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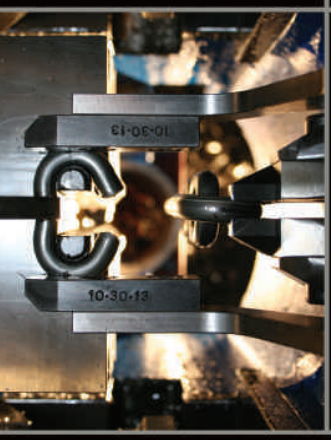

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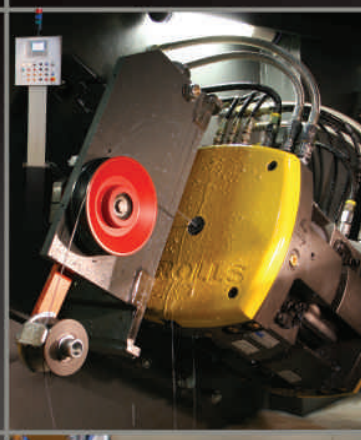

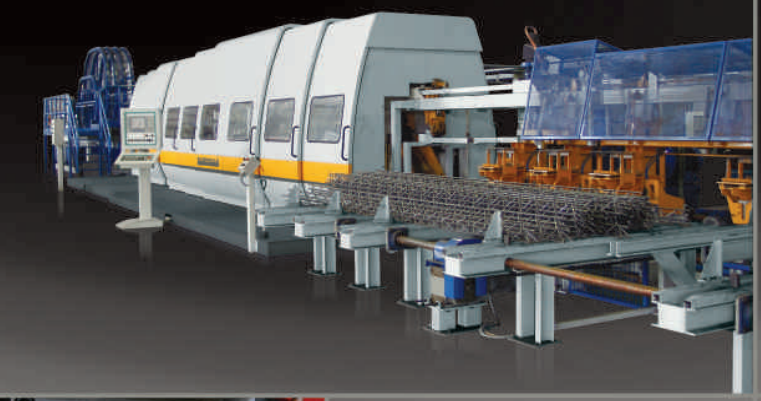

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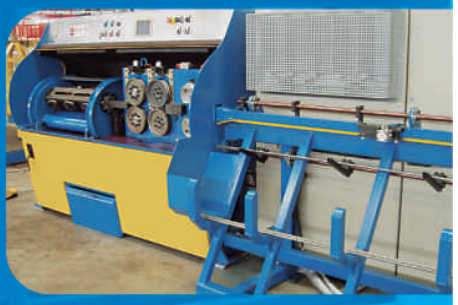

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Going green or flying high?

Saving the environment is – quite rightly – becoming more and more of an issue around the globe. Indeed, for the UK's main political parties the green issue is certain to be part of a hard-fought campaign in the next general election.

The reason I bring this up is two related stories that I've read recently – one of which features in Dorothy Fabian's 'Transatlantic Cable' section of this magazine.

Firstly, 'Europe is set to cut emissions sharply if the US will do likewise', and secondly, 'Open skies treaty'. The latter is the one Dorothy mentions in her column.

The story I read in a national newspaper was about European Union ministers pledging that their countries will raise targets for curbing greenhouse gas emissions if other countries, like America, do the same. The story in 'Transatlantic Cable' is the tale of the EU and the US reaching an agreement on more transatlantic routes, allowing budget airlines to fly to the States.

Is it me or is there something slightly contradictory about the two stories? More flights and lower fares will, inevitably, mean more greenhouse gases.

Leading the (green) way in Europe is Germany, whose commitment to the environment is nothing short of extraordinary. Whilst some of the 27-block EU countries stand ready to cut emissions by 30% below 1990 levels, the leaders of Europe's biggest economy want it extended to 40%.

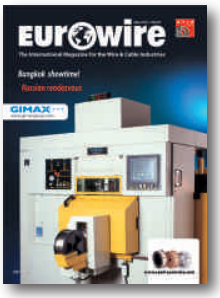
The European initiative is not exclusively 'green' in motivation. If others, notably the US, adopt European-style restrictions of emissions, it will help ensure the global competitiveness of continental businesses at a time when the EU is toughening its regulation of air travel, car manufacturing and construction.

But there is no doubting the sincerity of the European determination to arrest global warming. The environmental federation 'Friends of the Earth International' reported that while Finland, Poland and Hungary resisted the 20% target in the renewable resources proposal, Sweden and Denmark supported the 30% target.

The question is whether or not such examples of European virtue will be enough to coax (or shame) the world's two leading energy gluttons – China and the US – into joining in. On past performance, the prospects would seem rather dim.

David Bell

The International Magazine for the Wire and Cable Industries



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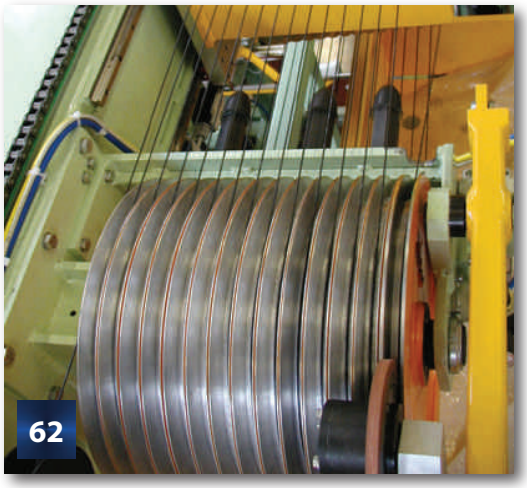

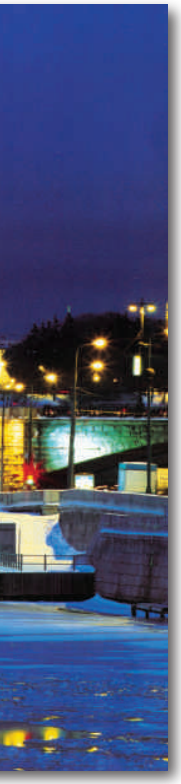

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word on the wire

Write to: The Editor, 'Word on the Wire', EuroWire, 46 Holly Walk, Leamington Spa, Warwickshire. CV32 4HY. UK

Thank you for the warning

Dear Sir

I've just read with interest the article on page 31 of the March edition of EuroWire, regarding the FAIRguide organisation.

I paid this company nearly £2,000 a few years ago. It was particularly upsetting at the time as I was struggling to balance the books at UKP Ltd and this was money I could ill afford!

I can honestly say I didn't receive a single enquiry from the advertisement.

I believed it was 'free' as suggested in the text of the letter and would never have dreamed of spending such a large amount of money, especially on such an obscure organisation.

Of course, when the first invoice arrived I assumed that they had made a mistake and returned it, along with my explanation as to why I wasn't going to pay it.

Eventually, after several weeks of arguing, they threatened to charge interest on the outstanding amount, followed by legal action. I then received a 7-day payment notice, which I reluctantly paid.

You can only begin to imagine my sense of anger and frustration when another invoice arrived the following year! I asked my German counterpart to check the document for me and he explained that it was indeed legal and that as I had signed it, there was nothing I could do to revoke it. He also informed me that it was a contract for three years!

Perhaps it was too late for me but it did teach me to be extra vigilant about signing for any 'free /special offers'.

Well done to you and the IWMA for bringing this company to members' attention.

Simon Lepine, Managing Director, UKP Limited, Horsham, West Sussex, UK

Magazine changes have impressed us

Dear Sir

We have been impressed with the changes made within EuroWire, and are delighted to see that our articles are also being promoted on the wirefirst.com website.

However, the thing we have been most impressed with is the wide distribution which generates very positive results from our advertorials in your magazine's Technology News column.

I can always tell when a new customer requests an enquiry if he is a regular reader of your magazine – and I'm glad to say that most of them are.

We wanted you to know that the response to our advertising in EuroWire has been increasing. We feel strongly that your magazine covers the readers we are trying to reach, and the result has been a very strong response with us receiving many enquiries about our new products.

We also find that the wirefirst.com website is a very creative platform, containing lots of technical articles. Every article, hyperlinked to a separate page, is completed with illustrations and performances to help readers understand more about the company's technology.

Thanks to you and your editorial team. We greatly appreciate your support.

Dominique Petkovic, Decalub,
31 Av de Conde, 77500 Chelles, France

Showtime in Bangkok!

▲ *Bangkok venue for wire Southeast ASIA 2007*

Bangkok – at the heart of one of the most dynamic economies in the region – will stage wire/Tube Southeast ASIA 2007 in October this year.

More than 90% of available exhibition space has already been booked, with many companies who were absent from Singapore in 2005 making a return, reflecting their enthusiasm for the Thai and other regional markets.

The move to Bangkok has also been applauded by the International Wire and Machinery Association (IWMA). Chairman Peter Large said that although the last exhibition in Singapore was an 'unqualified success' the move to Bangkok was ideal for all.

"The new location is truly the gateway to other important developing markets like Vietnam as well as Malaysia and Indonesia and the IWMA will have an excellent opportunity to widen its membership appeal," he said.

Commenting on the relocation of this key industry event to Thailand, IWCEA's President Dr Horst Birkmann said: "South East Asia is still an emerging market and its growth is fuelled by Asia's incumbent super powers of India and China. The South East Asian economies are free from restrictions and we believe that Bangkok is a good place to gain strong access into the region. As it is, both Thailand and Vietnam have tremendous market potentials and will no doubt have great impact in South East Asia."

Exhibitors are also lauding the move to locate the show in Thailand. Commenting on his company's rationale for exhibiting at wire Southeast ASIA, Brad Scherer, vice president, International Operations, at Fort Wayne Wire Die, Inc, said: "The GDP growth rate of the southeast Asian region is among the highest in the world and Thailand has historically been at the forefront of this growth, partly because of their regional leadership role in the automotive industry.

"Additionally, Bangkok is geographically located in the centre of the region and has been rapidly improving its infrastructure to handle such [major] events. Finally, the wire industry is quite well established in Thailand, with many foreign owned companies having established manufacturing plants there to serve the local market, complementing the many Thai-owned wire production enterprises that are also present."

As part of the exhibition, the IWMA are also running a supporting seminar – Non-Ferrous Bangkok, co-organised with the ITA on 17th October.

The format will be a wire session in the morning and a wire and tube session after lunch. Non-Ferrous Bangkok will take place at the exhibition hall, enabling delegates and speakers to attend both the exhibition and the seminar.

For more information on either attending or speaking at the seminar please contact the IWMA (info@iwma.org) or ITA (info@itatube.org).

wire/Tube Southeast ASIA 2007 is being held from 16th-18th October at Bangkok International Trade and Exhibition Centre (BITEC).

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corporate at a glance

Austrian company Eder Engineering has picked up an 'extraordinary' amount of orders already this year. Find out more inside.

What's in a name? Global packaging company Windings, Inc has announced a change of name, to Reelex Packaging Solutions, Inc.

Nexans, France, has been awarded a contract, worth approximately €15 million, to supply medium and low voltage power cables for Vietnam's first crude oil refinery.

€15m power cable contract for Vietnam refinery

Nexans, France, has been awarded a contract, worth approximately €15 million, to supply medium and low voltage power cables for Vietnam's first crude oil refinery.

The Dung Quat refinery project is being commissioned by Technip, a major corporation in the field of oil, gas and petrochemical engineering, construction and services, and the leader in a consortium with Japan Gas Corporation and Tecnicas Reunidas, on behalf of Vietnam Oil & Gas Corporation (Petrovietnam).

The Dung Quat project includes both the refinery and crude oil import facilities. The refinery is designed to have a processing capacity of 145,000 BPSD (barrels per stream day), which will serve Vietnam's domestic market and reduce the country's oil product imports.

Nexans will supply approximately 1,400km of medium and low voltage power cables, which will be installed underground to supply power for the contractors involved in the construction of the refinery, and then for the refinery itself. The cables will be manufactured by Nexans plants in Vietnam, Korea and France, and should be delivered and installed from January to September 2007. Mechanical completion of the refinery should occur in 2008.

▲ *€15m contract for Nexans*

Nexans has had an industrial presence in Vietnam since 2001, and currently employs 435 people in the country, with three industrial plants dedicated to telecom/energy infrastructures, industrial, building wire and LAN markets.

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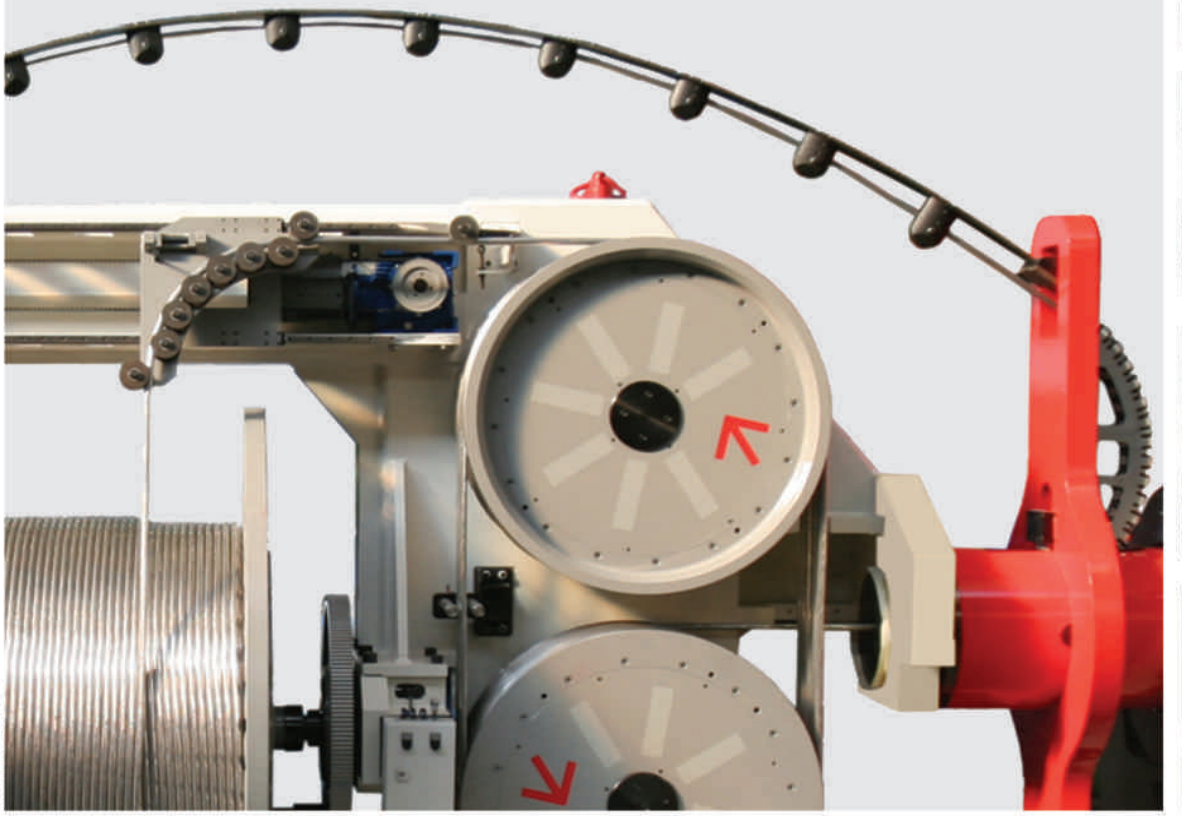

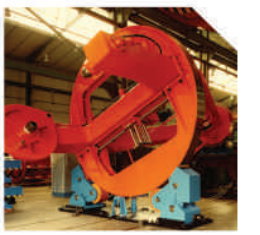

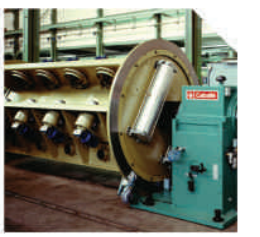

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▲ *InterWire's Michigan unit*

InterWire's got it covered!

A substantial growth in business has led to InterWire Products (IWP) opening up a new 30,000ft² facility in Fort Mill, South Carolina, US.

Along with its existing Georgia site, this now means that IWP covers the entire southeast of the US.

"We initiated this expansion in direct response to our growth and success in the marketplace," said Frank Cardile Jr, president of IWP.

"The new facility, along with the relocation of experienced team members of the company, represents our long-term commitment to our business and customers." The opening follows IWP's recent expansion into Michigan with an 80,000ft² unit.

The addition of these new locations to the existing distribution centres now provides IWP, the largest distributor of fine quality wire, with a total of 430,000ft² of warehousing throughout the United States.

InterWire Products – USA
Email: info@interwiregroup.com
Website: www.interwiregroup.com

European market for Woodgate

Mark Woodgate has recently been promoted to Business Director, Extrusion Systems Europe for Davis-Standard, LLC.

In his new post, Woodgate will oversee the sales and marketing for both the D-S Brookes and Davis-Standard pipe and profile product lines throughout Europe, the Middle East and parts of Asia.

He will also lead the European extrusion sales team, which includes the equipment sales team, aftermarket sales team and technical team.

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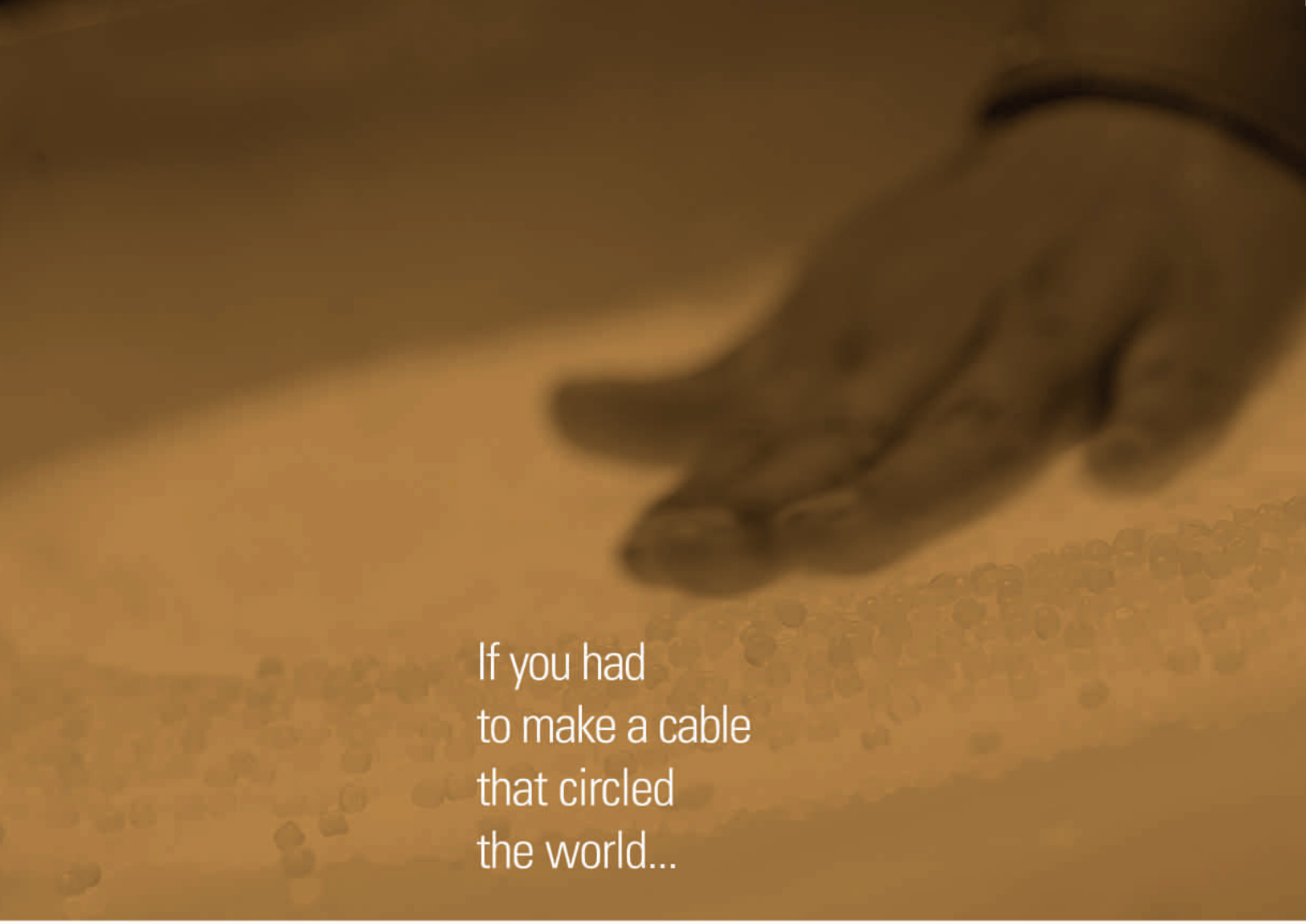
Website: www.davis-standard.com



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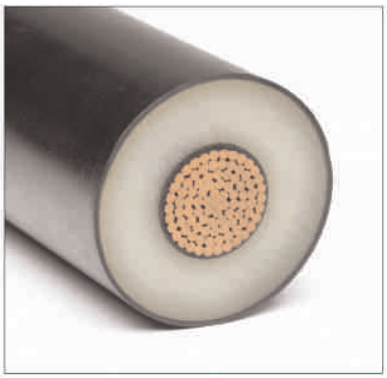

Please visit us at Wire Russia - Stand E02, Hall 1

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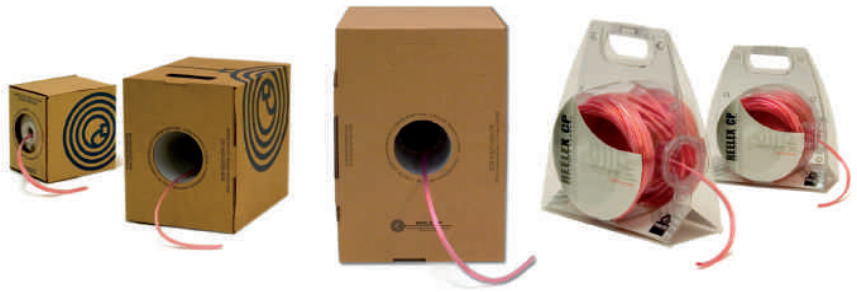
Windings becomes Reelex Packaging Solutions

Global packaging company Windings, Inc has announced a change of name, to Reelex Packaging Solutions, Inc, with effect from March 2007.

"We are excited to announce our new company name," said Mr Tom Copp, president. "The Reelex brand name is already widely known in the wire and cable industry. As we expand our business outside of our traditional customer base, our new name will make it easier for potential customers to identify us, and what we do."

The company will continue to offer as its main business the providing of packaging equipment for the wire industry. All other company details, including its address, website, email addresses and telephone numbers, will remain unchanged.



▲ *The products are the same – just the name that changes*

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Website: www.reelex.com

UK move

Davis-Standard has moved the extrusion systems portion of its European business from Erkrath, Germany, to the D-S Brookes facility in Birmingham, UK. The converting systems business will remain in Erkrath.

The move is part of a reorganisation that will enable Davis-Standard to focus on its core customer base in Europe.

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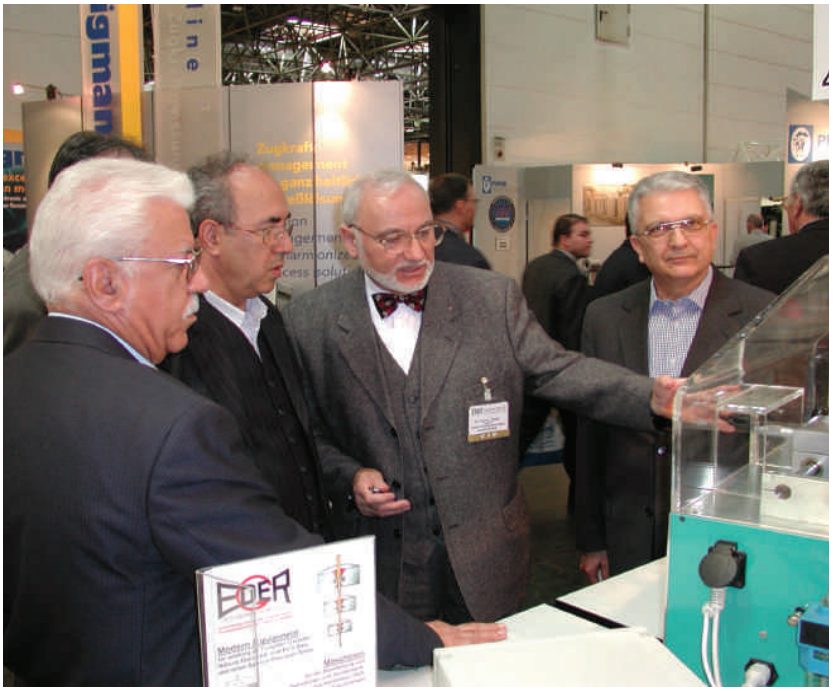
Hard work and quality from Eder



▲ *Dr Eder at an exhibition*

Orders from across Europe and the Far East for Eder Engineering is proof that hard work and quality pays dividends.

The Austrian company has picked up an 'extraordinary' amount of orders, in particular for the die-tool processing machines.

Founded in 1947, Eder Engineering has recently collected an award for outstanding 'EDDS' innovation, an intelligent and patented system for protecting property rights of costly tools, parts and equipment, as well as countering counterfeiting.

Dr Eder, president of Eder Engineering and the Austrian Wire and Cable Association (AWCMA), said: "Never ever before we have entered a new year with such a large stock of firm orders."

Eder Engineering will also be displaying at wire Russia '07 in Moscow from 28th-31st May, and at wire South East Asia '07 in Bangkok from 16th-18th October.

Eder Engineering GmbH – Austria
Email: office@eder-eng.com
Fax: +43 1367 494949
Website: www.eder-eng.com

What's in a name?

Following a period of fast growth, Techint Technologies has taken the strategic decision to change its name to Tenova.

The new name Tenova keeps, through the prefix 'Te', a strong link with the Techint Group and with Technology, and through the word 'nova', a clear commitment to innovation – essential for a company supplying advanced technologies.

Tenova is a network of synergic companies providing innovative integrated solutions for complete process areas.

Order intake has gone beyond the $1bn mark and is expected to increase in the coming years.

Tenova – Italy
Email: info@tenovagroup.com
Fax: +39 0246 93026
Website: www.tenovagroup.com

Second hot-strip rolling mill for China

Metals Technologies (MT), a division of the Siemens Group Industrial Solutions and Services (I&S), received another order from Tangshan Guofeng Co Ltd, China, to equip its second hot-strip rolling mill at the Tangshan location with automation technology.

This includes all basic and process automation as well as the visualisation system.

A new strip-cooling model, which is also part of the scope of supply, enables the efficient production of high-quality steels.

Commissioning of the automation equipment of the new rolling mill is scheduled for January 2008 and the first coil is to be produced at the end of March 2008.

Tangshan Guofeng Co Ltd, located in Hebei province around 200km to the east of Beijing, operates a production complex the capacity of which is to be doubled from a current 4.4 million metric tons of crude steel to 8.8 million metric tons in the next few years.

A new rolling mill will be installed with a rolling capacity of up to three million metric tons of hot strip per year and will be capable of rolling strip with thicknesses up to 1,430mm.

Siemens is supplying the basic and process automation for the reversing roughing stand equipped with a hydraulic edger, a coil box, the seven-stand finishing train with work-roll shifting and bending equipment, the laminar-cooling section and the two coilers, including coil conveyor.

The technological control systems and the process models for the individual mill sections are also included in the scope of supply.

Integrated HMI (human machine interface) systems with easy-to-use process and plant diagnostic functions will facilitate plant operation.

A central feature of the automation solution is the new strip-cooling model of Siemens, which is based on a physical description of the thermodynamic processes during cooling.

The calculation of temperature characteristic curves and phase components along the entire strip is carried out in real time.

The current data is sent to a model-predictive cooling-line control system. As a result, precise monitoring of the entire strip cooling procedure over time is possible.

This not only ensures constant quality for the whole strip, the required metallurgical properties of the steel can also be reliably achieved within tight tolerances. This enables the efficient production of high-quality steel grades.

All of the components and systems to be used are part of the integrated Siroll HM solution for hot-rolling mills.

The automation system is characterised by its high degree of standardisation. This ensures rapid production start-up and high plant availability. Siemens is also responsible for the installation of the supplied systems.

The mechanical equipment and the drives – mainly Siemens components – for the hot-rolling mill will be provided by domestic Chinese companies.

Siemens – Austria
Fax: +43 732 6980 3131
Website: www.siemens.com/metals

Records fall again as it's a boom year for Maillefer

2006 was a record year for Maillefer with sales exceeding €100million – and the trend looks set to continue this year.

A healthy order backlog at the end of last year, and with deliveries booked well into 2008, total sales for this year are expected to be even better.

Much of this sales activity is down to demand for the modernisation or expansion of power grids.

This is leading to investments across the entire energy distribution network.

The company is also seeing considerable growth in projects in Russia, China and the Gulf states.

Maillefer SA – Switzerland
Fax: +41 21 691 2143
Email: info@maillefer.net
Website: www.maillefer.com

CMS partnership deal

CMS and Control & Power Engineering have announced a partnership for the design and supply of fully integrated PC wire and PC strand lines.

The deal combines the expertise of more than 30 complete process lines installed worldwide, together with modern machinery design and manufacturing techniques.

There are a number of technical standards in pre-stressed concrete wire and strand for low relaxation:

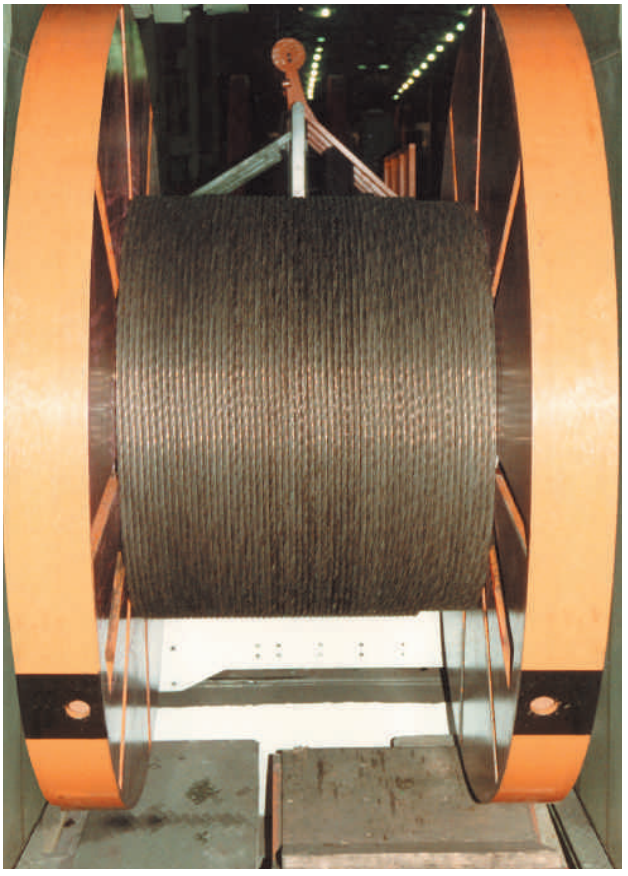
- ASTM A421 (single wire)
- ASTM A416 (seven strand)
- ASTM A886 (indented wire strand)
- PR EN10138 (European wire standard)

There are few suppliers who can reliably combine complete knowledge of the process with fully integrated plant supply. However, the partnership between CMS and C&PE does just that, offering a one-stop shop for complete production line installation.

A wide range of production machinery that meets the required standards is available, including:

PC wire line equipment, powered pay-off, die block or first capstan, induction furnace, cooling trough, stretch capstan, pinch rolls, power shear, pan of coiler type take-ups, PC strand line equipment, skip or tubular strander, input capstan, induction furnace, cooling trough, stretch capstan, spooler and rewind layer winders, pre or post tension strand extrusion lines, including grease application and extruded polyethylene jacketing.

Cable Machinery Spares Ltd – UK **Fax**: +44 1204 669002
Email: sales@cablemachineryspares.co.uk **Website**: www.cablemachineryspares.co.uk



▲ *PC strand coiler*

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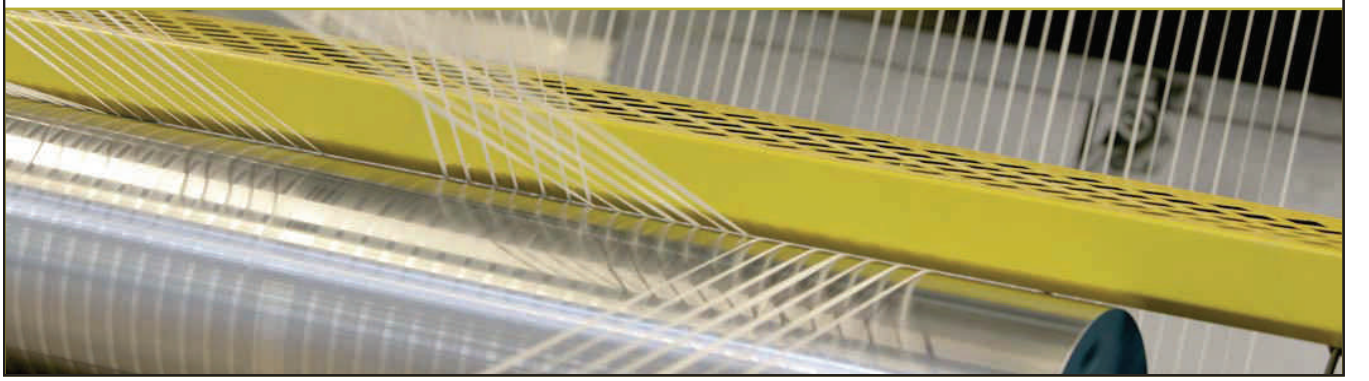

First coil at China plant

Wuhan Iron & Steel in Wuhan, China, has successfully produced the first coil on the continuous annealing line supplied by SMS Demag AG, Germany.

The line at Wuhan is designed for the production of strip in widths of 900 to 2,080mm and in gauges of 0.3 to 2.5mm. An annual production of 990,000 tons is generated with a maximum process speed of 450m/min.

The steel stripes in the grades ULC (IF), HSS, BH, DP, PMK and TRIP with low carbon content are mainly used in the automotive industry for the manufacture of domestic appliances.

The SMS Demag supply scope comprises not only the mechanical and process-engineering equipment but also the Drever vertical furnace with modern annealing and cooling technology. The essential process stages include strip degreasing, recrystallisation annealing with controlled strip cooling, and skin passing to obtain differing degrees of surface roughness and controlled elongation.

The trimming shear cuts the strip to the required final width and the strip surface is oiled electrostatically. The inline six-high skin-pass mill stand is equipped with hydraulic adjustment, work-roll and intermediate-roll bending, and intermediate-roll axial shifting with CVC plus® technology.

High quality grades can be achieved for the products and, in conjunction with the flatness measurement system, WISCO obtains very good results as regards strip flatness and surface quality with these facilities.

The fully automated work-roll and intermediate-roll changing device allows very quick roll changing to be performed without interrupting continuous operation in the process section of the plant.

An inspection loop accumulator makes it possible to bring the exit section to a complete halt to allow visual inspection of the strip surface without needing to stop the mill stand.

The special technology of the trimming shear with its rotating shear housings enables the knives to be changed while the strip is running. The DUMA oiling machine is able to apply two different types of oil.

SMS Demag AG – Germany **Fax**: +49 211 881 4386
Email: info@sms-group.com **Website**: www.sms-group.com

Have your say in EuroWire

Want to get something off your chest, or simply to get your point across? Word on the Wire – EuroWire's new letters page – gives you the ideal platform to do just that! Letters submitted to the Editor should be written in English, and should be concise (around a maximum of 250 words). All letters must include the sender's name and address. If you wish to remain anonymous please state this clearly on your letter. The Editor reserves the right to amend and withhold letters.

Please send your letters to the 'Word on the Wire', EuroWire, 46 Holly Walk, Leamington Spa, Warwickshire. CV32 4HY. UK, or via email to editor@intras.co.uk

We're also giving you a chance to increase the amount of media coverage your company gets – for FREE! In the July edition of EuroWire we are producing three features:

- wire drawing machinery
- testing and measuring technology and equipment
- automated wire production (weaving, knitting and braiding).

If your company is involved in any of these fields, why not take advantage of our FREE editorial offer. Simply send your 250 words, in English, and any pictures to editor@intras.co.uk to be considered for publication. With a worldwide readership of more than 16,000, you can be part of the wire and cable industry's most important source of information.

▲ *Nexans will supply 135km of cable for the wind farm*

Nexans powering up down under

Nexans is to supply flexible low voltage cables for the Suzlon Energy Turbines at Hallett Wind Farm – which will become the biggest wind farm in Australia.

The contract, awarded via Olex and worth around €2.1million, will see Nexans provide 135km of low voltage flexible rubber cables for the project.

Once complete, the wind farm will have the capacity to provide enough 'green' electricity for around 54,000 households.

The award of the contract comes after Nexans completed the purchase of Australian company Olex for €310 million on 9th November 2006.

Nexans – Deutschland Industries GmbH & Co KG – Germany
Fax: +49 511 676 3777 **Email**: info@nexans.com **Website**: www.nexans.com

31 October - 2 November, 2007, Kiev, Ukraine, NC "Expocenter of Ukraine"

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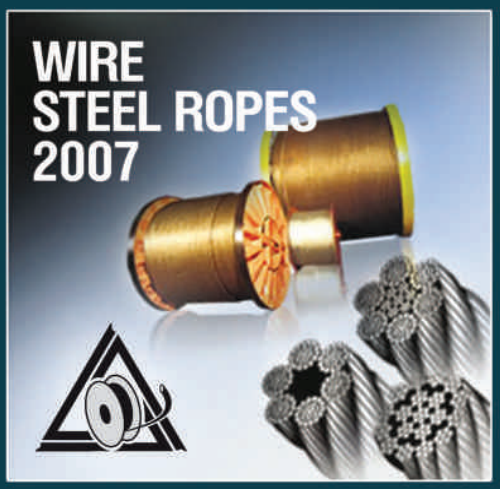

Exhibit at the Cabling Wiring & Wire Steel Ropes 2007 show!

Kiev Technical Trade Show 2007

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Steel output in China set to rise by 17% this year

China will account for almost a third of the total world production of steel in 2007, and consume nearly all of its additional output, according to a special report included in the Global Sectors Outlook (December 2006) from Euler Hermes, the world's largest credit insurance group and part of Allianz.

Chinese output should increase by 10% in 2007 – three times more than its nearest rival, Japan.

Main end-user markets for Chinese steel include construction (55%), capital goods (12%), automobiles (5%) and household appliances (2%).

Even with its increased capacity, China will need to import steel in order to keep up with demand.

Brazil, Russia and India, who together with China make up the BRIC alliance, will also increase steel production in 2007, assisted by modernisation of production apparatus, cheap labour, and access to natural resources including iron ore, essential to the good running of blast furnaces for cast iron, for which they account for 65% of world production.

"The exponential growth in steel prices has not resulted from a traditional imbalance between demand and supply, but rather from the explosion in upstream raw material prices such as those for iron ore and scrap," explained Mr Philippe Brossard, head of research for Euler Hermes SFAC.

"China's voracious appetite for commodities helped to tighten the market: on its own the country will this year account for more than 40% of world iron ore imports, mainly from Brazil and Australia.

"Even so, a lull in steel prices seems likely in 2007, with prices slowing from the second half of 2007 in line with the slowing of the world economy."

Steel sector forecasts are founded upon the microeconomic expertise of Euler Hermes group underwriters and analysts, who closely monitor risk in companies worldwide through its network of 30 local subsidiaries.

Euler Hermes SFAC – France
Fax: +33 140 705 017
Website: www.eulerhermes.com

DSE strengthens its position in India

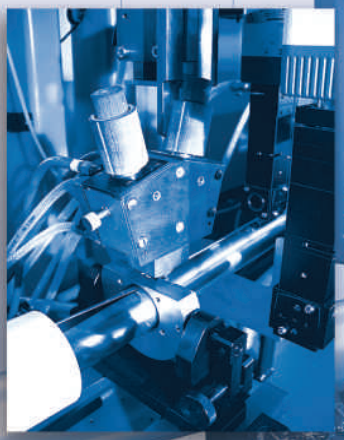
DSE A/S, Denmark, has reported growing demand on the Indian wire market. To strengthen its position on the world market, and to offer extended service to customers in India, the company has entered into an agreement with a new agent in India: Mr Nara from Vertical Technologies.

DSE A/S is a high technology company founded in 1981. The company is organised in two divisions, engaged in airport solutions and test solutions.

The Test Technology Division specialises in high-quality control equipment for the wire and cable industry and advanced test systems for telecommunications, information technology and the electronics industry.

DSE A/S – Denmark
Fax: +45 7561 5895
Email: dse@dse.dk
Website: www.dse.dk

UNIWEMA®: The Universal Welding Machine



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WIRE RUSSIA 2007

Development and production of special machinery for cable and tube production have a long tradition in our company. The starting point was the development of the universal forming and welding machine UNIWEMA® more than five decades ago. Over the decades, a whole family of machines for a great variety of products was created on the basis of this process. Besides the UNIWEMA® process Nexans today supplies production lines and technology for applications in cable and tube manufacture including pipe systems for liquid gases.

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Tel. +49 511 6762321 · Fax +49 511 676233777 · www.nexans.de · uniwema.tech@nexans.com

World Wire and Cable Conference in Paris, France

The inaugural World Wire and Cable Conference, incorporating the KMI Fibreoptics Conference, is being held in Paris, France, between 10th-12th June.

This two-day conference offers an update and insight into the latest movements of the global wire and cable industry on issues ranging from raw materials to end users. EuroWire and Wire and Cable ASIA magazines have been named as the official media partners for the conference.

Day one will cover creating value in the cable business and materials management in a volatile price environment. Day two will consist of three parallel tracks, including the KMI Fibreoptics Conference.

Confirmed speakers already include Dr Valerio Battista, chief executive officer, Prysmian; Greg Kenny, chief executive officer, General Cable; Martin Abbott, chief executive, London Metal Exchange; Pascal Portevin, executive vice-president, strategic operations, Nexans; Dr Xu Xizhou, general manager, Yangtze Optical Fibre & Cable Co Ltd; Dr Jeremy Hodge, chief executive, BASEC; Dion Metzemaekers, chief executive officer, NKT Cables Group; Richard Mack, director of research, KMI Research; Mike Barden, chief executive officer, CRU Strategies; Glynn Stainthorpe, head of wire & cable research, CRU/KMI; Michael Bjorn, marketing manager, wire & cable business unit, Borealis Polymers NV; Dr Jan Vydra, vice president marketing and sales, Heraeus Quarzglas GmbH & Co KG; Phil Edwards, vice president marketing & sales, Heraeus Quarzglas GmbH & Co KG; Dr Bernard Deutsch, director marketing and market development, Corning Cable Systems LLC; Thomas Deitz, director and European small/mid capitalization analyst, ABN Amro.

CRU Events – UK
Email: marilyn.portner@crugroup.com
Fax: +44 207 903 2432
Website: www.cruevents.com

What's On and When

May

7-10: **Interwire 2007** – trade exhibition – Cleveland, Ohio, USA
Organisers: Wire Association Int Inc
Fax: +1 203 453 8384
Website: www.wirenet.org

28-31: **wire Russia** – trade exhibition – Moscow, Russia
Organisers: Messe Düsseldorf GmbH
Fax: +49 211 45 6087 7793
Email: info@messe-duesseldorf.de
Website: www.messe-duesseldorf.de

June

10-12: **World Wire and Cable Conference (incorporating the KMI Fibreoptics Conference)** – conference – Paris, France
Organisers: CRU Events
Fax: +44 207 903 2432
Email: marilyn.portner@crugroup.com
Website: www.cruevents.com

21-24: **8th China (Guangzhou) International Metal and Metallurgy Exhibition** – Guangzhou, PR China
Organisers: Julang Exhibition Co Ltd
Fax: +86 20 3862 0790
Email: meiwen@julang.com.cn
Website: www.julang.com.cn

October

2-4: **Metaltech 2007** – trade exhibition – Sao Paulo, Brazil
Organisers: Grupo Cipa
Fax: +55 11 5585 4359
Website: www.metaltech.tmp.br

16-18: **wire Southeast Asia 2007** – trade exhibition – Bangkok, Thailand
Organisers: Messe Düsseldorf Asia
Fax: +65 6337 4633
Email: mdafairs@singnet.com.sg
Website: www.wire-southeastasia.com

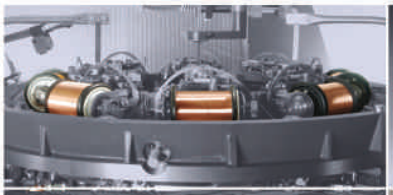
17: **Non-ferrous Bangkok Seminar** – technical seminar – Bangkok, Thailand
Organisers: IWMA, ITA
Fax: +44 1926 314755
Email: info@iwma.org
Website: www.iwma.org

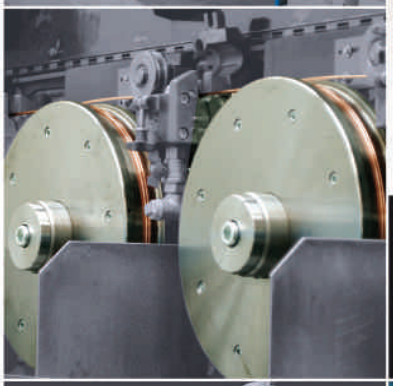
November

5-7: **Wire '07 Bologna** – conference – Bologna, Italy
Organisers: ACIMAF, CET, IWMA & WAI
Email: info@iwma.org
Website: www.iwma.org

11-14: **IWCS** – conference – Florida, USA
Organisers: IWCS
Email: admin@iwcs.org
Website: www.iwcs.org

www.niehoff.de





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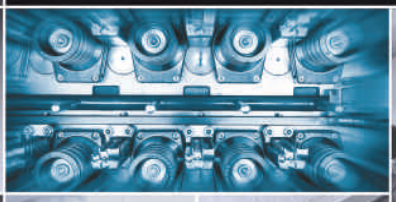

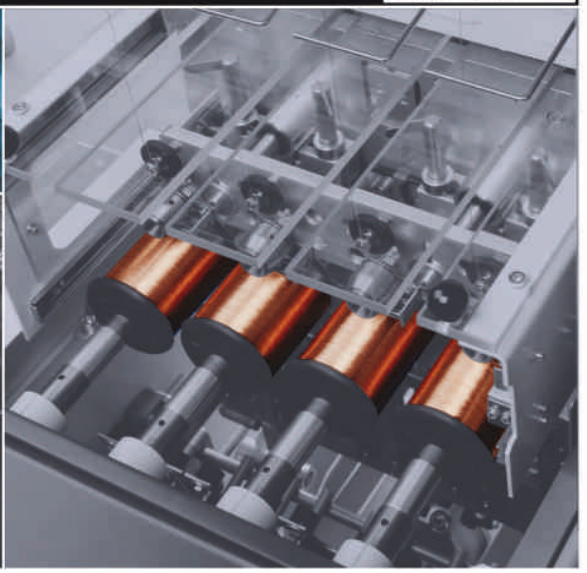

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Candor Sweden AB expands its business in USA

Candor Sweden AB, provider of surface treatment equipment for the wire industry, has announced that it will be represented in the USA, Canada, Central and South America by Bulk Chemicals Inc, USA.

Candor Sweden supplies both single and multi-strand systems for ferrous and non-ferrous materials, and has provided more than 300 plants for different applications of surface treatment of wire to more than 25 countries worldwide.

Applications covered by the company's range include:

- Plating – for electrolytic plating of brass, copper, chromium, nickel, silver, tin and zinc on ferrous and non-ferrous wire

- Cleaning – single and multi-strand cleaning systems with bipolar electrolytic degreasing and ultrasonic cleaning, or a combination of both technologies

- Pickling – single and multi-strand pickling lines using hydrochloric or sulphuric acid in line with hot dip galvanising, phosphating and electroplating

- Phosphating – single and multi-strand phosphating plants

- Candojet HW – patented high speed hot water cleaning system for high wire speeds

- Copperjet – high speed copper coating unit for CO_2 welding wire using the company's own product – the Inhibitor E1

- Bead wire – high speed bronze coating for the automotive industry

Bulk Chemicals has a wide programme of chemicals and lubricants for the wire industry. Its range of products incorporates new polymer and traditional zinc phosphates, zinc phosphate replacements, drawing soaps and pre-coats for carbon and stainless steel wire.

Candor Sweden AB – Sweden
Fax: +46 1112 6312
Email: info@candorsweden.com
Website: www.candorsweden.com

Bulk Chemicals, Inc – USA
Fax: +1 610 926 6125
Email: info@bulkchemicals.us
Website: www.bulkchemicals.us

Leading the way

The Pervouralsky New Pipe Works (PNTZ), of Russia, has placed an order with SMS Demag, Germany, as the leader of an international consortium for the supply of a turnkey electric steelworks with two continuous casting plants.

The new steelworks will produce the starting material for the existing tube rolling mills of the ChTPZ group and will produce 1.1 million tons of steel annually.

The product mix comprises carbon steels, above all for the manufacture of pipes for the oil and natural gas industry.

SMS Demag's supply scope for the new steelworks incorporates a scrap yard, a 120 ton electric arc furnace with modern Arccess® technology, a 120 ton ladle furnace and a VD vacuum tank degasser.

SMS Demag AG – Germany
Fax: +49 211 881 4386
Email: info@sms-group.com
Website: www.sms-group.com

SCOB Worldwide – Die Working for the Innovative Die Shop

SCOB-Weltweit Ziehsteinbearbeitung für die innovative Praxis

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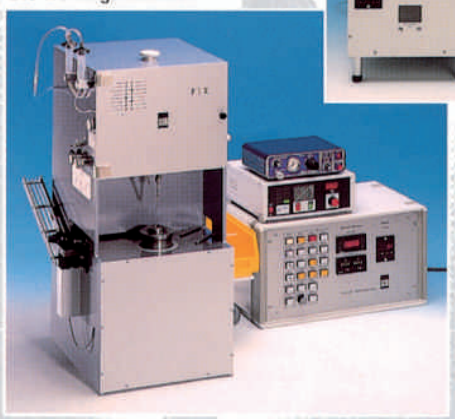
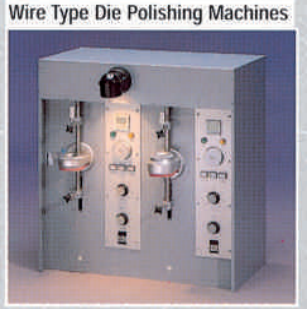


Ultrasonic Die Working Machines

Drawing Dies – Special Tools – Rolls

Quality
Control

Wire Type Die Polishing Machines



Ultrasonic Cleaning Units

SCOB

Paul Schaaf GmbH & Co.
Ziehsteine und die komplette Ziehsteinbearbeitung
D-35754 Mittenaar 1 - Bicken
Telefon (0 27 72) 6 20 16 · Telefax (0 27 72) 6 20 19

Prysmian's Venezuela contract

Prysmian Telecom Cables & Systems has secured a contract to supply more than 2,000km of Optical Ground Wire (OPGW) cable to Venezuela.

The contract was signed at the end of last year between Prysmian Telecomunicacoes Cabos e Sistemas, Brazil, and the leading Chinese company, Zhongxing Telecom Equipment Company Limited (ZTE), who will install the cables on the high voltage (up to 400kV) network of CADAFE, the Venezuelan state electrical utility.

OPGW cable forms an integral part of an overhead electricity network, performing both the primary function of a conventional earth conductor together with the provision of a state-of-the-art communications link – thanks to the optical fibres contained within and the cable supplied in this contract will form the first part of a major national telecoms network providing a full range of broadband and internet services to CADAFE customers.

A total of 2,260km of OPGW is to be supplied in this first phase with the cable containing a combination of 24 and 48 singlemode optical fibres.

Production of cables for the project will be focused on the Prysmian facility at Sorocaba in Brazil. Prysmian also manufactures OPGW at factories in Spain and China.

Since production of OPGW started in 1984 Prysmian has supplied more than 100,000km of cable, all based upon the highly reliable aluminium tube technology, in more than 60 countries.

The optical fibres used within the cables will be produced at Prysmian's facility in Battipaglia, Italy.

First deliveries were due to be made before the end of January and the full quantity will be supplied by mid-2007 with the overall project continuing into next year.

Prysmian Telecom Cables & Systems – Italy
Email: info@prysmian.com
Website: www.prysmian.com

Record year for DSM

Despite announcing record sales and operating profits from 2006, DSM has warned that operating profit in 2007 is likely to be lower.

The Dutch company saw an operating profit of €835m – 6% higher than in 2005. Net profit also rose 4% to €547m.

At €186m, the operating profit from continuing operations for the fourth quarter of 2006 was €6 million, 3% higher than in the same quarter in 2005. Net profit amounted to €89m, down 21% from the fourth quarter of 2005.

Peter Elverding, Chairman of the DSM Managing Board, said: "In 2006 we launched more than 25 new products and applications. We also started several investment projects, especially in performance materials, which will contribute to sales growth in the near future.

"We increased our presence in emerging economies; our sales, investments and workforces in these regions grew strongly, especially in China. We made important additional steps towards operational excellence and fixed costs increased only slightly.

"All this happened in a business context that was not unambiguously positive. Economic growth developed very satisfactorily, but raw-material and energy prices reached unprecedented levels and were highly volatile, while the US dollar remained weak. Nevertheless, we succeeded in posting a record operating profit for the second year in a row. This was mainly due to solid volume growth (5%) and the ongoing efforts to optimise our operations."

Royal DSM NV – Netherlands
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Contract for high voltage subsea power cable in China

Nexans, France, has been awarded a €140 million contract by the EHV Power Transmission Chinese Company of CSG, and Guangdong Nan-Dian Power Equipment Co, to manufacture and install a 500kV submarine power link to connect Hainan Island at the south end of China to the Chinese mainland in Guangdong province.

The 30km submarine cable link, capable of carrying up to 600MW of power, will be laid at a water depth of around 100m.

The power link is scheduled to commence operation in July 2009 and will play a key strategic role in the development of Hainan Island as a tourist resort.

The submarine link will consist of an oil-filled cable with a cross section of 800mm^2, and will be manufactured in Japan by NVC, a factory joint venture owned 66% by Nexans and 34% by Japanese company Viscas.

It will be installed by Nexans' own cable ship, the Skagerrak.

▲ *Nexans will provide the subsea power link to connect Hainan Island to the Chinese mainland*

Mr Patrick Barth, Nexans' HV business group president, commented, "In July 2006 Nexans announced the creation of NVC, a production joint venture with the Japanese company Viscas, dedicated to the manufacture of submarine high voltage power cables and aimed at immediately increasing Nexans' submarine high voltage cable and service potential activity over the next few years.

"Today, this first contract perfectly illustrates the needs of this fast-growing market. Thanks to this alliance, Nexans is able to meet the demands of customers in China."

Nexans – France
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Email: nexans.web@nexans.com
Website: www.nexans.com

Opportunities for all

The 2007 China International Wire and Cable Industry Conference and Exhibition (Wireshow 2007) will highlight the opportunities on offer for the wire and cable companies in China's coal mining industry.

Between between 5th and 7th September, wireshow visitors will hear that a total of 70% of energy output in China depends on coal – making the industry highly profitable and lucrative.

However, along with such huge profits, the coal mining industry also faces huge potential risks.

Throughout many of the country's mines, a lack of equipment, ageing rails and cables need replacing to ensure safe production.

Since June 2006 the State Administration of Work Safety has been ensuring that 8,648 mines have been brought up to standard. Many mines were forced to suspend their operations until they conducted safety improvements to a national standard.

According to the experts from Shanghai Electrical Cable Research Institute 'SECRI', the safety rectification of China's coal mine industry in a big way will undoubtedly create a great market for the wire and cable industry.

Small and medium-sized coal mines must employ wind finding meters, self-self device and gas detectors when conducting cabling in the tunnels and connecting dual blowers, dual loop (dual power system) and independent ventilation and drainage systems, and large-sized coal mines need to replace old rails and cables.

With an eye on the future, the Notice of Cabling in Mining Areas, issued by the State Administration of Work Safety in January 2007, the cabling system selected must ensure the adequate allowance for transmission to ensure network upgrade in the following three to five years.

At present, Category 5e and Category 6 cabling systems should be selected. The coal mines that have over-standard cabling distance between work area and machine room should use optical fibres as a backbone and enable switch cascade by means of internal optical fibre modules.

The enforced rectification of the mining industry by the Chinese government not only ensures work safety, but provides great business opportunities for the wire and cable industry.

Shanghai Electrical Cable Research Institute (SECRI) – China
Email: info@secri.com **Website**: www.secri.com

Range of alloy wires from Telmaksan

Since 1978 Telmaksan has manufactured steel reels and drawing aluminium fine wire.

The company specialises in the drawing of aluminium and aluminium alloy wires for mechanical use and electrical appliances.

Its portfolio includes pure aluminium, as well as alloys such as 1310, 6101 and 5154.

The main emphasis for the fine wire is on alloy 6101 which has been drawn to the finest diameter of 0.12mm.

Telmasksan Ltd – Turkey
Fax: +90 216 593 0524
Email: telmaksan@telmaksan.com
Website: www.telmaksan.com

▲ *Fine wires from Turkey*

Dramatic growth for Stuttgart fair

Following its much-praised launch in 2005, Fastener Fair Stuttgart has grown dramatically.

"With more than 330 confirmed exhibitors and six months to go before the show opens, I can confidently predict this will be the industry's main event in 2007," said exhibition organiser Jerry Ramsdale.

"Not only are there already 132 more exhibitors than there were in 2005, but the show has also grown from one hall to cover three."

Taking place on 19th and 20th September at Messe Stuttgart in Germany, the exhibition has been designed as an 'end-to-end' show, exclusively dedicated to the fastener and fixings industry.

Two years ago, 2,000 senior trade buyers from 51 countries visited the show, and that number is expected to double in 2007.

"We're not in the numbers game when it comes to visitors – we focus on high quality attendees that are the true decision influencers and makers," insisted Ramsdale.

"Because we focus on a niche sector, visitors come knowing exactly what they need. They are not simply there to walk the aisles, but to buy."

Fastener Fair Stuttgart – UK
Fax: +44 1727 831033
Email: jerry@fastfair.net
Website: www.fastenerfair.com

Celsa's new Cardiff site

For Celsa Steel, a member of the Celsa Group, SMS Demag has successfully commissioned a turnkey steelmaking plant with a downstream continuous billet caster from Concast AG, Switzerland. The facilities are installed at the customer's operations in Cardiff, Wales.

Acting as consortium leader, SMS Demag provided the engineering and supplied the equipment for the steel plant. The continuous casting machine came from Concast and is designed for an annual production of 1.2million tons.

The EAF meltshop for carbon steel consists of a 140 ton AC ARCCESS® electric arc furnace with electric bottom tapping, a 140 ton ladle furnace, as well as the associated dust extraction facilities. The six-strand billet caster features the Convex® technology for rapid high-capacity casting of various section sizes.

The scope of supply also included the complete electro-technical outfit.

SMS Demag AG – Germany
Fax: +49 211 881 4386
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ADVERTISER'S ANNOUNCEMENT

Lubricant Viscosity Control Eliminates Pre-coating Chemicals

The new innovative Lubricant Viscosity Control (LVC) system, operating in conjunction with the PDH ultra high-pressure lubrication technology, is used in the most demanding drawing applications, allowing mechanically descaled high-carbon, or low-carbon rod, to be drawn directly, without pre-coating chemicals, at the highest speeds.

The LVC/PDH rod dry coating/lubrication system benefits from the most unique fully controlled 3-way interaction between the pressure, temperature and lubricant viscosity, enabling an automatically controlled fusion of standard lubrication compounds, making them molten/liquefied with a viscosity suitable for the application.

Such a substance eliminates completely traditional pre-coating chemicals and performs an exceptionally adherent and consistent residual coat in the 1st draft, operating in close circuit lubrication, automatically adjustable in weight at all speeds without limitation, completely eliminating traditional wet pre-coatings for all drawing applications, including mechanically descaled 0.90%C bare rod.

▲ *LVC/PDH dry coated spring wire*

The system permits full film 'frictionless' drawing in remaining drafts, benefiting from the innovative LVC/PDH rod dry coating/lubrication technology, completely eliminating the need for phosphate and borax pre-coating chemicals and their substitutes in the most demanding multi-draft applications from rod to wire in a one-step operation.

The new rod dry coating/lubrication system allows a wide range of residual coats, strongly adherent for high-tensile wire, and light water soluble coat for plating wire.

Typical applications of the LVC/PDH dry coating system include direct drawing from mechanically descaled H/C rod, without pre-coating chemicals, from 5.5mm down to 1.3-3.25mm at 18-8.3m/s, and with die life enabling production of 200-220 tons/die in the first draft.

Decalub – France
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Email: info@decalub.com
Website: www.decalub.com

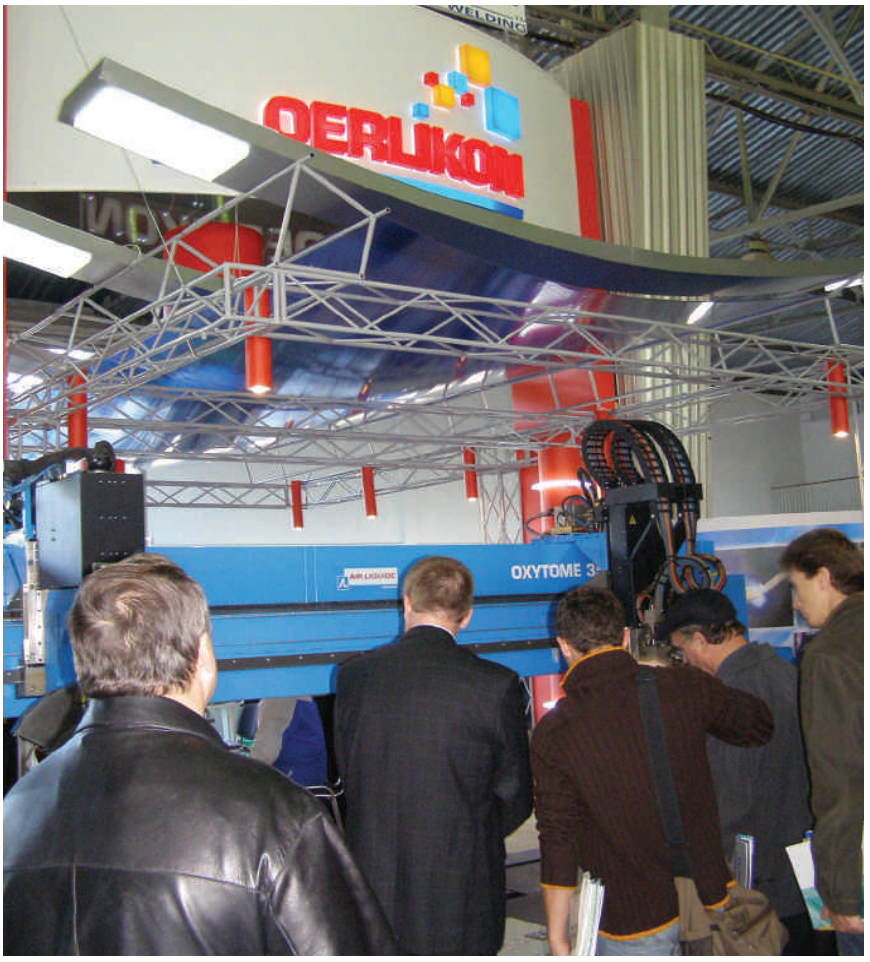
Ideal way to open up the Ukrainian market for your business

Looking to make inroads into the lucrative Ukrainian market place? Then look no further than the Kiev Technical Trade Show 2007, being held between 31st October and 2nd November.

