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wire

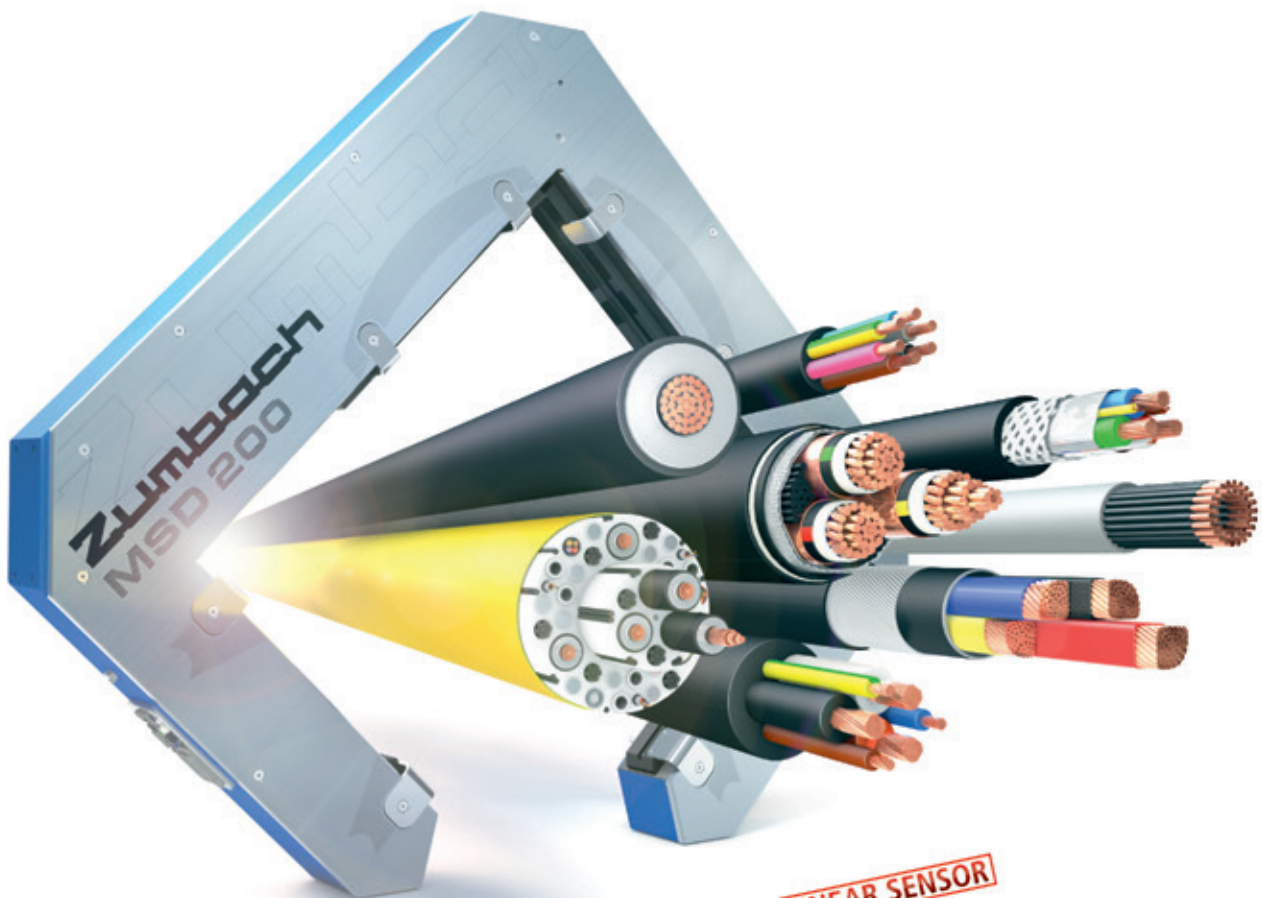


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On the move for exhibitions and news

We're coming up to a hectic time of year for both exhibitors and show attendees alike.

Hot on the heels of Interwire in America, held at the end of April, is wire Russia from 25th to 28th June, and our special feature on the exhibition can be found on page 72.

After that attention will turn swiftly to wire SouthEast Asia. That will be featured heavily in our September issue, and in sister publication *Wire & Cable ASIA*.

Also in the September issue of *EuroWire* will be a more in-depth look at the South American market as a prelude to wire South America in São Paulo, Brazil, from 1st to 3rd October. Make sure to let us have your editorials for all the shows well in advance.

In this issue it's very much a case of credit where credit is due, and it would be wrong of us not to applaud the efforts of the staff and directors of Metalube. The Manchester, UK-based company has just won a Queen's Award for International Trade. The full story can be found on page nine.

For those of you on the move – and we know that's a lot of you – you can also keep right up-to-date with all the news from the wire and cable industry by accessing our website at www.read-eurowire.com

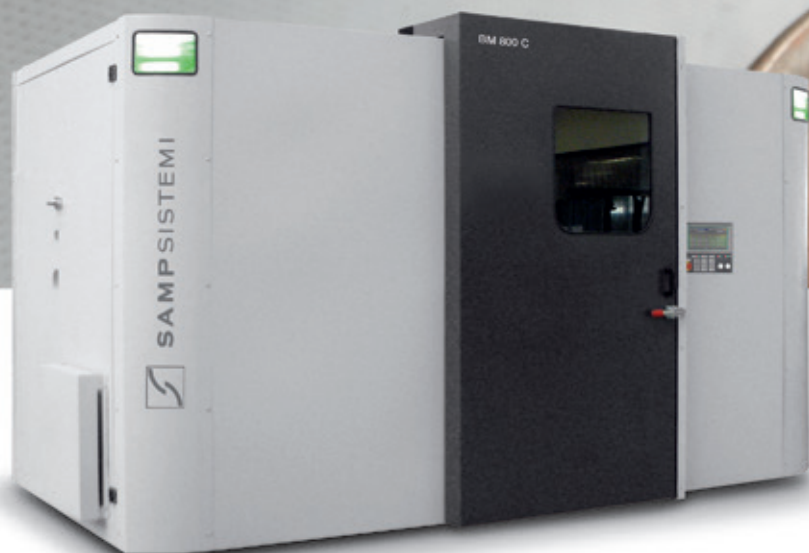
Every issue of our magazine is there for you to read, and we have now introduced a new mobile system which recognises your smartphone's operating system and tailors your browser to make it even easier to access all your favourites in *EuroWire* and its sister publications.



David Bell
 Editor

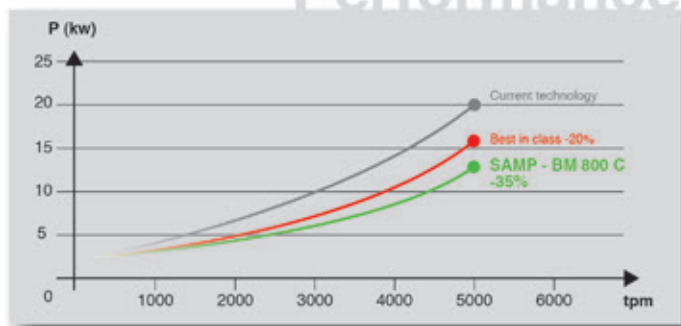
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Por Wayne Kachmar, miembro de Electro-Optical Engineering, TE Connectivity, North Bennington, Vermont

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Getting Technical

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dates for your diary ...

Guangzhou Wire & Tube 2013

16–18 June: **Guangzhou Wire and Tube** – trade exhibition – Guangzhou, China

Organisers:

Julang Exhibition Company Ltd

Fax: +86 203 862 0781

Email: meiwen@julang.com.cn

Website: www.julang.com.cn

June 2013

25–28 June: **wire Russia** – trade exhibition – Moscow, Russia

Organisers:

Messe Düsseldorf GmbH

Fax: +49 211 4560 7740

Email: info@wire-russia.com

Website: www.wire-russia.com

September 2013

17–19 Sept: **wire/Tube SE Asia** – trade exhibition – Bangkok, Thailand

Organisers:

Messe Düsseldorf Asia Pte Ltd

Fax: +65 6332 9655

Email: wire@mda.com.sg

Website:

www.wire-southeastasia.com

October 2013

1–3 Oct: **wire South America** – trade exhibition – Imigrantes Expositoes Exhibition Centre, São Paulo, Brazil

Organisers:

Messe Düsseldorf/Grupo Cipa

Fax: +49 211 456 0668

Email:

infoservice@messe-duesseldorf.de

Website: www.wiresa.com.br

November 2013

4–5 Nov: **CabWire World Conference** – conference – Milan, Italy

Organisers:

ACIMAF, CET, IWCEA, IWMA, WAI

Fax: +44 1926 314755

Email: info@iwma.org

Website: www.cabwire.com

10–13 Nov: **IWCS 2013** – trade exhibition – Charlotte Convention Center, Charlotte, NC, USA

Organisers:

IWCS

Tel: +1 717 993 9500

Email:

phudak@iwcs.org

Website: www.iwcs.org



▲ Directors and staff at Metalube, winners of the Queen's Award for Enterprise in International Trade

Metalube awarded Queen's Award for International Trade

MANCHESTER, UK-based Metalube is celebrating being named as winner of a Queen's Award for Enterprise in International Trade 2013 – the UK's highest accolade for business success.

Metalube produces speciality lubricants and protective greases used for making non-ferrous tubes, wires, cables and electrical conductors.

This experienced exporter employs 31 people and is active in 80 markets with offices in China, India and Brazil.

Investment is paramount, with a particular emphasis on marketing as well as research and development programmes.

"It is very gratifying to have our hard work and commitment recognised by such a prestigious award"

"This is the greatest tribute we could receive and our team is tremendously proud," said David Lee, founder and managing director.

"For the three-year period, our overseas sales growth has been 51 per cent with exports accounting for 96 per cent of our total turnover.

"When we started the business back in the 80s all our trade was in the UK.

"Over the decades we have watched the domestic industry diminish, and today we are almost entirely an export business, selling our oils and greases to over 80 countries worldwide."

He added: "It is very gratifying to have our hard work and commitment recognised by such a prestigious award and we look forward to receiving this honour from the Lord Lieutenant of Greater Manchester later this year."

Metalube Ltd – UK
Website: www.metalube.co.uk



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ADD: 16 Fumin Road, Zhongyuan District,
Zhengzhou, Henan, China

40 years and still going strong

This year sees CTR Carbide Dies Ltd celebrating 40 years in business. Based in Birmingham, the manufacturing heartland of the UK, it is one of the largest specialised fastener tooling companies in the world and supplies to all sectors including general engineering, construction, automotive, aerospace, energy and defence industries to more than 50 countries.

The CTR management team can between them boast 75 years technical, manufacturing and commercial experience. The close working relationship with customers and "know how" enables them to offer added value tool design and development advice, resulting in cost savings by eliminating unnecessary process operations together with extended tool life.

The tooling is used for the manufacture of all industrial standard and special fasteners including airframe rivets, construction anchor bolts, automotive wheel bolts, engine bolts, special formed gear assemblies and special alloy nuts. Tooling can be individual and also for complete machine kits.

CTR has proven experience in low volume sub-contract machining in areas such as tooling for spring manufacturing, tube

cold forming dies, medium range press tooling, rubber mould tooling, feed fingers and various component parts machining.

It continues to invest in the latest machining techniques, including hard turning, CNC lathe and internal grinding machines, together with the very latest technology wire electro discharge machining centres. 2013 sees the addition of a specialist five axis-machining centre.



▲ CTR is celebrating 40 years in business

CTR is BS EN ISO 9001 and AS 9100 Rev C Accredited and a member of ADS (Advancing UK Aerospace, Defence, Security and Space Industries, globally) and MAA (Midlands Aerospace Alliance).

CTR Carbide Dies Ltd – UK
Website: www.ctr-uk.com

Foundation for the future – thanks to Nexans

Nexans has established the 'Nexans Foundation', a common platform for all its corporate sponsorship activities, aimed at assisting and supporting Nexans' active and long-term participation in solidarity initiatives across the world.

The Nexans Foundation will focus on two areas of intervention, in line with the company's corporate values:

Supporting general interest projects of a social and humanitarian nature, by contributing to the fight against energy insecurity and poverty worldwide. The Nexans Foundation will achieve this by providing access to energy, enabling disadvantaged communities to access services that are essential for their human, social and economic development;

Preserving the world's cultural heritage through the development and restoration projects of the

Public Establishment of the Palace, Museum and National Estate of Versailles. Current initiatives include:

Electriciens sans frontières (Electricians without borders (ESF)) – This non-government organisation contributes to making access to energy a developmental lever for the most disadvantaged communities worldwide, in partnership with Nexans which is supplying low and medium voltage power cables covering 50 per cent of ESF's needs.

Palace of Versailles – Declared a World Heritage Site by UNESCO, Nexans agreed to sponsor cables that could be used to help with renovations of the site.

Louvre-Lens Museum, Northern France – Nexans donated all the cables for the 28,000m² building premises and 22 hectares of land.

Nexans – France
Website: www.fondationnexans.com



Hall 7
booth
3A06
3B06



bowtechnology@gaudergroup.com
www.bowtechnology.com

Death of Mr Arthur F Organ, former president of the IWMA

Mr Arthur F Organ, a former president of the International Wire and Machinery Association, and founder of Arthur F Organ Packaging Machinery Ltd, has died at the age of 89.

Mr Organ, of Tarbert Argyll, Scotland, created the brand of 'Organpak', a name synonymous with fastener and hardware packaging machinery.

More than 3,000 installations were installed in over 70 countries. The

company went on to become Vibro Weigh-Count Ltd.

Arthur F Organ (Packaging Machinery) Co Ltd had been operating for just over two years when he first exhibited at The Wire Machinery Exhibition in Basle, Switzerland, in 1973. He was president of the International Wire Machinery Association from 1979 to 1983.

After a heart attack, Mr Organ retired from the packaging industry but formed a new

company, Waterbourne Equipment, and went into the sales and manufacture of bow thrusters, eventually developing a system to harness the power of the vessel's diesel engine and convert it into a stable supply of AC electricity for on-board use.

Following the sinking of the Scottish trawler Antares, with the loss of four crew, Mr Organ and a friend developed and manufactured a Net Release system, which many trawler men took up, so if they were caught by a submarine they could release themselves.

He became secretary of the Tarbert RNLI and spent much of his and his second wife Jean's time fundraising for them.

Family floral tributes were given and gifts were presented to the RNLI. Mr Organ's trademark was his bow tie, and a tribute, in the shape of a bow tie, had a simple message from four long standing former employees and friends: "Thank you for our careers and most importantly your friendship."

Mr Organ had two sons, Robin and Rupert, with his first wife Doris who pre-deceased him.

CabWire Conference call for papers

The leading international wire and cable industry associations are collaborating again to hold the 6th CabWire World Conference at the Palazzo Turati in Milan, Italy on Monday, 4th November 2013.

This year's theme will be "Innovations driving worldwide wire and cable markets" and will feature a panel of both ferrous and non-ferrous expert speakers, presenting papers on the latest technological developments.

The conference will also have tabletop

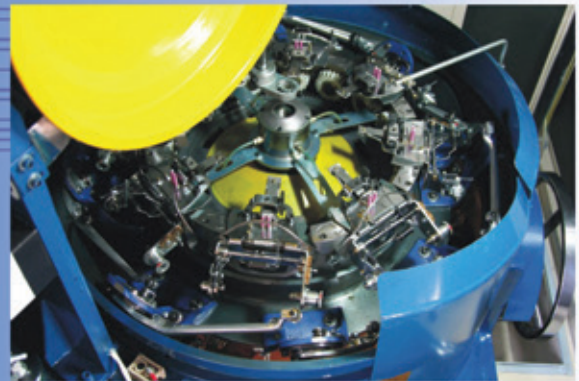
exhibits on display and there will be the opportunity to attend a gala dinner at the nearby Royal Palace.

There will also be a guided factory visit on Tuesday, 5th November. Further information is available at www.cabwire.com. The conference is jointly organised by ACIMAF, CET, IWCEA, IWMA and WAI.

International Wire and Machinery Association – UK
Website: www.iwma.org

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Medium-voltage submarine cables for Westermost Rough wind farm

WESTERMOST Rough Ltd, London, and Nexans recently signed an agreement for the delivery and assembly of medium-voltage submarine cables for the Westermost Rough wind farm, which is to be built eight kilometres off the Holderness coast in Yorkshire, UK.

The order encompasses around 53km of submarine cables. These will be used for connecting the individual wind turbines to each other and to the transformer platform.

In addition, a further two kilometres of cable will be delivered for the internal

platform cabling. Delivery is scheduled to begin in spring 2013.

The offshore wind farm will be constructed and subsequently operated by Westermost Rough Ltd, a subsidiary of the Danish energy company DONG Energy.

Upon completion, 35 wind turbines, each with an output of six megawatts, will be located northeast of the Humber estuary in the North Sea.

Following commissioning, which is scheduled for 2014, Westermost Rough

will generate 210 megawatts of clean energy over an area of 35 square kilometres, enough to supply around 160,000 households in Britain with power.

The new agreement is the third call-up from the framework agreement for the delivery of up to 900 kilometres of medium-voltage submarine cables.

This agreement was concluded between DONG Energy and Nexans in August 2011.

According to the agreement, the Danish contracting party can take delivery of up to 150 kilometres of Nexans high-performance cables every year for further offshore wind farms.

Previous call-ups were for the West of Duddon Sands wind farm and the Borkum Riffgrund 1 wind farm.

The three-wire medium-voltage submarine cable is VPE-insulated with a PE sheath and armouring, as well as a shield area with longitudinal and transverse waterproofing, enabling it to meet challenging underwater requirements.

High voltage testing in Faraday cage

Tratos has constructed a Faraday cage test site at its headquarters in Pieve Santo Stefano, Italy. Measuring 24m x 16m and standing at 14m high, the new cage enables Tratos to administer AC resonant tests on site, allowing testing of up to 220kV of nominal voltage cables and up to 20km of medium voltage cable.

AC resonant testing is now the standard method of testing higher voltage cables.

This sophisticated equipment can detect even very low levels of picocoulombs and is governed by a modern control system incorporating a programmable logic controller (PLC), which is designed for multiple input and output arrangements, immunity to electrical noise, and resistance to vibration and impact.

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Website: www.tratos.eu

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2. Water-blocking Tape Series

- Water-blocking tape
- Film laminated water-blocking tape



3. Insulation Binding Tape Series

- Polyester tape
- Non-woven tape
- Strengthened light non-woven fabric

4. Flame Retardant Tape Series

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- Thin flame retardant tape
- Fire resistant mica tape - Phlogopite mica tape
- Synthetic mica tape

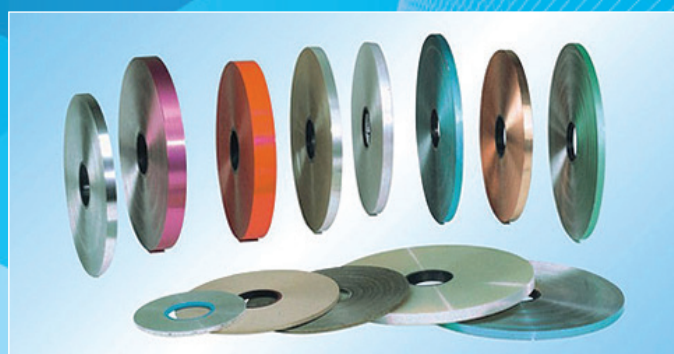


5. Metal Shielding Tape

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- Electrodeposited copper foil (Cu+PET)

6. Filling Rope Series

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- Semi-conductive water-blocking filling rope
- High temperature-resistant filling rope
- PP filling rope
- Flame-retardant high temperature-resistant filling rope



Yangzhou Tengfei Electric Cable and Appliance Materials Co., Ltd

East of Qixin Road, Anyi Industrial Zone, Baoying, Yangzhou, Jiangsu, China 225800

Tel: 0086-514-8089 0755

Fax: 0086-514-8824-2144

Email: yztf2012@126.com

Website: www.tengfeicable.com

Gimax are doing the 35th anniversary waltz

ITALIAN machinery manufacturer Gimax has justifiable reason to be proud this year – the company is celebrating its 35th anniversary.

Since 1978 Gimax has been active in the welding wire market supplying its machinery to manufacturers of ferrous and non-ferrous wire worldwide.

Well over 1,000 semi-automatic respoolers of the "POLI" series in its various configurations have been manufactured and many of the early ones are still in operation. The majority are for small diameter wire, but the company has also manufactured many for large diameter (sub arc) wire. This machine is still as popular as it was 35 years ago – and it has been updated and improved over the years.

Building on the enormous experience Gimax gained with the "POLI" series, the fully automatic respooler ("ROBO" series) was designed, patented and put into

production 25 years ago and constantly updated and improved. This year will also mark the 250th automatic respooler to be sold.

The "ROBO" series can be found producing spool after spool of solid or tubular wire, steel or aluminium for numerous wire manufacturers around the world.

As for the "INF" pail packers, despite an initial number sold during the 1990s, the popularity for this type of machinery has increased greatly in the past ten years and up to last year 140 units had been produced and shipped worldwide.

Gimax claims to be the only manufacturer of this type of machinery that has considered dimensions and ergonomics in its design: the patented "INF" series occupies 30-40 per cent less floor space than competitive machinery, while running consistently at speeds of even 35m/second (7,000 feet/min).



▲ 35 years and going strong – Gimax

To this, Gimax adds a selection of ancillary equipment or specialised equipment, such as wet drawing and coppering lines for steel wire, shaving lines for aluminium wire, drawing/shaving/cleaning lines for aluminium wire, rewind lines, pay-offs and take-ups and various packaging solutions.

Gimax Srl – Italy

Website: www.gimaxgroup.com

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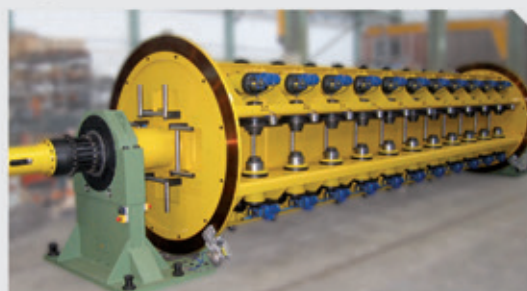
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News on the move!

All INTRAS titles – *EuroWire*, *Wire & Cable ASIA* and *wiredInUSA* – can now be viewed online with your smartphone. We have introduced a system that automatically recognises which operating system your phone uses – iPhone, Blackberry, Android, Windows or Nokia – and adjusts the settings making it easier for you to read. Keep up with all the latest news at www.read-eurowire.com

Workshop

Hosted in Zurich by Swissgrid, a Renewable Grid Initiative (RGI) workshop joined over 90 experts from transmission system operators (TSOs), NGOs, legislators and interested stakeholders to discuss how best to add partial undergrounding for extra high voltage power transmission projects in Europe.

The workshop gave an overview of the current status of partial undergrounding across a variety of TSOs. Participants actively discussed aspects of technology, cost and environmental impact, as well as political criteria to enable the deployment of partial undergrounding in the future.

Investment pays off for Bar Products in Europe

BAR Products & Services Ltd has completed a large order for 'wire strand compaction units' into Europe.

The project was completed in March and reinforces the company's strategy to increase investment in the wire rope manufacturing sector.

"Wire strand compaction units, along with compaction rollers and associated products are a large part of the business," said Steven Rika, managing director.

"We have made substantial investment over the last few years to meet the increased demand for this type of tooling, and this looks set to continue."

There has also been a large increase in the shaped-die order book this year with new



▲ Wire strand compaction units ready to be shipped

customers in Mexico, China, Germany, Belgium and India, all of which are selecting Bar Products & Services Ltd as their preferred supplier.

Further investment will be made

later this year to facilitate this area of growth.

Bar Products and Services Ltd – UK
Website:

www.barproductsandservices.com

EBFL cable system running between the UK and Ireland

Offshore Marine Management (OMM), a leading independent services provider to the renewables, telecoms and hydrocarbon industries, has completed the installation of a 117 kilometre optical fibre submarine cable for Emerald Bridge Fibres Ltd (EBFL), a joint venture between Geo Networks Ltd (Geo), a leading fibre network provider, and Ireland's leading wholesale telecom provider, ESB Telecoms Ltd.

The 96-fibre subsea link provides a new and direct low latency route from Portmarnock, Ireland, to Porth-Y-Post, Wales.

OMM was fully responsible for the marine delivery of this challenging project and provided expert management and consultancy services during execution of the marine works. OMM provided a full range of turnkey services to ensure successful installation.

"This was an important major project to the diversity of OMM's capability and flexibility," said Rob Grimmond, managing director.

OMM's participation in this project commenced at an early stage with review of the initial route design and survey data before advising

on the development of the route. In addition to full project management of the marine installation, OMM delivered a number of key packages including route deviation surveys, pre-lay grapnel services and the installation of a pre-laid shore end.

Further services provided to EBFL by OMM included not only the installation of the submarine cable itself but also supporting works covering assistance with permitting; inshore and offshore burial; cable protection using ducting and articulated piping; and jointing and system testing. Project final deliverables were completed using OMM's in house resources to meet EBFL's needs for reporting, charting and digital video.

As principal contractor, OMM

was responsible for all health, safety and environmental activities and is pleased to report that the project was successfully delivered with no lost time incidents recorded.

"The skills and experience of the Offshore Marine Management team were crucial to delivering this challenging project," said Eckhard Bruckschen, OMM operations director.

"Our ability to assess, organise and adapt as a project progresses and changes through its life cycle, using innovative approaches and methods of delivery, is a key strength of our team."

Offshore Marine Management – UK
Website: www.offshoremm.com

New business manager at TKT Group

Fabio Bellina has been appointed business manager of TKT Group SpA, the holding company that owns Tecno, which produces lubricants and auxiliary chemicals for wire drawing, and Koner, a die manufacturer.

The 35-year-old doctor of economics graduated at Milan University and previously held the role of head of credit management in Roche, Switzerland. He is now based in Milan, Italy.

TKT Group Spa – Italy

Website: www.tktgroup.it

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An even stronger partnership between Niehoff and HFSAB

THE Niehoff Group has been working together with HFSAB in international sales outside Europe for more than two years, with the sales and service department helping to market HFSAB products.

The Niehoff Group acquired shares in HFSAB with retroactive effect from 1st January 2013.

The management of HFSAB in Motala, Sweden, will remain under the leadership of Derek Russell, CEO, and Mats Larsson, CFO. Production and development are to be maintained and expanded at the existing site, and HFSAB will continue to run and be developed as an independent brand.

What connects the Niehoff Group and HFSAB is that both are premium manufacturers of technologically cutting-edge and high-quality products, constantly seeking to develop these further, and can offer a reliable service worldwide for their respective products. They have workforces with first-class training who boast outstanding technological expertise and are fully and squarely behind the products of their companies.

The two companies are also connected by

the fact that their global customer bases are identical.

HFSAB supplies lead extrusion systems and CRRS (cable repair and recovery systems) for subsea cables, underground cables, high-voltage cables and cables for the oil and gas industry. HFSAB also offers upgrades for existing systems.

Maschinenfabrik Niehoff develops and manufactures plant and machinery for the drawing, annealing, galvanic coating, bunching, take-up, rewinding and braiding of wire made of non-ferrous metals.

The production programme also includes machinery for the stranding, winding

and take-up of insulated data and special cables, automobile wires and power cables.

The Niehoff Group has more than 700 employees in all major markets around the world. The products and services it offers range from development and design to the turnkey delivery of fully-fitted cable factories. Both companies offer expert advice and a comprehensive after-sales service across the world.

