma.

Il direttore esecutivo di Main One Cable Company, Funke Opeke, ha dichiarato che la Fase 1 del sistema Main One Cable comprende 6.800km e fornirà la capacità indispensabile fra la costa occidentale dell'Africa ed il Portogallo.

Il progetto relativo alla tecnologia DWDM a doppia fibra da 1,92 terabit/s prevede prima il collegamento di Lagos, Accra e Seixal con l'Europa, l'Asia e le Americhe, mentre la Fase 2 del progetto prevede di estendere il collegamento al Sud Africa.

Il sistema di cavi, la cui entrata in servizio era prevista per giugno 2010, offrirà l'accesso aperto agli operatori locali di telecomunicazioni e ai fornitori di servizi Internet a tariffe inferiori ai prezzi internazionali attualmente applicati per la banda larga nella regione.

Il sistema fornirà inoltre la capacità a banda larga di estendere l'accesso a Internet nella zona sahariana e alleggerirà le difficoltà di commutazione del traffico fra i paesi africani senza che sia necessario passare per l'Europa.

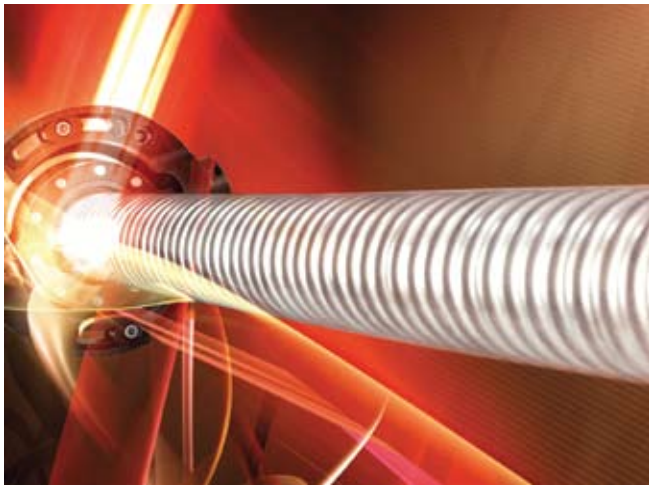
Il presidente di SubCom, David Coughlan ha sottolineato: "dall'inizio della nostra collaborazione nel 2008, la società SubCom è stata desiderosa di completare l'installazione marina della Fase 1.

"Il completamento del programma marino sta trasformando il sistema Main One Cable System Cable in realtà. A nostro avviso il lavoro che abbiamo realizzato su Main One rappresenta un risultato molto importante e siamo fieri di fare parte di questo progetto."

Tyco Electronics Subsea Communications – Stati Uniti
Website: www.subcom.com

Main One Cable Company – Isola di Mauritius
Website: www.mainonecable.com

Tecnologia di formatura e di saldatura di nastri metallici



▲ Equipaggiamenti di saldatura e di ondulazione per cavi elettrici di Rosendahl

Rosendahl ha ampliato la sua gamma di prodotti per offrire equipaggiamenti di saldatura e di corrugazione per applicazioni di cavi di potenza.

In seguito alla richiesta di soluzioni alternative per l'industria, e sulla base dell'esperienza acquisita in progetti con esito positivo nel settore della formatura, della saldatura e della corrugazione per cavi RF high-end, Rosendahl ha deciso di penetrare questo segmento di mercato.

I fabbricanti di cavi richiedono questa tecnologia per prodotti quali cavi per centrali eoliche, centrali nucleari offshore o cavi per le applicazioni sottomarine. Il settore della bassa tensione comprende inoltre una serie di prodotti (cavi per pompe ad olio, marini e di segnalazione), che utilizzano la tecnologia di Rosendahl per migliorare le proprietà dei prodotti o per aumentare la produttività durante il processo di fabbricazione.

Unità di produzione di cavi aeronautici in Marocco

Nexans ha inaugurato a Mohammedia (Marocco) una nuova unità, completamente dedicata alla produzione di cavi aeronautici.

Questa fabbrica è il risultato di un accordo fra Nexans e Airbus per la fornitura di cavi all'avanguardia destinati agli aeromobili A320, A350 e A380.

L'investimento di quasi 10 milioni di euro rafforza l'attività aeronautica di Nexans e l'attività di base della filiale marocchina, già provvista di una notevole competenza nella fabbricazione di cavi per il settore automobilistico, edile e delle infrastrutture.

Si tratta della terza unità di Nexans specializzata in cavi per aeromobili; impianti simili sono stati installati in Francia e negli Stati Uniti.

Nexans ha così riorganizzato l'impianto di Mohammedia per ospitare una superficie di produzione di 3.000m² progettata per la produzione di 21.000km di cavi l'anno, il 70% dei quali è destinato all'esportazione.

Nexans – Francia

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Rispetto ad altre tecnologie, quali l'estrusione di alluminio o di piombo, il sistema di formatura e di saldatura di nastri metallici offre numerosi vantaggi.

Questa tecnologia offre risultati migliori per il servizio continuo, l'utilizzo economico dell'energia elettrica e dell'acqua, la riduzione di scarti durante la produzione, la possibilità di variare le dimensioni e di utilizzare diversi materiali metallici per la schermatura.

Si ritiene che i cavi fabbricati con questa tecnologia presentino proprietà eccellenti di stabilità meccanica e di impermeabilità all'acqua e al gas.

Le tecnologie sviluppate e ottimizzate per queste applicazioni comprendono:

- Formatori ottimizzati per diversi materiali
- Processo di saldatura, per garantire cordoni di saldatura perfetti con zone caratterizzate da una minima influenza termica, e le migliori proprietà meccaniche
- Corrugatori ad alta velocità per la corrugazione elicoidale e anulare del rame, dell'alluminio e dell'acciaio inossidabile

Per la schermatura metallica con materiali lisci o corrugati quali l'alluminio, il rame o l'acciaio inossidabile, Rosendahl offre soluzioni per la formatura, la saldatura e il processo di riduzione dei tubi, inclusi adeguati equipaggiamenti posti a valle della linea.

In base alla struttura del cavo, alla disponibilità di spazio e alla gamma di prodotti, Rosendahl è in grado di offrire soluzioni in linea (combinata con il processo di rivestimento) e fuori linea.

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Rautomead in Iraq

Majeed A Al-Rawi della società El-Tech Energies and Technologies rappresenterà Rautomead in Iraq e in Giordania, offrendo servizi ai clienti attuali di Rautomead del settore della tecnologia della colata continua del proprio paese e identificando potenziali clienti nei settori del filo e del cavo e del trattamento dei metalli.

Al-Rawi promuoverà la gamma completa di prodotti di Rautomead, compresi i macchinari completamente automatizzati per la produzione fino a 30.000 tonnellate l'anno. Per volumi di vergella inferiori, è disponibile una nuova gamma in grado di produrre da 1.000 a 3.600 tonnellate. I modelli speciali in metalli preziosi facilitano la produzione di forme e sezioni di leghe d'oro e d'argento di qualità superiore.

Il direttore delle vendite e del marketing di Rautomead, Guy Henderson, ha dichiarato: "La nomina di Al-Rawi rappresenta un altro esempio dell'impegno della società rispetto ai mercati emergenti, che segue il lancio delle nostre nuove pagine web in russo e in cinese".

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Sostenibilità nello sviluppo e nella produzione di leghe

A cura di Ralf Hojda, Dr Michael Köhler, James Schraml

1 Introduzione

La crescente scarsità di risorse sta influenzando sempre più i risultati economici sia nel settore privato che nel settore industriale. Anche la fornitura di energia e di materie prime ne risentono.

I fabbricanti di prodotti semi-finiti di leghe di rame hanno registrato un aumento dei prezzi in percentuali di tre cifre cosicché, recentemente, il rapporto tra il tasso di valore aggiunto e il valore del metallo, che era in equilibrio fino solo pochi anni fa, è ora di uno a tre.