Organised by TDS-Expo, the show will take place at the national complex Expocentre of Ukraine and be attended by wire and cable specialists, scientists and businessmen from the EU, USA, China, Korea, Ukraine and former CIS countries. Intras Ltd, publishers of EuroWire and Wire & Cable ASIA, are responsible for the international exhibit sales.

The show includes the following specialised exhibitions of machinery and technology:

- Welding Ukraine – the 7th specialised technical exhibition with international participation
- Cabling, Wiring – the 7th specialised exhibition of the achievements in the fields of cabling, wiring and accessories
- Wire, Steel Ropes – the 3rd specialised exhibition of the achievements in the field of the wires, ropes and hard components manufacturing
- Sheet metal working – the 2nd specialised exhibition of the achievements in the fields of processing, joining and fastening of sheet metal
- Surface engineering – the 3rd specialised exhibition of the achievements in the field of processing, rebuilding and protection of metal surfaces



▲ *Exhibitors at last year's exhibition in Kiev*

The show provides engineers and technologists with a wide range of innovative technical solutions, and participation in the international and all-Ukrainian conferences will allow exhibitors to meet their target audience, establish new business relationships, present advance technologies and is a superb networking opportunity as last year's show played host to 154 companies from 14 countries. The 2007 show will host a large number of exhibitors from the EU, USA, China, Korea and former CIS countries. The show is staged with the official support of the Ministry of Industrial Policy of Ukraine, Ukrainian Association 'Ukrelectrocabel', Ukrainian Welding Society, Machine Construction Technologists Association of Ukraine, Union of Entrepreneurs of Small, Middle-Sized and Privatised Enterprises, Union of Entrepreneurs and Manufacturers of Ukraine, Intras Ltd, UK, Business Proposals from Czech Republic, International Sheet Metal Review, UK, IWIM, Iran, and the Metal Network Korea Company, Korea.

For more information on exhibiting at Cabling/Wiring 2007, please call Intras on +44 1926 334137, or email intras@intras.co.uk

TDS-Expo – Ukraine
Fax: +380 84526 9376
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Intras Ltd – UK
Fax: +44 1926 314755
Email: intras@intras.co.uk
Website: www.intras.co.uk

EUROwire

Meet us during 2007

Here's your chance to meet staff from EuroWire and Wire & Cable ASIA magazines – and get a free copy of the magazine into the bargain!

Since being named as media partner for the first CRU World Wire & Cable Conference in Paris, France, between 10th and 12th June this year, staff will be manning our tabletop display and handing out free copies of the magazines to both delegates and visitors.

In June, Linda Li, our very own Chinese speaking sales representative, will also be giving away copies of the magazines when she attends the 8th Guangzhou International Wire and Tube exhibition in China from 21st-24th June.

We will also be at Interwire in Cleveland, USA, Metaltech in Brazil, wire South East Asia in Bangkok, Cabling Wiring in Kiev, Ukraine, and IWCS in Florida, USA.

Make sure you don't miss out on the industry's best read magazines – EuroWire and Wire & Cable ASIA – the most important source of information in the wire and cable industry.

Tenova receives order for walking beam furnace in Germany

Italy's Tenova Loi Italimpianti (formerly Techint Technologies) designs and supplies advanced technologies, products and services for the metal and mining industries.

Thyssenkrupp Steel AG, Germany, has awarded the company a contract for the engineering, fabrication, erection and commissioning of one bilateral heated walking beam furnace for its hot strip mill in Bochum.

The furnace is designed for a capacity of 250t/h to heat up slabs with different qualities, and is equipped with FlexyTech® Low-NOx high speed and roof radiant burners.

The new furnace will be connected in series with three existing furnaces, in order to increase the mill load capacity.

This will also fulfil the highest conditions in terms of homogeneity of temperature, scale losses, efficiency and emissions control.

The start-up of the complete equipment will be in February 2008.

Tenova Loi Italimpianti – Italy
Email: marina.landi@it.tenovagroup.com
Website: www.tenovagroup.com

Thyssenkrupp Steel AG – Germany **Fax**: +49 203 52 25102
Website: www.thyssenkrupp-steel.com

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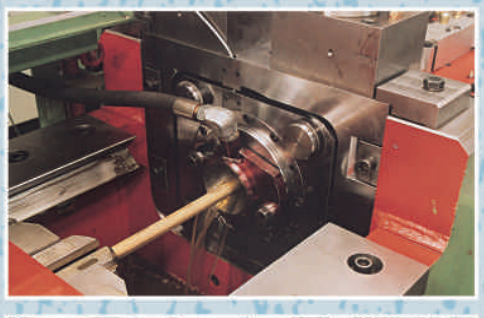
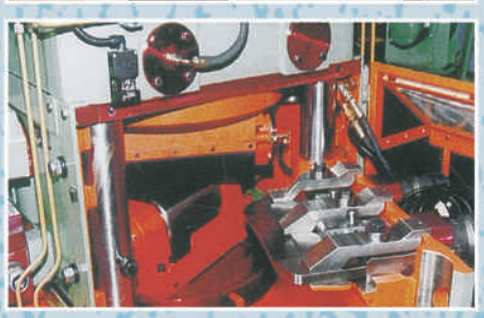


Устройство для контроля силы тяги и электроприводная матрица

Pulling force control and motorized die

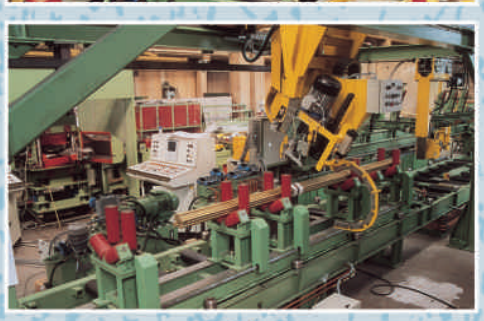


Правильная машина с автоматической регулировкой положения валков и с внесением данных в компьютерную память

Reeling machine with automatic positioning of rolls memorized by PC

Устройство для автоматического контроля правильности с машиной для снятия фаски

Automatic straightness control with chamfering units



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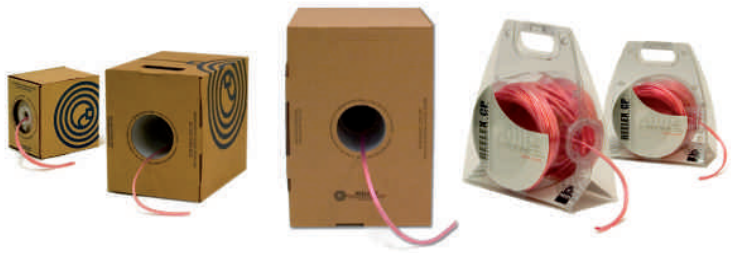
Windings wird Reelex Packaging Solutions

Das weltweit tätige Verpackungsunternehmen Windings, Inc hat bekanntgegeben ab März 2007 seinen Namen zu Reelex Packaging Solutions, Inc, zu ändern.

"Wir sind erfreut unseren neuen Firmennamen bekanntgeben zu dürfen," sagte Tom Copp, Präsident. "Das Markenzeichen Reelex ist in der Draht- und Kabelindustrie bereits sehr bekannt. Angesichts der Tatsache, daß wir unsere Geschäfte über unsere traditionellen Kunden hinaus erweitern, werden potentielle Neukunden uns und unsere Aktivitäten mit diesem neuen Namen leichter identifizieren können."

Das Hauptgeschäft des Unternehmens wird weiterhin die Lieferung von Verpackungseinrichtungen für die Drahtindustrie sein. Alle anderen Details des Unternehmens, einschließlich Adresse, Internetseite, E-Mail-Adresse und Telefonnummern, werden weiterhin bestehen bleiben.



▲ *Die Produkte sind das gleiche - es ist nur der Name, der geändert hat*

Das System von Reelex ist eine patentierte Methode um Draht oder jegliches andere seilförmige Produkt zu wickeln, so daß sich daraus ein spulenloser, selbsttragender Ring ergibt. Der Ring verteilt sich von Innen nach Außen ohne Verdrillungen, Verschlingungen, Gewirr oder Unregelmäßigkeiten. Die Pakete können leicht gehandhabt, aufgestapelt und auf Paletten gelagert werden. Außerdem sind sie leichter als Spulen und Haspeln und 100% umweltfreundlich.

Reelex Packaging Solutions, Inc – USA
Fax: +1 845 878 7884
Email: sales@reelex.com
Website: www.reelex.com

2006: Ein Rekordjahr für Maillefer

2006 war ein Rekordjahr für Maillefer, deren Umsätze die 100 Millionen Euro überschritten haben und dieser Trend wird sich aller Voraussicht auch dieses Jahr fortsetzen.

Mit einer soliden Auftragsreserve am Ende des letzten Jahres und Lieferungen die bis ins Jahr 2008 hineinreichen, erwartet man, daß dieses Jahr der Gesamtverkauf noch besser sein wird.

Viele dieser Verkäufe konzentrieren sich auf die Nachfrage nach Modernisierungen oder Erweiterungen von Stromleitungen.

Dies führt zu Investitionen im ganzen Energieverteilungsnetz.

Das Unternehmen stellt außerdem einen Zuwachs an Projekten in Rußland, China und den Golfstaaten fest.

Maillefer SA – Schweiz
Fax: +41 21 691 2143
Email: info@maillefer.net
Website: www.maillefer.com

Neue Erweiterung für InterWire!

Beträchtliches Wachstum hat InterWire Products (IWP) veranlaßt, ein neues 2787m² großes Werk in Fort Mill, Süd Carolina, USA, zu eröffnen.

▲ *Die Anlage von InterWire in Michigan*

Zusammen mit dem bestehenden Standort in Georgia, bedeutet dies für IWP, daß nun der ganze Südosten der Vereinigten Staaten abgedeckt ist.

"Diese Erweiterung stellt eine Reaktion zu unserem Wachstum und Erfolg im Markt dar," sagte Frank Cardile Jr, Präsident von IWP. "Dieses neue Werk, zusammen mit der Umsiedlung erfahrener Mitarbeiter des Unternehmens, steht für unser langfristiges Engagement im Markt und gegenüber unseren Kunden."

Die Eröffnung folgt der kürzlichen Erweiterung von IWP in Michigan mit einer Größe von 7432m², um Märkte von West-Pennsylvania, Ohio, Indiana und Michigan zu bedienen.

Dank dieser neuen Standorte, die zu den bestehenden Vertriebszentren hinzukommen, umfaßt nun der wichtigste Zwischenhändler von hochqualitativem Draht, IWP, insgesamt 39.948 m² Lagereinrichtungen in ganz Amerika.

InterWire Products – USA
Email: info@interwiregroup.com **Website**: www.interwiregroup.com

Auftrag für Hochspannungs-Unterseestromkabel in China

Nexans, Frankreich, hat einen Auftrag von über 140 Millionen Euro vom chinesischen Unternehmen des EHV Power Transmission von CSG sowie von Guangdong Nan-Dian Power Equipment Co, zur Herstellung und Installation einer 500kV- Untersee-Stromverbindung, um die Insel Hainan am südlichen Ende von China mit dem chinesischen Festland in der Provinz von Guangdong zu verbinden, erhalten.

Die 30km lange Unterseekabelverbindung, die bis zu 600MW Strom übertragen kann, wird in einer Wassertiefe von ungefähr 100m verlegt. Die Inbetriebnahme der Stromverbindung ist für Juli 2009 geplant. Diese Stromverbindung wird eine strategische Schlüsselrolle in der Entwicklung der Insel Hainan als Fremdenverkehrsort spielen.

Die Unterseeverbindung umfaßt ein ölgefülltes Kabel mit einem Querschnitt von 800mm^2, und wird in Japan von NVC herstellt, einem Joint-Venture-Unternehmen, das zu 66% im Besitz von Nexans und zu 34% im Besitz des japanischen Unternehmens Viscas ist. Es wird durch ein eigenes Kabelverlegungsschiff von Nexans, der Skagerrak, installiert.

▲ *Nexans wird eine Untersee-Starkstromverbindung zwischen der Insel Hainan und derm chinesischen Festland errichten*

Patrick Barth, Präsident der Hochspannungs-Sparte bei Nexans, kommentierte: "Im Juli 2006 hat Nexans die Gründung von NVC bekanntgegeben, einem Produktions-Joint-Venture mit dem japanischen Unternehmen Viscas, das sich der Herstellung von Untersee-Hochspannungsstarkstromkabeln widmet und auf eine sofortige Steigerung der Untersee-Hochspannungskabel von Nexans sowie der potentiellen Dienstleistungstätigkeiten in den kommenden Jahren zielt. Heute verdeutlicht dieser erste Auftrag perfekt den Bedarf dieses schnell anwachsenden Markts."

Nexans – Frankreich
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Stahlproduktion wächst 2007 in China um 17% an

China wird 2007 fast ein Drittel des gesamten Weltstahls produzieren und beinahe seine ganze zusätzliche Produktion verbrauchen. Dies geht aus einem Sonderbericht hervor, der Teil des Global Sectors Outlook (Dezember 2006) von Euler Hermes ist, der weltweit wichtigsten Kreditanstaltgruppe und Teil der Allianz.

Die chinesische Produktion soll 2007 um 10% steigen – dreimal mehr als sein größter Konkurrent, Japan. Zu den größten Endverbrauchern von Stahl aus China gehören die Bereiche Bau (55%), Investitionsgüter (12%), Automobil (5%) und Haushaltsgeräte (2%). Selbst mit erhöhter Kapazität wird China Stahl importieren müssen, um mit der Nachfrage Schritt halten zu können.

Brasilien, Rußland und Indien, die zusammen mit China das Bündnis der BRIC-Staaten bilden, werden ebenfalls 2007 die Stahlproduktion erhöhen, dank der Modernisierung von Produktionseinrichtungen, preiswerter Arbeitskräfte und dem Zugang zu Bodenschätzen, einschließlich Eisenerz, die Stahlproduktion, erhöhen. Eisenerz wird im wesentlichen für einen guten Betrieb von Hochöfen für Gußeisen eingesetzt, von dem sie 65% der weltweiten Produktion liefern.

"Der exponentielle Anstieg der Stahlpreise ergab sich nicht aus einem traditionellen Ungleichgewicht zwischen Angebot und Nachfrage, sonder eher aus der explosiven Aufwärtsbewegung der Preise für Rohmaterialien, wie z. B. für Eisenerz und Zunder," erklärte Philippe Brossard, Forschungsleiter bei Euler Hermes SFAC.

"Chinas´ unersättlicher Appetit nach Ware half dabei den Markt zu straffen: dieses Land wird im laufenden Jahr allein über 40% der weltweiten Importe von Eisenerz erwerben, vor allem aus Brasilien und Australien.

"Trotzdem scheint eine Beruhigung der Stahlpreise im Jahre 2007 möglich, mit Preisen, die ab der zweiten Hälfte des Jahres mit der Abschwächung der Weltökonomie zusammen laufen."

Euler Hermes SFAC – Frankreich
Fax: +33 140 705 017
Website: www.eulerhermes.com

Was sagt der Name aus?

Nach einer schnellen Wachstumperiode, hat Techint Technologies die strategische Entscheidung getroffen den Firmennamen zu Tenova zu ändern.

Der neue Name Tenova behält durch die Vorsilbe "Te" einen starke Verbindung zur Techint Group und zur Technologie, und durch das neue Wort "nova", ein deutliches Engagement zur Innovation – was für ein Unternehmen, das fortschrittliche Technologien liefert, äußerst wichtig ist.

Tenova ist ein Netz synergistischer Unternehmen, die innovative integrierte Lösungen für komplette Prozeßbereiche bieten. Der Auftragseingang hat 1 Mrd. USD überschritten und eine weitere Steigerung wird in den kommenden Jahren erwartet.

Tenova – Italien
Fax: +39 0246 93026
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SKET
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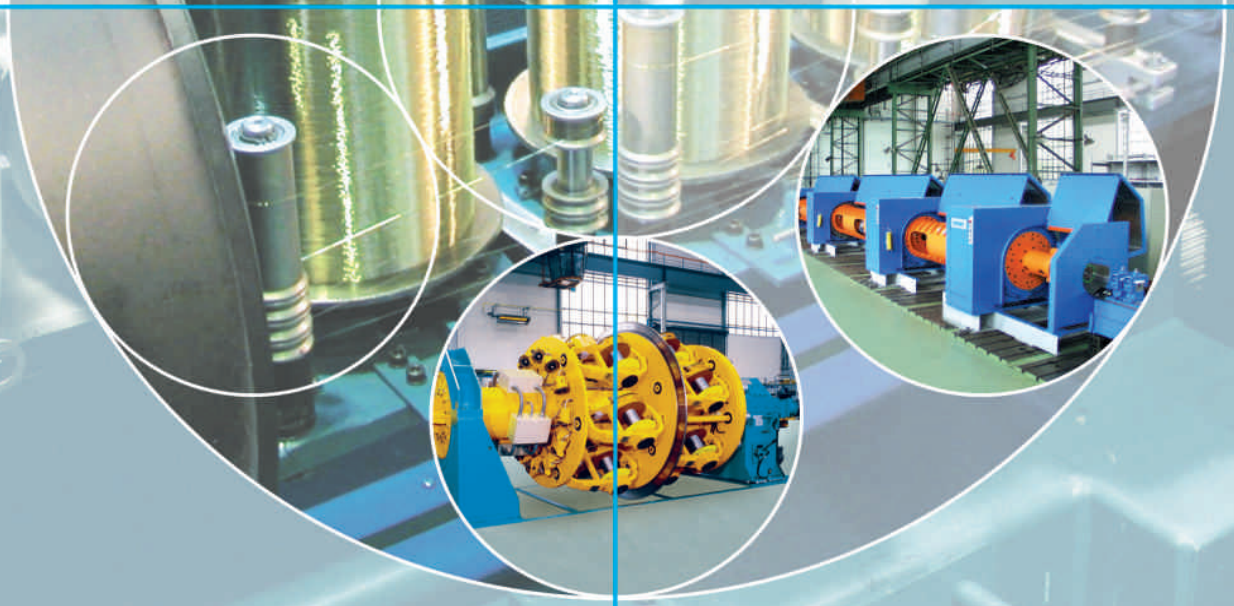
Мы разрабатываем и конструируем, изготавливаем и поставляем машины и оборудование для кабельной и сталеканатной промышленности.
В объем поставок и услуг фирмы входят высокопроизводительные машинные системы и комплексные инновационные решения для изготовления стальных канатов, металлокорда, арматурных стальных проволок и прядей с низкой релаксацией, а также телекоммуникационных (медных и оптических) кабелей, силовых кабелей, подводных кабелей и оптических кабелей, встроенных в грозозащитные тросы (OPGW).

Кроме того, мы предлагаем Вам обширные сервисные услуги, начиная с первой консультации и заканчивая пуском оборудования в эксплуатацию, включая приезд наших специалистов на место установки оборудования и обучение Вашего персонала.

Ваш партнер для кабельной и сталеканатной промышленности.



Проволока Россия
г. Москва
с 28 по 31 мая 2007 г.
павильон 1, стенд B23

wire Russia

SKET Verseilmaschinenbau GmbH
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Тел.: + 49 (0) 391 40558-0, Факс: + 49 (0) 391 40558-15
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Номер плательщика НДС: DE183571337


wire
Russia
Italian Pavilion
Смазки и покрытия для волочения проволоки
Пан Кемикалс
PAN CHEMICALS
Вебсайт: www.panchemical.com
Pan Chemicals S.p.A. • via Leopardi 24 • 24060 Rogno BG Italy
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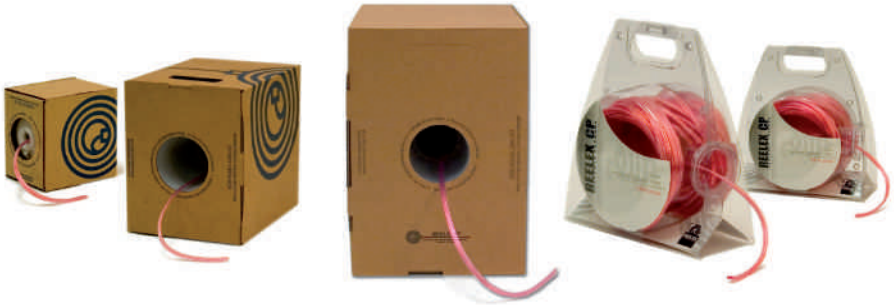
Компания «Уайндингс» меняет название на «Рилекс пэкаджинг солюшнз»



Транснациональная упаковочная компания «Уайндингс, инк» (Windings, Inc) объявила о смене своего названия на «Рилекс пэкаджинг солюшнз, инк» (Reelex Packaging Solutions, Inc), начиная с марта 2007 года.

«Мы с удовлетворением сообщаем о новом названии нашей компании, – заявил президент компании г-н Том Копп (Tom Copp). – Торговая марка Reelex уже широко известна среди предприятий проволочно-кабельной промышленности. Поскольку мы развиваем свою деятельность и, помимо работы с постоянным контингентом наших заказчиков, выходим на новые рынки, благодаря новому названию потенциальным заказчикам будет легче идентифицировать нас и узнать о том, что мы делаем». Компании продолжит работу по своему основному виду деятельности, связанному с производством упаковочного оборудования для нужд предприятий проволочно-кабельной промышленности. Все прочие реквизиты компании, включая ее юридический адрес, Web-страницу, адреса электронной почты и номера телефонов, останутся прежними.

Выпускаемая компанией система Reelex предлагает патентованную технологию намотки кабеля и любой другой канатно-проволочной продукции в безбобинные, плотно смотанные бухты. Размотка бухты производится по направлению из центра, без перегибов, «барашков», петель и набегания материала. Упаковка проста в обращении, легко штабелируется и пакетируется. Она легче, чем традиционные бобины и катушки, и абсолютно безвредна для окружающей среды.

«Рилекс пэкаджинг солюшнз, инк» (США)
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Адрес электронной почты: sales@reelex.com
Web-страница: www.reelex.com

Рекордный год для «Мэйллефер»

2006 год стал рекордным для компании «Мэйллефер» (Maillefer): общий объём продаж превысил 100 млн. евро, и эта тенденция, судя по всему, сохранится и в наступившем году.

С учетом значительного объема портфеля заказов, имеющегося у компании на конец года, а также графика поставок, расписанного вплоть до следующего 2008 года, можно предположить, что показатели продаж в этом году будут еще выше.

Существенная доля продаж связана с проектами модернизации или расширения электроэнергетических систем. Эти проекты предполагают значительные инвестиции в развитие всего сектора электроэнергетических распределительных сетей.

Компания также демонстрирует значительные успехи в реализации своих проектов в России, Китае и странах Персидского залива.

«Мэйллефер СА» (Швейцария)
Факс: +41 21 691 2143
Адрес электронной почты: info@maillefer.net
Web-страница: www.maillefer.com

«ИнтерУайр» расширяет зону обслуживания

Компания «ИнтерУайр продактс» (InterWire Products), находящаяся на подъеме своей коммерческой деятельности, ввела в эксплуатацию новый склад продукции общей площадью 30000 кв. футов в г. Форт-Милл (шт. Южная Каролина, США). Это означает, что компания «ИнтерУайр продактс», у которой уже имеется склад в штате Джорджия, теперь сможет обслуживать весь юго-восток США. «Принятие решения о расширении мощностей напрямую связано с развитием нашей компании и ее успешной рыночной деятельностью», – заявил Фрэнк Кардайл-младший (Frank Cardile Jr), президент «ИнтерУайр продактс».

«Открытие нового предприятия, наряду с передислокацией квалифицированных специалистов компании, свидетельствует о нашем стремлении развивать свою деятельность и повышать качество обслуживания заказчиков на долгосрочную перспективу». Открытие предприятия в Южной Каролине стало продолжением недавнего выхода компании «ИнтерУайр продактс» на рынок шт.

▲ *Предприятие компании «ИнтерУайр продактс» в шт. Мичиган*

Мичиган, где она ввела в эксплуатацию новый склад площадью 80000 кв. футов, который будет обслуживать заказчиков в Западной Пенсильвании, Огайо, Индиане и Мичигане. С открытием дополнительных предприятий компания «ИнтерУайр продактс» – крупнейший дистрибьютор высококачественной проволоки – теперь станет обладателем мощной сети дистрибьюторских центров и складских помещений общей площадью 430 000 кв. футов на всей территории Соединенных Штатов.

«ИнтерУайр продактс» (США)
Адрес электронной почты: info@interwiregroup.com
Web-страница: www.interwiregroup.com

Подписан контракт на поставку подводного силового кабеля высокого напряжения в Китай

Французская компания «Нексанс» (Nexans) заключила контракт стоимостью 140 миллионов евро с китайскими компаниями «И-Эйч-Ви пауэр транзмишн Чайниз компани» (EHV Power Transmission Chinese Company), входящей в состав электросетевой корпорации «Си-Эс-Джи» (CSG), и «Гуандун Нан-Дьянь пауэр экуипмент ко» (Guangdong Nan-Dian Power Equipment Co) на производство и прокладку 500-кВ подводного силового кабеля между о-вом Хайнань на южной оконечности Китая и провинцией Гуандун в континентальном Китае.

Подводная кабельная линия протяжённостью 30 км, рассчитанная на передачу мощности 600 МВт, будет проложена на глубине около 100 м. Эта линия электроснабжения сыграет ключевую роль в превращении о-ва Хайнань в туристический курорт и по графику должна вступить в строй в июле 2009 года.

Подводная линия будет выполнена из маслонаполненного кабеля сечением 800 мм^2, изготовленного в Японии на заводе «Эн-Ви-Си» (NVC), находящегося в совместной собственности компании «Нексанс» (66 %) и японской компании «Вискас» (Viscas) (34 %). Кабель будет прокладываться с помощью судна-кабелеукладчика Skagerrak компании «Нексанс».

▲ *Компания «Нексанс» поставит подводный силовой кабель, который соединит о-в Хайнань с континентальным Китаем*

Г-н Патрик Барт (Patrick Barth), президент бизнес-группы «Нексанс», занимающейся производством кабельной продукции высокого напряжения, отметил следующее: «В июле 2006 года компания «Нексанс» объявила о создании «Эн-Ви-Си» – совместного с японской компанией «Вискас» производственного предприятия, предназначенного для производства подводных высоковольтных силовых кабелей.

В результате компания «Нексанс» сможет значительно увеличить объемы производства подводных высоковольтных силовых кабелей и в ближайшей перспективе предложит заказчикам новые современные услуги. Этот первый контракт наглядно свидетельствует о том, насколько высокими стали требования этого быстроразвивающегося рынка. Благодаря нашему успешному сотрудничеству компания «Нексанс» сможет удовлетворить потребности заказчиков на китайском рынке».

«Нексанс» (Франция)
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Адрес электронной почты: nexans.web@nexans.com
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Производство стали в Китае в 2007 году должно увеличиться на 17 %

В 2007 году Китай будет контролировать почти треть мирового производства стали и потреблять практически все дополнительные объемы стали, выпускаемой на местных предприятиях.

Об этом сообщается в специальном докладе, который вошел в отчет о перспективах развития глобальной экономики (за декабрь 2006 г.), подготовленный «Улер Эрмес» (Euler Hermes) – крупнейшей в мире группой компаний по страхованию кредитов, входящей в состав группы «Альянц» (Allianz).

Объемы производства стали в Китае в 2007 году должны увеличиться на 10 % – это в три раза больше, чем у ближайшего конкурента Китая – Японии.

В числе основных рынков сбыта китайской стали – строительство (55 %), сектор производства средств производства (12 %), автомобильная промышленность (5 %) и производство бытовых электроприборов (2 %).

Даже с увеличением объемов производства Китай будет вынужден импортировать сталь, чтобы удовлетворить спрос на внутреннем рынке.

В 2007 году Бразилия, Россия и Индия, которые вместе с Китаем входят в альянс БРИК, также увеличат производство стали за счет модернизации производственного оборудования, использования дешевой рабочей силы и возможности доступа к природным ресурсам, в том числе к месторождениям железной руды, необходимой для бесперебойной работы доменных печей для выплавки чугуна, 65 % мирового производства которого приходится на эти страны.

«Экспоненциальный рост цен на сталь обусловлен отнюдь не традиционной диспропорцией между коммерческим спросом и предложением, а скорее – скачкообразным увеличением цен на первичные сырьевые ресурсы и, в частности, на железную руду и металлолом, – пояснил г-н Филипп Броссар (Philippe Brossard), руководитель аналитического отдела филиала «Улер Эрмес СФАК» (Euler Hermes SFAC). – Неизменно высокий интерес Китая к товарно-сырьевым ресурсам способствовал ужесточению рыночной конъюнктуры: в этом году импорт Китая на свои собственные нужды составит более 40 % мирового объема поставок железной руды, в основном, из Бразилии и Аргентины.

Тем не менее, в 2007 году следует ожидать временного затишья в колебаниях цен на сталь, с замедлением их роста начиная со второй половины 2007 года в соответствии с общей тенденцией спада развития мировой экономики».

Прогнозы в области мирового производства стали базируются на результатах микроэкономического анализа, проведенного ведущими страховщиками и аналитиками группы компаний «Улер Эрмес», которые ведут постоянный мониторинг коммерческих рисков компаний во всем мире, используя для сбора информации собственную сеть из 30 местных филиалов.

«Улер Эрмес СФАК» (Франция)
Факс: +33 140 705 017
Web-страница: www.eulerhermes.com

IWCEA FRANCE newsletter

Newsletter from IWCEA-France & French-speaking Countries Association • May 2007 n° 16

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wire Russia

French Pavilion
Hall E1

IWCEA-France newsletter
Wire and Cable French-speaking Suppliers Association

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ASSOCIATION EVENT

IWCEA-France to support long-term business relationship and development with Russia

Dear colleagues and friends,

For some years our French association, in harmony with our international IWCEA association, has encouraged its members to participate in the wire exhibition in Moscow.

From the first, we started to establish early business moves with our Russian friends. However, it is a long process to develop these relationships in depth. It is still ongoing, but difficulties should not prevent us from being patient and long-term oriented.

The pace and scope of Russian business interests may differ from what our French business core has to propose. Undoubtedly, there will come a time when those interests will finally match. Thus, it is critical to pursue the communication and business links already achieved since 2003.

Some of our members now have consistent business in Russia, and others have plans to open local operations.

So, if we look to the global picture and avoid any particular interest, our progress over five years has certainly been slow, but definitively successful. It is thus necessary to hold the line of our long term commitment to our Russian friends.

I wish you all an active and fruitful wire-Moscow 2007.

▲ *Mr Alain Bernard, President of IWCEA-France*

Alain Bernard
President
IWCEA-France & Pays Francophones

Компания IWCEA-France поддерживает долгосрочные деловые отношения и развитие с Россией

Уважаемые коллеги и друзья,

Уже несколько лет наша французская ассоциация в содружестве с Международной Ассоциацией Кабельной Промышленности (IWCEA) поощряет своих членов участвовать в кабельной выставке в Москве.

С самого начала мы стали устанавливать деловые контакты с российскими друзьями. Однако, создание более глубоких отношений – долгий процесс, который все еще продолжается, тем не менее, трудности не должны мешать нам оставаться терпеливыми и ориентироваться на долгосрочную перспективу.

Скорость и размах деловых интересов в России могут отличаться оттого, что предлагает французский деловой центр. Несомненно, придет время, когда эти интересы в конечном итоге совпадут. Поэтому, чрезвычайно важно продолжать развивать уже достигнутые, начиная с 2003 года, деловые и личностные контакты.

Некоторые из наших членов уже занимаются постоянным бизнесом в России, другие же планируют начать деятельность в этом регионе. Таким образом, если мы посмотрим на глобальную картину и опустим некоторые определенные интересы, наш прогресс за пять лет, конечно, протекал медленно, но определенно успешно. И так, необходимо придерживаться курса на долгосрочные взаимоотношения с нашими российскими друзьями.

Я желаю всем вам активной и плодотворной выставки wire-Moscow 2007.

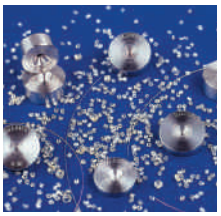
Ален Бернард
Президент
IWCEA-France & Pays Francophones

Meet the French Exhibitors at

BALLOFFET

Balloffet – Route de Bourg, BP 18, F-01150 Lagnieu Cedex – France
Tel: +33 4 74 40 19 00 • **Fax**: +33 4 74 35 79 01 • **Email**: balloffet@balloffetdie.com • **Website**: www.balloffetdie.com

Optimise your production time and reduce your maintenance and overheads – Balloffet's quality ensures accurate compliant surface finishes, diameters and technical characteristics, for all your wire drawing requirements.



Revolutionary manufacturing keeps Balloffet and its customers at the leading edge of technology. The company's product range includes natural single crystal diamond dies from 6μ to 2.5mm, synthetic single crystal diamond dies from 6μ to 1mm, polycrystalline (PCD) diamond dies from 25μ to 28mm, compacting, stranding and special shaped dies, enamelling guides, extrusion tooling (guides and dies), special tooling with diamond inserts, and repolishing machines and equipment.

Balloffet offers services such as repolishing of dies, training of customers' technicians for repairing dies and controls and technical reports on customers' dies.

For further details, please contact the 'French Pavilion' at the show.

Оптимизируйте производственное время, минимизируйте эксплуатацию и сокращайте накладные расходы – качество компании Balloffet обеспечивает точные гибкие параметры обработки поверхности, диаметры и технические характеристики для всех ваших требований по волочению проволоки.

Кардинально новое производство выводит компанию Balloffet и ее клиентов на лидирующие позиции в технологии. Ассортимент компании включает алмазные волоки с единичным естественным кристаллом от 6 до 2.5 мм, алмазные волоки с единичным синтетическим кристаллом от 6 до 1 мм, поликристаллические алмазные волоки от 25 до 28 мм, прессующие, скручивающие, а также имеющие особую форму волочильные фильеры, руководства по эмалированию, прессовый инструментарий (руководства и фильеры), специальный инструментарий с алмазными вставками, а также оборудование для повторного полирования.

Компания Balloffet предлагает такие услуги, как повторное полирование фильер, тренинги для технических специалистов по ремонту фильер и их контролю, подготовка отчетов по техническому состоянию фильер клиентов.

За дополнительной информацией, пожалуйста, обратитесь во «Французский Павильон» на выставке.

CONDAT LUBRIFIANTS

Condat Lubrifiants – Avenue Frédéric Mistral, F-38670 Chasse-sur-Rhône – France
Tel: +33 4 78 07 38 38 • **Fax**: +33 4 78 07 38 00 • **Email**: info@condat.fr • **Website**: www.condat.fr

Condat will present at wire Russia its innovative range of metal forming lubricants for wire drawing and cold heading aimed at reducing the environmental impact of this industry, including:

- The Vicafil range: Wire drawing lubricants (soap based powders, neat and soluble oils, pastes and greases), non reactive precoatings and surface protective products.
- The Extrugliss range: High performance, dual purpose oils designed to meet the total requirements of cold forming machinery.

For further details, please contact the 'French Pavilion' at the show.

Компания Condat представит на выставке wire Russia свою инновационную линию смазочных масел для обработки металлов при волочении проволоки и холодной высадки, с целью сокращения влияния данного производства на окружающую среду, а именно:

- Линия Vicafil: смазочные масла для волочения проволоки (порошки на мыльной основой, чистые и растворимые масла, пасты и смазки), инертные предварительные покрытия и защитные материалы для поверхности
- Линия Extrugliss: высокоэффективные масла с двойным действием, удовлетворяющие всем требованиям оборудования холодной штамповки

За дополнительной информацией, пожалуйста, обратитесь во «Французский Павильон» на выставке.

CONDUCTIX DELACHAUX GROUP

Conductix – Delachaux Group, Cable & Extrusion Department – 30 Avenue Brillat Savarin, F-01300 Belley – France
Tel: +33 4 7942 5088 • **Fax**: +33 4 7942 5005 • **Email**: pgrillet@delachaux.fr • **Website**: www.conductix.com

Conductix, Delachaux Group, is a worldwide leading machinery supplier for the production of bare silica fibre, fibre optic cables and copper cables.

The company's range includes:

- for silica fibre production: complete drawing tower with perform handling, furnace and dual take-ups; prooftester/rewinder, colouring units
- for fibre optic cable production: loosetube lines, microtubes/tight lines, premise cable lines, ribbon in tube, SZ strander, jacketing lines
- for plastic fibre production: drawing tower for data POF and extrusion system for illumination POF
- for copper cable production: the unique Rollertwist strander can provide the fastest production speed for LAN cable Cat 5, 5e, 6, 6e and 7 (technology that can also be applied to medium voltage cables, shipyard cables, etc); concentric and longitudinal taping units; a wide range of pay-offs and take-ups, caterpillars without gear box, etc

Conductix is also very well-known for its capability to upgrade almost any cable and fibre equipment.

The company has an extensive knowledge of the fibre and cable industry, and can propose solutions corresponding to cable makers' requirements, providing fast production solutions, good tension control, and perfect traversing.

Conductix, Delachaux Group, has a local permanent contact in Moscow, in offices scheduled to be opened in March.

For further details, please contact the 'French Pavilion' at the show.

Conductix, Delachaux Group – мировой поставщик передового оборудования для производства кварцевого волокна, волоконно-оптических кабелей и медных кабелей.

Ассортимент продукции компании включает:

- Для производства кварцевого волокна: полная волочильная установка с операционным управлением, печным и двойным наматывающим устройством; тестером пробы/ разматывателем, устройствами для окрашивания
- Для производства волоконно-оптических кабелей: линии несоединенных труб, микротрубы / сжатые линии, линии проводов для помещений, полоски для труб, кабелескруточный станок, линии обшивки
- Для производства пластических волокон: волочильные установки для данных POF и системы экструзии при освещении POF
- Для производства медных кабелей: уникальный кабелескруточный станок Rollertwist, который может обеспечить высокоскоростное производство кабелей локальной сети 5, 5e, 6, 6e и 7 (технология, которая может быть применена к кабелям среднего напряжения, кабелям в судостроении, и т.д.); концентрические и продольные ленточные установки; широкий выбор наматывающих и разматывающих устройств, гусеничные ленты без коробки передач, и т.д.

Компания Conductix также хорошо известна своей способностью модернизировать почти любое кабельное и волоконное оборудование.

Компания накопила обширный арсенал знаний по кабельной и волоконной индустрии, и может предложить соответствующие требованиям рынка решения в отношении повышения скорости производства, контроля поддержания устойчивого напряжения и отличного прохождения.

Conductix, Delachaux Group располагает постоянным региональным контактным адресом в Москве, в марте планируется открытие офисного центра.

За дополнительной информацией, пожалуйста, обратитесь во «Французский Павильон» на выставке.

wire Russia 2007 – 28-31 May

Contrôle Mesure Systemes – 1 Chemin des Bruyères, F-71100 La Charmee – France
Tel: +33 3 85 94 14 14 • **Fax**: +33 3 85 94 14 15 • **Email**: contactcms@cmseddyscan.com • **Website**: www.cmseddyscan.com

Contrôle Mesure Systemes provides eddy current inspection technology for tubes, bars, wires, and profiles, suitable for on-line and off-line testing. The equipment range – designed to meet quality standards such as API, ASTM, and DIN – includes the Zet@Master portable instrument and the Eddyscan 30X system for on and off-line inspection.

The Zet@Master is one of the smallest instruments on the market, and offers unique features including multi-channels, multi-frequencies, and frequency range from 10Hz to 10MHz. Its supervision system allows control of all peripheral devices, sorting management and reporting. These reports give defect location, type, number of good and bad parts, together with different rates in a virtually unlimited number of parameter sets. Remote control of the Zet@Master is possible via the internet, offering the possibility to supervise or support from any location.

The company's Zet@premium and Zet@Micro are designed for simpler applications that do not need the power of the Zet@Master. The company also offers magnetising and demagnetising units, standards or customised coils, and a wide range of rotating heads to inspect longitudinal defects on wires and bars (from Ø 2 up to 220mm).

For further details, please contact the 'French Pavilion' at the show.

Компания Contrôle Mesure Systemes предлагает технологию по обследованию вихревых токов в трубах, прутьях, проволоке и предоставляет «срезы» параметров, что подходит для онлайнового и автономного тестирования. Ряд оборудования, разработанного компанией и отвечающего таким стандартам качества как API, ASTM, и DIN, включает также портативный инструмент под названием Zet@Master и систему Eddyscan 30X для онлайновой и автономной экспертизы.

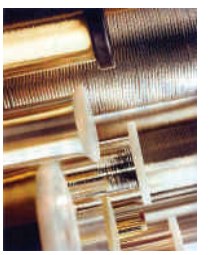
Zet@Master – один из наименьших по размеру инструментов на рынке с уникальными свойствами, такими как многоканальность, разнообразная частотность, которая варьируется от 10 герц до 10 мегагерц. Система наблюдения прибора позволяет контролировать все периферийные механизмы, распределяя управление и предоставляя отчетность. Подобные отчеты указывают на дефектные места, трубу, номер «хорошего» и «плохого» отрезка, наряду с разными показателями в виртуально бесчисленном наборе параметров. Дистанционное управление Zet@Master может осуществляться через Интернет с возможностью наблюдения и поддержки из любого местонахождения.

Приборы Zet@premium и Zet@Micro разработаны компанией для более упрощенного применения, не требующего мощности Zet@Master. Компания также предлагает намагничивающие и размагничивающие установки, стандартные и созданные согласно требованиям заказчика катушки, а также широкий спектр вращающихся головок дл отслеживания дефектов на проволоке и прутьях (диаметром от 2 до 220 мм).

За дополнительной информацией, пожалуйста, обратитесь во «Французский Павильон» на выставке.

FSP–One SAS – 31 rue Giffard, BP 37, F-38231 Pont-de-Cheruy Cédex – France
Tel: +33 4 78 32 39 39 • **Fax**: +33 4 78 32 39 19 • **Email**: osaunier@fsp-one.com

FSP-one belongs to the Thermo Technologies group, and is a specialist in plating on metallic parts, ribbons and wire.



The company works with customers in the field of copper, copper alloy, copper clad steel or aluminium wires, plated with silver, nickel or gold. FSP-one offers electrolytical plating of silver, nickel and gold, drawing of plated or unplated wires down to very fine size (0.02mm), stranding, flattening or assembling of those wires, and specific annealing processes.

FSP-one's products are mainly used within a wide range of wires and conductors, including aeronautics, space, hi-fi, medical equipment, telecommunications, geophysics, music, as well as other applications using components for electronics, electro-technics or decoration.

FSP-one is the chosen partner of major industrial companies using electrical conductors for high-technology.

For further details, please contact the 'French Pavilion' at the show.

Компания FSP-one принадлежит к группе Thermo Technologies group и специализируется на металлическом покрытии отдельных отрезков, полосок и проволоки.

Компания работает с заказчиками в сфере медной проволоки, проволоки из сплава меди, армированной медью стальной и алюминиевой проволоки, покрытой серебром, никелем и золотом. Компания FSP-one предлагает электролитическое покрытие серебром, никелем и золотом, волочение покрытой и непокрытой проволоки вплоть до самых мелких размеров (0.02мм), скручивание, сплющивание и монтаж такой проволоки, а также особый процесс отжига.

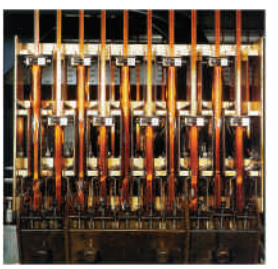
Продукция компании находит широкое применение в разных областях, где применяется проволока и проводники, включая аэронавтику, космическую промышленность, высокие технологии, медицинское оборудование, телекоммуникации, геофизику, музыку с использованием компонентов в электронике, электротехнике и внутренней отделке.

FSP-one – партнер, выбранный крупнейшими промышленными компаниями, применяющими проводники для высоких технологий.

За дополнительной информацией, пожалуйста, обратитесь во «Французский Павильон» на выставке.

Essex Nexans IVA – 145 rue de la République, F-69330 Meyzieu – France
Fax: +33 478 045 980 • **Email**: remy.pons@essexnexans.com • **Website**: www.essexnexans.com

Operating since the late 1930s, IVA is one of the world's leading wire enamel manufacturers. Originally known under the name of Alsthom, then Alcatel, and nowadays Essex Nexans, IVA markets its own products worldwide through an efficient and supporting sales network located close to magnet wire manufacturers.



Based in France, the company's manufacturing site has a production capacity of 25,000 MT/year and enables IVA to serve its partners, wherever they are located, with smooth deliveries. Its new operation, with a highly computerised production system, allows the company to meet the toughest and highest quality requirements, as well as high consistency.

The company is ISO 9001 certified and provides its internationally recognised products to meet the most stringent requirements of standards such as IEC, NEMA, and JIS. Essex Nexans IVA wire enamels are also recognised under the UL file number E 142381. Several grades cover the whole range of varnishes including PolyAmideImide, PolyEsterImide, PolyUrethane, PolyEster, PolyVynilActoformal and self bonding.

For further details, please contact the 'French Pavilion' at the show.

Функционируя с конца 1930 годов, компания IVA является одним из ведущих мировых производителей проволочной эмали. В начале известная под именем Alsthom, затем как Alcatel и сегодня как Essex Nexans, компания IVA находит рынки сбыта по всему миру через действующую эффективную сеть продаж, расположенную вблизи производителей обмоточных электромагнитных проводов.

Производственная база компании, расположенная во Франции, обладает мощностью в 25 000 мегатонн в год и позволяет обслуживать своих партнеров беспрепятственными поставками, где бы они не находились. Новый режим работы с высококомпью теризированной производственной системой позволяет компании удовлетворять самым жестким и высоким требованиям качества, а также обеспечивать высокую слаженность работы.

Компания, аттестованная по стандарту ISO 9001, поставляет зарекомендовавшую на международном рынке продукцию, удовлетворяющую строгим требованиям таких стандартов как IEC, NEMA и JIS. Проволочные эмали компании Essex Nexans IVA признаны лабораторией по технике безопасности США (UL), номер E 142381. Несколько классов охватывают целый ряд лаков, включая полиамидные, полиэстермидные, полиуретановые, полиэстеровые, поливинилактоформальные и самополимирезующиеся виды.

За дополнительной информацией, пожалуйста, обратитесь во «Французский Павильон» на выставке.

Other Members of IWCEA-France

CERSA-MCI

Компания CERSA-MCI разрабатывает и производит высококачественные приборы для измерения диаметра изделий проволочно-кабельной и оптоволоконной промышленности.

Эти приборы широко применяются на производственных участках и в лабораториях. Чувствительность и повторяемость приборов делает их надежным и точным инструментом контроля качества.

Номенклатура изделий для оптоволоконной промышленности включает в себя лазерные измерительные приборы.

Номенклатура изделий для проводов и кабелей представлена лазерными дифракционными приборами для измерения диаметра, овальности и для дефектоскопии.

CERSA-MCI – Parc Expobat 53,
F-13825 Cabries Cedex, France
Тел: +33 4 42 02 60 44 • Факс: +33 4 42 02 79 79
Адрес электронной почты: sales@cersa-mci.com

MOUTON RIVOM

Компания Mouton является одним из ведущих европейских производителей вольфрамового твердосплавного инструмента для проволочно-кабельной промышленности: волок (диаметром 0,1-30 мм), профильных волок, волочильного инструмента, направляющих устройств для проволоки и т.д.

Кроме того, компания Mouton разработала полную линейку кромкогибочных машин для проволоки из черных и цветных металлов.

Mouton Rivom – 3 Chemin de Thil, Saint Maurice de Beynost,
F-01708 Miribel Cedex, France
Тел: +33 4 78 55 15 81 • Факс: +33 4 78 55 03 27
Адрес электронной почты: ferret @agir-technologies.com
Web-страница: www.mouton-sa.com

RHODIA HPCII

Компания Rhodia предлагает полный набор присадок для смазочно-охлаждающих жидкостей на основе поверхностно-активных веществ и синтетических полимеров, например, эмульгаторы для смазочно-охлаждающих жидкостей на водной основе, применяемых при металлообработке, а также антифрикционные и противозадирные присадки, предназначенные для повышения эффективности использования жидкостей.

Компания Rhodia является мировым лидером в области производства смазочных веществ для мокрого волочения металлокорда, осуществляющим поставки высококачественной продукции, продаваемой под торговой маркой Supersol®.

Представитель в России: Nicolas Afremov – **Rhodia Moscow**
4 Kozhevnichesky proezd, bld 1, 115114 Moscow
Тел: +7 095 9265706/26 • Факс: +7 095 9265707/08

Mr Patrice Le Cornec – **Rhodia HPCII –** 40, rue de la Haie Coq
F-93306 Aubervilliers, France
Тел: +33 1 53 56 53 01 • Факс: +33 1 53 56 53 55
Web-страница: www.rhodia-hpcii.com/hpcii

COUSIN COMPOSITES

Компания Cousin Composites специализируется на разработке, производстве и продаже композитных материалов, изготовленных с использованием стекловолокна, арамидной нити и других высокотехнологичных материалов.

Продукция компании используется в следующих областях:

- в виде прутка (например, из пластмассы со стекловолокном) – для использования в качестве центрального держателя (CMS) для оптоволоконного кабеля;
- в виде сверла для стекла – для изготовления периферийных усиливающих элементов для оптоволоконного кабеля;
- а также для других прикладных задач в кабельной промышленности.

Cousin Composites – Allée des Roses
F-59117 Wervicq-Sud, France
Тел: +33 3 28 38 87 00 • Факс: +33 3 20 39 06 90

Представитель в России:
Mr Valery Mouraviev – **Unitrade Group LLC**
Nautchiy proezd, 10, 117 246 MOSCOW
Тел: +7 095 232 96 47 • Факс: +7 095 334 18 83

NUMALLIANCE

Группа предприятий Numalliance предлагает полную линейку проволочно-гибочного и трубоформовочного оборудования с ЧПУ.

Numalliance разработала оборудованный ЧПУ проволочно-гибочный станок с 2 шпиндельными головками – идеальную машину для мелко- и среднесерийного выпуска продукции строго в срок.

Быстрая и простая процедура программирования позволяет изготовлять детали самых разных профилей. Эта простая и эффективная технология не требует специального инструмента и обеспечивает абсолютную гибкость.

Numalliance – Parc d'Activités, BP 11,
F-88470 St Michel sur Meurthe, France
Тел: +33 3 29 58 36 15 • Факс: +33 3 29 58 46 47
Адрес электронной почты: pmaitre@numalliance.com
Web-страница: www.numalliance.com

SASA TREFIL'ALU

Компания Sasa Trefil'Alu специализируется на производстве тянутой проволоки из алюминиевых сплавов для различных областей применения: машиностроение (холодная штамповка, гнутье, оплетка, ткачество, вязание, изготовление металлических скоб), электротехническая промышленность (оплетка, скрутка).

Sasa Trefil'Alu предлагает полный ассортимент круглой и плоской проволоки (от 0,16 до 12 мм), изготовленной из различных сплавов с использованием разнообразных металлургических технологий и условий обработки и в строгом соответствии с европейскими стандартами.

Sasa Trefil'Alu – ZI N° 1 – BP 9
F-59360 Le Cateau Cambresis, France
Тел: +33 3 27 77 52 01 • Факс: +33 3 27 77 52 09
Адрес электронной почты: contact@trefilalu.com
Web-страница: www.trefilalu.com

LUTZ ET KREMPP INDUSTRIES

Компания LKI является ведущим производителем проволочно-волочильного оборудования.

Номенклатура производства включает в себя:

проволочно-волочильные станки, волочильные станы, намоточные и навивочные машины, отдающие и разматывающие устройства (бесшпиндельные отдатчики с катушек, отдатчики с бунтов, горизонтальные и вертикальные проволочно-правильные машины), острильные станки для проволоки и проволочно-волочильное оборудование.

Lutz et Krempp Industries – 12, rue Edouard Vaillant
F-91200 Athis-Mons, France
Тел: +33 1 69 38 05 18 • Факс: +33 1 69 38 63 03
Web-страница: www.lki.fr

PLASTYROBEL

Компания Plastyrobel выпускает линейку катушек, предназначенных для кабельного, проволочно-волочильного, оптоволоконного и ряда других производств.

На всех этапах – от производства до доставки продукции, заказчики довольны качеством продукции, изготовленной в соответствии с самыми высокими международными стандартами и в минимальные сроки.

При создании катушек, отвечающих конкретным требованиям заказчиков, используется система автоматизированного проектирования.

Mr Yvan Mondiere or Mrs Patricia Bourson
Plastyrobel – Pessat-Villeneuve, BP 60153
F-63204 Riom Cedex, France
Тел: +33 4 73 63 03 03 • Факс: +33 4 73 63 17 24
Адрес электронной почты: psb@plastyrobel.com

Visit our website:
www.iwceafrance.com

Последние разработки от производителя №1
Крутильного оборудования

POURTIER GAUDER GROUP

SETIC GAUDER GROUP

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Высокая рабочая скорость до 600 об\мин
Производительность, умноженная на 30

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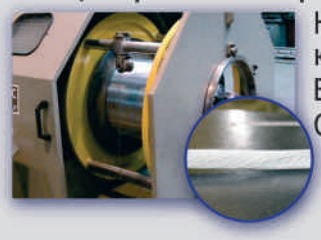
Концентрическая бронеголовка TEC 630-SWA



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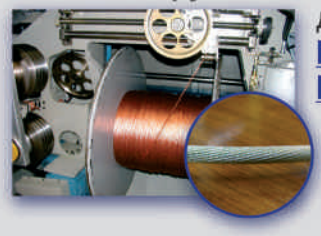

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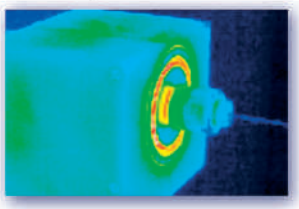

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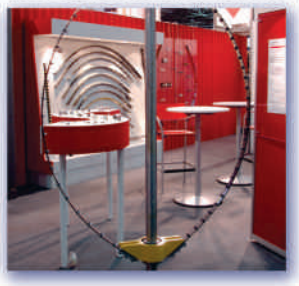

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Windings change en Reelex Packaging Solutions

La société Windings Inc. spécialisée en emballages a annoncé le changement de sa raison sociale en Reelex Packaging Solutions, Inc, à dater de mars 2007.

"Nous sommes fiers d'annoncer notre nouveau nom de société," a déclaré le président M.Tom Copp. "La marque commerciale Reelex est désormais largement connue dans l'industrie du fil et du câble. Puisque notre activité s'étend à l'extérieur de notre cercle de clients traditionnel, notre nouveau nom facilitera l'identification de notre société et de ses activités pour des clients potentiels."

La société continuera à offrir comme activité principale la fourniture d'équipements d'emballage pour l'industrie du fil. Les données de la société, telles que l'adresse, le site web, les adresses e-mail et les numéros de téléphone, ne varieront pas.

▲ *Les produits sont pareils - c'est juste le nom qui est changé*

Le système mis au point par la société Reelex est une méthode brevetée d'enroulement de câbles ou de tout type de produit à base de corde de manière à former une bobine autoporteuse sans dévidoir.

Cette bobine distribue le fil en partant de l'intérieur vers l'extérieur sans torsions, enchevêtrements, accrocs ni superposition. Les paquets peuvent être manipulés, empilés et palettisés aisément, ils sont plus légers que les bobines et les dévidoirs et sont 100% écologiques.

Reelex Packaging Solutions, Inc – États-Unis
Fax: +1 845 878 7884
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Website: www.reelex.com

Nouvelle expansion pour InterWire!

Une croissance importante des activités a amené InterWire Products (IWP) à ouvrir un nouvel établissement de 30 000 pieds carrés à Fort Mill en Caroline du Sud, États-Unis.

Avec l'établissement existant déjà situé en Géorgie, IWP couvre actuellement la totalité du sud-est des États-Unis.

"Nous avons commencé l'expansion en réaction à notre croissance et à notre succès sur le marché," a déclaré Frank Cardile Jr, Président de IWP.

"Le nouvel établissement et la relocalisation de membres faisant partie d'une équipe expérimentée de la société, représente notre engagement à long terme vers notre activité et nos clients".

L'ouverture suit la récente expansion de IWP au Michigan avec une unité de 80 000 pieds carrés desservant les marchés de la Pennsylvanie occidentale, de l'Ohio, de l'Indiana e du Michigan.

▲ *Unité Michigan de InterWire*

L'ajout de ces nouveaux emplacements aux centres de distribution existant déjà offre à IWP, principal distributeur de fil fin, un total de 430 000 pieds carrés d'entreposage de par les États-Unis.

InterWire Products – États-Unis
Email: info@interwiregroup.com
Website: www.interwiregroup.com

2006: Une année record pour Maillefer

2006 a été une année record pour Maillefer qui a réalisé un chiffre d'affaires supérieur à 100 millions d'euros, tendance qui semble destinée à continuer également cette année.

Avec un carnet de commandes satisfaisant à la fin de l'année dernière et des livraisons prévues arrivant jusqu'à 2008, le chiffre d'affaire de l'année en cours devrait être même supérieur.

La majorité de ces ventes est axée sur la demande de modernisation ou d'expansion des réseaux électriques, avec pour résultat des investissements dans la totalité du réseau de distribution de l'énergie.

La société est également engagée dans un nombre croissant de projets en Russie, en Chine et aux États du Golfe.

Maillefer SA - Suisse
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Website: www.maillefer.com

Nexans: contrat pour la fourniture d'un câble haute tension sous-marin en Chine

La société française Nexans a signé un contrat d'environ 140 millions d'euros avec les sociétés chinoises EHV Power Transmission Company of CSG et Guangdong Nan-Dian Power Equipment Co, pour la fabrication et l'installation d'une liaison sous-marine de 500kV qui reliera l'île de Hainan située à l'extrémité du sud de la Chine, à la province du Guangdong sur le continent chinois.

Cette liaison sous-marine d'une longueur de 30km, capable de transporter une puissance pouvant aller jusqu'à 600MW, sera posée à une profondeur d'environ 100 mètres. Cette liaison, qui devrait être mise en service en juillet 2009, jouera un rôle stratégique dans le développement de l'île de Hainan, notamment pour le tourisme.

Cette nouvelle liaison comprendra un câble à huile d'une section de 800mm^2 qui sera fabriqué au Japon par NVC, la société commune détenue à 66% par Nexans et 34% par la société japonaise Viscas. Il sera installé par le navire câblier C/S Skagerrak de Nexans.

▲ *Nexans fournira la liaison sous-marine pour relier l'île de Hainan au continent chinois*

"La création de NVC, la société commune de production de câbles haute tension sous-marins entre Nexans et le japonais Viscas, annoncée en juillet dernier, visait à augmenter immédiatement l'activité potentielle de Nexans dans les câbles haute tension pour les prochaines années.

"Aujourd'hui, ce premier contrat illustre parfaitement les besoins de ce marché en forte croissance. Grâce à cette alliance, notre Groupe peut aujourd'hui satisfaire la demande de ses clients chinois" a déclaré M. Patrick Barth, Président du groupe des activités HV de Nexans.

Nexans – France
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Website: www.nexans.com

Augmentation de 17% de la production d'acier prévue en Chine pour l'an 2007

La Chine représentera presque un tiers de la production d'acier mondiale totale en 2007 et utilisera presque la totalité de sa production supplémentaire, comme décrit dans un rapport spécifique inclus dans le Global Sectors Outlook (décembre 2006) de Euler Hermes, le principal groupe mondial d'assurance-crédit faisant partie d'Allianz.

La production chinoise devrait augmenter de 10% en 2007 – c'est-à-dire trois fois plus que son concurrent le plus proche, le Japon. Les principaux marchés destinés aux utilisateurs finals de l'acier chinois comprennent les secteurs de la construction (55%), des biens de production (12%), des voitures (5%) et des appareils électroménagers (2%). Malgré l'augmentation de sa capacité, la Chine devra importer l'acier afin de soutenir le rythme de la demande.

Également le Brésil, la Russie et l'Inde, formant le groupe de pays dénommé BRIC avec la Chine, augmenteront la production d'acier en 2007, grâce à la modernisation des équipements de production, à une main-d'œuvre à prix réduit, et à l'accès aux ressources naturelles y compris le minerai de fer, essentiel au bon fonctionnement des hauts-fourneaux pour la production de fonte, qui représente 65% de la production mondiale.

"La croissance exponentielle des prix de l'acier ne dérive pas du déséquilibre traditionnel entre la demande et l'offre, mais de l'augmentation explosive des prix des matières premières telles que le minerai de fer et la ferraille," a expliqué M. Philippe Brossard, responsable de la recherche pour Euler Hermes SFAC. "L'appétit vorace de la Chine pour les matières premières a contribué à consolider le marché: le pays considéré indépendamment représentera cette année plus de 40% des importations mondiales de minerai de fer, principalement du Brésil et de l'Australie. Toutefois, une trêve dans les prix de l'acier est prévue en 2007."

Les prévisions concernant le secteur sidérurgique sont basées sur l'analyse microéconomique des garants et des analystes du groupe Euler Hermes.

Euler Hermes SFAC – France
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Website: www.eulerhermes.com

Qu'est-ce qu'il y a derrière un nom?

Après une période de croissance rapide, Techint Technologies a pris la décision stratégique de changer son nom en Tenova.

La nouvelle raison sociale Tenova maintient, grâce au préfixe "Te ", une liaison étroite avec Technint Group et avec Technology, et à travers le mot 'nova', un clair engagement vers l'innovation, facteur essentiel pour une société spécialisée dans la fourniture de technologies de pointe.

Tenova est un réseau de sociétés synergiques fournissant des solutions intégrées innovantes pour des zones de traitement complètes.

L'acquisition de commandes a dépassé la limite d'un billion de dollars américains et une augmentation supplémentaire est prévue dans les années à venir.

Tenova – Italie
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Website: www.tenovagroup.com

Windings diventa Reelex Packaging Solutions

La società Windings Inc. specializzata in imballaggi, ha annunciato il cambiamento della propria ragione sociale in Reelex Packaging Solutions, Inc, con decorrenza marzo 2007.