Maschinenfabrik Niehoff GmbH – Germany
Website: www.niehoff.de

H Folke Sandelin AB – Sweden
Website: www.hfsab.com

Cable company buyout

A Manchester, UK, distribution operation has been bought out of administration.

Clynder Cables, a producer of single-core, LSHF and defence-standard cables and including a bespoke service, was placed under the control of administrators from KPMG in mid-March. The company operated from a base in the city and a manufacturing site in County Durham. On appointment, administrators made 15 employees redundant.

Administrators have now agreed a deal with Davro Investments, which owns Manchester-based wire and cable maker Permanoid, in an undisclosed deal which has saved six jobs. Clynder Cables' operation in Bishop Auckland will continue to be run by administrators as they market the business for sale.

Joint administrator Howard Smith said: "Clynder Cables has suffered in recent months due to a steep decline in order volumes, especially for their high margin products. This, coupled with high fixed costs, meant the company could no longer pay their debts as they fell due."

Permanoid Ltd – UK
Website: www.permanoid.co.uk

Cash raised by power grid tenders

Turkey has sold its four remaining electricity grids, completing the last stage of a complete privatisation of the electricity distribution sector.

The final negotiations on the privatisation of four electricity distributor companies – Ayedaş, Toroslar, Van Gölü and Dicle – raised \$3.457 billion, almost \$3 billion coming from Enerjisa, which won the tender for the two largest grids.

Enerjisa, jointly-owned by Turkey's second-largest company, Sabancı, and German energy giant E.ON, placed the highest bids for the largest of the two grids, offering \$1.22 billion for Ayedaş and \$1.72 billion for Toroslar Elektrik.

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Keeping wire coiling

THORITE, the UK's largest distributor of pneumatic products and process systems, has supplied 20 in-house designed single-station control panels, plus a range of pneumatic cylinders, actuators and air preparation equipment, for a new 20-station line of vertical take-up units (VTUs) at Bridon's Wire Mill & Ropery in Doncaster, UK.

Each Thorite panel controls pneumatic actuators, which activate nip rollers and accumulator arms feeding wire from Bridon's galvanising plant on to a wire coiler. This unique system provides an advanced, remotely controlled electro/pneumatic interface, enabling the VTU operators to transfer fully coiled reels from the production line to an accumulating reel, remove the old reel and install an empty reel as part of a continuous process.

This is achieved via bespoke electrical controls without halting the output of the galvanising process, enabling raw material to be fed in to the start of the line and fully finished wire rope to be taken off at the end.

Steve Jenkins, strategic engineering



▲ Thorite-supplied control boxes in Bridon's Wire Mill & Ropery

manager at Bridon, said: "In order to produce the world's most innovative ropes, Bridon requires the very best in advanced manufacturing technology.

"The state-of-the-art control systems that Thorite has provided are part of a £5 million equipment upgrade at our Doncaster facility – a programme of work that will help Bridon maintain and develop its technology leadership position across its key markets."

The control panels were designed and produced in a specialist department at Thorite's Bradford head office, with all ancillary pneumatic fittings being supplied from Thorite's Doncaster sales and service centre, one of ten regional outlets located throughout Yorkshire, Lancashire, the North East and West Midlands.

Thorite – UK

Website: www.thorite.co.uk

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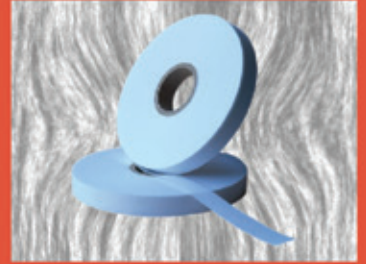
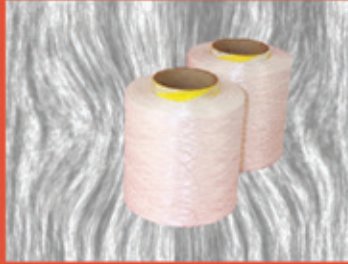


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Queins' Mr Dautzenberg is new executive board member

THE International Wire and Machinery Association has welcomed Willibert Dautzenberg of Queins Machinery GmbH to the executive board.

Mr Dautzenberg has been a director of Queins, based in Monschaue, Germany, since 2011 and has a special focus on developing customised solutions for the wire, steel rope and umbilical industry, with a responsibility for the project management and integration of the latest technological developments for the complete range of Queins products.

Mr Dautzenberg, a certified engineer, entered the wire and cable industry in 1993 when he joined Queins to work on the development of hardware and software for machine controls.

In 2008 he moved into the company's technical sales department where the expertise he had amassed during his 15 years working in the worldwide commissioning

and customer services enabled him to benefit many major projects.

On the subject of his recent election to the executive board Mr Dautzenberg said: "I am very much looking forward to working with the executive board in supporting the IWMA membership network and providing input on wire industry technical developments and production trends that may benefit the association members."

IWMA – UK
Website: www.iwma.org



▲ Willibert Dautzenberg

Right place, right time



▲ Okür Abdullah – manager of Zumbach Service in Istanbul, Turkey

Zumbach Service provides the right solution in the right place at the right time.

Since November 2012, the company has been offering customers in Turkey local support from the newly opened customer service centre in Istanbul.

The rapid growth in the customer base in Turkey prompted Zumbach to open the new office, managed by Okür Abdullah.

With this additional service centre, the company's network now spans more than 20 service centres around the world.

Zumbach Electronic AG – Switzerland
Website: www.zumbach.com



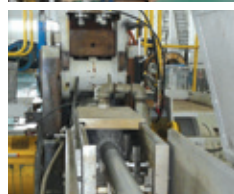
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BWE Ltd

New headquarters is powered by the sun

WIRE rolling machine manufacturer FUHR has moved into new headquarters, where an additional 70 per cent production capacity caters to the continuously rising demand of its wire rolling technology.

Within a construction period of only seven months, a modern office building and two functional production facilities with a total floor space of 40,000ft² have been built on a total area of 100,000ft².

Integrated into the manufacturing process is a state-of-the-art paint shop, as well as a separately air-conditioned grinding facility, which both guarantee workmanship of the highest quality levels.

With an assembly hall that allows the parallel erection of three rolling mills of up to 200ft each, FUHR now has the capacity to significantly shorten delivery times and reliably serve its customers in a timely manner and on a reduced cost basis.

Furthermore, most of the company's yearly energy consumption is now being provided by a roof-top photovoltaic power plant, which has a total capacity of 207 kw.



▲ The new headquarters, complete with roof-top photovoltaic power plant

Founded in 1946, FUHR develops and produces rolling mills mainly for cold forming applications, eg the automotive, electrical, food, textile and building industry, as well as the renewable energy sector.

The scope of delivery encompasses the entire range from stand-alone units to turnkey solutions for shaped, flat and round profiles made of ferrous and non-ferrous wires, as well as stainless steels.

FUHR rolling mills combine latest technologies and state-of-the-art CNC controls, recipes and process visualisation to minimise set-up times to efficiently produce both small and large batches.

Integrated measurement systems ensure consistent product qualities and high-precision rolling processes.

FUHR GmbH & Co KG
Website: www.fuhr-wire.com



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Take-off time for new cables in USS Gerald R Ford

PRYSMIAN Group has supplied medium-voltage (15kV) and optical fibre cables for the new American aircraft carrier *USS Gerald R Ford*. The contract is said to be worth in excess of \$10 million.

Kevin P Hamilton, defence, specialities and OEM manager for Prysmian Group in North America, said: "We have developed a customised 15kV cable for use in this class of ship.

"The US Navy had never previously used voltages of more than 5kV. This cable is a vital part of the new electrical system that has three times the capacity of other aircraft carriers.

Without developing this cable, the increase in electrical capacity would not have been possible."

The additional electrical capability achieved with medium-voltage 15kV cable is needed to support the electro-magnetic aircraft launching system (EMALS) and other advanced technologies.

All fixed-wing aircraft (non-helicopters) need assistance to reach take-off speed from the aircraft carrier's deck. Previously, the catapults used were powered by steam.



▲ *USS Gerald R Ford*. Photo courtesy of Navytimes.com

However, General Atomics has developed EMALS to use linear induction motors to more finely control aircraft acceleration off the deck.

Prysmian has received the contract from General Atomics to develop and supply the cables needed to power the system and has supplied more than 85 per cent of the

cables used with this system. Hundreds of kilometres of fibre optic cables have been supplied for the carrier, which is over 1,092 feet long, accommodates 4,660 people and provides airport and storage for over 75 aircraft.

Prysmian Group – Italy
Website: www.prysmian.com

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Hyosung Wire Luxembourg S.A. (formerly Goodyear/Dunlop)

ROUGH DRAWING (5.5 – 3.5mm)

- KOCH, 2008, (2) pay-off flippers, (5) blocks (with 1 rotary die), descaler, borax/reborax baths, dryers, KOCH wind-up (2.7t), ZUMBACH laser, guiding pulleys, SIEMENS S7
- HI-DRAW, 1975, (2) pay-off flippers, (5) blocks with rotary die, descaler, borax/reborax baths, dryers, LENZE wind-up, guiding pulleys, SIEMENS S7, AC motors
- HI-DRAW, 1975, (2) pay-off flippers, (5) blocks with rotary die, descaler, borax/reborax baths, dryers, LENZE wind-up, guiding pulleys, SIEMENS S7, AC motors

INTERMEDIATE DRAWING (2.5 – 1.4mm)

- KOCH, 1994, pay-off (2.5 t), (8) blocks 37kW, Siemens S7, Zumbach laser
- OZ Cams, 1978/2008, pay-off, (8) blocks 28 kW, Zumbach laser, AC, Siemens S5
- (3) HI-DRAW, 1975/2008, pay-off, (8) blocks 30kW, AC, Zumbach laser, Siemens S7

FINE DRAWING (2.3 – 0.15mm)

- (82) MRB, (36) HERBORN, (10) M&E, (3) ARBED, (2) HENRICH (15kW – 45kW, Controls: (11) SIEMENS S7, (42) SIEMENS S5, (48) Moeller)
- Pay-off: (58) AMECO, (42) AXE, others
- Wind-up: (49) LENZE, (41) SCHMIDT, others

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Global audience



▲ A planetary strander for CTC from the German company

Since the 1970s Queins has supplied new and reconditioned machinery to the cable and rope industry, including huge production lines for special industries.

The company offers a wide range of modern rigid, planetary, skip-type and tubular stranders, single or double twist bunchers/stranders, machines for the production of off-shore and umbilical cables, continuously transposed conductors (CTC) as well as disc- and belt-capstans, taping machines and all types of pay-offs and take-ups.

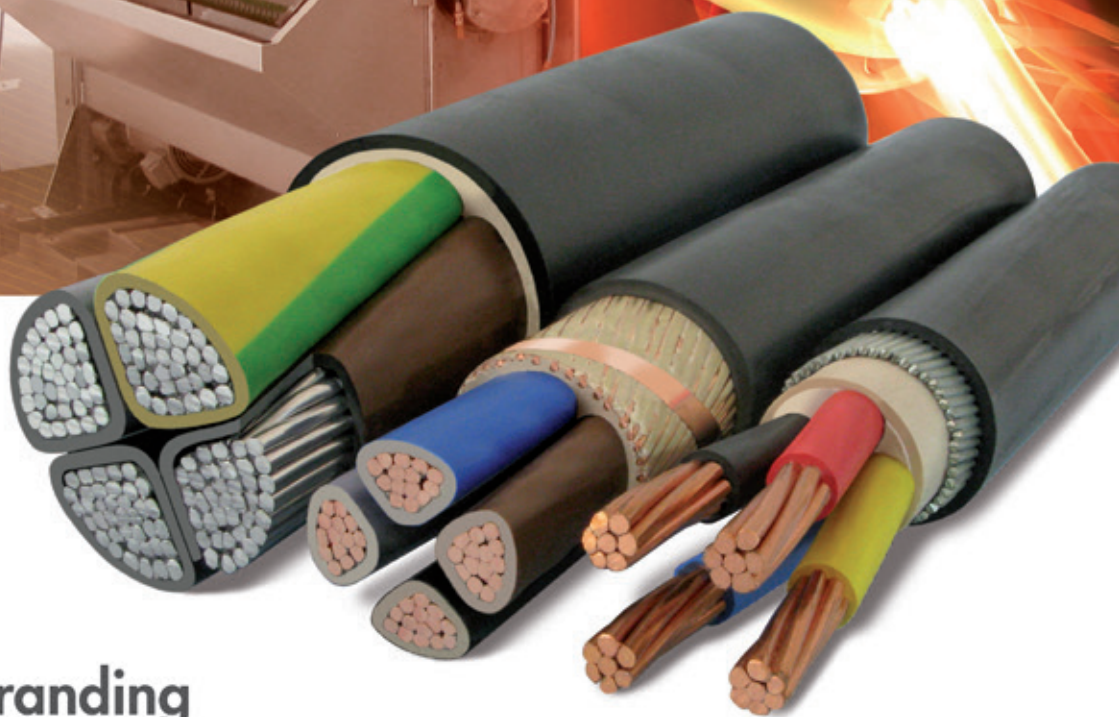
Queins Machines GmbH – Germany
Website: www.queins.com

Japanese thumbs up for wind turbine

Evance's 5kW wind turbine has completed all tests and has been awarded full certification in Japan.

This certification is a formal recognition of the reliability, safety and overall performance of the Evance small wind turbine. The Evance turbine is offered in Japan through Zephyr Corporation as the Zephyr9000.

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Forging ahead with 95 per cent exports

FROM catering for the domestic market since it was formed in 1964, Surtel Kablo now exports 95 per cent of its production to Europe, the Middle East and the Arabian Peninsula. Until 2001 the company catered solely for the domestic market.

Since 1997, the company has always been in the list of the top 1,000 industrial companies announced by the Istanbul Chamber of Industry for sales volume, and in the top 1,000 exporter companies, as reported by the Turkish Exporters Assembly.

Surtel Kablo is also one of the first cable manufacturers to have taken the Certification of Turkish Standards Institution. This is in addition to quality certificates such as TS EN ISO 9001:2008 quality management system, TS EN ISO 14001:2004 environmental management system, TS certificates of conformity, licences to use harmonised marking, TSEK certification of conformity to criteria, GOST, KEMA and BASEC as needed in the field of cables.

The company has an in-house laboratory conforming to international quality levels, where the incoming materials and the international quality standards can be tested.

Surtel Kablo produces PVC, XLPE, HFRR insulated cables, PVC, PE, HFRR armoured

Power across the border

Aggreko has signed tri-party power purchase agreements (TPPA) with Electricidade de Moçambique (EDM), the Mozambique power utility, and NamPower, the Namibian power utility, to provide 122MW of gas-fuelled power from the Aggreko interim power plant located at Gigawatt Park at Ressano Garcia, Mozambique.

The agreement follows the authorisation by EDM for the direct supply of power by Aggreko to NamPower and will see the installed capacity of 122MW split between the two utilities.

Aggreko built the facility at Ressano Garcia in 2012. Under the first phase of the project, which started power production in July 2012, Aggreko and its joint-venture partner Shanduka supply power to EDM for national energy requirements in Mozambique, and also generate power for the South African utility Eskom.

The success of this initial project, currently providing 110MW of power to the two utilities, has enabled Aggreko to offer additional power to other members of the



▲ Surtel Kablo – leading from the front

cables for the domestic market and PVC, XLPE, HFRR insulated, armoured and unarmoured cables conforming to BS and IEC standards for international markets in the low voltage conductors group.

The factory is conveniently based just six kilometres from Atatürk International Airport and 20km from the Ambarlı Port.

Surtel Kablo AS – Turkey

Website: www.surtel.com.tr



▲ Transporting power – Photograph courtesy of Aggreko

Southern African Power Pool, which is one of the largest interconnected grids in the world and links the power networks of nine countries in Southern Africa.

EDM will transmit the power over its network to the South African border where NamPower will take delivery. Eskom, on behalf of NamPower, will handle the wheeling of the power across the South African grid network to Namibia. The new 122MW power plant is scheduled to go into production in the second quarter of 2013 and will supply power for a minimum of two years.

Aggreko PLC – UK

Website: www.aggreko.com

Ideally placed in the heart of Europe

GMP Slovakia is a leading producer of steel reels, drums and handling equipment.

Based in Slovakia in the heart of Europe, the industrial area is 130,000m², 32,000m² of which is under cover.

The manufacturing department is formed of traditional machinery, high technology machines as well as welding robots, CNC turning machines, 1,000 ton presses, and balancing machines up to Ø1,600mm. All operators are skilled and continuously trained.

All manufacturers are able to supply their products, but the difference between GMP Slovakia and the others is the experience.

The company is able to understand customer requests and they are in

an ideal situation to suggest the right product.

The range of products includes many different items including drums for

cable and rope, available in reinforced versions for process or in lightweight versions for transportation, and they can also be supplied in knock down conditions to reduce transport cost.



▲ GMP Slovakia – a leading producer of steel reels, drums and handling equipment

There are two kinds available: SD-Structural Drum with flat flange and CD-Corrugated Drum with corrugated flange.

Both types can be reinforced on the barrel and flanges for the drum twister process.

Besides these reels, GMP Slovakia also manufactures special equipment of different dimensions: tilting devices up to five tons loading capacity, and lifting devices to handle both reels, drums and coils in vertical or horizontal position. Dolly bases and skid rolls are also available.

GMP Slovakia – Slovakia
Website:
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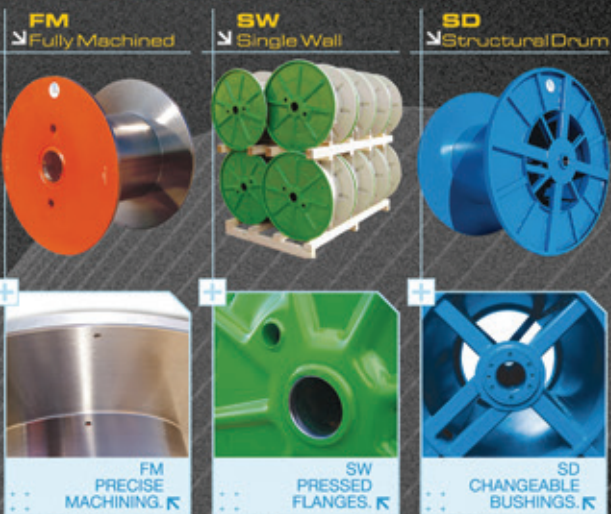
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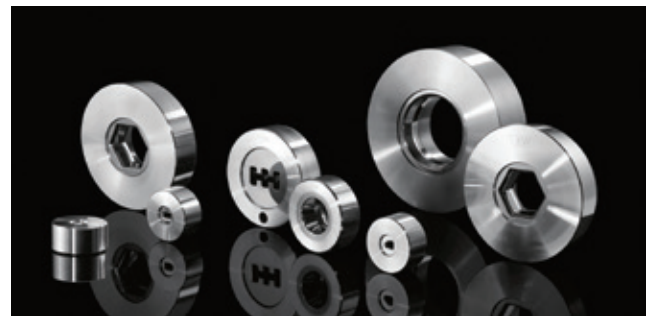
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▲ Kämpfer Würz – a true specialist

Specialist in chipless technology

KÄMPFER Würz is a worldwide operating medium-sized specialist for chipless forming technology, as well as high precision parts and components for a variety of uses.

The company produces and sells sophisticated forming tools, mainly for rolling mills and drawing dies, but also the automotive industry, aeronautical and space engineering industries.

In cooperation with divisions at Würz Fertigungstechnik and Bühler-Würz Kaltwalztechnik the company has an ultramodern fleet of machinery, coupled with the experience gained from more than 20 years of tool manufacturing, ensuring a perfect result.

Future-orientated, Kämpfer has a focus on its fleet of machinery, which is continually kept in step with the latest stage of development.

Production halls house 9-axes CNC lathes and milling machines, as well as numerous CNC profile grinding machines and external, internal and surface grinding machines that enable the company to produce high precision tools with complex geometries.

The fleet also includes four-axes electrical discharge and wire EDM machines with extra-fine-cut technology. The hub of the grinding shop is profile-grinding centres with a high precision. All machines and all experiences are perfectly equipped for any kind of steel and tungsten carbide.

To keep the measuring laboratory on this same high-end level Kämpfer uses, for example, CNC-3D coordinate measuring machines analysing 3D cylindrical profiles. The company is certified in DIN EN ISO9001:2008 and DIN EN ISO 14001:2009, and is also an Authorized Economic Operator (AEO).

Kämpfer Würz Umformtechnik GmbH – Germany

Website: www.kaempfer.de

100 per cent satisfaction

Madem Gulf has come out glowing from a recent customer satisfaction survey, with 100 per cent of responses putting the company into the good or very good category.

The Brazil, South America-headquartered company asked 57 wire and cable manufacturing customers in the Middle East, Asia and African countries for their responses on claim response, quantities shipped x received, documentation, deliveries, quality inspections, performance and packing.

Madem Gulf – Brazil

Website: www.madem.com.br

Wiring harness industry data

FIGURES from ReportLinker feature the development of the automotive wiring harness industry, which has benefitted from the increase in automotive electronics and in the number of hybrid vehicles.

Data suggests that Yazaki, Sumitomo, Delphi and Leoni account for over 75 per cent of the global automotive wiring harness market. According to statistics, in 2012 Yazaki accounted for nearly 30 per cent of global market share with an annual revenue of \$12.92 billion.

In China's automotive wiring harness market, Japanese enterprises had a market share of about 60 per cent; followed by South Korea's Yura, Comba and Youjin, accounting for about 15 per cent of the market share.

Yazaki, Sumitomo, Leoni, Furukawa, Fujikura, Coroplast and Comba developed from electric wire and cable manufacture. Many of these manufacturers have support from upstream mining resources; Sumitomo and Furukawa have their own copper mine, so cost control is firmer. Traditional automotive parts manufacturers have no adequate advantages in the wiring harness field, evidenced, for example, by Valeo's sale of its wiring harness business to Leoni.

Vehicle wiring harness design involves aspects of electronic, machinery and thermal distribution; the design work must coordinate with entire vehicle manufacturers, and it is difficult for small-scale enterprises to enter this supply chain level.

North Sea cable deal for Prysmian

Prysmian Group will design, supply and install a turnkey high voltage alternating current (HVAC) submarine power cable system to connect the North Sea offshore wind park Deutsche Bucht to the mainland grid. Consisting of two 3-core 155kV extruded cables with integrated fibre optic cable elements along a 31km submarine route, the system will enable the grid connection of Deutsche Bucht via converter platforms planned within the BorWin cluster.



▲ Prysmian cable laying vessel Giulio Verne

The Deutsche Bucht project execution will be coordinated from new Prysmian Group offices in Hamburg, using production from the group's facility in Arco Felice (Naples, Italy). Marine cable-laying operations will be performed using the group's own installation vessels, *Giulio Verne* and *Cable Enterprise*, with handover of the supplied systems planned for late 2015.

"This new project [is] the 12th secured by the group that – since the earliest stages – has been investing in this growing sector of renewable wind power in Germany and Northern Europe," stated Marcello Del Brenna, CEO of Prysmian Powerlink.

Prysmian Group – Italy Website: www.prysmian.com



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Telecommunications

▶ Sweeping revisions, including the possibility of 100 per cent foreign investment, seem set for the Mexican telecom sector

Reporting from Mexico City, the *Latin American Herald Tribune* noted the passage, by Mexico's lower house of Congress, of an ambitious telecommunications overhaul bill aimed at boosting competition, breaking up dominant players, and opening the door to greater foreign investment. The bill, approved by a 414-50 vote, then went to the Senate, where it was expected to pass. President Enrique Peña Nieto said he hoped to sign it into law before the end of April. ("Mexico's Lower House OKs Telecommunications Overhaul Bill," 24th March). The bill, submitted to Congress by the federal government on 11th March, stems from the so-called Pact for Mexico, an agreement signed by four political parties including the governing Institutional Revolutionary Party, or PRI.

The legislation would create a new autonomous body, the Federal Telecommunications Institute, or Ifetel, to regulate the use of spectrum and oversee broadcasting and telecommunications networks and the services delivered on them. Ifetel would be charged with granting and revoking broadcast and telecommunications concessions. The bill also would allow up to 100 per cent foreign investment in telecommunications, up to 49 per cent in broadcast media. If the proposed regulatory changes become law, Mexican companies that control more than 50 per cent of their markets could be forced to shed assets. The English-language *Herald Tribune* pointed out that large telecommunications firms "controlled by multi-billionaire Carlos Slim, the world's wealthiest individual, also may have to pay higher fees to connect to their rivals' networks than what they will be allowed to charge."

The effect on Mr Slim's telecommunications empire could be considerable, since Telcel and Telmex, the wireless and fixed-line units of his company América Móvil, control 70- and 80 per cent of their respective markets in Mexico. The overhaul could also disrupt Mexico's broadcast television duopoly of Grupo Televisa and TV Azteca, which control 70 per cent and 30 per cent, respectively, of that market.

▶ If enacted, the overhaul is expected to boost economic growth in Mexico. The *Latin American Herald Tribune* cited a 2012 report by the Paris-based Organisation for Economic Co-operation and Development, which said the lack of sufficient competition in Mexico's telecommunications sector costs the economy \$25.8 billion annually. This amount is equivalent to 1.8 per cent of the country's gross domestic product.

Elsewhere in telecom ...

▶ The \$35 billion US private line services market is expected to decline only one per cent annually over the next five years, according to a market analysis study released 27th March by Insight Research Corp, even as the shift to packet-based services offsets demand for higher-bandwidth private lines. These lines are leased point-to-point circuits for applications including the connection of enterprise locations and backhauling cell towers to mobile switching centres. The study of that US market concludes that, even as private line revenues decline modestly, equivalent circuit counts will continue to rise – driven by cloud computing and the new video applications. Director Fran Caulfield of Insight Research (Boonton, New Jersey) said: "The need to backhaul data-intensive wireless services and increased local bandwidth for wireline data and video services will prevent significant revenue erosion for the foreseeable future."

Steel

▶ At least 30 of the steel rods holding together the new \$6.4 billion eastern span of San Francisco's Bay Bridge have snapped

Caltrans is responsible for highway, bridge and rail transportation planning, construction and maintenance in California. Recently the state agency was reported to be investigating why nearly three dozen threaded steel rods on the new eastern span of the Bay Bridge snapped while crews tightened down the fittings.

As described by Lisa Vorderbrueggen in the *Contra Costa Times* (27th March), the rods connect the bridge deck to the 10-foot concrete cap that sits atop the massive pier just east of the self-anchored suspension span tower. There are 288 of these rods. Roughly one-third of the 96 tightened rods broke, according to Metropolitan Transportation Commission spokesman Randy Rentschler.

The commission is overseeing the new \$6.4 billion span construction with the state. "Caltrans is diagnosing the problem," Mr Rentschler said on 26th March. "We are confident they will find a solution." Ms Vorderbrueggen noted that the thick steel rods are among the seismic protection features on the fortified Bay Bridge, which – though secondary in prestige to the nearby Golden Gate Bridge – is essential to Bay Area motor traffic. The eastern span was designed to remain passable for emergency and supply vehicles immediately after a major earthquake.

Transatlantic cable

The broken rods are not considered a structural problem with the bridge, Mr Rentschler told the newspaper. Nor, he said, are they expected to delay the scheduled Labor Day weekend opening in early September.