Sebbene le caratteristiche meccaniche e tecnologiche siano sempre state considerate i criteri principali per selezionare una lega adeguata, attualmente il prezzo del metallo è diventato un fattore più importante. Ciò ha inoltre conseguenze nello sviluppo e nella fabbricazione delle leghe.

I progettatori sono ugualmente preoccupati della riciclabilità delle nuove leghe e dei composti nonché dell'utilizzo di leghe più resistenti per ridurre gli spessori delle pareti e, conseguentemente, della conservazione delle risorse utilizzando meno materiale.

Il presente articolo descrive due esempi di sviluppo di materiali che presentano una buona riciclabilità e consentono di ridurre la quantità di materiali utilizzati.

Nel primo esempio, il materiale descritto è una nuova lega ad alta conduttività che può essere riciclata senza alcuna limitazione, anche quando è rivestita di stagno.

Il secondo esempio riguarda l'utilizzo di bronzo ad elevata resistenza, che può essere facilmente reintrodotta nel ciclo del materiale e che è soprattutto particolarmente indicato per l'uso in numerose applicazioni di miniaturizzazione, facilitando in questo modo la conservazione delle risorse.

2 Esempi

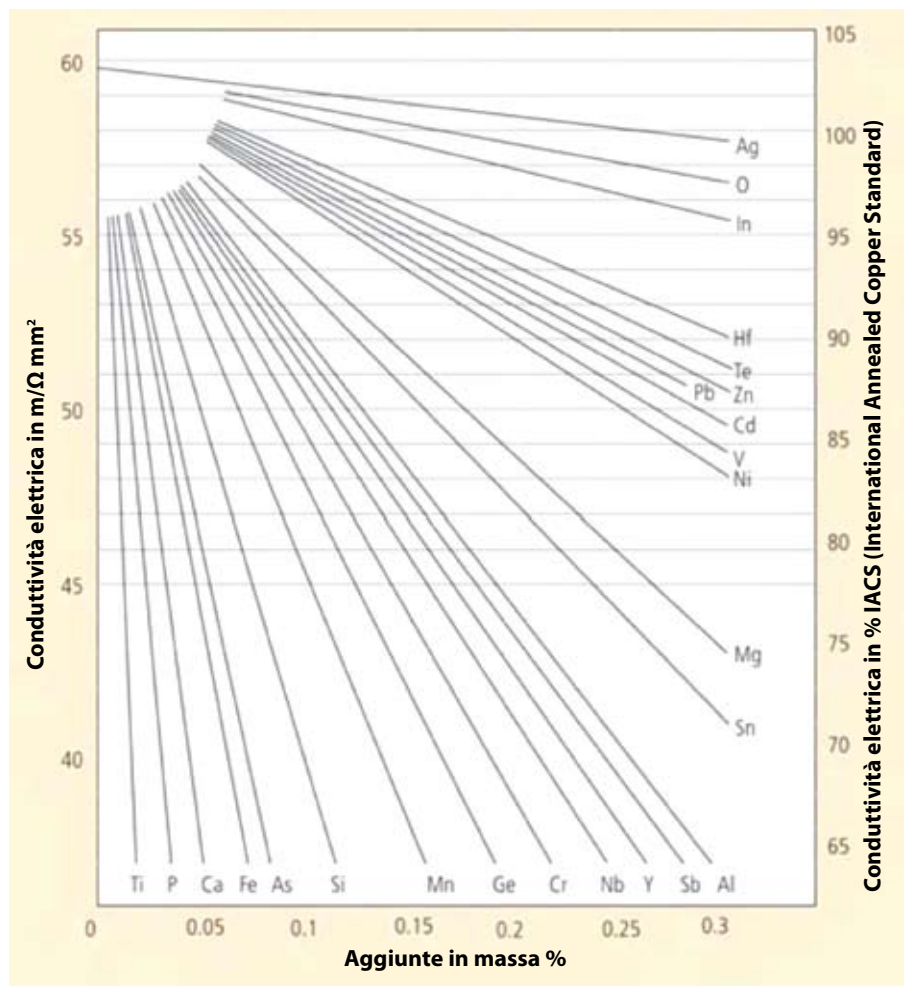
2.1 Sviluppo 1

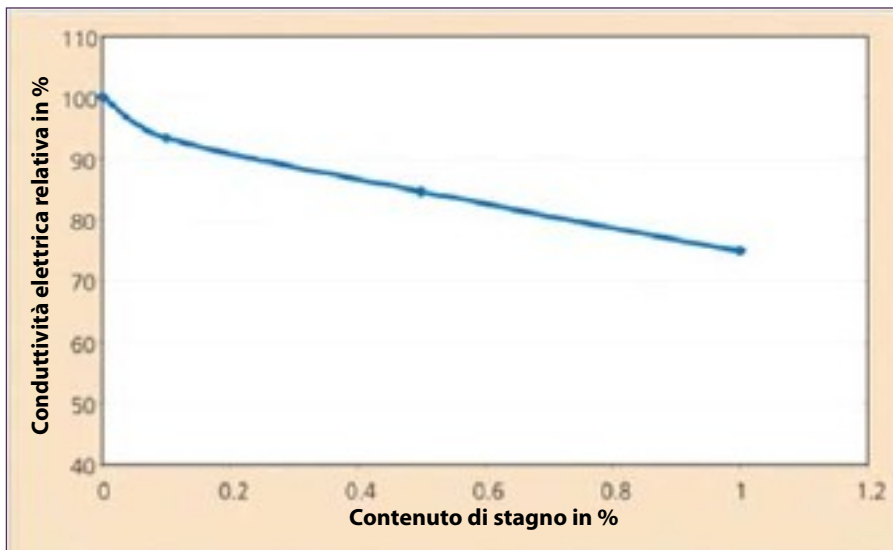
Gli elementi di connessione utilizzati nei settori dell'ingegneria elettrica ed elettronica devono soddisfare numerosi requisiti. La resistenza meccanica, la conduttività elettrica e la resistenza alla corrosione costituiscono dei criteri chiave per un funzionamento affidabile dei componenti durante la vita utile

dell'intero sistema. In numerosi casi, le proprietà richieste sono reciprocamente incompatibili, come quando viene specificata una combinazione di buona conduttività ed eccellente resistenza alla corrosione.

Nonostante componenti di una lega di rame, come il nichel e il cromo, migliorino la resistenza alla corrosione, al tempo stesso ne riducono notevolmente la conduttività (cfr. Figura 1).

▼ **Figura 1:** Influenza degli elementi leganti sulla conduttività elettrica del rame





▲ **Figura 2:** Influenza del contenuto di stagno sulla conducibilità del CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Rame	Bilanciamento	Bilanciamento	Bilanciamento
Stagno	0.12	-	0.2 – 0.8
Zinco	<0.10	0.13	<0.05
Ferro	<0.02	2.4	<0.02
Nichel	<0.02	-	0.1 – 0.6
Fosforo	<0.015	0.03	0.008 – 0.05

▲ **Tabella 1:** Comparazione della composizione chimica di vari bronzi

Gli elementi composti sono una soluzione frequentemente adottata per risolvere questo problema, soprattutto sotto forma di rivestimenti a base di stagno puro applicati alla superficie della lega di rame.

Solo con poche eccezioni, la direttiva RoHS (Restriction of Hazardous Substances), entrata in vigore il 1° luglio 2006, vieta i tipici composti di piombo-stagno che si utilizzavano precedentemente.

Qui di seguito, viene descritta in dettaglio l'integrazione del rivestimento funzionale di stagno puro nel ciclo di materiale.

La selezione del materiale per connettori si basa principalmente su criteri fisici come la conducibilità elettrica, il modulo di elasticità, il rilassamento termico e le caratteristiche di processo quali la duttilità e la capacità di piegamento, ed il comportamento durante la saldatura.

I problemi relativi alla protezione parziale o totale della superficie sono di importanza secondaria come pure la disponibilità di base dei materiali ed i costi dei materiali.

Un esame degli scarti di produzione e di punzonatura rivela che, in molti casi, questi fattori non ricevono l'attenzione che meriterebbero né da un punto di vista ecologico né economico, come illustrato dal seguente esempio.