"Siamo fieri di annunciare il nuovo nome della nostra società," ha dichiarato il presidente Tom Copp. "Il marchio commerciale Reelex è ormai ampiamente noto nell'industria del filo e del cavo. Poiché la nostra attività si estende all'esterno della nostra tradizionale cerchia di clienti, il nuovo nome faciliterà a potenziali clienti l'identificazione della nostra società e delle sue attività."

La società continuerà ad offrire come attività principale la fornitura di equipaggiamenti d'imballaggio per l'industria del filo. I dati della società, come l'indirizzo, il sito web, gli indirizzi e-mail ed i numeri telefonici resteranno invariati.

▲ *I prodotti sono lo stesso - è soltanto il nome che ha cambiato*

Il sistema messo a punto dalla società Reelex è un metodo brevettato per l'avvolgimento di cavi o di qualsiasi prodotto a base di corda in modo da formare una bobina autoportante senza rocchetto. Questa bobina distribuisce il filo partendo dall'interno verso l'esterno senza torsioni, nodi, incagli o irregolarità. I pacchetti possono essere manipolati, impilati e palettizzati facilmente, sono più leggeri dei rocchetti e degli aspi e sono ecologici al 100%.

Reelex Packaging Solutions, Inc – Stati Uniti
Fax: +1 845 878 7884
Email: sales@reelex.com
Website: www.reelex.com

Nuova espansione per InterWire!

Un'importante crescita delle attività ha stimolato InterWire Products (IWP) ad aprire un nuovo stabilimento di 30.000 piedi quadrati a Fort Mill nella Carolina del Sud (Stati Uniti).

Assieme allo stabilimento esistente ubicato in Georgia, IWP copre attualmente l'intera parte sud orientale degli Stati Uniti.

▲ *Unità Michigan di InterWire*

"Abbiamo iniziato l'espansione in risposta alla nostra crescita e al nostro successo sul mercato," ha dichiarato Frank Cardile Jr, presidente di IWP.

"Il nuovo stabilimento e il trasferimento dei componenti di un'équipe esperta della società, testimoniano il nostro impegno a lungo termine nei confronti della nostra attività e dei nostri clienti."

L'apertura fa seguito alla recente espansione di IWP nel Michigan con un'unità di 80.000 piedi quadrati che assicura il servizio ai mercati della Pennsylvania occidentale, dell'Ohio, dell'Indiana e del Michigan.

L'aggiunta di queste nuove strutture ai centri di distribuzione esistenti offre ad IWP, primario distributore di filo sottile, un totale di 430.000 piedi quadrati di magazzinaggio in tutti gli Stati Uniti.

InterWire Products – Stati Uniti
Email: info@interwiregroup.com **Website**: www.interwiregroup.com

2006, un anno record per Maillefer

Il 2006 è stato un anno record per Maillefer che ha realizzato un volume d'affari superiore a 100 milioni di euro, tendenza che sembra destinata a continuare anche quest'anno.

Con un portafoglio ordini soddisfacente alla fine dello scorso anno e consegne previste fino all'anno 2008, si prevede che il volume d'affari dell'anno in corso sia addirittura migliore.

La maggior parte delle vendite è concentrata sulla richiesta di modernizzazione o espansione delle reti elettriche, con conseguenti investimenti su tutta la rete di distribuzione dell'energia.

La società è inoltre impegnata in un numero crescente di progetti in Russia, in Cina e nei Paesi del Golfo.

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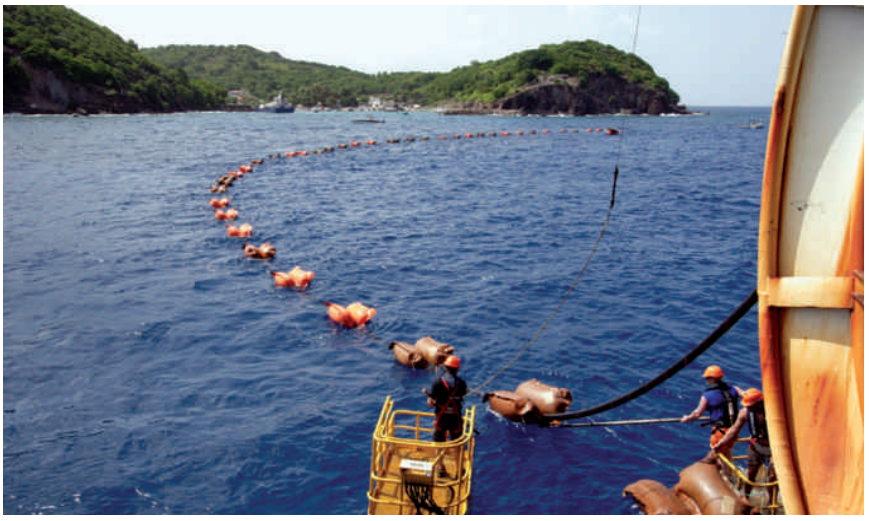
Nexans: contratto per la fornitura di un cavo sottomarino ad alta tensione in Cina

La società francese Nexans ha firmato un contratto di 140 milioni di euro con le società cinesi EHV Power Transmission Company di CSG e Guangdong Nan-Dian Power Equipment Co, per la costruzione e l'installazione di un collegamento sottomarino di 500kV che collegherà l'isola di Hainan situata all'estremità meridionale della Cina, alla provincia di Guangdong sul continente cinese.

Questo collegamento sottomarino della lunghezza di 30km, progettato per trasmettere una potenza fino a 600MW, sarà posato ad una profondità di circa 100 metri. Il collegamento, la cui messa in servizio è prevista per luglio 2009, giocherà un ruolo strategico nello sviluppo dell'isola di Hainan, in particolare da un punto di vista turistico.

Questo nuovo collegamento che comprenderà un cavo ad olio fluido della sezione di 800mm^2 e sarà realizzato in Giappone da NVC, (la joint venture di proprietà di Nexans per il 66% e della società giapponese Viscas per il 34%) sarà installato dalla nave posacavi Skagerrak di Nexans.



▲ *Nexans fornirà il collegamento sottomarino per collegare l'isola di Hainan al continente cinese*

"La creazione di NVC, la joint venture di produzione di cavi sottomarini ad alta tensione fra Nexans e la società giapponese Viscas, annunciata lo scorso luglio, aveva lo scopo di aumentare immediatamente l'attività potenziale di Nexans nei cavi ad alta tensione nei prossimi anni. Oggi, questo primo contratto illustra perfettamente le necessità di questo mercato in rapida crescita. Grazie a questa alleanza, Nexans è in grado di soddisfare le richieste dei propri clienti cinesi" ha dichiarato Patrick Barth, presidente del gruppo di attività HV di Nexans.

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Aumento del 17% della produzione di acciaio prevista in Cina per l'anno 2007

La Cina rappresenterà quasi un terzo della produzione d'acciaio mondiale totale nel 2007 e utilizzerà quasi tutta la propria produzione aggiuntiva, come descritto in un rapporto specifico incluso nel Global Sectors Outlook (dicembre 2006) di Euler Hermes, il primo gruppo mondiale di assicurazione crediti che fa parte di Allianz.

Si prevede che la produzione cinese aumenti del 10% nel 2007, ovvero 3 volte più del Giappone, suo concorrente più vicino. I principali mercati destinati agli utilizzatori finali dell'acciaio cinese comprendono i settori della costruzione (55%), dei beni di produzione (12%), delle autovetture (5%) e degli apparecchi elettrodomestici (2%). Nonostante l'aumento della propria capacità, la Cina dovrà importare acciaio per poter sostenere il ritmo della domanda.

Anche il Brasile, la Russia e l'India, che costituiscono il gruppo di paesi denominato BRIC assieme alla Cina, aumenteranno la produzione d'acciaio nel 2007 grazie alla modernizzazione degli equipaggiamenti di produzione, ad una mano d'opera a basso costo e all'accesso alle risorse naturali compreso il minerale di ferro, essenziale al corretto funzionamento degli altiforni per la produzione di ghisa, che rappresenta il 65% della produzione mondiale.

"La crescita esponenziale dei prezzi dell'acciaio non deriva dal tradizionale squilibrio fra la domanda e l'offerta, bensì dall'esplosivo aumento dei prezzi delle materie prime quali il minerale di ferro e il rottame," ha spiegato Philippe Brossard, responsabile della ricerca per Euler Hermes SFAC.

"Il vorace appetito della Cina per le materie prime ha contribuito a consolidare il mercato: il paese da solo rappresenterà quest'anno oltre il 40% delle importazioni mondiali di minerale di ferro, soprattutto dal Brasile e dall'Australia.

"Tuttavia è prevista una tregua nei prezzi dell'acciaio nel corso del 2007, con una diminuzione dei prezzi durante il secondo semestre del 2007 in linea con il rallentamento dell'economia mondiale."

Euler Hermes SFAC – Francia
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Cosa c'è dietro un nome?

Dopo un periodo di rapida crescita, Techint Technologies ha preso la decisione strategica di cambiare la propria ragione sociale in Tenova.

Attraverso il prefisso "Te", il nuovo nome Tenova mantiene uno stretto legame con Technint Group e con Technology, e attraverso la parola 'nova', un chiaro impegno nei confronti dell'innovazione, fattore essenziale per una società specializzata nella fornitura di tecnologie avanzate.

Tenova è una rete di società sinergiche che forniscono soluzioni integrate innovative per aree di processo complete.

L'acquisizione di ordini ha superato il limite di un miliardo di dollari americani e si prevede un ulteriore aumento nei prossimi anni.

Tenova – Italia
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Windings cambia de nombre

Windings Inc., compañía global de embalaje, ha anunciado que cambiará su denominación social por Reelex Packaging Solutions Inc. a partir de marzo de 2007.

"Estamos encantados de anunciar el nombre nuevo de nuestra empresa", declaró el presidente Tom Copp.

"La marca Reelex ya es muy conocida en el sector del alambre y del cable. Cuando ampliemos nuestra actividad fuera de nuestra tradicional base de clientes, con nuestra nueva denominación los clientes potenciales podrán reconocer fácilmente nuestros productos y lo que hacemos".

La empresa seguirá ofreciendo equipos de embalaje como producto principal a la industria del alambre. Los demás datos de la empresa (dirección, página web, e-mail y teléfonos) seguirán siendo los mismos.

El sistema Reelex de la empresa es un método patentado de enrollado de cable

▲ *Los productos son el mismo - es apenas el nombre que ha cambiado*

o productos similares, que utiliza una bobina de auto soporte sin carrete.

Esta bobina distribuye el material desde dentro hacia fuera sin torceduras, enredos, atranques ni irregularidades. El material embalado resulta fácil de manejar, apilar o paletizar, pesa menos que en carretes y respetan fielmente las normas ambientales.

Reelex Packaging Solutions, Inc – Estados Unidos
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InterWire cubre todo el territorio comercial

Tras el considerable incremento de sus negocios, InterWire Products (IWP) ha decidido abrir una nueva planta de 30.000 pies cuadrados en Fort Mill, Carolina del Sur, en Estados Unidos.

Con la planta nueva y la actual de Georgia InterWire Products cubre todo el sureste de Estados Unidos.

"Hemos iniciado esta expansión con motivo del crecimiento y éxitos registrados por nuestra empresa en el mercado", declaró Frank Cardile Jr., presidente de IWP.

"La planta nueva, adonde se destinarán miembros altamente cualificados de la empresa, representa un compromiso a largo plazo para nuestra empresa y para nuestros clientes".

La apertura llega tras la reciente expansión de IWP en Michigan con una planta de 80.000 pies cuadrados que cubrirá los mercados de Pensilvania del Oeste, Ohio, Indiana y Michigan.

Con estas nuevas plantas, además de

▲ *Planta de InterWire en Michigan*

los centros de distribución existentes, IWP, principal distribuidor de alambre fino de calidad, dispone ahora de una superficie total de almacenamiento de 430.000 pies cuadrados en todo el territorio de Estados Unidos.

InterWire Products – Estados Unidos
Email: info@interwiregroup.com
Website: www.interwiregroup.com

2006, año récord para Maillefer

2006 fue un año récord para Maillefer con un volumen de ventas que superó los 100 millones de euros, y la tendencia indica que seguirá así este año.

Con el lote de pedidos recibido a finales del año pasado, cuyos plazos de entrega abarcan hasta el 2008, parece que las ventas totales de este año serán incluso mejores.

Gran parte de estas ventas está sujeta a la modernización o expansión de las redes eléctricas.

Esto induce a invertir en toda la red de distribución eléctrica.

La empresa también está registrando un crecimiento considerable gracias a proyectos ganados en Rusia, China y estados a orillas del Golfo.

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Email: info@maillefer.net
Website: www.maillefer.com

DSE consolida su posición en La India

La danesa DSE A/S ha registrado una demanda creciente en el mercado indio del alambre.

Para reforzar su posición en el mercado mundial, además de ampliar el servicio a los clientes de La India, la compañía ha llegado a un acuerdo con un nuevo representante en La India, el Sr. Nara de Vertical Technologies.

DSE A/S – Dinamarca
Fax: +45 7561 5895
Email: dse@dse.dk
Website: www.dse.dk

China se adjudica contrato para cable de alta tensión submarino

La francesa Nexans ha firmado un contrato de 140 millones de Euros con la EHV Power Transmission Chinese Company de CSG y Guangdong Nan-Dian Power Equipment Co, para fabricar e instalar un enlace de suministro eléctrico submarino de 500 KV que conectará la isla de Hainan, en el extremo sur de China, con el territorio chino en la provincia de Guangdong.

El cable submarino de 30 Km, capaz de transportar hasta 600 MW de potencia, será instalado a una profundidad de 100 m aproximadamente. La entrada en funcionamiento de este enlace submarino está prevista para julio de 2009 y jugará un papel estratégico clave en el desarrollo de la isla Hainan como meta turística.

El enlace submarino estará formado por un cable impregnado en aceite con una sección de 800mm^2 y será fabricado en Japón por NVC, joint venture de la que Nexans posee el 66% y la empresa japonesa Viscas el 34%. El cable será instalado con el buque para el tendido de cables de Nexans, el Skagerrak.

▲ *Nexans suministrará el cable submarino de alta tensión que conectará la isla Hainan con China*

Patrick Barth, presidente de la actividad de alta tensión de Nexans, comentó "en julio de 2006 Nexans anunció la creación de NVC, joint venture con la japonesa Viscas, dedicada a la fabricación de cables submarinos de alta tensión y creada para aumentar inmediatamente la actividad de la empresa en el sector de la fabricación y asistencia de cables submarinos de alta tensión en los próximos años. Actualmente, este primer contrato ilustra perfectamente las necesidades de este mercado en rápido crecimiento. Gracias a esta alianza, Nexans puede responder a la demanda de sus clientes en China".

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En 2007 la producción de acero aumentará un 17% en China

En 2007 China representará aproximadamente un tercio de la producción mundial total de acero y consumirá casi toda su producción adicional, según un informe especial incluido en el Global Sectors Outlook de diciembre de 2006 elaborado por Euler Hermes, grupo líder mundial en seguros y créditos y parte de Allianz.

Según las previsiones, la producción china aumentará un 10% en 2007, tres veces más que su más próximo rival, Japón. El acero chino irá destinado principalmente al sector de la construcción (55%), bienes capitales (12%), automoción (5%) y electrodomésticos (2%). Incluso con este incremento de capacidad, China necesitará importar acero para responder a la demanda.

Brasil, Rusia y La India, que junto con China forman la alianza BRIC, también incrementarán su producción de acero en 2007 gracias a la modernización de los equipos de producción, mano de obra barata y acceso a recursos naturales como el hierro, esencial para el buen funcionamiento de los altos hornos que producen arrabio, del que representan el 65% de la producción mundial.

"El aumento exponencial de los precios del acero no es debido al desbalance tradicional entre la oferta y la demanda, sino más bien a la explosión de los precios de las materias primas como el hierro y la chatarra", explicó Philippe Brossard, jefe del equipo de investigación de Euler Hermes SFAC. "El voraz apetito de productos de primera necesidad experimentado por China contribuyó a la consolidación del mercado. Por sí solo el país representará este año más del 40% de las importaciones mundiales de hierro, procedentes principalmente de Brasil y Australia. Incluso así, se prospecta un posible respiro en los precios del acero en 2007, con precios que bajarán a partir de la segunda mitad de 2007 paralelamente a la ralentización de la economía mundial".

Los pronósticos en el sector del acero se basan en la experiencia en microeconomía de los aseguradores y analistas del grupo Euler Hermes, quienes siguen de cerca el riesgo de las compañías en todo el mundo a través de su red de 30 subsidiarias locales.

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Significado de la denominación social

Tras un periodo de rápido crecimiento, Techint Technologies ha tomado la estratégica decisión de cambiar su nombre por Tenova.

Con el prefijo "Te" la empresa mantiene su sólido vínculo con el Grupo Techint y con Technology, y con el término "nova" hace referencia a un claro compromiso con la innovación, factor clave para una empresa proveedora de tecnologías avanzadas.

Tenova es una red de compañías sinérgicas que ofrece soluciones integradas innovadoras para todas las áreas de proceso.

Los pedidos entrantes han superado el escalafón de los 1.000 millones de dólares y se espera que aumenten en los años venideros.

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Transatlantic Cable

Immigration

Microsoft chairman Bill Gates offers his own recommendation for US excellence: an infusion of foreign talent

When Bill Gates addresses himself to the subject of US competitiveness in the global economy, it is no surprise to hear him identify innovation as key. It is also to be expected that the founder of Microsoft Corp will praise the scientists and engineers, trained in American universities, who pioneered the microprocessor technologies that made his very considerable fortune. (Worth $56 billion in 2006, Mr Gates was the world's richest man for the 13th consecutive year.)

To keep that stream open, Mr Gates stresses the need for strong schools to ensure that young Americans enter the workforce with the maths, science, and problem-solving skills they need to succeed in the knowledge economy. This is widely conceded to be a matter of some urgency. On an international maths test given to high school students in 2003, the US ranked 24th among the 29 industrialised nations surveyed. What is more surprising, coming from Mr Gates, is the second part of his prescription for American competitiveness in the global economy: immigration reforms that reflect the importance of highly skilled employees from overseas. He asserts, "We must make it easier for foreign-born scientists and engineers to work for US companies."

In an open letter to the *Washington Post*, Mr Gates observed that demand in the US for specialised technical skills has long exceeded the supply of native-born workers with advanced degrees. The United States provides 65,000 H-1B (temporary, non-immigrant) visas each year to make up the shortfall, but this is not nearly enough to fill even the technical positions available now. ("How to Keep America Competitive," 25th February).

In Mr Gates's view, permanent residency regulations compound the issue. Temporary employees wait five years or longer for the permanent-resident accreditation ('green card') that usually precedes full citizenship. Mr Gates notes the problem here: "During that [waiting period] they can't change jobs, which limits their opportunities to contribute to their employer's success and overall economic growth."

Last year, reform on immigration issues stalled as Congress concerned itself with border security. With lawmakers again taking up these issues, the Microsoft chairman urged changes to both the H-1B visa and the green card programmes.

According to Mr Gates, who must know a thing or two about such matters, highly skilled professionals from other countries 'are vital to US competitiveness, and we should welcome their contribution to US economic growth.'

- Mr Gates also advised the US to encourage foreign students to stay after graduation. Half of the country's doctoral candidates in computer science come from abroad. The Microsoft chairman told the *Washington Post* readers, "It is not in our national interest to educate them here but send them home when they've completed their studies."

Of related interest . . .

- US government money for free-of-charge instruction in the English language is supplemented at varying rates from state to state, for a patchwork of programmes that according to advocates does not come close to meeting the need. The Department of Education reported that 1.2 million adults were enrolled in free public English programmes in 2005 – about one in 10 of the 10.3 million foreign-born residents 16 and older who speak English not at all or 'less than very well,' according to Census figures from the same year.

  As immigrants increasingly settle away from large urban centres (the suburbs of New York City have seen a net gain of 225,000 since 2000, compared with 44,000 in the city itself), many face a long wait for admittance to the government-financed English classes. A survey last year by the National Association of Latino Elected and Appointed Officials found that, in 12 states, 60% of the free English programmes had waiting lists ranging from a few months to as long as two years.

Fiscal Matters

China may sell its US Treasury bonds, auguring a rate rise for Americans. The government of China said on 9th March that it would look for more aggressive ways to invest sizable portions of its massive foreign-exchange reserves, the world's largest. Analysts said the new Chinese pool of money, expected to total $200 billion to $300 billion, would instantly create one of the world's most powerful investment funds.

In the *Chicago Tribune* for 10th March, William Sluis wrote: "With much of China's $1.07 trillion in currency reserves invested in ultrasafe US Treasury debt, a significant shift out of the American bond market could have an impact on American consumers. Interest rates would rise, making it more expensive to borrow money for a home mortgage or car loan or to pay credit card debt."

Chinese officials said they planned to form a government agency – the State Foreign Exchange Investment Co – to manage some of its holdings. Mr Sluis saw in this an indication that China has tired of earning small and predictable returns and wants to look elsewhere.

The announcement should not have come as a surprise. The Chinese have been threatening for several years to look for new investment opportunities for their ample reserves. Even so, for the last decade Americans have more or less taken for granted huge holdings of Treasury bonds by both China and Japan. Their portfolios of the reliable 'T-bills' have helped to hold down long-term interest rates in the US, especially for house buyers. For Americans, 'this will be a challenge, no doubt about it,' economist John Silvia of Wachovia Corp, told the *Tribune*. "It likely will mean higher mortgage rates and a weaker dollar. But these effects could take five or 10 years to be fully felt."

Another economist, Chicago-based William Hummer, of Wayne Hummer Investments, took the view that Americans should

welcome the news from China. He said: "Our government has been demanding that the Chinese take steps to boost their currency, which is too cheap and is creating inflation."

Mr Hummer predicted that diversification of Chinese assets around the globe will do little harm in the US. If the dollar weakens a bit against the Chinese yuan, so much the better, he said. Why? It might slow the torrent of goods coming into the country, making American factories more competitive.

- If China does go ahead with its plan to place hundreds of billions of dollars in 'strategic assets' around the globe, it is considered likely to move at a measured pace to avoid disruption of its sizeable investments in the US. In the opinion of Chicago investment manager Marshall Front, any rapid or concerted selling could diminish the value of those holdings in China's top market. In the 21 months up to March, the Chinese allowed their currency to decline by about 7% against the dollar, partly to satisfy US demands.

  But any projected shift in Chinese reserves is bound to be regarded warily, if not with alarm, in Washington. Less than two weeks before China floated the diversification idea, a steep sell-off in Chinese stocks triggered a global sell-off in equities, including a brief 540-point drop in the Dow Jones industrial average. Global markets had not yet recovered from that setback when the diversification plan was announced.

Job growth resists downward tug of the US economy

Although some recent statistics point to a definitely weakening American economy, the trend has not yet affected the job market. The Labour Department's latest monthly report on employment, released 9th March, showed that employers added 97,000 workers in February, and the jobless rate edged down a notch to 4.5% from 4.6%.

While the economy may remain relatively sluggish, the new employment report suggests that a slower but still robust job market and rising wages should help keep Americans in spending money. It is the solid pace of their so-called discretionary spending that has bolstered the US economy for so long.

But, as much encouragement as the Labour Department report offered, it also raised some worry points. 40% of the new jobs tallied in February were created by localities, states, and the federal government. Businesses added only 58,000 of the private-sector jobs that economists consider fundamental to a hardy labour market. This was the lowest monthly total of these new jobs since November 2004.

As usual with employment statistics, they showed an uneven distribution of the good and bad luck. Workers in factories and on construction sites lost a combined 76,000 jobs – 62,000 in construction, reflecting both cold weather and a slowdown in new housing. The unemployment rate for construction workers jumped to 10.5% from 8.6% a year earlier.

On a demographic basis, the unemployment rate for Hispanics dropped to 5.2% from 5.7% in January.

Transatlantic Cable

The rate for blacks, 7.9%, and the rate for whites, 4.0%, each fell by a tenth of a percentage point.

In a separate report on 9th March, the Commerce Department said that the nation's trade deficit – the difference between what Americans export and import – narrowed in January, to $59.1 billion from a revised $61.5 billion deficit in December.

The change may seem negligible, but every dollar shaved off the stubbornly impacted deficit is greeted with joy in Washington.

In brief . . .

- New high-security drivers' licences issued by the Canadian province of Ontario will include the latest safeguards against tampering and identity theft.

  The Ontario government will spend between $10 million and $12 million a year for 10 years on the new licences, which are to feature two photographs of the driver and laser-engraved signature. But they will not contain citizenship or other personal information until the US agrees to allow them to be used in lieu of passports at border crossings.

  Since January, the US has required every air traveller to the country to have a valid passport. The White House wants to extend the same rule to land crossings by January 2008.

  According to the *Toronto Star*, Ontario is optimistic that the US will decide to consider the greatly enhanced licence an alternative to a passport.

  On 10th March, transportation reporter Tess Kalinowski wrote that, just the day before, British Columbia's minister for intergovernmental relations was in Washington, DC 'trying to persuade US officials of the merits of a scheme to synchronise drivers' licences in his province and Washington State,' to ease border crossings for the sake of both Canadians and Americans.

Open-skies treaty

Pact between the EU and the US promises more competition and higher capacity on lucrative transatlantic routes

On 2nd March, the European Union and the United States reached a preliminary agreement to eliminate almost all restrictions on air routes between the two areas.

Europe's transport commissioner, Jacques Barrot, announced 'decisive progress' in talks with US negotiators in Brussels toward concluding a hard-fought push

for the 'open skies' agreement that would lead to more flights and lower fares. If, as expected, the deal gains US Congressional approval, the new rules would take effect on 28th October.

The accord would allow European airlines to fly into the US from anywhere in the 27-member bloc, not just from their home countries.

Restrictions on US airlines flying to Europe would also be liberalised. Notably, authorisation to fly into Heathrow Airport, near London, UK, would be broadened. Under current rules, only two US carriers – American Airlines and Delta Air – have that right.

The agreement has existed in broad outline since November 2005, but was held up by the request of officials in Brussels for a change in US rules limiting equity ownership by foreign airlines in American carriers to 25% of the voting stock.

Eager for the open-skies deal, President George W Bush tried to persuade Congress to change the rules. But opposition from labour unions and some domestic airlines caused the administration to abandon the effort last December.

Now, both parties have somehow managed to finesse the problem, at least enough to justify a preliminary announcement.

The European Commission said that the US and Europe have agreed on 'rights in the area of ownership, investment, and control of US airlines by EU investors' – although it provided no details.

But a European official told Nicola Clark, of the *Washington Post* (3rd March) in Paris, that the US had consented to allow European airlines to acquire more than 50% of the total capital of a US airline without risking a legal challenge. Under current rules, for reasons of national security Washington may block investments that exceed such limits. ('US and Europe in Accord on Air Routes,' 3rd March)

❉ If Washington seems to have made a rather large concession here, the potential benefits of an open-skies policy are also considerable. According to the International Air Transport Association, a Geneva-based trade group, the transatlantic market represents 60% of global air traffic.

The IATA said it welcomed the announcement of a draft aviation agreement between the US and the EU as a 'first step in the right direction' for liberalisation of the industry, but called for more. IATA's director, Giovanni Bisignani, said: "Airlines are businesses. In any business, the ability to respond flexibly to consumer demand is critical to success. [This agreement] is a good start, but both sides must think bigger and lead the way."

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Airbus and Boeing

American delivery giant UPS walks away from a big Airbus order

United Parcel Service, the largest package delivery company in the world and the last remaining customer for the cargo version of the Airbus A380 superjumbo jet, said on 2nd March that it was cancelling its order for 10 of the planes. UPS (Sandy Springs, Georgia) cited concerns that Airbus would not be able to meet a revised schedule calling for delivery in 2012.

The cancellation of the $2.8 billion order is the latest blow to the European plane maker, which had just announced the details of a cost-cutting plan expected to result in the loss of 10,000 jobs over four years.

Only months earlier, the international courier service FedEx (Memphis, Tennessee) also abandoned an order for 10 of the big freighters, leaving Airbus without a customer for the A380. The pull-out by UPS – described by a company spokesman as a final decision – followed confirmation by Airbus on 26th February that it had halted work on the A380 to concentrate on the passenger version of the plane, now two years behind schedule.

While a formal presentation of its intention to withdraw will be made later, UPS said it understands that either party to the deal has the right to cancel the order.

Between them, Airbus (Toulouse, France) and Chicago-based Boeing account for virtually the entire global jet airliner business. Although Boeing declined to say whether it was in talks for the UPS contract, Chris Lozier, an analyst for the investment research firm Morningstar, told the *Chicago Tribune* (3rd March) that the cancellation is a 'crippling blow' for the entire Airbus cargo programme and a boon for Boeing.

"It almost spells the demise of that cargo business, because the alternative to the 380 is the [Boeing] 747," Mr Lozier said. "You would expect UPS to be at the negotiating table with Boeing right now, if not weeks ago, working out details for the 747."

Déjà vu for Boeing: an Air Force contract is challenged

Even as Boeing Co seemed poised to benefit from the United Parcel Service repudiation of a big contract with Airbus (see above), Boeing faced similar troubles of its own.

In a rare decision that could overturn its selection to provide the US Air Force with the next generation of search-and-rescue helicopters, the Government Accountability Office on 26th February recommended reopening the competition. If Boeing's bid 'no longer represents the best value to the government,' the GAO will recommend termination of the contract.

Lockheed Martin (Bethesda, Maryland) and Sikorsky Aircraft (Stratford, Connecticut) were surprised as well as displeased to lose out to Chicago-based Boeing for the $15 billion contract, awarded in November 2006. Both companies had submitted models that are newer, lighter, and more flexible than Boeing's 54,000-pound update on its Vietnam-era Chinook. They promptly lodged protests with the GAO, the auditing arm of Congress.

Less than 30% of such protests are taken up by the GAO but it lent an ear to the Lockheed and Sikorsky complaints. Finding in favour of the two companies, the GAO said that in its selection of Boeing the Air Force had violated its own cost-analysis rules. The agency moreover held that Lockheed and Sikorsky should be reimbursed for their legal expenses in lodging the complaint.

This episode is uglier than the decorous Airbus-UPS rupture. Lockheed even accused the Air Force of using two sets of books in an effort to steer the contract Boeing's way.

Greg Caires, a Lockheed spokesman, said in a statement last November, "The competitors received different instruction during the competition."

If Boeing does lose the helicopter contract, it will revive memories of a conflict-of-interest scandal that ended last year in prison terms for top Boeing and Air Force officials. At the centre of that unsavoury case, which cost Boeing billions in Pentagon contracts and more than $600 million in fines, was a former Air Force official who was found to have shepherded billions of dollars in contracts toward Boeing. Some of these, too, are now being bid again.

While the GAO recommendation in the current case is non-binding, it would be unusual for the Air Force to ignore its findings. The GAO criticised only the financial analysis used to award Boeing the contract. It did not comment on the relative merits of the various helicopters evaluated.

Notes on telecom . . .

* Escalating its effort to bring its case under American jurisdiction, **Vivendi**, the French conglomerate, said on 2nd March that it had new ammunition in its long-running dispute with **Deutsche Telekom** over control of a Polish

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cellular company. Vivendi asserts that Deutsche Telekom, the parent of **T-Mobile USA**, colluded with a Polish investor to illegally transfer its shares in the Polish company, wiping out a $2.5 billion investment.

The latest development came more than four months after Vivendi sued the German telecommunications company in Federal District Court in Seattle under the Racketeer Influenced and Corrupt Organisations Act, or RICO, a law originally intended to combat organised crime.

The RICO suit, which is considered by legal experts to be a long shot, follows years of unsuccessful attempts by Vivendi to recover its investment by way of European courts.

❊ New England's power grid comprises nearly 8,000 miles of high-voltage lines that feed local lines. Now, the two biggest utilities in southern New England are developing plans to spend up to $1 billion constructing 80-100 miles of high-voltage electric transmission lines to make the regional power grid more reliable and keep up with steadily growing energy demand.

As reported by Peter J Howe in the *Boston Globe* (7th March), within months **National Grid USA** and **Northeast Utilities** will present state regulators in Massachusetts, Connecticut, and Rhode Island with proposed routes.

For years, US Energy Department and regional electric officials have been warning that the New England power grid needs to be upgraded. With new financial incentives provided by the 2005 national energy bill, several projects are getting underway.

Even so, the latest expansion plans are almost certain to arouse local concern. Mr Howe noted that all seven corridors where the utilities want to upgrade transmission capacity already have power-line rights of way that are hundreds of feet wide and filled with tall towers and electric lines.

Dorothy Fabian
USA Editor

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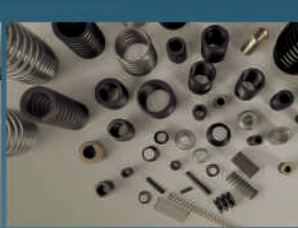
As the cars move you through the day, as an elevator connects you to the building, as a bridge connects you to the road and as a ship connects you to the ocean...
Kiswire connects the world through a safe and simple place to live through a new and high technology.



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EFAF delivers coiling line to Bangkok

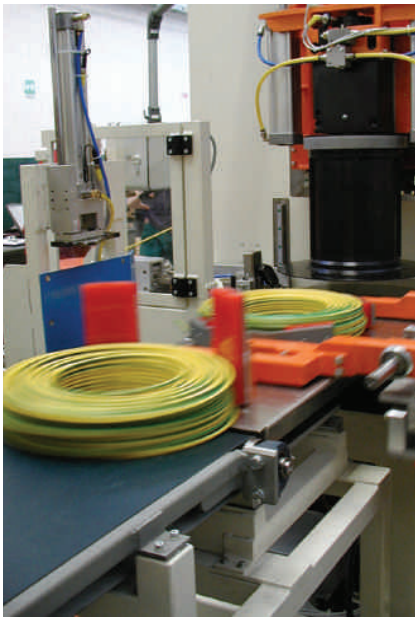
After the successful launch of the new automatic coiling line from EFAF in Europe, the first one has been delivered to the Far East – to the Yazaki Group in Bangkok, Thailand.

The coiling line works in-line with the extruder and is composed of a horizontal accumulator, the coiler model Mautomatic 300 Evolution, two trolleys for the manipulation of the coils, two automatic toroidal strapping machines and one coil accumulation rolling device.

The coiling line has been optimised, not only mechanically and electrically (it is possible to control the traction on the cable with an accuracy of 0.1-0.2kg), but the encumbrance has also been reconstructed, and this coiling plant needs only 6.3 x 4m for a height of 3.3m.

This machine can process cable with minimum cross section of 0.5mm^2 up to a maximum of 6mm^2.

The cable in Yazaki's case passes directly through the towing device of the extruder in the accumulator of the coiling line, by excluding the accumulator of the extrusion line resulting in a reduction of effort and cost.



▲ *Automatic coil winding line Mautomatic 400 Evolution*

At the exit of the accumulator, the cable enters the coiler which is composed of the length measuring device, coiling head, traversing group, cutting group and spark tester (it is possible to add other quality control devices as well, such as lump and neck down detector).

If the spark tester detects a fault in the cable, it generates an alarm that allows the machine to reject that coil without stopping the cycle.

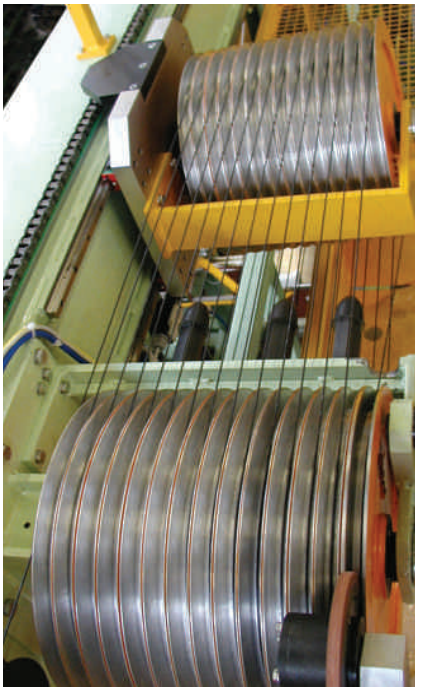
The customer can select the size of coil he requires as it is possible to change the height and external diameter, in addition to the internal diameter of the coil.

After the coiler, a double turning manipulator transfers the coils from the coiling head to the first or second strapping machine alternately.

The customer opted for the toroidal strapping machines. These devices package coils of different heights and internal and outside diameters without the necessity of equipping or preparing.

The number of straps is up to the customer: in this case there are three straps at 120° but it is also possible to have four straps at 90° or only two straps at 180°.

These strapping machines are also equipped with a control system on the bobbin on which the PP-Band is wound.



▲ *A horizontal accumulator*

When the strap is almost exhausted, an alarm warns the operator that the roll must be replaced, avoiding stopping the extrusion line. This example is only one of the possibilities that EFAF can offer to customers.

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technology at a glance

Read about the range of high performance cermics from CeramTec AG

Gauder's new solution to increasing productivity with single twist machines

An improved double head fully automatic spool winding line from PS

Petig has been among the leaders in the field of hydraulic cable cutters

Unique approach to achieve results

A unique approach by S & E Specialty Polymers' research and development team has led to the development of a new generation of TPO-based zero Halogen compounds under its GTPO-9100 series.

The compounds offer excellent physical properties, a temperature rating of 90°C-105°C and can be produced in a wide Durometer Range. Applications for the product include communication and fibre optic cables.

A second major breakthrough was also achieved after an unconventional method was used to simulate the Steiner tunnel conditions in the laboratory.

The FS-1000 Plenum compound is RoHS compliant and combines great processability along with outstanding electrical characteristics. This makes it suitable for not only PVC/PVC applications but also for the applications requiring higher electrical categories in wire and cable.

S & E Specialty Polymers continues to be a strong player in other markets such as:

- FR Polypropylene compounds, with unique combination of high impact properties and stiffness for moulding application
- flexible, FR TPO-based compounds for extrusion application
- specialty PVC compounds, formulated to meet the toughest customer specifications

The company also offers tolling services utilising a variety of compounding equipment, including Banbury, Twin Screw and FCM.

S & E Specialty Polymers – USA
Fax: +1 978 534 8362 **Website**: www.sespoly.com

New machine for testing railway springs

Guilin Wintime Testing Machine Co Ltd, China, is an expert in load testing, with nearly 15 years' experience of manufacturing spring testing machines, torsion testing machines and universal testing machines.

The company recently developed the TCD-C computer controlled spring testing machine, for testing railway springs with maximum load capacity of 600kN, to meet the requirements of updated national standards of suspension spring testing, according to the European standard.

▲ *The new TCD-C spring testing machine from Guilin Wintime Testing Machine Co Ltd*

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New automatic spool winding line

PS Costruzioni Meccaniche has launched a new, improved double head fully automatic spool winding line.

The enhanced features are most noticeable in regard to the restart time between one wound spool and the next one.

While the first spooling head is winding the cable, the second head has completed the winding cycle thus enabling the final spool to automatically proceed to the palletising area.

The PS 200/6/B enables customers to double a normal machine output, thanks to the two winding heads working at the same time.

This machine can accommodate approximately 200 cardboard, aluminium, plastic, plywood and wooden spools which are located into two separate stores. The spool ranges are flange outer diameter from 100mm (3.94") to 200mm (7.88") and flange width from 50mm (1.97") to 190mm (7.49").

The PS 200/6/B process specifications are:

- bore centering (to start the winding operation)
- cable layer on layer winding
- cable measuring accuracy ±0.1%
- spark tester cable insulation tests
- pneumatic and fast cable cutting

▲ *New launch from PS Costruzioni*

- end-product packaging by polyethylene film
- division between end-products with insulation defects and correct end-products
- labelling
- palletising (a Cartesian axis palletiser)
- pallet wrapping

The machine can produce more than four spools of 100m (328.08ft) per minute. The cable sections can vary from 0.65 to 6.53mm² (AWG from 19 up to 9).

The wireguide comes with CNC digital technology, and special CNC software helps to obtain perfect winding results. On request, an in-line cable diameter detector can be included. It can correct any cable diameter modification in real time.

PS Costruzioni Meccaniche Srl – Italy
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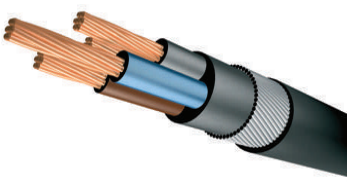
Armoured cables delivered worldwide

Since 1992, Atom Kablo has been one of the leading electric cable manufacturers and exporters in Turkey.

Focusing mainly on steel wire armoured (SWA) low voltage installation power and control cable types and building wires, the company supplies to national, international and customer specific standards that meet the requirements of ISO 9001:2000.

Strategic planning has led to Atom Kablo being able to serve its customers with the most advanced technology, specialist staff and modern laboratory facilities.



▲ *Quality standards to ISO 9001:2000 levels*

The company holds the ISO 9001:2000 certificate from BASEC (British Approvals Service For Cables) and ISO 14001 certificate from TSE (Turkish Standards Institute).

Regarding cable approvals, Atom Kablo already has BASEC, VDE, TS approvals for some of products. TS, BS, HAR, VDE, IEC, IS, ISI are the main cable standards. The company is also capable of manufacturing PVC, PE, XLPE, HFFR insulated or sheathed low voltage cables.

Atom Kablo – Turkey
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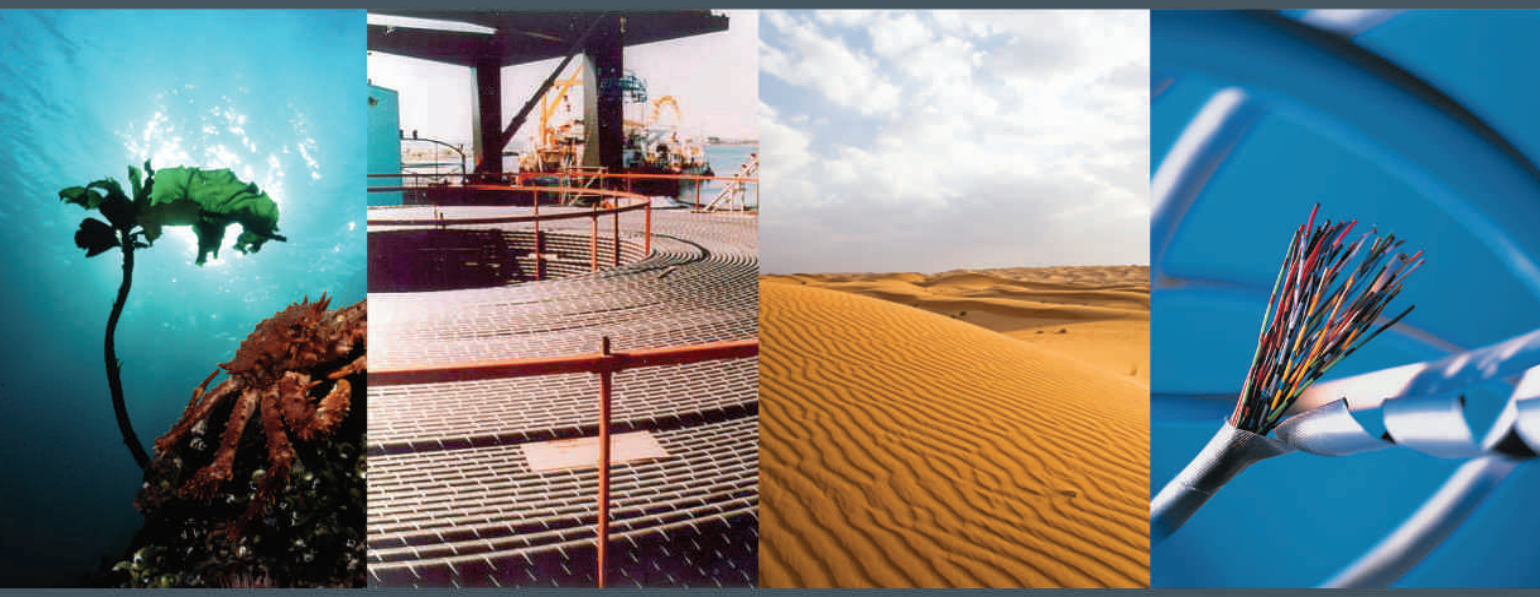
Fax: +90 216 4670 439
Website: www.atom.com.tr

Scapa

Scapa Cable Solutions



Cable solutions for all environments

Scapa Cable Solutions is the brand new name for the cable division of Scapa Group plc. This new name reaffirms our commitment to this key expanding market, and our continually developing cable tapes and components range.

Cable Wrapping Tapes
Our high quality range of technical cable wrapping tapes are widely used in the manufacture of power, telecommunications, data and sub-sea cables. Whatever your project needs, Scapa has the right product for you whether it be insulative, semi-conducting, fire retardant, bitumenised or water swellable tapes.

Components
Servicing all the market leading cable kit manufacturers, Scapa's range of self amalgamating tapes, putties, stress control products and resins for jointing, terminating and repairing the full range of cables

To be one of the first customers to receive the new Scapa Cable Solutions product brochure please e-mail your full name, address and product range interest to marketing@scapacable.com today.

For more information please contact our Cable Solutions sales team on:

Tel +44 (0) 870 871 3131
Fax +44 (0) 161 301 7445
E-mail sales@scapacable.com

www.scapacable.com

Scapa Cable Solutions

part of Scapa Group plc

Saving materials and money with Sikora

The X-Ray 8000 and X-Ray 2000 from Sikora measure power cables without requirements of calibration or lengthy set-up routines, with information available as soon as the extrusion is started.

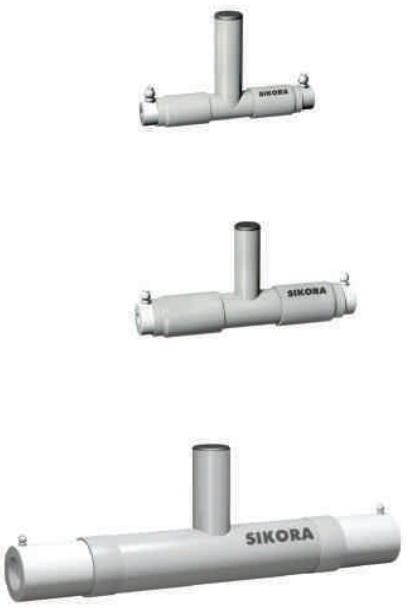
Sikora's technical approach provides the operator with information when he needs it saving materials and money.

The Ecocontrol 2000 processor system provides for the integration of the range of Inline 2000 series gauges into one common system.

The touch-screen driven device simplifies operator interface while offering the state-of-the-art approach to FFT/SRL examinations, tandem extrusion control and eccentricity graphical analysis.

The full range of Inline 2000 systems start with the support of the diagnostics software for each device.

This software for the full range of devices offers flexibility in ease of configuration, as well as expanding the range of information available from a standard device.



▲ *Take the technical approach from Sikora*

True innovation reflects the technique employed in the Laser 2000 series XY and triple axis diameter measurement devices. No moving parts means lower maintenance and cost of manufacture while laser diffraction analysis techniques, supported by Texas Instruments DSP, provides the highest data rates and FFT/SRL analysis done inside the device.

The Centerview 2000 series provides non-contact measurements of eccentricity, diameter and wall thickness all from one system on a non-contact basis. The other devices of the Inline 2000 range of products offer similar benefits.

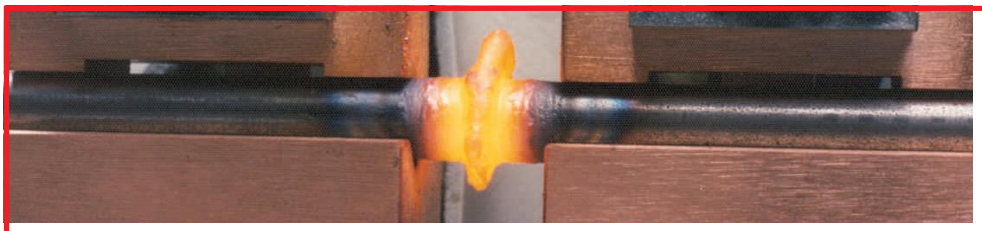
Sikora AG – Germany
Fax: +49 421 489 0090
Email: bodmann@sikora.net
Website: www.sikora.com

Choice is endless

Tempering, annealing, hardening, quenching, solution annealing, forging, curing, pre-heating, drying, ageing – these are only some of the applications which can be completed with Nabertherm's extensive programme of furnaces and systems.

From the compact hardening furnace up to fully-automatic systems with conveying technology and process documentation, Nabertherm has one of the broadest product ranges for furnaces in the world. Besides the annealing and hardening furnaces, also offers a wide range of accessories for the hardening shop.

Nabertherm GmbH – Germany
Fax: +49 4298 922129
Email: info@nabertherm.de
Website: www.nabertherm.com



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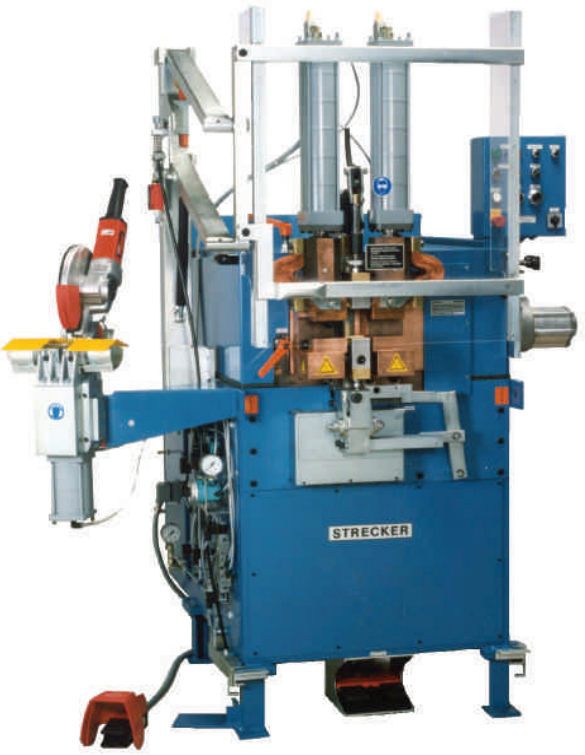
Wire mm dia.
Steel: 0.10-35
Copper:..... 0.10-30
Aluminium:..... 0.80-34

Stranded mm²
Copper:..... 0.08-1200
Aluminium:..... 1.50-1200



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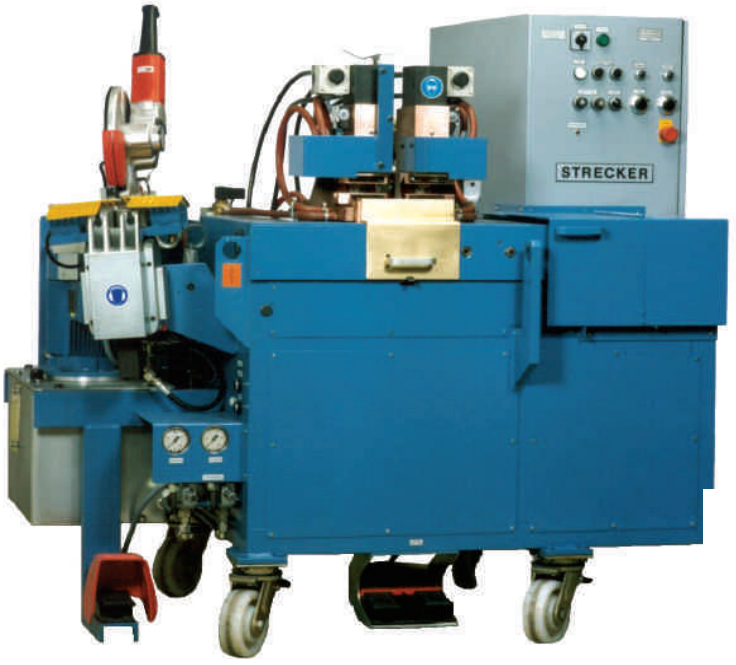

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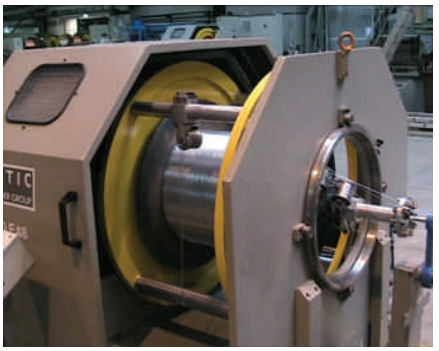
Internet: www.strecker-limburg.de



▲ *The TEC 630-SWA from Pourtier-Gauder Group*

Speeding up the armouring process

Steel wire armouring on small cables with a diameter of up to 20mm is a very time consuming process, as the linear speed is low due to short lay-lengths.

Pourtier-Gauder Group has developed a concentric solution achieving at least 2.5 times the productivity with conventional, single twist machines. The principle of the TEC 630-SWA machine is based on the 'concentric multi-wire' principle already applied by Pourtier for wire screening.

Customers can test this solution on a Pourtier production line.

Pourtier-Gauder Group – France
Email: sales.pourtier@gaudergroup.com
Fax: +33 16426 6110
Website: http://pourtier.gaudergroup.com

Cutting the Petig way

For many years Petig has been among the leaders in the field of hydraulic cable cutters.

▲ *A vast range of cable cutters*

Long before the hydrocut steel cutter made its appearance in the wire rod mills of the world, the first cable and wire rope cutters had been presented to Petig customers.

Since then a vast family of hydraulic cable cutters has resulted. The cutters, which are made in eight sizes, have differing capacities. The smallest shear cuts to a maximum diameter of 16mm while the largest shear copes with a maximum of 225mm.

Friedrich Petig GmbH – Germany
Fax: +49 2181 73108
Email: info@petig.com
Website: www.petig.com

At a glance . . .

With more than 30 years' experience, Nova specialises in engineering, design and manufacture for the wire and cable industries.

The Italian company's range includes double twist bunching machine, double twist stranding machine, double twist pairing and quadding machine, single twist machine, drum twister lines, pay-off, take-up, rewinding lines, taping, rigid cage stranding machine, planetary machine, tubular machine, caterpillar and tension equalisers.

For manufacturing by:

- EXTRUSION
- LAMINATION
- CALENDERING
- INJECTION/BLOW MOULDING
- FILMING

In applications as:

- ELECTRICAL CABLES
- AERIAL CABLES
- PIPES
- PROFILES & SHEETS
- GASKETS
- INJ. TECH. PARTS AND ITEMS

FRAGOM (HFFR)

GETILAN (XLPE)

POLIGOM (XEPDM)

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Tel. +39 +521 331411 – Fax. +39 +521 331400 – E-mail: cross@crosspolimeri.com - www.crosspolimeri.com

Rosendahl extrusion equipment

Rosendahl, a global supplier for turnkey extrusion equipment, provide a wide range of equipment for automotive wire applications, including: Single core extrusion lines with quick colour change systems; battery cable extrusion lines; multi-conductor cable jacketing lines and POF cable jacketing lines.

Single core extrusion lines: The production programme of Rosendahl, includes standard line types equipped with two extruders, as well as with quick colour change lines with three or four extruders. The auxiliary extruders are available as vertical machines, respectively, as horizontal machines. The operating range of a typical automotive wire extrusion line, covers the cross sectional range of 0.22 to 7mm^2.

Rocomat quick colour change system: The unique and patented Rocomat quick colour change system features a rotating shaft integrated into the crosshead. This design assures a maximum compactness.

Additionally, the Rocomat is also capable of realising the by-pass function of all extruders connected to the same system.

Scrap marker: Rosendahl lines can be equipped with a special scrap marker. This module provokes spark faults, which trace quality errors, such as welding points.

Cooling troughs: By using brake systems for deflection pulleys in the multi-pass cooling trough, the downtimes after wire breaks can be reduced significantly. The highly efficient cable dryers ensure a proper function, even at top line speeds.

Take-up systems: Rosendahl's single core extrusion lines are available with different take-up systems, such as double spoolers, barrel coilers and ring coilers.

Rosendahl Maschinen GmbH – Austria
Fax: +43 3113 510059
Email: office@rosendahlaustria.com
Website: www.rosendahlaustria.com

Solving your problems . . .

▲ *Wide range from CeramTec*

Wire drawing and forming is part of the mechanical applications division of CeramTec AG.

The range of high performance ceramics includes ceramic forming and casting rollers, guide elements and idlers, forming rings, drawing disks, cones and rollers, and tube forming, bending and widening tools.

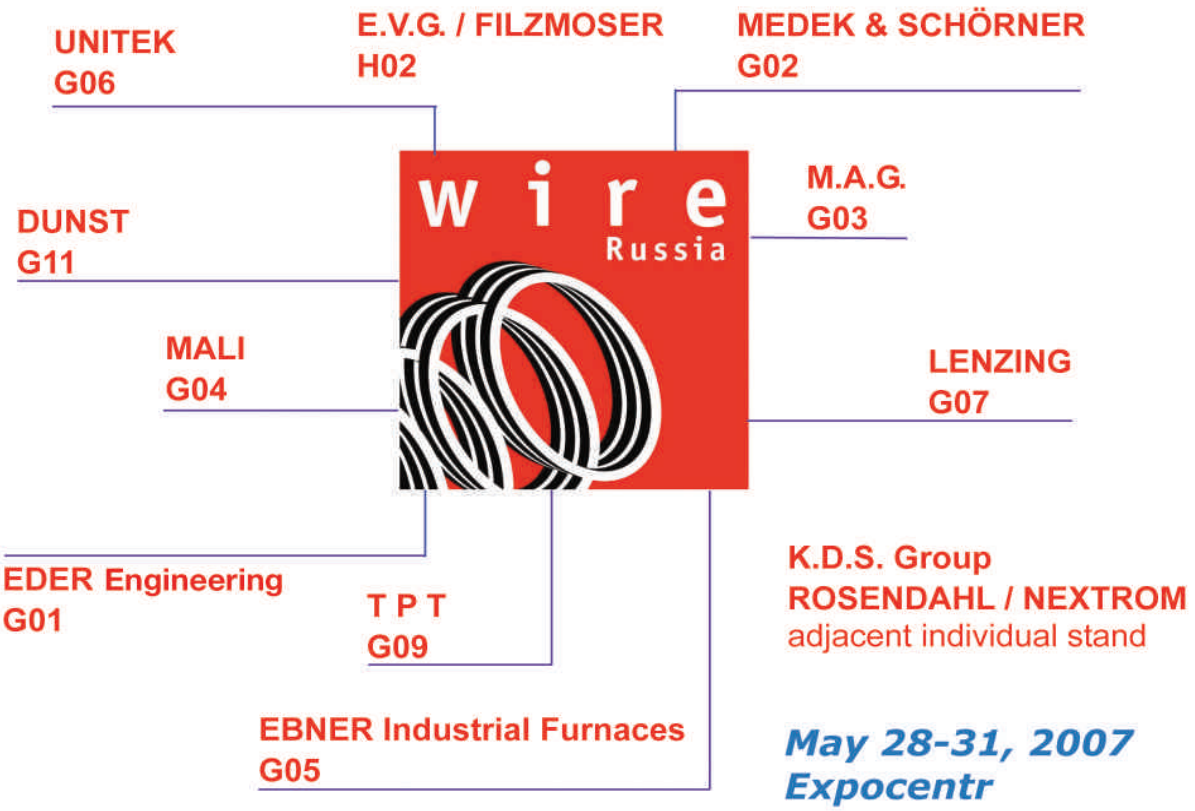
CeramTec AG – Germany **Fax**: +49 7153 611601
Email: mechanical_applications@ceramtec.de
Website: www.ceramtec.com

AUSTRIAN WIRE & CABLE MACHINERY MANUFACTURERS ASSOCIATION

With 22 member companies and since 1988 under the lead of Dr. Kurt G. EDER, the Austrian association will be present at ***„ Wire RUSSIA 07"*** *with a huge attractive* ***"AUSTRIAN PAVILLION"****, jointly organised by the* ***AWCMA*** *and the* ***Austrian Federal Economic Chamber*** *and with a remarkable number of companies exhibiting therein as well as on adjacent individual stands.*

VÖDKM / AWCMA
Stand No. 1-G01

The following enterprises will display their leading products and technologies for the C.I.S. wire- and cable industry under the below stated stand numbers:



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MEET US AT WIRE RUSSIA 2007 MOSCOW

At the favourably positioned ***„AWCMA/VOEDKM Stand/G01"****, which - for easier servicing of visitors - has been combined with the EDER stand, information and catalogues about all member companies and their special products will be available, particularly also of those enterprises who cannot be present in Moscow this time.*

Besides of printed and verbal information available in Russian language, the AWCMA, jointly with the ***Austrian Federal Economic Chamber/H01*** *also has arranged a special* ***"Café Vienna "****, which will be at the full disposal of our exhibiting member companies and their visitors and friends there.*

Come and see leading technology "made in Austria"

Greater efficiency

Nuova Tecno Tau's new delta line enamelling plant is designed to help producers of enamelled wire cut production costs.

Around a third of the production cost is used in electrical energy consumption.

▲ *NTT – driving down production costs*

The delta line combats this by ensuring the energy developed inside every enamelling oven is not reaching the outside.

Additionally, a new steam generator system uses the hot air from each enamelling oven to produce the necessary steam for the annealing oven. This characteristic allows the delta line plant to claim the lowest electrical energy consumption at this time. During the design phase, technicians ensured that the machines were easy to use and maintain, adding to the cost savings.

For this reason the annealing ovens are assembled externally from the enamelling oven frame, providing a generous space to access the electrical heaters.

The enamel applicator can easily be removed for a thorough cleaning.

The transmission belts and motors are also assembled in such a way that makes them easily accessible to the operator. In other words, this project considers an elevated technology that allows greater efficiency and high levels of productivity.

Nuova Tecno Tau Srl – Italy
Fax: +39 0161 423920
Email: scaringella@ntecnotau.com
Website: www.ntecnotau.com

Devotion to research and design pays off

Devotion to research and design has led to Wire Technology and Machinery (WTM) earning an enviable reputation as a specialist in designing, manufacturing and installation of concentric taping lines, rewinding equipment and special machines for companies worldwide.

The most recent development of WTM includes a new range of high speed single-twisting machines, also suitable for small and medium special cables, with the possibility to use bobbins from din.630 up to din.1000.

These lines can be equipped with detorsion pay-offs, in-line tapers, and other devices like in-line feeders suitable for fibre or yarn to be coupled to the twisted wires.

WTM Srl – Italy
Fax: +39 049870 5599
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Website: www.wtmachinery.com

Quality, heavy-duty wire drawing machinery.

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info@tecnoimpianti-italy.com

www.tecnoimpianti-italy.com

Mit EFAF nach Osten zielen!

Nach der erfolgreichen Einführung der neuen automatischen Aufwickellinie von EFAF in Europa, wurde nun die erste dieser Anlagen nach Fernosten geliefert, an die Yazaki Group in Bangkok, Thailand.

Die Aufwickellinie läuft Inline mit dem Extruder und besteht aus einem horizontalen Speicher - dem Aufwickler-Modell Mautomatic 300 Evolution - zwei Wagen zur Handhabung der Spulen, zwei automatischen toroidalen Abbindemaschinen und einer Spulenspeicher-Walzvorrichtung.