All 288 rods may be replaced

Although less confident about meeting the opening-day date, toll bridge programme manager Tony Anziano did confirm that engineers are 'pretty confident' the problem is not related to a design or a construction issue but to the quality of the steel rods (also known as bolts) themselves. "It appears to be a type of materials problem, the presence of hydrogen" making the metal brittle, he told the *San Francisco Chronicle*. As a result, the newspaper learned, Caltrans is considering replacing all 288 of the rods/bolts on the eastern span before it is cleared for public use. ("Bay Bridge Inspections: Busted Bolts," 27th March).

Chronicle reporters Phillip Matier and Andrew Ross noted that, unlike the Chinese-built deck sections, the bolts – ranging in length from 9 to 17 feet and 2½ inches in diameter – were produced in the United States. The reporters said the problem was first detected on a large concrete foundation and column that supports the easternmost end of the new single tower, where eight fabricated steel pieces are anchored into a concrete cap and into the bridge deck with the giant steel bolts. They were inserted in 2008, before the roadway decking was installed, making access to many of them difficult.

- According to Mr Anziano, the toll bridges official, construction crews began tightening the nuts on both ends of 96 bolts – only to find, days later, that some one-third of the nuts had popped loose, damaging the bolts.

- "We have extracted samples so we can have a clear understanding of what went on," Mr Anziano told the *Chronicle*. "We don't have a cost, but we will have a solution." The problem did not particularly surprise him. "I'd be very surprised if you [were to look] at any large structural project that used fasteners and didn't have an issue like that," he said. "That's why you have inspections."

- Messrs Matier and Ross of the *Chronicle* supplied some context for the latest problem with the eastern span, which has been under construction for more than a decade, and has a history of trouble and setbacks: notably when microscopic cracks were found in the steel deck sections being fabricated in China. That problem delayed key work on the bridge for months while new fabrication procedures were developed. There were also questions about the integrity of the welds on the piers of the new skyway section, leading to further inspections before that work was cleared.

Plus, the *Chronicle* reporters observed, there was the accusation that an inspector who had worked on the bridge project faked seismic inspection reports on another, unrelated project: "That raised questions about whether he had taken similar shortcuts on inspections of concrete on [the Bay Bridge]."

The faulty Bay Bridge steel rods originated in Ohio

Last year, Bay Area motorists could glance up at huge billboards starkly asserting "Bay Bridge: 100% Foreign Steel." The public-relations campaign, by domestic manufacturers and union groups, was intended to shame the two state agencies



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that own and operate the bridge for their purchases of steel from China for the new self-anchored suspension span of the bridge. The discovery that stabilising steel rods in the span had cracked prompted early concerns about shoddy material from overseas. But the supplier of the rods is Dyson Corp (Painesville, Ohio), a maker of large-diameter fastening systems ("100% melted and manufactured in the USA," according to the company's website).

As reported by Will Reisman of the *San Francisco Examiner* (29th March), the major part of the steel in the new suspension span – the soaring centre-piece of the bridge's eastern section – came from China. The rods, which bolt the roadway to the towers rising out of the water, form part of a relatively minor collection of domestic products that went into building the span.

John Goodwin of the Metropolitan Transportation Commission, the nine-county San Francisco Bay area transit agency, told the *Examiner* that American firms won 76 per cent of the contracts for the eastern span rebuild project. That figure includes everything from temporary scaffolding structures to small rebar strands. While bridge officials have acknowledged that there should have been more oversight before the steel rods were embedded into the concrete of the span, Mr Goodwin said that both his MTC and Caltrans, the state agency, remain committed to the purchase of domestic materials for public-works projects.

- "There are questions about the degree of materials testing," the public information officer told the *Examiner's* Mr Reisman. "But this doesn't push the needle one way or another when it comes to contracting with domestic firms." Mr Reisman reported that Gary Hubbard of the United Steelworkers of America, which backed the Bay Bridge billboard campaign of 2012, said that his union was monitoring news reports and looking into the facts of the Bay Bridge case. The union spokesman observed that Dyson workers do not hold Steelworkers membership.

US Steel will stay in Slovakia, saving some 12,500 jobs at its Kosice plant

A signed agreement between the Slovak government and US Steel (Pittsburgh), announced 26th March, ensures that Slovakia's biggest employer will continue as owner of a steel mill in the eastern city of Kosice for at least five more years. The plant, now US Steel's sole overseas operation, is a major supplier to the growing Slovak automotive industry. It employs about 12,500 people in a country with a jobless rate of almost 15 per cent.

US Steel reportedly had received offers for the steel works, which it purchased in 2000. But apparently, after months of negotiations, a determined last push by Slovakia's prime minister, Robert Fico, persuaded the American steel giant to retain its Slovak connection.

"Today, we created conditions to motivate US Steel to stay in Slovakia and continue to produce steel," Mr Fico said, a day after meeting with John Surma, the CEO of US Steel, at the company's Pittsburgh headquarters. The Fico government said the agreement includes details of energy costs and environment protection but offers no tax breaks. The Kosice plant is rated to account for five million tons of US Steel's annual raw steel making capacity of about 29 million tons. Actual production in Kosice was 4.2 million tons in 2011 and 4.4 million tons in 2012.

- Early last year, in an effort to keep 5,400 workers in their jobs, the government of Serbia bought a money-losing US Steel plant for the symbolic sum of one dollar.

A lightweight automotive steel from AK Steel is proof against a patent infringement suit brought by ArcelorMittal

Stronger, lighter-weight steel components gain in importance as car makers in the US focus on safety and fuel efficiency. Ultralume, from AK Steel (West Chester, Ohio), is an aluminised boron steel designed to meet increasingly stringent standards for automotive applications. It is intended primarily for hot-stamped, press-hardened applications in which ultimate tensile strength is under 1,500 megapascals (MPa). As described in the *Mansfield (Ohio) News Journal* (26th March), Ultralume steel is quickly heated, stamped into shape, and quickly cooled. The heating and cooling alter the crystalline structure, converting the steel into austenite and martensite. According to the manufacturer, it becomes stronger and is also readily shaped into thinner, lighter-weight parts.

In an action brought in January 2010, Luxembourg-based ArcelorMittal, which operates a tubular products facility in Ohio, alleged that AK Steel infringed its patent for an aluminium-based coating applied after a boron sheet is rolled to its final thickness. In November 2012, the ArcelorMittal suit was rejected by jury verdict. Now, AK Steel has again prevailed against ArcelorMittal. In mid-March the European company's appeal for a re-hearing of its case was denied by the US Court of Appeals for the Federal Circuit. The decision affirms that ArcelorMittal's patent was not infringed and permits AK Steel to continue selling Ultralume.

Elsewhere in steel ...

- A proposed \$1 billion steel plant, announced in late January, to be built in Osceola, Arkansas, has received approval for \$14.5 million in funds from the Mississippi County Quorum Court. The Big River Steel plant is now under review by the Arkansas state legislature for \$125 million in general obligation bonds. If approval is gained, the plant could break ground this autumn and be completed in 20 months. Michael Sheffield of the *Memphis (Tennessee) Business Journal* reported that the project is opposed by Nucor Steel Corp (Charlotte, North Carolina), which operates a steel mill in Osceola. The company's opposition centres on the funding of the general obligation bonds by Arkansas taxpayers, resulting in the use of Nucor employees' money to "subsidise a direct competitor." John Correnti, the former Nucor executive who is the developer of Big River Steel, holds that the new plant would produce steel for industries not currently supplied by Nucor. Big River will produce for the automotive, oil and gas, and electrical energy industries.

Random notes

- Marking the beginning of the 2013 Great Lakes shipping season, the US Army Corps of Engineers, Detroit District, announced the opening of Soo Locks in Sault Ste Marie, Michigan, at 12.01am on 24th March. For the Port of Cleveland the season began a week earlier, with the opening of the St Lawrence Seaway, but for the Ohioans the more significant occasion would be the arrival of the first international vessel of the season, traditionally marked by a ceremony. On 27th March this year's honoree – the *Federal Welland*, from the Netherlands – dropped off about 13,000 tons of steel before heading north toward Milwaukee and other ports.

David Gutheil, who is vice-president of maritime and logistics for the Port of Cleveland, told the *Sault Ste Marie Evening News* (24th March) that in 2012 his port

Transatlantic cable

accommodated 52 international ships and seven barges carrying 350,000 metric tons of such cargo as steel and heavy machinery. Overall, 159 lake-only vessels passed through the port, carrying just over 2.9 million tons of mainly limestone, iron ore and cement.

- As reported in the *Detroit Free Press* (24th March), Ford Motor Co said it has brought water consumption down at its plants around the world. The automaker had said last year that it was aiming for a 30 per cent decrease between 2009 and 2015. Having made adjustments in everything from the painting process to parts washing, Ford now says it has reduced water use by 62 per cent, or 10.6 billion gallons: enough to fill 16,000 Olympic-size pools. By 2015 the company aims to be using 1,056 gallons of water to make each Ford vehicle.

Economics

The OECD expects growth in developed countries to accelerate in first-half 2013

The Organisation for Economic Cooperation and Development has said that economic growth among developed nations is likely to accelerate in the six months to June. "The global economy weakened in late 2012," Pier Carlo Padoan, the chief economist of the Paris-based group, said in its 28th March report. "But the outlook is now improving for OECD economies." The Group of 7 industrialised nations alone will grow at an annualised 2.4 per cent in the first quarter and 1.8 per cent in the second, the report estimated. G-7 nations shrank by 0.5 per cent overall in the fourth quarter of 2012.

The OECD forecast that the US economy would rebound in the first quarter to grow 3.5 per cent on an annualised basis from the last three months of 2012, when growth was just 0.1 per cent. The US economy also appears to be on track for second-quarter growth of around two per cent, the report said. The organisation said growth from developing nations would continue to outpace the advanced economies, with China alone expected to simmer along at a level "well above eight per cent" in the first six months of the year. Mr Padoan warned that "bold policy action," mainly on the part of the monetary authorities, was still needed to ensure growth, particularly in Europe.

Earning more and spending more, the American consumer lifts the world's largest economy even as government cutbacks start to pinch

The closely watched spending habits of the average consumer are boosting morale in the United States. Commerce Department data released 29th March in Washington shows consumer spending climbed in February by the most in five months. Purchases, which account for about 70 per cent of the national economy, rose 0.7 per cent after a 0.4 per cent advance the prior month that was bigger than previously estimated. Taken together with another report showing consumer sentiment at a four-month high, signs are strong that Americans are definitely in the buying mood. As noted by the Washington-based *Bloomberg News* reporters Shobhana Chandra and Jeanna Smialek, record stock prices and rising home values combined with gains in wages are helping households to repair finances "left in shreds" by the recession, making it easier to cope with a two

percentage-point higher payroll tax. The pickup in spending at retailers is giving the economy a boost just as government cutbacks to narrow the budget deficit take effect. "The economy is in a very good place right now ahead of the fiscal restraint," Chris Rupkey, chief financial economist at Bank of Tokyo-Mitsubishi UFJ Ltd in New York, told *Bloomberg* (29th March). "There are no signs in the data that the expiration of the payroll-tax cut is affecting consumers whatsoever. This recovery is sustainable."

In general, Americans apparently concur. Exceeding all estimates in a Bloomberg survey, the Thomson Reuters/University of Michigan's index of consumer confidence for March rose to 78.6, from 77.6 in February. According to economists at JPMorgan Chase and Co and Barclays Plc in New York, the 6.8-point revision from a preliminary March reading of 71.8, released two weeks earlier, was the largest on record. Richard Curtin, the sentiment survey's chief economist, said in a statement: "Consumers discounted [the Obama administration's] warning about economic catastrophe following the cuts in federal spending, and consumers have renewed their expectations that job gains will accelerate in the months ahead."

- Will the optimism last? *Thomson Reuters/Michigan* findings suggest that it will. The group's gauge of expectations six months into the future, which projects the direction of consumer spending, also advanced to a four-month high in March. Its index of current conditions, which gauges consumers' views of their personal finances and measures whether Americans think it is a good time to make big investments, matched November as the strongest reading since January 2008.
- According to the median estimate of 73 economists surveyed by *Bloomberg* from 8th March to 13th March, economic growth in the US will move up to a two per cent rate in the first quarter of 2013. Incomes are being buoyed by payroll growth. Employers added a net 236,000 workers in February after a 119,000 increase the prior month. Average hourly earnings climbed 2.1 per cent from February 2012, matching the year-over-year gains in the previous two months as the strongest since March 2012.

Manufacturing

US industrial production in brief: the news is all good

- On 18th March the National Association of Manufacturers reported that industrial production rose 0.8 per cent in February, led by strong demand for automobiles and other goods including business equipment.
- Taking a longer backward look, the *Wall Street Journal* reported that industrial production rose 0.7 per cent in January. Citing the Federal Reserve's Industrial Production Index, the *WSJ* noted that the recent numbers are almost as high as they were before the financial crisis struck the US in 2008.
- Also in March, the small business survey of the National Federation of Independent Business sounded a bright note on both the current job market and job creation. An NFIB source told *Reuters*: "A continued rebound in the labour-intensive housing industry will help a lot."

Dorothy Fabian — USA Editor



▲ Cost effective new method from FR and H Lüling

Possibilities for cold massive forming

FR and H Lüling, located in Altena and Iserlohn, Germany, has developed a new method for surface treatment for the manufacture of wire in the process of cold massive forming.

With zero P, Lüling has developed a phosphate free surface which enables multi-station forging processes.

In the past, wire that had a phosphate coated surface was used exclusively in the production of complex cold extrusion parts.

However, besides the advantages in manufacturing process, there are also disadvantages in subsequent course of the process, resulting from the phosphate coated surface.

The fact that the phosphate residue slowly contaminated the extrusion oil had to be accepted.

The dephosphorising process of the forged parts in the manufacturing chain was not only very expensive but also extremely environmentally unfriendly.

Depending on the geometry and the tensile strength of the forged part, heat treatment is necessary. However, there is a danger of getting a delta-ferrite microstructure, if the dephosphorising process is carried out adequately.

These are only some of the reasons why the cold forging industries want to use wire with a phosphate-free surface.

Lüling has faced this challenge. In cooperation with customers, chemists and universities the company has developed a product which has met these high standards in cold forging industry.

For the manufacture of zero P, the

company has used a combination of three components. The phosphate layer has been replaced by a special coating consisting of organic and inorganic chemicals.

By using a special heat treatment and drawing die technology, a wire surface will be obtained, which allows an optimal forming of the material.

zero P is easily removed after the forming process as, in contrast to phosphate treatment, there is no chemical reaction with the basic material.

With this new development, Lüling offers not only financial savings but also supports the manufacturing chain as far as the environmental aspects are concerned.

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Design and application engineers in the aerospace, defence, military, industrial and RF communications fields are now tasked with finding cables that fulfil their high performance requirements, yet must be durable, light in weight and able to fit into increasingly smaller spaces.

Giotech has a solution for this with a new range of TMaxx coaxial cables which are uniquely able to meet these competing needs, providing exceptional low loss characteristics over a high frequency range, while also

New launch from Strecker

August Strecker has introduced its new development: Dual upset butt-welding machine MK300-3P.

The machine is equipped with a three-phase DC transformer and welds copper wires as well as cables up to 2,500mm² (5,000 kcmil).

Like all machines in the Strecker SS, MS, SMK and MK series, the MK300-3P conveniently deburrs the conductors automatically after welding.

August Strecker GmbH & Co KG – Germany
Website: www.stricker-limburg.de



▲ The new MK300-3P

providing significant weight and space savings over traditional MIL-DTL-17 and RG coaxial cables.

TMaxx cable's exceptional electrical performance and physical attributes are made possible by its unique construction and high-performance materials that meet aerospace requirements.

The main key advantages of TMaxx coaxial cable are: its low loss characteristics – improvements in

attenuation up to 60 per cent can be experienced when compared to standard, similarly sized MIL-Spec coaxial cables; the cable's small size – typically half the size of standard MIL-Spec coaxial cables with similar attenuation characteristics; and reduced weight – between 30 and 75 per cent lighter than standard MIL-Spec coaxial cables with similar attenuation characteristics.

Giotech – UK
Website: www.giotech.eu



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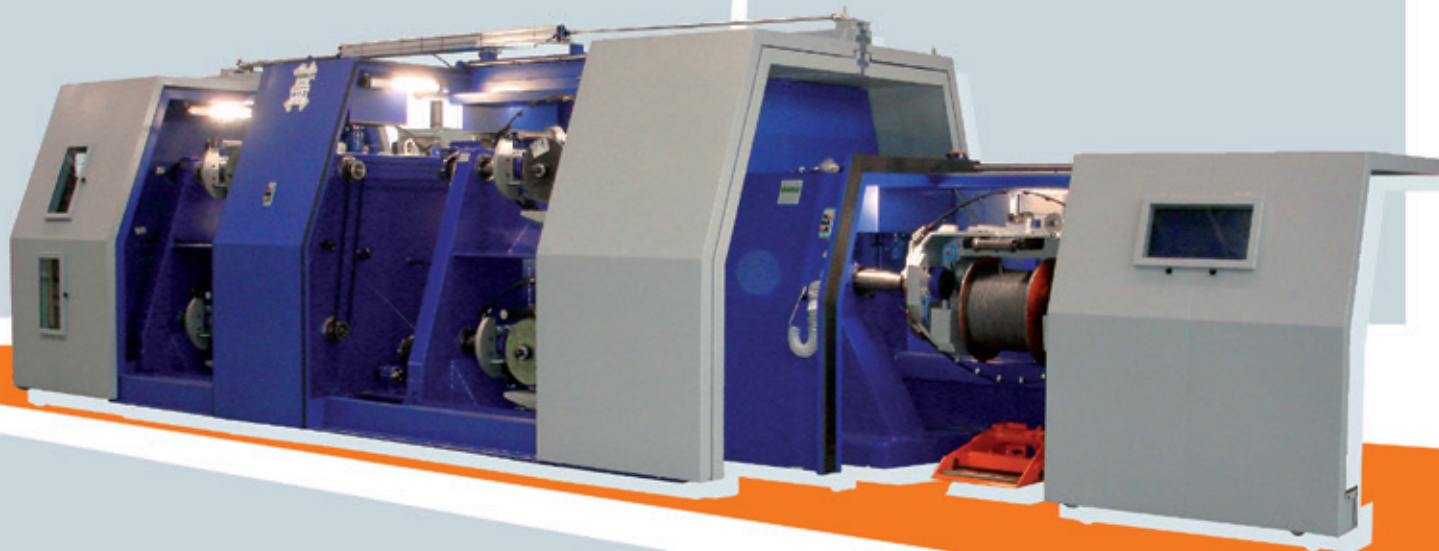

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Avert downtime with quick release adapters

ROBLON continues to introduce equipment and yarns.

According to Roblon it is time to re-think many of the processes in OFC production. Starting with the yarn server – one of its best known machines – Roblon is now offering a dramatic reduction of downtime related to exchange of spools.

Roblon introduces a new quick release adapter which, based on compressed air, makes it possible to exchange spools in only a few seconds.

Using Roblon quick release adapters, the spools are fastened simply by pulling a small collar. To remove the empty tube after finishing a production run, the adapter is released by compressed air.

An additional benefit of using the adapters is increased production speed since they are able to better fasten the spools and minimise vibrations. Combined with Roblon high-speed yarn spools, the maximum rpm of the yarn server can be increased by up to 50 per cent.

The adapters will be a standard option for new Roblon servers just as they will be available for upgrading of existing Roblon



▲ *Helping customers with the introduction of quick release adapters*

servers. For fully integrated production, you need fully integrated resources.

Roblon is a total solution provider to the cable industry, focusing on cable-making machinery and industrial yarns for cables. Roblon's extensive knowledge of industrial fibres and related machinery ensures a unique position in the OFC industry.

As the company can supply both product

groups, Roblon's customers experience a strong technical support and reassurance of a smooth production.

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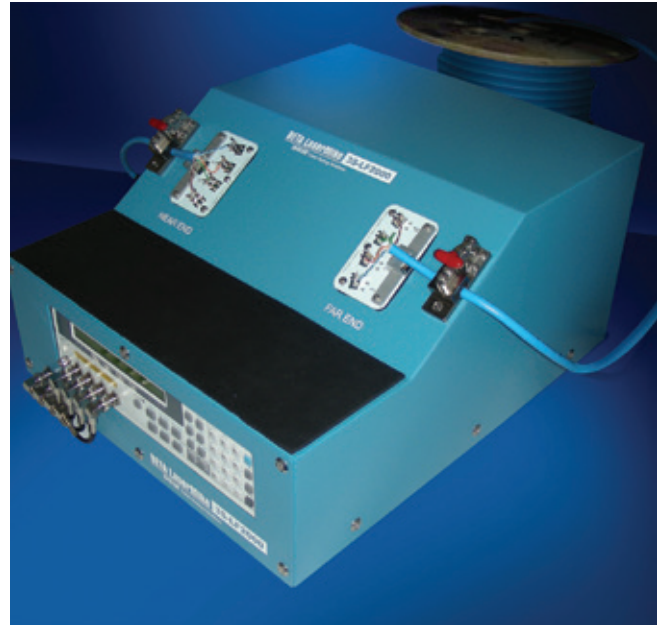
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▲ DCM Model 3S-LF2000

Meeting measurement demands

BETA LaserMike continues to meet the measurement demands of cable makers by announcing the latest solution in high-speed, low-frequency cable testing.

The new DCM Model 3S-LF2000 measurement system effectively tests the low-frequency (LCRG) primary transmission parameters of twisted-pair communication cables.

The DCM 3S-LF2000 by Beta LaserMike is suitable for testing data cables, control cables, instrumentation cables, and telecommunication cables.

It is capable of testing very long cable lengths up to 30km (18.6 miles). Because of its compact and flexible design, the DCM 3S-LF2000 can be used anywhere on the factory floor.

The system can be used alone or in conjunction with high-frequency transmission parameter measurement systems, such as Beta LaserMike's DCM ES-2G (2 GHz) and SCS-350B (600 MHz) LAN/data cable testing systems.

The DCM 3S-LF2000 consists of an LCR measurement apparatus and operating software combined with an automatic, solid-state switching (3S) system that provides fast, accurate and reliable test results.

Up to four pairs can be automatically scanned and measured with the results normalised for length and temperature, and compared against pre-programmed test limits.

The operating software is uniquely designed for cable testing, allowing the entry of cable length, conductor diameter, specification limits, and other administrative information.

The automatic, four-pair, solid-state switching system includes insulation displacement clips that eliminate the need for removing the conductor insulation.

The 3S-LF2000 also includes 5m extension cables for connection to short inner ends.

Beta LaserMike – USA
Website: www.betalasermike.com

Cost-effective solutions

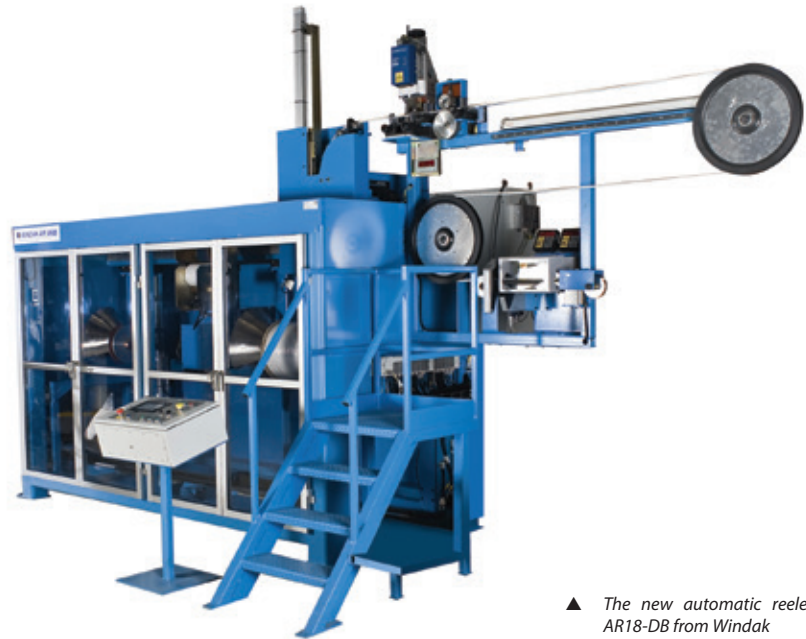
WINDAK specialises in automatic packaging solutions for the wire and cable industry and has offices in Sweden, USA, Australia and Estonia.

With thoughts on cost-effective solutions for customers, the company continuously designs innovative products such as the new automatic reeler AR18-DB and automatic spooler SW6-14.

At Interwire Windak introduced the new automatic reeler AR18-DB line, a fully automatic reeler developed for automatic packaging of cable and wire products on spools or reels between 216-460mm (8.5"-18") in overall diameter.

It can be run both in-line (direct connection with the extruder) and off-line and loads and unloads the empty reels automatically. This includes stretch wrapping of the spool to contain the cut end. Output of the machine is two reels per minute.

The SW6-14 is a dual head spooler developed for fully automatic packaging of cable and wire products onto spools between 165mm (6.5") and 360mm (14") in overall diameter. It can be run in both in-line and off-line applications. Full line integration can include an automatic



▲ The new automatic reeler AR18-DB from Windak

palletiser, film unit, pallet conveyor, reel labeller, test equipment and metre marking on the cable. The SW6-14 loads and unloads the spools automatically. The cut ends are secured with stretch wrap.

The SW6-14 uses the same reliable catch cut mechanism as the high-speed SW6

spoolers. This time-proven design allows for a stop time of approximately one second. The short stop time increases the line output up to 30-40 per cent against traditional spoolers.

Windak OU – Estonia
Website: www.windakusa.com

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Integration the way forward

PROFIBUS DP and Profinet IO industrial fieldbus standards have been used successfully for communication between devices of different manufacturers in automated production lines. With a new update to its Profibus DP interface, Zumbach is raising the usability of its devices to a new level. In addition, Profinet IO Industrial Ethernet is now available for the entire Zumbach family of devices.

In industrial production, numerous automation, engineering and visualisation systems are connected to a bus. The Profibus interface enables centralised control of all devices involved in the production process as well as many standard diagnostic functions – and all of this via a secure and fast connection (up to 12 Mbps). The cyclic collection and preparation and reliable evaluation of the measuring data via the interface has a significant effect on the standard of the quality monitoring.

Zumbach's communication via Profibus DP not only significantly improves the workflow between individual production units. It also requires little hardware (one engineering tool for all devices), reducing investment and service costs. Thanks to the bus topology, sensors can be coupled and uncoupled during operation.

Practically every Zumbach device is available for use in Profibus DP structures – directly or via a Profibus interface. Through the use of an intelligent Zumbach protocol, the complete functionality of each Zumbach sensor is fully supported from the initialisation step all the way to the actual data exchange.