Durante la produzione di ampi leadframe composti da CuFe2P (C19400) stagnati per immersione a caldo per sistemi ABS ed ESP, si produce approssimativamente dal

50% al 70% di rottame. Questo non può essere riciclato direttamente (reintrodotto nel processo di fusione), ma deve essere sottoposto a lunghi processi di fusione e separazione elettrochimica.

Quindi viene reintrodotta nel ciclo del materiale e di produzione sotto forma di catodo. Questo procedimento è caratterizzato da una forte intensità di energia ed è pertanto costoso per quanto riguarda la fusione diretta.

Normalmente, un nastro dello spessore di 0,4mm è provvisto di un rivestimento di stagno di 3µm su entrambi i lati. Quando il rottame viene riciclato direttamente, la lega di CuFe2P risultante contiene circa l'1,5% di impurità di stagno.

Ciò influenza notevolmente il comportamento durante l'incrudimento e la conducibilità elettrica della lega, che si riduce drasticamente quando il contenuto di stagno supera lo 0,3% (cfr. Figura 2).

Pertanto è necessaria una nuova lega con proprietà comparabili a quelle del CuFe2P, ma che possa essere riciclata senza difficoltà anche quando è rivestita di stagno. Le leghe di rame puro e di stagno come il CuSn 0,15 offrono la possibilità di essere utilizzate come alternative.

Quando è rivestito con stagno, il rottame può essere reintrodotta direttamente nel ciclo del materiale riciclabile (cfr. Tabella 1).

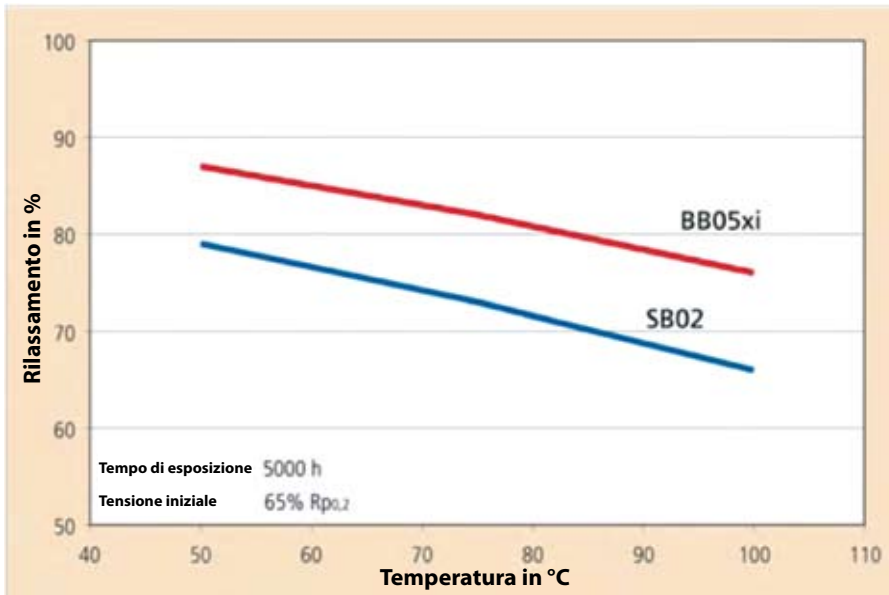
Inoltre, le proprietà meccaniche e tecnologiche corrispondono relativamente

▼ **Tabella 2:** Comparazione delle proprietà tecnologiche di vari bronzi

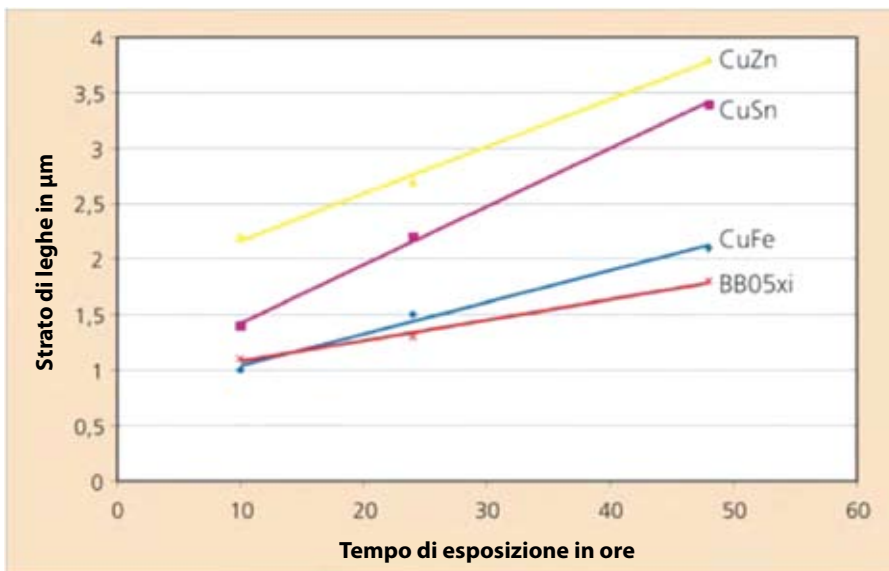
	BB01	SB02	BB05xi
Conducibilità elettrica morbida Soft [% IACS]	>83	63	>62
Conducibilità termica (watt/metri Kelvin)	360	260	250
Coefficiente di dilatazione termica [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Modulo di elasticità [GPa]	128	123	126

▼ **Tabella 3:** Comparazione delle proprietà tecnologiche di vari bronzi

	BB01	SB02	BB05xi
Spessore del nastro 0,3mm			
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Temperatura di rammollimento [°C (1 h)]	300	350	350
Capacità di piegamento [180° GW R/S]	1	0	0.5
Capacità di piegamento [180° BW R/S]	1	1	0.5



▲ **Figura 3:** Comparazione del comportamento di rilassamento tra CuFe2P e BB05xi



▲ **Figura 4:** Formazione dello strato di leghe a 180°C dopo stagnatura per immersione a caldo

bene a quelle del CuFe2P. Tuttavia esistono evidenti punti deboli in termini di comportamento durante il rammollimento e di resistenza al rilassamento (cfr. Tabelle 2 e 3).

Un'analisi della lega BB05xi sviluppata recentemente rivela una situazione diversa. Mediante l'armonizzazione mirata degli elementi leganti (stagno, nickel e fosforo) questo materiale raggiunge proprietà meccaniche e tecnologiche comparabili sia con quelle del CuFe2P sia con quelle del profilo delle proprietà richieste per la rispettiva lavorazione successiva e per l'applicazione finale per quanto riguarda il comportamento durante il rammollimento ed il rilassamento (scorrimento del componente sotto tensione a temperatura elevata) (cfr. Figura 3).

Durante la lavorazione successiva ad alte temperature, lo spessore dello strato legante che si viene a formare tra il materiale di base e il rivestimento di stagno del BB05xi stagnato è comparabile con quello del CuFe2P. Pertanto non è necessario un adattamento delle linee di produzione per introdurre questo nuovo materiale composto (Figura 4).

Inoltre, questa nuova lega si distingue soprattutto perché il rottame stagnato prodotto durante le varie fasi della catena di creazione del valore aggiunto è direttamente riciclabile.

Una comparazione dei valori dei metalli BB05xi e CuFe2P non giustifica inoltre la differenza di costi fra il riciclo indiretto e diretto del rottame di produzione e di

punzonatura, che in questo settore si attestano normalmente dal 20% al 25% del valore del metallo – un fattore di notevole importanza in tempi in cui i prezzi delle materie prime sono elevati e in aumento.

Ad esempio, con una percentuale di rottame del 70%, i costi di fusione possono rapidamente allinearsi ai costi di produzione, sollevando dubbi circa la fattibilità economica dell'intero processo.

L'utilizzo di un bronzo fosforoso rivestito di stagno costituisce pertanto una valida alternativa alle leghe di rame-ferro stagnate sia dal punto di vista ecologico che economico (si elimina l'utilizzo aggiuntivo di elettricità e acido per il trattamento elettrolitico del rottame).