Die Aufwickellinie wurde nicht nur mechanisch und elektrisch optimiert (der Zug am Draht kann mit einer Präzision von 0,1-0.2kg gesteuert werden), sondern auch der Raumbedarf wurde reduziert, d.h. daß diese Aufwickelanlage nur ein Platzbedarf von 6,3 x 4m bei einer Höhe von 3,3m benötigt.

Diese Maschine kann Kabel mit einem Querschnitt von mindestens 0,5 bis mm^2 höchstens $6mm^2$ verarbeiten.

Die Kabel in der Yazaki-Anlage laufen direkt durch die Schleppvorrichtung des Extruders im Speicher der Aufwickellinie, wobei der Speicher der Extrusionslinie ausgeschlossen wird, was wiederum eine Reduzierung des Aufwands und der Kosten zur Folge hat.

Am Auslauf des Speichers läuft das Kabel im Aufwickler ein, der aus einer Vorrichtung zur Längenabmessung, einem Aufwicklerkopf, einer Verlegeeinheit, einer Schneideinheit und einem Durchlaufprüfgerät besteht (es besteht auch die Möglichkeit andere Qualitätsprüfvorrichtungen hinzuzufügen, wie z. B. Knoten- und Dellenwächter).

Wenn das Durchlaufprüfgerät einen Fehler am Kabel erfaßt, wird ein Alarm ausgelöst. Dadurch kann die Maschine diese Spule auswerfen ohne dabei den Zyklus anhalten zu müssen.

Der Kunde kann die Abmessung der Spulen nach eigenem Wunsch festlegen, da wie gewohnt die Höhe und der Außendurchmesser, und darüber hinaus auch der Innendurchmesser der Spule, gewechselt werden können.

Danach überträgt der Abwickler - ein doppelter Drehmanipulator - die Spulen vom Aufwicklerkopf abwechselnd zur ersten und zur zweiten Abbindemaschine.

Der Kunde hat sich für den Einsatz toroidaler Abbindemaschinen entschieden. Diese Vorrichtungen verpackten Spulen mit unterschiedlichen Höhen sowie Innen- und Außendurchmessern, ohne sie umrüsten oder vorbereiten zu müssen. Der Kunden

▲ *Horizontaler Speicher*

wählt die Anzahl an Bänder aus: in dieser Yazaki-Anlage werden 3 Bänder bei 120° vorgesehen, aber es können auch 4 Bänder bei 90° oder nur zwei Bänder bei 180° verwendet werden.

Diese Abbindemaschinen sind auch mit einem Steuerungssystem an der Spule ausgestattet, auf dem das PP-Band gewickelt wird. Wenn das Band fast leer ist, wird der Bediener durch einen Alarm gewarnt die Rolle zu ersetzen, damit die Extrusionslinie nicht angehalten werden muß.

Das ist lediglich ein Beispiel der Möglichkeiten die EFAF den Kunden anbieten kann.

Engineering Future AF Srl – Italien
Fax: +39 0583 981678
Email: efaf@efaf.it
Website: www.efaf.it

Einzigartige Weise um Ergebnisse zu erzielen

Eine einzigartige von der Forschungs- und Entwicklungsmannschaft von S&E Specialty Polymers ausgearbeitete Methode hat zur Entwicklung einer neuen Generation von halogenfreien Mischungen geführt, die auf TPO (thermoplastische Olefine) basieren und zur Baureihe GTPO-9100 des Unternehmens gehören.

Die Mischungen bieten hervorragende physikalische Eigenschaften, Temperaturnennwerte von 90 bis 105°C und können in einer breiten Durometerauswahl hergestellt werden. Zu den Produktanwendungen gehören Kommunikations- und Lichtwellenleiterkabel.

Ein zweiter wichtiger Durchbruch wurde ebenfalls erzielt nachdem eine unkonventionelle Methode eingesetzt wurde, um im Labor die Steiner-Tunnel-Bedingungen zu simulieren.

Die FS-1000 Mischung für Plenum-Kabel entspricht den RoHS-Richtlinien und vereinigt große Bearbeitungsmöglichkeiten mit außergewöhnlichen elektrischen Eigenschaften. Demzufolge eignet sich diese Mischung nicht nur für PVC/PVC-Anwendungen sondern auch für die Anwendungen, bei denen höhere elektrische Kategorien für Draht und Kabel erfordert werden.

S&E Specialty Polymers spielt ebenfalls eine starke Rolle in anderen Märkten wie z. B.:

- Flammwidrige Polypropylen-Mischungen, mit einer einzigartigen Kombination von hohen Stoßeigenschaften und Steife für Formanwendungen
- flexible, flammwidrige TPO-basierte Mischungen für Extrusionsanwendungen
- Sonder-PVC-Mischungen, derart entworfen, daß die strengsten Kundenspezifikationen erfüllt werden

Das Unternehmen bietet auch Werkzeugbestückungsdienste an, mit Einsatz von einer Vielzahl von Mischungsausrüstungen, einschließlich Banbury, Twin Screw und FCM sowie andere Ausrüstungen.

S & E Specialty Polymers – USA
Fax: +1 978 534 8362
Website: www.sespoly.com

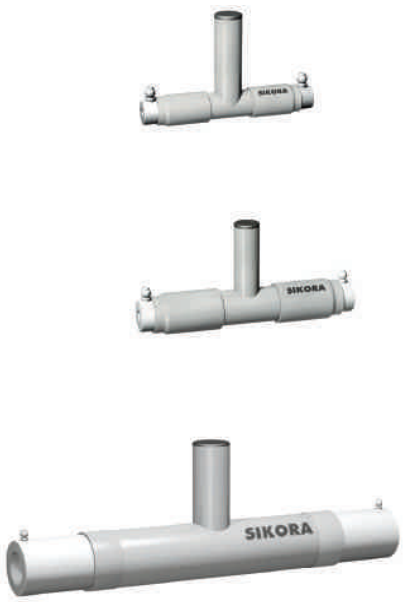
Mit Sikora Material und Geld sparen

X-Ray 8000 und X-Ray 2000 von Sikora messen Stromkabel ohne jegliche Kalibrierung oder zeitaufwendige Einstellungsroutinen, mit Informationen die sofort beim Anfahren der Extrusion zur Verfügung stehen.

Sikoras´ technische Einstellung bietet dem Bediener Informationen an, dank deren es ermöglicht wird Material und Geld zu sparen.

Das Ecocontrol 2000 Prozessorsystem dient als Ergänzung der Meßgeräteauswahl der Baureihe Inline 2000 zu einem herkömmlichen System.

Die mit dem Touchscreen betriebene Vorrichtung vereinfacht die Bedienerschnittstelle und bietet zugleich einen dem letzten Stand der Technik entsprechenden Zugang zu FFT/SRL-Prüfungen, Tandem-Extrusionsprüfung und der graphischen Exzentrizitätsanalyse. Die komplette Auswahl der Inline 2000 Systeme startet mit der Unterstützung der Diagnose-Software je Vorrichtung.



▲ *Sikora:eine technisch zu befolgende Einstellung*

Diese Software für die komplette Auswahl an Vorrichtungen bietet Flexibilität bei einfacher Gestaltung, sowie eine Ausweitung der Auswahl an Informationen, die von einer Standardvorrichtung verfügbar sind.

Wahre Innovation spiegelt sich in der für die Baureihe Laser 2000 eingesetzte Technik für die Meßvorrichtungen der XY-Achse und der dreiachsigen Durchmesser wider.

Da keine beweglichen Teile vorhanden sind, bedeutet dies eine geringere Wartung sowie niedrige Fertigungskosten, während die Techniken der Laserstrahlenbrechung, durch Texas Instruments DSP (digitaler Signalprozessor) unterstützt, die höchste Datenübertragungsgeschwindigkeit und FFT/SRL-Analysen bieten, die im Vorrichtungsinneren erreicht werden.

Die Serie Centerview 2000 bietet berührungslose Messungen von Exzentrizität, Durchmesser und Wanddicke, alle durch ein einziges System, basierend auf einer berührungslosen Grundlage.

Die anderen Vorrichtungen der Produktauswahl Inline 2000 bieten ähnliche Vorteile an.

Sikora AG – Deutschland
Fax: +49 421 489 0090
Email: bodmann@sikora.net
Website: www.sikora.com

Hohe Präzision von Mikropack!

Der MPM-2000 Lichtwellenleiter-Multiplexer von Mikropack ist ein Hochgenauigkeitsgerät, das optisch eine Lichtquelle entweder zu 8 oder 16 Ausgängen in sequentieller Reihenfolge verbinden kann.

Darüber hinaus besteht die Möglichkeit ihn an ein Spektrometer zu 8 oder 16 Eingängen optisch zu verbinden.

Multiplexer werden oft in Industrien eingesetzt, wie z. B. in der Chemie-, Pharma-, Labor- und Glassindustrie, wo das Bedürfnis besteht mehrere Stellen mit Mehrfachsonden zu messen, und zwar alle mit einem Spektrometerkanal und/oder einer Lichtquelle.

▲ *MPM-2000 Lichtwellenleiter-Multiplexer*

MPM-2000 bietet Präzisionsmessungen mit einer 99%igen Wiederholbarkeit sowie einen optischen Durchsatz von über 60%.

Das Licht wird in sequentieller Reihenfolgen, mit Schaltzeiten zwischen den Kanälen unter 150 Milisekunden, verteilt. Der MPM-2000 zeichnet sich durch einen präzisionsgesteuerten GS-Motor auf einem Rotatorblock aus.

Ein Encoder konvertiert die inkrementellen Bewegungen in einen digitalen Impulsausgang. Jeder Kanal ist mit einer einstellbaren Linse zum Anschluß an ein internes Lichtwellenleitersystem ausgestattet.

Zur Verfügung steht der optische Multiplexer als Version mit einem E/A, um eine Lichtquelle oder ein Spektrometer mit 16 Kanälen zu verbinden, sowie als Version mit zwei E/A, um eine Lichtquelle oder ein Spektrometer mit je 8 Kanäle zu verbinden.

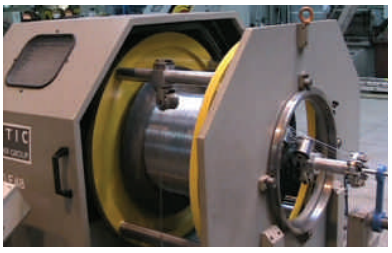
Sie stehen in den Versionen UV/VIS (250-800nm) sowie VIS/NIR (350-2000nm) zur Verfügung.

Der Multiplexer verbindet sich über einen RS-232-Port zu einem Rechner und ist mit Software und einem Treiber für die komplette Rechnersteuerung ausgestattet. Außerdem ist auch eine USB-Version verfügbar.

Mikropack GmbH – Deutschland
Fax: +49 71134 169685
Email: spektroskopie@mikropack.de
Website: www.mikropack.de

Armierungsverfahren wird beschleunigt

Die Stahldrahtarmierung bei kleinen Kabeln mit einem Durchmesser bis zu 20mm ist ein sehr zeitaufwendiges Verfahren, weil die Lineargeschwindigkeit auf Grund der kurzen Schlaglängen niedrig ist.



▲ *Die TEC 630-SWA von Pourtier-Gauder Group*

Pourtier – Gauder Group hat eine konzentrische Lösung entwickelt, die mindestens 2,5 Mal die Produktivität konventioneller Einzeldrehmaschinen erreicht. Das Prinzip der TEC 630-SWA Maschine basiert auf dem "konzentrischen Mehrdraht"-Prinzip, das bereits von Pourtier für die Drahtabschirmung eingesetzt wurde.

Pourtier-Gauder Group – Frankreich
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Email:
sales.pourtier@gaudergroup.com
Website:
http://pourtier.gaudergroup.com

Компания «ИФАФ» обращает взор на Восток

После успешного выпуска на европейский рынок новой автоматической намоточной линии производства компании «ИФАФ» (EFAF) первая аналогичная линия была поставлена и на Дальний Восток – для группы компаний «Язаки» (Yazaki) (г. Бангкок, Таиланд).

Намоточная линия работает в паре с экструдером и состоит из горизонтального накопителя, намоточного устройства модели Mautomatic 300 Evolution, двух тележек для перемещения бухт, двух машин тороидальной обвязки и одного роликового транспортера для укладывания бухт.

Оптимизация намоточной линии проведена не только по механическим и электрическим параметрам (предусмотрена возможность регулирования силы трения кабеля с точностью до 0,1-0,2 кгс), но и по габаритам: конструкция была модернизирована, и теперь намоточная линия в сборе занимает площадь

▲ *Горизонтальный накопитель*

всего 6,3 х 4 м при высоте 3,3 м. Машина может работать с кабелем с минимальным сечением 0,5 кв. мм и максимальным сечением 6 кв. мм.

На предприятии «Язаки» кабель подается непосредственно через тянущее устройство экструдера в накопитель намоточной линии, за счет чего устраняется необходимость в наличии накопителя на экструзионной линии, и, как следствие, обеспечивается снижение трудоемкости и затрат.

На выходе из накопителя кабель подается в намоточное устройство, состоящее из устройства отмера длины, намоточной головки, агрегата поворотного механизма, обрезной группы и искрового пробника (предусматривается возможность установки дополнительных устройств контроля качества, например, детекторов утолщения и сужения провода).

При обнаружении искровым пробником пробоя кабеля подается аварийный сигнал, по которому машина отбраковывает дефектную бухту, не прерывая рабочий цикл. Благодаря возможности изменения внутреннего диаметра бухты, а также ее высоты и наружного диаметра заказчик может задавать размеры бухт по своему усмотрению.

На выходе из намоточного устройства двухповоротный манипулятор передает бухты с намоточной головки попеременно на первую или вторую обвязочную машину. По желанию заказчика обвязочные машины поставлены в исполнении для тороидальной обвязки. Устройства

такого типа производят упаковку бухт различной высоты, внутреннего и наружного диаметра без дополнительной оснастки и без подготовительных работ. Количество обвязочных полос устанавливает сам заказчик: в данном случае обвязка выполняется с использованием трех полос под углом 120°, однако также возможен вариант обвязки с использованием четырех полос под углом 90° или всего двух полос под углом 180°.

Обвязочные машины также оборудованы системой контроля на бобине, на которой намотана полипропиленовая лента. Когда лента будет практически на исходе, аварийный сигнал предупредит оператора о необходимости замены рулона без останова экструзионной линии. Приведенный пример иллюстрирует лишь одну из возможностей, которые компания «ИФАФ» может предложить своим заказчикам.

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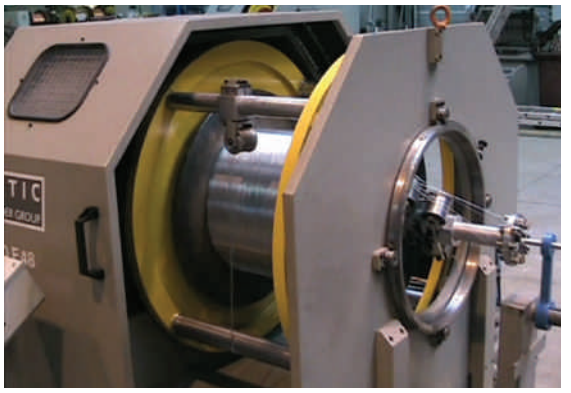
Ускорение процесса армирования

Армирование кабеля малых диаметров (до 20 мм) с использованием стальной проволоки – это весьма длительный и трудоемкий процесс, т.к. из-за малого шага скрутки линейная скорость при армировании получается невысокой.



▲ *Машина TEC 630-SWA производства группы компаний «Портье – Годер груп»*

Группа компаний «Портье – Годер груп» (Pourtier – Gauder Group) разработала новое технологическое решение концентрической намотки, позволяющее, по меньшей мере, в 2,5 раза увеличить производительность оборудования по сравнению с традиционными машинами одинарной скрутки. Принцип работы машины TEC 630-SWA основан на методе «концентрической многопроволочной навивки», уже применяемом компанией «Портье» для экранирования проводов. Заказчики могут проверить работоспособность новой машины в действии на технологической линии компании «Портье».

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Высокоточное устройство от компании «Микропак»

Оптоволоконный мультиплексор MPM-2000 производства компании «Микропак» (Mikropack) представляет собой высокоточный прибор, способный обеспечить оптическое сопряжение источника света по 8 или 16 выходным каналам в последовательном порядке. Кроме того, его также можно использовать для оптического сопряжения спектрометра по 8 или 16 входным каналам.

Мультиплексоры широко применяются, в частности, на химическом и фармацевтическом производстве, в лабораториях, стекольной промышленности, т.е. там, где необходимо произвести замер нескольких точек методом многократного зондирования, причем с использованием одного спектрометрического канала и (или) источника света.

Устройство MPM-2000 обеспечивает точность измерений с воспроизводимостью результатов, составляющей 99 %, при пропускной способности оптического канала более 60 %. Распределение оптического излучения осуществляется последовательно, время коммутации между каналами составляет менее 150 миллисекунд. В устройстве MPM-2000 на блоке вращателя установлен электромотор постоянного тока с точно регулируемым напряжением.

Кодовый датчик положения преобразует инкрементные перемещения в цифровой импульсный выходной сигнал. Каждый канал оборудован коллиматорной линзой, которая обеспечивает сопряжение с внутренней волоконно-оптической системой.

Оптоволоконный мультиплексор поставляется в исполнении с одним портом ввода/вывода для подключения источника света или спектрометра к 16 каналам, и с двумя портами ввода/вывода для подключения как источника света, так и спектрометра с выделением 8 каналов отдельно для каждого. Обе модели мультиплексора могут поставляться как в версии UV/VIS (250-800 нм), так и в версии VIS/NIR (350-2000 нм).

Мультиплексор сопрягается с ПК через порт RS-232 и поставляется

▲ *Оптоволоконный мультиплексор MPM-2000*

с программным обеспечением и набором драйверов, обеспечивающем полное управление этим устройством от персонального компьютера. Возможен также вариант поставки мультиплексора, оснащенного портом сопряжения USB. Программное обеспечение обеспечивает полное управление последовательностью коммутации, временем задержки коммутации и юстировкой системы.

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Продукция компании «Сикора» позволяет экономить материалы и денежные средства

Системы X-Ray 8000 и X-Ray 2000 производства компании «Сикора» (Sikora) обеспечивают проведение тестирования параметров силовых кабелей без необходимости в калибровке и продолжительной настройке служебных программ, с выводом необходимой информации сразу же после запуска экструдера.

Технология, примененная компанией «Сикора», обеспечивает оперативный вывод информации на экран оператора по его команде, что дает ощутимый эффект экономии времени и средств.

▲ *Инженерный подход компании «Сикора»*

Процессорная система Ecocontrol 2000 обеспечивает интеграцию в одной общей системе измерительных устройств серии Inline 2000. Наличие сенсорного экрана упрощает работу оператора и позволяет применять современные методы тестирования методом спектроскопии с Фурье-преобразованием (FFT), анализа структурных возвратных потерь (SRL), контроля двойной экструзии и графического анализа эксцентриситета.

В начале работы всех систем Inline 2000 запускается диагностическое программное обеспечение для каждого устройства. Программное обеспечение, предлагаемое для всего спектра устройств, обеспечивает эксплуатационную гибкость и легкость настройки, а также позволяет снимать дополнительные параметры со стандартного устройства.

В устройствах измерения диаметра серии Laser 2000 с двумя и тремя осями измерения применены инновационные технологии. Отсутствие движущихся частей ведет к снижению себестоимости продукции и затрат на техническое обслуживание, а методики лазерной дифрактометрии, реализуемые с помощью DSP-устройств компании «Тексас инструментс» (Texas Instruments), обеспечивают высочайшие скорости обработки данных и проведение анализа методом спектроскопии с Фурье-преобразованием (FFT) и анализа структурных возвратных потерь непосредственно в устройстве. Устройства серии Centreview 2000 обеспечивают бесконтактное измерение эксцентриситета, диаметра и толщины стенки инструментальными средствами одной системы.

Аналогичные усовершенствованные функции предлагаются и в других устройствах серии Inline 2000.

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Vers l'orient avec EFAF!

Après le succès du lancement de la nouvelle ligne de bobinage automatique de EFAF en Europe, la société a délivré sa première ligne en Extrême Orient au Groupe Yazaki à Bangkok, Thaïlande.

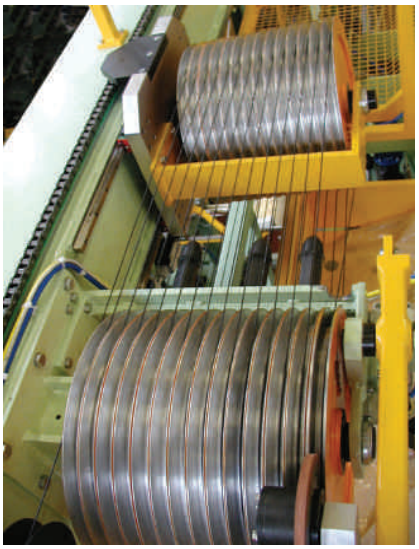
La ligne de bobinage fonctionne en ligne avec une extrudeuse et est composée d'un accumulateur horizontal, la bobineuse Mautomatic 300 Evolution, de deux chariots pour la manipulation des bobines, de deux cercleuses toroïdales automatiques et d'une rouleuse pour l'accumulation des bobines.

La ligne de bobinage a été optimisée non seulement mécaniquement et électriquement (il est possible de contrôler la tension du câble avec une précision de 0,1-0,2kg), mais il y a également eu une réduction des dimensions d'encombrement ce qui fait que le système de bobinage n'exige qu'un espace de 6,3 x 4m et une hauteur de 3,3m.

Cette machine peut traiter des câbles de section transversale minimale de 0,5mm^2 jusqu'à un maximum de 6mm^2.

Dans le cas de l'installation de Yazaki, le fil passe directement à travers le dispositif de traction de l'extrudeuse à l'accumulateur de la ligne de bobinage, en excluant l'accumulateur de la ligne d'extrusion avec pour résultat une réduction des efforts et des coûts.

À la sortie de l'accumulateur, le câble entre dans la bobineuse qui comprend le



▲ *Accumulateur horizontal*

dispositif de mesure de la longueur, la tête de bobinage, le groupe de trancanage, le groupe de coupe et le dispositif d'essai à l'étincelle (des dispositifs supplémentaires pour le contrôle de la qualité peuvent être ajoutés tels que le détecteur de nœuds et d'étranglements).

Si le dispositif d'essai à l'étincelle relève un défaut dans le câble, une alarme est générée permettant à la machine de rejeter la bobine sans interrompre le cycle.

Les dimensions des bobines peuvent être gérées par le client en fonction de ses exigences, grâce à la possibilité de modifier, comme d'habitude, la hauteur et le diamètre extérieur, outre le diamètre intérieur de la bobine.

Après le bobinoir, un manipulateur "à deux directions" transfère les bobines de la tête d'enroulement à la première ou à la deuxième cercleuse alternativement.

Dans l'installation de Yazaki on utilise des cercleuses toroïdales. Ces dispositifs permettent l'emballage de bobines présentant des hauteurs et diamètres internes et externes différents sans exiger aucun équipement ni préparation. Le client décide le nombre de ficelage à effectuer: dans le cas de l'installation de Yazaki il y a 3 ficelages à 120°, mais il est possible d'effectuer 4 ficelages à 90° ou seulement deux ficelages à 180°.

Ces cercleuses sont également équipées d'un système de contrôle de la bobine qui entraîne l'enroulement de la bande de polypropylène. Lorsque le feuillard est presque épuisé, une alarme signale à l'opérateur que le rouleau doit être remplacé, en évitant ainsi l'interruption de la ligne d'extrusion.

Cet exemple ne représente que 1'une des possibilités que le système du EFAF peut offrir aux clients.

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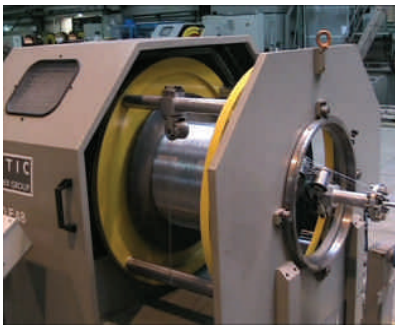
Processus de blindage plus rapides

Le processus de blindage des câbles d'acier de petites dimensions avec des diamètres arrivant jusqu'à 20mm est un processus exigeant beaucoup de temps, la vitesse linéaire étant basse à cause des pas d'enroulement réduits.

La société Pourtier, faisant partie de Gauder Group, a développé une solution concentrique permettant d'atteindre une vitesse de production d'au moins 2,5 fois supérieure à celle des machines à simple torsion.

Le principe de la machine TEC 630-SWA se base sur la technologie "multifil concentrique" déjà appliquée par Pourtier pour le blindage des fils. Les clients peuvent tester



▲ *La machine TEC 630-SWA de Pourtier-Gauder Group*

cette solution sur une des lignes de production de Pourtier.

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Coupage des câbles à la façon de Petig…

Depuis plusieurs années Petig fait partie des leaders dans le champ des coupeuses de câbles hydrauliques.

Bien avant l'introduction des coupeuses hydrauliques pour acier dans les laminoirs pour fil machine de par le monde, Petig avait déjà présenté à ses clients les premières coupeuses de câbles et fils d'acier.

Les coupeuses, qui sont disponibles en huit dimensions, présentent des caractéristiques différentes. La cisaille la plus petite permet d'effectuer un coupage jusqu'à un diamètre maximum de 16mm tandis que la cisaille de dimensions supérieures peut gérer un diamètre maximum arrivant jusqu'à 225mm.

Friedrich Petig GmbH – Allemagne
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Email: info@petig.com

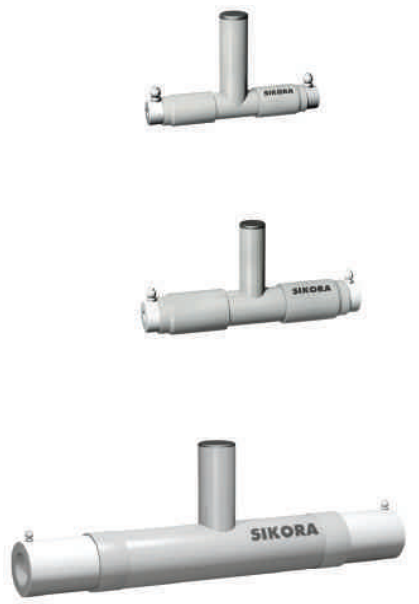
Économie de matériaux et d'argent avec Sikora

X-Ray 8000 et X-Ray 2000 de Sikora permettent d'effectuer le mesurage des câbles de puissance sans exiger de calibrage ou de longues routines de configuration, et de disposer des informations dès que l'extrusion est démarrée.

Grâce au système mis au point par Sikora, l'opérateur reçoit les informations au moment nécessaire en permettant ainsi une économie de matériaux et d'argent.

Le système à processeur Ecocontrol 2000 est conçu pour l'intégration de la gamme de jauges de la série Inline 2000 dans un système conventionnel. L'écran tactile simplifie les tâches de l'opérateur et offre une interface de pointe pour les analyses FFT/SRL, le contrôle de l'extrusion en tandem, l'analyse graphique de l'excentricité.

La gamme complète du système Inline 2000 comprend tout d'abord le support du logiciel de diagnostic pour chaque dispositif.



▲ *Sikora: une approche technique à suivre*

Ce logiciel, disponible pour la gamme complète de dispositifs, offre une grande flexibilité grâce à sa configuration simple, et la possibilité d'étendre la gamme d'informations disponibles par rapport à un dispositif standard.

La véritable innovation réside dans la technologie utilisée dans les dispositifs de mesure de diamètre des axes XY et à triple axe de la série Laser 2000.

L'absence de parties mobiles permet de réduire l'entretien et les coûts de fabrication tandis que les techniques d'analyse par diffraction de rayons laser, supportées par le processeur de signal numérique (DSP) de Texas Instruments, offre les vitesses de données les plus élevées et l'analyse FFT/SRL effectuée à l'intérieur du dispositif.

La série Centerview 2000 permet d'effectuer les mesures sans contact de l'excentricité, du diamètre et de l'épaisseur des parois, et ce au moyen d'un seul système sans contact.

Les autres dispositifs de la gamme Inline 2000 offrent des avantages similaires.

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Une approche unique pour obtenir des résultats

Une approche unique utilisée par l'équipe de recherche et de développement de S&E Specialty Polymers a amené au développement d'une nouvelle génération de composés sans halogène basés sur TPO dans sa série GTPO-9100.

Les composés offrent des propriétés physiques excellentes, à des valeurs de température allant de 90°C à 105°C et peuvent être produits dans une vaste gamme de duretés. Ce produit peut être également utilisé dans les câbles de communication et à fibres optiques.

Un progrès supplémentaire très important a été également réalisé en utilisant une méthode non conventionnelle pour la simulation des conditions du tunnel de Steiner dans le laboratoire.

Le composé pour câbles plénum FS-1000 est conforme aux spécifications RoHS et permet de combiner une ouvrabilité élevée avec des caractéristiques électriques excellentes. Ces caractéristiques font de ce dernier un produit indiqué non seulement pour des applications PVC/PVC, mais également pour les applications exigeant des catégories électriques supérieures du fil et du câble.

S&E Specialty Polymers reste toujours un producteur principal dans d'autres marchés tels que:

- composés de polypropylène ignifuges (FR), avec une combinaison unique de propriétés de haute résistance au choc et de rigidité pour des applications de moulage;
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S & E Specialty Polymers – États-Unis
Fax: +1 978 534 8362 **Website**: www.sespoly.com

Haute précision de Mikropack!

Le multiplexeur à fibres optiques MPM-2000 de Mikropack est un instrument de haute précision pouvant accoupler optiquement une source lumineuse à 8 ou 16 sorties en ordre séquentiel.

Cet instrument peut être également utilisé pour accoupler optiquement un spectromètre à 8 ou 16 sorties.

Le MPM-2000 permet d'effectuer des mesures précises avec une répétabilité de 99% et offre une portée optique supérieure à 60%.

La lumière est distribuée en ordre séquentiel, avec des temps de commutation entre les canaux inférieurs à 150 millisecondes. Le multiplexeur MPM-2000 est équipé d'un moteur à CC contrôlé avec précision sur un bloc rotatif.

Un codeur permet la conversion des mouvements incrémentaux dans une sortie d'impulsion digitale. Chaque canal est pourvu de lentilles de collimation se connectant à un système de fibres optiques intérieur.

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Verso l'oriente con EFAF!

Dopo il successo del lancio della nuova linea automatica di bobinatura di EFAF in Europa, la società ha consegnato la sua prima linea in estremo oriente al Gruppo Yazaki a Bangkok in Tailandia.

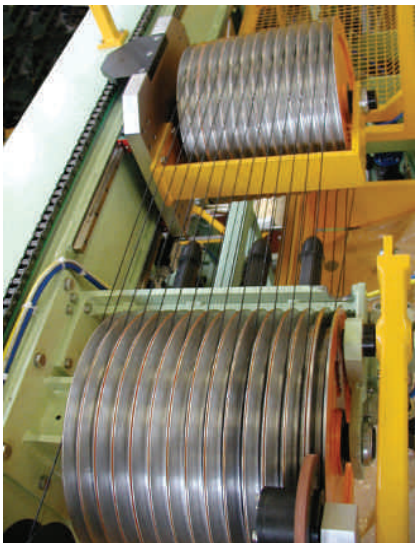
La linea di bobinatura funziona in linea con un'estrusore ed è composta di un accumulatore orizzontale, il bobinatore Mautomatic 300 Evolution, di due carrelli per la manipolazione delle bobine, di due reggiatrici toroidali automatiche e di un dispositivo a rulli per l'accumulo delle bobine.

La linea di bobinatura è stata ottimizzata non solo meccanicamente ed elettricamente (è possibile controllare la tensione del cavo con una precisione di 0,1-0,2kg), ma anche le dimensioni d'ingombro sono state ridotte e quindi il sistema di bobinatura richiede solo uno spazio di 6,3 x 4m ed un'altezza di 3,3m.

Questa macchina può trattare cavi con una sezione trasversale minima di 0,5mm^2 fino ad un massimo di 6mm^2.

Nel caso dell'impianto di Yazaki, il filo passa direttamente attraverso il dispositivo di trazione dell'estrusore all'accumulatore della linea di bobinatura, escludendo l'accumulatore della linea di estrusione con conseguente riduzione degli sforzi e dei costi.

All'uscita dell'accumulatore, il cavo entra nel bobinatore che comprende il dispositivo di misurazione della lunghezza,



▲ *Accumulatore orizzontale*

la testa di bobinatura, il gruppo guidafilo, il gruppo di taglio e lo spark tester (è possibile aggiungere altri dispositivi per il controllo della qualità, come il rivelatore di nodi e strozzature).

Se lo spark tester rileva un difetto nel cavo, viene generato un allarme che consente alla macchina di scartare la bobina senza interrompere il ciclo.

Le dimensioni delle bobine possono essere gestite dal cliente in funzione delle sue esigenze, data la possibilità di modificare, come di norma, l'altezza ed il diametro esterno, oltre al diametro interno della bobina.

Dopo il bobinatore, un manipolatore a due direzioni trasferisce le bobine dalla testa di avvolgimento alla prima o alla seconda reggiatrice alternativamente.

Nell'impianto di Yazaki si usano reggiatrici toroidali. Questi dispositivi consentono l'imballaggio delle bobine di diverse altezze e diametri interni ed esterni, senza richiedere alcun equipaggiamento né allestimento. Il cliente decide il numero di reggiature da eseguire: nel caso dell'impianto di Yazaki vi sono 3 reggiature a 120°, ma è possibile eseguire 4 reggiature a 90° o solamente due reggiature a 180°.

Queste reggiatrici sono inoltre equipaggiate con un sistema di controllo della bobina che comporta l'avvolgimento del nastro di polipropilene. Quando la reggetta è quasi esaurita, un allarme segnala all'operatore che il rullo deve essere sostituito, evitando così l'interruzione della linea di estrusione.

Quest'esempio rappresenta solo una delle possibilità che possono essere offerte al cliente dal sistema messo a punto dalla società EFAF.

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Un approccio unico per ottenere risultati

Un approccio unico utilizzato dall'équipe di ricerca e di sviluppo di S&E Specialty Polymers ha condotto allo sviluppo di una nuova generazione di composti senza alogeno a base di TPO nella sua serie GTPO-9100.

I composti presentano eccellenti proprietà fisiche, a valori di temperatura che vanno da 90°C a 105°C e possono essere prodotti in una vasta gamma di durezze.

Questo prodotto può essere inoltre utilizzato nei cavi di comunicazione e a fibre ottiche. Un altro progresso molto importante è stato compiuto utilizzando un metodo non tradizionale per la simulazione delle condizioni del tunnel Steiner in laboratorio.

Il composto per cavi plenum FS-1000 è conforme alle specifiche RoHS e consente di combinare un'elevata lavorabilità con eccellenti proprietà elettriche.

S & E Specialty Polymers – Stati Uniti
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Queste caratteristiche rendono il prodotto adatto non solo ad applicazioni PVC/PVC, ma anche ad applicazioni che richiedono categorie elettriche superiori di filo e cavo.

S&E Specialty Polymers continua ad essere un primario produttore anche in altri mercati:

- composti ignifughi di polipropilene (FR), con una combinazione unica di proprietà di elevata resistenza all'urto e di rigidità per applicazioni di formatura
- composti a base di TPO ignifughi (FR), flessibili, per applicazioni di estrusione
- composti di PVC specifici, formulati per soddisfare le esigenze più rigorose dei clienti

La società offre inoltre servizi di attrezzaggio utilizzando una varietà di equipaggiamenti per la formazione di composti, inclusi Banbury, Twin Screw, FCM ed altri equipaggiamenti.

Website: www.sespoly.com

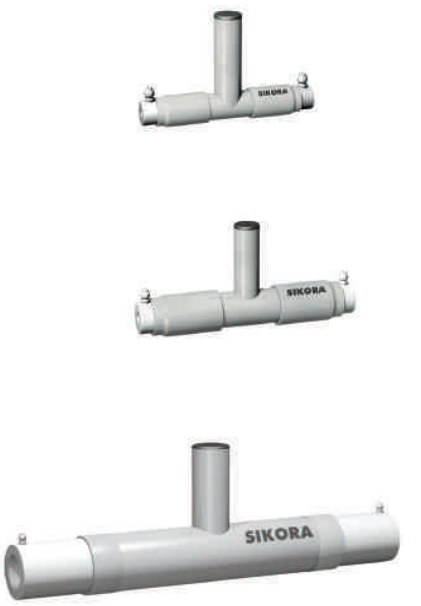
Risparmio di materiali e di denaro con Sikora

I sistemi X-Ray 8000 e X-Ray 2000 di Sikora consentono di eseguire la misurazione dei cavi di potenza senza richiedere la calibratura né lunghe procedure di configurazione, e di disporre delle informazioni non appena il processo di estrusione viene avviato.

Grazie a questo sistema messo a punto da Sikora, l'operatore riceve le informazioni al momento necessario consentendo un risparmio di materiali e denaro.

Il sistema basato su processore Ecocontrol 2000 è progettato per l'integrazione della gamma di calibri della serie Inline 2000 in un sistema convenzionale. Il dispositivo a schermo tattile semplifica le funzioni dell'operatore offrendo un'interfaccia avanzata per le analisi FFT/SRL, il controllo dell'estrusione in tandem e l'analisi grafica dell'eccentricità.

La gamma completa del sistema Inline 2000 comprende innanzitutto il supporto del software di diagnosi per ciascun dispositivo.



▲ *Sikora: un approccio tecnico da seguire*

Questo software, disponibile per la gamma completa di dispositivi, offre una notevole flessibilità grazie alla semplice configurazione, e la possibilità di estendere la gamma d'informazioni disponibili rispetto ad un dispositivo standard.

La vera innovazione può essere individuata nella tecnologia utilizzata nei dispositivi di misurazione del diametro degli assi XY e a triplo asse della serie Laser 2000. L'assenza delle parti mobili consente di ridurre la manutenzione ed i costi di fabbricazione mentre le tecniche di analisi della diffrazione con raggio laser, supportate dal processore di segnali digitali (DSP) di Texas Instruments, offre le velocità di dati più elevate e l'analisi FFT/SRL effettuata all'interno del dispositivo.

La serie Centerview 2000 consente di effettuare le misurazioni senza contatto dell'eccentricità, del diametro e dello spessore delle pareti, il tutto tramite un sistema senza contatto.

Gli altri dispositivi della gamma Inline 2000 offrono vantaggi similari.

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Alta precisione di Mikropack!

Il multiplatore a fibre ottiche MPM-2000 di Mikropack è uno strumento di alta precisione che consente l'accoppiamento ottico di una sorgente luminosa a 8 o 16 uscite in ordine sequenziale.

Questo strumento può essere utilizzato anche per l'accoppiamento ottico di uno spettrometro a 8 o 16 uscite.

I multiplatori sono spesso utilizzati nei settori industriali quali il settore chimico, farmaceutico, nei laboratori e nell'industria del vetro dove è necessario eseguire numerose misurazioni in diverse posizioni per mezzo di numerose sonde, equipaggiate di un canale di spettrometro e/o una sorgente luminosa.

Il multiplatore MPM-2000 consente di effettuare delle misurazioni precise con una ripetibilità del 99% ed è caratterizzato da una portata ottica oltre il 60%.

La luce è distribuita in ordine sequenziale, con tempi di commutazione fra i canali inferiori a 150 millisecondi. Il multiplatore MPM-2000 è equipaggiato con un motore a CC controllato con precisione su un blocco rotante.

Un codificatore permette di convertire i movimenti incrementali in un'uscita digitale ad impulsi. Ciascun canale è provvisto di lenti di collimazione che si

▲ *Il multiplatore a fibre ottiche MPM-2000*

collegano ad un sistema di fibre ottiche interno. Il multiplatore ottico è disponibile in una versione di E/U per il collegamento di una sorgente luminosa o uno spettrometro a 16 canali ed una versione a due E/U per il collegamento sia di una sorgente luminosa sia di uno spettrometro di 8 canali ciascuno. Questi dispositivi sono disponibili sia nelle versioni UV/VIS (250-800nm), sia nelle versioni VIS/NIR (350-2000nm).

Il multiplatore consente l'interfacciamento con un PC attraverso una porta RS-232 ed è fornito con un software ed un driver per il controllo completo tramite computer. É inoltre disponibile una versione USB.

Il software permette il controllo completo dell'ordine di commutazione, del ritardo di commutazione e del sistema di calibratura.

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Processi di armatura più rapidi

Il processo di armatura dei cavi d'acciaio di piccole dimensioni caratterizzati da diametri fino a 20mm, richiede molto tempo, poiché la velocità lineare è bassa a causa del passo ridotto.

La società Pourtier, che fa parte del Gauder Group, ha sviluppato una soluzione concentrica che consente di raggiungere una velocità superiore di almeno 2,5 volte rispetto a quella delle macchine a semplice torsione.

Il principio della macchina TEC 630-SWA si basa sulla tecnologia "multifilo concentrica" già applicata da Pourtier per la schermatura dei fili.

I clienti possono testare questa soluzione su una delle linee di produzione di Pourtier.

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Hacia el oriente con EFAF

Después del satisfactorio lanzamiento en Europa de la nueva línea de bobinado automática de EFAF, la compañía ha entregado su primera línea en el Lejano Oriente al Grupo Yazaki en Bangkok, Tailandia.

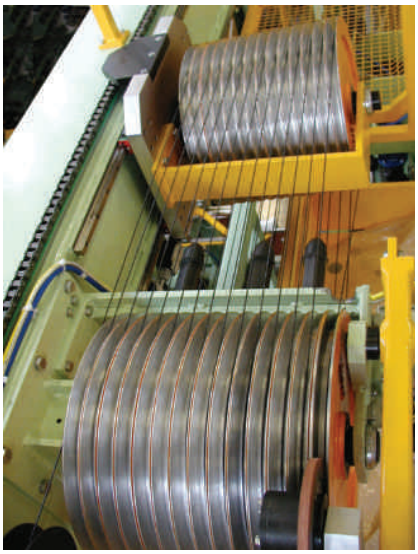
La línea de bobinado trabaja en línea con una extrusora y está formada por un acumulador horizontal, la bobinadora Mautomatic 300 Evolution, dos carros para el manejo de las bobinas, dos enflejadoras "toroidales" automáticas y un dispositivo de rodillos acumulador de bobinas.

La línea de bobinado ha sido optimizada no solo mecánica y eléctricamente (se puede controlar la tensión del cable con una precisión de 0,1-0,2kg), sino que también se han reducido sus dimensiones y ahora la planta de bobinado necesita un espacio de sólo 6,3 x 4m y una altura de 3,3m.

Esta máquina puede elaborar cables de sección transversal mínima de 0,5mm^2 hasta un máximo de 6mm^2.

En el caso de la planta de Yazaki, el alambre pasa directamente a través del dispositivo de arrastre de la extrusora y entra en el acumulador de la línea de bobinado, excluyendo el acumulador de la línea de extrusión, con la consiguiente reducción de esfuerzos y costes.

A la salida del acumulador, el cable entra en la bobinadora que comprende



▲ *Acumulador horizontal*

el dispositivo medidor de longitud, el cabezal de bobinado, el grupo de guía, el grupo de corte y el probador de chispas (se pueden añadir otros dispositivos de control de calidad, como un detector de bultos y estrechamientos).

Si el probador de chispas detecta un fallo en el cable, genera una alarma que permite a la máquina rechazar la bobina sin parar el ciclo.

Las dimensiones de las bobinas pueden ser gestionadas por el cliente según sus exigencias cambiando la altura y el diámetro externo, además del diámetro interno de la bobina.

Después de la bobinadora, un manipulador de dos direcciones transfiere las bobinas desde la cabeza de enrollado hasta la primera o segunda enflejadora, alternativamente.

En la planta de Yazaki se utilizan enflejadoras toroidales. Estos dispositivos permiten embalar bobinas de alturas y diámetros interno y externo diferentes sin que sea necesario equiparlas o prepararlas. El cliente decide el número de flejes que desea poner: en el caso de la planta de Yazaki hay 3 flejes a 120º, pero es posible poner 4 flejes a 90º o solamente dos flejes a 180º.

Estas enflejadoras también están equipadas con un sistema de control instalado en la bobina en que se envuelve la tira de polipropileno. Cuando el fleje está casi acabado, una alarma avisa al operador de que el rollo debe ser cambiado, evitando paradas en la línea de extrusión.

Este ejemplo es sólo una de las posibilidades que el sistema de EFAF puede ofrecer a los clientes.

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Alta precisión de Mikropack

El multiplexador de fibra óptica MPM-2000 de Mikropack es un instrumento de alta precisión que puede acoplar ópticamente una fuente luminosa a 8 ó 16 salidas en orden secuencial.

El multiplexador puede ser usado también para acoplar ópticamente un espectrómetro a un número de entradas de 8 a 16.

Los multiplexadores son utilizados a menudo en los sectores industriales químico, farmacéutico, en laboratorios y en la industria del vidrio donde se deben efectuar mediciones en varias posiciones con un cierto número de sondas, todas equipadas con un canal para un espectrómetro y/o una fuente luminosa.

El MPM-2000 permite obtener mediciones precisas con repetibilidad de un 99% y ofrece un alcance óptico superior al 60%. La luz es distribuida en orden secuencial, con tiempos de conmutación entre canales inferiores a 150 milisegundos. El MPM-2000 está provisto de un motor de CC controlado con precisión, instalado en un bloque giratorio.

Un codificador convierte los movimientos incrementales en una salida pulsada digital. Cada canal tiene una lente de colimación que se conecta a un sistema de fibra óptica interno.

El multiplexador óptico está disponible en una versión de una E/S para conectar una fuente luminosa o un espectrómetro a 16 canales y una versión de dos E/S para conectar una fuente luminosa y un espectrómetro a 8 canales cada uno.

Las dos están disponibles en la versión UV/VIS (250-800nm) y en la versión VIS/NIR (350-2000nm). El multiplexador se interconecta con un ordenador personal a través de un puerto RS-232

▲ *El multiplexador de fibra óptica MPM-2000*

y es suministrado con software y driver para ser controlado completamente por ordenador. También hay una versión USB disponible. El software permite controlar el orden de conmutación, el tiempo de retraso de la conmutación y el sistema de calibración.

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Ahorro de materiales y dinero con Sikora

X-Ray 8000 y X-Ray 2000 de Sikora permiten medir cables de potencia sin calibración o largas rutinas de configuración, con la información disponible tan pronto como inicia la extrusión.

Con el sistema de Sikora el operador recibe la información cuando la necesita permitiendo ahorrar materiales y dinero.

El sistema procesador Ecocontrol 2000 permite aplicar la gama de calibres de la serie Inline 2000 a un sistema corriente.

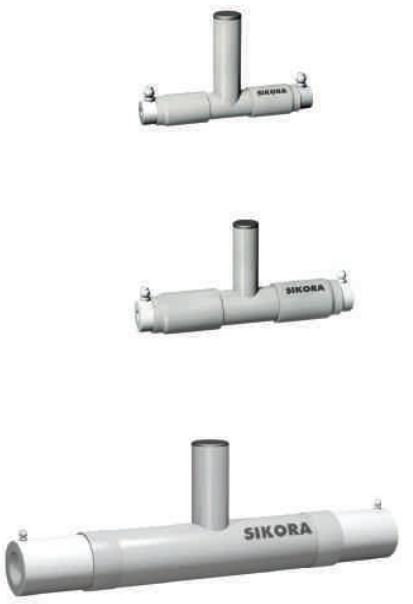
La pantalla táctil simplifica las tareas del operador y ofrece una interfaz de vanguardia para los análisis FFT/SRL, el control de extrusión en tándem y el análisis gráfico de la excentricidad.

La gama completa de sistemas Inline 2000 inicia con el soporte del software de diagnóstico de cada dispositivo.

Este software ofrece flexibilidad a toda la gama de dispositivos gracias a su facilidad de configuración y permite expandir la información recibida de un dispositivo estándar.

La verdadera innovación se puede apreciar en la tecnología usada en los medidores de diámetro XY y de triple eje de la serie Laser 2000.

La ausencia de partes móviles reduce el mantenimiento y los costes de fabricación mientras que las técnicas de análisis de difracción láser, soportadas por el procesador de señales digitales (DSP) de Texas Instruments, ofrecen las velocidades de datos más altas y el análisis FFT/SRL realizado dentro del dispositivo.



▲ *El enfoque técnico de Sikora*

La serie Centerview 2000 permite efectuar sin contacto medidas de excentricidad, diámetro y espesor de pared, todo con un solo sistema sin contacto.

Los otros dispositivos de la gama Inline 2000 ofrecen ventajas similares.

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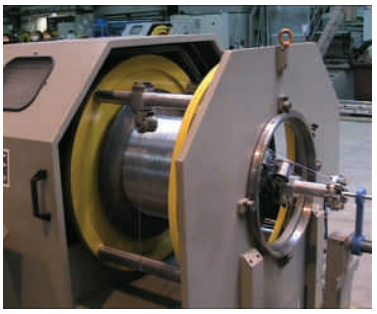
Procesos de blindaje más rápidos



▲ *La máquina TEC 630-SWA de Pourtier – Grupo Gauder*

El proceso de armadura de cables de acero finos con diámetros de hasta 20mm es un proceso que requiere tiempo porque la velocidad de línea es baja debido al paso reducido.

Pourtier, del Gauder Group, ha desarrollado una solución concéntrica que permite alcanzar una velocidad de producción por lo menos 2,5 veces más alta que con las máquinas de simple torsión. La TEC 630-SWA se basa en la tecnología "multihilo concéntrica" ya aplicada por Pourtier para el apantallado de alambres.

Los clientes pueden probar esta solución en una de las líneas de producción de Pourtier.

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Método único para obtener resultados

Un método único usado por el equipo de investigación y desarrollo de S&E Specialty Polymers ha llevado al desarrollo de una nueva generación de compuestos sin halógenos basados en TPO en su serie GTPO-9100.

Los compuestos ofrecen propiedades físicas excelentes, a temperaturas de 90ºC-105ºC y pueden ser producidos en una amplia gama de durezas. Este producto puede ser usado también en cables de comunicación y fibra óptica.

Otro importante avance fue obtenido usando un método poco convencional para simular en laboratorio las condiciones del túnel de Steiner.

El compuesto para cables plenum FS-1000 cumple los requisitos RoHS y combina una elevada procesabilidad con características eléctricas excelentes. Esto lo convierte en producto adecuado no sólo para aplicaciones PVC/PVC, sino también para aplicaciones que requieren categorías eléctricas más altas en el alambre y en el cable.

S&E Specialty Polymers sigue siendo un productor principal en otros mercados como:

- Compuesto de polipropileno retardantes de la llama (FR), con una combinación única de propiedades de alta resistencia a los impactos y resistencia al moldeado
- Compuestos a base de TPO retardantes de la llama (FR), flexibles, para aplicaciones de extrusión
- Compuestos de PVC especiales, formulados para cumplir las especificaciones de los clientes más severas

La compañía ofrece también servicios de equipamiento usando una variedad de equipos para la formación de compuestos, incluidos Banbury, Twin Screw, FCM y demás.

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SAMPSISTEMI

The art of wire & cable manufacturing technology

MT A 560 AV
Steel dry drawing machine

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Precision layer rewinding line

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Aluminium wire rod break-down machine

We manufacture machinery and equipment for all stages of ferrous and non-ferrous wire and cable production:

- Rod breakdown lines up to 4 wires for copper, aluminium and aluminium alloy
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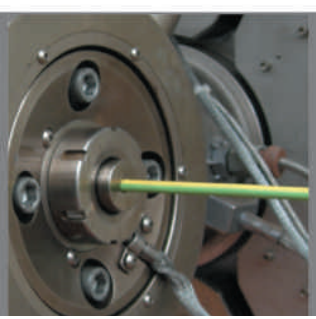
- Extrusion lines for insulation and sheathing of telecom, energy and automotive cable
- Dual Automatic take-up units
- Drawing lines for ferrous wires both dry or wet
- Precision layer rewinding lines for welding wires



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wire Rus

Moscow. Home of the Kremlin, Red Square – and lying at the heart of one of the fastest growing economies in the world.

The city's Krasnaya Presnya fairgrounds hosts wire Russia 2007 – considered to be the biggest and best attended industry show in the CIS at the end of May. With a backdrop of sophisticated shops and elegant restaurants, Moscow has taken its lead from Western capitals of the world.

Now the city is also enticing the wire and cable industry – including businesses from the Ukraine and other CIS countries – between 28th and 31st May. They will join more than 180 companies who are covering 55,000m^2 of exhibition space as they strive to show off the latest technological advances to potential customers.

International suppliers of wire, cable, springs and fastener technologies have profited from the growth in the region which has seen a rise in the Russian economy's GDP of almost 7%.

sia 2007

Companies from the USA, Korea, China, Germany, Italy, Spain, Austria and the UK – as well as businesses from the CIS region – will be showing at the event, hoping to attract some of the 12,000 plus visitors that are expected to attend. Running alongside wire Russia 2007 are parallel shows Metallurgy-Litmash, Tube Russia and Aluminium/Non-Ferrous, who open their doors in the forum hall at the same time.

Organisers Messe Düsseldorf GmbH and its subsidiary, Messe Düsseldorf Moscow, are supported by their partner and co-organiser, the All Russian Cable Scientific Research and Development Institute (VNIIKP). Additional support comes from several other national and international trade associations such as the International Wire and Machinery Association (IWMA), International Wire and Cable Exhibitors Association (IWCEA), the Italian Wire Machinery Manufacturers' Association (ACIMAF) and the US-based Wire and Cable Industry Suppliers Association (WCISA).

Alphabetical list of Exhibitors

(Exhibitors list correct at time of going to press – March 28th 2007)

Company Name	Booth
AGC Chemicals Europe Ltd	F16
AIM Inc	G08
Altana Electrical Insulation GmbH	B25
An Chen Fa Machinery Co Ltd.	J19
Automat Industrial SL	J15
Avi Alpenländische Veredlungs-industrie GmbH	H01
AWM SpA. Automatic Wire Machines	C05
Société des Filières Balloffet SA	G23
Bartell Machinery Systems LLC	G21
Bayka Color Farbkonzentrate GmbH	F14
Beta Lasermike Ltd	J09
BMS Machines Spécialisées	H14
Maschinenfabrik Bock	A08
Bongard Trading GmbH & Co KG	C23
Borealis Polymers NV	E05
Boxy SpA	D10
Bühler & Co GmbH	D18
C + E Jungeblodt Beteiligungs GmbH	D17
Carl Bechem GmbH	F14
Max W Claas GmbH & Co KG	C20
Clifford Welding Systems (Pty) Ltd	D17
CMC Caballé SA Construcciones Mecánicas	H15
Controle Mesure Systemes (CMS)	H17
Compomec Cable Machinery	H07
Condat Lubrifiants	G18
Condor Compounds GmbH	F14
Continuus-Properzi SpA	C07
Costa machinery GmbH	C16
CPA Computer Process Automation GmbH	H05
CZMP	F01
Russia Davis-Standard LLC	G19
Delachaux Division Conductique	G25
Die Quip Corporation	G08A
Dow Wire & Cable	E02
DSR Wire Corp	G22
Dunst GmbH	G11
DuPont Performance Coatings GmbH & Co KG	A10
Ebner Industrieofenbau GmbH	G05
Eder Engineering GmbH	G01
EFAF – Engineering Future Automazione Flessibile Srl	D06
EJP Maschinen GmbH	C19
Elinar	A07
Erocarb S.A.	J21
Esteves-DWD Polska Sp zoo	J01
Euroalpha Srl	D02
Eurolls SpA	C33
Euromarketing	A03
Eurowire Magazine	F07
EVG Entwicklungs-und Verwertungs-Gesellschaft MBH	H01
Fainplast-Faraotti Industrie Plastiche Srl	D05
Fastener Technology International	G17
Filzmoser Maschinenbau GmbH	H01
Fritz Finkernagel Drahtwerk GmbH & Co KG	B14
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Проволока

Москва. Дом Кремля, Красная площадь – лежат в сердце одной из наиболее быстро развивающихся экономик в мире. Городские выставочные площади на Красной Пресне примут гостей в рамках мероприятия Кабели Россия 2007 (wire Russia 2007) – промышленной выставки, которая считается наикрупнейшей и наиболее посещаемой в странах СНГ в конце мая.

С расположенными на заднем плане изящными магазинами и элегантными ресторанами Москва переняла на себя лидерство у западных столичных городов мира.

В настоящее время город притягивает кабельно-проводную индустрию, привлекая предприятия Украины и других стран СНГ на период с 28 по 31 мая. В выставке примут участие более 180 компаний, которые расположатся на 55 000 кв.м. выставочной площади и будут состязаться в показе последних технологических достижений своим потенциальным клиентам.

Международные поставщики проводов, кабелей, пружин и крепежных технологий уже получили прибыль вследствие экономического подъема в регионе, что отразилось на росте ВВП российской экономики почти на семь процентов. Компании из США, Кореи, Китая, Германии, Италии, Испании, Австрии и Великобритании – также как и из

а Россия 2007

региона стран СНГ – будут экспонироваться на этом мероприятии, надеясь привлечь некоторых из 12 000 предполагаемых посетителей выставки. Одновременно с выставкой Кабели Россия 2007 пройдут и другие выставки, а именно Металлургия-Литмаш (Metallurgy-Litmash), Трубы Россия (Tube Russia) и Алюминий/Цветные Металлы (Aluminium/Non-Ferrous), они откроют свои двери в это же время в павильоне форума.

Организаторам мероприятия компании Messe Düsseldorf GmbH и ее дочернему филиалу Messe Düsseldorf Moscow содействует их партнер и со-организатор Всероссийский Научно-исследовательский Институт Кабельной Промышленности (ВНИКП).

Дополнительная поддержка поступает от различных национальных и международных торговых ассоциаций, таких как Международная Кабельная и Машиностроительная Ассоциация (IWMA), Международная Ассоциация Экспонентов Проводов и Кабелей (IWCEA), Итальянская Ассоциация Производителей Машинного Оборудования (ACIMAF) и американская Ассоциация Поставщиков Кабельной Промышленности (WCISA).

Алфавитный список экспонентов

(Алфавитный список, соответствующий на момент поступления в печать - 28 марта 2007г.)

Проволока Россия 2007

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Agir Technologies
Booth F01

Mouton, part of the Agir Technologies Group, has more than 50 years' experience in the design and manufacture of grinding machines and various machine tools dedicated to the machining and repairing of tools and, in particular, tungsten carbide wire drawing dies from 0.10-30mm.

Mouton has also developed shaving machines for ferrous and non-ferrous wires to offer customers top-of-the-range wires. In 2006 Mouton created a new universal grinding machine, the MU 210, to repair any shaving die and tool.

New Grinding Machine MU 210

Wire Shaving Head Tr02

As toolmakers, the company's machines are initially manufactured to meet their own needs and are then commercialised.

Mouton's range also includes wire drawing dies (round, shaped, pressure), drawing dies and plugs, cable extrusion tools, straightening tools, wire-guides, tools for welding rods and plated wires.

Agir Technologies, also including Rivom, have specialised in the design and manufacturing of tungsten carbide tools for metal forming (heading dies and punches, extrusion tools, plate-cutting and ironing tools and compacting tools).

Agir Technologies Group,
Rivom-Mouton – France
Fax: +33 380 51 81 36

AIM
Booth G08

AIM's Accuform 'E' series is the economical choice for the CNC steel wire bender industry. It offers functionality, ease of use, and a great value unmatched in the industry.

The E-Line of 2D and 3D programmable CNC steel wire benders make virtually any kind of simple or complex parts from round and flat wire. There are five sizes of machines to choose from: 4, 6, 8, 10, and 12mm.

All models take wire directly from the coil, straighten, bend and cut to produce products

▲ *AFE-3D8-T steel wire bender*

using a software package that provides flexibility and simplicity in programming.

The 'E' series offers an 'a-la-carte option' where the user has the choice of putting extra options as their business needs change, without sacrificing quality because of price. The AFE-3D8-T is great for saving money and getting your production needs met.

AIM Inc will also be exhibiting at Wire South-East Asia, in Bangkok, Thailand from 16th-18th October 2007.

AIM Inc – USA
Fax: +1 630 458 0730

AWCMA/VOEDKM
Booth G01

With 22 member companies, the Austrian Wire and Cable Manufacturers Association will be staging their own display at wire Russia, in conjunction with the Austrian Federal Economic Chamber.

At the favourably positioned AWCMA/VOEDKM Stand/G01, which – for easier access for visitors – has been combined with the Eder Engineering stand, information and catalogues about all member companies and their special products will be available, particularly those enterprises which cannot be in Moscow.

Besides printed and verbal information being available in Russian, the AWCMA, jointly with the Austrian Federal Economic Chamber/H01 also has arranged a special 'Café Vienna', which will be at the full disposal of our exhibiting member companies and their visitors and friends there.

AWCMA – Austria
Fax: +43 1367 494949

AWM
Booth C05

AWM is presenting its complete range of machines and plants for reinforcement steel processing.

Since 1987 they have supplied machines for the production of standard and special electro-welded mesh and lattice girders, all types of cold rolling lines, straightening machines, and special machines for the production of tunnel reinforcement.

They will also be introducing the new high-speed wire straightening machine 'Duo Straight', featuring two spinners equipped with hyperbolic rollers granting an excellent straightening quality without damaging the wire ribs.

The machine has been re-designed, adopting a new flying shear driven by a brushless servomotor, suitable to cut at high speed and ensuring good accuracy on the length, thanks to a new electronic control. The remote technical assistance via modem has also been introduced on this machine, following the company's policy concerning the quality of after-sales technical service.

▲ *A complete range from AWM*

In addition, specifically for the Russian and Ukrainian market, AWM has developed a new patented system for the easy loading of cross wires on its 'Easynet S' mesh machines, fed by pre-cut hot rolled wire. This unique solution has already been tested on several machines installed in Russia and the Ukraine, and has produced excellent results.

AWM also has an official agent in Russia who ensures commercial and technical support, as well as qualified after-sales service.

AWM SpA – Italy
Fax: +39 0432 780350

Balloffet SA
Booth G23

A forerunner in manufacturing innovation (drilling, forming, sizing, polishing) tight controls of the products, Balloffet is ideally placed to help reduce your maintenance costs, combined with excellent quality and service. The French company has bases in the UK, USA and Germany, alongside a worldwide network of agents.

The product range includes natural diamond dies from 6µ to 2.5mm, mono-crystalline dies from 6µ to 0.5mm, poly-crystalline (PCD) dies from 50µ to 28mm, compacting, stranding and special shape dies, enamelling guides, extrusion tooling (guides and dies), special tooling with diamond insert and repolishing machines and equipment.

The company offers training of operators and technicians at the Balloffet training centre and showroom, or at customer sites. They also offer control and technical reports of customer dies. Balloffet is an ISO 9001-2000 certified company.