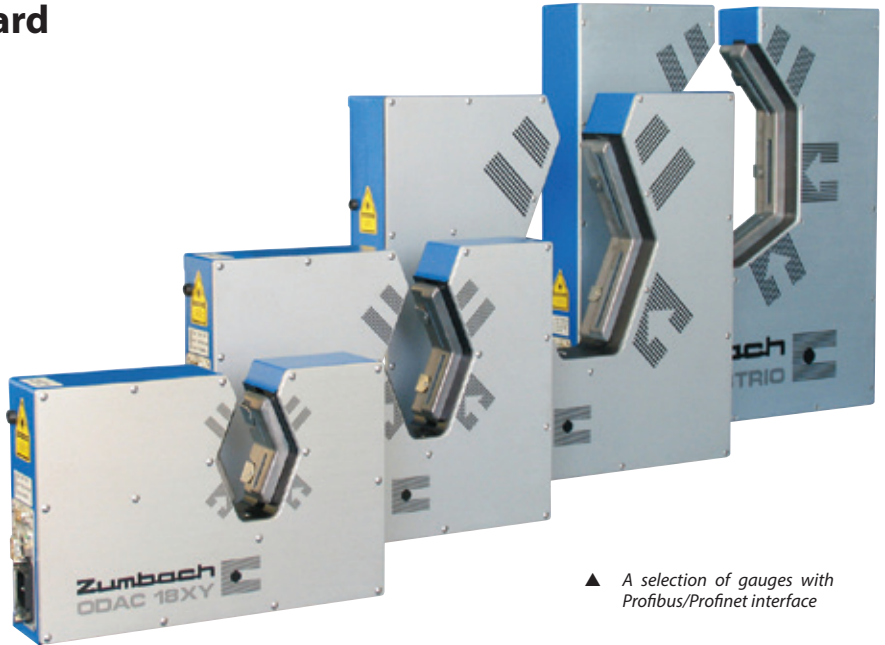
Second generation from Plasmait

Plasmait has introduced a second generation plasma annealer designed for wire, rope and tubes made of stainless steel and nickel alloys and with cross-sections from 20mm² down to the smallest fine wire sizes.

This new concept allows for a radical increase of continuous annealing speeds of stainless steels and nickel alloys. In the fine wire sizes it is possible to conduct annealing of austenitic stainless steel wire at speeds up to 15m/s. At such speeds annealing can be performed in-line with drawing or rolling, substituting multiple lines of a traditional tube furnace.

Efficient energy coupling in the plasma process allows for a compact design of the plasma chamber and results in high-energy conversion efficiency. Annealing power is controlled instantaneously and with a high degree of accuracy via power supply.

This gives the operator the ability to target



▲ A selection of gauges with Profibus/Profinet interface

Specifically, the Profibus firmware has been adapted and the GSD file has been significantly improved. Now it provides for an easier, faster and more cost-effective installation:

- Easy drag-and-drop installation: install device-specific language version of the GSD file (DE, FR, EN), then drag the Zumbach device to the user interface of the customer.
- Actual value acquisition: operational readiness with two inputs thanks to device-specific parameters, very easy to add measured quantities/modules.

Profinet IO – the successor to Profibus DP – is designed for data exchange between Ethernet-based field devices.

The open Industrial Ethernet standard meets the increasing demands of automation reliably and sustainably with optimum flexibility, efficiency and performance.

The company has developed a new GSDML file for Profinet. This makes the implementation of Profibus and Profinet easy and practically identical.

Taking into consideration the compatibility with Profinet and today's standards, the communication of the Zumbach device families has been fundamentally revised, making it much easier to integrate them.

Zumbach Electronic AG – Switzerland
Website: www.zumbach.com



▲ PlasmaAnnealer for high speed annealing of fine SS wire

mechanical properties with a great degree of accuracy and provides greater flexibility in new product development.

Rapid heating and reduced time of recrystallisation result in fine grain size with uniform crystal structure in the longitudinal and transversal direction. This improves the material's susceptibility to cold working and its resistance to surface cracking.

Ion bombardment or ion sputtering on the material surface results in fine dry surface cleaning and surface oxide removal, which has proven to be particularly beneficial to applications with demanding surface requirements in sectors such as medical, welding or aerospace.

Unlike the traditional tube furnace, the plasma annealer can cold start production in a few minutes and can be stopped immediately.

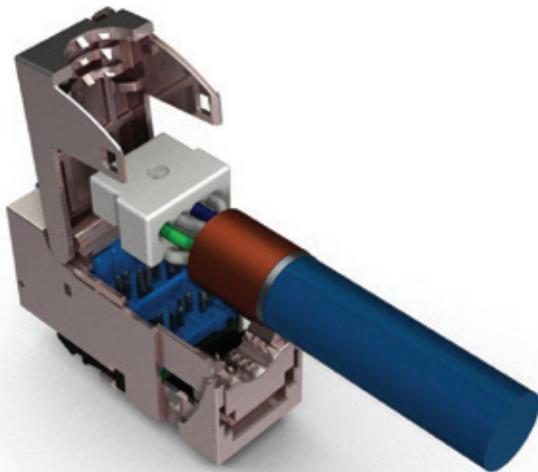
This avoids the lengthy heating-up and cooling-down times and associated energy costs that are symptomatic of a conventional furnace.

The gas cooling section in the plasma annealer has a closed loop design to minimise purging gas consumption.

Plasmait GmbH – Austria
Website: www.plasmait.com

The FutureCom™ is bright

CORNING Cable Systems GmbH & Co KG, part of Corning Incorporated's Telecommunications segment, has introduced the FutureCom™ xs500, the latest addition to the FutureCom EA product line – Corning's 10Gbit/s Ethernet copper cabling system.



▲ The back of the new FutureCom™ xs500

The xs500 is a fully shielded, standards-compliant Cat6A copper jack that offers deployment flexibility and quick installation for high-performance copper cabling projects.

The jack is durable, and its compact housing includes an integrated dust cover that can be closed when the port is not being used.

The xs500 is 14.5mm wide, and the narrow design allows the jack to support three port outlets, whereas most jacks support only two ports.

In floor boxes, the xs500 allows installers to put up to 12 jacks per box instead of only nine.

"Corning has a reputation for quality, and the xs500 can now offer the mid-market a complete end-to-end copper solution, which is affordable and doesn't compromise on the quality people have come to expect," said Jan-Sebastian Ziegler, manager LAN marketing,

Enterprise Networks, EMEA at Corning Cable Systems.

"The xs500 offers true value to the customer, is built to our usual high standards and is fully featured.

"We are confident it will be well received by the market and will raise the bar for the mid-market segment."

The low-profile, keystone footprint of the FutureCom xs500 is ideal for various installation scenarios, and the unit provides compatibility with a wide range of hardware options from outlets to panels.

The innovative two-piece design of the FutureCom xs500 helps make copper cable installation projects simpler and faster because no special tools are required to connect the cables to the jacks or install the jacks into the outlets.

With the mid-sized xs500 complementing the FutureCom EA range, Corning provides a total connection system for connector jacks, cables, outlets and panels, which helps eliminate the quality compromises of mixed source systems.

**Corning Cable Systems GmbH & Co KG
– Germany**

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The Chinese copper wire rod manufacturer, Eastern Copper, has already commissioned the second continuous copper wire rod plant from SMS Meer. The new CONTIROD CR 3700 is at the same time one of the largest and most modern plants of its kind in the country – with significantly improved sustainability compared with the previous technology. Fuel consumption has been reduced by 27%, and savings in electricity consumption total 67%. The plant has therefore been awarded the ecoplants hallmark as a particularly sustainable solution from SMS Meer.

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Wire tension monitoring in stranding machines

ANYONE who is familiar with the Indian cable industry understands the significance of high performance capability in a user-friendly package.

Products that include useless features, that are difficult to handle, and complicated to apply have a difficult position in this market. With that in mind, FMS has launched a new wire tension monitoring series for stranding machines.

A company that values high productivity while counting on advanced production facilities is the Indian Usha Martin group. The enterprise manufactures all styles of cables. Usha Martin's Wire Rope division has begun to modernise major production lines and modify its equipment to state-of-the-art levels.

Ease of retrofitting and operational simplicity was at the top of the requirements list for the RTMX42.

The RTMX42 series utilises force sensors to measure the tension of individual wires or strands, and then transmits the data wirelessly from the rotating to the static part of the machine. On the receiver side the system provides a sophisticated range of interface options for controlling or tension monitoring applications.



▲ A multi-stage planetary strander that was upgraded with FMS tension monitoring system RTMX42

It can be efficiently integrated into the existing communication infrastructure of the machine. RTMX42 is offered in five different sub versions:

- RTMX42.IOs for tension monitoring with up to 42 channels and analogue outputs to provide controlling capability
- RTMX42.PC: Tension monitoring with data processing and analysis capability (data logging, quality reports)
- RTMX42.PC/IOs combines the features of

the PC and IOs versions

- RTMX42.MODBUS makes the system very appealing for machine builders because of its fast bus interfaces. It allows real time control of breaks or drives in the machine
- RTMX42.PC/MODBUS combines all advanced features of the MODBUS and PC version.

FMS Force Measuring Systems AG – Switzerland
Website: www.fms-technology.com

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www.strecker-limborg.de

New FOC multi-pass cooling trough for loose tube lines

THE current trends in fibre optic cable manufacturing are all connected with the general optimisation of each step of the production process. In order to improve the performance of the cable, to reduce the costs of the final product, many technologies and devices have been invented to reduce optical loss, increase production speed and allow more flexibility in the manufacturing process.

In the buffer tube process new technological developments in equipment have been made:

- Improved high speed fibre pay off design with reduced footprint for space saving
- Special feeding section of the ROEX extruder was designed to optimise the process ability of the typical material used for loose tube production
- New development of the crosshead series RX for optimised material flow in the melt distributor in conjunction with a linear jelly needle guiding system for easier handling
- Multi-pass cooling through with integrated midspan- and exit capstan
- New generation of pulley clenching capstan SCC100 for accurate post shrinkage and EFL control especially for dry tubes.

Telescopic section: The distance from the crosshead to the cooling trough is adjustable. Additionally, the water in the first section is heated to allow an optimised temperature profile for different materials.

Straight section: The water temperature in the second section can be adjusted

Easy-to-use operation of mixing stations

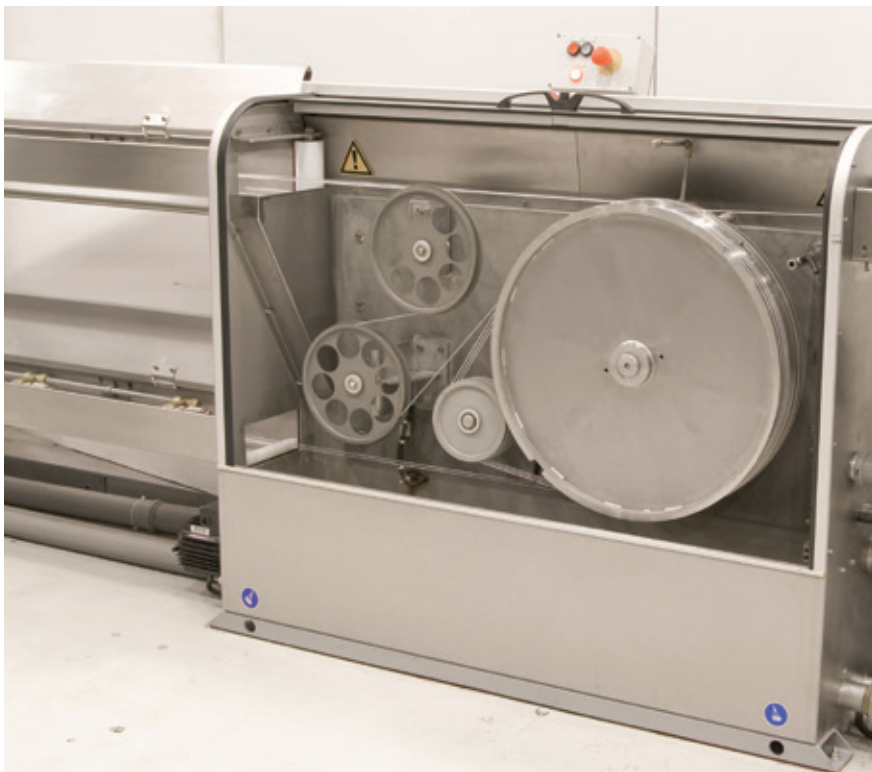
PLASTICOLOR volumetric and gravimetric mixing stations, in combination with extruder regulation and/or length/weight regulation, are being controlled by the tried and tested PPM II modules. New software has been developed to work on an industrial PC with touch screen.

A good number of mixing stations with this new touch screen control have been supplied to the market and the feedback from the customers is very positive.

On screen, the mixing stations and the components



▲ Be in control with the PPM II Smart Control from Woywod



▲ Multi-pass cooling trough from Rosendahl

independently from the first section. The shrinkage control capstan SCC100 is mounted on a rail system in this section of the cooling trough. Therefore the position of the SCC100 is easily adaptable for different product sizes or materials.

Multi-pass section: When the loose tube is entering the multi-pass cooling trough the product is wound around the driven single wheel capstan (mid-span capstan) several times. After that the product is repeatedly wrapped around the free-running deflection pulleys in

the spray cooled multi-pass section. At the exit of the multi-pass cooling trough the loose tube is wound around an integrated, tension controlled single wheel capstan (exit capstan).

This new design concept allows a reduction of the total line length of approximately 7.5m with the advantage of no limitation in cooling capacity at higher production speeds.

Rosendahl Maschinen GmbH – Austria
Website: www.rosendahlaustria.com

displayed in a graphic presentation. The complete operation is done via the touch screen, without mouse and keyboard.

- Based on the graphic display the functions are self-explanatory and all functions of the mixing stations can be done intuitively.

In order to handle larger extrusion lines (co-extrusion lines), the industrial panel PC is available with 10", 15" and 19" displays.

The panel PCs with touch screen display are being mounted in cabinets and in conformity with VDE and/or UL regulations.

In the same cabinet a main power switch, as well as short key push buttons for the functions mixing station start/stop and/or extruder regulation on/off can be mounted.

The LEDs of the push buttons will give the actual status. For the panel PC a separate power switch and two USB ports are mounted.

The cabinet can be supplied in various versions (for mounting on a wall or swivel arm), as per the requirements of the customer. It is also possible that existing PPM II controls can be upgraded with this operation through a touch screen.

Woywod Kunststoffmaschinen GmbH & Co Vertriebs-KG – Germany
Website: www.plasticolor.de

Linear drives on plain shafts

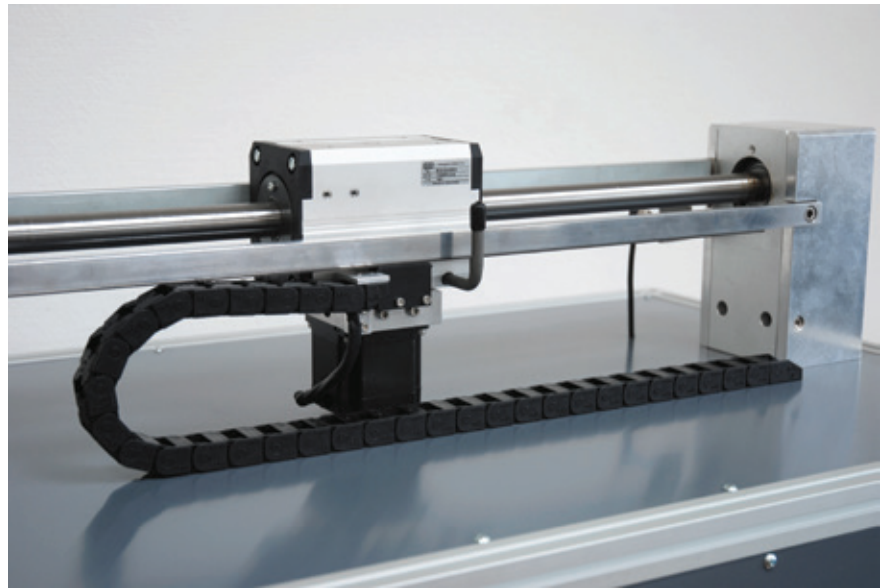
FOR more than 60 years, Joachim Uhing KG has been successful with linear drive technology, above all with the RG rolling ring drive invented by the company founder. In 1983, the RS linear drive nut was added to the product range. Both products operate as non-positive linear drives on plain shafts.

The previously mechanical elements were fitted with in-house, intelligent controls so the customers can purchase turnkey systems from Uhing. At Intec in Leipzig and Hannover earlier this year, Uhing showcased two product studies on this topic.

One of the studies focused on the Uhing RS linear drive nut. The prominent features are the lack of backlash and the excellent sealability. The linear drive nut is equipped with a position sensor system.

On the controller, the user can set the start position, the travelling distance, and the travelling speed. The position sensor system used in this application has a positioning accuracy of $\pm 0.1\text{mm}$; higher resolutions are possible.

The second study focused on the RG



▲ Product studies by Uhing at two exhibitions already this year

rolling ring drive. The linear direction of travel can now be changed individually without interfering with the mechanics while the shaft continues rotating in the same direction. In addition, a wide range of stroke speeds can be set almost continuously with the shaft rotating at a constant speed.

The gear pitch can now be set with a stepper motor in dependence of data provided by connected sensors, or by direct user input.

Joachim Uhing KG GmbH & Co
– Germany
Website: www.uhing.com



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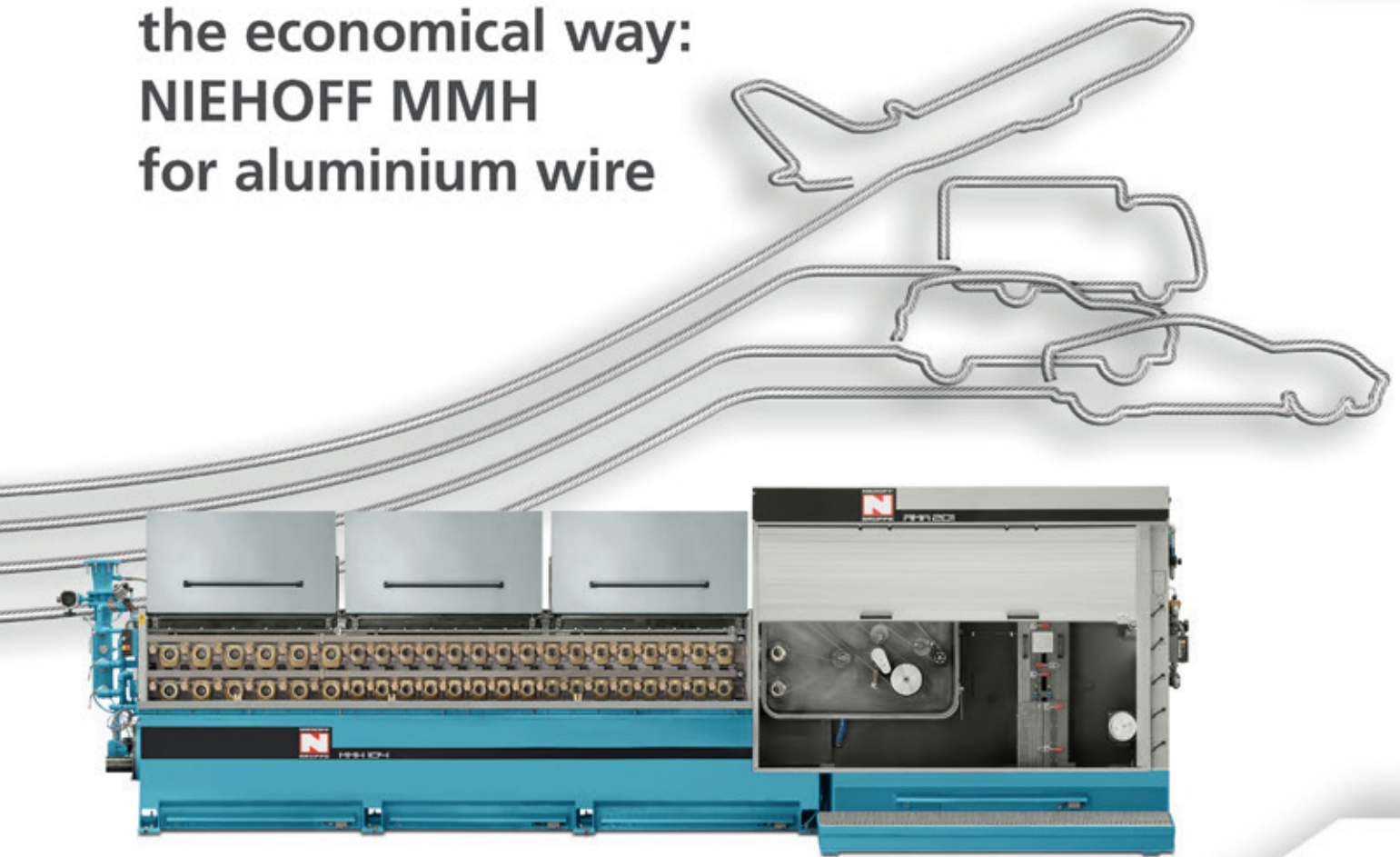
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As our customers confirm, using a NIEHOFF MMH line enhances product quality while reducing the number of production stages: drawing and annealing are done in-line as a single process, and the aluminium wire can be wound directly onto plastic spools. This permits the simultaneous achievement of high production speeds and a constantly high quality level.

Visit our website to find out more about NIEHOFF aluminium multi-wire drawing with MMH lines.

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More than a century of experience

COMPANY founder FG Theis started production of flat wire and profiles more than one hundred years ago – and Theis now rolls wire in thicknesses from 0.15 to 5mm at widths of 1-50mm in all customary grades and qualities. The Germany-based company values itself on highly precise and varied flat wires, narrow steel strips and complete profiles.

Theis has stringent tolerances, seamless edge shapes, linear straightness and absolute flatness in its flat wires.

Sophisticated calibration ensures that the company can also provide a number of edges, natural edges, cut, rolled or chased and can also manufacture special edges in accordance with technical drawings.

Theis – Germany

Website: www.theis.de

Keeping cool for over 20 years

For more than 20 years, High Temperature Textiles has been specialising in high temperature resistant textiles and heat resistance hoses for the iron and steel, ceramic and glass, and furnace and plan construction industries.

The fire protection sleeving HTT Fireproof 1300 is a suitable protective cover for hydraulic and pneumatic leads, electric cables and rubber cooling water hoses.

It also provides protection against high temperatures, hot sparks, direct flame and liquid metal splashes. The company also provides high temperature cloth and tapes.

High Temperature Textiles GmbH – Germany

Website: www.hightemperaturetextile.de



▲ HTT Fireproof 1300



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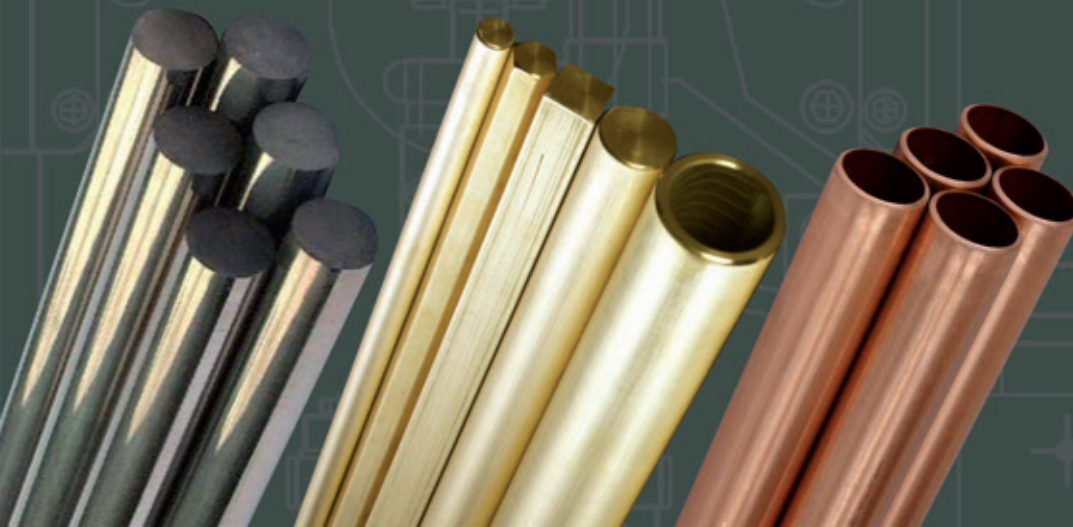


High technology plants for rods, bars, shapes and tubes in the ferrous and non ferrous metal industry:

- continuous casting machines
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Tried and tested system

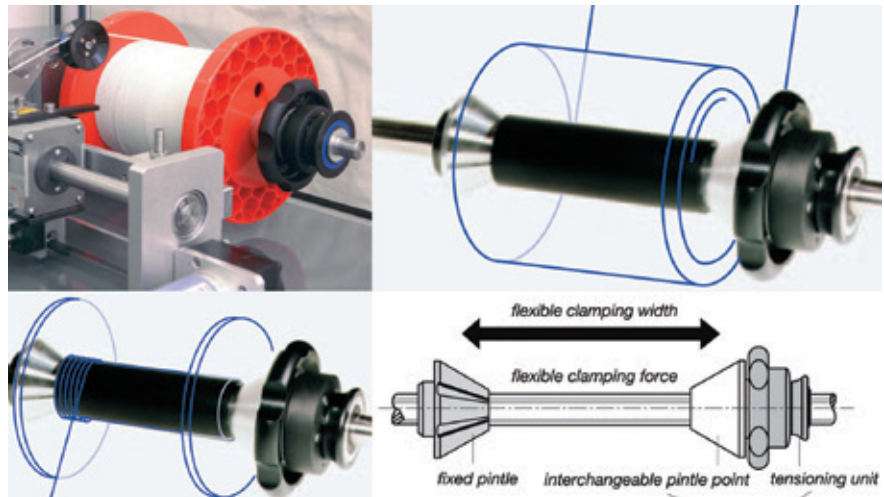
THE Uhing-Easylock®, available from Techna International, provides a tried and tested system for the secure clamping of items (spools, reels, etc) onto rotating shafts, in a range of sizes for shaft diameters of 10, 15, 20, 22, 25, 30, 35 and 40mm, with tension from 400N on the smallest unit up to 5,000N on the largest unit.

The units comprise a fixed cone, an interchangeable cone point and a tensioning clamping ring, which is increasingly offset to the shaft with which it engages, in response to axial or tensioning forces, so creating an increasing friction contact. The greater the tensioning force, the greater the clamping effect of the ring.

As the item is held firmly between the fixed cone and the clamping cone, braking moments are able to be transmitted from the shaft to the item being clamped, allowing fast stopping of the machine if a fault occurs.

These units provide several advantages including:

- Single-handed operation for assembly and disassembly
- Shortest possible changeover times
- No tools required



▲ The shaft clamping system from Techna

- High tensioning forces on a plain, round, greaseless shaft
- Suitable for use with driven shafts
- Emergency stop secure
- Maintenance-free
- Suitable for static applications
- Resistant to vibration

For less arduous clamping operations, Techna provides two ranges of spool clamping collars both with single-handed, quick release operation, without the need for tooling. The Uhing "U-Clip", in a range of

shaft diameter sizes of 8, 10, 12, 15, 16, 20 and 22mm, utilises a clamping ring which is offset to the shaft to provide clamping forces from 200N to 320N depending on size.

The Fastlock range is available in 15 metric shaft diameter sizes from 10mm to 56mm and in 14 imperial sizes from 0.375 (3/8") to 2".

Techna International Ltd – UK
Website: www.techna.eu



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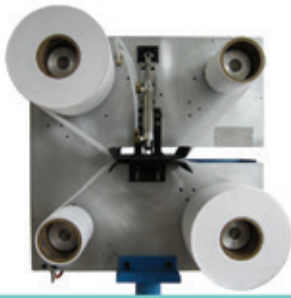
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Enable® technology boosts bending durability

NEXANS has launched an innovative range of remote operated vehicle (ROV) tether cables, known as Enable® that incorporate bending-optimised Dyneema® fibre as the strength member. The development offers a major increase in the bending fatigue resistance of tether cables, which is an important step towards more cost-effective ROV operations.