2.2 Sviluppo 2

Le leghe di rame-stagno si utilizzano per connettori e componenti in applicazioni di ingegneria elettronica ed elettrica in quanto presentano caratteristiche di elasticità che vanno da buone a molto buone, una buona resistenza alle tensioni termiche ed elettriche, un ridotto rilassamento della tensione ed un'eccellente capacità di piegamento e di saldabilità.

Normalmente, alle leghe di questo tipo viene aggiunta una piccola quantità di fosforo per la disossidazione, motivo per il quale sono anche definiti bronzi fosforosi.

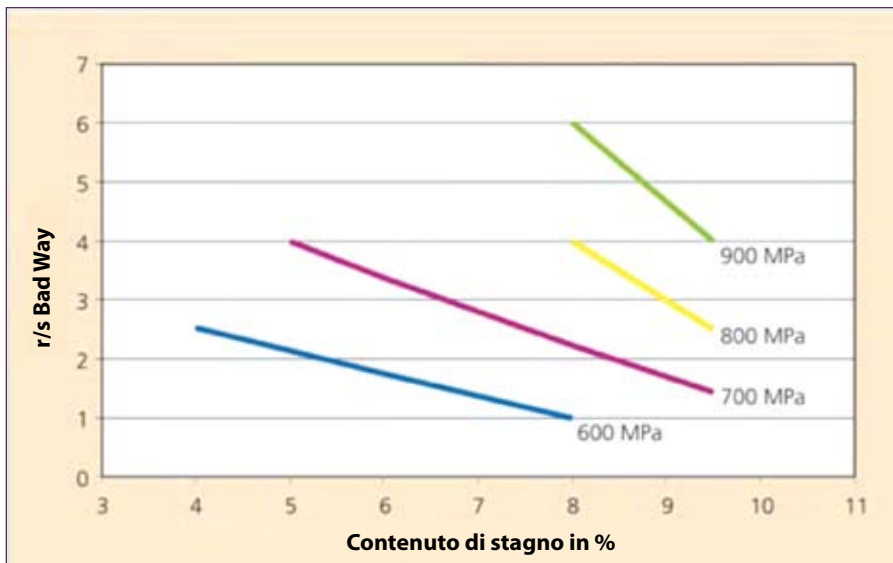
Le proprietà di questo gruppo di leghe dipendono principalmente dal contenuto di stagno e fosforo, e in grado minore, dall'aggiunta di altri elementi leganti.

Mediante un processo adeguato, le proprietà di queste leghe possono essere modificate per l'utilizzo in un'ampia gamma di applicazioni. Le numerose applicazioni industriali di questa gamma di leghe comprendono connettori e prese di alta qualità per moduli elettronici e molle di contatto elettricamente conduttive.

In passato si utilizzava il "declassamento" come efficace metodo di selezione per un bronzo fosforoso.

In altre parole, si modificavano le proprietà tecnologiche di un bronzo fosforoso a basso contenuto di leghe in modo tale che le caratteristiche di elasticità e di lavorazione corrispondessero a quelle del bronzo fosforoso originale ad elevato contenuto di leghe. Tuttavia, dovevano essere considerate alcune restrizioni.

Il contenuto di stagno e fosforo influenza notevolmente il comportamento di incrudimento e la duttilità dei bronzi fosforosi, ed è stata riscontrata una chiara relazione fra la capacità di piegamento ed il contenuto di stagno.



▲ **Figura 5:** Capacità di piegamento di vari bronzi fosforosi in funzione della resistenza

La Figura 5 illustra come un maggiore contenuto di stagno influenzi positivamente la capacità di piegamento sotto sforzo costante. Alla luce di ciò, appariva logico sviluppare un bronzo fosforoso con un contenuto di leghe più elevato.

Un'altra ragione che giustificava lo sviluppo di questo materiale era la richiesta per la miniaturizzazione dei connettori, poiché la riduzione delle sezioni trasversali riduce la forza di contatto ad una flessione costante dell'elemento elastico.

Pertanto, per una forza costante definita, è necessario riprogettare l'elemento elastico aumentando contemporaneamente la tensione ammissibile.

Una soluzione per questo problema è costituita dalla nuova lega BB95, un bronzo fosforoso al 10%. Rispetto al bronzo stagnato all'8%, il BB95 presenta un limite di snervamento di $R_{p0,2} > 720$ MPa, un miglioramento della capacità di piegamento in BW90° R/S secondo il fattore 2.

In base all'applicazione richiesta, il BB95 può essere indurito fino ad un limite di snervamento $R_{p0,2}$ di 800MPa, e il tipo di resistenza elevata fino a >950MPa.

La differenza di conduttività elettrica fra il BB95 e un bronzo stagnato all'8% è approssimativamente dell'1% IACS (International Annealed Copper Standard), cioè lo stagno presenta un'influenza trascurabile sulla riduzione di conduttività quando è presente in leghe a queste percentuali. Durante la tempra SH (spring hard) il BB95 presenta le stesse proprietà di rammollimento di un bronzo fosforoso all'8%; una significativa riduzione di durezza si osserva solo a circa 280°C.

Inoltre, il rilassamento del nuovo materiale (<20% ad una temperatura di 100°C in una prova continua di 10.000 ore) è comparabile a quello della lega di riferimento sopra citata (a condizione che il livello di tensione sia identico).

Considerata la forza di contatto di cui sopra, questi risultati suggeriscono che, utilizzando il BB95, si può ottenere una riduzione di spessore del materiale, e pertanto una riduzione di circa il 20% della quantità di materiale richiesta.

3 Riassunto

I rapidi aumenti di prezzo delle materie prime, e specialmente il prezzo del rame, hanno drasticamente mutato la relazione fra il valore aggiunto e il valore del metallo nella fabbricazione dei prodotti di lega di rame semi-finiti.

I risparmi realizzati mediante il riciclo e limitando la quantità di materiali utilizzati hanno un notevole impatto generale rispetto alla spesa di lavorazione totale.

L'utilizzo di materiali di rame a basso contenuto di leghe è un esempio che consente di descrivere l'influenza di una selezione ben programmata di leghe e composti.

La combinazione di un bronzo fosforoso recentemente sviluppato con bassi contenuti di leghe con un rivestimento di stagno rappresenta una valida alternativa alle leghe di rame-ferro stagnate anche da un punto di vista ecologico ed economico che consente di mantenere un profilo di proprietà similari.

Grazie al nuovo sviluppo di un bronzo fosforoso al 10%, è possibile pensare di generare valore aggiunto per il cliente, riducendo la quantità di materiale utilizzato.

Questo materiale presenta un profilo di proprietà simile ad una lega di rame-stagno all'8%, ma con una capacità di piegamento superiore. Inoltre, la nuova lega facilita il risparmio di risorse poiché in grado di resistere a tensioni più elevate. Risparmiare il 20% dei materiali sembra essere dunque fattibile. ■

Il presente articolo è stato presentato per la prima volta nel corso del 58° Seminario International Wire & Cable and Connectivity Symposium, tenutosi a Charlotte, NC, dall'8 all'11 novembre 2009 ed è stato riprodotto con l'autorizzazione degli organizzatori.

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Control de calidad versátil



▲ Detector KW 13Trio de Zumbach, una herramienta versátil

Para conseguir un control de calidad continuo, los detectores de abultamiento o estrechamiento son tan importantes como los medidores de diámetro o los probadores de chispa. La nueva línea de detectores KW 13Trio de Zumbach son capaces de capturar incluso minúsculos abultamientos y estrechamientos en hilos, conductores, fibra óptica y cables con rapidez y precisión.

El diseño compacto del detector KW 13Trio facilita su integración en cualquier línea de extrusión o proceso de rebobinado. El campo de medida está dimensionado de manera que durante el arranque pasen desapercibidos incluso abultamientos consistentes. Su diseño abierto permite trenzar el producto con facilidad y rapidez sin detener la producción.