Balloffet SA – France
Fax: +33 474 357901

Bongard
Booth C23

Known as one of the leading suppliers for second-hand equipment for the wire, cable and rolling mill industry, Bongard has been in the market for more than 48 years.

With more than 1,200 second-hand machines in stock to cover all different applications for the production of steel wire, flat wire, power cable, data cable and communication cable, Bongard also offers equipment directly from previous owner's factory sites.

The equipment can be purchased in its current condition or it can be tested mechanically and electrically, refurbished and then modernised by the highly qualified Bongard team.

▲ *Part of more than 1,200 machines in stock*

For delivery of complete manufacturing plants, Bongard organises the complete handling of, dismantling, transport, shipment, customs and commissioning.

Bongard Trading GmbH & Co KG – Germany
Fax: +49 23789 15300

Borealis
Booth E05

Borealis, together with Borouge, a joint venture between Borealis and the Abu Dhabi National Oil Company in the Middle East and Asia, the company will focus on technically advanced and innovative solutions that offer cable manufacturers and end-users greater productivity and longer service life.

Borealis aims to provide optimal plastics, keeping manufacturers competitive and ensuring end users receive the best quality cables for distribution of energy and communication.

The latest additions to its Supercure™ product range will be presented on the stand, alongside the Borealis complete line of wire and cable solutions.

Borealis A/S – Denmark
Fax: +45 4596 6123

Boxy Group
Booth D10

The Boxy Group, established in 1969, offers a complete range of steel reels and drums for wire and cable.

▲ *Boxy offers a complete range of steel reels and drums*

The range includes:

- fully machined reels for copper wire drawing;
- particularly resistant reels for steel wire drawing;
- one-way shipping reels;
- forged reels;
- heavy-duty reels;
- large cable drums;
- take-apart reels (hydraulic, mechanic, pneumatic) including the automatic type 'Koiler';
- tilting units (electromechanical – built-in or floor-mounted hydraulic or pneumatic);
- mechanical reel lifters;
- coil lifters.

The company is certified holder of ISO 9001:2000 quality control system.

Boxy SpA – Italy
Fax: +39 030 957 244

Bültmann
Booth TBA

Bültmann set a new benchmark with regard to product quality and productivity with the newly-developed series of peeling and straightening/polishing machines.

The up-to-date drive technology, as well as the heavy and rigid construction of machines, ensures high-precision manufacturing of workpieces out of high-yield-point steels. Short change-over times when setting a new diameter allow the economic production of very small lot sizes. The use of hydraulic clamping systems on the adjustment axis guarantees the long-term operation of machines offering constant product quality.

Modern MMI systems ensure easy operating and effective use of equipment. The peeling machines SH series are built in different sizes for a diameter range from 6mm-600mm. Due to the patented hydraulic clamping within the tool area, as well as the use of precision tools, the diameter tolerances and the respective tolerance on roundness are achieved. When appropriate ingoing material is used, tolerances up to IT7 may be reached.

The modern straightening/polishing machines of the SRM series are manufactured for a diameter range from 6mm-250mm. The use of quick changing systems for straightening rolls allows, depending on the requirements to diameter and material strength, the use of optimal roll contours.

The rolls may be changed in minutes by just one operator and without using the overhead crane. The exact diameter adjustment and the extremely high rigidity of machinery ensure that the accuracy of peeled bar will remain unchanged after straightening/polishing.

Bültmann GmbH – Germany
Fax: +49 2394 18171

Compomec Cable Machinery
Booth H07

Compomec was founded in 1993 and has provided innovative solutions in the fibre optics and cable industry to literally hundreds of companies, delivered to varying manufacturing conditions – from clean room fibre optics processes to challenging environmental conditions in conventional cabling processes.

Next generation fibre pay-off ComPo35 can be seen at the show. ComPo35 is member of new innovative ComPo-product family, which covers all fibre pay-off and take-up conditions in fibre optic cable processes.

The latest innovation, MaxiPad concept, is made for longitudinal tape application in all cabling processes.

This patent pending solution minimises the tape and cable scrap, and enables continuous process without risky tape extension operations. In addition, conventional on-line taping process is possible as well.

Compomec Cable Machinery – Finland
Fax: +358 54761 877

Condat
Booth G18

After over 150 years of existence, and thanks to the synergy of the Condat group in international structures and technical knowledge, the Condat Vicafil lubricant range is now the worldwide benchmark for the wire drawing market. ➤➤➤

▲ *Condat lubricants*

Condat will present its new products designed to accommodate new market trends resulting from environmental constraints and from the needs of customers always striving to reduce maintenance costs.

On display will be:

- Vicafil TF 1202 is a low consumption dry drawing lubricant to be used in the ripper box on acid pickled and phosphate coated wires (ie spring wire and pre-stressed concrete wire). This new technology helps reducing the wire temperature and avoids dust in the stranding lines (high adherence);
- for carbon steel, Vicafil TS 1550 is an environmentally friendly salt coating, free from boron salts and designed for high carbon steel;
- for tube drawing of stainless and carbon steel, Condat offers a very innovative product in Supralub 35. This eco-friendly product, based of dry lubricants, does not contain any solvent or heavy metal and does not produce any waste (such as zinc phosphate sludge);
- a new surface treatment alternative to zinc phosphate for cold heading. Vicafil®: surface preparation process (surface coating and wire drawing) and Extrugliss® cold heading dual purpose oil (forming lubrication as well as machinery lubrication).

Condat – France
Fax: +33 4780 73539

Condor
Booth F14

Condor Compounds has strengthened its portfolio in the wire and cable market with the installation of a new 120mm co-rotating twin screw extruder 40d line.

This new manufacturing line will be installed at Condor Compounds' existing facility in Braunschweig, Germany.

A further expansion is expected to start in October 2007. The new co-kneader 200-line will almost double Condor's capacities of CONGuard® LSFOH compliant compounds, as well as opening the door for further growth in a number of segments including PP, thermoplastic elastomer compounds, silane cross-linked systems or peroxide crosslinked rubber compounds. CONGuard® compliant thermoplastic non-halogenated compounds are low-smoke and highly flame-retardant and will not emit corrosive gasses when burned. They are ideal for extrusion applications such as wire, cable and conduit.

Strategically located in Central Europe, from October 2007 Condor Compounds is running three co-kneader lines, two internal mixers Banburry-type, one with tangential rotor system, and one with inter-meshing rotor system, and one twin screw extrusion line, with a total capacity of about 40,000t/y.

Condor Compounds GmbH – Germany
Fax: +49 531 21024 38

Eder
Booth 1-G01

Eder Engineering and their representation in Russia, Trade House of VNIIKP, Moscow, look forward to welcoming friends and customers to their 1-G01 stand of the Austrian pavilion.

▲ *See Eder Engineering's display on the Austrian pavilion*

The company will make potential customers aware and familiar with the latest developments and praxis-proven solutions for achieving the highest quality products at a cost effective price.

Exhibits will include drawing die-tools and die working machines, among them the new revolutionary USP-TWIN, dual workstation Ultrasonic equipment for a fast and economic processing of diamond/PCD dies, model ETC-1/HF to grind and polish tungsten carbide dies in record time and many other leading technology conceptions.

Eder Engineering GmbH/Ltd – Austria
Fax: +43 1367 494949

EFAF
Booth D06

EFAF's new automatic coiling line is finally reaching the Far East after one was delivered to the Yazaki Group in Thailand.

The coiling line works in-line with the extruder and is composed of a horizontal accumulator, the coiler model Mautomatic 300 Evolution, two trolleys for the manipulation of the coils, two automatic toroidal strapping machines and one coil accumulation rolling device.

The coiling line has been optimised, not only mechanically and electrically, but the encumbrance has also been reconstructed, and this coiling plant needs only 6.3 x 4ms and a height of 3.3m.

This machine can process cable with minimum cross section of 0.5mm^2 up to a maximum of 6mm^2.

EFAF can offer a number of options to customers, and manifold possibilities can create customised automatic packaging lines. The company studies and creates any type of machine based on the needs of customers and can accommodate pay-offs, accumulators, coilers or reels winders and palleting.

A new application is the extension of the range of cables to be packaged using only thermo-shrinking film.

This type of packaging is usually used for cables with a thin cross section, but is now available for cross sections up to 16mm^2 for single core or multi-core cables, solid and flexible.

EFAF has already introduced a system which is capable of keeping the shape and position of the traversing, thanks to the positioning of the end of the cable under the coil. This is another interesting opportunity for customers to save packaging costs.

Also available is a range of packaging options. A perfect example is with an automatic coiling line EFAF can process up to five different package varieties.

EFAF Srl – Italy
Fax: +39 0583 981678

Elinar
Booth A07

Elinar Holding Company is a leading Russian manufacturer of electrical insulating materials for the cable industry.

The company's product range includes phlogopite and muscovite mica tapes for fire-resistant cables, conductor tapes, glass yarns for flat conductor insulation, AL/PET shielding tapes and silicon rubber insulating tubes.

Elinar Holding Company – Russia
Fax: +7 495 509 0317

EDER DRAWING DIE REPAIRING MACHINES - a JACKPOT to optimize economy in any modern wire/cable plant!

EDER Engineering GmbH for over 60 years offers efficient, standard, semi-automatic and fully automatic machines for both the reconditioning and production of ultrahard precision die-tools made from tungsten carbide, natural diamond and synthetic PCD, as well as all ancillary die workshop equipment and technical assistance (training, know how etc.). All machines are being supplied ready for operation ("plug and work") and are easy to understand and operate.

TOP EFFICIENT WIRE DRAWING DIE-TOOLS RELY ON TOP CLASS RECONDITIONING/PRODUCTION MACHINE TECHNOLOGY.

If you have a question, we have the answer.

Just contact us.

EDER Engineering GMBH
Saarplatz 8, A-1190 Wien / AUSTRIA
Tel.: ++43 1 367 49 49 - Fax: ++43 1 367 49 49 49
E-Mail: office@eder-eng.com
Website: www.eder-eng.com

Esteves
Booth J01

Esteves-DWD Poland specialises in the manu-facturing and reconditioning of high quality diamond dies for the wire and cable industry. Products include natural diamond dies, polycrystalline and mono-crystalline diamond dies, dies for special applications, wire guides and extrusion tools for cable manufacturing, and reconditioning equipment for diamond dies.

▲ *A whole range of dies for all kinds of applications*

For almost 100 years, Esteves-DWD has been a symbol of success, achieved through continuous product improvement and inno-vation. The group is a member of Dutch holding company Diamond Tools Group (DTG), which specialises in the production of high precision diamond tools.

Esteves-DWD has eight production facilities in the USA, Brazil, Mexico, Poland, Spain and China, and produces natural diamond dies from 0.005-2.00mm and polycrystalline dies ranging from 0.070-35mm for all kinds of applications in drawing, compacting, stranding, tube and bar calibrating.

Esteves-DWD Polska Sp ZO O – Poland
Fax: +48 77 4214307

GCR Eurodraw
Booth C08

Among its many wire treatment lines and units, GCR Eurodraw has developed a full range of cleaning equipment for installation in-line with wire drawing machines.

This includes electrolytic cleaning units for production of lubricant-free wire, such as welding wire, stainless steel wire to be annealed, plating-quality wire for the tyre industry and for other plating processes.

These units can be used with both dry and wet drawing machines, to clean the wire and take off remaining lubricant before spooling or coiling.

GCR Eurodraw SpA – Italy
Fax: +39 029354 0452

Eurolls
Booth C33

All companies in the Eurolls Group will be displaying at wire Russia. The group has recently made a new and important acquisition in the form of Cortinovis SpA, a worldwide leader in the field of rotating machinery for the production of power cables, telecommunication cables and steel ropes.

Expansion into new fields has also seen a leap in the number of orders for the Eurolls Group. The group has again crossed the border of technological knowledge by experimenting with innovative solutions and applying them to the product, as with the presence of the cold rolling process in wet multi-pass systems.

In addition to Cortinovis, also present at the Moscow show will be:

Eurolls SpA (rolls, cassettes, multipass cold rolling lines, lattice girder production lines); Teurema SL (wire production lines for reinforcement material); Team Meccanica SpA (ferrous and non-ferrous multi-pass cold rolling and drawing lines, wire take-ups and pay-offs, specialised productions lines) and Vitari SpA (straightening and cutting machines, nail, chain, netted wire and gabion production lines).

Eurolls SpA – Italy
Fax: +39 0432 796501

Flymca
Booth J13

Flymca is a Spanish firm which designs and manufactures rotating machinery for the production of power and telecommunication cables, steel ropes, and low relaxation strands.

▲ *Flymca – designers and manufacturers of rotating machinery*

The company provides the cable industry with a wide range of cabling equipment such as rigid stranders, tubulars, skip stranders, planetary and drum twisters, as well as auxiliary equipment like pay-offs and take-ups, rewinding lines, taping and binding heads, capstans and caterpillars.

The services offered by Flymca are not restricted to the production of this machinery, and are completed by a whole service based on a professional installation and commissioning, reconditioning and upgrading, personnel training, and after-sales guarantee.

At present, the technological development department of the firm is studding the tubular layer production, with trapezoidal wires.

This process is realised non-stop during the cabling, beginning with circular section wires, and is a big boost for the production of this kind of cabling. This year Flymca has also opened a new subsidiary called Flyro, which deals with the purchase and sale of second hand machinery, with the possibility of reconditioning and refurbishment.

Flymca/Flyro – Spain
Fax: + 34 942 559865

Freudenberg Vliesstoffe
Booth F14

Freudenberg's product portfolio consists of a wide range of water blocking tapes as well as of separation/bedding/binding tapes.

All products are suitable for manufacturing of any kind of energy, data and special cables. Besides free swelling single layer and covered sandwich constructions, water blocking specialities are offered such as foil laminated styles and thread reinforced tapes for extreme tensile strength requirements during the manufacturing process of cables. In addition, separation bedding and binding types are available in a wide variety with specific technical properties.

Freudenberg is represented at wire Russia by its trade partner Proplast.

Freudenberg Vliesstoffe KG – Germany
Fax: +49 6201 886150

Gauder Group
Booth E01

Gauder Group designs and manufactures machines for the wire, cable and fibre optic industries as well as providing re-sale equipment and a comprehensive range of services, and with a specialised bow department.

Maillefer Moscow office and the Gauder Group combine their marketing and service activities for Russia, Belarus and Ukraine and will be present on the same booth.

Pourtier and Setic of the Gauder Group specialise in rotating machines. They develop and market innovative technically advanced equipment in manufacturing systems for metallic cables (energy, low, medium and high voltage power cable) – telecommunication and multi-media – special purpose cables and fibre optic cables.

Setic, owner of the patented triple twist technology has developed a concentric screening process while Pourtier's new developments include multi-wire screening, stranding and armouring, as well as steel taping from jumbo coils.

Gauder & Co specialises in second-hand equipment for the wire, cable and fibre optic cable, and maintains and develops a large availability of modern stock in Europe and

the USA. The entire stock of machine data will be immediately available through the interactive 'Gauder Group Explore' displayed on plasma screen.

Gauder & Co SA – Belgium
Fax: +32 4 367 87 98

Hasemann Maschinen Booth C18

Hasemann Maschinen will exhibit illustrations, photos and brochures for first class used wire, bar and tube machinery for the production of semi-finished products in the steel and non-ferrous industry.

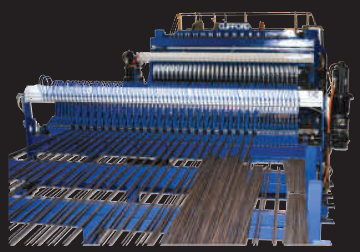
The delivery programme includes, among others, pointers, swagers, single/multiple drawing machines, bull blocks, combined drawing machines, chain drawing benches, pre-straighteners, 2/3-roll straightening and polishing machines, section straighteners, 6-roll tube straighteners, straightening and cutting machines, bar peelers and centreless grinding machines and mesh welding machines.

Hasemann Machinen – Germany
Fax: +49 2131 79 26 20

Ideal-Werk & Clifford Welding Systems Booth D17

Two international companies supplying welding machines will be jointly exhibiting and demonstrating their equipment. Ideal-Werk, of Germany, and Clifford Welding Systems, of South Africa, have a combined stand at hall 01, booth D17.

Clifford will be demonstrating their QRP24 precut mesh welding line which is tooled for 48 linewires with 12x200 kVA transformers. With a wire diameter range from 4mm-14mm, the machine is offered with a complete mesh handling system.



▲ *AC precut mesh welding line, Clifford type QRP24*

The QRP series fixed centres welding portals are specifically designed to facilitate rapid changeovers. Elements are fixed at 50mm (2") centres allowing only the required elements to be used without moving their positions. These robust portals are constructed from heavy fabricated plates and sections. The crosswire feed system is a gap type feeder, with picker disc eject mechanism.

The single gap type crosswire feeder also includes an automatic sorter mechanism and pre-feeder, with a bulk storage hopper of up to 2,000kg.

The QRP welding portal is of modular construction to allow for simple integration with other line components such as offcoil linewire feeders, trimmers and the turning and stacking equipment.

Sophisticated software allows for simple user-friendly operator input for mesh patterns with product sketches provided from the system. A clear text display with touch-screen operator interface allows for precise data input and status/error reporting.

Clifford manufactures a comprehensive range of mesh production machines covering high production reinforcing lines, heavy quick change engineering mesh lines and precision off coil light mesh lines.

Ideal will have their well-proven butt welders for wire drawing, cable manufacture and wire working on display. Sales teams and technical consultants from both companies will be on hand to meet and discuss customers' requirements.

Ideal-Werk – Germany
Fax: +49 2941 206 169

Clifford Welding Systems (Pty) Ltd – South Africa
Fax: +27 33 355 34 34

Kemaite Booth TBA

Kemaite manufactures a wide range of shield tape for data cables, coaxial and flat cables.

Kemaite – China
Fax: +86 510 8562 6028

Kieselstein Booth D16

Kieselstein Group consists of several wire related companies, one being Kieselstein GmbH which has the experience and the sales rights for the wire drawing products of former Sket and Herborn + Breitenbach.

Kieselstein is known worldwide as a partner in the development and manufacture of innovative wire drawing equipment and offers comprehensive service, spare parts and retrofitting of second-hand drawing machines). The group has more than 400 customers in 45 countries and has subsidiaries, distribution and service centres around the world, including Moscow, Russia, with Company TechnoLogistik.

One example for the production programme is the multiple wire drawing machine – type 'Rubin' – for the manufacturing of high-carbon steel wire, stainless steel wire, low-carbon material and non-ferrous metals.

▲ *Kieselstein – known for development and manufacture of innovative wire drawing equipment*

Kieselstein International GmbH is another main company of the group and one of the market leaders for draw-peeling machines, where they focus intensely on superior wire surface quality. The draw-peeling process provides the capability to remove marginally decarburised layers, rolling cracks, score marks and pores. The result is a faultless, very smooth surface and a nearly homogenous structure.

Kieselstein Industriesiebe und Drahtförderbänder GmbH offers a wide range of stainless wire mesh, wire cloth belts and wire spiral belts. The main partners of the company are enterprises in food, mining, chemical and other industries.

Kieselstein GmbH – Germany
Fax: +49 371 866 2675

Koner
Booth C02

Koner is a leading company in the field of wire drawing dies and is committed to a policy of research and innovation, both with regard to process and die technology.

▲ *Examples of Koner's drawing dies*

The hardness and toughness of Koner's sintered carbide products considerably increases die life and wire surface quality because of the use of special micro-grain powders and new additives specially developed for wire drawing.

Koner will design and produce drawing dies to customer specification and is also willing to research and develop dies jointly with customers.

Koner SpA – Italy
Fax: +39 0254 55832

Lämneå Bruk
Booth J08

Lämneå Bruk produces dry drawing machines, wet drawing machines, flux core wire lines, spoolers, coilers, precision layer winders, drum coilers, pointers, self-levelling traverse control systems and surface treatment machines.

The Swedish company has the capability for successful production in-house such as mechanical design, electrical design, programming, manufacturing of all components, final assembly and testing of functions.

▲ *The Lämneå Bruk site*

With their field technicians they can also support customers on-site worldwide. They also offer customers on-line support at all hours.

Their unique control systems, in combination with careful choice of electrical and mechanical components, results in very power efficient wire drawing machines.

Lämneå Bruk AB – Sweden
Fax: +46 122 232 99

LongVision
Booth J06

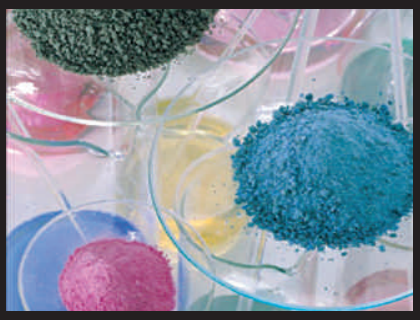
LongVision is the professional raw material supplier for cable and optic fibre cable.

The company supplies plastic clad steel tape, plastic clad aluminium tape, FRP, galvanised steel wire, galvanised steel tape, mylar tape (Alu-PET), tin-coated steel tape and waterblocking tape. They also manufacture plastic clad steel tape and plastic clad aluminium tape. Backed by experience, LongVision also exports to Europe, Russia, Pakistan, India and Southeast Asia.

LongVision (Shanghai) International Trade Co Ltd – China
Fax: +86 216309 9892

Lubrimetal
Booth B04

Lubrimetal will be at wire Russia with its Lubrifil® dry drawing lubricants, Lubriol® wet drawing lubricants and Steelfor® coatings, carriers and inhibitors.



▲ *Lubrimetal continues to invest in new formulations for its wide range of dry and wet lubricants*

The company's engineering division will also be displaying its rotating die-holders, mechanical de-scalers, multi-purpose helicoidal brushes, and lubricant applicators.

Lubrimetal SpA – Italy
Fax: +39 0341 422386

M+E
Macchine +Engineering Srl
Booth E04

M+E Macchine + Engineering specialises in the design and manufacture of pay-offs and take-ups for steel and stainless steel wires in coils or on spools for annealing, patenting, galvanising, oil tempering and other in-line processes.

With many years' experience in the steel-cord industry, M+E also manufactures wet drawing machines for steel and stainless steel wire complete with horizontal or vertical axis spoolers.

M+E machines are individually designed and manufactured to satisfy the most

▲ *Spool take-up frame with double accumulation capstan for non-stop operation*

rigorous customer demands. Each machine is made up of a combination of standard sub-assemblies which guarantee advanced technical quality and competitive prices.

Experience in the evolution of these products has produced the most sophisticated technology, offering reliability and efficiency in operation for customers worldwide. This makes M+E a well qualified supplier of such equipment, covering a wire diameter range from 0.015 to 25mm.

M+E Macchine + Engineering Srl – Italy
Fax: +39 0341 806002

M & M Wire
Booth J23

M & M Metal Wire is a leading manufacturer and exporter of various galvanised wire products in China.

Backed by more than 15 years' export experience, the company can supply a wide range of high-quality products.

M & M's range includes galvanised stitching wire and staple wire, galvanised steel wire for cable armouring, hose wire, baling wire, galvanised fencing wire, fine mesh wire, PVC coated wire, nylon coated wire, black or bright annealed wire, bright drawing wire and welding wire.

M & M Metal Wire Co Ltd – China
Fax: +86 10 849 2 8449

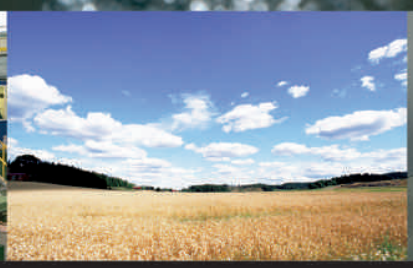
MAG
Booth G03

MAG has been one of the leading providers of magnet wire manufacturing machines for more than 50 years.

With the new generation of machines, the company is again setting new standards with a range of considerable improvements.

Fully developed innovation and a high performance capability are the important features of the new generation of MAG machines.

Mag Maschinen und Apparatebau AG – Austria
Fax: +43 3462 2545125



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Maillefer
Booth E01

Maillefer's long established Moscow office is eagerly preparing for the return of wire Russia. On display will be the latest designs from building, automotive to high speed MV cable manufacturing and optimum curing for CV lines. The CV lines balance speed and layout length for the highest productivity of quality cables reaching up to 500kV. The fibre optic team will present visitors with OEL lines used throughout every step of loose tube fibre optic cable production. The OEL 40, 41, 70 and 60 lines represent solutions for tight buffering, secondary coating, SZ stranding and jacketing.

▲ *Maillefer – long established in Moscow*

Finally, the telecom team will present products ranging from voice, data and LAN to micro-coax, mini-coax, CATV, drop and trunk, and large RF coax. The latest developments are found in LAN and micro-coax cable. For micro-wires used in hand-held devices, overall diameters are shrinking down to the order of a tenth of a millimeter for solid insulation. Physically foamed dual layer constructions are slightly larger.

Maillefer SA – Switzerland
Fax: +41 21 691 2143

Medek & Schörner
Booth G02

Medek & Schörner will once again be presenting its range of cable marking equipment and optical fibre coding systems.

On display will be:
- top performance optical fibre colour coding systems, including ring marking, tight buffering and proof-testing;
- fibre ribbon production line, including inline colouring, tandem ribbon take-up;
- hot foil meter/footage marking;
- top speed ring markers;
- high performance gravure printers;
- custom cable marking systems.

The only company operating in this market segment, Medek & Schörner covers virtually the entire spectrum of machines for marking cables and coding optical fibres.

▲ *High speed cable printer*

During the exhibition Medek & Schörner will be supported by their Russian agents M/s Trade House of VNIIKP (Hall 1/Stand No A 04).

Medek & Schörner GmbH – Austria
Fax: +43 1 982 72 96

Nexans
Booth B21

Nexans brings an extensive range of advanced copper and optical fibre cable solutions to the infrastructure industry and building markets. With an industrial presence in 30 countries worldwide, Nexans employs 21,000 people and recorded sales in 2006 of €7.5 billion.

Nexans Germany benefits from being fully integrated into the Nexans Group with its excellent opportunities to use the available synergies in all corporate fields. Development, design and production of special machinery for cable and pipe manufacturing have a long tradition in Nexans. The starting point for this important business line was the development of the universal welding machine UNIWEMA® more than five decades ago. Over the decades, a whole family of machines for a great variety of products was created on the basis of this technology.

Today, Nexans' Business group 'Production Lines and Technology' offers both a range of machinery and products for applications in cable (micro tubes for optical ground wires, high voltage cable, high frequency cable, submarine cable) and pipe production (micro tubes for the medical industry, composite tubes for warm water distribution and corrugated flexible metal tubes), as well as a pipe system for liquefied gases.

Nexans Deutschland Industries GmbH & Co KG – Germany
Fax: +49 511 676 3777

Nextrom & Rosendahl
Booth F05

Engineers and sales managers from Rosendahl will be present to discuss their latest automotive extruder group, with a quick colour change system, Rocomat. The patented design of the system ensures the shortest possible scrap lengths for layer, stripe or stripe and layer changes.

The change of colour is possible through a switch-able distributor. Since it is not necessary to use predictable valves, there is neither a risk for burning or blocking materials. Nextrom, one of the premier suppliers of solutions for the fibre and cable optic market, will be on hand to present its latest developments in fibre and cable manufacturing with special focus on deposition and sintering for VAD & OVD pre-forms, MCVD and draw towers for speciality fibres, high-speed draw towers, ribbon and colouring lines.

Together, the Nextrom & Rosendahl team offer first class products and turnkey solutions in the field of extrusion, SZ stranding, fibre optic, forming, welding and corrugation, combining leading-edge know-how and state-of-the-art technology in close co-operation with its customers and product suppliers.

Nextrom OY – Finland
Fax: +358 95025 3003

Rosendahl Maschinen GmbH – Austria
Fax: +43 3113 510051

Niehoff
Booth E07

Niehoff, one of the world's leading manufacturers of machinery for the wire and cable industry, and Niehoff, of Russia, the branch of Maschinenfabrik Niehoff in the Russian Federation, will present the following production systems:
- MMH101 multiwire drawing machine + RM141 annealer;
- D631 double-twist bunching machine;
- BMV16 high speed lever arm braider.

Niehoff, headquartered in Schwabach near Nuremberg, Germany, develops and builds machinery and lines for drawing, annealing, galvanic electro-plating, bunching, spooling, rewinding and braiding of non-ferrous wires, plus machines for stranding, coiling and spooling of high quality insulated data and special cables.

▼ *The BMV16 high speed lever arm braider*

The technology company has more than 500 employees worldwide and is represented by subsidiaries or sales and service companies on all the major markets.

Niehoff, of Russia, (NoR) is Niehoff's marketing and service branch based in Moscow and responsible for Niehoff activities in the Russian Federation and Belarus, and neighbouring countries. NoR's service engineers, all Russian native speakers, install Niehoff machines at customer sites, put the machinery into operation and provide after-sales service. The products and services offered by the Niehoff group range from development and planning right through to turnkey projects of complete cable factories.

Maschinenfabrik Niehoff GmbH & Co KG – Germany
Fax: +49 9122 977 155

OMD Booth C06

Officina Meccanica Domaso, one of the leading manufacturers of spring end grinding machines, also specialises in the production of wet grinding machines for hot coiled springs and for grinding spring ends with a wire diameter up to 90mm.

The production range includes two series:
- Series H (models: H50, H80, H100, H150), traditional pendulum grinding machines with one grinding wheel for grinding one spring end at a time and for big production volumes;
- Series HA/2 (models: HA80/2; HA100/2) machines with two grinding wheels and horizontal axes, with automatic progressive cycle for simultaneously grinding of both spring ends.

These machines are made for working in aggressive environments and have technically reliable solutions, accuracy and selected materials. The pendulum grinding machines have a horizontal spindle for grinding on the front surface of the grinding wheel with automatic feed and automatic compensation of the grinding wheel.

The machines offer the following working methods:
- spindle group feed with constant grinding pressure;
- spindle group feed with variable pressure and grinding with cooling breaks.

The series HA/2 consists of a double, horizontal mandrel and a loading plate for the simultaneous grinding of both spring ends.

The machines are equipped with automatic control and positioning system, automatic grinding wheel compensation, automatic dressing for grinding wheels, electronic adjustment of the loading plate rotation and system for recycling cooling water.

The working methods of these machines are: automatic grinding system with variable feed, automatic grinding system with constant pressure, automatic grinding system with constant feed and automatic grinding system with cooling breaks. The machines are PLC controlled and dispose of a simple and functional operator interface for programming and diagnostics.

Finally, the possibility to use inverters enables programming of the rotation speed of the grinding wheel, according to the used abrasive material and/or the processed material.

Officina Meccanica Domaso SpA – Italy
Fax: +39 0344 96093

TT Okroglica Booth A01

TT Okroglica offers a complete range of non-woven tapes for the wire and cable industry under the brand name 'Top Tapes'. The company has more than 30 years' experience in laminating different kinds of materials. Since 1985 the company has produced non-woven water blocking tapes, and it has a complete selection of non-conductive and semi-conductive water blocking tapes of double and single layer type.

TT Okroglica – Slovenia
Fax: + 386 5330 5164

Otomec Booth F04

Otomec Srl is a leading company in engineering and manufacturing customised cleaning and playing plants for the wire, cable and strip industry.

Clean wire is vital to improve drawing speed and final quality level, while an electro-plated surface (zinc-tin-nickel-brass-silver) is required to match the high-level standards for wire and strip technology, like extended life to corrosion, improved power transmission, facilitated lubrication and cost-saving procedures – such as forming final products (springs, rivets, buckets) directly from plated material. Through a wide range of machines, sized to perform small volumes of products as well as large outputs, single or multi-strand, reel to reel, speed up to 20 m/sec, Otomec can provide all the necessary assistance.

Of particular interest are:
- Model OTO5 – patented modular, multi-functional plant for in-line preparation of iron wire rod – awarded by the European Community for Innovative Features;
- Model OTO4 – complete plant for the electroplating of steel and non-ferrous wire Model OTO'FF Line – reel to reel or basket plant for copper, brass, stainless steel, carbon steel, superconductor, alloys, fine tubes;
- Model OTO2 – in-line coppering of max 5mm wire – speed up to 20 m/sec;
- Compact plants for environmental treatment (water, steam) and auxiliary plants.

Otomec Srl – Italy
Fax: +39 0341 660249

Pan Chemicals Booth D07

Pan Chemicals, an Italian producer of special drawing lubricants and coatings for ferrous, non ferrous and stainless steel wire and equipment for the wire industry, will be exhibiting a number of items at wire Russia:
- dry drawing lubricants for low carbon steel wire, plating quality wire, welding wire, CHQ, high carbon steel wire, drawing after galvanising and high alloyed steel;
- wet drawing lubricants soluble lubricants, neat oils and greases;
- products for surface treatment of phosphate coatings, non reactive pre-coatings, pre-coatings for stainless steel;
- auxiliary products for degreasing, surface treatment, pickling of stainless steel, special applications.

▲ *Sanding belt descaler*

Equipment on display will include a sanding belt descaler, mechanical descalers, deblaster TR 1 (single wheel shot blaster), rotating pressure die boxes, Borax - coating and drying equipment, and high-tech die reconditioning equipment.

Pan Chemicals SpA – Italy
Fax: +39 035 977288

Panchmahal Booth H19

Established in 1972, Panchmahal Steel is a leading stainless steel focused long product manufacturer in Asia. The company's product range includes austenitic, martensitic, ferritic and precipitation hardening grades in various sizes and finishes in the form of billets, wire rod, hot rolled bars, cold finished bars and wires, and forgings.

The company has invested in state-of-art production facilities and is the only one in India to manufacture all of its products, from billets to cold finished bars and wires, at a single location, allowing it to provide flexible

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▲ *Wire rod at the Panchmahal site*

service and on-time deliveries to customers worldwide. A sophisticated ERP system conforming to ISO 9001:2000 and other product specific accreditation and in-house quality checks, from incoming raw materials to finished products, has helped build strong foundation for future growth.

Panchmahal Steel Ltd – India
Fax: +91 0265 343150

Pentre Group
Booth F04

The Pentre Group, incorporating Hearl Heaton, designs, manufactures and supplies on an international basis, a comprehensive range of high speed steel and plastic ABS process reels, plywood and cardboard reels, wholly moulded plastic spools, steel and wooden shipping reels and drums.

Pentre's whole operation is focused on developing technically advanced processing solutions for today's new modern and high-speed wire and cable manufacturing plants, including those incorporating the latest robotic handling systems. Pentre's reels and drums can be manufactured to either international recognised standards or to customer's own specific requirements.

▲ *Range of reels from the Pentre Group*

Pentre, with Hearl Heaton, are acknowledged as a world leader in 'ABS (plastic flanged) high speed process reels', with a product range from 250-1,000mm diameter, conforming to both DIN 46395 and imperial standards for optical fibre tubing.

Pentre Group, Hearl Heaton – UK
Fax: +44 1924 400 803

PWM
Booth F09

PWM will exhibit its best-selling HP100 cold welder at wire Russia 2007. This air/hydraulic model is increasingly popular with wire and cable manufacturers because of its reliable performance, durability and low maintenance costs. Capable of welding non-ferrous wire and strip from 1.00mm to 5.00mm, the HP100 has a solid steel welding head for added strength and stability. Trolley-mounted for convenience and ease of use, the HP100 is powered by an air/hydraulic intensifier easily activated by a foot pedal.

A longer hose can be fitted between the welding head and the power source in order to make the welding head portable. This enables welding to take place where space is limited, at a strander lay plate, for example, or inside a spooler casing.

▲ *PWM's best-selling HP100 cold welder*

Also on show will be PWM's range of manually operated models. This includes the popular M101, a versatile bench/trolley mounted machine with a capacity of 1.00mm to 3.60mm copper and 1.00mm to 5.00mm EC aluminium; two bench-mounted models, and three lightweight, hand-held machines, ideal for welding in confined spaces.

PWM's new Russian language website at www.pwmltd.co.uk offers full details of PWM's range of high performance cold pressure welders and dies, a demonstration of the cold weld process and a comprehensive Q&A section.

Pressure Welding Machines – UK
Fax +44 1233 820591

Queins
Booth D19

Queins & Co will be hoping to entice visitors to its stand with a film about operating lines, along with a number of machines delivered to the wire and cable industry.

More detailed information on the range of new lines for special applications such as power transmission, steel rope applications and other fields can also be given during the exhibition. Besides new equipment Queins delivers the whole range of second hand wire rope and cable machines.

Customers can also visit the re-launched homepage of Queins & Co (www.queins.com), where all available equipment is displayed with brief descriptions for each machine for sale – second hand, re-conditioned or new.

Queins & Co GmbH – Germany
Fax: +49 2472 3014

Rautomead
Booth F08

Continuous casting technology specialist, Rautomead Limited, will be presenting models from its innovative range of oxygen-free copper and copper alloy wire rod casting machines.

Visitors to stand number F08 will be able to gain information regarding a wide variety of graphite furnace casting solutions for the wire and cable industry.

These include machines for the casting of 8mm CuOF for subsequent manufacture to high quality fine wire and enamelled wires; 12-30mm diameter CuOF for processing to flat strips or water tube fittings; 8-12.5mm diameter CuAG for processing to commutator sections; 18-30mm CuCd or CuMg for trolley wire cables and 8mm diameter copper alloy wires for applications, including EDM machining wires.

▲ *RS 2500 machine casting 8mm diameter brass wire rod*

Rautomead wire rod casting machines are available for production of 3,000-30,000 tons per year of rods 8.0–30mm diameter.

Rautomead Limited – UK
Fax: + 44 1382 622941

Sampsistemi
Booth C10

Customers old and new will be welcomed to the Samp stand at wire Russia.

Over the years companies from the region have opted for the Italian company's machinery and equipment, including for the production of MIG/MAG welding wire, comprising dry drawing lines, engineered with exclusive vertical drawing technology, wet drawing lines with copper-plating tanks, and fully automatic re-spooling lines, both of the precision-layer type or models suitable for basket spool coiling.

continuus-properzi
Wire Machinery Division

Over a century of experience in designing high technology machinery for ferrous products.

WMD

The 2006 newly designed "Megalogos" drawing machine,
assembling an ergonomic horizontal 1,270 mm. diameter capstan, can produce high carbon steel and stainless steel as well.

PC Strand line *(1+2) (1+6) and (1+18)*

PC Wire lines

High Bond lines

Steel Rope lines *(Skip stranders and tubular stranders up to 19 wires)*

Continuus-Properzi, Italy
Tel. +39-02-9884921
Fax +39-02-9810358
hq@properzi.it

Properzi France sarl
Tel. +33-1-60930063
Fax +33-1-60930072
chelles@properzi-france.fr

Properzi International Inc. USA
Tel. +1-563-4450700
Fax +1-563-4450710
info@properzi.us

Visit us at ICE Stand

ПОСЕТИТЕ НАС НА СТЕНДЕ 'ICE'

continuus-properzi

www.properzi.com
hq@properzi.it

In the energy sector, Samp has supplied both conventional and limited-slip rod breakdown machines for aluminium and aluminium alloys, equipped with automatic double spoolers and coilers, as well as insulating lines for the production of ABCs (aerial bundle cables) in aluminium and aluminium alloys, sheathed in XLPE to SIP 1, 2 and 3 standards, hence the first to use liquid silane technology in Russia.

Samp has delivered integrated manufacturing cells for automotive applications, comprising multi-wire drawing machines, double twist bunching machines and sheathing lines with integrated colour-change systems. When it comes to building wire, it has not only supplied multi-wire drawing machines and bunching solutions, but has installed numerous PVC or halogen-free compound insulating and sheathing lines for energy cables, not to mention high-speed sheathing lines for the production of both flexible and rigid cables. They have also supplied lines for physical expansion coaxial cables or sheathing lines for coaxial and fibre optic cables.

The Sampsistemi organisation will also be unveiling its own Moscow-based office, run by an Italian manager and competent team to provide the necessary support for equipment on order and after-sales service.

Sampsistemi SpA – Italy
Fax: +39 05135 6750

SCOB
Booth F17

Paul Schaaf GmbH & Co is a German-based family company, founded in 1929. Five different manufacturing units are operated by SCOB in Germany, Asia as well as north America.

▲ *Dies galore from Paul Schaaf*

The SCOB tool programme includes diamond dies, PCD dies, TC dies, pressure dies, carbide nibs and inserts for pressure dies, TC and PCD shaped dies, extrusion tools, enamelling dies, as well as TC and steel rollers and tools for the spring and fastener industry.

The SCOB machine programme consists of more then 30 different types of die re-working machines to meet the individual requirements of each customer. Manual, semi-automatic as well as fully automatic ultrasonic die re-working machines, wire polishing machines, TC die re-working machines, die cleaning equipments and die checking devices are manufactured and developed. Combining an extremely modern automatic and computerised production process with attention to product control guarantees the high quality level of SCOB products. Quality control is assured through the use of the most up-to-date measuring and testing equipment, combined with computer-based technology and evaluation methods.

Paul Schaaf GmbH & Co – Germany
Fax: +49 2772 62019

Rolf Schlicht
Booth B12

Rolf Schlicht's electrostatic powder coating machine model RSC was designed to give a fine dose, and absolutely dust free powdering of cables, wires, hoses, profiles with powders like talc, stearate and swellable powder.

▲ *The RSC machine from Rolf Schlicht*

Due to the electrostatic charging of the powder, a strong adhesive powder on the product and a very even layer on the surface is achieved.

The electrostatic also makes sure that no powder will fall from the product outside the dusting chamber. Depending on extrusion speed and product diameter one to three 100kV powder guns are used.

Machines are designed for product diameters from 0.5-120mm. In the machine there is a fluidised powder hopper out of which the powder is sucked by pneumatic venturi pumps and blown to the guns.

For an optimal adjustment of the powder quantity customers can adjust the power of the electrostatic charging from 0-100kV, the powder quantity and the speed of the dust cloud.

In the machine there is a fully automatic and maintenance-free filter system consisting of three compact filter elements which are no longer cleaned off pneumatically.

Thanks to this filter system a strong and constant vacuum is generated in the machine, so that no powder will escape. Inlet and outlet openings of the dusting chamber do not have to be sealed by brushes.

If there is not enough space in the line to place the machine, Rolf Schlicht will deliver a free-standing dusting chamber which is connected to the machine by a 3m long hose.

For an extremely fine powdering of slowly running products, a fine dosing device can be ordered to make sure that only a minimum powder quantity is transported to the guns.

Rolf Schlicht GmbH – Germany
Fax: +49 4067 994211

Hans Schmidt & Co GmbH
Booth A12

Worldwide there are more than 140,000 Schmidt tension meters used on a regular basis.

Wherever precision and superior quality is essential in production and processing, Schmidt tension meters are indispensable in monitoring, quality control, automation and process engineering.

Schmidt offers the largest selection of tension meters: 10 different series, 22 models and more than 2,000 possible variations. The product range includes both hand-held models and online tension meters, each available as mechanical and electronic versions. Existing product lines are continuously updated to meet the customer demands.

Among new developments is the introduction of the DN1-V1 series, a new version of the mechanical tension meter with up to 50daN with special guide rollers for cables and wires with bigger diameters.

The well-known TS series is now available with new features to meet the latest demands for digital signal processing. The advantage of this is the easy installation of the connecting cables (max. 1,000m), the independence to electronic noise and the direct connection to computers in order to control or store data in the production process.

Up to 32 tension sensors can be connected to a single PC to display, store and continuously analyse tension readings.

Other control instruments – force gauge and test stands, tachometers and stroboscopes, wire speed meter, thickness gauges and shore hardness testers – will also be on display.

Hans Schmidt & Co GmbH – Germany
Fax: +49 8638 4825

28-31 May

Sikora
Booth B15

On display at Sikora's stand will be the X-Ray 8000 and X-Ray 2000 which measure power cables without requirements of calibration or lengthy set-up routines, with information available as soon as the extrusion is started. The German company's technical approach provides the operator with information when it is needed, saving materials and money. The Ecocontrol 2000 processor system provides for the integration of the range of Inline 2000 series gauges into one common system. The touch screen driven device simplifies operator interface while offering the state-of-the-art approach to FFT/SRL examinations, tandem extrusion control, eccentricity graphical analysis and more.

The full range of Inline 2000 systems starts with the support of the diagnostics software for each device. This support software offers flexibility in the ease of configuration, as well as expanding the range of information available from a standard device.

▲ *Sikora's 3 Laser T Red*

True innovation reflects the technique employed in the Laser 2000 series XY and triple axis diameter measurement devices. No moving parts means lower maintenance and cost while laser diffraction analysis techniques supported by Texas Instruments DSP provides the highest data rates and FFT/SRL analysis done inside the device.

The Centerview 2000 series provides non-contact measurements of eccentricity, diameter and wall thickness – all from one system on a non-contact basis. The other devices of the Inline 2000 range of products offer similar benefits – Lump 2000 series of XY and triple axis lump and neck-down detectors, Capacitance 2000 series of capacitance measurement systems, Spark 2000 series of spark tester systems and more will be demonstrated.

Sikora AG – Germany
Fax: +49 421 489 0090

Sket
Booth B23

As a traditional supplier to the cable and steel rope manufacturers in Russia, Sket Verseilmaschinenbau's success is the result of sustained

▲ *A traditional supplier to steel cable and rope manufacturers*

market activity and testimony to the high degree of an acceptance of products by the users.

At wire Russia the company will be introducing its latest products to a specialist public. These include the highly efficient stranding machine type MKZT for the stranding of copper and aluminium wires, the MKRD for the manufacture of OPGW cables, the drum-twister for assembly of milliken cable, modern double twist stranding machines for the production of steel cord and specialised tubular stranders with integrated stretching device and planetary cage type stranders for the production of steel wire strands and heavy ropes.

Sket Verseilmaschinenbau GmbH – Germany
Fax: +49 1405 5837

SMEI
Booth D04

SMEI supplies several plants/machines to suit any customer requirement. Among these are wire drawing machines, straight-line multi-pass wire drawing machines, lattice girder machines, straightening units, mesh machines and panelling machines.

The company also has a wide range of butt welder machines covering different types of welding from 0.5mm diameter to 350mm^2.

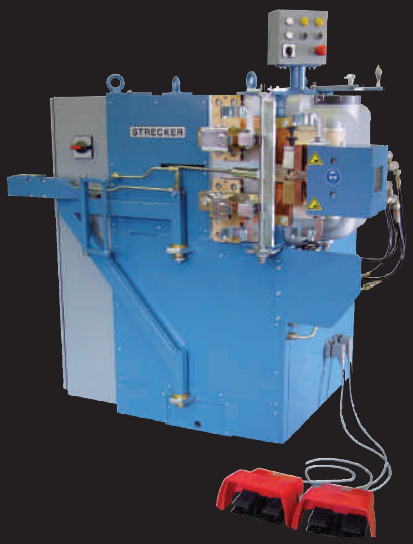
SMEI Srl – Italy
Fax: +39 0432 9647 84

August Strecker
Booth C27

August Strecker will be exhibiting an extensive programme at wire Russia. On display will be buttwelding machines for all kinds of wires, starting at 0/04mm diameter up to 35mm diameter for steel, 34mm diameter for solid non-ferrous wires, including welders with automatic deburring cycle.

For steel wire welders there are different annealing features available, depending on the individual steel quality.

➢➢➢



▲ *Part of the extensive programme on display from August Strecker*

The well-known programmable microprocessor controls are now available with remote maintenance via modem.

Buttwelders for stranded conductors will also be exhibited. These work with or without any tubes (with automatic deburring) in pneumatic or hydraulic executions.

Machines for electrical parting, as well as buttwelding of steelcord or steel strands.

Finally, cold pressure buttwelders with automatic deburring for non-ferrous materials.

August Strecker GmbH & Co KG – Germany
Fax: +49 5431 44221

Technodiament Ltd
Booth C01

Based in Poland, Technodiament Ltd, is an experienced supplier of machinery and tooling for the cable manufacturing industry.

▲ *The TEA 30.25 T extruder from Technodiament*

The company offers a wide portfolio of equipment that includes:

- complete extrusion lines (insulating and sheathing);
- universal extruders and co-extruders;
- extruders for fluoro-thermoplastics;
- cable rewinding lines;
- pay-offs and take-ups;
- natural diamond dies;
- synthetic mono-crystalline dies;
- polycrystalline diamond dies;
- extrusion tips;
- profile extrusion tools.

Technodiament Ltd – Poland
Fax: +48 22857 9305

Tecnosider
Booth C02

Tecnosider has been operating for many years in the steel wire drawing industry and its extensive knowledge of the market allows it to be present in an advisory capacity, enabling it to find practical solutions based on actual experience.

Tecnosider designs and constructs auxiliary machinery and devices, including: Dekofil mechanical descalers, Galvatek galvanising devices, KR-KD wire straighteners, TE-TS-TV pulling-in dogs and Dekofil 2000 equipment for fast and effective wire cleaning.

Tecnosider Srl – Italy
Fax: +39 02545 5832

Tecnovo
Booth C02

Tecnovo has been producing lubricants and chemical products for the wire manufacturing and metal working industry since 1945. Constructive and continuous cooperation with customers has always been one of its most important company policies.

Tecnovo provides full and prompt technical assistance from start to finish with selection of the most suitable product and thorough testing on the customer's plant by specialist technicians.

Tecnovo will research and develop special lubricants and products to customer requirements and specification. Efficient quality control means that performance and reliability is always guaranteed.

Tecnovo produces: Tecnolubre powder lubricants for dry drawing; Sintek oils and liquid compounds for wet drawing; Tecnofix pastes, grease and compounds for wire drawing; Tecnoline products for preparing wire rods and wires for drawing; Tecnolam products for wire rod and wire rolling, and Tecnolux products for cleaning and degreasing wire.

Tecnovo Srl – Italy
Fax: +39 02545 5832

Teijin Twaron
Booth B01

Teijin Twaron is the pioneer in reinforcement technology for fibre optical cables. A global supplier of aramid fibre, with the brands Twaron, Technora, Teijinconex and Sulfron, the company expects strong growth in the data transmission market in the future.

Teijin Twaron BV – Netherlands
Fax: +31 26 366 52 30

Teknodiam
Booth C02

The clean, precise and constant profiles of the working parts (cone and cylinder) required for correct wire drawing are secured by high precision grinding to guarantee wire quality, long die life and high machine performance.

Teknodiam customers are provided with a reliable and prompt reconditioning service for worn dies.

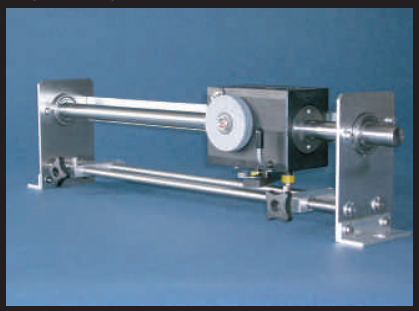
The drawing angles and length of the cylindrical part are ground to the exact measurements requested, maintaining correct die geometry.

Teknodiam Srl – Italy
Fax: +39 0254 55832

Uhing
Booth TBA

Uhing will show its winding programme, including the FA system with the traversing system that automatically adapts to the spool width.

Uhing has developed the non-contact FA flange detecting system that automatically adapts the traversing pitch to the respective spool in use.



▲ *At the forefront of technology – Uhing*

This facilitates retro-fitting of traversing units to spools with varying widths with the FA. The FA also detects and compensates for non-standard positions of spools on the winding shaft without requiring manual adjustment of end stops on the traversing unit.

The major FA component is a light barrier travelling on the traversing unit. When one of the spool flanges interrupts its light

beam, the pneumatic reversal unit on the traversing unit receives a switch-over signal. FA is either directly mounted on the Uhing rolling ring drive or on an intermediate slide. The forked light barrier is mounted at a correction angle that changes when the traversing unit reverses.

This compensates for system-inherent switching delays. A simple relay controller is responsible for signal processing with constant spool speed, a PLC is used with constant material speed and decreasing spool speed.

The light barrier has proven to be the ideal solution in heavily soiled environments and where varying illumination and reflection conditions prevail.

For application in confined spaces, in particular for stranding machines, Uhing is currently developing a system where a rolling ring drive's end stops perform an automatic non-contact search for the correct reversal position.

This system also allows for correction movements during winding, for example to adapt the pitch to bulging spool flanges or changed spool positions.

Tensioning and clamping systems of the Easylock type also allows brake and torque forces to be transferred to the spool, and U-Clip, an element for easily securing spools on the shaft, are also shown.

In the rolling ring drives sector Uhing shows the enhanced free movement lever for the RG 3-30-2 MCRF as well as the new RGK 20, the worldwide first rolling ring drive made of plastic.

Joachim Uhing KG – Germany
Fax: +49 4347 90640

Upcast OY
Booth F13

The upward continuous Casting method – better known as the Upcast® system – was originally innovated and developed by Outokumpu in the late 60s for the production of oxygen-free (OF) copper and copper alloys wire rod.

Since the startup of the first production unit in 1971 more than 160 other Upcast® units have been delivered worldwide, establishing it as the leading method in its line of production. Today the Upcast® legacy is carried on under the banner of Upcast OY, exhibiting its full range of single and double-furnace casting lines.

Several interesting new developments have been introduced to the Upcast® system.

Among these are:

- maximum output from a single-furnace system increased from 7,500tpa to 12,000tpa capacity;
- maximum output from a double-furnace system increased from 30,000tpa to 40,000tpa capacity;
- a new Omega-type inductor doubling the previously available power range, combined with a marked decrease in specific power consumption;
- a transistor converter type stepless power control system, offering reduced specific power consumption, increased inductor lifetime and the elimination of harmonic resonance effects.

▲ *The Upcast® system*

These, together with a number of other new features, will offer the operator of an Upcast® system a marked improvement in the cost-efficiency and reliability of the process, as well as in the quality of the produced wire rod.

Upcast OY – Finland
Fax: +358 207 577 401

Unitek
Booth G06

Unitek is an international leader in providing innovative solutions for fixed centre crossheads and automatic colour change technology for the wire and cable industry. The company emphasises quality, productivity and a commitment to provide the ultimate support to the extrusion industry around the world.

The Unitek team has a strong background in the extrusion and cable industry and is dedicated to providing intelligent, efficient solutions to the problems encountered by manufacturers. Unitek was established in 1979, initially to serve both the plastic processing and the cable making industry.

Since the first product line of fixed centre crossheads, introduced in the early 80s, Unitek has earned a name for high quality products. Close contacts with cable makers and machinery manufacturers all over the world, high standards of research and development in innovative products and their application, and modern production facilities for precision and quality, has been the basis of the company's philosophy from the start.

During the ensuing years, Unitek was highly innovative in developing new solutions and implemented state-of-the-art technology.

Unitek Maschinenbau-und Handels GmbH – Austria
Fax: +43 1332 5515

Vitari
Booth TBA

Vitari – part of the Eurolls Group – is based in Valbrembo, near Bergamo, and since 1925 has been designing and manufacturing innovative machinery for the wire industry.

The company has an aptitude for the development of innovative solutions, which are not only technological but allow saving for the end-user.

Vitari manufactures a large number of machines, starting from automatic wire straightening and cutting-off machines, to machines for manufacturing nails, chains, chain-link fencing, barbed wire and dress-hangers, as well as all ancillary machines for the various indicated productions.

Customers are well served with agents spread throughout the world and an efficient after-sales service.

Vitari SpA – Italy
Fax: +39 0355 28999

Wafios
Booth E04

Wafios will exhibit three of its machines in Hall 1, booth E04 at wire Russia 07.

▲ *Wafios CNC coiling and bending centre FMU 2.7*

The machines are as follows:

- a CNC tube and rod bending machine BMZ 61, which can take wire up to 13.0mm diameter and tube to 25.0mm;
- a CNC coiling and bending centre FMU 2.7 with a wire diameter in the range of 0.8-2.5mm;
- an electronic spring coiling machine FSE 23 with a wire diameter from 0.35-1.6mm.

Wafios AG – Germany
Fax: +49 7121 491209

Weber & Scher
Booth D01

Now in their 90th year of business, Weber & Scher has specialised for more than 60 years in providing equipment and technology specifically to the wire and cable industry. At wire Russia 2007, the company will be displaying information and literature on its complete range of products, including corrugated metal tape shielding/armouring lines, metal tape handling and ultrasonic splicing equipment as well as longitudinal forming equipment for smooth and corrugated metal tape, core wrap tape handling, application and binding equipment.

▲ *A small corrrugator from Weber and Scher*

Also included in their production programme is Kevlar serving equipment, cable core pressure filling and flooding equipment for optical fibre cables and copper telephone cables, metal tape overlap seam bonding systems, multi-position tension controlled supply equipment, high speed rewind/repair equipment, vertical and horizontal cable accumulators, belt wrap type capstans, linear belt caterpillar capstans, concentric and eccentric taping heads and cable pay-offs/take-ups.

Detailed information and video presentations will be available covering the company's unique Inductoweld and Gatweld continuous seam welded sheathing systems for coaxial cables, RF cables, optical fibre cables and power cables.

Weber & Scher Mfg Co Inc – USA
Fax: +1 908 236 7001

Well Gain
Booth J07

Well Gain Cable Systems is specialised in the supply of machinery and with 20 years' extensive experience, can supply wire and cable machinery to fulfil needs such as equipment for conductors, power cables and communication cables.

All machines are manufactured in China and the range of products include Cu rod upward continuous casting line, rod break down machine and wire drawing machines, rigid strander, planetary strander, cage strander, drum twister, extrusion lines, CCV line for up to 35kV cables, testing equipment, compounding machines for PVC and LSHF materials.

Well Gain Cable Systems (Shanghai) Ltd – China
Fax: +86 021 34140438

Windak
Booth J24

Windak, based in Stockholm, Sweden, offers the largest range of automatic coiling and spooling equipment in the industry. The key to Windak's success has been the close co-operation from the early stages in each project. The company's extensive experience ensures the correct equipment recommendation. To cater for an expanding market, Russian-speaking support and trained service personnel are on call.

Windak supplies the following equipment:

Fully automatic coilers: From max 360mm coil OD to max 1,000mm coil OD in seven different models.

Fully automatic spoolers: From 165mm to 1,200mm spool flange diameter in five different models.

Pay-off/take-up and rewind equipment: From 200mm to 4,500mm reel flange diameter in a large range of models.

Other sizes and specifications can be discussed.

Windak AB – Sweden
Fax: +46 580 38955

WPM
Booth G13

Wire and Plastic Machinery Corporation – one of the largest suppliers of used equipment in the world – specialises in buying quality used equipment and reselling them in either their original condition or refurbishing them mechanically and electrically to current standards.

▲ *24 wire planetary strander recently shipped to China*

Based at Bristol, Connecticut, USA, and with more than 90,000m² of warehouse, the company stocks a wide range of equipment for producing almost all cable types such as fibre optic cable, low voltage cables, data cable and copper communication cables.

The company will exhibit photographs and provide technical data on the equipment currently in available from its stock.

Wire & Plastic Machinery Corp – USA
Fax: +1 860 589 5707

Zumbach Electronic AG
Booth H06

Zumbach Electronic will present many new developments and products.

▲ *The latest offering from Zumbach*

Sensors:
- the ODEX® 10 concentricity and diameter gauge for wire extrusion. This extremely accurate and advanced sensor is insensitive to environmental conditions, fully non-contact and is based on magnetic and laser technology;
- new laser-based diameter gauges for very big cables and profiles;
- large 3-axis laser diameter gauges with incorporated fault detection;
- ethernet TCP/IP enabled diameter gauges for direct networking without need of external processors;
- new ultrasonic scanners of the novel Umac® Z range for wall thickness measurement with quick and easy adaptation to cable diameters and space-saving integration.

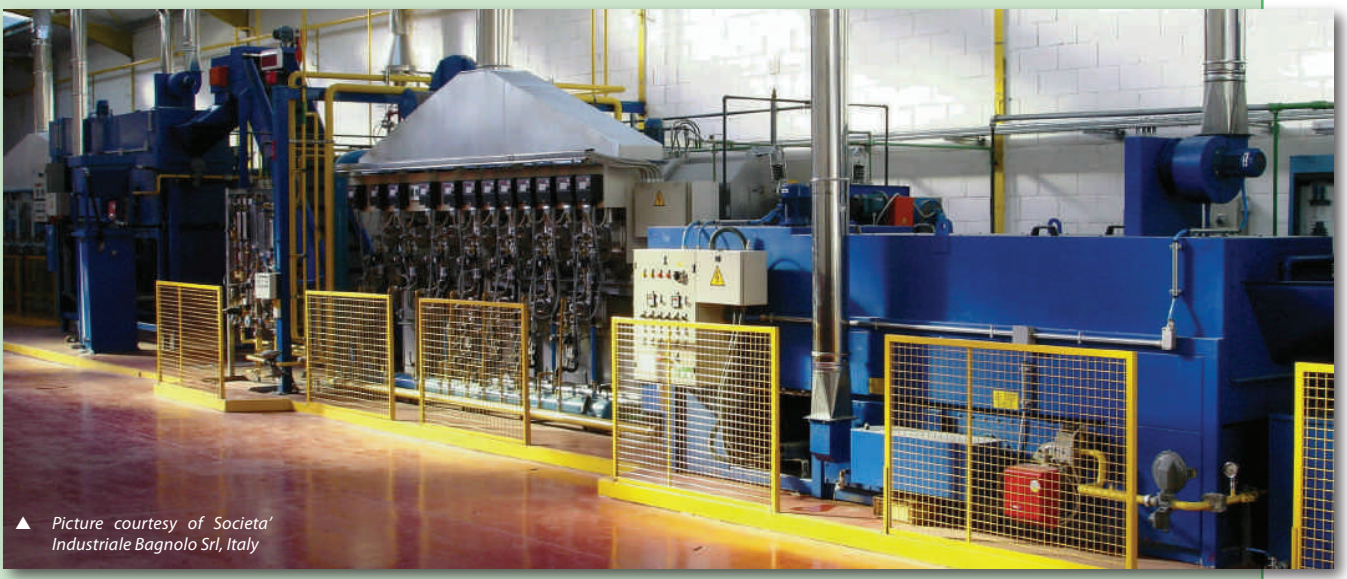
Data Acquisition, Processing and Display Units (Processors):
- three new full lines of USYS processors, ranging from a low-cost basic model USYS 200 up to the high-end multi-sensor processor/controller USYS 8100, will also be displayed;
- all USYS processors are extremely user-friendly, safe, stable and flexible for extending to and upgrading.

Complete Measuring and Control Systems:
- Wallmaster wall thickness and eccentricity systems for cable jackets and tubes now offer combination with gravimetric weigh hopper Gravi 8000 and Diacal option for fully automatic calibration and control.

Cellmaster®, Jacketmaster and Multiline systems for extrusion and wire-drawing are based on the new USYS line.

Zumbach Electronic AG – Switzerland
Fax: +41 032 356 0530

Equipment for Wire Treatment



▲ *Picture courtesy of Societa' Industriale Bagnolo Srl, Italy*

Even the thickest wire is thin by ordinary standards – and its 'skin,' thinner still.