The tether cable is a flexible, lightweight cable that provides the physical connection between the ROV and its tether management system (TMS), transmitting electrical power and optical signals and carrying mechanical payloads.

During operation, the cable is subjected to small bending diameters and relatively sharp directional changes in the TMS as well as vehicle motions. This causes the synthetic fibres used as the strength member to mechanically deteriorate, resulting in the need for regular re-termination of the ROV tether cable.

The key innovation in the development of the Enable® cables is that the aramid fibres previously used as the strength member have been replaced by high-performance bending-optimised Dyneema® fibres. Extensive fatigue testing has demonstrated that the new Enable® cables have a bending durability that is several orders of magnitude better than conventional cables.

ROV operators can utilise the improved bending performance of Enable® cables in a number of ways, depending on their strategy. It is immediately apparent that they can ensure a prolonged mechanical lifetime when deployed on existing systems, with the increased intervals between re-terminations offering more cost-effective operations. Enable® cables could also offer a similar mechanical lifetime on smaller systems.

Furthermore, the use of the bending-optimised strength element offers greater flexibility in the design of ROV tethers in the range of 20 to 45mm outer diameter.

One option is to use fewer strength members to reduce the overall outer diameter. Another alternative is to use the reduction in specific weight offered by the Dyneema® fibres to incorporate more copper conductors, reducing voltage drop to achieve longer excursion lengths.

Nexans – France

Website: www.nexans.com

Cable carrier chain and leads

A safe cable carrier system consists of a number of different components. For the user this means a rather complex process in which the individual components must be perfectly matched in order to be fully functional.

For the customer, a reliable and much less troublesome solution which is also optimised in terms of costs, are ready-to-install complete systems. Such systems are offered by Tsubaki Kabelschlepp under the brand Total Trax.

In machine and plant engineering the demands on technical parameters and performance are increasing – and this also applies to components or assembly parts such as cable carrier systems. Cable carrier systems can be found in all automated processes.

Tsubaki Kabelschlepp – Germany

Website: www.kabelschlepp.de

New Medalist® compounds

THREE new thermoplastic elastomer (TPE) wire and cable compounds from Teknor Apex combine the rubber-like durability and flexibility valued by hospital and clinical professionals and the high degree of purity required for meeting stringent medical standards.

Medalist® 8421, 8431 and 8451 elastomers can be used for insulation, jacketing and moulded fittings and connectors. They have Shore A hardness levels of 92, 69 and 82, respectively, a flammability classification of HB (UL-94), and a maximum continuous operating temperature rating of 105 °C (UL-1581).

The three compounds retain high levels of tensile strength, tensile modulus and elongation after autoclave, gamma irradiation and EtO sterilisation. They are resistant to the cleaning solutions commonly used in medical facilities.

The new TPEs are analogues to specific Elexar® non-medical wire and cable compounds from Teknor Apex and provide comparable properties, but they are manufactured in an ISO-13485 facility dedicated to Medalist medical elastomers. Medalist® 8421, 8431 and 8451 compounds pass ISO-10993-5 cytotoxicity



testing, are RoHS- and REACH- compliant, and are free of animal-derived materials, phthalates and latex proteins.

“The new Medalist elastomers for wire and cable provide rubber-like toughness and elasticity and, unlike

rubber, are readily recycled,” said Keith Saunders, senior market manager for the thermoplastic elastomer division of Teknor Apex.

Teknor Apex – USA

Website: www.teknorapex.com



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Shanghai Electric Cable Research Institute, China

Tensile testing of overhead optical fibre cables

OVERHEAD optical fibre cable systems have become a key factor in telecommunications networks used by operators and power utilities. They are popular since no civil works are required to implement them and the rights of way have already been established, so it is possible to minimise costs and, importantly, the time required to get the network up and running.

Optical cables are available in a variety of configurations: composite optical ground wire systems (OPGW) for installation on high voltage electric lines; self-supporting optical cable systems (ADSS) for all types of lines including electric lines, overhead distribution lines for railways, etc; optical cable systems lashed to the ground wire or the phase cable on the electric lines and composite optical phase cable systems (OPPC), for high voltage electric lines.

Overhead cables are subject to a wide range of environmental conditions and factors such as wind, temperature and ice can result in elongation and/or compression of the cable which can lead to increased signal attenuation or even breakage. It is therefore essential that mechanical properties including tensile strength of the cables are measured as part of the manufacturing quality assurance procedure to allow the publication of accurate specifications for mechanical and environmental properties as well as optical performance.

Tensile testing of optical cable is one of the more difficult mechanical tests to undertake due to the long cable length and potentially high forces required. However the International Electrotechnical Commission has published an international standard (IEC-60794-1-2 Method E1) to specify the requirements for this testing.

This test simulates conditions that could arise during and after installation, and simultaneous measurements of attenuation and elongation strain are recorded versus tensile force. It is a non-destructive test where the tension applied is within the operational values for the cable.

The image above shows an experimental arrangement for the tensile testing of optical fibre using a special 'pogo'-style configuration of the LR30KPlus twin column materials testing machine from Lloyd Instruments. The LR30KPlus is suitable for testing applications up to 30 kN (6744 lbf). The crosshead can be driven over a wide speed range of 0.001-508mm/min (0.00004 to 20"/min) and the instrument uses high accuracy interchangeable XLC Series load cells for tension, compression and cycling through zero force measurements.



▲ Tensile testing assembly for optical fibres

It has a high stiffness frame which incorporates a crosshead guidance system to prevent side loading of the test sample. Normally, tensile tests are carried out on a sample mounted in a suitable test jig which has one part affixed to the load cell and the other attached securely to the base of the instrument. This is not practical for optical fibre testing due to the long lengths of fibre that must be tested, so in order to couple the LR30KPlus to the horizontal optical fibre pulley arrangement, a 'pogo' arrangement of the LR30KPlus is used.

The tester is mounted horizontally to a rigid frame with a rod fitted to the bottom of the load cell and this runs through a linear bearing in the lower crosshead and connects to the frame containing the end pulley which is mounted on rails. This allows a uniform tensile force to be applied to cable under test via the pulley.

The tensile test is set up as a completely automated measurement. The cable is paid out around the pulleys so that a pre-determined length (between 50 and 80m) is available. The ends of the cable are firmly secured so that they are fixed when tension is applied. Individual fibres in the cable under test are attached to an instrument to measure signal attenuation during the test, typically an optical time-domain reflectometer.



▲ 'Pogo' arrangement for LR30KPlus twin column materials testing instrument

The LR30KPlus applies a tension load to the end pulley on its rails such that the load is transmitted evenly along the entire length under test and measures the elongation of the cable. Some testing involves applying load at pre-determined strain rates and holding the load at an elevated level as the cable stretches. IEC-60794-1-2 Method E1 sets out the pass/fail criteria for optical fibre tested in this way.

These are:

- Under load, the fibre attenuation is not increased more than a predetermined value, typically 0.05dB over the fibre length measured
- Under load, the fibre does not elongate by more than a pre-determined value over its initial length. The allowed elongation under installation load is typically 0.25%
- A complete materials testing solution

The tensile testing of optical fibre described here provides a perfect example of the versatility offered by the Lloyd Instruments range of single or twin column universal materials testing machines. The instrument range offers versions allowing precisely controlled tensile or compression forces to be applied to a maximum values ranging from 1kN (225lbf) to 150 kN (33,722lbf), meaning that the most appropriate testing machine can be chosen for the required application.

Universal testing machines are so called because they can be adapted to make an extraordinary range of measurements by using a wide variety of grips and fixtures that accommodate a huge range of sample types, shapes and sizes so that the forces can be applied in different ways.

NexygenPlus materials testing software ensures fast, reliable and powerful testing and data analysis. As described earlier, testing of large products places special demands on the instrument. In addition to the 'pogo' version described, extended column versions of the instruments are also available which increase the crosshead travel range to allow the testing of high elongation, ductile materials or longer than normal test specimens.

For extra large or awkwardly shaped samples which do not fit within the standard working area of a test machine, purpose built compression cages can be supplied for most instruments in the range. The test machines are mounted on top of the compression cage, whose dimensions and size depends on the individual application and required specification.

Lloyd Instruments Ltd – UK
Website: www.lloyd-instruments.com

Focus on

France & Spain

**Knowledge, experience
and customer service pays off
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▲ *Ideal solutions for your copper production problems*

Experience counts

With decades of experience, Conductix-Wampfler machinery is recognised worldwide for its tension control, high speed solution, excellent traversing, reliability and innovative equipment.

For bare fibre optic production, the company has complete draw towers including pre-form handling units, furnace, cooling tubes, fibre spinning units, capstans and dual winders, etc.

For copper production Conductix-Wampfler has a unique rollertwist stranding line, concentric and longitudinal taping units, motorised pay-off and take-ups, gantry pay-offs and take-ups, rotating capstans, caterpillar, flyers and accumulators, etc.

Customer satisfaction is the company's main objective with innovative solutions to achieve its aims.

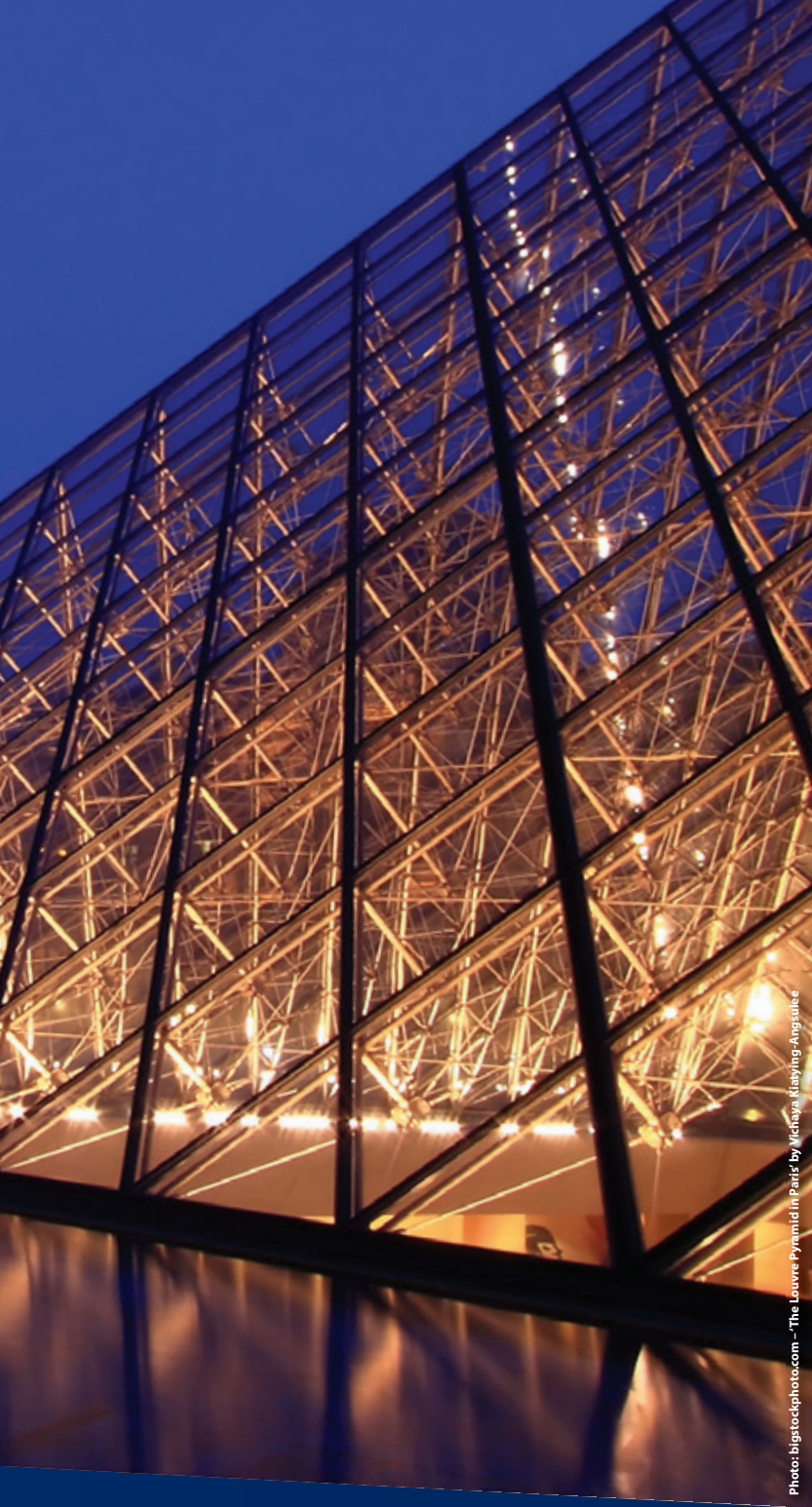


Photo: bigstockphotocom - 'The Louvre Pyramid in Paris' by Jichaya / ianqing-Angoulie

geophysics and IT, and is now qualified by the aircraft industry.

NPCCA (nickel plated copper clad aluminium) and SPCCA (silver plated copper clad aluminium) have been especially developed for the aircraft industry by FSP-One. This new generation of conductors are now available as standard industrial products and are already being used by Airbus in the A380.

The CCA conductor offers a competitive advantage over classic copper conductors. This allows the reduction of more than half the weight of cable while keeping optimum performance. These excellent performances are now moving to other applications such as automotive.

FSP-One has had a presence in Russia for more than 15 years and is a recognised partner on the Russian market. FSP-One has proven to be a dynamic and innovative company and is ready to move forward with its customers and the markets to provide the best service, quality and efficiency.

FSP-One – France
Website: www.fsp-one.com

Expanding on a global scale

Cersa-MCI is a French company with more than 30 years' experience in the measurement and control instruments.



▲ Some of the range on offer from Cersa-MCI

The product range includes:

- Optical fibre: A complete line of measurement instruments for a full in line quality certification: LIS-Glass, LDS-T, CM5 (Coating Monitor 5 axes), NCTM, and CIM PC software
- Fine wire: LDS (high accuracy diameter measurement) and accessories, 1 and 2 axes, high frequency measurement)
- Cables and rods: LPS, LPS-H, (1 or 3 axes) fast or ultra fast diameter measurement
- Surface Quality Check: Advance: SQM-fine (for fine wire, optical fibre).

All these products are the result of customer demands and close cooperation between industry experts and

This, coupled with price competitiveness whilst retaining the quality, makes Conductix Wampfler an appealing client for production needs.

The integrated mechanical, electrical and PLC design departments are one of the key points of the company's flexibility and constant improvement.

Conductix Wampfler France SAS – France
Website: www.conductix.com

Innovative and specialised

FSP-One is well known worldwide as a specialised and innovative company in the production and sale of speciality conductors.

Green6° is still developing strongly and reveals itself as the best new RoHs alloy to replace the classic alloys such as cadmium copper. Green6° is already used in high technology markets such as



Photo: bigstockphoto.com – 'Cibeles fountain in Madrid' by Rob Wilson

Cersa-MCI engineers, to improve in-line continuous production checks and quality certification, to reduce off-line checks and costs.

Cersa is constantly involved research and development activity in cooperation with customers in the fibre optic and wire and cable industries, with the objective to extend the product line for these industries in order to meet most of their metrological and production quality control.

For the last 20 years, 40 per cent of Cersa's labour cost has been spent on advanced research and development programmes, resulting in several international patents.

In order to maintain and extend its position on the world market and broaden product awareness, Cersa is developing an extensive representative network and setting-up local production and maintenance units, to ensure closer customer service.

At the start of 2013 the company set up its Chinese maintenance and support office in Wuhan, and is currently moving into America, the Middle East and the former Soviet bloc market with an extensive product range.

Cersa-MCI – France
Website: www.cersa-mci.com

Full range of stranding and cabling equipment

C M Caballé sa specialises in manufacturing and designing rotating machinery for the wire and cable industry. Since 1944 the company has consolidated its leadership through technology, quality, honesty and professionalism.

Caballé engineers combine more than 60 years' experience in rotating machines with the state-of-the-art design, manufacturing, assembly methods and technologies.

The portfolio includes bunchers, stranders and cabling for power and control cables, telecom and LAN cables (metallic and fibre optics) and steel ropes.



▲ A rigid strander from Caballé

In recent years Caballe has focused its innovation and new developments in stranders for high transmission capacity energy cables. High voltage and extra high voltage cables have specific requirements that the Spanish company meets with its new products and services.

For underground high voltage cables: 127 wire rigid strander DIN 630 to produce compacted concentric conductors of copper and aluminium up to 3,000mm². Compacting by dies or rollers. Heavy duty capstan. Prespiralled sectors for Milliken conductors. Fully automatic loading system that reloads the 127 bobbins in less than 15 minutes.

Drum twisters to assemble the sectors to produce Milliken conductors up to 3,000mm². Rotating take-up specially designed for this application for reels up to 50 metric tons.

For overhead high voltage conductors: Rigid stranders DIN 630 or the new DIN 800 for aluminium alloy, ACSR conductors. Special forming heads for trapezoidal or "Z" shape wires. New DIN 800 rigid strander provides big advantages to overhead conductor manufacturers.

C M Caballé sa – Spain
Website: www.cmcaballe.es

France & Spain

Focus on

Wealth of experience

Baloffet has been manufacturing since 1870 and now has several subsidiaries the USA, UK and Germany, as well as a worldwide agents network.



▲ A range of dies from Baloffet

The company produces: Natural diamond dies from 6 μ to 3mm; synthetic mono-crystalline dies from 6 μ to 1mm; poly-crystalline (PCD) dies from 50 μ to 30mm; compacting, stranding and special shaped dies; enameling guides; extrusion tooling (guides and dies); special tooling with diamond insert and repolishing machines and equipment.

Baloffet's services include repolishing; training of operators/technicians in Baloffet training centre and showroom; training of operators/technicians at customer plant; and control and technical report of customers' dies.

The company is a quality partner, registered as ISO 9001-2000, giving you the surface conditions, accuracy of the diameters and the technical characteristics of your wires and cables.

A forerunner in manufacturing innovation (drilling, forming, sizing, polishing), tight controls of the products, customers get a constant manufacturing process which is a guarantee of reliability of its production.

Baloffet – France

Website: www.baloffetdie.com



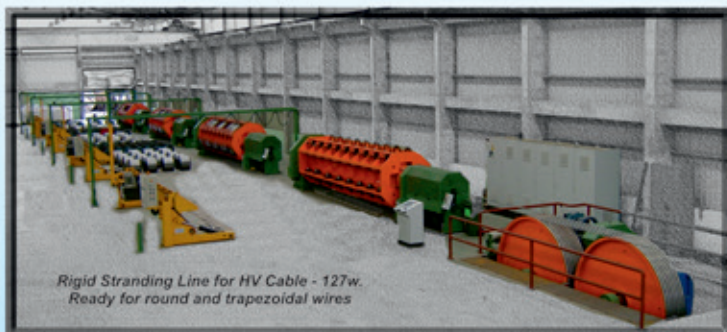
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▲ The Flymca and Flyro factory in Spain

Customised and innovative stranding solutions

Flymca is continuously manufacturing special solutions adapted to the global cable market. Its expertise range covers the complete set of machines for stranding and laying-up of conductors, cables and ropes, for the power field as well as for the steel ropes market.

The stranding technology, under unceasing development over the years, is one of Flymca's key areas of expertise. A huge technical knowledge helps customers to achieve their goals together with a full capability that covers from the research and development until the final delivery and the after-sales service going through the whole engineering, manufacturing, assembling, software and control, as well as installation and commissioning by experienced staff.

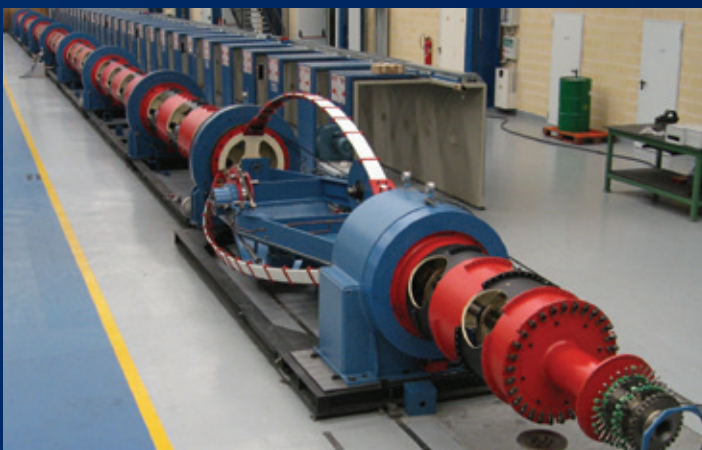
Among the latest deliveries are: A complete SZ line for laying-up HV conductors and producing cables up to diameter 150mm ready for off-shore wind farms, a tubular for 30 Bob with bulk-head for armouring optical fibre and a bow cabler with a motorised and precise tension control on each conductor. The company is currently involved in several different projects for HV underground cables.

Sister company Flyro has a huge inventory of used machinery for the wire and cable industry. Special offers can be made combining used and new equipment, revamped solutions that will modernise equipment, as well as utilising updated electrical solutions to achieve better and quicker production.

Composed of a skilled and experienced team as well as modern and large facilities, Flymca and Flyro can meet customer requirements for the wire and cable industry, matching needs and budget with top class and customised solutions.

Both companies will be attending wire Russia from 25th to 28th June (Booth 7-5A25); wire Southeast Asia in Bangkok, Thailand, from 17th to 19th September; and wire South America in Brazil from 1st to 3rd October.

Flymca and Flyro – Spain Websites: www.flymca.com, www.flyro.es



▲ A stranding machine from the company



Photo: bigstockphoto.com – 'Strasbourg, France by Xiao Peng

Complete range of machines

It was between 1865-1870 that Pierre Ferret polished the first diamond drawing die, whilst his son went on to manufacture the first tungsten carbide die in the world in 1929.

Today, Agir Technologies provides a complete range of tools for cold metal forming, and has more than 150 years' experience in manufacturing dies for the wire and cable industry.

The company provides a range of machinery, including internal horizontal die grinding machines; vertical machines with grinding and polishing process (diameter from 0.6 to 6mm), automatic feeding, management per computer; manual or automatic external grinding machines for steel pins; wire shaving machines; polishing lathes; and machines to clean carbide and diamond drawing dies. The company exports worldwide.

Agir Technologies – France
Website: www.agir-technologies.com

Wire cleaning for plating quality

The PWC-S system performs wire cleaning and polishing in-line with wire drawing machine at 6 to 12m/s (1,200 to 2,400 ft/min).

Exceptional cleanliness obtained permits wire direct brass coating, copper coating, and wire cleaning prior to heat treatment and coating applications including patenting, annealing, painting, plastic coating, etc.

The PWC-S wire cleaning system incorporates new technology which enables normal plant water to be converted into a unique multi-action high pressure wetting/displacement/flush cleaning liquid used to clean drawn wire at high-speed, providing a smooth and glossy wire finish in plating quality.

The PWC-S system effectively removes lubricant residue from the base material and is particularly recommended for cleaning applications with wires drawn upon severe conditions resulting in increased heat and burnt lubricant tightly bound to the wire surface and embedded in micro cavities.

The system can be used with an emulsion including a new

rust preventive additive diluted at 3-5 per cent concentration. The system provides the ultimate combination of simplicity and effectiveness: acid-free, caustic-free, without ultrasonic, without chemicals, hermetically sealed zero-emission system, no fumes, no foam.

Economical and environmentally friendly, the system provides significant process savings in production of clean wires. The PWC-S unit is compact and can be easily installed on the finishing/last block of a wire dry drawing machine.

Decalub – France
Website: www.decalub.com



▲ Wire cleaning by PWC-S system



bigstockphoto.com – 'Guell Park' – Barcelona, Spain' by Vladitto

Research pays off

Founded in 1948, Setic joined the Gauder Group in 1987. The company benefits from highly skilled engineering and research and development departments to develop new and improved cable manufacturing processes as well as



▲ The Setic machine workshop

innovative rotating machines, including bunchers, stranders, cablers, twinners, quadders, group twinners and taping machines.

The company offers complete solutions to produce high-quality LAN cables with enhanced performances (in one step or two steps according to product mix), low voltage conductors and cables, automotive cable, as well as instrumentation, special, data, telephone and control cables.

Setic is the first company in the world to implement around Unilay with double twist process and is also the owner of the patented triple twist technology. More than 8,800 machines are in production worldwide.

Setic has also created a dedicated department to answer market needs: customers satisfied with the bows equipping their Setic machines are requesting the same level of technology

for their other machine brands. This department was successfully launched in 2003.

Bow Technology by Gauder Group offers a complete service, from design work to worldwide express distribution, including conception, evaluation trials and upgrade of obsolete designs. More than 500 bow models are available for enhanced performance and extended lifetime of the equipment.

The brand also showcases its latest innovation at international trade shows, and the patented GreenBow is an exclusive design that attracts bare copper

producers looking for energy savings and top quality productions.

Pourtier joined the Gauder Group in 2002. Based in a suburb of Paris, the company develops state-of-the-art technologies to design and manufacture stranding lines, screening lines, drum twisters and taping machines.

Pourtier-made machines guarantee proven solutions for the production of all types of power cables, low and medium voltage and more specifically high voltage and extra-high voltage power cable from overhead cable (including ACCC™, ACSS-TW and ACSR-TW with trapezoidal wires) to insulated cable

AC type (using high quality Milliken conductor), or DC type (using large round compacted conductor or trapezoidal wires).

This represents the company's core business, in addition to flat conductors for transformers (paper covered, CTC)/ magnet wires, armoured cable and pipes (power, FO, oil pump for deep well, pipes) as well as control, instrumentation, special, data and telephone cables.

The company is also active in the submarine and umbilical cable market and is now supplying the largest armouring line ever made for large high voltage three core AC submarine cable. It is also supplying laying-up line for umbilical cable for one European marine cable maker.

The Pourtier range worldwide includes more than 1,500 lines in use (ie 10,000 individual machines) in production, 750 drum twisters for energy cable including HV (Milliken) and telecom cable, 150 rigid and planetary stranders for energy cable including HV and OPGW cable armouring and umbilical cables, and 2,200 taping heads for all applications including HV cable, transformer wire and special applications.

Setic and Pourtier, Gauder Group – France

Website: www.gaudergroup.com



▲ The Pourtier workshop

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NIEHOFF MMH for aluminium wire

The solution for efficient aluminium multi-wire production in the automobile and aviation industries: NIEHOFF MMH lines. For years NIEHOFF, the market leader in the field of multi-wire drawing of aluminium wire for automotive wire, has demonstrated using patented technique that aluminium wire can be produced efficiently, economically and with outstanding quality.

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Photo courtesy of Reber Systematic GmbH + Co KG

Wire cleaning technology & products

A lubricant is not a contaminant. Or is it?

In fact, when only whistle-clean wire will do, not even the thinnest shimmer of dry lubricant can be tolerated. When they are no longer essential to the protection of the drawing die, oils and soaps join scale and rust, oxides and dyes in the noxious category of things that must be expunged before the shipment leaves the plant.

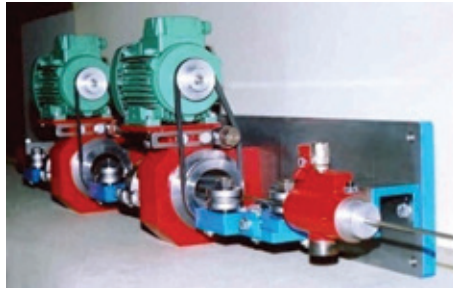
Despite the fact that wire – metallic, thin, frangible – is extraordinarily susceptible to attack from contaminants, zero tolerance for anything that might adhere to the wire surface is not a mere ideal. Expert and thorough cleaning is a condition of doing business in the wire making industry of today.