La integración de un potente microprocesador y el procesamiento de las señales totalmente digital convierten al detector de abultamiento y estrechamiento en una herramienta importante para el control de calidad. El detector está disponible como dispositivo independiente. Usando una unidad operativa y de visualización local, el detector KW 13Trio puede ser totalmente configurado y activado en el dispositivo.

Tiene una tolerancia de altura de fallo detectable mínima de 0,01mm (0,0004 pulgadas) y de longitud de fallo mínima de 0,2mm (0,008 pulgadas), y dispone de un procesador de señales totalmente digital.

El versátil detector KW 13Trio tiene varias interfaces, que comprenden un enlace RS serie, Profibus DP y Ethernet EN. Puede conectarse, a través de un puerto de interfaz RS, a un sistema USYS de adquisición de datos, procesamiento y visualización. Las versiones con Profibus DP y Ethernet EN permiten conectarlo a un host de nivel más alto, como un PLC o un sistema de adquisición de datos.

El principio de medida y la compleja solución óptica garantizan inmunidad a la luz difusa e intensa, ofreciendo máxima precisión de detección y localización de abultamiento y estrechamiento del orden de micrómetros.

Los modelos KW 13Trio disponen de una base de datos de fallos interna donde se guardan los últimos 100 fallos detectados, que incluyen características de fallo como número de fallo, tipo, altura, posición y longitud de fallo. Es posible acceder a esta base de datos a través de la unidad operativa y de visualización local o de las interfaces remotas opcionales.

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Empresa de cable submarino completa instalación

Main One Cable Company, empresa de instalación de cables submarinos que ofrece acceso abierto, capacidad de banda ancha mayorista en África occidental, y su proveedor de sistemas, Tyco Electronics Subsea Communications SubCom, han finalizado la instalación de la primera fase de su sistema de cable según la programación prevista.

La instalación del equipo terminal ha sido finalizada ya en Seixal (Portugal) y está en fase de realización en los puntos de amarre del sistema ubicados en Lagos (Nigeria) y Accra (Ghana).

El director ejecutivo de Main One Cable Company, Funke Opeke, afirmó que la Fase 1 del sistema Main One Cable abarca 6.800km y proveerá la tan necesaria capacidad entre la costa occidental de África y Portugal.

El proyecto de multiplexación por división de longitud de onda densa (DWDM) de doble par de fibra de 1,92 terabits/s primero conectará Lagos, Accra y Seixal con Europa, Asia y América, y más tarde, cuando se implemente la Fase 2, con Suráfrica.

El sistema de cable, cuya entrada en servicio estaba prevista para junio de 2010, proveerá acceso abierto a las operadoras de la zona y proveedores de Internet a tarifas inferiores a las internacionales de ancho de banda aplicadas actualmente allí.

El sistema también proveerá capacidad de banda ancha para ampliar el acceso a Internet en la zona subsahariana, además de paliar las dificultades de conmutación de tráfico entre los países africanos sin necesidad de pasar por Europa.

El presidente de SubCom, David Coughlan remarcó que "desde el inicio de nuestra alianza en 2008, SubCom esperaba con ansia terminar la instalación marina de la Fase 1. La finalización del programa marino convierte al sistema Main One Cable en casi una realidad." Para nosotros el trabajo que hemos hecho en Main One es un logro importante y estamos orgullosos de formar parte de este proyecto".

Tyco Electronics Subsea Communications (SubCom) – EE.UU.
Website: www.subcom.com

Main One Cable – Isla Mauricio
Website: www.mainonecable.com

Tecnología de conformado y soldado de cintas metálicas



▲ Equipo de soldado y corrugado para cables eléctricos de Rosendahl

Rosendahl ha ampliado su gama de productos con la oferta de equipos de soldado y corrugado para aplicaciones en cables de suministro de energía.

Tras la demanda de soluciones alternativas para la industria, y basándose en la experiencia adquirida en proyectos de éxito en el sector del conformado, soldado y corrugado de cintas metálicas para cables de RF de alta calidad, Rosendahl decidió entrar en este sector de mercado.

Los fabricantes de cables necesitan esta tecnología para productos como cables para parques eólicos, estaciones de suministro eléctrico costa fuera o cables para aplicaciones submarinas. El sector de baja tensión también comprende una serie de productos (cables para sistemas de bombeo de aceite, marinos, señales), que usan la tecnología de Rosendahl para mejorar las propiedades de los productos o para incrementar la productividad durante el proceso de fabricación.

Fábrica de cables para aviones en Marruecos

Nexans ha abierto una planta nueva en Mohammedia (Marruecos), dedicada exclusivamente a la fabricación de cables para aviones.

La planta es fruto de un acuerdo entre Nexans y Airbus. En ella se fabricarán cables avanzados para aeronaves A320, A350 y A380.

Esta inversión de unos 10 millones de Euros consolida la actividad de Nexans en el sector aeronáutico, además de la actividad principal de su subsidiaria marroquí, que ya tiene una sólida experiencia en la fabricación de cables para los sectores del automóvil, construcción e infraestructuras.

Ésta es la tercera planta de Nexans dedicada a los cables para aviones. Las otras dos plantas se encuentran en Francia y Estados Unidos.

Nexans ha desarrollado nuevamente la planta de Mohammedia para dar cabida a un área productiva de 3.000m² diseñada para fabricar 21.000km de cables al año, de los que un 70% irá a exportación.

Nexans – Francia

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Comparada con otras tecnologías, como la extrusión de aluminio o plomo, el sistema de conformado y soldado de cintas metálicas ofrece varias ventajas.

Da mejores resultados en funcionamiento continuo, ahorro de electricidad y agua, menor producción de desechos, cambio de dimensiones y posibilidad de usar distintos materiales metálicos para el blindaje.

Los cables fabricados de este modo suelen tener excelentes propiedades de estabilidad mecánica e impermeabilidad al agua o al gas.

Las tecnologías desarrolladas y optimizadas para estas aplicaciones comprenden:

- Conformadores optimizados para varios materiales
- Procesos de soldado, para garantizar soldaduras perfectas con zonas afectadas por el calor mínimamente y las mejores propiedades mecánicas
- Corrugadores de alta velocidad para corrugado helicoidal y anular de cobre, aluminio y acero inoxidable

Para el blindaje de cables con materiales metálicos como el aluminio, cobre o acero inoxidable liso o corrugado, Rosendahl ofrece soluciones para el conformado y soldado de cintas, y procesos de reducción de tubos que comprenden los equipos montados a continuación.

Dependiendo del diseño del cable, disponibilidad de espacio y gama de productos, Rosendahl puede ofrecer soluciones en línea (en combinación con el proceso de recubrimiento) y fuera de línea.

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Rautomead en Irak

Majeed A Al-Rawi de la sociedad El-Tech Energies and Technologies representará a Rautomead en Irak y Jordania, ofreciendo sus servicios a los clientes actuales de Rautomead del sector de la tecnología de colada continua de esos países y buscando potenciales clientes nuevos en los sectores del hilo y cable y del procesamiento de metales.

El Sr. Al-Rawi promocionará toda la gama de productos de Rautomead, incluidas las máquinas totalmente automatizadas para la producción de hasta 30.000 toneladas anuales. Para volúmenes de alambroñ menores existe una gama nueva capaz de producir de 1.000 a 3.600 toneladas. Los modelos especializados en metales preciosos facilitan la producción de formas y secciones de aleaciones de oro y plata de máxima calidad.

El director de ventas y marketing de Rautomead, Guy Henderson, observó: "El nombramiento del Sr. Al-Rawi representa otro ejemplo del compromiso contraído por la empresa con los mercados emergentes, que sigue al lanzamiento de nuestras páginas web en ruso y chino".

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Sostenibilidad en el desarrollo y producción de aleaciones

Por Ralf Hojda, Michael Köhler, James Schraml

1 Introducción

La creciente escasez de recursos está afectando de forma constante al éxito económico en el sector particular e industrial.

El suministro energético y las materias primas también se están viendo afectados.