Some idea of the challenge of working on that skin, or imparting properties to it, can be gained from the abstract of a patent ('Wire Coil Guiding Device for Wire Treatment') chosen more or less at random from the Internet. It reads:

"A rotating horizontal carrier shaft having the coils of wires suspended and imparting to the coils rotative movement about the shaft to transport the coils in a direction generally parallel to the axis of the carrier shaft. At least one guide disc is positioned on both sides of the carrier shaft and the guide discs of each of the guide disc devices is freely rotatable about a rotational axis of the disc arranged to extend generally parallel to the direction of transport of the wire coils."

And so on. These sentences will give some sense of the gingerly approach that is a staple of wire treatment. And bear in mind that they refer only to the presentation of the wire, in this case to a jet de-scaling machine.

Without question, this is a province for experts . . .

Heat and surface treatment systems

For physical reasons, wire must be annealed during the drawing process. For certain applications a surface treatment is also necessary. Maschinenfabrik Niehoff GmbH & Co KG, Germany offers a range of continuous annealers and galvanic plating lines for wire made of copper, aluminium and other non-ferrous metals and their alloys.

Wire made of copper and copper alloys is normally continuously annealed immediately following the drawing process, in an annealer which is integrated into the drawing line. The wire is fed over contact pulleys, which induce an electrical voltage. A defined current flows as a result of the inherent resistance of the wire material causing the wire to heat up.

Niehoff has developed annealers for various applications. The product line incudes systems that process between 1 and 42 wires with diameters ranging from 0.05mm to 8mm. In practice, heat treatment during continuous annealing of copper wire consists of a pre-heating, the main annealing, and sometimes post-heating. As a result, the annealing sections in the annealers are designed as a three-zone circuit.

After the wire has passed through the main annealing section, it is cooled using a coolant, which is then removed with forced air emitted by air jets. In order to remove any moisture residue on the wire surface, the wire is heated again in the third zone. However, if the wire diameter is greater than 0.20mm, the residual heat in the wire is sufficient to evaporate the moisture. Consequently, this wire can be reliably annealed in a two-zone circuit without any additional supply of energy. The RM series annealers from Niehoff are able to switch automatically between two and three-zone annealing according to the wire diameter, thus avoiding energy wastage.

▲ *Anode basket with anode material*

The company has also developed an inline annealer for use in the production of wire made of EC aluminium and numerous aluminium alloys. Because aluminium has a strong tendency to oxidise, continuous resistance annealers for aluminium wire must be designed so that no oxygen can enter during the heating process.

The Niehoff Bühler NBM joint venture company has developed RI type inductive continuous annealers. These operate on the basis of the induction principle, and are suitable for wire with low electrical and heat conduction characteristics, such as wire made of various copper alloys. This kind of wire is very difficult to anneal in resistance continuous annealers designed for copper. The RI annealers create wire with a fine grained, homogeneous microstructure that gives it very good processing and forming properties. RI annealers can be combined with rolling systems and drawing systems, and are suitable for round, flat and profile wires with a simple cross-section made of brass, bronze and German silver, as well as nickel and nickel alloys such as heating conductor and resistance alloys.

The process for plating copper alloy wires realised in continuously working galvanic plating lines must generate a tight plating with homogeneous physical properties and a high surface quality along the whole wire length. Modern plating lines for copper alloys must meet demanding technical, ecological and economical requirements.

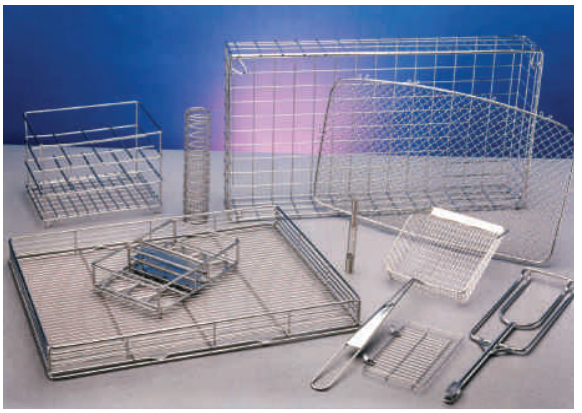
Maschinenfabrik Niehoff and Steuler Anlagenbau, a manufacturer of surface treatment plants, combined their experience to develop the Niehoff-Steuler WPT wire plating technology and to manufacture galvanic wire plating lines for tin plating, tin-lead plating, nickel plating, silver plating, and zinc plating of non-ferrous metal wires. Advantages of WPT lines include complete solutions without interface problems, minimised consumption of energy, water and chemicals, up to 100% usage of anode materials, and automatic dosing of additive and supply of water.

Maschinenfabrik Niehoff GmbH & Co KG – Germany
Fax: +49 9122 977 155
Email: info@niehoff.de
Website: www.niehoff.de

Polished stainless steel wirework

Anopol Ltd, UK, provides sub-contract services for the electropolishing of customers' free-issue stainless steel items. The company is also able to supply electropolishing plant and associated chemistry.

Stainless steel wire has proved to be invaluable for use in a wide range of fabricated wirework applications. A growing number of these applications require the wire to be brightly polished for decorative or aesthetic reasons, or a combination of both. Equally important is the requirement that wire items show no signs of corroding, even if subjected to repeated washing or sterilising in potentially harsh and corrosive fluids.



▶ *The electropolishing process can be used on welded stainless steel wire products, where conventional metal polishing is not practical*

Welded stainless steel wire products, such as trays and baskets, are not suitable for conventional metal polishing, traditionally using mops and brushes. Electropolishing has proven successful for achieving a highly polished finish with high corrosion resistance.

In simple terms, electropolishing is the opposite of electroplating. Rather than depositing a metal layer, electropolishing removes a fine surface layer. The resulting wire finish is bright, micro-smooth and free from surface contamination, with no mechanical or thermal distortion of the finished item.

Anopol Ltd – UK
Fax: +44 121 631 2274
Email: info@anopol.co.uk
Website: www.anopol.co.uk

Specialists in wire cleaning

GEO-ReinigungstechnikGmbH,Germany, designs, develops, manufactures and installs wire and cable cleaning solutions, and provides application-specific solutions for comprehensive turnkey systems, upgrades, and additions to existing processes.

Wet chemical processes are supported by compact, high-performance ultrasound modules and high pressure nozzles to boost the cleansing capacity of the purifying agent. As a rule, the material passes through separate cleaning and rinsing sections before the final drying, and is capable of single-strand and multiple-strand cleaning.

The company also produces economically-priced equipment for fine cleaning or the improvement of gliding qualities, and stainless-steel air wipes for the drying of cables, wires and litz wire at high speed with low air consumption.

GEO-Reinigungstechnik GmbH – Germany
Fax: +49 25 4292 9791
Email: info@geo-reinigungstechnik.de
Website: www.geo-reinigungstechnik.de

Heat treating, cleaning and coating

QED Wire Lines Inc, Canada, specialises in the treatment of steel wires. After being drawn to the required size, wire will usually need some type of heat treating, a cleaning process and the application of a coating.

Heat treatment can take the form of annealing, stress relieving, patenting or oil tempering, depending on the carbon content and the required tensile. QED Wire's FastHeatTM Fluidbed furnace is used to heat treat multiple strands of drawn wire, and offers increased furnace efficiency due to the newly developed 'Production Proportional Algorithm' used on the company's PLC-controlled furnaces. The algorithm provides tighter control of fluidisation rates in proportion to changing production loads.

Advantages of QED's fluidbeds include rapid heat-transfer to the wires, reliable performance, high thermal efficiency at full production, quick start-up and shut-down, multiple zone control and flow rate control, and a double sand return system.

For surface treatment, QED provides high speed cleaning and descaling solutions with its HighTurbulence® Pickling System.

▲ *QED Wire's HighTurbulence Pickling System*

This fumeless system provides an environmentally friendly replacement for older cleaning baths.

The patented special nozzle configuration produces highly turbulent acid throughout the processing tray that accelerates the pickling process and shortens immersion lengths, and the multiple stage design uses the acid more efficiently, resulting in lower acid and waste treatment costs.

Wire coating can take the form of phosphate, borax, aluminium, zinc or Galfan®. QED's ceramic lined Galvanizing and Galfan® furnaces are supplied with fuel efficient patented burner pressure control systems. The company also offers advanced wiping systems: both vertical pad wiping and the latest generation nitrogen wiping systems are available in modular units, ensuring high wire speeds and production flexibility.

QED Wire Lines Inc – Canada
Fax: +1 450 458 0200
Email: sales@qedwire.com
Website: www.qedwire.com

Bronzing line for tyre bead wire

Sirio Wire is an Italian company that supplies equipment for the chemical and electrochemical treatment of wire, including ultrasonic and electrolytic cleaning, chemical and electrochemical pickling, coating, and electro-deposition. The company's bronzing lines for the production of tyre bead wire combines many of these elements.

The bead wire is a bronze coated wire used for the reinforcement of all types of tyre. A bronzing line can be divided into three main sections: a stress relieving lead bath, a cleaning and pickling section, and a bronzing section. The lines operate at very high speed (up to 500m/min) with wire diameter between 0.8mm and 1.8mm.

As the speed of the wire is very high in this type of line, special care has to be taken for all rising and air wiping steps, and Sirio Wire has designed an efficient solution to reduce the liquid drag out from one bath to another.

▲ *General view of a bronzing line*

The line consists of a set of polypropylene or stainless steel working basins, and a set of tanks made of polypropylene welded plates.

Collecting pipes feed the working basins, and the bath is pumped from the storage tank located below, by vertical pumps.

The alignment of all working basins allows straight line guiding of the wire, without any deviation. It is essential for the wire entering the bronze plating line to be perfectly clean, and it is therefore necessary to remove all residuals of soap and oxide present on the wire. Sirio Wire recommends the use of a combined system, first using electrolytic cleaning in an alkaline bath to remove any soap present on the wire, then an electrolytic pickling bath to remove oxide and activate the surface of the wire for the deposition.

The wire is bronze coated by chemical displacement in an acid bath (containing copper sulphate, tin sulphate and sulphuric acid) at a controlled temperature. A good agitation is obtained in the bath in order to improve the coating process.

Sirio Wire Srl – Italy
Fax: +39 0362 576 138
Email: info@siriowire.it
Website: www.siriowire.it

Bell-type batch annealing furnaces

Rad-Con, Inc, USA, has over 40 years' experience in the design of bell-type batch annealing furnaces, and the company engineers, manufactures, installs, and supports high-capacity, robust systems for the wire and wire-rod industry, with innovations in convection design, atmosphere analysis and temperature control of bell annealing equipment.

Efficient performance of the system's convection flow is critically important to the end-quality of the annealed material. Rad-Con's 100% Hydrogen Super-High Convection (H2SHC)™ system utilises advanced fan designs combined with a 100% hydrogen atmosphere, resulting in greater temperature uniformity throughout the charge, low utility costs, and clean, decarb-free product. Modern control technology allows for ease of operation and maintenance of required advanced safety systems for 100% hydrogen, with redundant safety elements to eliminate operator error.

The company has also developed the AC/APEx™ atmosphere control system, which couples gas stream analysis with closed-loop process control, to improve the surface quality of the charge while minimising the amount of atmosphere gas required.

▲ *Rad-Con specialises in annealing systems*

Specialising in annealing systems that produce spheroidised Cold Heading Quality (CHQ) wire for the fastener industry, Rad-Con's experience also encompasses ferrous and non-ferrous applications in the agricultural, electrical, construction, spring, industrial, and communications.

Rad-Con, Inc – USA
Fax: +1 440 871 2948
Email: sales@rad-con.com
Website: www.rad-con.com

Range of surface treatments from Candor in Sweden

Candor Sweden AB specialises in processes and equipment for the surface treatment and metal finishing industry.

The company supplies both single and multi strand systems for ferrous and non-ferrous materials, with all plants being tailor-made to customers' requirements.

The company's flexibility allows it to provide any design the customer requests, based on new developments, production needs, surface requirements, space limitations or other requirements.

Candor has supplied over 300 plants to more than 25 countries, for surface related treatments including:

- Plating – plating of brass, copper, chromium, nickel, silver, tin and zinc on ferrous and non-ferrous wire
- Cleaning – single and multi strand cleaning systems with alkaline or acidic bipolar electrolytic degreasing and ultrasonic cleaning or combination of both technologies
- Pickling – single and multi-strand acid pickling lines using hydrochloric or sulphuric acid in line with hot dip galvanising, phosphating and electroplating
- Candojet HW – patented high speed hot water cleaning system for high wire speeds
- Copperjet – high speed copper coating unit for CO_2 welding wire using the company's own product, Inhibitor E1
- Bead wire – high speed bronze coating for the automotive industry

Candor Sweden AB – Sweden
Fax: +46 1112 6312
Email: info@candorsweden.com
Website: www.candorsweden.com

Heat treatment systems from Italy

▲ *Sib Societa' Industriale Bagnolo manufactures heat treatment systems*

Sib Societa' Industriale Bagnolo Srl, Italy, specialises in systems and equipment for heat treatment, with 50 years' experience.

The company's equipment is manufactured in Italy according to the highest standard (certified ISO 9001), using modern technology to give the ultimate in control and energy conservation.

The manufacturing programme consists of furnaces for:

- Continuous or batch heat treatment lines for hardening, carburising and carbonitriding
- Pit furnaces for hardening, carburising, nitriding and tempering
- Stainless steel treatments
- Sintering and sinterhardening (up to 1,300°C)
- Aluminium field heat treatment (hardening, ageing, die nitriding, die heaters)
- Controlled atmosphere generators

For fasteners producers, the company has developed high fidelity hardening and carbonitriding heat treatment lines.

These lines feature: automatic loading; continuous hardening furnace with wire mesh or cast link belt; electric or gas heating with radiant recuperative tubes; forced controlled atmosphere circulation; measuring and automatic regulation of carbon potential; controlled atmosphere by nitrogen/methanol or by endo-thermic generator; and total automation and managing through PC with tele-assistance via modem.

All the furnaces can be managed by PC with the Sibvision Supervision system.

Sib Societa' Industriale Bagnolo Srl – Italy
Fax: +39 0373 649 429
Email: info@sib-bagnolo.it
Website: www.sib-bagnolo.it

Associated as they are with the legendary development of high-temperature superconductivity, compounds conjure up visions of 'magic wire' from silver spools. Coatings, too, have something of the marvellous about them, probably owing to the seeming improbability of imparting fail-safe protection in minute thicknesses of deposition along a strand barely visible to the eye. Customarily bracketed together, compounds and coatings enjoy a particular prestige in wire making practice.

But compounds and coatings must also be considered in the light of an entirely down-to-earth factor: they are custom-created of expensive materials. In today's hypercompetitive industrial environment, they must provide value for money – and they do. Companies understand that retaining a sterling reputation is harder than gaining it in the first place. Like their excellent products and services, they are more than equal to the challenge.

Colour and additive concentrates

Ampacet manufactures high quality colour and additive concentrates for plastics processors. The company's product lines include utility and speciality additives for many different polymers. The company invests heavily in manufacturing technology, research and development, multi-level statistical quality and process control, dedicated customer services, constructive safety and environmental policies, and all of its plants are ISO certified.

▲ *Ampacet produces a wide range of colour and additive concentrates*

The company's diverse range of reliable and consistent masterbatches utilise existing and emerging technologies for industrial applications including wire and cable, bi-axially oriented polypropylene, pipe and profile extrusion, blow moulding, injection moulding, and blown and cast film.

In addition to manufacturing large and small orders of masterbatches, the company formulates additive concentrates such as UV absorbers and inhibitors, flame retardants, anti-static agents, process aids and purges, antioxidants, scented masterbatches, slips and anti-blocks, conductive blacks, foaming and nucleating agents, and catalysts for PEX.

Ampacet – USA
Fax: +1 914 631 7197 **Website**: www.ampacet.com

Compounds & coatings for wires, cables & fibre optics

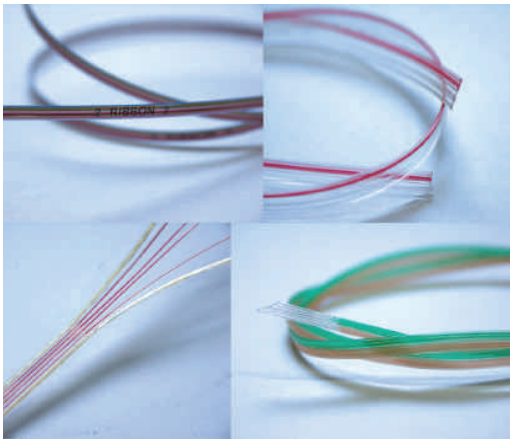
Picture courtesy of Colorant Chromatics AG, Switzerland

Coating systems for optical fibres

Medek & Schörner, Austria, developed its concept for coating optical fibres with ultra-violet hardening inks in close cooperation with companies in the cable industry.

Each optical fibre coating line is equipped with Medek & Schörner designed M550 high performance SOFT-curing UV irradiators. Advantages include: perfect curing results with minimum energy load for fibre and ink; permanent irradiation control; automatic adjustment for the actual curing demand, which compensates bulb aging and quartz tube deterioration; and optimised energy consumption.

The modular design allows quick and easy adaptation of the coating system for various applications, with upgrading available as the need arises, eg for ring marking, higher UV curing performance, tight buffering, screen proof test, and fibre ribbon production.



▲ *Examples of fibre ribbon applications*

Examples of adaptations of the M&S designed fibre ribbon production system include: ribbon of plastic optical fibre (POF) for automotive pedestrian protection systems; CFU (compact fibre unit): up to 12 colour-coded optical fibres gathered to form a small fibre bundle; designs for air-blown installation applications (eg FTTH); and indoor 'fibre to the desk' (FTTD) cables with Kevlar strength member.

The M&S coating system can also be used for applications other than optical fibre, such as a new manufacturing concept for precision micro flexible flat cables (FFC). FFCs have found widespread use in the automotive and IT industries, and lamination and extrusion are the processes most commonly used in their production.

The disadvantage of lamination is its extremely low production speed, while extrusion is unsuitable for the production of micro FFCs due to the high temperatures and pressures encountered in the extruder head, which make it impossible to maintain accurate geometrical dimensions and precise positioning.

Medek & Schörner has developed a new pressureless cold process for the production of FFCs using UV cured resins, ensuring geometrical accuracy of the cable at high production speeds. The same procedure can also be employed inline with an extruder to position the individual flat cables accurately as they enter the extruder head.

Medek & Schörner GmbH – Austria
Fax: +43 1 982 7296
Email: m+s@medek.at
Website: www.medek.at

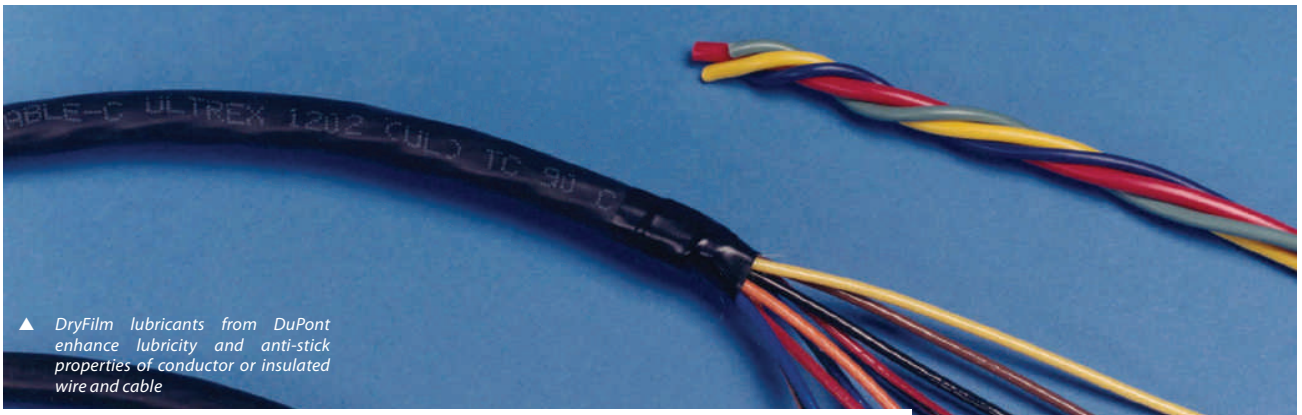
Ukrainian producer of polymeric compositions

Prominvest, Ukraine, develops and manufactures polymeric compositions for the cable industry, with a product range including PVC, flame-resistant, heat-resistant and cold-resistant compounds. The company has also developed HF compounds for fire-resistant cables.

The company's laboratory is accredited by the National Agency of Accreditation of Ukraine, with conformity to the standard DCTY ISO/ IEC 17025, and has the License of ECM State Department of Ukraine for the right to carry out tests on fire safety indexes of polymeric materials and cable goods.

The company actively takes part in the development of national standards of Ukraine, and has patents on in-house design in fire safe polymeric compositions.

Prominvest – Ukraine
Email: info@prominvest.com.ua
Fax: +380 57 714 35 25
Website: www.prominvest.com.ua



▲ *DryFilm lubricants from DuPont enhance lubricity and anti-stick properties of conductor or insulated wire and cable*

Dry film lubricants in wire production

As metalworking technology and metallurgy evolve, new synthetic lubricants and improved standard lubricants have emerged. These new dry lubricants can be used in wire production to help upgrade wire quality and simplify manufacturing practices, helping to provide better finishes and cleaner products, while reducing processing steps.

Lubricants in the DryFilm series from DuPont™, USA, are suitable coatings for enhancing the lubricity and anti-stick properties of conductor or insulated wire and cable. DryFilm dispersions are used to impart a thin non-stick film on metal wires or on insulated wire for cable products and twisted wire in jackets.

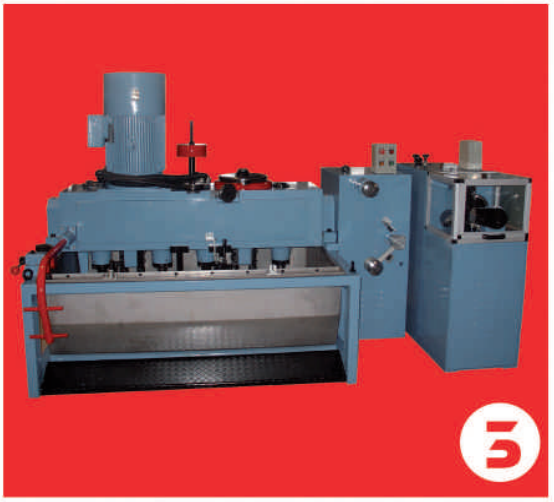
Wire production facilities can use these dispersions to reduce insulation stripping force, provide non-stick (abrasion resistance) to twisted wire and offer lubricity for welding wire, wire forming, and knitting.

DuPont™ DryFilm lubricants exhibit an extremely low coefficient of friction. The patented polymer is thermally stable and can be used at temperatures up to 300ºC. The lubricants are clean, non-migrating, chemically inert and not gummy or oily, and are available in concentrate and ready-to-use formulations.

DuPont Safety & Protection – USA
Fax: +1 302 892 1135
Email:
christine.e.procopio@usa.dupont.com
Website: www.dupont.com

JIANGSU JIN TAILONG

JIANGSU JINTAILONG is the largest equipment manufacturer in China for the steel cord making industry. Over the years we have made high-quality, cost-effective machinery for some of the best-known steel cord producers in the global tyre market. Long-term relationships with our customers have been built upon our proven innovation and our ability to take designs through development and into real-time production. Come to JIANGSU JINTAILONG for high-quality, cost-effective steel cord equipment.



1. plating line
2. dry drawing machine
3. 23 Wet drawing machine
4. double twisting strander
5. wet drawing machine
6. wrapping machine

JIANGSU JINTAILONG MECHANICAL AND ELECTRICAL EQUIPMENT MANUFACTURER

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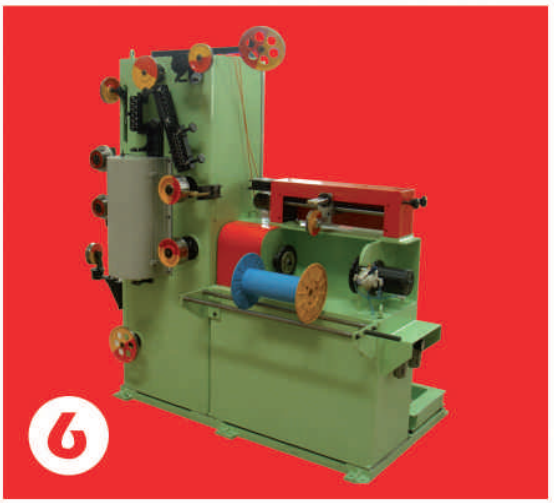
website: www.jsjintai.cn



New halogen free flame-retardant compounds

Crosspolimeri SpA, Italy, is a company that supplies the compound-market sector for ready-prepared and tailor-made special compounds. The company produces thermoplastic and crosslinkable compounds both with and without flame-retardant and halogen free properties.

The main applications for the company's compounds are in the industrial fields of electrical cables, tubes and technical parts for the automotive aeronautical and railway industries, consumer goods and communication systems. Crosspolimeri has been researching new halogen free flame-retardant crosslinkable and thermoplastic compounds related to T2 and T3 classes, and is now ready to offer these products to its customers.

The company's manufacturing facilities in Italy feature several polyvalent production lines with a total capacity of up to 15,000 tons per year, while its sister factory, Crosspolimeri AG in Switzerland, can produce up to 7,000 tons per year.

Crosspolimeri SpA – Italy
Email: cross@crosspolimeri.com
Fax: +39 0521 331 400
Website : www.crosspolimeri.com

Speciality inks and coatings

▲ *Herkula manufactures UV-curable inks and coatings for OF-technology*

Herkula, Belgium, produces marking inks for the cable industry, and since 1984 has supplied UV-curable inks and coatings for OF-technology.

The company has developed a water-borne series – MarCablo-W – suitable for ringmarking of PVC, PE and foam skin, at a speed of 1,500m/min.

The machines can be cleaned with tap-water, and environmentally friendly gravure and offset inks are also available.

Within the OF-field, in addition to its UV-curable inks for colouring optical fibres, the company produces 12 luminescent inks.

In combination with 12 Munsell Standard shades, these luminescent inks provide 24 distinguishable shades.

Herkula also offers material combinations for compact fibre units meeting all requirements of house and LAN installation of cables.

All raw materials are made by means of the Nirvis controlling system. The company is certified to ISO 9001:2000 and ISO 14001:2004.

Herkula – Belgium
Fax: +32 8022 8765
Email: info@herkula.com
Website: www.herkula.com

Compounds and colourants for fluoropolymer coated wires and cables

Fluoropolymers are used in wire insulation and jacketing applications where at least two or three of the following properties are required: high temperature stability, chemical resistance, electrical properties at thin gauges, non flammable, UV inert and low adhesion.

Colorant Chromatics, Switzerland, has developed an extensive range of heavy metal-free colour concentrates for FEP, ETFE, E-CTFE, MFA, PFA and PVDF.

Different concentrations are available to accommodate processing equipment and obtain optimal incorporation of the pigments in the polymer matrix.

High strength PVDF colour concentrates are also available for the colouration of highly filled flame retardant PVDF jacketing compounds.

The company's product range also includes:

- Additive concentrates such as nucleating agents to foam FEP on-line in applications such as coaxial cables and plenum wire
- Irradiation cross linkable X-ETFE compounds to improve the mechanical properties of ETFE and conductive or semi-conductive ETFE, MFA or PVDF compounds for heat trace cables

▲ *Switzerland's Colorant Chromatics manufactures a range of heavy metal-free colour concentrates*

- Printing, striping, or ring marking inks with specially developed heavy metal free pigments, including new offerings featuring reduced PFOA dispersions
- Naphtha-based, heavy metal-free pigment dispersions for the coloration of PTFE fine powders

Colorant Chromatics operates three plants in Finland, the USA and China, and serves the wire and cable industry worldwide.

Colorant Chromatics AG – Switzerland
Fax: +41 41 741 0102
Email: info@colorant-chromatics.com
Website: www.colorant-chromatics.com

Production trial to evaluate flame-retardant compound

A production trial using FRNC/LS0H (flame-retardant no corrosive/low smoke zero halogens) compound from Fainplast Srl, Italy, has been conducted on a cable extruder manufactured by Samp Sistemi Spa, to assess its processability at a production line speed of 1,000m/min.

The compound tested was HF 045/11, which is a thermoplastic material, formulated on a polyolefinic basis. It can be used for the production of energy, signal and control cables, in both insulation and sheathing applications.

Its properties comply with the requirements of CEI 20-11 M1, VDE 0207 Part 24 type HM4, and BS 7655 type LTS2.

The company reported that the production trial ran well, and that a smooth cable surface was obtained without spark faults being detected.

The extruder temperatures appeared to remain constant throughout the production evaluation, with a head melt temperature reading of 169°C.

The measured test parameters, such as motor absorption and head melt pressure (55% and 312 bar respectively), suggested that higher production speeds are possible with the HF 045/11 flame-retardant and halogen free compound.

Fainplast Srl – Italy
Email: info@fainplast.com
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Website: www.fainplast.com

Polymers for advanced bonding and coating

Master Bond, USA, manufactures speciality polymers for advanced bonding and coating applications. Its product line includes both one and two component epoxy resin, latex, polyurethane, polysulfide, polyamide and silicone compounds.

Systems cure at room temperature, upon exposure to elevated heat, and upon exposure to UV and EB radiation.

The company's compounds are all formulated to maximise resistance to liquid water, water vapour, petrol, oil, corrosive chemicals and other adverse environments.

The product line includes optical systems for fibre optic cables and assemblies featuring outstanding performance in terms of their light transmission characteristics, non-yellowing properties, and with fine tuned index of refractions ranging from a relatively low 1.43 up to 1.61.

Master Bond's custom coatings are abrasion resistant, highly flexible, resist thermal cycling, and offer service temperature ranges from 4°K to over 250°C. The easily processed ultraviolet compositions cure tack free in the presence of air in a matter of seconds.

All Master Bond products are processed to exclude contaminants such as chlorine and other halogens, sodium, and related elements.

The products virtually eliminate quality control difficulties caused by corrosion and other environmentally induced conditions.

▲ *Master Bond has more than 30 years' experience of providing speciality adhesives and coatings*

Master Bond Inc – USA
Fax: +1 201 343 2132
Email: eutech@masterbond.com
Website: www.masterbond.com

New ROHS-compliant colour concentrates for PVC and polyolefin compounds

Two new series of colour concentrates for use with a wide range of PVC and polyolefin compounds used in the wire and cable industry have been launched by Teknor.

The new ranges consist of 16 colours for PVC and 10 Munsell® colours for polyethylene, and comply with the RoHS requirements specified by the European Union, according to supplier Teknor Color Company, USA.

As applied to pigments used in colour concentrates, RoHS regulations restrict the use of lead-, cadmium-, and chromium-containing substances.

"These new concentrates have been formulated with pigments that comply with RoHS regulations yet provide the same colouring efficiency and electrical performance obtained with standard concentrates," said Anne Upton, wire and cable market manager.

▲ *The new RoHS-compliant concentrates are available in a wide range of colours*

"They make it possible for wire industry manufacturers in the Americas to serve customers in Europe as well as to meet growing restrictions on the use of certain metal-containing compounds in the domestic market."

Both series are available in bead form, except for PVC black, which is in dice form. The 16 colours of the concentrates for use with PVC are aqua, black, blue, dark blue, brown, dark brown, grey, green, light green, orange, pink, purple, red, dark red, white and yellow.

The carrier resin for these concentrates is lead stabiliser-free PVC.

The 10 Munsell colours for use with PE and TPEs are black, blue, brown, grey, green, orange, purple, red, white and yellow.

Teknor Color Company – USA
Fax: +1 401 724 8520
Email: info@teknorcolor.com **Website**: www.teknorcolor.com

Resin for underground joint protection

Phoenix 2K Resin jointing compound from Phoenix International, Denmark, has recently been used on several major new projects in the Middle East. The 2K Resin jointing compound, specially designed for MV and HV underground joint protection, has passed IEC60840 testing for the sixth consecutive test for certification on projects in Qatar for a major Scandinavian Cable producer.

▲ *Phoenix International's 2K Resin offers MV and HV underground joint protection*

Following the failure of other protection systems during installation in Qatar, project managers re-tested 2K Resin for certification with their customer.

2K Resin will now be installed on all underground joints on this high voltage project. Phoenix International will also provide on-site support and consultation for the first few joint bays. 2K Resin has been used successfully throughout the UAE on large high voltage projects for the last few years, and the use of this type of high-level joint protection continues to expand thought the region, as both cable producers and operators see the need for long term protection of underground cable joints.

Phoenix International A/S – Denmark
Email: info@phoenixint.dk
Fax: +45 7696 3401
Website: www.phoenixint.dk

Flame retardant compound for cable

Hangzhou JLS Flame Retardants Chemical Co, Ltd, China, manufactures a series of products to meet the flame-resistant requirements of users of plastics.

▲ *Hangzhou JLS's flame-resistant compound is both RoHS and WEEE compliant*

The company has launched an environmentally friendly low-smoke halogen-free compound for cable, featuring low density, high flame retardancy and good mechanical properties, maintaining the physical, mechanical and electrical properties of the polymer.

The compound requires no special screw combination, and can be processed in an ordinary PVC processing machine. It is both RoHS and WEEE compliant, and meets UL, CSA, IEC, VDE, JIS and T-MARK standards.

Hangzhou JLS Flame Retardants Chemical Co, Ltd – China
Fax: +86 571 8725 0388
Email: sales@jlschemical.com **Website**: www.jlschemical.com

Rinsing methods in the wire and tube industry

By K D Nittel, Member of Chemetall GmbH, Frankfurt/M, Germany

Rinsing operations form an essential part of a treatment line in the wire and tube industries, and water rinse processes have a strong effect in the following areas:

- Poor rinsing methods may not only result in unnecessary carry-over of chemicals into the subsequent process baths, associated with sludge formation, higher consumption and lower bath life, but they may also jeopardise the quality of the conversion coat formation;
- High water consumption is a major cost factor, in addition to the related treatment costs;
- In many areas water is becoming short in supply. Tap water is needed for human consumption and not for industrial rinsing processes;
- It is believed that just one rinse tank may help to save water. Two rinse tanks connected in the right way are not only much more efficient, but also save a lot of water.

Chemetall is the leading chemical supplier in Europe as far as the wire and tube industries are concerned.

The company not only sells cleaners, activators and phosphating products, but also all related lubricants, and believes in working in partnership to increase quality and productivity.

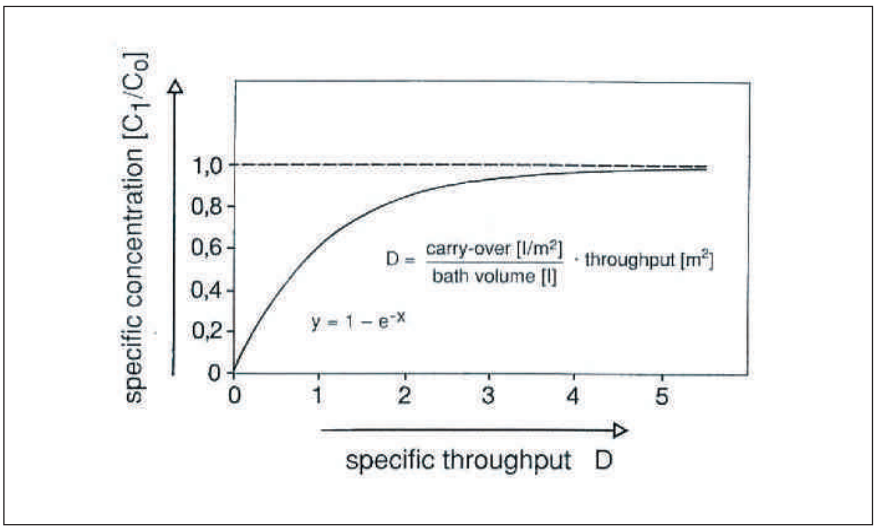
This article describes the typical rinsing methods. It gives a clear guideline as to which technology and treatment line layout may minimise water consumption to the lowest possible levels or provide a higher quality level as far as surface treatment is concerned.

The mathematic formulas allow each technician to adapt the figures to his needs. The target is to provide help and ideas for new lines as well as for the optimisation of lines already in use.

The author and the company feel the responsibility to be a true partner for these industries under both technical and economical aspects.

This summary does not refer to administrative regulations or any other legal aspect.

▼ **Figure 1**: *Drag out rinse*



1. Technical terms

In the following description of rinsing methods certain terms are used which are briefly explained here. Together with the wire coils or tube bundles a certain amount of treatment solution – *carry-over* – is transferred from one bath to the next. Depending on the viewpoint, this may also be termed the *drag-out* or the *drag-in*.

The amount of the carry-over varies considerably; it is dependent on the geometry of the work pieces and the drain-off times.

A guideline figure for a wire dip line based on a wire diameter of 5.5mm is 150ml/m^2. For tubes, based on an outer diameter of 30mm, with 100ml/m^2.

The '*rinsing factor*', also known as the '*rinsing criterion*,' is the ratio between the concentration in the rinsing bath and that in the previous process bath; it is often given as a ratio, eg 1:100.

In addition to the carry-over, when considering rinsing methods allowance should be made for a possible *overflow* – into the waste water or effluent pre-treatment system or into another treatment tank – and a possible influx – of fresh water or overflow from another treatment tank.

The *stationary concentration* would occur in a rinsing bath if all processes – treatment, influx, and overflows – were to operate continuously. The following balance would then apply:

drag–in + influx = drag-out + overflow,

both to the volume and also to the substances dissolved in it, if the evaporation losses and consumption due to chemical reactions are disregarded.

In estimating the efficiency and water consumption during rinsing operations, stationary values can usually be expected.

2. Rinsing methods

2.1. Drag-out rinse with no overflow

A drag-out rinse is a rinse operated without an overflow. It consists of one tank and is dumped after a certain time.

These operation conditions result in an enrichment of the chemicals carried over from the process bath, in an extreme case amounting to the concentration of the previous bath.

The drag-out rinse is used:
- After pickling baths with high iron content, to prevent precipitation of iron (III)-Hydroxide on the wire or tube surface;
- To relieve the following overflow rinses;
- After process baths with high evaporation and drag-out losses.

A typical procedure is to allow the concentration in the drag-out rinse to reach about 20% of the previous bath and to counteract the losses there with the drag-out rinse.

In this way the chemicals are recycled.

2.1.1. Calculation

The enrichment is calculated as follows:

$$c_1 = c_0 \times (1 - e^{Vx \times F/V})$$

c_1 = concentration in the drag-out rinse as a function of the throughput
c_0 = concentration of the previous bath
V_x = carry-over volume per workpiece surface
V = volume of the rinsing bath
F = work piece surface throughput
D = specific surface throughput

Example:

$V_x = 0.1 l/m^2$ carry-over
V = 2,000 l bath volume
c_0 = 20% concentration
F = 20,000m^2 throughput

By insertion the following is obtained:

$$C_1 = 20 \times (1 - e^{-0.1 \times 20000/2000})$$

Result: The concentration in the drag out rinse is 12.6%.

Alternatively from the diagram with the specific through-put (D):

$$D = 0.1 \times 20{,}000/2{,}000 = 1$$

Result: A specific throughput of 1 is equal to a specific concentration of 0.63.

This is corresponding to 12.6%.

2.2. Overflow rinse

A rinsing bath being fed continuously or intermittently with water is called an overflow rinse.

Apart from the period following make-up, the concentration in the overflow rinse remains mainly constant.

The concentration and hence the rinsing factor is set by the overflow. For the overflow rinse the following formula applies approximately in the stationary state:

$$V_Z = V_X \times c_0/c$$

in which c_0 is the concentration of the previous bath and c that of the overflow rinse.

Example:

Carry-over .....$V_X = 0.1 l/m^2$
Rinsing factor.....$c/c_0 = 1:200$
Water consumption $V_Z = 0.1 \times 200 = 20 l/m^2$

2.3. Multi-stage rinse

The water consumption can be drastically reduced by rinsing in several stages with a constant rinsing factor.

Example:

Carry-over .....$V_X = 0.1 l/m^2$
Rinsing factor.....$c_2/c_0 = 1:200$
divided in two stages of approx...1:14 each (14x14 = 196)

Process bath concentration:..... c_0

Rinsing bath 1

Concentration.....$c_1 = c_0/14 = 0.0714\ c_0$

Water consumption.....$0.1 \times 14 = 1.4 l/m^2$

Rinsing bath 2

Concentration.....$c_2 = c_1/14 = 0.005 \times c_0$

Water consumption.....$0.1 \times 14 = 1.4 l/m^2$

Total water consumption: .....$2.8 l/m^2$

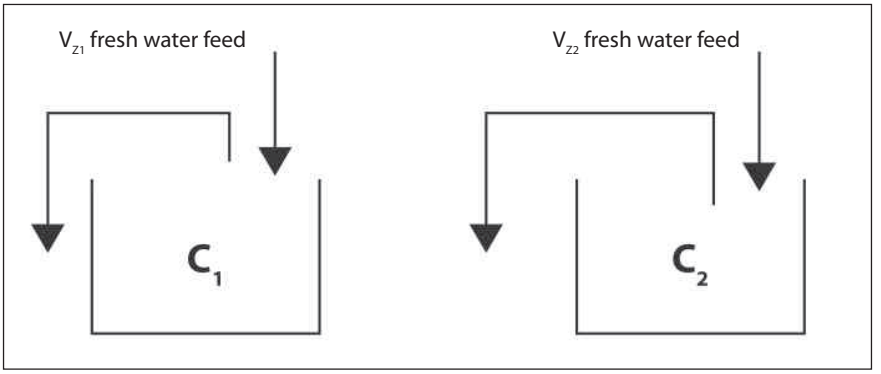
The water consumption is thus reduced from 20 l/m^2 with a single-stage rinse to around 3 l/m^2 with a two-stage rinse.

2.4. Cascade rinsing

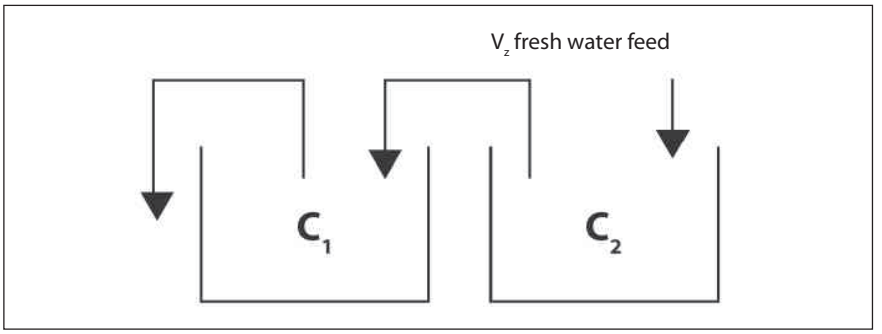
The term cascade rinsing is applied when in a multi-stage rinse the overflow from the subsequent rinse is used as the influx water feed**.**

For an n-stage cascade rinse the following formula approximately applies:

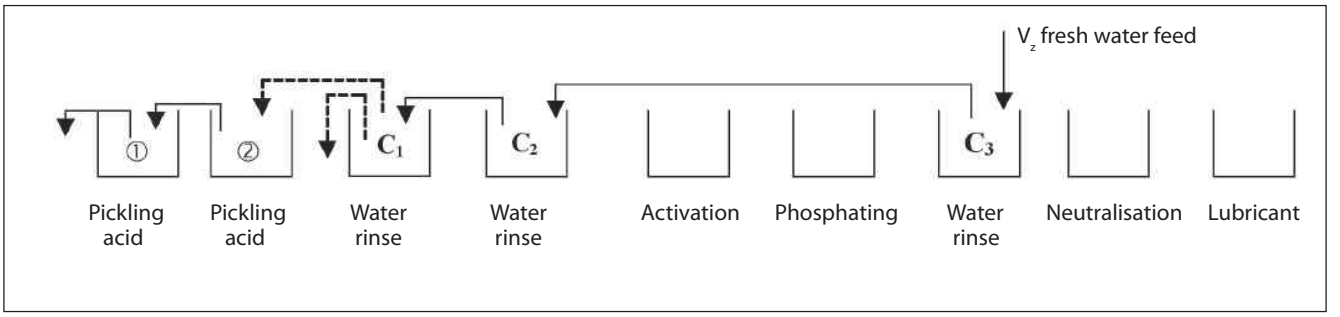
$$V_Z = V_X \times \sqrt[n]{co/cn}$$



▲ **Figure 2**: *Diagram showing the principle function*



▲ **Figure 3**: *Diagram showing the difference to a multi-stage rinse*



▲ **Figure 4**: *Cascade rinse*

In a two-stage cascade rinse the water consumption with the figures of the previous example is reduced to

$$V_z = 0.1 \times \sqrt[2]{200/1} = 1.4 \text{ l/m}^2$$

3. Surface Treatment Line layout wire or tube mill

Figure 4 (see above) shows a cascade rinsing including all rinse tanks after pickling as well after phosphating.

This is the most economical method for water savings.

Tank C_1 is quite often a spray rinse in wire treatment lines.

Additionally the water from C_1 is used for the bath replenishing of pickling tank 2.

Pickling tank 1 is replenished with the acid from tank 2. The acid savings with this so-called cascade pickling reach about 30%. ■

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Anwendungsvorteile der Technologie der induktiven Erwärmung bei der Behandlung von Drahtprodukten

Inductotherm Heating and Welding Technologies Ltd – Radyne Division

Induktive Erwärmung: die Grundsätze

Um die vielen im Zusammenhang mit der induktiven Erwärmung stehenden Vorteile vollkommen zu ergreifen, ist es zunächst wichtig die wesentlichen Grundsätze zu verstehen, die im Mittelpunkt der Technologie stehen.

Für mehrere unterschiedliche Verfahren einsetzbar, schließen die typischen Anwendungen seit Beginn der kommerziellen Induktionserwärmung Anfang der 40er Jahre, das Schmelzen von Metallen, Erwärmen vor dem Biegen oder Umformen, verschiedene Wärmebehandlungen, Härten und Vergüten sowie die Verbindung von Metallen durch Löten oder Schmelzspleißen ein. Unter den ersten Beispielen der induktiven Erwärmung findet man auch die Entwicklung der Hochfrequenz oder der rohrförmigen Oszillatoreinrichtung, die in der Regel bei hohen Frequenzen wirkte, und die Motorgeneratoren, die zur Entwicklung der induktiven Erwärmungsleistung bei niedrigen Frequenzen eingesetzt wurden.

Verlangte man eine Lehrbuchdefinition über das Verfahren der induktiven Erwärmung, lautete sie stets wie folgt: "Die induktive Erwärmung entsteht, wenn ein metallisches Objekt in ein veränderbares elektromagnetisches Feld gelegt wird. Die induktive Erwärmung entsteht durch die Bewegung der Molekularstruktur des Objekts anhand des elektromagnetischen Felds, wenn die Moleküle erregt werden, zusammenstoßen und dadurch Wärme produzieren."

Demzufolge kann die induktive Erwärmung mit der elektrischen Anordnung eines kleinen Transformators verglichen werden, wobei die Primärseite des Transformators die induktive Energiequelle oder den Induktionsgenerator umfaßt, welcher der Induktionsspule oder dem Induktionselement die Energie zuführt, wobei das zu erwärmende Objekt im magnetischen Feld dieser Wicklung oder dieses Elements liegt und die Sekundärseite darstellt.

Ein magnetisches Wechselfeld wird dann von der induktiven Energiequelle oder vom Induktionsgenerator an der Induktionsspule oder an das Induktionselement angebracht. Dank gegenseitiger Wärmübertragung fließen magnetische Flusslinien durch das Objekt, um einen Widerstand gegen die Stromrichtung zu schaffen; da auf diese Weise Strom fließt, wird Wärme generiert.

Eindringtiefe

Der englische Physiker, Michael Faraday, bemerkte anfangs das oben genannte Phänomen bei seiner Entwicklung des elektrischen Transformators. Um diese Wärmewirkung tatsächlich zu beseitigen, wurden danach Transformatoren mit Lamellen entworfen, um die Wirkungen des elektromagnetischen Felds bei der Erwärmung des Transformators zu vermeiden oder zu reduzieren. Der Grund, warum ein laminierter Transformator sich nicht durch die elektromagnetische Induktion erwärmt, liegt an einem Phänomen, das „Eindringtiefe" oder „Bezugstiefe" genannt wird, und bezieht sich auf die Tiefe bei der zirka 80% des Stroms durch ein Werkstück fließen.

Die Tiefe verhält sich proportional zum elektrischen Widerstand des erwärmten Materials sowie zur Betriebs-Ausgangsfrequenz (in Hertz gemessen) der induktiven Energiequelle oder des Induktionsgenerators, die das magnetische Feld entwickeln. Bei Hochfrequenzen ist die Eindring- oder Bezugstiefe im Vergleich zu den Niederfrequenzen dünn.

Das ist einer der Hauptgründe weswegen induktive Erwärmung derart weitgehend bei selektiven Stahlwärmebehandlungen eingesetzt wird, wo die Aufkohlungstiefen der Wärmebehandlung dank einer sorgfältigen Auswahl der Ausgangsfrequenz des Induktionssystems genau überprüft werden können.

Ein weiterer entscheidender Faktor, der bei der Wirkung der Erwärmung eines metallischen Gegenstands in einem elektromagnetischen Feld auftritt, ist die in Kilowatt gemessene Leistungsdichte. Daraus folgt, daß, je höher die Leistungsdichte für eine bestimmte Frequenz ist, desto näher an der Oberfläche die Erwärmung erfolgt. Je niedriger die Leistungsdichte ist, desto tiefer ist die Erwärmung. Die Grundauswahl der induktiven Erwärmung für jedes spezifische Verfahren ist demzufolge weitgehend mit der Auswahl der richtigen induktiven Energiequellen-Ausgangsfrequenz verbunden sowie mit der richtigen Leistungsdichte für eine bestimmte Anwendung.

Berechnung der Frequenz

Bei Frequenzen, die für die induktive Erwärmung benutzt werden, neigt der Strom dazu in der Oberfläche des

Leiters zu fließen, bei einer Tiefe, die vom Widerstand des Leiters, der Frequenz des Wechselstroms und der effektiven Permeabilität des Leiters abhängt. Die effektive Stromeindringtiefe, in metrischer Form, wird anhand nachfolgender Formel bestimmt:

$$\rho = \frac{1}{20}\pi\sqrt{\frac{10r}{\mu F}}$$

In der oben genannten Formel:
p = Stromeindringtiefe
r = Widerstand in Mikroohm-Zentimeter
μ = effektive Permeabilität
(μ = 1 für unmagnetische Werkstoffe)

Durch Auswahl der richtigen Frequenz, kann kontrolliert werden, welcher Materialanteil erwärmt wurde, mit Hochfrequenzen, die niedrige Niveaus effektiver Eindringung zur Folge haben und mit Niederfrequenzen, die eine tiefere Eindringung bewirken.

Mit der oben genannten Formel werden zirka 90% der gesamten Wärme in der Schichttiefe "p" hergestellt, mit größeren Tiefen, die mittels Leitung durch das Material erwärmt werden. Um jedenfalls die höchste Wirkung durch das Erwärmen zu erzielen, sollte die Überlappung der Gegenströme vermieden werden, die in den gegenüberliegenden Oberflächen des Leiters fließen, um die Stromlöschung zu verhindern.

Normalerweise sollte "p" unter der Hälfte des Leiterradius liegen, obwohl diese Vorgabe nicht immer angewandt wird.

Es werden auch andere Stromeindringtiefen für verschiedene Materialien und Temperaturen bei unterschiedlichen Frequenzen angewandt.

Im induktiven Erwärmungsverfahren wird eine Metallkomponente erwärmt, die in oder neben einer Induktionsspule angeordnet wird, indem ein Induktionsstrom durch die Spule fließt, die wiederum einen anderen Strom in die Komponente führt. Die Wärme wird durch den Widerstand gegen den genannten Induktionsstrom erzeugt, entsprechend dem Gesetz I^2R (wo I = Strom und R = Widerstand ist) sowie durch den Ummagnetisierungsverlust in magnetischen Werkstoffen – eine Wirkung, die bei der Curie-Temperatur (zirka 1.400°F/760°C) entfällt.

Stromauswahl (entsprechend eines durchwärmten Drahts)

Mit einer richtig bestimmten Frequenz und geeigneten ausgewählten Stromversorgungseinheiten, ist danach der Leistungsbedarf zu berücksichtigen, wobei zunächst der Wärmeinhalt des Leiters zu bestimmen ist. Der Wärmeinhalt eines beweglichen Drahts ist lediglich eine Funktion aus Massendurchsatz, der spezifischen Wärme und des Temperaturanstiegs. Jedoch kompliziert sich diese scheinbar einfache Berechnung durch die Tatsache, daß die spezifische Wärme sich mit dem Temperaturanstieg verändert. Nimmt man beispielsweise einen mittelgekohlten Stahl, verändert sich die spezifische Wärme durch einen Faktor von 1,3 zwischen 68°F (20°C) und 1.022°F (550°C) und 1,5 zwischen 68°F (20°C) und 1.652°F (900°C).

▼ **Bild 1**. *Drahtanlage mit Härte- und Vergütungsverfahren*

Demzufolge können bei der Bestimmung des Wärmeinhalts zur Erwärmung von gekohltem Stahl 1.022°F (550°C) und 1.652°F (900°C), als grobe Erfahrungsregel spezifische Wärmefaktoren von 0,58 und 0,63 angesetzt werden. Nimmt man diese Regel an, so entspricht der Wärmeinhalt des auf 1.022°F (550°C) erwärmten Drahts 2,31 x lb/min (1,05 x kg/min) und bei 1.652°F (900°C) 4,27 x lb/min (1,94 x kg/min), wobei das Ergebnis in kW ausgedrückt wird. Nachdem der Wärmeinhalt des Produkts bestimmt ist, wird darauffolgend die Leistungsabgabe der Stromversorgungseinheit bestimmt, indem ein Wärmewirkungsgrad bezüglich des Stromversorgungsausgangs festgesetzt wird.

Wärmewirkungsgrad

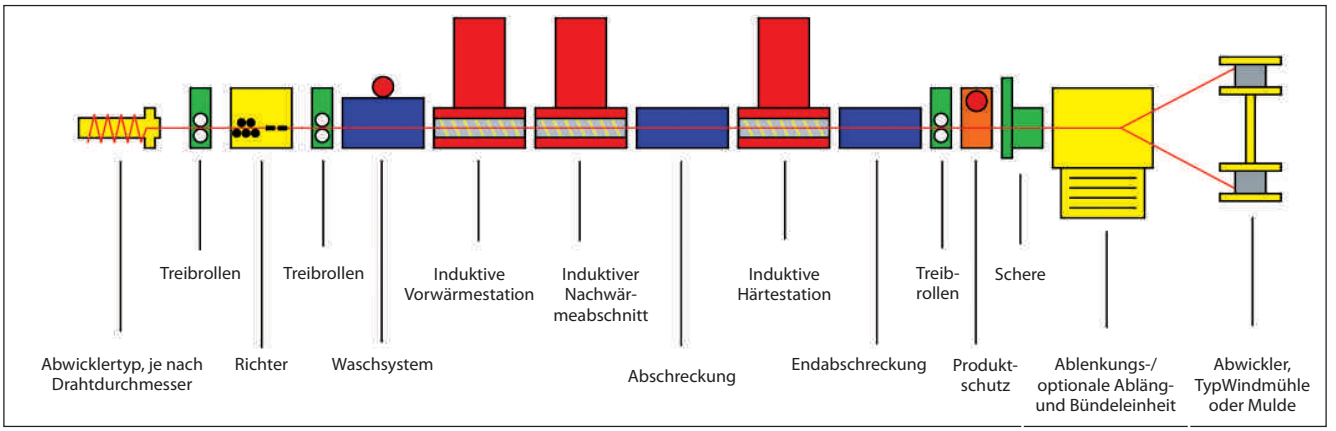
Das typische Induktionssystem besteht aus einer Stromversorgungseinheit, einem Heizspulensystem und Einrichtungen um die Heizspule (und den bearbeiteten Draht) mit der Stromversorgungseinheit zu „verbinden". Die Stromversorgungseinheit ist auch als Konverter, Inverter oder Generator bekannt. Diese Einheit verwandelt eine 3-Phasen-Versorgung von 50 oder 60 Hz in eine 1-Phasen-Versorgung mit einer nominalen Ausgangsfrequenz zwischen 250Hz und 800kHz, und Ausgangsleistungen von 1kW bis 4MW, in einer großen Auswahl an Netzfrequenzkombinationen.

Außerdem stehen auch einige Zweifrequenzkombinationen zur Verfügung. Diese Stromversorgungseinheiten basieren sowohl auf Thyristoren wie auf Transistoren.

Das Heizspulensystem, wie jenes, das für Drahterwärmungsanwendungen benutzt wird, umfaßt ein Kupferrohr, das spiralförmig gewickelt wird. Das Rohr kann rund, viereckig oder rechteckig sein und ist oft zusätzlich mit einem hartgelöteten Kupferband im Innendurchmesser der Spirale ausgestattet. Die Spulenlänge, der Innendurchmesser, die Windungszahl und der Prozentsatz an Kupfer gelten gegenüber dem Freiraum entlang des Innendurchmessers der Spirale alle als wichtige Faktoren für den Wirkungsgrad.

Sämtliche Stromversorgungseinheiten werden innerhalb eines Frequenzbands laufen, d.h. 7-11kHz, 20-25kHz und 40-50kHz je für die nominalen Ausgangsfrequenzen der 10kHz, 25kHz- und 50kHz-Einheiten.

Damit ein Betrieb innerhalb dieses Band erreicht wird, wird die Spuleninduktivität und -betriebsspannung sowie die Kapazitätsmenge (KVAR) im Behälterkreislauf der Stromversorgungseinheit verändert, um sich so spezifischen Drahtabmessungen, Materialien, Durchsatzraten und Temperaturen anzupassen.



▲ **Bild 2**. *Drahtanlage mit kontinuierlicher Wärmebehandlung von Radyne*

Bei der Betrachtung des Wirkungsgrads muß zunächst das Spulsystem berücksichtigt werden. Der Innendurchmesser der Kupferspirale ist der wichtigste Aspekt zur Bestimmung des Wirkungsgrads. Dieser Durchmesser hängt wiederum von wichtigen mechanischen Aspekten ab, die sich auf die Drahtführung, -vibration und -verunreinigung beziehen, neben der Drahtabmessung und der Methode zur Verbindung zwischen Drahtspule und Drahtspule. Im allgemeinen gilt, daß je näher die Spule zum Material steht, desto höher ist der Wirkungsgrad. In vielen Fällen könnte es erforderlich sein, verschiedene Drahtabmessungen durch eine einzige Spule laufen zu lassen. Geringere Abmessungen werden mit einen niedrigeren Wirkungsgrad hergestellt, gerechtfertigt werden kann jedoch der Kompromiß durch niedrigere Kapitalkosten, die durch geringere Spulenabmessungen und Ausfallzeiten erzielt werden, dank Reduzierung der Spulenwechsel wegen verschiedener Abmessungen.

Der zweite Aspekt des Spulenentwurfs betrifft die Spulenlänge. Theoretisch wird eine Zeit von zirka $D^2/25$ Sekunden (wo D = Drahtdurchmesser in mm) benötigt, um einen Durchmesser bei einer bestimmten Temperatur gleichmäßig durchzuerwärmen. Die minimale Spullänge in Meter entspricht daher $D^2M/25$ (wo M = Drahtgeschwindigkeit in Meter/Sekunden).

In der Praxis ergibt sich daraus besonders für kleinere Drahtdurchmesser, daß die genannte Mindestlänge eine übermäßige Leistungsdichte wegen der sehr kurzen Spulenlänge aufweist, mit einem daraus folgenden schlechten Wirkungsgrad. Spulenlängen werden daher erweitert, um den Wirkungsgrad zu erhöhen. Eine erfahrene Beurteilung der Spulenlänge (mit Spulendurchmesser, die anhand Drahtabmessungen bestimmt werden) sowie mehrere Berechnungen - unter Berücksichtigung der Spulenspannung, Windungszahl und Prozentsatz an Kupfer gegenüber dem Freiraum - wird mit der Absicht durchgeführt einen optimalen Wirkungsgrad zu erzielen. Mit diesen Berechnungen könnte die anfängliche Beurteilung über die Spulelänge variieren, um somit den Wirkungsgrad zu erhöhen.

Drahterwärmungsanwendungen

Die Induktionserwärmung wird heute bei einer großen Auswahl an Drahtverfahren angewendet, die sowohl Einzeldrähte, Mehrdrähte, die parallel laufen, oder verseilte Drähte, betreffen. Die Drahterwärmungsanwendungen umfaßen: Erwärmung vor dem Ziehen; Erwärmung vor dem Vergießen (beispielsweise bei der Herstellung PVC-abgedeckter Kabel); Wärmebehandlung von Drähten (in der Regel Härtung, manchmal gefolgt von Vergütung); Glühen von ein- und mehrsträngigen Drähten; Erwärmung des Drahts vor der Beschichtung (sowohl mit einer metallischen Beschichtung wie mit Isoliermischungen); Entspannung, wie bei Spannbetondrähten durchgeführt, und Vorerwärmung vor einem konventionellen Wärmeverfahren.

Auf einen Blick – Verfahren der Induktionsdrahterwärmung im Detail:

Erwärmung vor dem Ziehen

Manchmal ist es erforderlich, bestimmte Drähte vor dem Ziehen zu erwärmen, um Schäden an der Drahtoberfläche zu vermeiden, die durch das Ziehverfahen verursacht werden könnten.

Erwärmung vor dem Vergießen

In der Regel wird dies bei Aluminiumdrähten vorgenommen, sowohl bei Einzeldrähten wie bei Litzen. Die Drähte werden erwärmt sobald sie die Abwickelrolle verlassen und die Induktionsspule wird auf dem Kettenlinien-Winkel der Drahtlinie positioniert. Der Draht läuft durch die Induktionsspule wo er bei zirka 250°F (120°C) erwärmt wird und dann unmittelbar zum Vergießprozeß übergeht, wo das PVC gleichmäßig über den Draht fließt. Die Induktionsspulenlänge hängt von der Geschwindigkeit des Verfahrens ab sowie von der Tiefe der Erwärmung, die durch den Drahtquerschnitt erfordert wird. Da die Durcherwärmung des Drahts nicht grundlegend ist, liegt die Induktionsspulenlänge (für die meisten Anwendungen) zwischen 20 und 40 Zoll (0,5m bis 1m).

Wärmebehandlung der Drähte

Ein kontinuierliches Härten und Verglühen des Stahldrahts ist für bestimmte Drahtanwendungen besonders wichtig, wie z. B. bei der Herstellung verformter Stäbe, die der Verstärkung von Betonkonstruktionen dienen.