This is very well understood by the contributors to this section of EuroWire, whose skill sets run from acid to ultrasonic.

Wire green cleaning focuses on galvanizing

Advertorial on behalf of Decalub

Development of the wire Smooth-Brush (SB) dry cleaning system replaces the most costly operations in wire cleaning process, including acid and other wet chemicals, generating substantial cost savings, environmental benefits and improvement in productivity.



▲ Wire cleaning by the SB brushing system

For drawn wire cleaning, the SB system features in-line smooth ultra-fine brushing, operating with virtually no speed limitation. The system incorporates high density ultra-fine brush bristles that finely impact the wire surface, effectively separating lubricant residue from base material, evacuating dispersed contaminants by moving wire exiting the unit clean of white-metal appearance, providing clean wire that is ideal for galvanising and metallic and plastic coating applications, including Al and Cu clad wire.

The system provides an extra-clean product by transversal high-speed ultra-fine brushing all around the wire circumference with automatically controlled brush pressure, adjustable at will, and ensures unchanged wire physical properties with no residual stress induced.

In rod cleaning applications, the SB incorporates revolutionary new technology which continuously uses liberated rod scale converted into unique micro-abrading pressure pads, with load adjustable at will, to effectively remove residual solid contaminants from base material, making the product ideal for in-line dry coating/lubrication and direct drawing from mechanically descaled H/C and L/C rod (including 0.90%C). The SB system is recommended for use where the surface finish is of great importance. The system offers consistency and can benefit demanding applications including plating wire, cold-heading wire and H/C wire where the ductility is a prime focus, particularly in production of spring wire, bead wire, PC strand wire, etc.

Decalub – France
Email: info@decalub.com

Fax: +33 1 60 20 20 21
Website: www.decalub.com

Flux bath filtration

Flux bath in hot-dip galvanising industries must be filtered to improve quality. The iron concentration has to be maintained at a low level to avoid any problem in the treatment. Siebec, with more than 50 years' experience in the plating industry, has developed a filter system for flux filtration: P51 filter fitted with exclusive high load L-TECH pleated cartridges. This filter system will provide better filtration than a filter press. It can also be installed in series after a filter-press to clean the residual sludge and work continuously with a clean flux bath.

Advantages include:

- Reliable PP/glass-fibre filter chamber
- Economic first-class 50µ plated cartridges
- Cleanable and reusable cartridges
- Huge 20m² filtering capacity up to 40m³/hours per filter chamber
- Iron maintained below 1 gr/litre
- ZnCl₂ is not removed by filtration
- Consistent flux bath quality
- Sharply reduces iron in flux
- Reduces coating defects and rework
- Properly maintained flux bath can reduce immersion time, lowering zinc pick up and dross formation



▼ Filtered to improve quality

Siebec GmbH – Germany
Website: www.siebec.com

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Specialists in wire cleaning

For almost two decades GEO Reinigungstechnik (GEO) has specialised in continuous cleaning equipment for wire, cable and strip.

Whether in high-speed applications, the manufacture of medical products, in combination with plasma treatment or in the production process of fasteners such as bolts and nuts, GEO components and systems are used in a multitude of production and finishing stages.

Typical cleaning applications include the removal of oil, grease, stearates, soap and dust following the drawing process and final cleaning before further operations such as coating.

Demanding applications require wet chemical processes which are generally supported by compact high-performance ultrasound units and high-pressure nozzles to boost the cleansing capacity of the purifying agent.

Depending on the applications, further methods like steam cleaning and mechanically-supported washing, either separately or in any combination, are available. In less demanding applications, pure mechanical cleaning can be sufficient.

Perfect examples of the applicability of wet chemical systems are the contact-free cleaning of precious metal and aluminium alloy strips for the production of precision stamped parts, as well as the fully automatic cleaning of high-grade steel ribbon for the production of high temperature superconductors

(HTS tapes/wires). The high quality demands on the cleaning processes have been realised with proven GEO components, complemented by state-of-the-art systems for continuous bath monitoring, take-up and pay-off units and much more according to individual requirements.

The cleaning of high-grade narrow strips illustrates one facet, the Primary Wire Wipe (PWW) system is suitable for the less demanding requirements.

The principle is as ingenious as it is simple: the wire to be cleaned passes between two strips of absorbing tape material which move in opposite directions laterally so that a clean tape surface is continuously presented to the wire. In this way the wire does not come into contact with contaminated wipers as is the case when rags or stationary felt pads are used.

The PWW is suitable for wiping wire or strand with a diameter of up to 2mm or narrow tapes. Customised modifications of the PWW have proven successful in applying different types of lubricants and finishes, such as corrosion inhibitors, adhesion enhancers and welding wire finishing materials.

GEO's product range is completed by powerful air wipes and a wide variety of spiral brushes with metal and synthetic filaments.

GEO-Reinigungstechnik GmbH – Germany
Website: www.geo-reinigungstechnik.de

Filtration of high viscosity lubricants

Filtration systems are built to keep the operating fluid as clean as possible, ie they have to remove the particles loosened during the drawing operation. Pure filtration of coolants and lubricants will give the effect of higher productivity due to fewer wire breaks, less down time, lower wear of the dies and much better surface quality of the wires.

To achieve these goals, RESY developed and introduced the compact-band-filter (KBF), which has gained acceptance all over the world for more than 30 years. For high viscosity lubricants (larger than 120 cSt), which are mostly used for aluminium, band filters are not suitable. In these cases, the separation of the particles occurs by sedimentation in the system tank. This has to be cleaned on a regular basis.

▼ *The RESY filtration and supply system*



The sludge on the bottom is discharged together with a big part of the lubricant. Another effect of the fine aluminium filters is that the viscosity of the media increases. This higher concentration affects the whole supply and cooling system.

RESY's filtration and delivery system is especially developed for this application. The unit consists of a centrifuge, a delivery pump, a heater, cooling system and electrical control.

It is built modular to suit customers' needs and can be easily integrated in existing systems.

The lubricant is cleaned and cooled continuously during operation. The concentration of the particle in the lubricant stays at an acceptable level and ensures high quality of the wire and a consistent drawing process.

Maintenance efforts and discharge costs will be reduced by this new system and higher productivity achieved.

Reber Systematic GmbH + Co KG – Germany

Website: www.resy-filtration.com

Cleaning hand in hand with quality

The request for cleaning processes in the wire industry is continuously increasing along with increased quality requirements. Already largely used for stainless steel and for aluminium wire, ultrasonic cleaning is now also more often used in other processes (eg oil tempering line, galvanising lines, etc).

Oil tempering process is commonly used in the wire industry to designate a type of wire which receives a hardening and tempering treatment after it has been drawn to the desired size. The line usually includes:

- A furnace with tubes having a protective atmosphere
- An oil quenching bath
- A tempering furnace (in lead bath or fluidised bed).

The majority of existing oil tempering lines do not have cleaning baths at the entrance of the line as this is not absolutely requested by the process, but this leads to problems. The soaps or oil present on the wires burn in the furnace and clog the tubes. This requires a long cleaning operation and frequent replacement of the tubes. In order to avoid this hard operation, some of the major oil tempered wire producers have now installed a Sirio Wire cleaning line in front of their tube furnace. The pay-back of this technology has been demonstrated. The operation cost of the cleaning line is largely compensated by the savings in tubes and production losses due to tube cleaning and replacement operations.



▲ General view of a Sirio Wire ultrasonic cleaning line

Ultrasonic cleaning is the use of high frequency sound waves. During the activity called cavitation, micro-size bubbles form, grow and implode due to alternating positive and negative pressure waves. Just prior to the bubble implosion, there is a tremendous amount of energy stored inside the bubble itself. The implosion event occurs near a hard surface and changes the bubble into a jet which travels at a speed of approximately 400km/h towards the hard surface. Because of the inherent small size of the jet, ultrasonic cleaning has the ability to reach into small crevices and effectively remove entrapped soils. The basic components of an ultrasonic cleaning system include some ultrasonic transducers, an electrical generator and a tank containing the cleaning solution. The ultrasonic generator converts a standard electrical frequency of 50 or 60Hz into the high frequencies required. The higher the frequency, the smaller the bubbles created during the cavitation will be.

The transducers are constituted of PZT elements (Pb-Zr-Ti) which converts the electrical energy in mechanical vibrations by the piezoelectric action. The transducers are installed inside a watertight box made in stainless steel immersed in the cleaning bath and located some centimetres below the wire field. A watertight cable connects the transducer holding box to the generator. The working temperature has a profound effect on ultrasonic cleaning effectiveness. In general higher temperatures will result in higher cavitation intensity and better cleaning. However, if the solution temperature approaches the boiling point of the solution, the liquid will boil in the negative pressure areas of the sound waves, reducing or eliminating the cavitation effect. Sirio Wire's temperatures of around 60°C (140°F) offer an excellent compromise.

For the construction materials, Sirio Wire recommends that the baths be made of polypropylene with one reservoir and one overflow bath in order to avoid any inflexion of the wire. One vertical pump transfers the solution from the reservoir to the overflow bath. In order to avoid any down time, a standby pump should be installed. After the cleaning operation, it is necessary to thoroughly rinse the wire in order to remove the chemical residuals. Sirio Wire has developed a special system working with water under pressure allowing the best rinsing effect. All Sirio Wire equipment is fitted with special mechanical drop trap and very effective air wiping devices to limit to the minimum the liquid drag out.

Sirio Wire Srl – Italy

Website: www.siriowire.it

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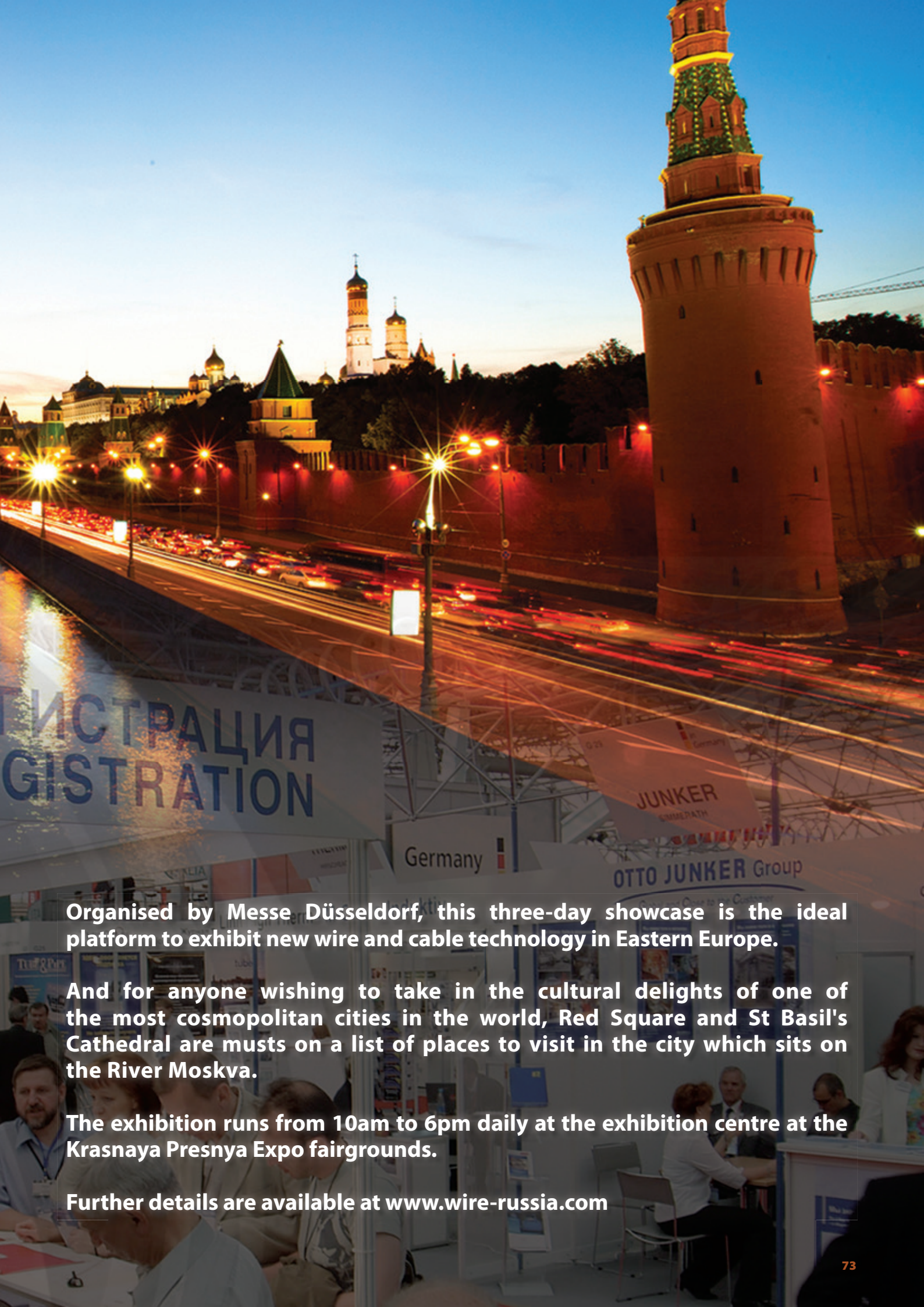
wire Russia 2013



SIGNIFICANT changes have taken place in Russia since the fall of the Soviet Union, moving to a globally-integrated economy and, certainly, one of the most forward-thinking in the world.

With more than 25 per cent of the population working in the industry sector, it comes as no surprise that wire Russia is an eagerly anticipated exhibition for companies wanting to gain a foothold in the local market.

Held every two years, the show at the ZAO Expocentr Exhibition Centre, Moscow, from 25th to 28th June will feature more than 250 exhibitors and is expected to attract more than 10,000 visitors.



Organised by Messe Düsseldorf, this three-day showcase is the ideal platform to exhibit new wire and cable technology in Eastern Europe.

And for anyone wishing to take in the cultural delights of one of the most cosmopolitan cities in the world, Red Square and St Basil's Cathedral are musts on a list of places to visit in the city which sits on the River Moskva.

The exhibition runs from 10am to 6pm daily at the exhibition centre at the Krasnaya Presnya Expo fairgrounds.

Further details are available at www.wire-russia.com



Alphabetical list of Exhibitors

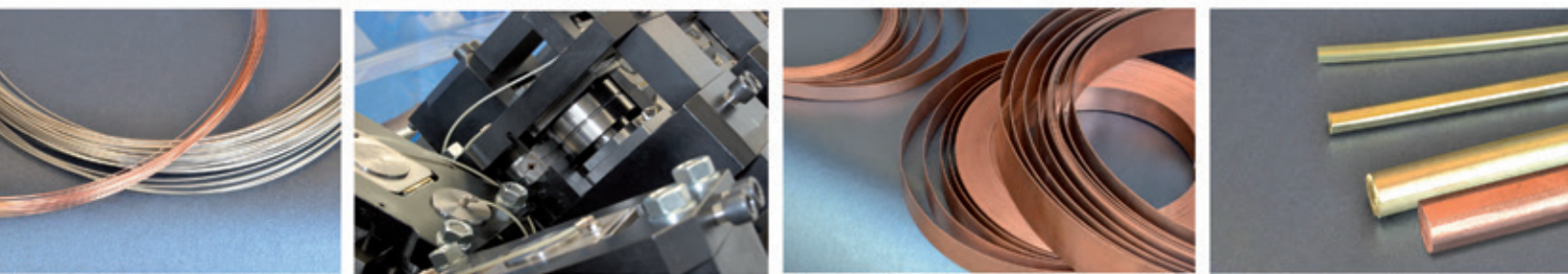
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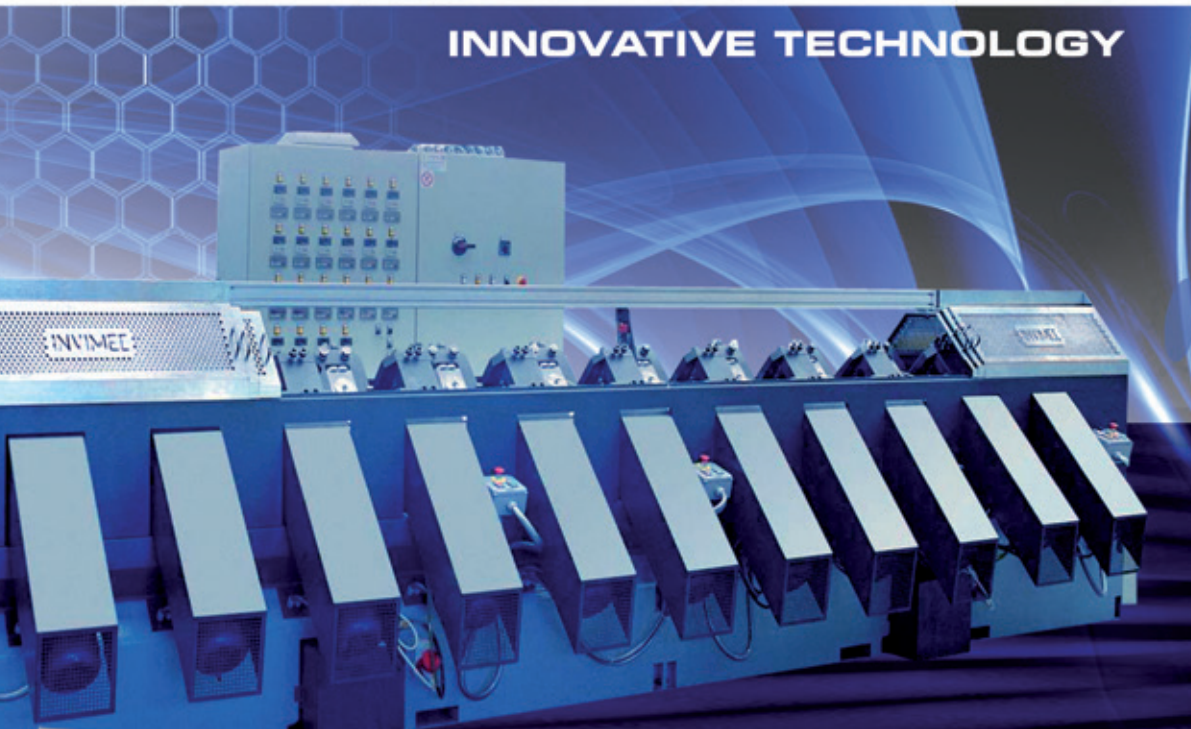
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Anbao (Qinhuangdao) Wire & Mesh Co offers armouring cable strip (tape), supplied as 50-60g/m² and 210g/m² and zinc coated on four or two sides in widths from 15mm to 100mm.



▲ Range of thicknesses for armouring cable strip

The cable comes in thicknesses of 0.2mm, 0.5mm, 0.8mm or 1mm. Elongation minimum is 10-30 per cent and the diameter inside the coil is 160-200mm. Outside diameter is 500-800mm.

Anbao (Qinhuangdao) Wire & Mesh Co Ltd – China

Website: www.anbao.com

Carl Bechem GmbH

Bechem develops, produces and sells high performance lubricants and additives all over the world. Its special solutions in the fields of speciality lubricants, industrial lubricants and lubricants for metal working and forming technology are based on the latest tribological knowledge.

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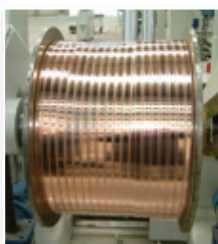
Besides the headquarters in Hagen, Bechem has two other production sites in Germany, in Mieste and Kierspe. In addition to that, its worldwide

distribution network allows it to develop markets all over the world. With daughter companies in France, India and Switzerland, as well as joint ventures in the USA, South Africa, Sweden and China, Bechem shows its international presence.

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Carl Bechem GmbH – Germany

Website: www.bechem.de



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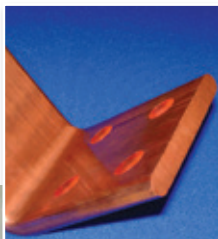
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- Low manpower
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Bogdany Petrol Ltd

Bogdany Petrol Ltd is a long-term and reliable manufacturer of Lunectra® products – cable filling compounds to be used for different cable designs.

Lunectra® products boast of high reputation not only in the Russian cable producing market but in Europe as well. The main characteristics of the products are the excellent water-blocking abilities and usage for different temperature ranges.



▲ Used for different cable designs

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Bogdany Petrol Ltd – Germany
Website: www.bogdanypetrol.hu

Bongard Trading GmbH & Co KG

Bongard Trading is a second generation family business that can look back on more than 50 years of experience in new machine manufacturing as well as several decades of experience in the purchase and selling of used machines for the wire, cable and rolling industries.

This includes the design and production of custom machines, the combining of new and used machines as well as the reconditioning of used machines.

The company is committed to the highest technological standards to ensure efficient production and reliable machines, with a guarantee of intelligent design solutions, ease of operation, standard replacement parts and minimal maintenance requirements.

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The company's strength comes from its international network and the close dialogue with customers around the world.

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Its polypropylene (PP) and polyethylene (PE) products continue to enhance society and address challenges such as providing

clean drinking water and sanitation to millions of people around the globe and safe, light, energy-saving components for cars.

Borealis Group – Austria
Website: www.borealisgroup.com

BWE Ltd

BWE Ltd is a British engineering company specialising in continuous extrusion machines and cold pressure welders for many different applications.

Conform™ and Conklad™ are well-established continuous extrusion technologies in the non-ferrous, cable and tube industries. Typical applications include copper and aluminium rectangular wire (magnet wire for transformers), solid aluminium conductor (SAC for cables) copper bus bar, trolley wire and other shaped conductors, AS wire, OPGW, CATV, round refrigeration tube, multiport or PFC tubes in different alloys.

At BWE's booth, staff will be on hand to discuss and present new developments for the cable industry.



▲ A BWE production line

With six lines currently in production, BWE's SheathEx™ technology is fast becoming the new alternative to seamless aluminium sheathing of high voltage cables. A further line will be installed and commissioned in Europe during the second quarter of this year.

The SheathEx process provides a continuous (no stop marks), reliable (no weld) and cost effective (cheap materials, low energy, etc) method of sheathing high voltage power cables.

A new Conform machine has been specifically designed to extrude solid aluminium conductor (round or sector shaped) from 2 x 9.5mm diameter rods, providing a cost-effective process to a product in demand. >>>

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BWE continues to manufacture and supply a complete range of cold welders and dies for a fast, cost-effective and reliable solution to welding non-ferrous materials from fine wire to round rod.

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BWE Ltd – UK
Website: www.bwe.co.uk



▲ *Rigid strander with automatic loading system*
SZ stranders); telecom and LAN cables (double twist pairing-quadding machines, single twist cabling lines, group twinners, drum twisters, shielding-jelly filling-sheathing lines and SZ stranders); steel ropes (double twist stranders, tubular stranders, planetary stranders and bow skip stranders); and ancillary equipment (payoffs, take-ups, capstans, caterpillars, taping machines and binders).

At wire Russia, the company will show a new range of rigid stranders and drum twisters that have been redesigned and upgraded in collaboration with energy cable producers to manufacture products such as compacted conductors of copper and aluminium for LV, MV, HV and EHV insulated conductors; sector conductors (Milliken) of copper and aluminium for high and extra high voltage insulated conductors; aluminium overhead conductors (AAAC,

ACSR) with round or trapezoidal wires; screening with copper wires (single or multi-wire) for MV and HV conductors; and armouring with galvanised steel wires.

CM Caballé SA – Spain
Website: www.cmcaballe.com

CM Caballé SA

With over 60 years of experience in the design and manufacture of rotating machinery for the production of power and telecommunication cables and steel ropes, CM Caballé provides the cable industry with a wide array of stranding, twinning, bunching and cabling machinery. The firm is constantly developing new, high quality equipment to meet the ever-changing needs of the wire and cable industry.

The company's portfolio includes equipment for power cables (double twist stranders, rigid stranders, drum twisters, single twist stranders, bow skip stranders, tubular stranders, planetary stranders and

Cerrini Srl

Since 1946, Cerrini has been delivering complete cable extrusion lines worldwide.

Cerrini's line equipment is manufactured at its two production plants in Castellanza (Italy).

The cable extrusion portfolio includes complete lines and equipment for insulation, filling and jacketing of energy cables and to process HFFR compounds, high-speed automotive cable lines with quick automatic colour change system, high-speed building wire lines, high-speed telephone insulation and jacketing lines and medium/high voltage cable catenary lines.

Cerrini's experience in liquid silane crosslinking technology for energy cable production is well acknowledged with



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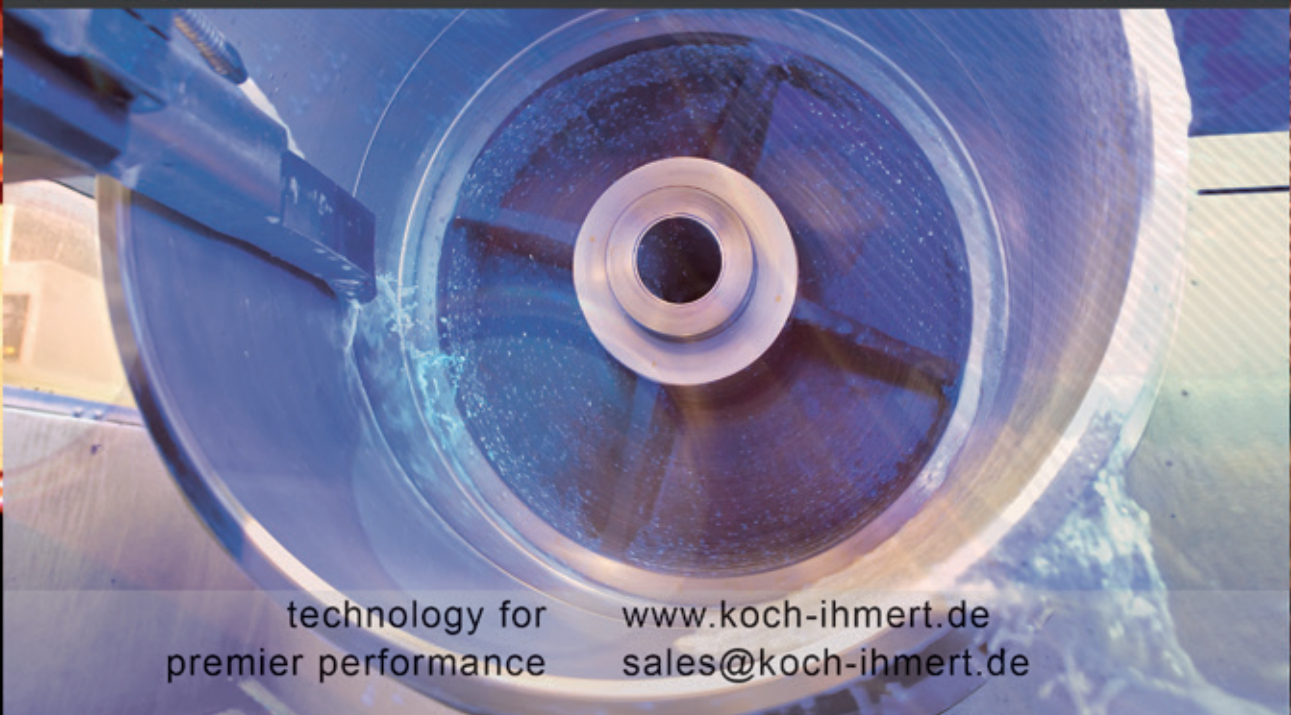
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many working lines around the world, and liquid silane technology represents the top-of-the-range in production.