Los fabricantes de productos semiacabados de aleaciones de cobre han experimentado aumentos de precios en porcentajes de tres cifras, así que en los últimos años la proporción del valor añadido respecto al valor del metal, que estaba equilibrada hace sólo unos años, ahora es de uno a tres.

Aunque las características mecánicas y tecnológicas hayan sido siempre los factores principales considerados para seleccionar una aleación adecuada, ahora el precio del metal es un factor cada vez más importante. Y esto tiene consecuencias en el desarrollo y fabricación de aleaciones.

A los desarrolladores les preocupa también la reciclabilidad de las nuevas aleaciones y compuestos y están buscando aleaciones más resistentes que permitan reducir los espesores de las paredes con el fin de administrar mejor los recursos usando menos material.

Este artículo describe dos ejemplos de desarrollo de materiales que presentan buena reciclabilidad y permiten reducir la cantidad de materiales usados.

En el primer ejemplo, el material descrito es una nueva aleación de alta conductividad que puede ser reciclada sin ninguna limitación, incluso cuando está revestida de estaño. En el segundo

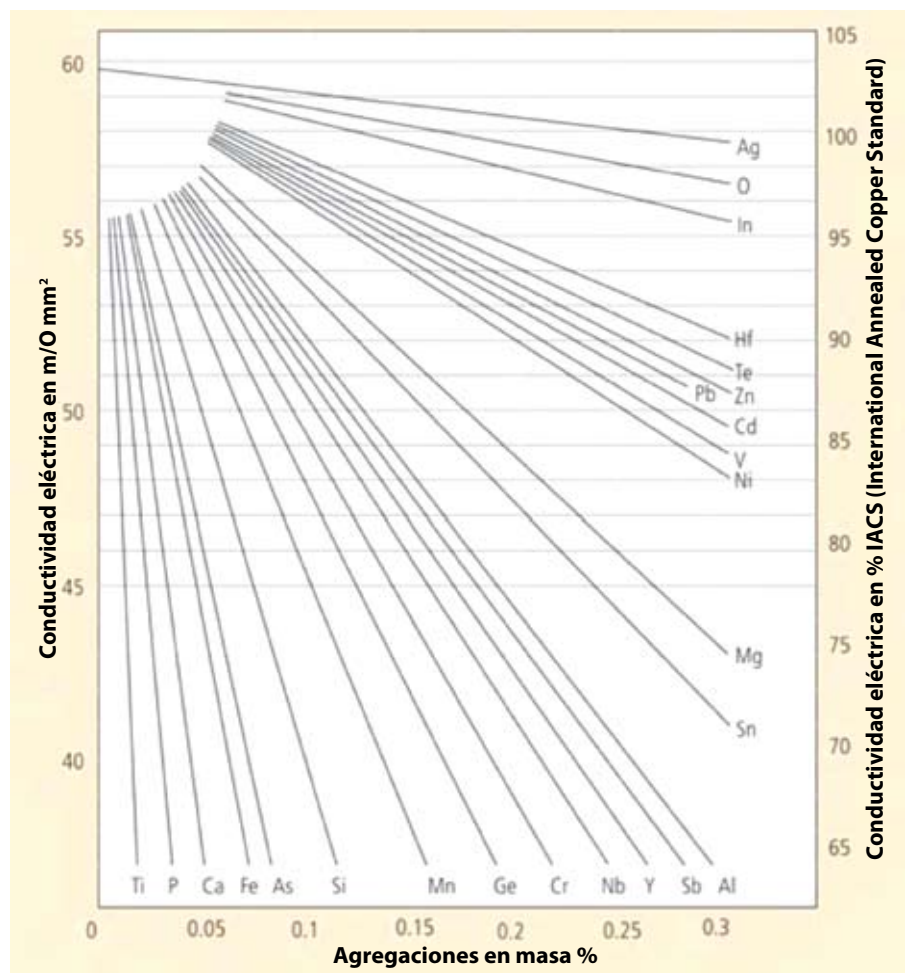
ejemplo, el material considerado es bronce de alta resistencia, que puede ser fácilmente reintroducido en el ciclo del material reciclable, y, sobre todo, está muy indicado para numerosas aplicaciones de miniaturización, facilitando de esta manera la conservación de los recursos.

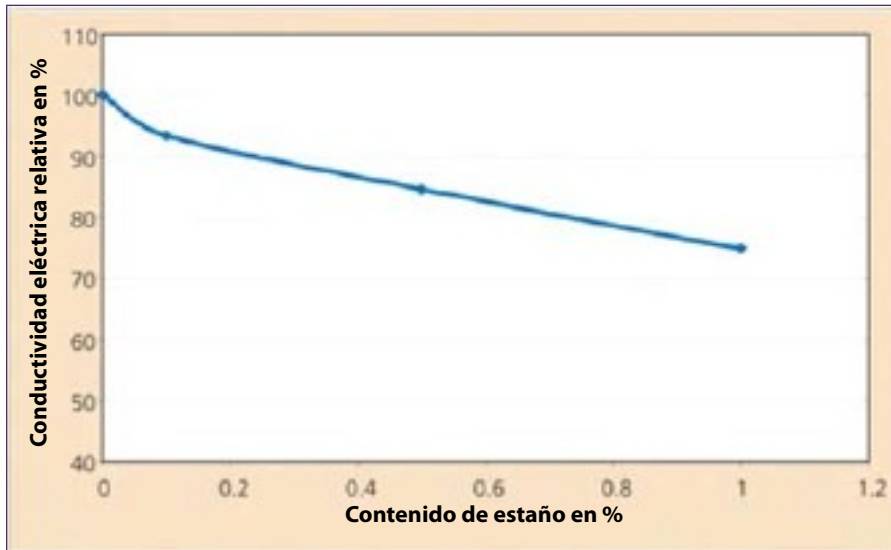
2 Ejemplos

2.1 Desarrollo 1

Los elementos de conexión usados en ingeniería eléctrica y electrónica deben cumplir numerosos requisitos.

▼ **Figura 1:** Influencia de los elementos de aleación en la conductividad eléctrica del cobre





▲ **Figura 2:** Influencia del contenido de estaño en la conductividad del CuFe2P

	BB01 C14410/15	SB02 C19400	BB05xi
Cobre	Equilibrio	Equilibrio	Equilibrio
Estaño	0.12	-	0.2 – 0.8
Cinc	<0.10	0.13	<0.05
Hierro	<0.02	2.4	<0.02
Níquel	<0.02	-	0.1 – 0.6
Fósforo	<0.015	0.03	0.008 – 0.05

▲ **Tabla 1:** Comparación de la composición química de varios bronce

La resistencia mecánica, la conductividad eléctrica y la resistencia a la corrosión son criterios clave para el funcionamiento fiable de los componentes durante la vida útil de todo el sistema. En muchos casos, las propiedades requeridas son incompatibles recíprocamente como, por ejemplo, cuando se especifica una combinación de buena conductividad y excelente resistencia a la corrosión.

Aunque algunos componentes como el níquel y el cromo mejoren la resistencia a la corrosión de una aleación de cobre, sucede que también reducen considerablemente su conductividad (véase la Figura 1).

Los compuestos son una solución adoptada a menudo para resolver este problema, sobre todo aplicados como revestimientos a base de estaño puro sobre la superficie de la aleación de cobre.

Con poquísimas excepciones, la directiva RoHS (Restriction of Hazardous Substances), que entró en vigor el 1 de julio de 2006, prohíbe los compuestos de plomo-estaño que se usaban antes. La integración del revestimiento funcional de estaño puro en el ciclo del material reciclable está descrita detalladamente a continuación.