Dies wird mit der Anwendung eines horizontalen Inline-Verfahrens erzielt, wo der Draht bis zu einer Austenisierungstemperatur von 1.742°F (950°C) erwärmt wird, gefolgt von einem Abschreckverfahren mit Wasser und danach wiedererwärmt zwischen 660°F (350°C) und 842°F (450°C) für das Endhärten, wobei die Temperatur von den Zugfestigkeitsanforderungen des Endprodukts abhängt. Radyne verfügt über ein eingetragenes „Hi Bond"-Verfahren für diese spezifische Anwendung.

Glühen

Stahldrähte können für das Glühverfahren durch Induktion normalerweise bis zu einer Temperatur von 1.290°F (700°C) erwärmt werden, sowohl einzeln (für eine Vielzahl von Durchmessern) wie mehrfach (in der Regel zwischen 0,04 (1mm) und 0,23 Zoll (6mm)). Die Ausgangsfrequenz der Induktionsenergiequelle hängt vom Drahtdurchmesser ab und das Leistungsniveau hängt von der

gewünschten Produktionsrate an. Bei Mehrdrähten kann ein Abstand von 0,61 (15,5mm) bis 1 Zoll (25,4mm) aufgenommen werden, wobei alle Drähte durch ein Keramikrohr für die Drahtführung durch die Spule laufen und damit die Linie einfacher einzufädeln ist.

Erwärmung vor der Beschichtung

Folgende Verfahren stellen zwei deutlich gesonderte Behandlungsmethoden dar: Diffusion oder Metallbeschichtung und Isolierbeschichtung der Oberflächen.

Diffusion
Das gängigste Verfahren dieser Anwendung ist weltweit die Produktion von Reifenkord, aber es könnte gleichfalls für andere Märkte Anwendung finden.

In einer ähnlichen Methode wie die des Glühverfahrens werden Stahldrähte mit einem Durchmesser zwischen 0,031 (0,8mm) und 0,08 Zoll (2mm) bei 1.112°F (600°C) erwärmt, um die Oberflächenbeschichtungen aus Kupfer und Zink zu schmelzen, die sich dann im Grunddraht als Sperre für die Rostbildung ausbreiten. Im Allgemeinen werden Drähte als Mehrfachdrähte auf einer horizontalen Ebene durch eine ovalförmig angeordnete Induktionsspule erwärmt, wohin die Drähte durch einzelne Keramikrohre zugeführt werden.

Die Produktionsrate wird anhand der Berechnungen bestimmt: D x V, wobei D dem Drahtdurchmesser und V der Draht- oder Produktionsgeschwindigkeit entspricht. Die typischerweise eingesetzten Stromversorgungen sind 60kW bis 240kW bei einer Ausgangsfrequenz von 25kHz, mit Induktionsspulenlängen von 7 bis 8 Fuß (2m bis 2,5m). Das als Stromlöschung bekannte Phänomen kann effektiv bei der Anwendung eingesetzt werden, in der eine Induktionsfrequenz ausgewählt wird, die zum Drahtdurchmesser vergleichsweise niedrig ist.

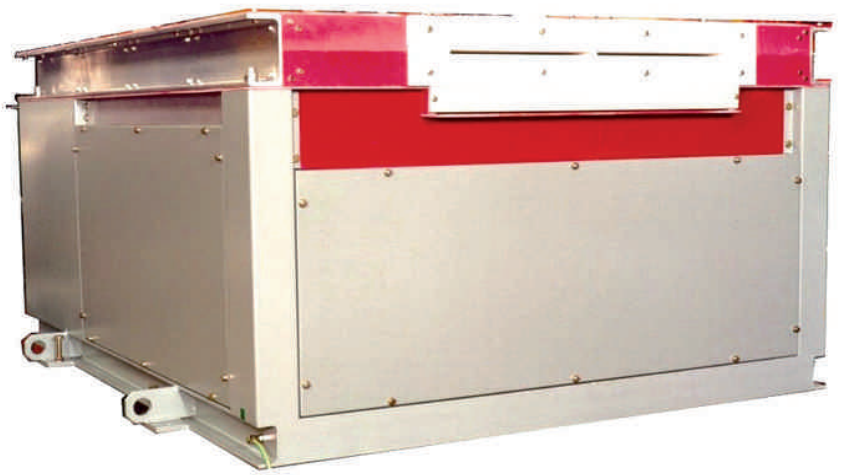
Dabei wird gesichert, daß wenn ein Draht in der Linie bricht, er nicht über die Curie-Temperatur erwärmt werden kann (etwa 1.400°F). Im Falle eines Einzeldrahtbruchs wird hierdurch die Notwendigkeit eines unmittelbaren Anhaltens der Linie vermieden. Für das Verfahren kann bei Bedarf Stickstoff oder einfach Luft benutzt werden.

Isolierbeschichtung der Oberflächen
Bei der Herstellung elektrischer Drähte mit Beschichtungen, wie z. B. Lack, Epoxid oder wärmeempfindliche Bandumwicklungen, kann der Draht Inline kontinuierlich erwärmt werden. Diese Technik kann auch beim Trocknen des Anstrichs auf dem Draht eingesetzt werden.

Da die Temperaturanforderungen in der Regel niedrig sind (unter 300°F 150°C), kann öfters eine geringe Stromversorgung mit einer Energiequelle, die bei Hochfrequenz arbeitet, in einer bestehenden Beschichtunganlage aufgenommen werden, weil lediglich die Drahtoberfläche erwärmt zu werden braucht (bzw. nicht den Drahtquerschnitt hindurch).

Entspannung
Dieses Verfahren wird für die Herstellung von Draht oder Litzen angesetzt und ist dem Drahthärtungsverfahren ähnlich, insofern der Draht kontinuierlich auf 750°F (400°C) erwärmt wird, während er unter Spannung ist. Das System besteht grundsätzlich aus eine Einzelinduktions-Energiequelle, die bei einer Ausgangsfrequenz von 3/10kHz eingestellt wird. Diese versorgt sowohl einen statischen wie einen beweglichen Induktionsspulen-Zusammenbau, entsprechend der Linienkonfiguration.

▼ **Bild 3**. *Technologie für Mehrfachdrahtofen*



Vorwärmung
Die Induktionserwärmungssysteme wurden in vorhandenen Drahtanlagen eingebaut, um den Draht vorzuwärmen und um die Fertigungskapazität der bestehenden Verfahren zu steigern. Beispielsweise betrachtet man einen Einzeldraht, der vor dem Einlauf in einen konventionellen Ofen oder Fließbett vorerwärmt wurde.

In einem besonderen Projekt wurden zwei Anlagen benutzt, die je 500kW/10kHz Induktionsenergiequelle mit 10 Fuß (3m) langen Induktionsspulen vereinigten, um Mehrfachdrähte von 70°F (25°C) auf 1.292°F (700°C) vorzuerwärmen, bevor diese in einen konventionellen Ofen eingeführt wurden. Der Induktionsofen wies in der Regel einen Wärmewirkungsgrad von 2000kg/Std auf.

Härten und Vergüten: das „Hi-Bond"-Verfahren
Das Inline-Härten und -Vergüten ist eine gängige Anwendung, wo Draht bei 1.742°F (950°C) erwärmt wird, abgeschreckt zum Härten und zwischen 660°F (350°C) und 1.200°F (650°C) für die Vergütung wieder erwärmt wird. Diese Einstellung wurde erfolgreich für die Behandlung verformter Stäbe für die Verstärkung von Betonkonstruktionen angewandt, um dem Draht eine hohe Dehnungsgrenze bei niedriger Entspannung zu geben – das von Radyne eingetragene Hi-Bond-Verfahren.

Die Erwärmung für das Härten erfolgt in zwei Phasen, mit Anwendung von 10kHz, um den Draht auf 1.382F (750°C) mit einer einzigen Spule zu bringen, und 50kHz oder 200kHz, um den Draht von 1.382°F (750°C) auf 1.742°F (950°C) mit zwei oder mehreren Spulenabmessungen zu führen, abhängig jeweils von den Anforderungen bezüglich Drahtauswahl, Durchsatz und Wirkungsgrad. In der Regel weisen Spulen eine Länge von 6 Fuß (1,8m) je Stufe auf, während eine Leistung von 280kW (bei 10kHz) und 180kW bei 50kHz benutzt wird. Gleich nach der Erwärmung auf 1.742°F (950°C) wird das Produkt mit Wasser unter hohem Druck bespritzt, um die Temperatur auf ungefähr 80°F (30°C) zu reduzieren, und mit einem Luftabweiser getrocknet.

Reifenkord-Diffusion
Für diese Anwendung wird in der Regel eine gleichzeitige Erwärmung von 10 bis 24 Drähten erfordert, die parallel laufen und ungefähr auf 1.112°F (600°C) erwärmt werden, um die Oberflächenbeschichtungen aus Kupfer und Zink zu schmelzen, die sich dann im Grunddraht ausbreiten, um Reifenkorddraht herzustellen.

In der Regel haben die Drähte eine Zwischenachs-Abmessung von 0,61

bis 1 Zoll (15,5mm bis 25,5mm) sowie eine Durchmesserauswahl von 0,031 bis 0,080 Zoll (0,8mm bis 2mm).

Der typische Durchsatz basiert auf DV=70 (wobei D= Durchmesser und V= Geschwindigkeit ist).

Die Anzahl an Drähten innerhalb einer bestimmten Heizspule werden in der Regel durch die Zwischenachs-Abmessung festgelegt, da die Spulenzusammensetzung für eine große Anzahl an Drähten mit höheren Zwischenachs-Abmessungen sperrig wird.

Interaktive Leistungskontrolle in geschlossenen Kreisläufen
Im Vergleich zu Verfahren wie jenen der Gas- und Elektroöfen, Infrarotstrahler, Widerstandserwärmer und Fließbetten, reagiert die Induktionserwärmung besonders schnell auf Änderungen der Prozessbetriebsparameter. Eine kleine Veränderung des Stroms oder der Liniengeschwindigkeit wirkt sich fast augenblicklich auf die sich ergebende Temperatur des zu bearbeitenden Produkts aus. Um kongruente Ergebnisse zu erzielen ist demzufolge die Prüfung der Linie sorgfältig vorzunehmen. Die zwei eingesetzten Standardmethoden basieren zum einen auf von Temperaturfühlern gelieferten Informationen (wie bei der Infraroten Pyrometrie) und zum anderen auf solchen von der Liniengeschwindigkeit.

Temperatursensoren
Im Falle einer Erwärmung von magnetischem Stahl bei einer Austenitisierungstemperatur für ein Härtungsverfahren kann sich Zunder auf der Drahtoberfläche bilden, es sei denn eine Atmosphäre wird aufgenommen. Dies könnte die Ablesungen der ein- sowie zweifarbigen Infrarot-Pyrometersysteme beeinflussen.

Demzufolge wird die Beseitigung des Zunders und die Genauigkeit beim Positionieren und Fokussieren des Pyrometersystems, das sich ergebende Signalfeedback zur Induktionsstromversorgung bestimmen. Schwebende Verunreinigungen wie z. B. Rauch können ebenfalls das Signal der Pyrometer beeinflussen.

Ein wirkungsvoller Einsatz der Pyrometer scheint nur dann gegeben, wenn der Reinigung des Drahts besondere Sorgfalt gewidmet wird, sowie der Genaugikeit anderer Prozessparameterregelungen und Regelsysteme mit geschlossenem Kreislauf. Temperatursensoren sind außerdem am zu erwärmenden Draht zu fokussieren.

Diese Drähte können sich besonders im Fall kleinerer Drahtdurchmesser während des Verfahrens vertikal bewegen, und sich somit aus dem Sichtfeld des Pyrometers entfernen, wodurch dem Induktionsverfahren irreführende Signale übermittelt würden.

Liniengeschwindigkeit
Die Berechnung der Liniengeschwindigkeit bezüglich der Drahtabmessung und des Leistungsniveaus vom Induktionserwärmer stellt ein durchführbares Verfahren dar, bei dem Vorwärtsschub-Steuergeräte erfolgreich eingesetzt wurden.

NE-Materialien
Beschrieben wurde bis hierhin die Induktionserwärmung von Kohlenstoff-Stahldrähten. NE-Materialien, wie z. B. Aluminium und Messing können ebenso durch die Induktionserwärmung erwärmt werden, obwohl nicht dieselbe Effizienz erzielt wird.

Wenn man beispielsweise Messingdraht mit einem Durchmesser von 0,08 Zoll (2mm) annimmt, mit einer Erwärmungsanforderung ausgehend von einer Umgebungstemperatur von 70°F (20°C) auf 1.200°F (650°C) bei einer Geschwindigkeit von 985 Fuß/min (300m/min), würden dafür insgesamt 540kW Ausgangsleistung bei einer Frequenz von 50kHz mit einer insgesamt 10 Fuß (3m) langen Induktionsspule benötigt werden.

Für einen Messingdraht mit einem Durchmesser von 0,24 Zoll (6mm), der von 70°F (20°C) auf 1.200°F (650°C) bei einer Geschwindigkeit von 985 Fuß/min (300m/min) erwärmt wird, wird eine Ausgangsleistung von 1.500kW bei einer Frequenz von 10kHz mit einer insgesamt 20 Fuß (6m) langen Induktionsspule benötigt.

Die sich daraus ergebenden Gesamtwirkungsgrade sind jeweils 6% bei einem Drahtdurchmesser von 0,08 Zoll (2mm) im ersten Beispiel und 20% bei einem Drahtdurchmesser von 0,24 Zoll (6mm) im zweiten Beispiel. Vergleicht man die Gesamtwirkungsgrade bis zu 80% bei der Erwärmung des magnetischen Stahls, so bemerkt man, warum die induktive Erwärmung nicht verbreitet für NE-Materialien eingesetzt wird. Dies bedeutet, daß erfolgreiche Installationen mit niedrigen Wirkungsgraden in Betrieb sind wegen anderer Vorteile, wie jenen die sich aus der Arbeitsumgebung durch Induktionsverfahren ergeben.

In die Zukunft blicken
Die induktive Erwärmung wird weiterhin in der Drahtindustrie verbreitet eingesetzt werden, insbesondere für Stahldraht.

Ein steigendes Interesse und eine höhere Anzahl an Systemen werden somit entstehen, die dazu dienen werden die Produktivität bestehender konventioneller Heizsysteme zu ergänzen und zu erhöhen.

Entwicklungen wird es weiterhin geben für die Erwärmung sehr dünner Drähte sowie Sonderlegierungen, Verbundmetalle und Materialien wie z. B. Titan und Hartmetall. Die physische Größe von Induktionsstromversorgungen wird sich senken, während deren Leistungen sich steigern werden.

Kontrolltechniken und -Systeme werden auch zukünftig weiter entwickelt, um sehr enge Toleranzen sowie die Beständigkeit der Drahtprodukte zu sichern und Verbesserungen wird es geben durch Inline-Qualität.

"Da weitere Verfahren entdeckt wurden, in denen die induktive Erwärmung eingesetzt werden kann, sind diese jeweils im Hinblick auf ihre Rentabilität zu berücksichtigen. Nach unserer Erfahrung kann sich manchmal die unwahrscheinlichste Anwendung, oder jene die anfangs als nicht durchführbar scheint, als eine erfolgreiche und wirtschaftlich geeignete Installation erweisen." ■

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Преимущества использования технологий индукционного нагрева при обработке проволочных изделий

Отделение «Рэдайн» компании «Индактотерм хитинг энд уэлдинг текнолоджис лтд»

Основные принципы индукционного нагрева

Для того чтобы в полной мере оценить многочисленные преимущества индукционного нагрева, важно сначала уяснить сами принципы, лежащие в основе этой технологии. Впервые появившись в начале 40-х годов XX века, промышленные установки индукционного нагрева вскоре нашли применение в самых различных производственных процессах, в том числе связанных с плавкой металлов, нагревом изделий перед гибкой или профилированием, а также с различными видами термической обработки изделий, включая их закалку и отпуск, а также сварку и пайку тугоплавкими припоями. К ранним примерам технологии индукционного нагрева также относятся ламповые осцилляторы, работавшие, как правило, на высоких частотах, и двигатель-генераторные установки, использовавшиеся для выработки необходимой для индукционного нагрева энергии в области нижних частот.

Если бы нам понадобилось хрестоматийное определение процесса индукционного нагрева, то оно неизменно звучало бы следующим образом:
«Индукционный нагрев происходит, когда металлический предмет помещается в переменное электромагнитное поле. Индукционный нагрев возникает за счет возбуждения молекулярной структуры предмета под действием электромагнитного поля, когда его молекулы возбуждаются, сталкиваются и, как следствие, генерируют тепло».

Таким образом, установку индукционного нагрева можно схематично представить в виде электрического устройства, состоящего из простейшего трансформатора, в котором индукционный источник мощности (генератор), подающий нагрузку на индуктор (элемент), является первичной обмоткой, а подлежащий нагреву предмет, помещенный в магнитное поле этого индуктора (элемента), – вторичной обмоткой.

Затем с помощью индукционного источника (генератора) мощности обеспечивается наведение переменного электромагнитного поля на индукторе (элементе). Благодаря явлению взаимной проводимости, линии магнитной индукции проходят сквозь предмет, создавая при этом некое препятствие на пути магнитного потока; и при протекании результирующего тока вырабатывается тепло.

Глубина проникновения поля

Описанное выше явление впервые было обнаружено английским физиком Майклом Фарадеем при проведении исследований с использованием электрического трансформатора. И действительно, для устранения эффекта нагревания трансформаторы впоследствии начали набирать из отдельных пластин (с целью устранения или снижения интенсивности нагрева трансформатора под действием электромагнитного поля). Причина, по которой набранный из отдельных пластин элемент в виде трансформатора не нагревается под действием электромагнитной индукции, заключается в феномене, получившем название «глубина проникновения» или «толщина скин-слоя» и означающем глубину, на которую проникает приблизительно 80 % протекающего в заготовке тока.

Глубина проникновения пропорциональна величине электрического сопротивления нагреваемого материала, а также рабочей частоте (измеряемой в герцах) на выходе индукционного источника мощности (генератора), наводящего электромагнитное поле. На высоких частотах глубина проникновения, или толщина скин-слоя, значительно меньше, чем на низких частотах, и это является ключевой причиной, по которой индукционный нагрев находит столь широкое применение в технологиях избирательной термической обработки изделий из стали, когда глубину цементации стали при термообработке можно точно контролировать путем тщательного подбора рабочей частоты индукционной системы.

Ещё одним определяющим фактором при нагревании металлического предмета в электромагнитном поле является удельная мощность, измеряемая в киловаттах. Соответственно, чем больше удельная мощность при заданной частоте, тем ближе к поверхности предмета происходит нагревание, и наоборот, чем меньше удельная мощность, тем больше глубина, на которую распространяется

нагрев. Поэтому основным вопросом при использовании той или иной конкретной технологии индукционного нагрева является выбор правильных для данного применения значений рабочей частоты индукционного источника мощности и величины удельной мощности.

Расчет значения частоты

На частотах, используемых при индукционном нагреве, ток стремится к прохождению по поверхности проводника на глубину, зависящую от удельного сопротивления проводника, частоты переменного тока и эффективной магнитной проницаемости проводника. Эффективная глубина проникновения тока (в метрическом выражении) рассчитывается по следующей формуле:

$$\rho = \frac{1}{2}\,\pi\sqrt{\frac{10r}{\mu F}}$$, где

ρ = глубина проникновения тока
r = удельное сопротивление, мкОм · см
μ = эффективная магнитная проницаемость
(для магнитных материалов μ = 1)

Выбирая правильную частоту, мы можем контролировать глубину, на которую наш проводник будет нагреваться. С увеличением частоты эффективная глубина проникновения уменьшается; и наоборот – чем ниже частота, тем больше глубина проникновения.

Обратимся снова к нашей формуле. Из нее следует, что приблизительно 90 % всего тепла генерируется в слое проводника толщиной ρ, при этом бóльшие глубины нагрева материала достигаются при теплопередаче проводимостью. Однако для обеспечения максимальной эффективности сквозного нагрева следует избегать взаимного перекрытия разнонаправленных токов, проходящих по противолежащим поверхностям проводника во избежание обрыва тока. Как правило, величина ρ должна составлять менее половины радиуса проводника (хотя это правило применимо не во всех случаях). При этом для разных материалов, а также при разных температурах и на разных частотах величина глубины проникновения тока оказывается разной.

В процессе индукционного нагрева металлический предмет, помещенный внутрь индуктора или в непосредственной близости от него, нагревается при пропускании через этот индуктор индукционного тока, что, в свою очередь, приводит к наведению дополнительного тока внутри самого предмета. Нагрев происходит вследствие возникновения сопротивления этому наведенному току (по закону I^2R, где I = ток, а R = сопротивление), а также возникающих в магнитных материалах потерь на гистерезис – эффекта, исчезающего при температуре Кюри (около 760 °C, или 1400 °F).

Выбор индукционной мощности (применительно к проволоке, подвергаемой сквозному нагреву)

После того, как определена правильная частота и выбран подходящий блок питания, следующим шагом является определение требуемой индукционной мощности и, прежде всего, теплосодержания токопроводящего тела. Теплосодержание движущегося проводника можно представить в виде простой функции от количества энергии, поглощаемой единицей массы проводника, его удельной теплоемкости и скорости возрастания температуры. Однако столь очевидный «прямой» метод расчета осложняется тем фактом, что с ростом температуры величина удельной теплоемкости проводника изменяется. Так, удельная теплоемкость

проводника из углеродистой стали возрастает в 1,3 раза при увеличении температуры с 20 °C (68 °F) до 550 °C (1022 °F) и в 1,5 раза при увеличении температуры с 20 °C (68 °F) до 900 °C (1652 °F).

Таким образом, при определения количества тепла, необходимого для нагрева заготовки из углеродистой стали до температуры 550 °C (1022 °F) и 900 °C (1652 °F), можно (в качестве грубо-эмпирического метода) использовать значения удельной теплоемкости, равные 0,58 и 0,63, соответственно. При использовании этого метода теплосодержание проволоки, нагретой до 550 °C (1022 °F), составляет 1,05 x кг/мин (2,31 x фунт/мин), а проволоки, нагретой до 900 °C (1652 °F) – 1,94 x кг/мин (4,27 x фунт/мин) (результат выражается в киловаттах). Когда значение теплосодержания изделия определено, следующий шаг заключается в том, чтобы определить величину выходной мощности блока питания путем установления зависимости теплопроизводительности индукционной установки от мощности блока питания.

Теплопроизводительность

Типовая индукционная установка состоит из блока питания, системы нагревательного индуктора и устройств «согласования» нагревательного индуктора (и, соответственно, обрабатываемой проволоки) с блоком питания. Блок питания называют также преобразователем, инвертором или генератором. Он служит для преобразования трехфазного переменного тока частотой 50 или 60 Гц в однофазный переменный ток номинальной частотой от 250 Гц до 800 кГц. Блоки питания установок индукционного нагрева собираются на тиристорах или транзисторах и имеют мощность от 1 кВт до 4 МВт в широком диапазоне соотношения мощность-частота. Существуют также установки, в которых используются блоки питания, генерирующие токи двух различных частот.

В используемых на практике установках, предназначенных для индукционного нагрева изделий из проволоки, система нагревательного индуктора состоит из свитой в спираль медной трубки. Трубка может иметь круглое, квадратное или прямоугольное сечение и зачастую снабжается дополнительной медной полосой, напаянной твердым припоем по внутреннему диаметру спирали.

Длина индуктора и его внутренний диаметр, а также число витков и процент меди до свободного пространства вдоль внутреннего диаметра спирали – все это имеет значение с точки зрения к.п.д. установки.

Все блоки питания работают в определенном диапазоне частот (например, 7-11 кГц, 20-25 кГц или 40-50 кГц при номинальной рабочей частоте в 10 кГц, 25 кГц и 50 кГц, соответственно). Для того чтобы обеспечить работу блока в этом частотном диапазоне, индуктивность индуктора и его рабочее напряжение, а также величина емкости (в киловольт-амперах резистивных) колебательного контура блока подбираются соответственно диаметру и материалу подвергаемого обработке проводника, скорости его подачи и требуемой температуре нагрева.

▲ *Технологическая линия закалки и отпуска проволоки*

Говоря о к.п.д. установки индукционного нагрева, мы должны, прежде всего, обратить внимание на систему индуктора. Наиболее важным фактором, определяющим эффективность этой системы, является внутренний диаметр её медной спирали. Диаметр же медной спирали, в свою очередь, преимущественно подчинен механическим параметрам, связанным с используемым способом подачи, а также величиной вибрации проволоки и изменением ее химического состава (помимо диаметра проволоки и способа, используемого для соединения одной бухты проволоки с другой).

В общем случае, чем ближе расположен индуктор к нагреваемому изделию, тем выше к.п.д. установки. На практике нередки ситуации, когда через один и тот же индуктор требуется пропускать проволоку различного диаметра. Производительность обработки проволоки меньшего диаметра ниже, однако такой компромисс может быть оправдан благодаря снижению капитальных затрат за счет использования меньшего количества типоразмеров индукторов и сокращения времени простоя оборудования при замене индукторов под заготовки различных диаметров.

Другой важной характеристикой конструкции индуктора является его длина. Теоретически для того, чтобы равномерно нагреть проволоку определенного диаметра до заданной температуры, требуется время, равное $D^2/25$ секундам (где D = диаметр проволоки, мм). Поэтому минимальная длина индуктора получается равной $D^2M/25$ (где M = скорость подачи проволоки, м/с).

На практике, особенно при термообработке изделий из проволоки малого диаметра, использование индуктора минимальной длины привело бы к излишне высокой плотности мощности (из-за слишком малой длины индуктора) и, как следствие, к снижению к.п.д. установки. Поэтому с целью повышения к.п.д. установок длину индукторов увеличивают. При этом сначала выбирается длина индуктора (определенного диаметра с учетом размеров проволоки), после чего рассчитываются значения других его параметров (напряжение на индукторе, число витков, процент меди до свободного пространства и др.) для оптимизации к.п.д. установки. В ходе расчетов первоначально выбранная длина индуктора может быть скорректирована для получения максимально возможного к.п.д.

Термическая обработка проволочных изделий

В настоящее время метод индукционного нагрева применяется в самых различных технологических процессах производства изделий из проволоки (при обработке как отдельных нитей проволоки, нескольких параллельных нитей, так и свитых в канат нитей проволоки).

В качестве примеров практического применения метода индукционного нагрева можно назвать нагрев перед волочением, нагрев перед заключением в оболочку (например, при производстве электрических кабелей с ПВХ изоляцией), термообработку проволоки (обычно – закалку, иногда с последующим отпуском), отжиг

одножильных и многожильных проводников, нагрев перед нанесением покрытия (металлического или на основе электроизоляционного компаунда); релаксацию (например, при производстве арматуры для изделий из предварительно напряженного железобетона), а также предшествующий традиционному нагреву предварительный нагрев.

Технологии индукционного нагрева проволоки – краткий обзор

Нагрев перед волочением
В некоторых случаях при производстве отдельных видов изделий проволоку перед волочением требуется предварительно нагреть с тем, чтобы предотвратить повреждение её поверхности в процессе волочения.

Нагрев перед заключением в оболочку
Обычно применяется при производстве алюминиевого провода (как одножильного, так и многожильного). При подаче с приемной катушки провод предварительно нагревается, при этом индуктор располагается на линии провеса провода.

Провод подается через индуктор, где нагревается до температуры порядка 120 °C (250 °F), а затем сразу же поступает на участок нанесения оболочки, на котором ПВХ равномерно обволакивает поверхность провода. Длина индуктора зависит от скорости процесса, а также от глубины, на которую требуется прогреть провод. Поскольку в данном случае необходимости в сквозном прогреве нет, длина индуктора выбирается (для большинства практических задач) в диапазоне от 0,5 м (20 дюймов) до 1 м (40 дюймов).

Термообработки проволоки
Непрерывная закалка и отпуск стальной проволоки особенно важны при производстве определенных видов изделий, например, фасонного арматурного стержня для железобетонных конструкций.

Достигается это за счет использования технологии горизонтальной поточной термообработки, при которой проволока нагревается до температуры аустенизации (950 °C, или 1742 °F) с последующим быстрым охлаждением водой, а затем вновь нагревается до температуры 350 °C - 450 °C (660 °F - 842 °F) для окончательного отпуска (значение температуры зависит от требований, предъявляемых к пределу прочности на растяжение готовой продукции). Компания «Рэдайн» запатентовала фирменную технологию такой термообработки, получившую название «Hi Bond».

Отжиг
Для отжига стальной проволоки индукционный нагрев (обычно до температуры 700 °C, или 1290 °F) может проводиться как на одиночных нитях проволоки различного диаметра, так и на нескольких нитях проволоки (со стандартным диаметром от 1 мм до 6 мм (0,04 – 0,23 дюйма) одновременно. Рабочая частота индукционного источника мощности зависит от диаметра проволоки и уровня мощности, необходимого для обеспечения заданной производительности.

Установки, предназначенные для одновременного отжига нескольких нитей проволоки, могут пропускать через себя сразу нескольких проволочных жил, разнесенных друг от друга на расстояние от 15,5 мм (0,61 дюйма) до 25,4 мм (1 дюйм); при этом каждая жила подается через керамическую трубку, направляющую ее сквозь индуктор и облегчающую процесс заправки нити в установку.

Нагрев перед нанесением покрытия

Следующие технологии представляют собой примеры применения двух четко различающихся между собой методов обработки: диффузионного покрытия (нанесения металлического покрытия) и нанесения поверхностного изоляционного покрытия.

Диффузионное покрытие
Данная технология наиболее часто используется в мире при производстве металлокорда, однако она могла бы с равным успехом применяться для производства и другой продукции. Подобно тому, как это происходит в процессе отжига, стальная проволока диаметром от 0,8 мм (0,031 дюйма) до 2 мм (0,08 дюйма) нагревается до температуры 600 °C (1112 °F) для расплавления поверхностного покрытия из меди и цинка и его диффундирования в вещество основы с формированием «барьера», препятствующего образованию ржавчины.

Обычно производится нагрев сразу нескольких расположенных в горизонтальной плоскости нитей проволоки, пропускаемых через индуктор овальной формы; при этом каждая нить подается через отдельную

направляющую керамическую трубку. Производительность установки определяется по формуле D x V, где D = диаметр, а V = скорость подачи проволоки. Мощность блока питания установки, как правило, составляет от 60 до 240 кВт при рабочей частоте 25 кГц, а длина индуктора составляет от 2 до 2,5 м (7 - 8 футов).

В данной области применения с успехом может использоваться явление, известное как гашение тока. При этом задается такая величина (сравнительно низкая применительно к значению поперечного сечения обрабатываемой проволоки) частоты индукции, чтобы в случае обрыва одной из проволочных нитей в технологической линии температура изделия не превысила точку Кюри (примерно 760 ºC). Это устраняет необходимость немедленного останова технологической линии в случае обрыва одной из нитей. Процесс может проходить либо в обычной воздушной среде, либо (при необходимости) в азотной среде.

Нанесение поверхностного изоляционного покрытия

При производстве электрических проводов с изоляционным покрытием на основе эмалей, эпоксидных смол или из термостойкой ленточной изоляции провод в технологической линии может нагреваться непрерывно. Этот же способ может использоваться и для сушки нанесенного на провод слоя краски.

Поскольку требования к температурному режиму, как правило, невелики (менее 150 ºC, или 300 °F), во многих случаях оказывается возможным дооборудовать уже существующие линии для нанесения покрытий блоками питания небольшой мощности, работающими на высокой частоте, поскольку нагревать проволоку необходимо не по всему поперечному сечению, а лишь на её поверхности.

Релаксация

Этот процесс, используемый при производстве проволоки и многожильного провода, аналогичен процессу отпуска в том, что предварительно напряженная проволока непрерывно нагревается до температуры 400 ºC (750 °F).

В основном система состоит из одного индукционного источника мощности с номинальной рабочей частотой 3/10 кГц, от которого запитывается узел либо статического, либо подвижного индуктора (в зависимости от конкретной конфигурации технологической линии).

Предварительный нагрев

Системы индукционного нагрева нередко встраиваются в действующие технологические линии для предварительного нагрева проволоки с целью увеличения производительности существующих технологических процессов. В качестве примера можно привести предварительный нагрев одинарного проводника перед его подачей в обычную печь или погружением в псевдоожиженный слой.

Так, на одном из предприятий две линии, каждая оборудованная индукционным источником мощности (500 кВт, 10 кГц), подключенным к индуктору длиной в 3 м (10 футов), были использованы для предварительного нагрева сразу нескольких нитей проволоки с 25 ºC (70 °F) до 700 ºC (1292 °F) перед подачей их в обычную печь. Теплопроизводительность индукционной печи обычно составляла 2000 кг/ч.

Закалка с высоким отпуском – фирменная технология «Hi-Bond»

Поточная закалка в высоким отпуском является примером стандартного применения метода индукционного нагрева, при котором проволока нагревается до температуры 950 °C (1742 °F), закаливается быстрым

охлаждением, а затем отпускается путем повторного нагрева до температуры от 350 °C (660 °F) до 650 °C (1200 °F).

В настоящее время такой подход успешно применяется при термической обработке фасонного арматурного стержня для железобетонных конструкций с целью получения на выходе изделий с низким уровнем релаксации и высоким пределом текучести. Эта технология запатентована компанией «Рэдайн» и получила название «Hi-Bond».

Нагрев для закалки осуществляется в два этапа: сначала с использованием тока частотой 10 кГц для нагрева проволоки до температуры 750 °C (1382 °F) в одном индукторе, а затем с использованием тока частотой 50 кГц или 200 кГц для разогрева проволоки с 750 °C (1382 °F) до 950 °C (1742 °F) в двух или более индукторах (в зависимости от диаметра проволоки, пропускной способности и к.п.д. технологической линии).

Обычно индукторы каждой ступени имеют длину 1,8 м (6 футов) и мощность 280 кВт (при частоте 10 кГц) и 180 кВт (при частоте 50 кГц). Сразу после нагрева до температуры 950 °C (1742 °F) изделие охлаждается до температуры примерно 30 °C (80 °F) под действием водяной струи высокого давления и подвергается сушке воздухом.

Нанесение диффузионного покрытия при производстве металлокорда

Для данного применения обычно требуется одновременный нагрев от 10 до 24 проволочных нитей, параллельно подаваемых в установку и нагреваемых там до температуры около 600 °C (1112 °F), достаточной для расплавления исходных материалов поверхностного покрытия (меди и цинка) и диффундирования их в металл основы, из которой изготавливается металлокорд.

Используемая при производстве металлокорда проволока обычно имеет диаметр от 0,8 до 2 мм (0,031 - 0,080 дюйма) и подается в установку в виде нитей, разнесенных друг от друга по оси на расстояние от 15,5 до 25,5 мм (0,61 - 1 дюйм).

Производительность типовой установки определяется формулой DV=70 (где D = диаметр, а V = скорость подачи проволоки).

Число нитей проволоки в нагревательном индукторе обычно определяется межосевым расстоянием нитей металлокорда. По мере увеличения числа нитей и их межосевого расстояния индукторный узел получается все более громоздким.

Интерактивное управление мощностью в замкнутом контуре

В отличие от технологий, в которых используются газовые и электрические печи, инфракрасные нагреватели, резистивные нагреватели или псевдоожиженный слой, технология индукционного нагрева позволяет чрезвычайно быстро отслеживать и реагировать на изменения технологических параметров. А ведь даже небольшое изменение мощности или скорости технологической линии почти мгновенно сказывается на конечной температуре обрабатываемого изделия. Поэтому для достижения стабильных результатов большое внимание необходимо уделять управлению технологической линией.

Двумя стандартными методами, используемыми для этого, являются обратная связь от термочувствительных устройств (например, инфракрасных пирометров) и использование данных, полученных от датчиков скорости технологической линии.

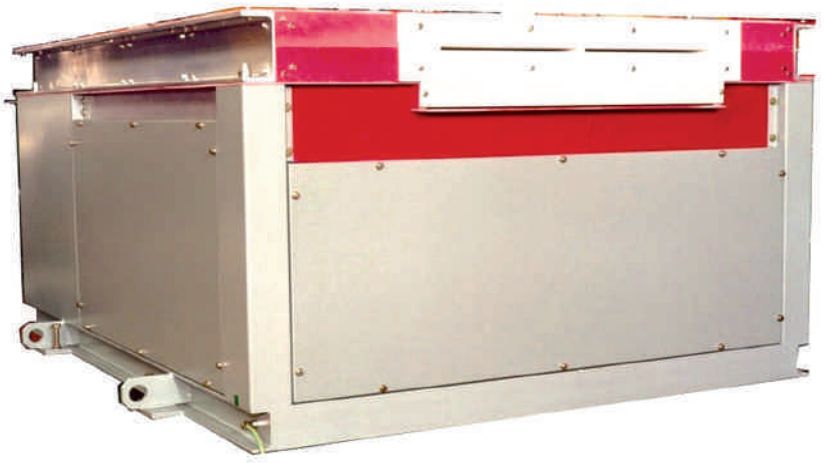
Датчики температуры

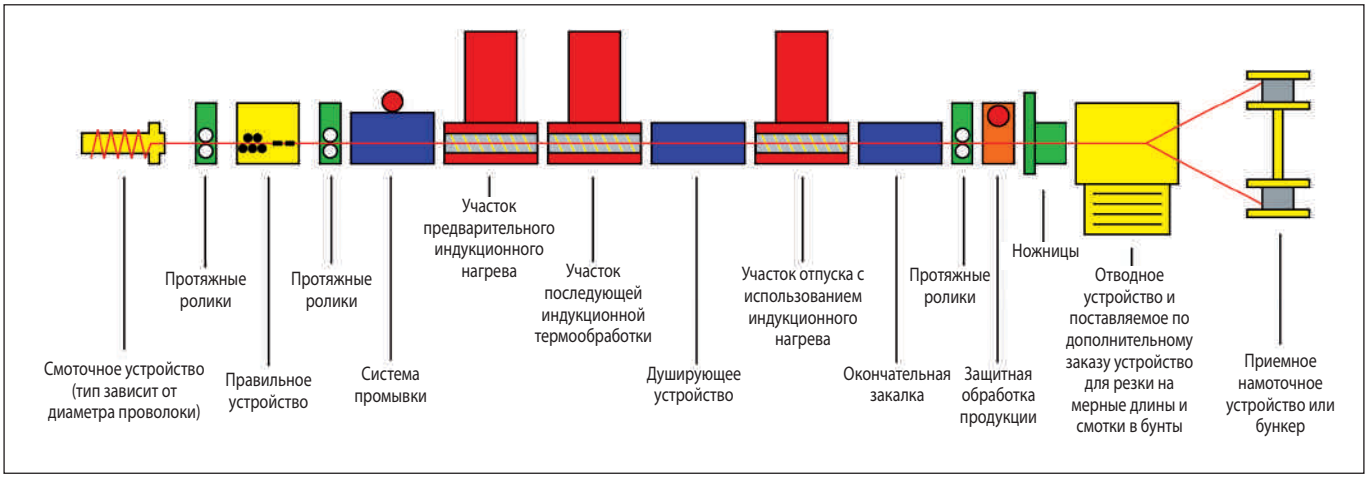
При нагреве проволоки из магнитной стали до температуры аустенизации в процессе закалки на ее поверхности может образовываться окалина (если только обработка не проходит в соответствующей среде).

Это может отрицательно сказаться на показаниях инфракрасной пирометрической измерительной системы, работающей в одноцветном и двухцветном режимах. Поэтому удаление окалины и обеспечение точности позиционирования и фокусировки системы пирометрического контроля становятся факторами, определяющими качество конечного сигнала обратной связи, подаваемого на индукционный источник мощности. Имеющиеся в воздухе примеси (например, дымовые газы) также могут оказывать отрицательное влияние на поступающий от пирометров сигнал.

Если не уделять особого внимания обеспечению чистоты заготовки и точности показаний системы управления технологическими параметрами с обратной связью, использование пирометрии вряд ли будет

▼ *Печь для одновременной термической обработки нескольких нитей проволоки*





▲ *Технологическая линия компании «Рэдайн» для непрерывной термической обработки проволоки*

эффективным. Датчики температуры должны также быть сфокусированы непосредственно на нагреваемой проволоке. Это особенно важно при работе с проволокой малого диаметра: в процессе обработки нити проволоки могут смещаться по вертикали и выходить из зоны видимости пирометра, что может приводить к искажению сигнала, поступающего в систему управления процессом индукционного нагрева.

Производительность технологической линии

Расчет оптимальной скорости технологической линии при заданных значениях диаметра проволоки и уровня мощности индукционного нагревателя представляется вполне возможным. Для этого успешно используются контроллеры прямой связи.

Проволока из цветных металлов

До сих пор наши рассуждения касались индукционного нагрева проволоки из углеродистой стали. Однако индукционный нагрев может использоваться (хотя и с меньшей эффективностью) и при термообработке проволоки из цветных металлов (например, алюминия и латуни).

Для примера рассмотрим случай, когда латунную проволоку диаметром 2 мм (0,08 дюйма), подаваемую со скоростью 300 м/мин (985 фут./мин), необходимо нагреть из состояния температуры окружающего воздуха (20 °C, или 70 °F) до 650 °C (1200 °F).

Для этого потребуется установка с суммарной выходной мощностью 540 кВт (при частоте 50 кГц) и индуктором общей длиной 3 м (10 футов). Для нагрева же с 20 °C (70 °F) до 650 °C (1200 °F) латунной проволоки диаметром 6 мм (0,24 дюйма), подаваемой со скоростью 300 м/мин (985 фут./мин), потребуется установка с выходной мощностью 1500 кВт (при частоте 10 кГц) и индуктором общей длиной 6 м (20 футов).

Конечное значение общего к.п.д. установки составит при этом, соответственно, 6 % для установки для нагрева провода диаметром 2 мм (0,08 дюйма) в первом случае и 20 % для установки для нагрева провода диаметром 6 мм (0,24 дюйма) во втором случае.

При сравнении этих показателей с общим к.п.д. установок для нагрева проволоки из магнитных материалов (доходящим до 80%) становится очевидным, почему метод индукционного нагрева не находит широкого применения при производстве проволоки из цветных металлов.

С другой стороны, есть примеры очень успешного применения в этих целях низкочастотных установок, которое обусловлено рядом других преимуществ (в частности – экологичности) технологии индукционного нагрева.

Заглядывая в будущее

Индукционный нагрев будет продолжать широко использоваться при производстве проволоки, особенно стальной. Интерес к технологиям индукционного нагрева будет возрастать; они все чаще будут использоваться в существующих сейчас обычных нагревательных системах для повышения их производительности.

Продолжатся разработки систем для нагрева проволок сверхмалого диаметра, а также проволок из специальных сплавов, композитных металлов и материалов, таких как титан и вольфрам. Физические габариты блоков питания устройств индукционного нагрева будут уменьшаться, а их эксплуатационные показатели – улучшаться.

Предстоит разработка новых методов и систем управления, способных обеспечить соблюдение очень жестких допусков и постоянство характеристик изделий из проволоки; будут усовершенствованы методы и системы поточного контроля качества продукции.

«Каждый случай выявления новых сфер возможного применения методов индукционного нагрева должен рассматриваться с точки зрения его преимуществ.

Наш собственный опыт свидетельствует о том, что иногда даже самое маловероятное применение или применение, на первый взгляд кажущееся практически нереализуемым, может быть воплощено во вполне успешно работающую и экономически рентабельную установку». ■

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Les avantages dérivant de l'utilisation de la technologie du chauffage par induction dans le traitement des produits à base de fil

Inductotherm Heating and Welding Technologies Ltd – Radyne Division

Le chauffage par induction : les principes de base

Pour comprendre entièrement les nombreux avantages associés au chauffage par induction, il est tout d'abord important de comprendre les véritables principes existant au cœur de la technologie. Utilisée dans plusieurs processus depuis le début de son application commerciale au début des années 40, la technologie du chauffage par induction comprenait des applications telles que la fusion des métaux, le chauffage avant le pliage ou le formage, différents traitements de chauffage tels que l'écrouissage et le revenu et l'union des métaux par le brasage fort ou le brasage tendre. Les premiers exemples de chauffage par induction comprenaient également le développement d'oscillateurs radio-fréquence du type à tube, fonctionnant normalement à des fréquences élevées et des groupes convertisseurs utilisés pour le développement de puissance pour le chauffage par induction à des fréquences inférieures.

Si l'on souhaite donner une définition du processus du chauffage par induction, cette dernière ne peut être que: "Le chauffage par induction a lieu lorsqu'un objet métallique est placé dans un champ électromagnétique variable. Le chauffage par induction est généré par l'agitation de la structure moléculaire de l'objet produite par le champ électromagnétique, et a lieu lorsque les molécules sont excitées, entrent en collision et par la suite produisent de la chaleur."

Par conséquent, le chauffage par induction peut être comparé à la configuration d'un simple transformateur, où le primaire du transformateur comprend la source de la puissance inductive ou générateur à induction qui alimente la puissance à la bobine ou à l'élément d'induction, et l'objet à chauffer est placé dans le champ magnétique de cette bobine ou élément et représente le secondaire du transformateur.

Ensuite, un champ magnétique alternatif est appliqué à partir de la source de la puissance inductive ou générateur à induction à la bobine ou élément d'induction. Au moyen de la conduction mutuelle, des lignes de flux magnétiques passent à travers l'objet pour créer une résistance au parcours du flux; la chaleur est générée pendant le flux du courant.

Profondeur de pénétration

Lorsque le physicien anglais Michael Faraday a développé le transformateur électrique, il a remarqué le phénomène décrit ci-dessus. En réalité afin d'éliminer cet effet thermique, les transformateurs ont été ensuite reconçus avec des lamelles dans le but d'éliminer ou réduire les effets du champ électromagnétique chauffant le transformateur.

La raison pour laquelle un composant en feuillards utilisé pour réaliser en utilisant un transformateur ne se chauffe pas par induction électromagnétique, est due à un phénomène dénommé "profondeur de pénétration" ou "profondeur de référence", qui indique la profondeur à laquelle environ 80% du courant s'écoule dans une pièce de fabrication.

Cette profondeur est proportionnelle à la résistance électrique du matériau qui se chauffe à la fréquence de sortie opérationnelle (mesurée en Hertz) de la source de la puissance inductive ou générateur à induction générant le champ magnétique. À des fréquences élevées, la profondeur de pénétration ou de référence est mince par rapport aux basses fréquences. C'est là la raison essentielle pour laquelle le chauffage par induction est largement utilisé dans les traitements thermiques sélectifs de l'acier où les profondeurs de cémentation du traitement thermique peuvent être contrôlées avec précision en sélectionnant soigneusement la fréquence de sortie du système d'induction.

Un autre facteur essentiel influençant le chauffage d'un objet métallique dans un champ électromagnétique est représenté par la densité de puissance mesurée en kilowatts: plus la densité de puissance est élevée pour une fréquence donnée, plus le chauffage a lieu à proximité de la surface. Par contre, plus la densité de puissance est réduite, plus le chauffage est profond. Il s'ensuit que l'utilisation du chauffage par induction pour tout processus spécifique et étroitement lié à la possibilité de sélectionner la fréquence de sortie correcte de la source de la puissance inductive et la densité de puissance correcte pour une application donnée.

Calcul de la fréquence

Aux fréquences utilisées pour le chauffage par induction, le courant a tendance à s'écouler sur la surface du conducteur à une profondeur qui dépend de la résistivité du conducteur, de la fréquence du courant alternatif et de la perméabilité

effective du conducteur. La profondeur effective de pénétration du courant, sous forme métrique, est fournie par la formule suivante:

$$\rho = \frac{1}{20}\pi\sqrt{\frac{10r}{\mu F}}$$

Dans la formule ci-dessus:
p = profondeur de pénétration du courant
r = résistivité exprimée en microhms centimètres
μ = perméabilité effective
(μ = 1 pour des matériaux non magnétiques)

En sélectionnant la fréquence correcte, il est possible de contrôler la quantité de matériau chauffé: des fréquences élevées entraînent des niveaux de pénétration effective réduits, tandis que des fréquences inférieures auront pour résultat une pénétration plus profonde. En considérant la formule, environ 90% de la chaleur totale est générée à la profondeur 'p', avec des profondeurs supérieures chauffées par conduction à travers le matériau. Toutefois, pour obtenir un chauffage optimal à travers la totalité du matériau, il faut éviter la superposition des courants opposés s'écoulant sur les surfaces opposées du conducteur afin d'empêcher l'annulation du courant. Normalement la valeur de 'p' devrait être inférieure à la moitié du rayon du conducteur, bien que cette règle ne soit pas appliquée constamment.

En outre, des profondeurs de pénétration de courant différentes peuvent être utilisées pour plusieurs matériaux et températures à différentes fréquences.

Dans le processus de chauffage par induction, un composant métallique placé à l'intérieur ou à proximité d'une bobine d'induction est chauffé grâce au passage du courant inducteur à travers la bobine, qui à son tour, introduit du courant supplémentaire à l'intérieur du composant. La chaleur est générée par la résistance à ce courant induit, conformément à la loi I^2R (où I = Courant et R = Résistance) et également par perte par hystérésis dans les matériaux magnétiques: un effet qui disparaît à la température de Curie (environ. 1 400°F / 760°C).

Sélection de la puissance (pour fil chauffé complètement)

Dès que la fréquence correcte est déterminée et que les unités de puissance appropriées sont sélectionnées, le pas successif consiste à considérer les exigences de puissance et, avant tout, à déterminer le contenu calorifique du conducteur. Le contenu calorifique d'un fil en mouvement est simplement une fonction du débit du matériau, de la chaleur spécifique et de l'augmentation de la température.

Toutefois, ce calcul apparemment simple, est compliqué par le fait que la chaleur spécifique varie au rythme de l'augmentation de la température. En considérant comme exemple un acier à moyenne teneur en carbone, la chaleur spécifique varie en raison d'un facteur de 1,3 allant de 68°F (20°C) à 1 022°F (550°C), et 1,5 allant de 68°F (20°C) à 1.652°F (900°C).

Par conséquent, afin de déterminer le contenu calorifique pour chauffer l'acier au carbone à 1 022°F (550°C) et 1 652°F (900°C), comme méthode empirique approximative, l'on peut utiliser des valeurs de chaleur spécifiques de 0,58 et 0,63. Selon cette règle, le contenu calorifique du fil chauffé à 1 022°F (550°C) sera égal à 2,31 x lb/min (1,05 x kg/min), tandis qu'à 1 652°F (900°C) sera égale à 4,27 x lb/min (1,94 x kg/min) avec un résultat exprimé en kW. Une fois le contenu calorifique du produit déterminé, le pas successif consiste à déterminer la puissance de sortie de l'unité de puissance en établissant un rendement thermique correspondant à la sortie de l'unité de puissance.

Rendement thermique

Un système d'induction typique consiste en une unité de puissance, en un système à bobines de chauffage et en les équipements nécessaires pour "accoupler" la bobine de chauffage (et le fil traité) à l'unité de puissance. L'unité de puissance est également connue comme convertisseur, invertisseur ou générateur.

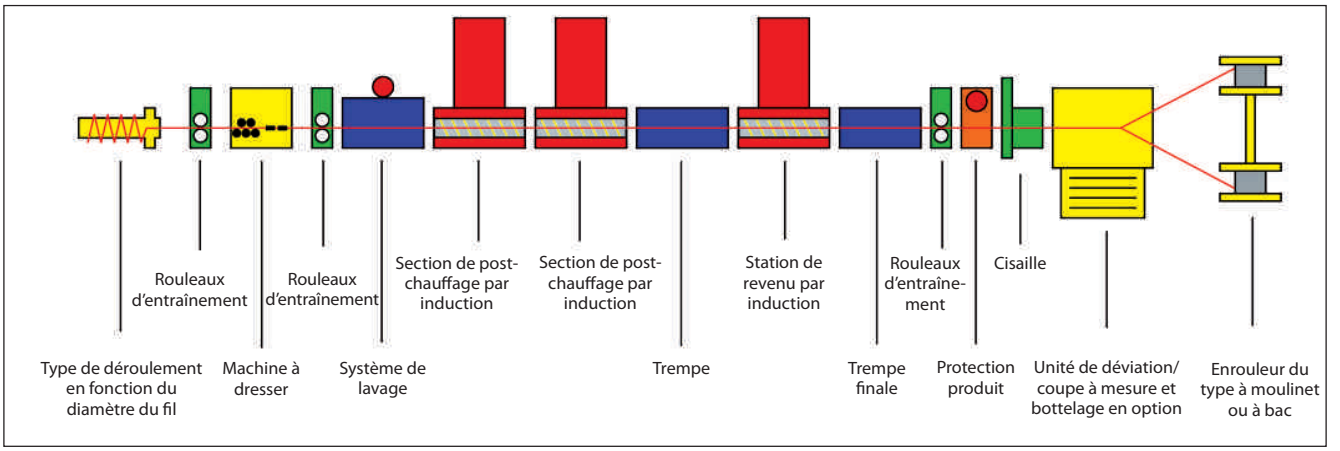
Cette unité permet de convertir une alimentation triphasée de 50 ou 60Hz à une fréquence de sortie nominale allant de 250Hz à 800kHz en une seule phase, avec des sorties de puissance allant de 1kW à 4MW, dans une vaste gamme de combinaisons de fréquences de puissance, et avec la possibilité de combinaisons de double fréquence. Ces unités de puissance peuvent être constituées de thyristors ou de transistors.

Le système à bobine de chauffage utilisé pour les applications de chauffage des fils, consiste en un tube de cuivre enroulé en spirale. Le tube peut être rond, carré ou rectangulaire, et présente souvent des bandes de cuivre supplémentaires brasées sur le diamètre intérieur de la spirale. La longueur de la bobine, le diamètre intérieur, le nombre des spires et le pourcentage de cuivre par rapport à l'espace libre le long du diamètre intérieur de la spirale sont tous des paramètres importants en termes de rendement du système.

La totalité des unités de puissance fonctionne dans une bande de fréquences de, par exemple, 7-11kHz, 20-25kHz, et 40-50kHz pour des fréquences de sortie nominales d'unités de 10kHz, 25kHz et 50kHz respectivement. Afin d'obtenir l'exploitation à l'intérieur de cette bande, l'inductance de la bobine, la tension de fonctionnement de la bobine et la capacité (KVAR) du circuit à résonance de l'unité de puissance peuvent être variées pour s'adapter aux exigences spécifiques des dimensions du fil, des matériaux, des taux de débit et des températures.

En considérant le rendement, il faut d'abord analyser le système de la bobine.

▼ **Figure 1**. *Ligne de processus de trempe et revenu pour fil*



▲ **Figure 2**. *Ligne pour le traitement thermique en continu de fil de Radyne*

Le diamètre intérieur de la spirale en cuivre est l'élément le plus significatif pour déterminer le rendement. À son tour, ce diamètre dépend d'aspects principalement mécaniques comme le guide du fil, la vibration du fil et la contamination du fil, ainsi que des dimensions du fil et de la méthode utilisée pour unir une bobine de fil à l'autre. En général, plus la bobine est située à proximité du matériau, plus le rendement est élevé.

Dans plusieurs cas, il peut être nécessaire de faire passer des fils de dimensions différentes à travers une seule bobine. Les fils de dimensions inférieures seront produits à un rendement inférieur, mais le compromis peut être justifié par un coût de capital inférieur pour des dimensions de bobines réduites et par la réduction des temps d'arrêt résultant de la réduction des changements de la bobine dans le cas de fils de dimensions différentes.

Le deuxième aspect de la forme de construction de la bobine est représenté par sa longueur. Théoriquement, pour chauffer uniformément la totalité du diamètre d'un fil à une température donnée, un temps correspondant approximativement à $D^2/25$ secondes (où D = diamètre du fil en mm) est nécessaire. La longueur minimale de la bobine en mètres sera ainsi égale à $D^2M/25$ (où M = vitesse du fil en mètres/secondes).

D'un point de vue pratique, surtout en cas de diamètres petits, une longueur de bobine minimale entraînerait une densité de puissance excessive et, par conséquent, un rendement faible. Pour améliorer le rendement, on augmente la longueur des bobines.

Grâce à une évaluation basée sur l'expérience, il est possible d'effectuer des calculs pour déterminer la longueur de la bobine, (avec les diamètres de la bobine déterminés en fonction des dimensions du fil) et de calculer la tension de la bobine, le nombre de spires et le pourcentage du cuivre par rapport à l'espace libre, afin d'obtenir le rendement maximal. Au sein de ces calculs, afin d'améliorer le rendement, la valeur initiale peut être variée sur la longueur de la bobine.

Applications du chauffage du fil

De nos jours, le chauffage par induction s'applique à une vaste gamme de processus de fil, pour le traitement tant de fils individuels et de fils multiples parallèles ou fils toronnés formant des câbles. Les applications du chauffage des fils comprennent: le chauffage avant le tréfilage; le chauffage avant l'encapsulation (par exemple pour la fabrication de câbles électriques revêtus de PVC); le traitement thermique du fil (normalement le durcissement, parfois suivi de la trempe); le recuit de fils individuels et de câbles multi-brins; le chauffage du fil avant le revêtement (au moyen d'un revêtement métallique ou de composants d'isolement); la relaxation comme celle effectuée sur les fils pour béton précontraint et le préchauffage avant un processus de chauffage conventionnel.

Un coup d'œil aux processus de chauffage par induction des fils en détail:

Chauffage avant le tréfilage

Parfois il est nécessaire de chauffer quelques types de fil avant le tréfilage pour éviter des dommages éventuels sur la surface causés par le processus de tréfilage.

Chauffage avant l'encapsulation

Généralement, ce processus s'applique aux fils d'aluminium, individuels et toronnés. Le fil est préchauffé au moment de quitter le rouleau du dérouleur et la bobine d'induction est positionnée sur la chaînette de la ligne du fil.

Le fil passe à travers la bobine d'induction lorsqu'il est chauffé à environ 250°F (120°C) et ensuite il passe immédiatement au processus d'encapsulation pendant lequel le PVC s'écoule uniformément sur le fil. La longueur de la bobine d'induction dépend de la vitesse du processus et de la profondeur du chauffage requise à travers la section transversale du fil. Étant donné qu'il n'est pas essentiel de chauffer entièrement le fil, la longueur de la bobine d'induction dans la majorité des applications varie de 20" à 40" (de 0,5m à 1m).

Traitement thermique du fil

Le durcissement et le recuit continus du fil d'acier sont particulièrement importants pour certains types d'applications telles que la production de barres déformées pour structures de béton armé.

Cela se réalise en utilisant un processus en ligne horizontale qui entraîne le chauffage du fil à une température d'austenitisation de 1 742°F (950°C), suivi d'une trempe à l'eau et d'un réchauffage à une température allant de 660°F (350°C) à 842°F (450°C) pour le revenu final, étant donné que la température dépend des spécifications finales de la résistance à la traction du produit. Radyne a breveté un processus dénommé "Hi Bond" pour cette application spécifique.

Recuit

Les fils d'acier peuvent être chauffés par induction, normalement à une température de 1 290°F (700°C), pour le processus de recuit, individuellement (pour différents diamètres) ou en configurations multiples (normalement de 0,04" (1mm) à 0,23" (6mm)). La fréquence de sortie de la source de puissance inductive dépend du diamètre du fil, tandis que le niveau de puissance dépend de la vitesse de production requise.

Dans le cas de fils multiples, il est possible d'adapter des fils de dimensions de 0,61" (15,5mm) à 1" (25,4mm): chaque fil passe à

travers un tube de céramique et est guidé à travers la bobine pour faciliter l'insertion de la ligne.

Chauffage avant le revêtement

Les processus suivants représentent deux méthodes de traitement clairement séparées: la diffusion ou le revêtement du métal et le revêtement isolant de surface.

Diffusion
L'application de ce processus est globalement plus diffuse dans la production de câbles pour pneus, mais il peut être également utilisé dans d'autres secteurs de marché. Avec une méthode similaire au processus de recuit, les fils d'acier allant de 0,031" (0,8mm) à 0,08" (2mm) de diamètre peuvent être chauffés à une température de 1 112°F (600°C) pour fondre les revêtements de surface de cuivre et zinc, qui ensuite se diffusent dans le fil de base en formant une barrière contre la formation de rouille.

Généralement, les fils sont chauffés en des configurations multiples, disposés sur un plan horizontal, à travers une bobine d'induction de forme ovale et les fils sont alimentés à travers des tubes en céramique. La vitesse de production est déterminée au moyen des calculs suivants: D x V où D correspond au diamètre du fil et V à la vitesse du fil ou la vitesse de débit. Les valeurs typiques de la puissance utilisées vont de 60kW à 240kW avec une fréquence de sortie de 25kHz et des longueurs de la bobine d'induction de 7 à 8 pieds (de 2m à 2,5m).

Le phénomène connu comme annulation du courant peut être utilisé efficacement dans cette application: on sélectionne une fréquence à induction comparativement basse par rapport à la section du fil tout en s'assurant que, dans le cas de rupture d'un fil en ligne, ce dernier ne peut être chauffé à une température dépassant la température de Curie (environ 1 400ºF).

Cela élimine la nécessité d'arrêter immédiatement la ligne en cas de rupture d'un seul fil. Il est possible de réaliser le processus, si nécessaire, sous azote ou simplement dans l'air.

Revêtement isolant de surface
Pour la production de fil électrique pour lequel on utilise des revêtements tels que les émaux, des époxydes ou des enrobages à rubans sensibles à la chaleur, le fil peut être chauffé en ligne en continu. Cette technique peut être également utilisée pour sécher des peintures appliquées au fil.

Les exigences de température étant généralement réduites (inférieures à 300°F 150°C), une alimentation de puissance limitée peut être souvent intégrée dans une ligne de revêtement existant déjà, avec une source de puissance fonctionnant à haute fréquence, étant donné qu'il est nécessaire de chauffer exclusivement la surface du fil (et non la totalité de la section transversale du fil).

Relaxation
Conçu pour l'application à la production de fil ou toron, ce processus est similaire au processus de revenu de fil du fait du chauffage continu à une température de 750°F (400°C) alors qu'il est sous tension.

Généralement, ce système consiste en une seule source de puissance inductive avec une fréquence de sortie nominale de 3/10kHz qui alimente un jeu de bobines d'induction statique ou mobile en fonction de la configuration de la ligne.

Préchauffage
Les systèmes de chauffage par induction ont été incorporés dans les lignes de fil existant déjà pour le préchauffage du fil et pour augmenter la capacité de production des processus. Considérons, par exemple, un fil unique préchauffé avant l'introduction dans un four conventionnel ou dans un lit de fluidisation. Dans un projet particulier, deux lignes, chacune caractérisée par une source de puissance inductive de 500kW/10kHz couplée avec des bobines d'induction de 10 pieds (3m) de longueur, ont été utilisées pour chauffer des fils multiples de 70°F (25°C) à 1 292°F (700°C) avant d'être introduites dans un four conventionnel. Normalement, le four d'induction présentait un rendement de chauffage de 2000kg/heure.