Coaxial cables, LAN cables and high performance data cables for special applications benefit from the lightness and the high dielectric properties of high-degree foam-insulated cables. Fluoropolymers processing, both solid and foam, are also manufactured.

The manufacturing of THHN/THWN building wire cables has to comply with strict regulations: tandem and co-extrusion process of PVC insulation and polyamide jacketing guarantee the desired cable properties.

The SZ stranding machine and stranding line for rigid and flexible conductors can also be delivered. Innovation plays a key role in the equipment design and process technology of Cerrini: the new generation of rubber extruders with improved cooling capacity to process also the hardest compounds are showing the expected success.

Cerrini also offers safety silicone cable extrusion lines with infrared vulcanisation for the production of silicone fire resistant cables. Silicone cables must meet the



▲ Rubber extruder TG 90

strictest standards and regulations and Cerrini's extrusion line with IR curing addresses the growing demands for this kind of product.

Cerrini Srl – Italy
Website: www.cerrini.it



Contrôle Mesure Systèmes has designed, developed and manufactured a complete NDT range of products in eddy current and

ultrasonic testing methods for more than 25 years. These products comprise high-performance instruments and systems, probes and transducers, accessories, and complete turnkey machines with associated mechanics.

Manufactured by CMS are:

- eddy current rotating heads RotoETscan for tubes and bars diameter range 1 to 220mm for surface, subsurface, and punctual flaws detection
- ultrasonic rotating head RotoUTscan for tube inspection welded or not, in stainless steel, titanium, zirconium, also in carbon steel (diameter range 6 to 250mm) for longitudinal and transversal defect detection, thickness measurement as well as OD – ID and ovalisation

Ultrasonic and eddy current rotating heads (RotoUTscan and RotoETscan) can be combined with other CMS equipment (magnetising units, rotating systems, support coils, etc).

It can be installed together in a strong control bench including centring devices.

The supervision software Probus collects information provided by NDT equipment,

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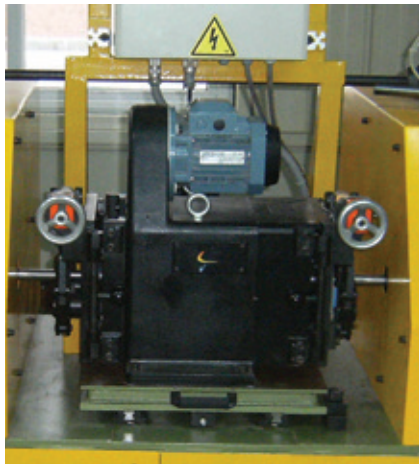
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▲ Eddy current rotating head RotoETScan

and allows the display of combined signals (UT/ET) and creates inspection reports that can be used as control evidence for quality services and customers. Data stored can be recalled for analysing and quality treatment.

All the systems meet quality standards such as API, ASTM and DIN, and can be used on and off-line.

Contrôle Mesure Systèmes – France
Website: www.cmseddyscan.com

Cortinovis Machinery SpA

Cortinovis Machinery holds a global position in designing and manufacturing of all kinds of rotating machines for power cables, telecommunication cables and steel ropes.

The company, part of the Eurolls group, has subsidiaries in America – Cortinovis Machinery of America Inc – and also Brazil, Cortinovis Do Brazil, supplying customers with immediate and qualified support on-site.

In February 2011 Cortinovis Machinery SpA acquired the business and operating unit of Sictra Srl forming a corporation having two divisions:

- Drawing lines for non-ferrous (production Sictra)
- Stranding lines (typical product Cortinovis Machinery)

This gave the company complete plants for the non-ferrous wire and electric cable market.

Cortinovis Machinery SpA – Italy
Website: www.cortinovismachinery.com

Daloo

Daloo has a long background in cable industry. For cable producers wanting simple and reliable machines at affordable prices, Daloo is one of the choices for rigid cage stranders, taping lines, rewinding lines, pay-offs and take-ups, as well as pulling caterpillars.

While the design is based on European experience, the manufacturing is done in China following strict criteria with

▼ Simple, reliable machines



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systematic quality control all along the process. Components are also ordered from well-known companies and with support from local agents.

Daloo – China

Website: www.daloo-machines.com

Davis-Standard

Davis-Standard will feature technology for the manufacture of complete wire and cable systems for building and communication wire, construction wire, coaxial cable, automotive wire, high temperature wire, and speciality wire

applications. Experts will be available to discuss systems for a wide range of extruders, pay-offs and tension brakes, take-ups, and auxiliary equipment including cooling troughs, capstans, caterpillars and accumulator systems. Laboratory equipment, customised feedscrews and control systems are also available.

High performance wire handling equipment includes large 96" (2,400mm) pay-offs and take-ups, and 60 to 80" (1,524 to 2,000mm) caterpillars. Single wheel capstans are available from 6 to 48" (150 to 1,200mm) in diameter, dual wheel multi-pass configurations from 12 to 48" (300 to 1,200mm) in diameter, with lengths to 40 feet (12 metres) in dry and wet arrangements.

Single reel, dual reel, flyer, and portal pay-offs and take-ups are offered for a wide range of applications. Options are available for portal, cantilevered arm and floor traversing.

Davis-Standard auxiliary equipment also includes cooling troughs, semi-automatic and fully automatic spoolers, wire pre-heaters, and curing systems that can be supplied based on application.

Davis-Standard designs, develops and distributes extrusion and converting technology. With more than 950 employees worldwide and a network of independent sales agents and suppliers in nearly every country, the company is committed to engineering equipment that is cost effective, environmentally friendly, and offers a high return on investment.

The company has three manufacturing and technical facilities in the United States, as well as subsidiaries with facilities in China, Germany and the United Kingdom.

Davis-Standard – USA

Website: www.davis-standard.com

Dow Electrical and Telecommunications

As the world gets "smaller" and "flatter" the demand for power and telecommunications grows stronger – both in newly developing nations as well as in established regions. Expanding the wire and cable infrastructure is vital, but long-term investments require assurance of long-term quality.

Dow Electrical & Telecommunications provides that assurance, with a broad portfolio of high-quality insulation, semi-conductive shields, jacketing and

speciality application materials that are setting new quality and performance standards in the industry, including new standards for safety, sustainability and reliability.

Experience, innovation, customer focus – these are the reasons Dow is a leader in providing technology-driven solutions for the wire and cable industry.

Dow Electrical and Telecommunications – USA

Website: www.dow.com

Eder Engineering GmbH

Eder-Austria has over 65 years of experience and exports 98 per cent of its output. The company is a technological leader and global player in the wire drawing die tool and particularly in the drawing die machine technology sector (hard and software) and supplies its products to the international wire and cable industry worldwide.

Recently Eder has also developed the EDDS-2 A equipment, which serves for a fully automatically dot-peening marking of costly die-tools by means of a durable tungsten carbide marking pin, producing an individual DataMatrix code within seconds. Even lots of costly dies can get easily marked, identified and administered.



▲ Data scanning with the EDDS-2

The product range of Eder Engineering Austria consists of approximately 80 per cent machines, 10 per cent wire drawing die tools and 10 per cent software (technical assistance).

These products are supplied to the wire and cable industry in over 80 countries and the latest technological developments are presented at all international wire trade fairs and technical symposiums in Europe, North America and Asia.

Eder Engineering GmbH – Austria

Website: www.eder-eng.com

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the production of dies, extrusion tools, machines for die reconditioning and refurbishing services. The group is committed to continue expanding and strengthening its worldwide network of production and service facilities in order to support customers in optimising their processes.

Esteves Group – USA
Website: www.estevesgroup.com



▲ Efficiency is part of the business with FIB

FIB Belgium SA

FIB designs complete solutions for thermal treatment of metallic wires. The company optimises customers' equipment within the framework of flexibility, energy and environmental concerns.

On top of this, it complies with the demanding international standards, in particular regarding the quality of the treated products and the safety of the workers.

Within the framework of furnaces, FIB masters direct-heating gas solutions in a view of technological and reliable solutions. Galvanising lines (both for high and low carbon), steel cord, sawing and

bead wires lines, oil tempering lines and stainless furnaces are part of the scope of supply.

Solutions with bell and pit furnaces with nitrogen, hydrogen or air are possible in a range of 2 to 75 tons per batch. Great care is given to the management of projects but also to the continuous updating of the customer's operators thanks to efficient technical support.

FIB Belgium SA –Belgium
Website: www.fib.be

Flymca and Flyro

For many years Flymca has been producing standard and traditional

rotating machines such as rigid, tubular, skip, and planetary stranders as well as drum twisting lines, bow cablers and double twist bunchers.

The company, which produces payoffs and take-ups for bobbins up to 8,000mm/650 tons, is now also involved in the production of special equipment used for submarine, offshore and umbilical cables production, as well as machinery for steel rope manufacturing.

Flyro is also buying and selling used equipment for the wire and cable, tube and bar industry.

Flymca and Flyro – Spain
Website: www.flymca.com

Fort Wayne Wire Die Inc

Fort Wayne Wire Die has historically been the birthplace of technology that drives the wire drawing and wire die industries.

From the first wire die manufacturing equipment and processes developed in the 1930s, to the ongoing engineering advancements that have marked the



LUKAS

ANLAGENBAU GMBH

Lukas is a global supplier of machinery for the wire and cable industry, located in Germany/Bavaria. As a leader in technology, Lukas is well known for its high quality and high precision products. Both standard machinery and customized solutions are provided.

We are exhibiting at the WIRE Russia Show in Moscow (June 25 - 28, 2013)

Our current product highlight is a Vertical Taping Line with Vertical Sintering Oven. It is suitable for nearly all available kinds of tapes, such as: e. g. PTFE, Kapton, Mica, Polyester, Fleece, Laminated Tapes, Metal Tapes. The high speed and high precision taping is enabled by a closed loop tape tension control and a very precise speed synchronization between the capstan and the taping heads.

Depending on the application, the line can be equipped with a cooling unit for the taping area or equipment for quality control.

We are looking forward to welcoming you during the show! Booth no. A16, Hall 7/3



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US Patent #6,233,513 #5,809,703 and Other Patents Pending



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Fort Wayne Wire Die Inc – USA
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FSP-One

FSP-One is well known worldwide as a specialised and innovative company in the production and sale of speciality conductors.

Green6® is still developing strongly and reveals itself as the best new RoHS alloy to replace the classic alloys such as Cadmium copper. Green6® is already used in high technology markets such as geophysics and IT, and is now qualified by the aircraft industry.

NPCCA (nickel plated copper clad aluminium) and SPCCA (silver plated copper clad aluminium) have been especially developed for the aircraft industry by FSP-One. This new generation of conductors are now available as standard industrial products and are already being used by Airbus in the A380.

The CCA conductor offers a competitive advantage over classic copper conductors. This allows the reduction of more than half the weight of cable while keeping optimum performance. These excellent performances are now moving to other applications such as automotive.

FSP-One has had a presence in Russia for more than 15 years and is a recognised partner on the Russian market. FSP-One has proven to be a dynamic and innovative company and is ready to move forward with its customers and the markets to provide the best service, quality and efficiency.

FSP-One – France
Website: www.fsp-one.com

Gauder Group Inc

With over 20 years of continuous presence and after several recent major machine installations in the USA, the wire Russia show is an opportunity for the Gauder Group Inc to highlight the joint rebranding of its Pourtier and SETIC product range as a combined entity, Pourtier & SETIC of America.

Based in France, both are leaders in rotating machines for the non-ferrous wire and cable industry.

Gauder Group Inc develops its support and parts services (including high technology bows) to the North American market from Greensboro, North Carolina.

Gauder Group Inc – USA
Website: www.gaudergroup.com

GMP Slovakia

GMP Slovakia produces take-apart reels, including the Easykoil Plus reel.

This patented reel can also be used as a coil lifter: with lifting rings in "lifting" position, the barrel expands during the lifting operation and lifts the coil. With lifting rings in "free" position, the barrel collapses during the lifting operation and sets the coil free.

Easykoil Plus is completely machined on the parts in contact with the wire, and can be customised according to customers' requirements. It can be supplied with slots in the flange to fit cardboard barrels, or with changeable flanges to make coils of different widths.



▲ GMP's Easykoil Plus take-apart reel

Easykoil Plus can be balanced, and to prevent wear problems due to the high rotation speed, hardened changeable bushings are recommended.

GMP Slovakia – Slovakia
Website: www.gmp-slovakia.com

Heinze & Streng GmbH

For more than 18 years Heinze & Streng has been a reliable provider for spare and used parts for cable and wire machinery worldwide.

At wire Russia, the company will present its newest Innovation, the hybrid flyer bow which provides lower energy consumption, lower costs compared to any other bow in its class, eliminates wear strip and improves manufacturing performance.



Other specials include:

- AirWipes: Provide an effective drying method with a simple design, with low air consumption, longer lasting with ceramic inserts
- RegBlue: Technical data transfer with Bluetooth length measuring-tension force/wire break control
- Kinrei Machinery providing stranding solutions for fine and ultra fine wire
- Nickel contact bands/tubes, carbon brushes, drawing cones, contact shaves, sealing components, special drive elements, cable recycling machines, drawing cones and pulleys, and ceramic components

Heinze & Streng GmbH – Germany
Website: www.heinze-streng-gmbh.de

H Folke Sandelin AB

H Folke Sandelin AB (HFSAB) has been supplying the following globally for more than 50 years:

Continuous lead extrusion equipment and know-how for trouble-free lead sheathing of cables, providing a perfect moisture barrier. The latest design lead extruder is horizontal, floor standing, easy to install and maintain, fully automatic, extremely reliable with its state-of-the-art control system, enabling continuous operation for weeks with little or no variation in temperatures and wall thickness/concentricity.



▲ The latest lead extruder from HFSAB

The lead wall thickness can be kept to a minimum with corresponding savings in lead. A range of die blocks are available to cover an extensive diameter range of 6mm-225mm (over lead), and a range of melting pots are available for 10, 18, 35 and 60 tonne capacities.

Additional equipment includes the cable repair and recovery system CRRS, which has the possibility of removing individual layers, such as the outer jacket, lead sheath or triple layer XLPE insulation, without causing any damage to the subsequent layer below.

This enables the outer jacket, lead sheath or triple layer XLPE to be re-applied and the cable repaired.

Even if the cable is just going to be scrapped, the metal price differences for insulated or un-insulated cables are very large and the equipment would have a very short pay-back period, if the metals are scrapped in their "bright" form.

HFSAB is able to supply second-hand fully refurbished lead extruders to very high standards, and provides a full and extensive after sales service, know how, fully trained and experienced technician support and spare parts.

H Folke Sandelin AB (HFSAB) – Sweden
Website: www.hfsab.com

Kieselstein International GmbH

Modern wire drawing draw-peeling plants will be demonstrated at the company's stand on the German pavilion.

Kieselstein offers wire manufacturers individual machine solutions that are tailored to customer requirements and are optimised for the requested purpose.

The company undertakes intense research activity at its own technology



▲ Draw-peeling unit

centre, and has a wealth of experience in the development and construction of both trolley wire and hot wire drawing machines.

In addition to the machine range, Kieselstein presents its scope of wire products at its booth, like the strucwire, which is first of its kind in the world and will raise the visitors' interest.

Kieselstein International GmbH – Germany
Website: www.kieselstein-group.com

Maillefer

Vitaly Meschanov, head of the Maillefer SA Moscow representative office, and his



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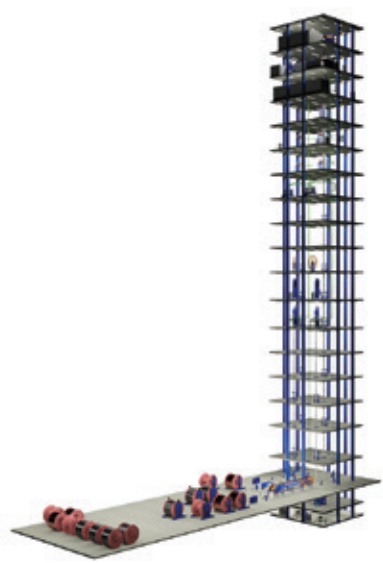
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www.wire-dies.com



▲ VCV line from Maillefer

team will be joined by key personnel from Finland and Switzerland.

Maillefer provides complete extrusion solutions serving both wire and cable and pipe and tube manufacturers worldwide. From individual components to complete production units, it prides itself on providing maximum productivity to its customers through superior technology, know-how and services.

The product families available from Maillefer are energy cables including manufacturing solutions for producing automotive, building, rubber, LV, MV, HV and EHV cables; fibre optic cable manufacturing solutions for buffering and jacketing fibre optic cables; telecom cable making including solutions for producing telecom, LAN, coax and speciality signal cables; plastic pipe manufacturing technology; and solutions for producing heating and plumbing, medical, automotive, irrigation, water and gas pipes.

Mr Meschanov said: "Customers benefit from nearly 40 years of the company's experience in the Russian and CIS market. Our Moscow office is the region's long-term partner for wire and cable manufacturing solutions.

"As of today, BRIC countries are the main world markets both for cable manufacturers and equipment producers. Maillefer recognises this. Russia and the CIS countries occupy sizeable shares of the company's activities.

"The progress we achieve together with customers comes not only from supply of technology and equipment solutions but also from products with high added value.

"A wide range of services and maintenance packages, product cost and materials saving solutions, insulation cleanness and quality improvements are proposed for your consideration at the show."

Maillefer SA – Finland
Website: www.mailleferextrusion.com

Medek & Schörner GmbH

Medek & Schörner will present the following state-of-the-art cable marking machines:

Cable marking machines:

- High quality gravure printers (LAN cables, control cables etc) for speeds up to 1,200m/min
- Water misting unit for the application of fine water dust for pre-cooling of the hot wire immediately after the extruder
- Embossing metre markers/hot foil sequential metre markers for highest accuracy of length measurement (power cables, telecommunication cables, optical fibre cables, etc)
- High performance ring markers for marking telephone wires, switchboard wires, automotive cables and LAN cables
- Video system for monitoring the print quality of fast-running cable printing machines, eg allowing real-time inspection for bad quality and/or missing prints
- Laser marking system for cables

Optical fibre coating systems:

- Top speed optical fibre processing systems
- Optical fibre colour coding up to 3,000m/min

▼ State-of-the-art cable marking machines from Medek & Schörner



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Copper wire insulation with UV varnishes (enamelled wire):

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As the only company operating in cable marking machines and optical fibre processing lines, Medek & Schörner covers virtually the entire spectrum of machines for marking cables and coding optical fibres, in particular for power, telecom and data cables.

Medek & Schörner GmbH – Austria
Website: www.medek.at

Meltech Engineering

UK specialist engineering company Meltech has undergone a re-structure to focus its technical sales and engineering resources on dedicated sectors to meet specific customer requirements.

Meltech Group will have four operating divisions, three of which – heat treatment, CRE (continuous rotary extrusion) and cable machinery – will be product driven. The fourth, total process solutions, will offer project management, QHSE, reporting and on-site contract management.

The group believes this new approach will help provide greater clarity of the breadth and scope of its operation.

“Meltech has been in business for more than 30 years and has gathered an excellent reputation for its flexible, service driven approach and for providing bespoke solutions for our clients,” said chairman Marcus Moir.

“Over that time we have developed long-term relationships with a wide range of customers, working in a diverse range of market sectors. The re-structure is intended to provide clarity for those new to Meltech on what we offer and how we operate.”

The company will be revealing more at wire Russia in June on the stand of its Russian agent, Lasso.

“Russia has, for some time, been an emerging market for Meltech. This is particularly true for our CRE products, where we have made a considerable impact on the market in recent years.



▲ Copper control panel from Meltech

That progress looks set to continue as we are in advanced discussions with a large Russian company to deliver a major piece of CRE machinery,” revealed Peter Drever, managing director of Meltech CRE.

Meltech is the only fully integrated supplier of complete CRE production lines in the world and it has particular expertise in aluminium and copper extrusion, which forms the backbone of many engineering developments in Russia.

Meltech Engineering Ltd – UK
Website: www.meltech.co.uk

Nextrom Oy

Nextrom is a premium supplier of optical fibreglass preform manufacturing equipment, and produces fibre draw towers and associated machinery for the



▲ The SCC 100 from Nextrom

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global fibre market using MCVD, OVD and VAD technologies.

The company is also a supplier of fibre optic cable production lines. It will present its latest advancements and technology highlights, including the latest developments for the production of fibre optic cables, energy, automotive and communication.

Nextrom OY – Finland
Website: www.nextrom.com

Maschinenfabrik Niehoff & Niehoff of Russia

Maschinenfabrik Niehoff and Niehoff of Russia, Niehoff's Moscow-based branch office, will be presenting the following exhibits:

- MMH 121 + RM 161.S multi-wire drawing line
- BMV 124 rotary braiding machine

The multi-wire drawing line MMH 121 + RM 201.S is designed to draw simultaneously eg 16 wires with a final diameter of up to 0.2mm. The wires drawn on this machine are characterised by very homogeneous properties with very fine tolerances along the entire wire length and can be processed to intermediate multi-wire bundles; as the bundles are spooled onto the spools under controlled wire tension, the wires drawn on MMH type machines are suited for the highest quality strands.

By using the machine spools handling is simplified, and the lower number of payoff stations results in huge savings in capital investments.

Based on a modular principle, customer-specific MMH machines adapted to each application and kind of non-ferrous metal can be built. More than 1,000 MMH lines are working worldwide.

The 24-carrier lever arm rotary braiding machine BMV 124, a heavier version of the BMV 24 model, has a central passage of 55mm and can carry spools with a weight of up to 5.5kg. By means of integrated and optionally available quality assurance systems, BMV braiders can work for a long time unattended and without operator intervention.

The machines are designed to process round or flat wire of bare or coated copper, aluminium and stainless steel with a single-wire diameter ranging from 0.05 to 0.3mm as well as artificial yarn and fibres.

With an integrated central taping device, the braiding and the subsequent taping processes are completed in one step.



▲ The BMV 124 rotary braiding machine from Niehoff

The Niehoff After Sales Original + provides expert know-how, a remote maintenance service, modernisation and upgrading measures, machine operator and maintenance training courses and the fast and reliable supply of wear and spare parts.

Especially developed machine components can also be obtained from the Niehoff After Sales Original + service which helps wire and cable makers reduce operational costs. Outstanding examples are the 'just plug and play' ECO-Bow for Niehoff's D type single bow design double twist bunching machines and the new generation of contact tubes for continuous annealers.

Maschinenfabrik Niehoff GmbH & Co KG – Germany
Website: www.niehoff.de

Pan Chemicals Italian Pavilion

For 25 years Pan Chemicals has been producing and supplying the wire industry with high-tech drawing lubricants, covering all applications.

The production programme includes different grades of calcium, sodium and combined dry lubricants (Panlube S series) and a full range of wet lubricants for low and high carbon, welding wire, stainless steel and non-ferrous wire (Panlube L series).

In addition to dry lubricants the company offers full technical support on the wire production process and development of customised products.

Pan Chemicals has recently focused its activity on lubricant carriers for drawing of carbon steel wire, stainless steel wire and cold forming operation (Pancover series).

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Contact person: Mr Jacky chen (Sales Manager)
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▲ Panlube S 1500

The company is also active in surface treatment technology with new fluxes for hot dip galvanising, anticorrosive products, and special wiping media (Panchem series).

Particular attention is dedicated to the development of ecological products according to the new international regulations (Borax-free coatings and lubricants).

The engineering department is proposing different solutions of descaling machines, coating devices, rotating die holder and die reconditioning equipment.

Pan Chemicals SpA – Italy
Website: www.panchemical.com

Pourtier and Setic

Pourtier and Setic, part of Gauder Group, will exhibit with Maillefer's Moscow office to offer value-added solutions to the Russian and CIS countries.

Both Pourtier and Setic provide high quality rotating machines with high standards in design and manufacturing, leading the innovation for optimised wire and cable production.

Pourtier, France, develops and produces high quality stranders and cablers for the

▼ Pourtier's rigid stranders



production of all types of high voltage and extra-high voltage power cable from overhead cable (including ACCC™, ACSS-TW and ACSR-TW) to insulated cable AC type (using high quality Milliken conductor) or DC type (using large round compacted conductor or trapezoidal wires).

The company is also active in the market of submarine and umbilical cables with a complete range of stranding/paper lapping/cablings and armouring machines, as well as oil pump cable.

Setic designs and manufactures high quality machines: double twist bunchers/stranders for the power cable and automotive industry as well as complete solutions to produce special/LAN cables with enhanced performances (in one step or two steps according to the product mix).

After sales and spare parts services including high technology bows – as well as the exclusive 'GreenBow' – and accessories for all brands' rotating machines aim to maintain and improve production capacity of existing machinery.

Pourtier sas – France
Setic sas – France
Website: www.gaudergroup.com

RichardsApex Europe Ltd

RichardsApex Europe Ltd is manufacturing the SK-60, its newest generation lubricant for copper rolling mills.

SK-60 incorporates state-of-the-art synthetic lubricant design technology.

Throughout ongoing field production trials, SK-60 has consistently demonstrated significant comparative advantages with regard to extending roll life, rejecting tramp oil, reducing operating concentrations, largely eliminating the need to use tank-side additives and a longer emulsion lifetime.

Visit RichardsApex at wire Russia at the CZKSK stand, Pavilion 7 Hall 6, or for more information about RichardsApex SK-60 and any of its wide range of engineered lubricants for copper and aluminium rolling or wire drawing processes.

Russian customers can also contact the company's local representative, North-West Company of Supply, www.czksk.ru

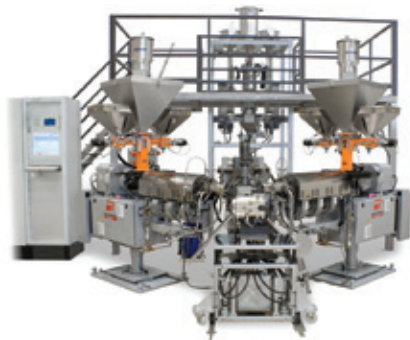
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Website: www.richardsapex.com



Rosendahl Maschinen GmbH

Rosendahl supplies hi-tech wire and cable manufacturing solutions, which offer first class products and turnkey solutions in the fields of extrusion, corrugation, fibre optic cable as well as SZ stranding.

Out of these competences Rosendahl developed the product segments power cable, automotive wire, LAN cable, coaxial cable and fibre optic cables. Rosendahl's most recent completion of its product portfolio is the crosshead series. It will present its latest advancements and technology highlights, including the latest developments for the production of energy, automotive, communication and fibre optic cables.



▲ 000 Rosendahl Russland is ideally located in Moscow to serve the local market

Rosendahl's Russian subsidiary 000 Rosendahl Russland is ideally located in Moscow where it is able to serve areas of Russia and the CIS market. The local sales and the service team are there to fully support Rosendahl's and sister company Nextrom's customers in all dealings during and after the execution of a project, from the initial consultation to long-term maintenance.

Rosendahl Maschinen GmbH – Austria
Website: www.rosendahlaustria.com

Saizar Strapping Machines

Saizar Strapping Machines specialises in the manufacturing of automatic strapping machines for the strapping of steel industry goods.