La selección del material para conectores se basa principalmente en criterios físicos

como la conductividad eléctrica, el módulo de elasticidad, la relajación térmica y las características de procesamiento, es decir su ductilidad y capacidad de doblado, además de su comportamiento durante el

▼ **Tabla 2:** Comparación de las propiedades tecnológicas de varios bronce

	BB01	SB02	BB05xi
Conductividad eléctrica suave [% IACS]	>83	63	>62
Conductividad térmica (Wattios/metro Kelvin)	360	260	250
Coefficiente de dilatación térmica [Rt-100°C]	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶	17.7 x 10 ⁻⁶
Módulo de elasticidad [GPa]	128	123	126

▼ **Tabla 3:** Comparación de las propiedades tecnológicas de varios bronce

	BB01	SB02	BB05xi
Espesor de la tira 0,3mm			
Rm [MPa]	450	450	425
Rp _{0.2} [MPa]	410	420	380
A50 [%]	4	9	6
HV	130	145	125
Temperatura de ablandamiento [°C (1 h)]	300	350	350
Capacidad de doblado [180° GW R/S]	1	0	0.5
Capacidad de doblado [180° BW R/S]	1	1	0.5

soldado. Los problemas relacionados con la protección parcial o total de la superficie son de importancia secundaria, como también la disponibilidad de base de materiales y el coste de éstos.

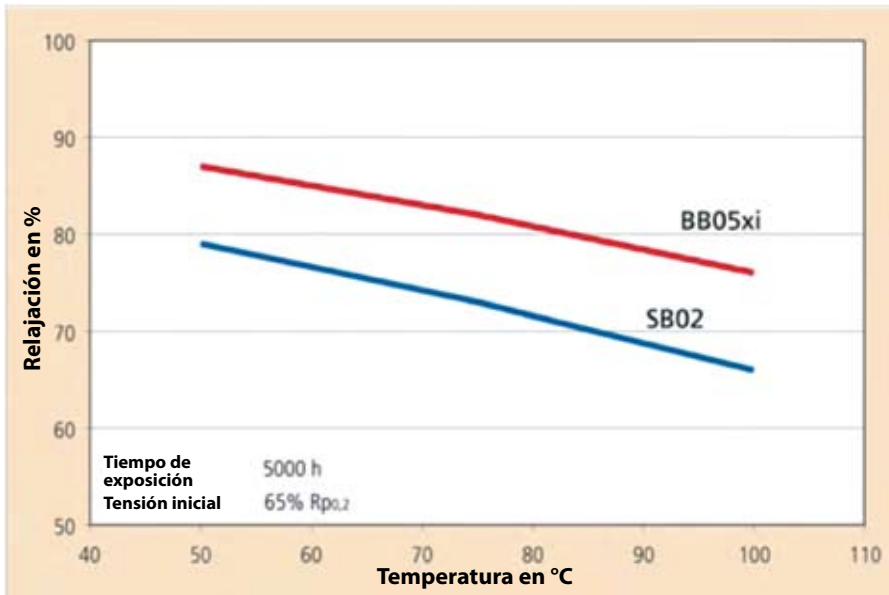
Un análisis de los desechos de producción y troquelado revela que, en muchos casos, no se presta la debida atención a estos factores desde un punto de vista ecológico y económico, como se ilustra en el ejemplo siguiente.

Durante la producción de grandes leadframes compuestos por CuFe2P estañados por inmersión en baño caliente para sistemas ABS y ESP, se produce aproximadamente entre un 50% y un 70% de chatarra, que no puede ser reciclada directamente (reenviada al proceso de fusión), sino que debe ser sometida a largos procesos de fusión y separación electroquímicos.

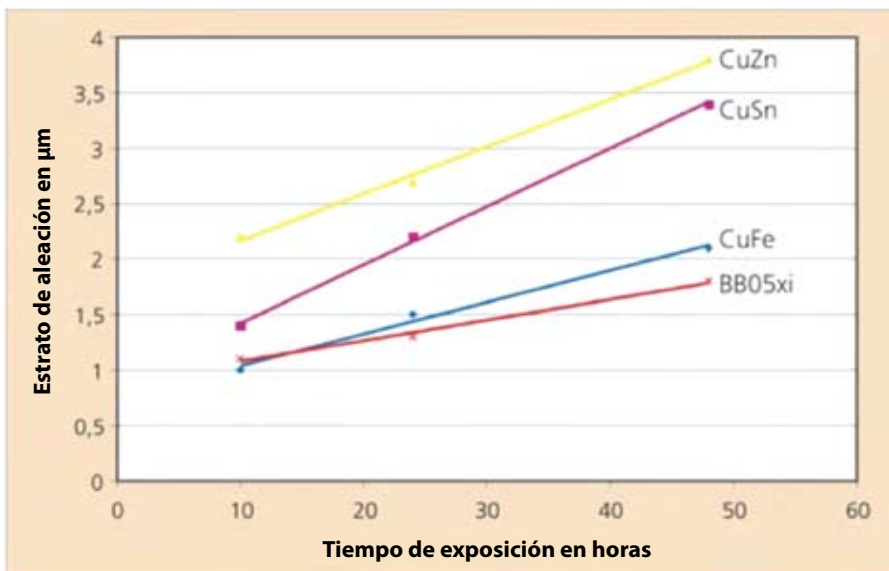
Luego, es realimentada en el ciclo del material reciclable y de producción como cátodo. Este procedimiento consume una gran cantidad de energía y, por lo tanto, resulta costoso por lo que se refiere a la fusión directa.

Normalmente, una tira de 0,4mm de espesor es revestida con una capa de estaño de 3µm por ambos lados. Cuando la chatarra es reciclada directamente, la aleación de CuFe2P resultante contiene aproximadamente un 1,5% de impureza de estaño.

Esto afecta principalmente al comportamiento durante el endurecimiento por



▲ **Figura 3:** Comparación del comportamiento de relajación del CuFe2P y del BB05xi



▲ **Figura 4:** Formación del estrato de aleación a 180°C después del estañado por inmersión en baño caliente

acritud de la aleación y su conductividad eléctrica, que se reduce drásticamente cuando el contenido de estaño excede el 0,3% (véase la Figura 2).

Por lo tanto, se necesita otra aleación con propiedades comparables a las del CuFe2P, pero que pueda ser reciclada sin dificultad, incluso cuando está revestida de estaño.

Las aleaciones de cobre puro y estaño, como el CuSn 0,15, tienen características que permiten usarlas como alternativa. Cuando está revestida de estaño, la chatarra puede ser reintroducida directamente en el ciclo del material reciclable (véase la Tabla 1).

Además, sus propiedades mecánicas y tecnológicas corresponden bastante bien a las del CuFe2P. Sin embargo,

presenta varios puntos débiles por lo que se refiere al comportamiento durante el ablandamiento y la resistencia a la relajación (véase la Tablas 1 y 3).

Un examen de la aleación BB05xi recién desarrollada muestra una situación diferente.

La normalización buscada de los elementos de la aleación (estaño, níquel y fósforo) ofrece propiedades mecánicas y tecnológicas del material comparables ya sea con las del CuFe2P, ya sea con el perfil de las propiedades requeridas para el procesamiento siguiente y para la aplicación final por lo que se refiere al comportamiento de ablandamiento y relajación (fluencia del componente bajo tensión a alta temperatura) (véase la Figura 3).

Durante el procesamiento siguiente a alta temperatura, el espesor del estrato de aleación que se forma entre el material de base y el revestimiento de estaño del BB05xi estañado es comparable al del CuFe2P. Por lo tanto, las líneas de producción no deben ser convertidas para trabajar con este nuevo material compuesto (Figura 4).

Además, esta nueva aleación es significativa porque la chatarra estañada generada en cada fase de la cadena de creación del valor añadido es directamente reciclable. Una comparación de los valores de los metales BB05xi y CuFe2P tampoco justifica la diferencia entre los costes del reciclaje indirecto y directo de la chatarra de producción y del troquelado, que en este sector son normalmente de un 20% a un 25% del valor del metal, un factor de considerable importancia en tiempos en que los precios de las materias primas son altos y están aumentando.

Por ejemplo, con un porcentaje de chatarra de un 70%, los costes de fusión pueden igualarse rápidamente a los costes de producción, poniendo en duda en la viabilidad económica de todo el proceso. El uso de un bronce fosforoso revestido de estaño es, por lo tanto, una alternativa válida a las aleaciones cobre-hierro estañadas, tanto del punto de vista ecológico como económico (se evita el uso de electricidad y ácido para el tratamiento electrolítico de la chatarra).