Durcissement et revenu: le processus "Hi-bond"
Le processus de durcissement et de revenu en ligne est une application commune dans laquelle le fil est chauffé à 1 742°F (950°C), trempé pour le durcissement et ensuite réchauffé à des températures de revenu allant de 660°F (350°C) à 1 200°F (650°C). Actuellement, cette méthode, dénommée processus "Hi-Bond" et brevetée par Radyne, est appliquée avec succès pour le traitement des barres déformées pour les structures en béton armé afin d'obtenir un fil caractérisé par une relaxation réduite et une haute résistance à la déformation.

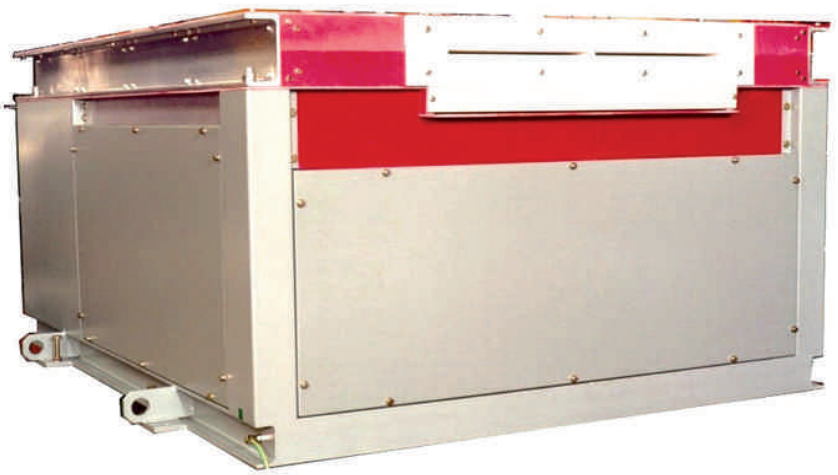
Le chauffage pour le durcissement s'effectue en deux phases en utilisant 10kHz pour augmenter la température du fil à 1 382F (750°C) avec une seule bobine, et 50kHz ou bien 200kHz pour augmenter la température de 1 382°F (750°C) à 1 742°F (950°C) avec deux ou plusieurs dimensions de bobines, en fonction de la gamme des fils, des exigences de débit et de rendement.

Normalement les bobines présentent une longueur de 6 pieds (1,8m) pour chaque phase et des puissances de 280kW (à 10kHz) et 180kW à 50kHz. Immédiatement après le chauffage à 1 742°F (950°C), le produit est arrosé avec des jets d'eau à haute pression pour réduire la température à environ 80°F (30°C), et séché au moyen d'un souffleur.

Diffusion des câbles pour pneus
Cette application exige normalement le chauffage simultané de 10 à 24 fils disposés en parallèle et chauffés à environ 1 112°F (600°C) pour fondre les revêtements de surface de cuivre et de zinc se diffusant sur le fil de base pour produire des câbles pour pneus.

Généralement, les fils présentent une distance entre les axes de 0,61" à 1" (de 15,5mm à 25,5mm) et un diamètre allant de 0,031" à 0,080" (de 0,8mm à 2mm). Le débit typique se base sur DV=70 (où D=diamètre et V=vitesse).

▼ **Figure 3**. *Technologie du four à multifils*



Le nombre de fils contenus dans une bobine de chauffage est généralement déterminé par la distance entre les axes, le jeu de bobines étant encombrant dans le cas d'un grand nombre de fils avec une grande distance entre les axes.

Contrôle interactif de la puissance dans des conditions de circuit fermé
Par rapport aux processus tels que ceux qui s'effectuent avec les fours à gaz et électriques, les radiateurs à infrarouge, les fils chauffants et les lits de fluidisation, le chauffage par induction est extrêmement rapide dans la réponse aux changements des paramètres de service.

Un faible changement de puissance ou de vitesse de ligne a un effet quasi instantané sur la température résultante du produit traité. Pour cette raison, le contrôle de la ligne doit être soigneusement considéré pour obtenir des résultats cohérents.

Les deux méthodes standard utilisées sont la rétroaction des dispositifs des capteurs de température (tels que la pyrométrie infrarouge) et de la vitesse de la ligne.

Capteurs de température
Dans le cas de chauffage de l'acier magnétique à la température d'austenitisation pour le processus de durcissement, à moins qu'une atmosphère ne soit incorporée, de l'écaille peut se former sur la surface du fil. Cela peut affecter les relevés des systèmes utilisant les pyromètres infrarouges à un ou deux couleurs.

Par conséquent, l'élimination de l'écaille et la précision du positionnement et de la focalisation du système pyrométrique permet de déterminer le signal de réaction à l'alimentation de la puissance inductive. La contamination atmosphérique telle que les fumés peut également influencer le signal provenant des pyromètres.

Si l'on n'accorde pas une attention particulière à la propreté du fil, à la précision de la rétroaction des paramètres de processus et au contrôle du circuit fermé, l'utilisation des systèmes pyrométriques ne sera pas efficace. Même les capteurs de température doivent être focalisés sur le fil étant chauffé et, en particulier, dans le cas de fils de diamètres réduits, ces derniers peuvent se déplacer verticalement durant le processus et sortir du champ de vision du pyromètre en émettant de faux signaux au processus d'induction.

Vitesse de la ligne
Le calcul de la vitesse de la ligne en relation aux dimensions du fil et du niveau de puissance du réchauffeur à induction est un procès viable où les dispositifs de régulation avec action prévisionnelle ont été utilisés avec succès.

Matériaux non ferreux
Jusqu'à présent nos considérations ont concerné le chauffage par induction de fils d'acier au carbone. Les matériaux non ferreux comme l'aluminium et le laiton peuvent être pareillement chauffés par induction, toutefois sans obtenir la même efficacité. Par exemple, l'on peut considérer un fil de laiton de 0,08" (2mm) de diamètre devant être chauffé à une température ambiante de 70°F (20°C) à 1 200°F (650°C) à une vitesse de 985 pieds/min (300m/min).

Cela exigera 540kW de puissance de sortie à une fréquence de 50kHz avec une bobine d'induction d'une longueur totale de 10 pieds (3m). Un fil de laiton de 0,24" (6mm) de diamètre chauffé de 70°F (20°C) à 1 200°F (650°C) à une vitesse de 985 pieds/min (300m/min) exigera 1 500kW de puissance de sortie à une fréquence de 10kHz avec une bobine d'induction d'une longueur totale de 20 pieds (6m).

Les valeurs de rendement total en résultant sont respectivement égales à 6% pour le fil de 0,08" (2mm) de diamètre du premier exemple et 20% pour le fil de 0,24" (6mm) de diamètre du deuxième exemple.

Si l'on compare les rendements totaux arrivant jusqu'à 80% pour le chauffage de l'acier magnétique, l'on peut comprendre pourquoi le chauffage par induction n'est pas largement utilisé pour les matériaux non ferreux.

Quoi qu'il en soit, il existe des installations couronnées de succès qui sont en service avec des rendements réduits grâce à d'autres avantages offerts par le processus d'induction comme par exemple le milieu de travail.

Perspectives futures
Le chauffage par induction continuera d'être largement utilisé dans l'industrie du fil, en particulier pour les fils d'acier. Il y aura un intérêt croissant et le nombre de systèmes utilisés pour compléter et améliorer la productivité des systèmes de chauffage conventionnels existant déjà est destiné à augmenter.

Le développement se poursuivra dans le secteur du chauffage de fils très fins et du chauffage d'alliages spécifiques, de pseudo-alliages et de matériaux tels que le titane et le tungstène. Les dimensions physiques des dispositifs d'alimentation de puissance inductive diminueront tandis que leurs performances augmenteront.

Des développements futurs concerneront les techniques et les systèmes de contrôle pour assurer des tolérances très étroites et l'uniformité des fils, et enfin des perfectionnements seront réalisés grâce au contrôle de qualité en ligne.

"À mesure que d'autres processus utilisant le chauffage par induction sont découverts, chacun d'eux doit être considéré par rapport à ses propres mérites. D'après notre expérience, parfois l'application la plus improbable ou celle qui apparaît initialement non praticable, peut se traduire en une installation couronnée de succès et financièrement faisable." ■

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Vantaggi derivanti dall'utilizzo della tecnologia del riscaldamento ad induzione nel trattamento di prodotti a base di filo

Inductotherm Heating and Welding Technologies Ltd – Radyne Division

Il riscaldamento ad induzione: i principi di base

Per meglio comprendere i numerosi vantaggi associati al riscaldamento ad induzione, vanno innanzi tutto colti i principi fondamentali che sono alla base di questa tecnologia. Utilizzata in numerosi processi sin dalla sua applicazione commerciale nei primi anni 40, la tecnologia ad induzione comprendeva numerose applicazioni quali la fusione di metalli, il riscaldamento che precede la piegatura o la formatura, diversi trattamenti di riscaldamento quali l'indurimento e il rinvenimento e l'unione di metalli tramite brasatura o saldatura.

Alcuni esempi anteriori di riscaldamento ad induzione riguardavano inoltre lo sviluppo di oscillatori a radiofrequenze o del tipo a tubo, generalmente funzionanti a frequenze elevate, e gruppi convertitori utilizzati per generare la potenza per il riscaldamento ad induzione a basse frequenze.

Volendo dare una definizione del processo del riscaldamento ad induzione, questa sarebbe invariabilmente: "Il riscaldamento ad induzione ha luogo quando un oggetto metallico è posto in un campo elettromagnetico variabile. Il riscaldamento ad induzione è generato tramite agitazione della struttura molecolare dell'oggetto prodotta dal campo elettromagnetico ed avviene quando le molecole vengono eccitate ed entrano in collisione generando successivamente calore." Di conseguenza, il riscaldamento ad induzione può essere paragonato alla configurazione di un semplice trasformatore, ove il primario del trasformatore comprende la sorgente della potenza induttiva o generatore ad induzione che alimenta potenza alla bobina o all'elemento d'induzione, mentre l'oggetto da riscaldare è posto nel campo magnetico di quella bobina o elemento e rappresenta il secondario del trasformatore. Viene quindi applicato un campo magnetico alternato a partire dalla sorgente della potenza induttiva o generatore ad induzione, alla bobina o elemento d'induzione. Tramite una conduzione reciproca, delle linee di flusso magnetiche vengono fatte passare attraverso l'oggetto al fine di creare una resistenza al percorso del flusso; durante il flusso di corrente si ha la generazione di calore.

Profondità di penetrazione

Il fisico inglese Michael Faraday, nello sviluppare il trasformatore elettrico, osservò inizialmente il fenomeno sopra descritto.

In effetti, per eliminare quest'effetto termico, in seguito i trasformatori sono stati riprogettati con lamelle al fine di eliminare o ridurre gli effetti del campo elettromagnetico che riscaldava il trasformatore. La ragione per la quale un componente con lamelle utilizzato per realizzare un trasformatore non si riscalda tramite induzione elettromagnetica, dipende da un fenomeno noto come "profondità di penetrazione" o "profondità di riferimento", che indica la profondità alla quale circa l'80% della corrente fluisce in un pezzo di lavoro.

Questa profondità è proporzionale alla resistenza elettrica del materiale che si riscalda e alla frequenza di uscita operativa (misurata in Hertz) della sorgente della potenza induttiva o generatore ad induzione che produce il campo magnetico.

A frequenze elevate, la profondità di penetrazione o di riferimento è limitata rispetto alle basse frequenze. É questa una ragione fondamentale per cui il riscaldamento ad induzione è ampiamente utilizzato nei trattamenti termici selettivi dell'acciaio ove le profondità di cementazione del trattamento termico possono essere controllate con precisione selezionando accuratamente la frequenza di uscita del sistema d'induzione.

Un altro fattore essenziale che influenza il riscaldamento di un oggetto metallico in un campo elettromagnetico è rappresentato dalla densità della potenza misurata in chilowatt: maggiore è la densità di potenza per una data frequenza, tanto più vicino alla superficie avviene il riscaldamento. D'altro canto, minore è la densità di potenza, e più è profondo il riscaldamento. Ne consegue che l'utilizzo del riscaldamento ad induzione per qualsiasi processo specifico è strettamente legato alla selezione della corretta frequenza di uscita della sorgente della potenza induttiva e alla corretta densità di potenza per una data applicazione.

Calcolo della frequenza

Alle frequenze utilizzate per il riscaldamento ad induzione, la corrente tende a fluire sulla superficie del conduttore ad una profondità che dipende dalla

resistività del conduttore, dalla frequenza della corrente alternata e dalla permeabilità effettiva del conduttore. La profondità effettiva di penetrazione della corrente, sotto forma metrica, è fornita dalla seguente formula:

$$\rho = \frac{1}{20}\pi\sqrt{\frac{10r}{\mu F}}$$

Nella precedente formula:
p = profondità di penetrazione della corrente
r = resistività espressa in microhom/cm
μ = permeabilità effettiva
(μ = 1 per materiali non magnetici)

Selezionando la frequenza corretta, è possibile controllare la quantità di materiale riscaldato: frequenze elevate determinano bassi livelli di penetrazione effettiva, mentre frequenze inferiori implicano una penetrazione più profonda.

Considerando la formula, circa il 90% del calore totale è generato alla profondità "p", con profondità superiori riscaldate per conduzione attraverso il materiale.

Tuttavia, per ottenere un riscaldamento efficace attraverso tutto il materiale è necessario evitare la sovrapposizione di correnti opposte che fluiscono sulle superfici opposte del conduttore al fine di impedire l'annullamento della corrente.

Generalmente il valore "p" dovrebbe essere inferiore alla metà del raggio del conduttore, sebbene questa regola non sia sempre applicata.

Inoltre, possono essere utilizzate profondità di penetrazione di corrente diverse per diversi materiali e temperature a varie frequenze.

Nel processo di riscaldamento ad induzione, un componente metallico posto all'interno di una bobina d'induzione o adiacente alla stessa viene riscaldato grazie al passaggio di corrente induttrice attraverso ad essa, la quale introduce a sua volta della corrente aggiuntiva all'interno del componente.

Il calore è generato dalla resistenza a tale corrente indotta secondo la legge I^2R (dove I = Corrente e R = Resistenza) e inoltre per perdita di isteresi nei materiali magnetici: un effetto che scompare alla temperatura di Curie (circa 1.400°F / 760°C).

Selezione della potenza (per fili riscaldati completamente)

Una volta determinata la frequenza corretta e selezionate le unità di potenza appropriate, il passo successivo consiste nel considerare le esigenze di potenza, e innanzi tutto, nel determinare il contenuto di calore del conduttore. Il contenuto di calore di un filo in movimento è semplicemente una funzione della quantità di materiale, del calore specifico e dell'aumento della temperatura. Tuttavia questo calcolo apparentemente semplice è complicato dal fatto che il calore specifico varia all'aumentare della temperatura.

Considerando come esempio un acciaio a medio contenuto di carbonio, il calore specifico varia in funzione di un fattore pari a 1,3 da 68°F (20°C) a 1.022°F (550°C), e 1,5 da 68°F (20°C) a 1.652°F (900°C).

▼ **Figura 1**. *Linea di processo di indurimento e rinvenimento per fili*

Di conseguenza, al fine di determinare il contenuto di calore per riscaldare l'acciaio al carbonio a 1.022°F (550°C) e 1.652°F (900°C), come metodo empirico approssimativo, si possono utilizzare valori di calore specifico pari a 0,58 e 0,63.

Accentando questa regola, il contenuto di calore del filo riscaldato a 1.022°F (550°C) sarà pari a 2,31 x lb/min (1,05 x kg/min), mentre a 1.652°F (900°C) sarà pari a 4,27 x lb/min (1,94 x kg/min) con un risultato espresso in kW. Una volta determinato il contenuto di calore del prodotto, il passo successivo consiste nel determinare la potenza di uscita dell'unità di potenza stabilendo un rendimento termico corrispondente all'uscita dell'unità di potenza.

Rendimento termico

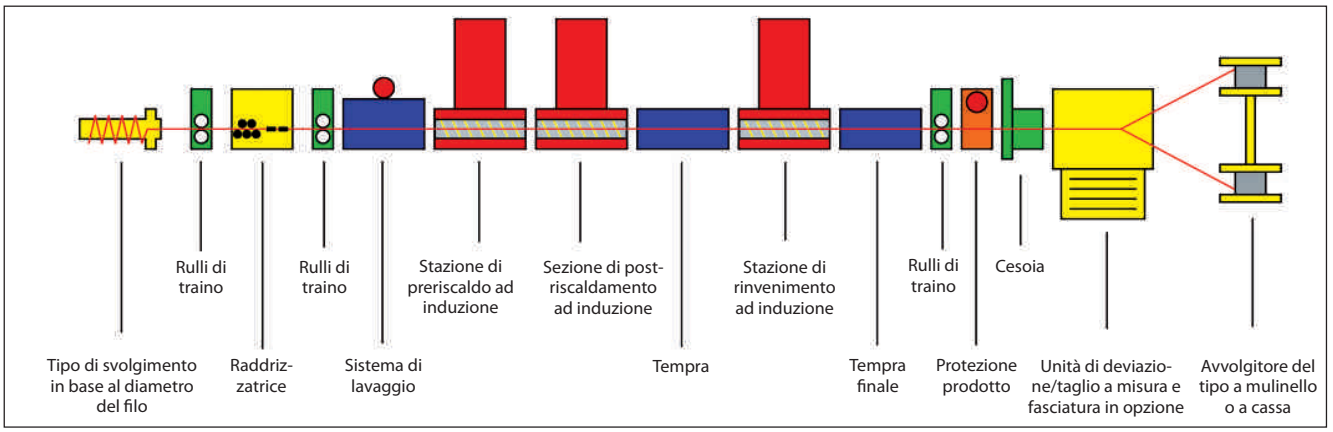
Un tipico sistema ad induzione consiste in un'unità di potenza, in un sistema di riscaldamento a serpentina e negli equipaggiamenti necessari per "accoppiare" la serpentina di riscaldamento (ed il filo trattato) all'unità di potenza. L'unità di potenza è anche nota come convertitore, invertitore o generatore.

Quest'unità consente di convertire un'alimentazione trifasica di 50 o 60Hz ad una frequenza di uscita nominale da 250Hz a 800kHz in una sola fase, con potenze d'uscita da 1kW a 4MW, in una vasta gamma di combinazioni di frequenze di potenza, e con la possibilità di combinazioni a doppia frequenza. Queste unità di potenza possono essere costituite da tiristori o da transistori.

Il sistema a serpentina di riscaldamento utilizzato per applicazioni di riscaldamento dei fili, consiste in un tubo di rame avvolto a spirale. Di forma rotonda, quadrata o rettangolare, il tubo presenta spesso delle piattine di rame aggiuntive con brasatura sul diametro interno della spirale. La lunghezza della bobina, il diametro interno, il numero di spire e la percentuale di rame rispetto allo spazio libero lungo il diametro interno della spirale sono tutti parametri importanti in termini di rendimento del sistema.

Tutte le unità di potenza funzionano in una banda di frequenze di, ad esempio, 7-11kHz, 20-25kHz, e 40-50kHz per frequenze di uscita nominali di unità rispettivamente di 10kHz, 25kHz e 50kHz.

Al fine di ottenere un funzionamento all'interno di questa banda, l'induttanza della bobina, la tensione di funzionamento della bobina e la capacità (KVAR) del circuito serbatoio dell'unità di potenza, possono essere variati per adattarsi alle esigenze specifiche delle dimensioni del filo, dei materiali, dei tassi di produttività e delle temperature.



▲ **Figura 2**. *Linea per trattamento termico in continuo di fili di Radyne*

Considerando il rendimento, bisogna innanzi tutto analizzare il sistema della bobina. Il diametro interno della spirale di rame è l'elemento più significativo per determinare il rendimento. Il diametro, a sua volta, dipende da aspetti principalmente meccanici come il guidafilo, la vibrazione e la contaminazione del filo, nonché le dimensioni del filo ed il metodo utilizzato per unire un aspo ad un altro.

In generale, più la bobina è vicina al materiale, più elevato è il rendimento. In molti casi può essere necessario far passare dei fili di dimensioni diverse attraverso una sola bobina. I fili di dimensioni inferiori saranno prodotti ad un minor rendimento, ma il compromesso può essere giustificato da un costo di capitale inferiore per dimensioni di bobine ridotte e dalla riduzione dei tempi morti derivante dalla riduzione dei cambiamenti della bobina nel caso di fili di dimensioni diverse.

Il secondo aspetto della forma costruttiva della bobina è rappresentato dalla sua lunghezza. Teoricamente, per riscaldare uniformemente tutto il diametro di un filo ad una data temperatura, è necessario un tempo corrispondente approssimativamente a $D^2/25$ secondi (dove D = diametro del filo in mm). La lunghezza minima della bobina espressa in metri sarà così pari a $D^2M/25$ (dove M = velocità del filo in metri/secondi).

In pratica, soprattutto nel caso di diametri piccoli del filo, la lunghezza minima della bobina determinerebbe un'eccessiva densità di potenza e, conseguentemente, uno scarso rendimento. Per migliorare il rendimento, si aumenta la lunghezza delle bobine.

Grazie ad una valutazione basata sull'esperienza è possibile effettuare dei calcoli per determinare la lunghezza della bobina (con i diametri della bobina determinati in base alle dimensioni del filo) e calcolare la tensione della bobina, il numero di spire e la percentuale di rame rispetto allo spazio libero, al fine di ottenere il massimo rendimento. Nell'ambito di tali calcoli, per migliorare il rendimento si può variare la valutazione iniziale sulla lunghezza della bobina.

Applicazioni di riscaldamento del filo
Attualmente, il riscaldamento ad induzione si applica ad una vasta gamma di processi di filo, per il trattamento di fili singoli e di fili multipli paralleli o fili a trefoli che formano cavi.

Le applicazioni del riscaldamento di fili comprendono: il riscaldamento prima della trafilatura; il riscaldamento prima dell'incapsulamento (ad esempio per la fabbricazione di cavi elettrici rivestiti di PVC); il trattamento termico del filo (in genere l'indurimento, a volte seguito dal rinvenimento); la ricottura di cavi singoli e multifilo; il riscaldamento di filo prima del rivestimento (per mezzo di un rivestimento metallico o di componenti di isolamento); il rilassamento come quello effettuato sui fili per cemento precompresso e il preriscaldamento prima di un tradizionale processo di riscaldamento.

Un rapido sguardo al processo di riscaldamento ad induzione dei fili in dettaglio:

Riscaldamento prima della trafilatura
A volte è necessario riscaldare alcuni tipi di filo prima della trafilatura per evitare eventuali danni alla superficie causati dal processo di trafilatura.

Riscaldamento prima dell'incapsulamento
Generalmente questo processo si applica ai fili di alluminio, singoli e a trefoli. Il filo viene preriscaldato al momento di lasciare il rullo dello svolgitore e la bobina d'induzione è posizionata sull'angolo della catenaria della linea del filo.

Il filo passa attraverso la bobina d'induzione quando viene riscaldato a circa 250°F (120°C) e immediatamente dopo al processo d'incapsulamento dove il PVC scorre uniformemente sul filo. La lunghezza della bobina d'induzione dipende dalla velocità del processo e dalla profondità di riscaldamento richiesta attraverso la sezione trasversale del filo. Poiché non è essenziale riscaldare interamente il filo, nella maggioranza delle applicazioni la lunghezza della bobina d'induzione varia da 20"a 40" (da 0,5m a 1m).

Trattamento termico del filo
L'indurimento e il rinvenimento continui del filo d'acciaio sono particolarmente importanti per alcuni tipi di applicazioni quali la produzione di barre deformate per strutture di cemento armato.

Ciò si ottiene utilizzando un processo in linea orizzontale che prevede il riscaldamento del filo ad una temperatura di austenitizzazione di 1.742°F (950°C), seguito da una tempra con acqua e quindi da un ulteriore riscaldamento ad una temperatura da 660°F (350°C) a 842°F (450°C) per il rinvenimento finale, poiché la temperatura dipende dalle specifiche finali di resistenza alla trazione del prodotto. Radyne ha brevettato un processo chiamato "Hi Bond" per questa specifica applicazione.

Ricottura
I fili d'acciaio possono essere riscaldati ad induzione, normalmente ad una temperatura di 1.290°F (700°C), per il processo di ricottura, individualmente (per diversi diametri) o in configurazioni multiple (normalmente da 0,04" (1mm) a 0,23" (6mm)). La frequenza di uscita della sorgente di potenza induttiva dipende dal diametro del filo, mentre il livello di potenza dipende dalla velocità di produzione richiesta.

Nel caso di fili multipli, è possibile adattare dei fili di dimensioni da 0,61" (15,5mm) a 1" (25,4mm): ogni filo passa attraverso un tubo di ceramica ed è guidato attraverso la bobina per facilitare l'inserimento della linea.

Riscaldamento prima del rivestimento

I seguenti processi rappresentano due metodi di trattamento distintamente separati: la diffusione o il rivestimento del metallo e il rivestimento isolante della superficie.

Diffusione
L'applicazione più comune di questo processo è la produzione di tortiglie per pneumatici, ma può anche essere utilizzato in altri settori di mercato.

Con un metodo simile al processo di ricottura, possono essere riscaldati fili d'acciaio del diametro da 0,031" (0,8mm) a 0,08" (2mm) ad una temperatura di 1.112°F (600°C) per fondere i rivestimenti di superficie di rame e zinco, che successivamente si diffondono nel filo di base formando una barriera antiruggine.

Generalmente, i fili vengono riscaldati in configurazione multipla, disposti su un piano orizzontale attraverso una bobina d'induzione di forma ovale, verso cui i fili sono alimentati attraverso singoli tubi di ceramica.

La velocità di produzione è determinata mediante i seguenti calcoli: D x V, dove D corrisponde al diametro del filo e V alla velocità del filo o alla velocità di produttività. I valori tipici della potenza utilizzati vanno da 60kW a 240kW con una frequenza di uscita di 25kHz, e lunghezze della bobina d'induzione da 7 a 8 piedi (da 2m a 2,5m).

Il fenomeno conosciuto come annullamento della corrente può essere utilizzato efficacemente in questa applicazione: si seleziona una frequenza ad induzione relativamente bassa rispetto alla sezione del filo garantendo che, nel caso di rottura di un filo in linea, quest'ultimo non possa essere riscaldato oltre la temperatura di Curie (circa 1.400ºF).

Ciò elimina la necessità di arrestare immediatamente la linea in caso di rottura di un solo filo. Per il processo, se necessario, può essere utilizzato azoto o semplicemente aria.

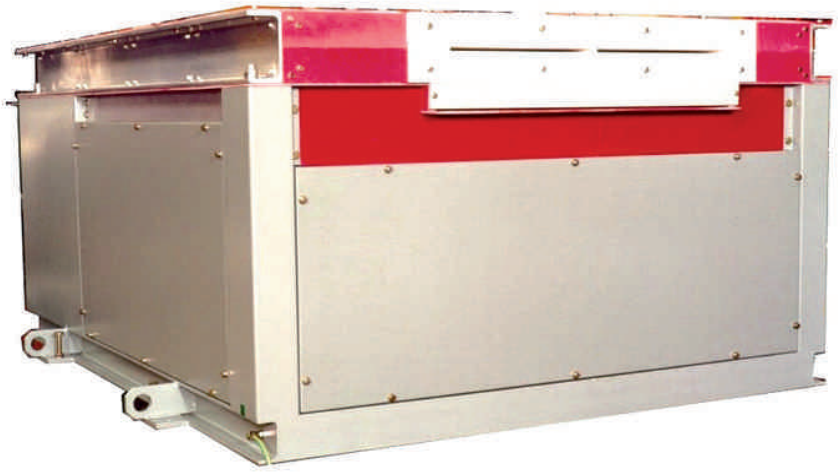
Rivestimento isolante di superficie
Per la produzione di filo elettrico per il quale si utilizzano rivestimenti quali smalti, materie sintetiche o rivestimenti a nastro sensibili al calore, il filo può essere riscaldato in linea in continuo. Questa tecnica può essere inoltre utilizzata per essiccare la vernice applicata sul filo.

Essendo i requisiti di temperatura generalmente bassi (inferiori a 300°F 150°C), un'alimentazione di potenza ridotta può essere spesso integrata in una linea di rivestimento già esistente con una sorgente di potenza che funziona ad alta frequenza, poiché è necessario esclusivamente riscaldare la superficie del filo (e non l'intera sezione trasversale).

Rilassamento
Progettato per l'applicazione alla produzione di filo o trefoli, questo processo è simile al processo di rinvenimento del filo dato il riscaldamento continuo ad una temperatura di 750°F (400°C) quando sottoposto a tensione.

Generalmente, questo sistema è costituito da un'unica sorgente di potenza induttiva con una frequenza di uscita nominale di 3/10kHz che alimenta un gruppo di bobine d'induzione statica o mobile in funzione della configurazione della linea.

▼ **Figura 3**. *Tecnologia per forni per multifili*



Preriscaldo
I sistemi di riscaldamento ad induzione sono stati integrati nelle linee di filo esistenti allo scopo di preriscaldare il filo e aumentare la capacità produttiva dei processi. Si consideri ad esempio un filo unico preriscaldato prima dell'introduzione in un forno convenzionale o in un letto fluidizzato.

In un progetto particolare, due linee, ciascuna caratterizzata da una sorgente di potenza induttiva di 500kW/10kHz accoppiata con bobine di induzione di 10 piedi (3m) di lunghezza, sono state utilizzate per riscaldare fili multipli da 70°F (25°C) a 1.292°F (700°C) prima di essere introdotti in un forno convenzionale. Di norma, il forno ad induzione presentava un rendimento termico pari a 2000kg/h.

Indurimento e rinvenimento: il processo "Hi-bond"
Il processo d'indurimento e di rinvenimento in linea è un'applicazione comune nella quale il filo è riscaldato a 1.742°F (950°C), temprato per l'indurimento e successivamente riscaldato a temperature di rinvenimento da 660°F (350°C) a 1.200°F (650°C). Attualmente, questo metodo denominato processo "Hi-Bond" e brevettato da Radyne, è applicato con successo al trattamento delle barre deformate per le strutture in cemento armato al fine di ottenere un filo caratterizzato da un rilassamento ridotto ed una resistenza allo snervamento.

Il riscaldamento per l'indurimento avviene in due fasi utilizzando 10kHz per aumentare la temperatura del filo a 1.382F (750°C) con una sola bobina, e 50kHz o 200kHz per aumentare la temperatura da 1.382°F (750°C) a 1.742°F (950°C) con bobine di due o più dimensioni, in funzione della gamma di fili, delle esigenze di produttività e di rendimento.

Generalmente, le bobine presentano una lunghezza di 6 piedi (1,8m) per ciascuna fase e potenze di 280kW (a 10kHz) e 180kW a 50kHz. Immediatamente dopo il riscaldamento a 1.742°F (950°C), il prodotto viene irrorato con getti d'acqua ad alta pressione per ridurre la temperatura a circa 80°F (30°C), e asciugato per mezzo di un soffiatore.

Diffusione delle tortiglie per cavi
Quest'applicazione richiede normalmente il riscaldamento simultaneo da 10 a 24 fili disposti in parallelo a circa 1.112°F (600°C), per fondere i rivestimenti di superfici di rame e zinco che si espandono sul filo di base per produrre tortiglie per pneumatici. Generalmente, i fili presentano una distanza interasse da 0,61" a 1" (da 15,5mm a 25,5mm) e un diametro che va da 0,031" a 0,080" (da 0,8mm a 2mm).

La produttività tipica si basa su DV=70 (dove D=diametro e V=velocità). Il numero di fili contenuti in una bobina di riscaldamento è generalmente determinato dalla distanza interasse, essendo il gruppo di bobine ingombrante nel caso di un gran numero di fili e un'elevata distanza interasse.

Controllo della potenza interattiva in condizioni di circuito chiuso
Rispetto ai processi che richiedono l'utilizzo di forni a gas e forni elettrici, i riscaldatori a raggi infrarossi, i riscaldatori a resistenza e i letti fluidizzati, il riscaldamento ad induzione rappresenta una risposta estremamente rapida ai cambiamenti dei parametri di esercizio. Un lieve cambiamento di potenza o di velocità di linea ha un effetto quasi istantaneo sulla temperatura risultante del prodotto trattato. Pertanto, al fine di ottenere risultati congruenti, il controllo della linea deve essere considerato molto attentamente. I due metodi standard utilizzati sono il feedback proveniente dai sensori di temperatura (quali la pirometria infrarossa) e dalla velocità della linea.

Sensori di temperatura
Nel caso del riscaldamento dell'acciaio magnetico alla temperatura di austenitizzazione per il processo di indurimento, se non viene incorporata un'atmosfera, si può avere la formazione di scaglia sulla superficie del filo.

Ciò può influenzare le letture dei sistemi che utilizzano pirometri ad infrarossi ad uno o due colori. Di conseguenza, l'eliminazione della scaglia, la precisione del posizionamento e della focalizzazione del sistema pirometrico consente di determinare il segnale di retroazione all'alimentazione della potenza induttiva.

La contaminazione atmosferica come i fumi, può anche influenzare il segnale proveniente dai pirometri. Se non si presta un'attenzione particolare alla pulizia del filo, alla precisione della retroazione dei parametri del processo e al controllo del circuito chiuso, l'utilizzo dei sistemi pirometrici non si dimostrerà efficace.

Anche i sensori di temperatura devono essere focalizzati sul filo che viene riscaldato e, in particolare, nel caso di fili di diametro ridotto, questi ultimi possono spostarsi verticalmente durante il processo ed uscire dal campo visivo del pirometro trasmettendo falsi segnali al processo d'induzione.

Velocità della linea
Il calcolo della velocità della linea rispetto alle dimensioni del filo ed il livello di potenza del riscaldatore ad induzione è un processo fattibile in cui i dispositivi di regolazione con controllo feedforward sono stati utilizzati con successo.

Materiali non ferrosi
Fino a questo momento le considerazioni su esposte hanno riguardato il riscaldamento ad induzione di fili d'acciaio al carbonio.

I materiali non ferrosi come l'alluminio e l'ottone possono essere ugualmente riscaldati ad induzione, tuttavia senza ottenere la medesima efficacia. Ad esempio, si consideri un filo di ottone del diametro di 0,08" (2mm) da riscaldare ad una temperatura ambiente da 70°F (20°C) a 1.200°F (650°C) ad una velocità di 985 piedi/min (300m/min).

Ciò richiederà 540kW di potenza di uscita ad una frequenza di 50kHz con una bobina d'induzione della lunghezza complessiva di 10 piedi (3m). Un filo di ottone del diametro di 0,24" (6mm) riscaldato da 70°F (20°C) a 1.200°F (650°C) ad una velocità di 985 piedi/min (300m/min) richiederà 1.500kW di potenza di uscita ad una frequenza di 10kHz con una bobina d'induzione della lunghezza complessiva di 20 piedi (6m).

I valori finali di rendimento totale sono rispettivamente pari al 6% per il filo del diametro di 0,08" (2mm) del primo esempio, e pari al 20% per il filo del diametro di 0,24" (6mm) del secondo esempio.

Se si confrontano i rendimenti totali che arrivano fino all'80% per il riscaldamento dell'acciaio magnetico, si può comprendere perché il riscaldamento ad induzione non è ampiamente utilizzato per i materiali non ferrosi. Ciò premesso, esistono impianti che funzionano con successo a rendimenti ridotti grazie ad altri vantaggi offerti dai processi ad induzione come ad esempio il luogo di lavoro.

Prospettive future
Il riscaldamento ad induzione continuerà ad essere ampiamente utilizzato nell'industria del filo, in particolare per i fili d'acciaio. Si assisterà ad una crescita dell'interesse e all'aumento del numero di sistemi impiegati per completare e migliorare la produttività dei sistemi di riscaldamento convenzionali esistenti.

Lo sviluppo proseguirà nel settore del riscaldamento dei fili molto sottili ed il riscaldamento di leghe specifiche, di metalli composti e di materiali quali il titanio e il tungsteno. Le dimensioni fisiche dei dispositivi di alimentazione di potenza induttiva diminuiranno, mentre aumenteranno le prestazioni.

Ulteriori sviluppi futuri riguarderanno le tecniche ed i sistemi di controllo per assicurare tolleranze molto strette e l'uniformità dei fili, e infine saranno realizzati perfezionamenti grazie al controllo della qualità in linea.

"A mano a mano che vengono scoperti altri processi che utilizzano il riscaldamento ad induzione, ciascuno di essi va considerato in base ai rispettivi meriti. La nostra esperienza dimostra che talvolta l'applicazione più improbabile o quella che inizialmente appare non praticabile, può tradursi in un impianto di successo e praticabile dal punto di vista economico." ■

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Las ventaja de usar la tecnología del calentamiento por inducción en el tratamiento de productos de alambre

Inductotherm Heating and Welding Technologies Ltd – Radyne Division

El calentamiento por inducción: los principios básicos

Para comprender las numerosas ventajas del calentamiento por inducción, es importante comprender en primer lugar los principios básicos de esta tecnología.

La tecnología del calentamiento por inducción se utiliza en muchos procesos desde el inicio de su aplicación comercial a principios de los años 40. Solía usarse para la fusión de metales, el calentamiento antes del doblado o del conformado, varios tratamientos térmicos como el temple y revenido y la unión de metales por soldadura fuerte o blanda.

Los primeros ejemplos de calentamiento inductivo comprendían también el desarrollo de osciladores de radiofrecuencia o de tubos de vacío, que funcionan normalmente a altas frecuencias, y grupos convertidores utilizados para generar la energía para calentamiento por inducción a bajas frecuencias.

Si se desea dar una definición del proceso de inducción, ésta sería sin duda alguna: "Se habla de calentamiento inductivo cuando un objeto metálico se encuentra dentro de un campo electromagnético variable. El calentamiento inductivo es originado por la agitación de la estructura molecular del objeto producida por el campo electromagnético y tiene lugar cuando las moléculas se energizan, entran en colisión y producen calor."

Por lo tanto, el calentamiento por inducción se puede comparar al obtenido con un simple transformador, donde el primario del transformador comprende la fuente de potencia inductiva o generador de inducción que proporciona la energía a la bobina o al elemento de inducción, y el objeto a calentar se encuentra en el campo magnético de esta bobina o elemento y representa el secundario del transformador.

Luego, se aplica un campo magnético alterno desde la fuente de potencia inductiva o generador de inducción hasta la bobina o elemento de inducción.

Por medio de la conducción recíproca, se hacen pasar líneas de flujo magnético a través del objeto para crear una resistencia en el recorrido del flujo y al circular la corriente, se genera calor.

Profundidad de penetración

Cuando el físico inglés Michael Faraday desarrolló el transformador eléctrico, notó inicialmente el fenómeno descrito arriba. Y de hecho, fue necesario rediseñar los transformadores usando pilas de chapas para eliminar o reducir los efectos del campo electromagnético que calentaba el transformador.

La razón por la que un transformador formado por pilas de chapas no se calienta por inducción electromagnética, se debe a un fenómeno llamado "profundidad de penetración" o "profundidad de referencia", que indica la profundidad a la que aproximadamente un 80% de la corriente circula por una pieza.

Esta profundidad es proporcional a la resistencia eléctrica del material que se calienta y a la frecuencia operativa de salida (medida en Hertzios) de la fuente de potencia inductiva o generador de inducción que produce el campo magnético. A altas frecuencias, la profundidad de penetración o de referencia es limitada respecto a la que se obtiene a bajas frecuencias. Esta es la razón principal por la que el calentamiento inductivo es muy utilizado para tratar térmicamente el acero en aquellos casos en que se pueden controlar con precisión las capas endurecidas del tratamiento térmico seleccionando atentamente la frecuencia de salida del sistema de inducción.

Otro factor determinante en el calentamiento de un objeto metálico en un campo electromagnético es la densidad de potencia medida el Kilowatios: cuanto más alta es la densidad de potencia para una determinada frecuencia, más cerca de la superficie tendrá lugar el calentamiento. Cuanto más baja es la densidad de potencia, mayor profundidad alcanzará el calentamiento. Por lo tanto, el uso del calentamiento por inducción para cualquier proceso específico está muy relacionado con la posibilidad de seleccionar la correcta frecuencia de salida de la fuente de potencia inductiva y la correcta densidad de potencia para una determinada aplicación.

Cómo calcular la frecuencia

A las frecuencias usadas para el calentamiento inductivo, la corriente tiende a circular en la superficie del conductor a una profundidad que depende de

la resistividad del conductor, de la frecuencia de la corriente alterna y de la efectiva permeabilidad del conductor. La profundidad efectiva de penetración de la corriente, en forma métrica, se obtiene con la fórmula:

$$\rho = \frac{1}{20}\pi\sqrt{\frac{10r}{\mu F}}$$

En esta fórmula:
p = profundidad de penetración de la corriente
r = resistividad en microohmios centímetros
μ = permeabilidad efectiva
(μ = 1 para materiales no magnéticos)

Seleccionando la frecuencia correcta, se puede controlar la cantidad de material calentada: con altas frecuencias se obtendrán niveles bajos de penetración efectiva, mientras que se obtendrá una penetración más profunda con frecuencias más bajas.

Aplicando nuestra formula, aproximadamente un 90% del calor total se produce en la capa de penetración "p", con capas interiores calentadas por conducción a través del material. Sin embargo, para obtener un calentamiento óptimo a través de todo el material, se debe evitar que las corrientes opuestas que fluyen por las superficies opuestas del conductor se sobrepongan, porque en este caso se anularía la corriente.

Normalmente "p" debería ser menos de la mitad del radio del conductor, aunque esta regla no se aplica siempre.

Además, se utilizan distintas profundidades de penetración de corriente para diferentes materiales y temperaturas a varias frecuencias.

En el proceso de calentamiento por inducción, un componente de metal situado dentro o cerca de una bobina de inducción se calienta debido al paso de una corriente de inducción a través de la bobina, que a su vez, introduce otra corriente dentro del componente.

El calor es generado por la resistencia a esta corriente inducida, según la ley I^2R (donde I = Corriente y R = Resistencia) y también por pérdida por histéresis en materiales magnéticos: un efecto que desaparece a la temperatura de Curie (aprox. 1.400°F / 760°C).

Selección de la potencia (para alambre calentado completamente)
Después de seleccionar la frecuencia correcta y las unidades de potencia adecuadas, lo siguiente es considerar los requisitos de potencia; lo primero será determinar el contenido de calor del conductor. El contenido de calor de un alambre en movimiento es simplemente una función de la productividad, del calor específico y del aumento de temperatura. Sin embargo, este cálculo aparentemente simple, es complicado porque el calor específico varía al aumentar la temperatura. Tomando como ejemplo un acero de medio contenido de carbono, el calor específico varía en función de un factor de 1,3 entre 68°F (20°C) y 1.022°F (550°C), y 1,5 entre 68°F (20°C) y 1.652°F (900°C).

▼ **Figura 1**. *Línea de proceso de temple y revenido de alambre*

Por lo tanto, para determinar el contenido de calor necesario para calentar acero al carbono a 1.022°F (550°C) y 1.652°F (900°C), como regla empírica aproximativa, se pueden usar valores de calor específico de 0,58 y 0,63.

Con esta regla, el contenido de calor del alambre calentado a 1.022°F (550°C) será 2,31 x lb/min (1,05 x kg/min), mientras que a 1.652°F (900°C) será 4,27 x lb/min (1,94 x kg/min) con el resultado expresado en kW. Tras determinar el contenido de calor del producto, el paso siguiente es determinar la salida de potencia de la unidad de potencia seleccionando el rendimiento térmico correspondiente a la salida de la unidad de potencia.

Rendimiento térmico
Un sistema de inducción típico consiste en una unidad de potencia, una bobina de calentamiento y los equipos necesarios para "acoplar" la bobina de calentamiento (y el alambre procesado) a la unidad de potencia. La unidad de potencia puede ser un convertidor, un invertidor o un generador.

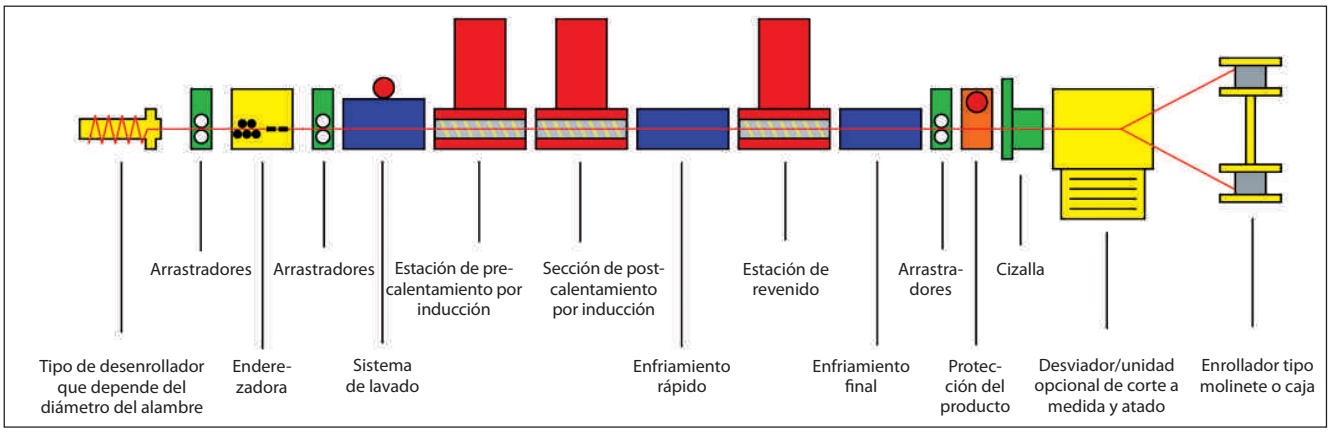
Esta unidad permite convertir una alimentación trifásica de 50 ó 60 Hz a una frecuencia de salida nominal de entre 250Hz y 800kHz en una sola fase con salidas de potencias de 1kW a 4MW en una amplia gama de combinaciones de frecuencias de potencia, y con la posibilidad de combinaciones de doble frecuencia. Estas unidades de potencia pueden ser de tiristores o transistores.

La bobina de calentamiento que se usa para calentar alambres consiste en un tubo de cobre enrollado en espiral.

El tubo puede ser redondo, cuadrado o rectangular, y a menudo presenta bandas de cobres soldadas en el diámetro interno de la espiral. La longitud de la bobina, su diámetro interno, número de espiras y el porcentaje de cobre respecto al espacio libre a lo largo del diámetro interno de la espiral son todos parámetros importantes para el rendimiento del sistema.

Todas las unidades de potencia funcionan en una banda de frecuencia de, por ejemplo, 7-11kHz, 20-25kHz, y 40-50kHz para frecuencias de salida nominales de unidades de 10kHz, 25kHz y 50kHz respectivamente.

Para que el sistema funcione dentro de esta banda, se pueden variar la inductancia de la bobina, la tensión de funcionamiento de la bobina y la capacidad (KVAR) del circuito tanque (resonante) de la unidad de potencia para cumplir requisitos específicos de dimensiones del alambre, materiales, velocidades de producción y temperaturas.



▲ **Figura 2**. *La línea para el tratamiento térmico en continuo de alambre de Radyne*

Si se considera el rendimiento, se debe analizar primero la bobina. El diámetro interno de una espiral de cobre es el factor más importante para determinar el rendimiento. A su vez, este diámetro depende principalmente de factores mecánicos como la guía, vibración y contaminación del alambre, además de las dimensiones del alambre y el método usado para unir una el alambre de un carrete a otro.

En general, cuanto más cerca está la bobina al material, más alta es el rendimiento. En muchos casos, puede ser necesario hacer pasar alambre de dimensiones diferentes a través de una sola bobina. Los alambres de dimensiones más pequeñas tendrán una eficiencia menor, pero ello puede ser compensado por una reducción de los costes para bobinas de dimensiones inferiores y la reducción de los tiempos muertos debido a un número inferior de cambios de bobina en caso de alambres de dimensiones diferentes.

El segundo aspecto del diseño de la bobina es su longitud. Teóricamente, para calentar uniformemente todo el diámetro de un alambre a una determinada temperatura, es necesario un tiempo que equivale aproximadamente a $D^2/25$ segundos (donde D = diámetro del alambre en mm). La longitud mínima de la bobina en metros será, por lo tanto, $D^2M/25$ (donde M = velocidad del alambre en metros/segundo).

En práctica, especialmente en caso de diámetros pequeños, una bobina que presenta la longitud mínima indicada arriba produciría una densidad de potencia excesiva y, por consiguiente, un escaso rendimiento. Para mejorar el rendimiento se aumenta la longitud de las bobinas.

La experiencia nos permite hacer cálculos para determinar la longitud de la bobina (con diámetros de la bobina determinados en base a las dimensiones de alambre) y calcular la tensión de la bobina, el número de espiras y el porcentaje de cobre respecto al espacio libre, para obtener el rendimiento máximo. De estos cálculos, el valor inicial de la longitud de la bobina puede ser variado para mejorar el rendimiento.

Aplicaciones del calentamiento de alambre

Actualmente el calentamiento inductivo se aplica a una amplia gama de procesos para alambre, tratando tanto alambres individuales como varios alambres paralelos o alambres trenzados que forman cables.

El calentamiento del alambre se aplica en varios campos: calentamiento antes del trefilado; calentamiento antes del encapsulado (por ejemplo para la fabricación de cables eléctricos recubiertos de PVC); tratamiento térmico del alambre (normalmente temple, a veces seguido de revenido); recocido de cables de uno o varios torones; calentamiento del alambre antes del revestimiento (tanto con revestimiento de metal o con compuestos aislantes); relajación como las que se realiza en los alambres para hormigón pretensado, y precalentamiento antes de un proceso de calentamiento convencional.

Panorámica de los procesos de calentamiento por inducción del alambre en detalle:

Calentamiento antes del trefilado

A veces es necesario calentar ciertos tipos de alambre antes del trefilado para evitar daños en la superficie causados por el proceso de trefilado.

Calentamiento antes del encapsulado

Se aplica generalmente a los alambres de aluminio, de un solo hilo y trenzados.

El alambre es precalentado cuando sale del rodillo del desenrollador y la bobina de inducción es colocada en la curva catenaria de la línea del alambre.

El alambre pasa a través de la bobina de inducción cuando es calentado a aproximadamente 250°F (120°C) y luego, pasa inmediatamente al proceso de encapsulado donde el PVC fluye uniformemente sobre el alambre.

La longitud de la bobina de inducción depende de la velocidad del proceso y de la profundidad del calentamiento requerida a través de la sección transversal del alambre. Dado que no es esencial calentar completamente el alambre, la longitud de la bobina de inducción en la mayoría de las aplicaciones va de 20" A 40" (de 0,5m a 1m).

Tratamiento térmico del alambre

El temple y revenido en continuo del alambre de acero es particularmente importante para ciertos tipos de aplicaciones como la producción de barras deformadas para estructuras de refuerzo del hormigón.

Esto se obtiene usando un proceso horizontal en línea, donde se realiza el calentamiento del alambre a una temperatura de austenización de 1.742°F (950°C), seguido de enfriamiento rápido con agua y recalentamiento a una temperatura de entre 660°F (350°C) y 842°F (450°C) para el revenido final; la temperatura depende de los requisitos finales de resistencia a la tracción del producto. Radyne ha patentado un proceso llamado "Hi-Bond" para esta aplicación específica.

Recocido

Los alambres de acero pueden ser calentados por inducción, normalmente a una temperatura de 1.290°F (700°C), para el proceso de recocido, tanto individualmente (para varios diámetros) como en configuración múltiple (normalmente

entre 0,04" (1mm) y 0,23" (6mm)). La frecuencia de salida de la fuente de potencia inductiva depende del diámetro del alambre, mientras que el nivel de potencia depende de la velocidad de producción requerida.

Para calentar alambres múltiples, se pueden colocar alambres con dimensiones de 0,61" (15,5mm) a 1" (25,4mm): cada alambre pasa a través de un tubo de cerámica y es guiado a través de la bobina para facilitar el enhebrado de la línea.

Calentamiento antes del revestimiento

Los procesos siguientes representan dos métodos de tratamiento claramente distintos: la difusión o revestimiento de metal y el revestimiento aislante superficial.

Difusión
La aplicación de este proceso globalmente más difundida es la producción de hilos de acero para neumáticos, pero este proceso se puede usar también en otros sectores de mercado. Con un método similar al del proceso de recocido, se calientan alambres de acero de 0,031" (0,8mm) a 0,08" (2mm) de diámetro a 1.112°F (600°C) para fundir los revestimientos superficiales de cobre y cinc que luego se difunden por el alambre de base formando una barrera contra la oxidación.

Se calientan generalmente varios hilos dispuestos en un plano horizontal a través de una bobina de inducción de forma ovalada; los alambres son alimentados a través de tubos de cerámica individuales. La velocidad de producción se determina con los cálculos siguientes: D x V donde D corresponde al diámetro del alambre y V a la velocidad del alambre o velocidad de producción.

Los valores típicos de potencia usados son de 60kW a 240kW con una frecuencia de salida de 25kHz, y longitudes de la bobina de inducción de 7ft a 8ft (de 2m a 2,5m).

El fenómeno conocido como anulación de corriente puede ser utilizado perfectamente en esta aplicación: se selecciona una frecuencia que sea relativamente baja respecto a la sección del alambre que asegure que, si se rompe un alambre en la línea, éste no se caliente superando la temperatura de Curie (aproximadamente 1.400°F). Esto elimina la necesidad de parar inmediatamente la línea en caso de rotura de un solo alambre. Se puede realizar el proceso tanto en atmósfera de nitrógeno, si es necesario, o simplemente en aire.

Revestimiento superficial aislante
Para la producción de alambre eléctrico donde se utilizan revestimientos como barnices, productos epoxídicos o envueltas de cinta sensible al calor, el alambre puede ser calentado en línea en continuo. Esta técnica se puede usar también para secar pinturas aplicadas al alambre.

Dado que los requisitos de temperatura son generalmente bajos (inferiores a 300°F 150°C), a menudo se puede añadir dispositivo de alimentación de energía pequeño en una línea de revestimiento existente, utilizando una fuente de energía que funciona solamente a altas frecuencias dado que es necesario calentar solamente la superficie del alambre (y no toda la sección transversal del alambre).

Relajación
Este proceso se aplica en la producción de alambre o trenza y es similar al proceso de revenido del alambre porque se calienta el alambre en continuo a 750°F (400°C) mientras está tensado.

Este sistema generalmente consiste en una sola fuente de potencia inductiva con una frecuencia de salida nominal de 3/10kHz que alimenta una bobina de inducción estática o móvil, según la configuración de la línea.

Precalentamiento
Se han incorporado los sistemas de calentamiento por inducción en las líneas de alambre existentes para precalentar el alambre y aumentar la capacidad de producción de los procesos existentes, por ejemplo, un alambre sólo precalentado antes de entrar en un horno convencional o un lecho fluidizado.

En un determinado proyecto, se utilizaron dos líneas, cada una con una fuente de potencia inductiva de 500kW/10kHz acoplada con bobinas de inducción de 10ft (3m) para precalentar alambres múltiples de 70°F (25°C) a 1.292°F (700°C) antes de ponerlos en un horno convencional. El horno de inducción presentaba normalmente un rendimiento térmico de 2000kg/hora.

Endurecimiento y revenido: el proceso "Hi-bond"
El proceso de endurecimiento y revenido en línea es una aplicación corriente en la cual se calienta el alambre a 1.742°F (950°C), se enfría rápidamente para endurecerlo y luego se vuelve a calentar a temperaturas de revenido de entre 660°F (350°C) y 1.200°F (650°C).

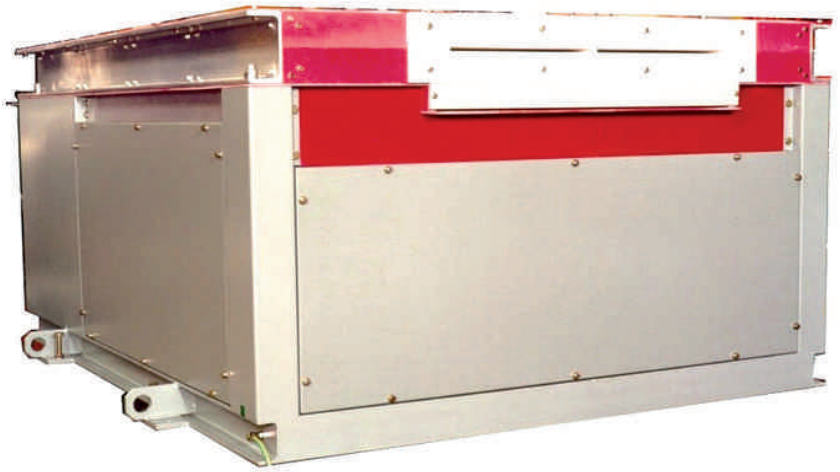
Actualmente este método, llamado "Hi-Bond" y patentado por Radyne, es utilizado con éxito para tratar barras deformadas de refuerzo de estructuras de hormigón con el fin de obtener en el alambre características de baja relajación de tensiones y alto límite elástico.

El calentamiento para el temple se realiza en dos etapas usando 10kHz para llevar el alambre a la temperatura de 1.382F (750°C) con una sola bobina, y 50kHz o bien 200kHz para aumentar la temperatura de 1.382°F (750°C) a 1.742°F (950°C) con bobinas de dos o más dimensiones, según la gama de dimensiones del alambre y los requisitos productividad y rendimiento.

Normalmente, las bobinas tienen una longitud de 6ft (1.8m) En cada etapa y se usan potencias de 280KW (a 10KHz) y 180KW a 50KHz. Inmediatamente después del calentamiento a 1.742°F (950°C), el producto es rociado con chorros de agua a alta presión para reducir la temperatura a aproximadamente 80°F (30°C), y es secado con chorros de aire.

Difusión de hilos de acero para neumáticos
Esta aplicación requiere normalmente el calentamiento simultáneo de 10 a 24 alambres circulando en paralelo y calentados a aproximadamente 1.112°F

▼ **Figura 3**. *Tecnología de horno multihilo*



(600°C) para fundir los revestimientos superficiales de cobre y cinc que se difunden en el alambres de base para producir el hilo para neumáticos.

Los alambres tienen normalmente una distancia entre ejes de 0,61" a 1" (de 15,5mm a 25,5mm) y un diámetro que varía de 0,031" a 0,080" (de 0,8mm a 2mm). La productividad típica se basa en DV=70 (donde D=diámetro y V=velocidad).

El número de alambres contenidos en una determinada bobina de calentamiento es generalmente determinado por la distancia entre ejes, dado que la bobina es difícil de manejar cuando se tiene un número elevado de alambres con una distancia entre ejes elevada.

Control de potencia interactivo en circuito cerrado
Respecto a los procesos como los que se realizan en hornos de gas y eléctricos, calentadores de infrarrojos, calentadores de resistencia y lechos fluidizados, el calentamiento inductivo responde muy rápidamente a los cambios de los parámetros operativos de proceso.

Un cambio pequeño de potencia o de velocidad de línea tiene un efecto casi instantáneo en la temperatura del producto que se procesa. Por esta razón, el control de la línea debe ser considerado atentamente para obtener resultados coherentes.

Los dos métodos estándares usados son la realimentación de dispositivos de detección de la temperatura (como los pirómetros de infrarrojos) y la velocidad de línea.

Sensores de temperatura
Cuando se calienta acero magnético a la temperatura de austenización para el proceso de temple, si no se incorpora una atmósfera, se puede formar cascarilla en la superficie del alambre. Esto puede afectar a las mediciones de los sistemas que utilizan pirómetros de infrarrojos de uno o dos colores.

Por lo tanto, la eliminación de la cascarilla y la precisión del posicionamiento y de la distancia focal del sistema pirométrico determinarán la consiguiente señal de realimentación a la alimentación de potencia inductiva.

La contaminación debida al aire (como el humo), puede afectar también a la señal procedente de los pirómetros. Si no se presta una particular atención a la limpieza del alambre y a la precisión de la realimentación de otros parámetros de proceso, y al control en circuito cerrado, el uso de sistemas pirométricos no será eficaz. Los sensores de temperatura también deben ser enfocados hacia el alambre que se calienta y, en particular, en el caso de alambres de diámetro pequeño, estos alambres se pueden mover verticalmente durante el proceso y salirse del campo visual del pirómetro dando señales falsas al proceso de inducción.

Velocidad de línea
El cálculo de la velocidad de línea con relación a las dimensiones del alambre y el nivel de potencia del calentador inductivo es un proceso factible y para ello se han usado con éxito controladores por prealimentación.

Materiales no ferrosos
Hasta ahora, se ha tratado el calentamiento por inducción de alambres de acero al carbono. Los materiales no ferrosos como el aluminio y el latón se pueden calentar igualmente por inducción, pero con menor rendimiento.

Por ejemplo, imagínese un alambre de latón de 0,08" (2mm) de diámetro que debe ser calentado de una temperatura ambiente de 70°F (20°C) a 1.200°F (650°C) a una velocidad de 985ft/min (300m/min). Éste requerirá un total de 540KW de potencia de salida a una frecuencia de 50KHz con una bobina de inducción de longitud total de 10ft (3m).

Un alambre de latón de 0,24" (6mm) de diámetro calentado de 70°F (20°C) a 1.200°F (650°C) a una velocidad de 985ft/min (300m/min) necesitará 1.500KW de potencia de salida a una frecuencia de 10KHz con una bobina de longitud total de 20ft (6m).

Los valores de rendimiento finales son respectivamente de un 6% para el alambre de 0,08" (2mm) de diámetro del primer ejemplo y un 20% para el alambre de 0,24" (6mm) de diámetro del segundo ejemplo.

Si se comparan los rendimientos totales, de hasta un 80% para el calentamiento de acero magnético, se puede comprender porqué no se suele usar el calentamiento por inducción para materiales no ferrosos.

Sin embargo, actualmente hay instalaciones que funcionan satisfactoriamente con rendimientos reducidos, compensados por otros beneficios ofrecidos por el proceso de inducción como, por ejemplo, el ambiente de trabajo.

Perspectivas futuras
El calentamiento por inducción continúa siendo ampliamente usado en la industria del alambre, en particular para calentar alambres de acero. Este sistema irá adquiriendo cada vez más interés y será utilizado cada vez más para completar y mejorar la productividad de los sistemas de calentamiento convencionales existentes.

El sector del calentamiento de alambres muy finos y de aleaciones especiales, metales compuestos y materiales como el titanio y el tungsteno seguirá desarrollándose. Las dimensiones físicas de las de las fuentes de potencia inductiva disminuirán mientras que sus prestaciones aumentarán.

Se producirán avances en las técnicas y sistemas de control para asegurar tolerancias muy estrictas y uniformidad de los productos de alambre, y se obtendrán mejoras con el control de calidad en línea.

"A medida que se vayan descubriendo otros procesos a los que se pueda aplicar el calentamiento por inducción, cada uno deberá ser analizado separadamente. Nuestra experiencia nos dice que a veces la aplicación que parece ser la menos adecuada, o la que parece inicialmente no factible, puede resultar una instalación exitosa y factible desde el punto de vista económico." ■

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editorial index

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