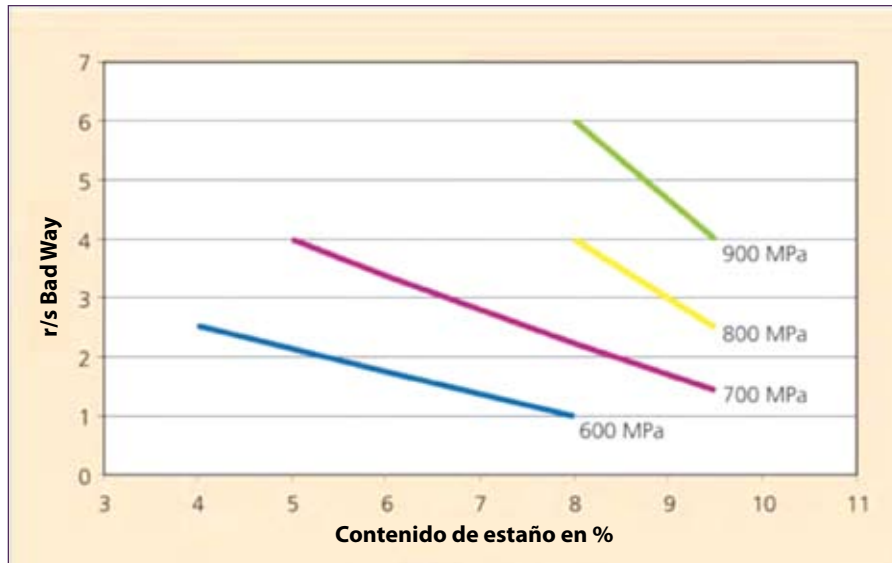
2.2 Desarrollo 2

Las aleaciones de cobre-estaño se usan para los conectores y los componentes en las aplicaciones de ingeniería electrónica y eléctrica porque tienen propiedades de elasticidad muy buenas, buena resistencia a los esfuerzos eléctricos y térmicos, baja relajación de la tensión y una excelente capacidad de doblado y soldabilidad.

Normalmente, se añade una pequeña cantidad de fósforo a este tipo de aleaciones para la desoxidación, y por esto se denominan también bronce fosforosos. Las propiedades de este grupo de aleaciones dependen principalmente de su contenido de estaño y fósforo, y en grado menor, de otros elementos de aleación añadidos.

Por medio de un procesamiento adecuado, las propiedades de estas aleaciones pueden ser ajustadas para usarlas en una amplia gama de aplicaciones. Las numerosas aplicaciones industriales de esta gama de aleaciones comprenden desde conectores y tomas de alta calidad para módulos electrónicos hasta resortes de contacto eléctricamente conductores.

Antes se utilizaba la "degradación" como método eficaz para seleccionar un bronce fosforoso.



▲ **Figura 5:** Capacidad de doblado de varios bronce fosforosos en función de la resistencia

En otras palabras, se ajustaban las propiedades tecnológicas de un bronce fosforoso de baja aleación para igualar sus características de elasticidad y propiedades de procesamiento a las del bronce fosforoso original de alta aleación. Sin embargo, se debían considerar algunas limitaciones.

El contenido de estaño y fósforo influyen considerablemente el comportamiento durante el endurecimiento por acritud y la ductilidad de los bronce fosforosos, y se ha encontrado una clara relación entre la capacidad de doblado alcanzable y el contenido de estaño.

La *Figura 5* muestra cómo se ve influenciada positivamente la capacidad de doblado bajo esfuerzo constante por un mayor contenido de estaño. Por consiguiente, era lógico desarrollar un bronce fosforoso de mayor aleación.

Otra razón del desarrollo de este material era la demanda de miniaturización de los conectores, dado que la reducción de sección transversal reduce la fuerza de contacto bajo una flexión constante del elemento elástico. Por lo tanto, para una fuerza constante determinada es necesario rediseñar el elemento elástico, aumentando también la tensión de proyecto admisible.

Una solución para este problema es la aleación recién desarrollada BB95, un bronce fosforoso (10%). Respecto al bronce estañado (8%), el BB95 presenta un límite elástico $R_{p0,2} > 720$ MPa y una mejor capacidad de doblado en BW90° R/S por un factor de 2. Según la aplicación requerida, el BB95 puede ser endurecido hasta un límite elástico $R_{p0,2}$ de 800 MPa, y el tipo de alta resistencia hasta >950 MPa.

La diferencia de conductividad eléctrica entre el BB95 y un bronce estañado (8%) es aproximadamente un 1% IACS (International Annealed Copper Standard), es decir, que el estaño tiene una influencia despreciable en la reducción de conductividad cuando se encuentra en la aleación en este porcentaje. Durante el temple SH (spring hard temper), el BB95 muestra las mismas propiedades de ablandamiento que un bronce fosforoso (8%); se observa primero una significativa pérdida de dureza a aproximadamente 280°C.

Además, la relajación del nuevo material (<20% a una temperatura de 100°C en una prueba continua de 10.000h) es comparable a la de la aleación de referencia citada arriba (a condición de que el nivel de tensión sea idéntico).

Con la fuerza de contacto citada, estos resultados indican que, usando el BB95, se puede obtener una reducción de espesor del material y, por lo tanto, una reducción de aproximadamente un 20% de la cantidad de material requerida.

3 Resumen

Los rápidos aumentos de precios de las materias primas, y especialmente el precio del cobre, han cambiado drásticamente la relación entre el valor añadido y el valor del metal en la fabricación de productos de cobre aleado semiacabados.

Los ahorros conseguidos reciclando y limitando la cantidad de materiales utilizados tienen un gran impacto, en general, respecto al gasto total final. El uso de materiales de cobre de baja aleación es un ejemplo que permite

describir la influencia de una selección de aleaciones y compuestos bien planificada. La combinación de un bronce fosforoso recién desarrollado de baja aleación con un revestimiento de estaño es una alternativa válida a las aleaciones de cobre-hierro estañadas, incluso desde un punto de vista ecológico y económico, que permite mantener un perfil de propiedades similares.

Gracias al nuevo desarrollo de un bronce fosforoso (10%) es posible generar valor añadido para el cliente, reduciendo la cantidad de material utilizado. Este material tiene un perfil de propiedades similares al de una aleación de cobre-estaño (8%), pero con capacidad de doblado superior.

Además, la nueva aleación facilita el ahorro de recursos porque puede soportar tensiones mayores. Gracias a estos nuevos desarrollos, ahorros de material de un 20% son algo factible. ■

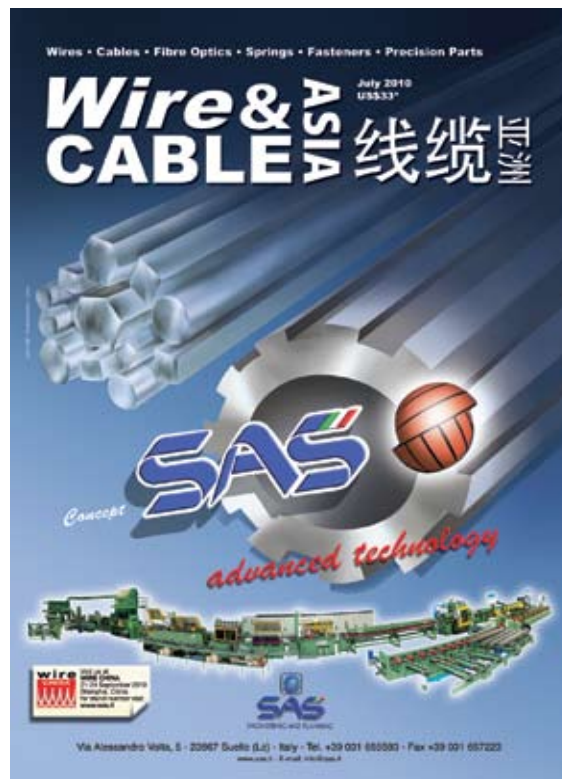
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