All Saizar machines are produced at the company's plant in Spain, and are available with strapping heads for steel and/or polyester strap from 16mm to 32mm width. The automatic strapping heads can be pneumatically or hydraulically operated depending on the requirement. Heads can be composed of different types of sealing system as the



▲ Saizar – a specialist in strapping machines

notching, TIG welding or linkers, for the steel strap, and vibration system, in case of the polyester strap. Depending on the features of the material to be strapped it is possible to apply different tensions. The strapping heads are 'intelligent', able to solve automatically any failure that may occur and have been designed to facilitate the work of the operator during handling.

The company also designs, manufactures and supplies solutions for the automation of all the strapping process and complete automatic packing lines. It studies customer needs and finds a satisfactory solution to meet requirements.

The strapping machines manufactured at Saizar are totally customised, designed according to the customer circumstances and features of the application and following European standards of quality and safety.

Saizar Strapping Machines – Spain
Website: www.saizarsl.com

August Strecker GmbH & Co KG

August Strecker manufactures butt welding machines for the most varied needs in the wire and cable industry. The company was founded almost 80 years ago and has always enjoyed an excellent reputation for its reliable machinery and excellent service, given by more than 70 skilled employees working on company-owned premises in Limburg, Germany.

Strecker welders are well represented in many renowned national and international wire and cable factories. The majority of the company's production is exported to more than 110 countries all over the world. There are more than 45 representative offices worldwide assisting customers from the very first contact, eg to choose the right product; adapt it to individual needs until final delivery sometimes including commissioning of these special machines. >>>



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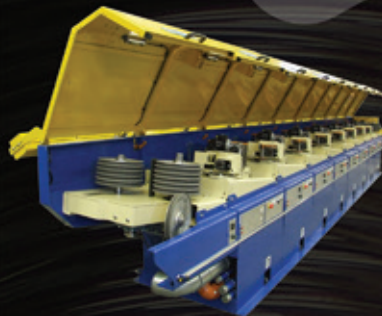
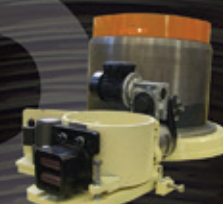



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wire Russia 2013



Participating in European as well as overseas exhibitions also helps to further promote the trademark of Strecker butt-welders so it is now a well-known symbol of quality.

The production programme includes:

- Butt welding machines for all kinds of wires from 0.04mm to 73mm diameter for solid steel and about 50mm diameter for solid non-ferrous wires, including welders with automatic deburring cycle. For steel there are various annealing devices available, suiting the needs of the most varied steel grades
- Butt welders for stranded conductors starting at 0.08mm² up to about 2,500mm². Welding by means of tubes or without any tubes at all (with automatic deburring)
- Cold pressure butt welders with automatic deburring cycle
- Wide specialised range for the most varied applications, including butt welding machines for steel cord, battery-operated parting guns for steel cord or steel strands, electric wire butt welding guns, and high-output butt welding machines for production of wire-made mass articles



▲ The MK300-3P from Strecker

- Special purpose welding machines, tailored to individual customer needs

August Strecker GmbH & Co KG – Germany

Website: www.strecker-limburg.de



Troester is a supplier of machines and complete lines for the cable manufacturing and rubber processing

industry, comprising CV lines for XLPE and rubber cables, silane lines, sheathing and insulation lines.

The German company will be presenting its technology and solutions in the field of:

- Rubber CV and CCV-lines up to 35 kV
- XLPE CCV and VCV lines for power cables up to 500 kV
- Sheathing lines for medium and high voltage cables
- Silane lines for LV and MV cables



▲ Extruder group for 2-layer extrusion

Troester also represents its subsidiary X-Compound, which supplies compounding plants for cable compounds like PVC, HFFR, XLPE, semi-conductive material and special applications.

Troester GmbH & Co KG – Germany

Website: www.troester.de



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WIRE PROCESSING TECHNOLOGIES



Double Block Galvanized Wire Drawing And Winding Machine



BUTT WELDING MACHINE



WIRE POINTING MACHINE



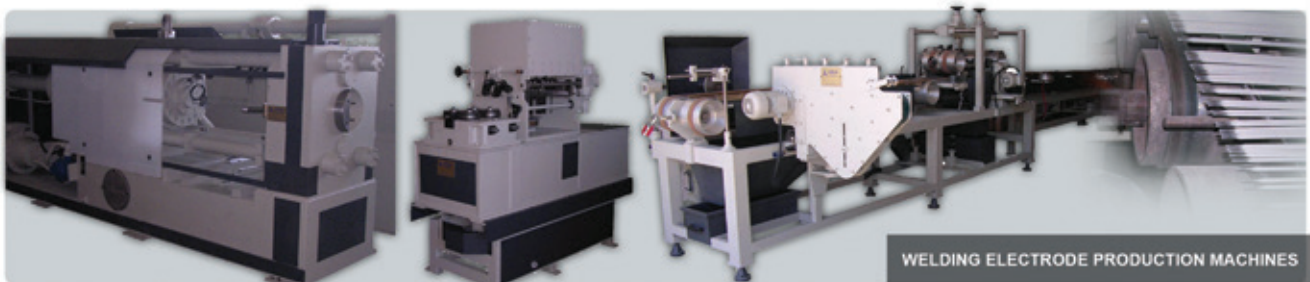
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WET WIRE DRAWING MACHINE (with 19 dies)



DRY WIRE DRAWING MACHINE



WELDING ELECTRODE PRODUCTION MACHINES

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Ultimate Automation Ltd

Ultimate Automation has been designing and manufacturing innovative CNC wire forming and welding machines, used for the manufacture of a wide range of wire products from POP displays to automotive components, since 1991. The range includes the well-established Ultimat UMW series of 2D wire forming and welding machines, which feature a robust, modern, modular design, and user-friendly Windows-based software.

All Ultimat models feature a closed die forming and cutting system, giving a high quality square, burr-free cut and butt weld. Options available include secondary bend heads, press tools, drilling, threading and chamfering stations, and automatic part unloading systems.

At wire Russia Ultimate Automation will be displaying the latest 2013 version of the Ultimat UMW-65 2D wire forming and welding machine, suitable for a range of 2-8mm, with CNC wire forming machines, which incorporate faster drives and new software and control systems.

The UMW can be combined with the innovative UCW series of machines, to create a fully integrated forming and welding cell, with rectangular butt-welded frames being produced directly from coil, on the UMW-65 wire forming and welding machine, and then the completed frame being transferred into the UCW-65 where upon the frames support/brace wire is fed direct from coil, straightened, cut to length and welded into the butt welded frame.

▼ The Ultimat UMW-65 2D wire forming and welding machine



With models available for a wire range from 2 to 16mm, the company has a machine to suit everyone's requirement from the manufacture of point of purchase displays, lampshades, supermarket shelving and automotive components, etc.

Ultimate Automation Ltd – UK
Website: www.ultimat.com

Upcast OY

Upcast® technology means you can cast top quality copper and copper alloy rod with low overall costs. It is a simple process with easy operation through an advanced control system.

Different rod sizes can be cast, even simultaneously, and output and product mix can easily be adjusted according to market demands.

Upcast® lines are always tailor-made to match the needs of each specific customer. A wide capacity range both in single- and double-furnace configurations is available with unique upgradeability.

The majority of delivered Upcast® lines are for Cu-OF rod. The most common cast rod diameter is 8mm, which is the standard size within the cable and wire industry. Rods with bigger diameters are used for manufacturing a variety of products, eg bus-bars, trolley wires, electroplating anodes, etc.

Upcast® Cu-OF rod is well-suited for all electrical applications and has become the preferred feedstock especially for:

- fine and multi-wire drawing where ductility requirements are most demanding
- enamel wire production where surface finish is of utmost importance
- continuous rotary extrusion where tool wear rate is a crucial factor.



▲ Upcast® technology helps you cast top quality copper and copper alloy rod with low costs

There is a wide range of alloyed coppers and copper alloys that can be cast with Upcast®. These include silver bearing and phosphor-deoxidised coppers, brasses and bronzes. As new applications for copper alloys are being developed and new types of copper alloys emerge, the utilisation of Upcast® technology within the copper alloys field is rapidly increasing.

Upcast OY – Finland
Website: www.upcast.com

WEILLY DIAMOND 威力鑽石工業股份有限公司
INDUSTRIAL CO., LTD.

Shaped PCD Dies Regular and Irregular

異形鑽石模 規則形 不規則形
最小的異形模有多小?
Shaped dies - How small can it be?

| | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| <p>Hexagon Square ultra-fine 0.10x0.10mm Rectangle Triangle Oval Irregular any shape you want</p> <p>六角形 方形 最小尺寸0.10x0.10mm 長方形 扁方形 最薄尺寸0.10x2.0mm 太陽能面板用超細鋼帶 三角形 橢圓形 不規則形 任何需求形狀</p> <p>Other main product ND and PCD wire drawing dies 天然及聚晶鑽石拉線模 Tinning dies 鍍錫線模 Nipple for plastic coating of wire 押出外模 Compacting or bunching dies 絞線壓線模 Others 其他用途鑽石板具</p> | <p>Hexagon 六角形</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|

| | | |
|-----------|---------------|----------------|
| | | |
| Oval 橢圓形 | Rectangle 長方形 | Triangle 三角形 |
| | | |
| Square 方形 | Thinness 扁方形 | Irregular 不規則形 |

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Windak Inc

Windak specialises in automatic packaging solutions for the wire and cable industry, and has offices in Sweden, USA, Australia and Estonia.

The company will introduce its new automatic reeler AR18-DB line at wire Russia.

The Auto Reeler AR18-DB is a fully automatic reeler developed for automatic packaging of cable and wire products on spools or reels between 216mm and 460mm (8.5" to 18") in overall diameter.

It can be run both in-line (direct connection with extruder) and off-line, and loads and unloads the empty reels automatically.

The line includes stretch wrapping of the spool to contain the cut end, and the output of the machine is two reels per minute.

At wire Russia Windak will combine the AR18-DB reeler with the integrated palletiser GP5, payoff and accumulator, to make a complete automatic spooling line with a short investment payback.



▲ Windak's AR18-DB automatic reeler

The company will also show the winding process and palletising of the finished spools.

Windak will also present the latest information about its full range of products, including payoffs, take-ups, rewind lines, coiling and spooling solutions, accumulators and palletisers.

Windak – USA
Website: www.windakusa.com



Woodburn Diamond Die Inc

Founded in 1957, Woodburn Diamond Die Inc has grown to become one of the world's leading manufacturers and suppliers of wire drawing dies.

An ISO 9001:2008 certified organisation, Woodburn Diamond Die is one of the few companies to offer a comprehensive line of wire drawing dies of its own manufacture.

The company serves the wire industry through three primary locations. The manufacturing facility in Woodburn, Indiana, USA, remains the corporate headquarters. A wholly-owned subsidiary, Woodburn Wire Die, S de RL de CV, is located in Juarez, Mexico, and serves the southwest USA, Mexico, and Central and South America.

A joint-venture partner, Walson Woodburn Wire Die Pvt Ltd, located in Surrat, India,

▼ Some of the dies offered by Woodburn Diamond Die



is serving the Asian market, Middle Eastern countries and Africa. Highly trained and dedicated agents support customers on a global basis.

As part of its expanding global coverage, Walson Woodburn Europe office covers the European market and experienced agent Alexander Dyakonov covers the Russian & CIS countries.

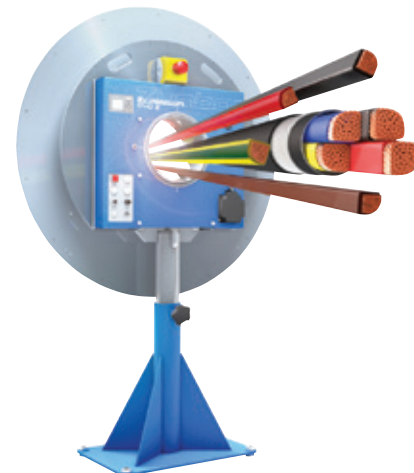
Woodburn Diamond Die Inc – USA
Website: www.walsonwoodburn.com



Zumbach Electronic AG

Zumbach will showcase its broad range of dimensional measurement and inspection systems for rod and bar mills, and wire drawing, wire insulating and cable jacketing processes.

Existing technology to be featured includes, Odac® laser scanning diameter gauges; DVO 2 oscillating device for Odac® gauges; Odex® non-contact diameter and eccentricity system; Capac® for in-line dielectric testing and FFT/SRL analysis; Wallmaster in-line ultrasonic wall thickness and concentricity systems; Rayex® for diameter, wall thickness and concentricity for CV power cable applications; WST and AUTAC preheating and conductor temperature sensors; and Sparkmaster spark tester solutions.



▲ The DVO2 oscillating device from Zumbach

New developments to be introduced include the new modular USYS IPC line of processors and controllers; Steelmaster Rotation (SMR) for in-line hot and cold rod and bar mills; Simac® 63 for in-line surface faults and defects; KW 13TRIO for lump and neckdown detection for fine dimension applications; and Profilemaster® PMM 30 for in-line profile measurement of non-round products for fine dimensions.

Zumbach Electronic AG – Switzerland
Website: www.zumbach.com



*Built like a Tank...
... Runs like a race car*

Our products :

- ▶ Straight Line Wire Drawing Machine
- ▶ Inline Wire Rod Preparation System
- ▶ Galvanizing line Pay-offs and Take-ups
- ▶ Bronze Coating Line Pay-offs and Take-ups
- ▶ Coilers

Technical know-how :
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From optical cable to optical wire – an evolutionary approach

By Wayne Kachmar, Fellow, Electro-Optical Engineering, TE Connectivity, North Bennington, Vermont

Abstract

This article will introduce a new design in optical fibre cable that allows small form factor cables to have handling characteristics that are as good or better than copper wire.

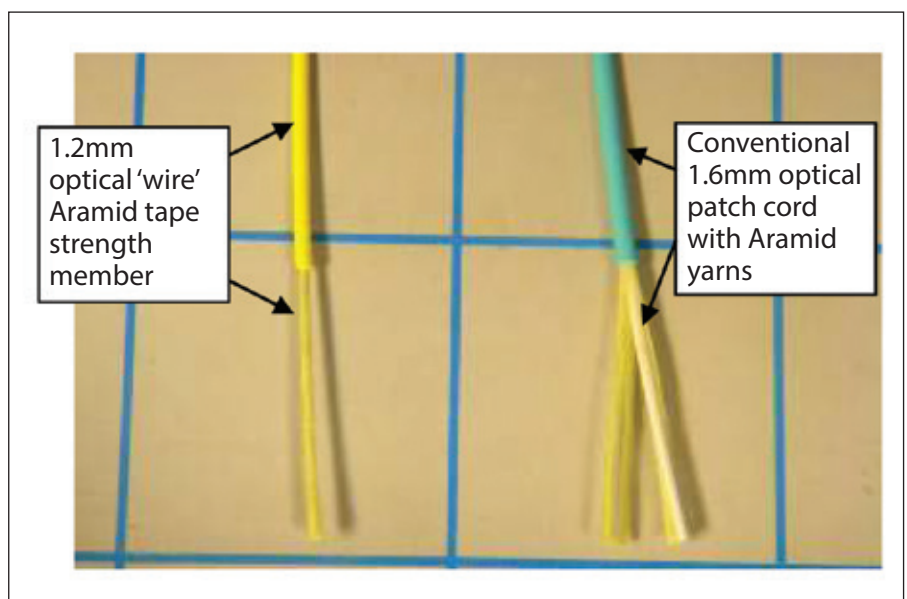
Currently, most light guides are housed in cable designs that follow an orthodox design protocol based on one of three basic cable types: loose tube, ribbon or tight buffer. All require very specific handling techniques that require special care and simply cannot be handled the same by installers who are accustomed to handling copper.

Yet, the need for a fibre to act more like copper is becoming more and more apparent as cable sizes decrease and applications, such as central offices, data centres, enterprise, and fibre-to-the home/desk (FTTH/D), demand more fibre density.

A fibre cable with the behavioural characteristics of a copper cable will improve installations in terms of time, flexibility and cost.

1 Introduction

Many new optical fibre cable developments have occurred in the recent past, such as reduced bend radius fibre (RBRF), nano-composite material fillers, new materials for strength, connector technology, new regulatory compliance issues (ROHS, REACH), and size/cost constraints. During this time, cable design solutions assumed fibre-optic cable to be a composite product where separate elements (tight buffered fibre, aramid yarn polymer jacket) were not bonded. Therefore, different handling and installation requirements were mandated based on a non-coupled core structure. In many cases, installation stresses were overcome by sheer bulk or material strength.



▲ Figure 1: 1.2mm vs conventional 1.6mm

Many analogue comparisons to copper have been made in the cable world. Other than speciality products, such as guided torpedo fibres, no true optical analogues to wire have been developed.

Typically, cables contain one or more insulated conductors and additional structural elements to achieve mechanical, environmental or other performance criteria. To date, most optical fibre designs use a “loose core” to achieve engineered performance in an optical cable – even single fibre cables that require minimal protection.

The result is that many designs require installation handling different from traditional copper cable installations. Many failures are a direct result of installer unfamiliarity with the special handling required by traditional indoor simplex or duplex fibre cables. Thus, the need for a fibre to act more like copper in terms of handling is important as fibre adapts to use in applications where copper once was king.

There is a perception by many installers that fibre can be handled and installed using the same methods as its copper predecessor.

However, glass is still glass, and the performance of traditional fibre cable can still be affected by improper handling and installation. So, why does this perception matter? In today’s environment, optical system solutions are being provided to a much broader selection of customers.

Many of these installation professionals have significant experience with copper installation practices. Yet they are, for the most part, unfamiliar with the installation practices of the fibre cables they are now being asked to install.

Thus, it is incumbent on fibre cable manufacturers to educate them on acceptable handling practices. More importantly, to improve the acceptance of optical fibre systems in new applications, we must provide products that will succeed under new criteria.

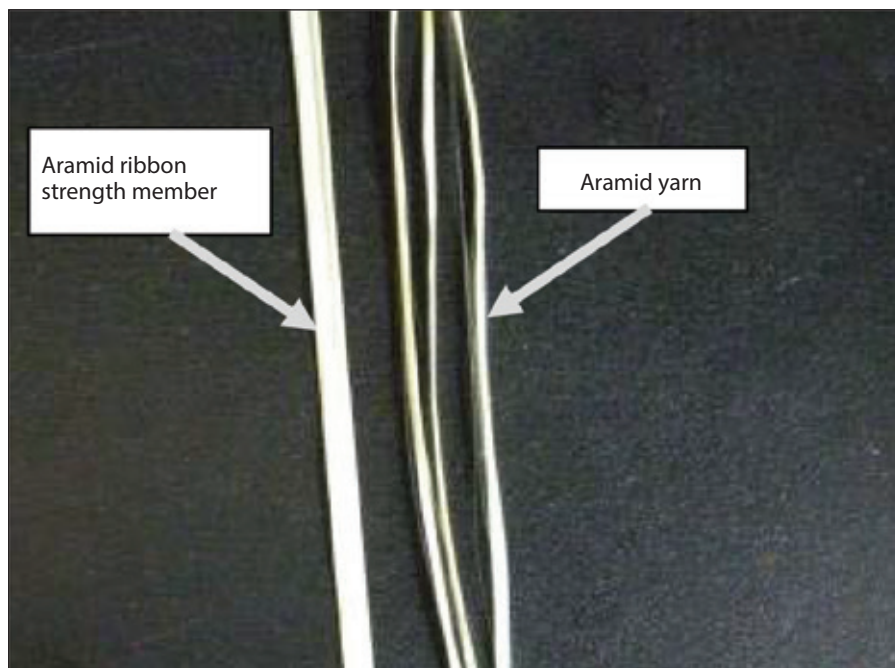
In terms of optical fibre cable, we must design products that behave closer to copper insulated wire in fibre cable handling, placement and management.

New optical waveguides have made this option viable, but we as cablers need to continue the evolution and design installable "cables" (wires) that meet customer needs and define a new class of optical waveguide product.

The design presented here is a geometric core design whereby the optical fibre is located in the centre of the core and loose yarns have been removed in place of geometric strength members. These strength members provide multiple functions, such as outer jacket adhesion (to assist with hand pulling), fibre buffering (against impact and crush loads) and reliable access to the optical fibre for fusion splicing or field connectorisation. As with all communication devices, improved performance must be accomplished while ensuring affordability. Designs that meet these new requirements but are costly and hard to produce will not succeed. The cable must also be able to be mass-produced on typical cable equipment with acceptable yields and quality performance.

2 Challenges to "optical wire"

Traditional simplex/duplex optical fibre cables, developed over the past 30 years or more, consist of a loose tube design with Aramid yarns for strength.



▲ **Figure 3:** New geometric strength member vs old loose yarn strength members

The glass fibre is embedded in the centre of the yarns with a polymer tight buffer coating to prevent severe bending or impact. Aramid yarns are deployed so that both ends can securely attach the connectors. Thus, if a connector is pulled, it is the non-stretching yarns that are actually being pulled and not the fibre or jacket itself.

The challenge in strengthening the fibre cables this way is that if we pull them by the insulation as if they were copper wires, we're actually pulling on a piece of polymer plastic with very little strength.

Pulling the fibre jacket temporarily stretches the polymer while the glass length remains constant.

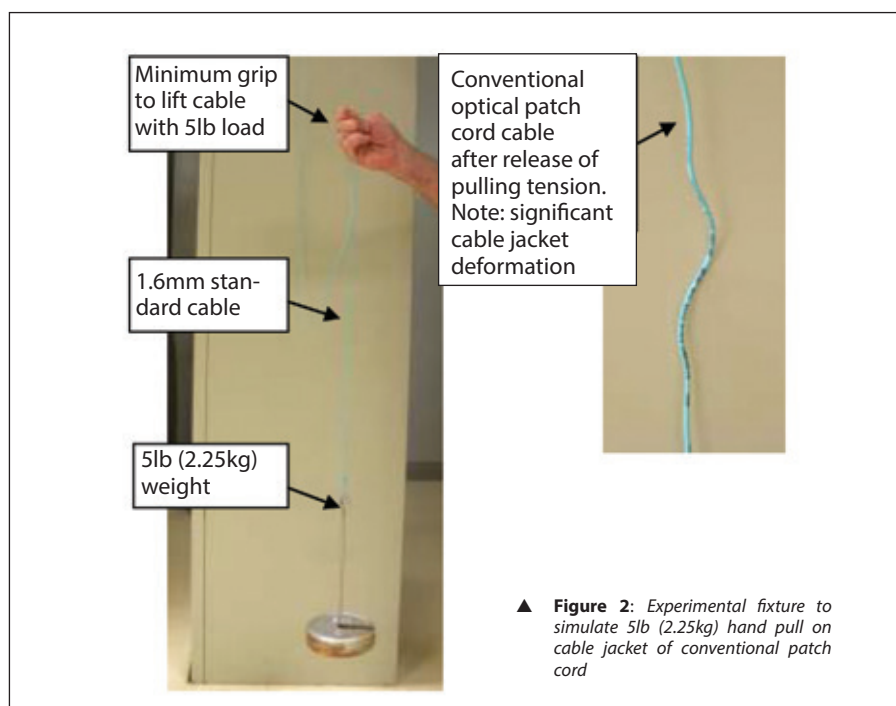
This causes a mechanical decoupling of the fibre from the strength members and polymer jacket, allows a bunching of the outer jacket and allows an unplanned movement of the buffered fibre to cause excess length on one side of the pull and a tensile condition to occur on the other.

This typically results in large macro bend losses as well as possibly exceeding the minimum bend radius of the optical fibre. This can shorten the life of the cable significantly.

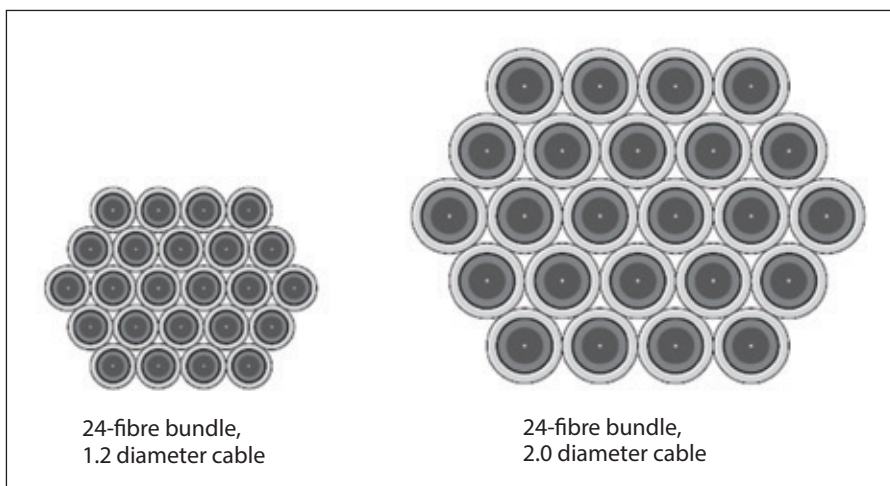
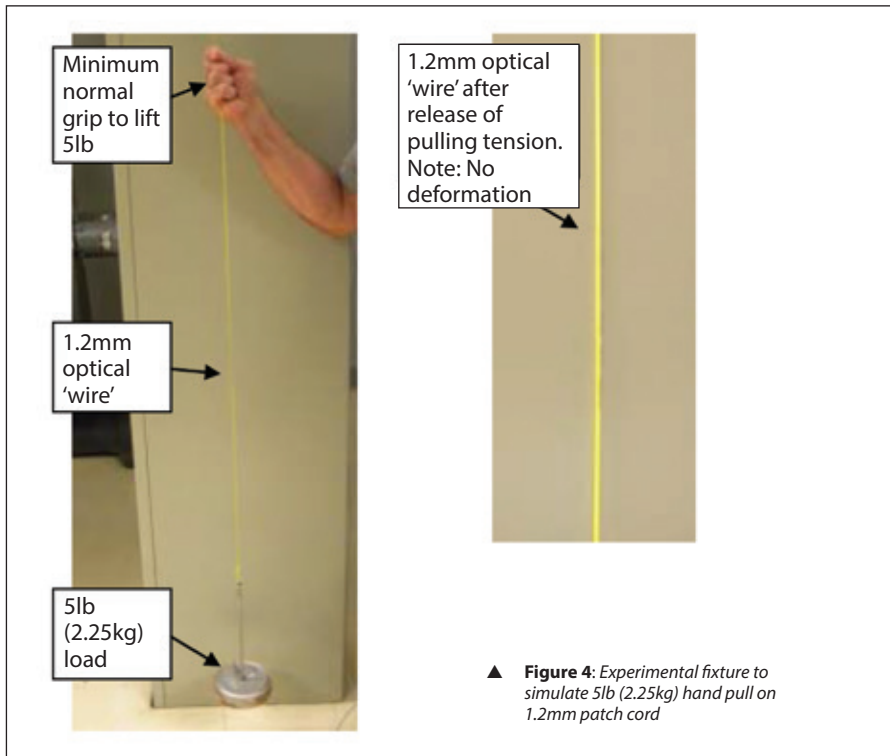
When developing 3mm fibre cables, the jackets were relatively thick – in some cases almost a millimetre thick. This provided a bit more intrinsic strength in the plastic polymer before it was stretched. And early installers were more concerned with handling characteristics.

Today, the demand is for density, so fibre cables are becoming as small as possible. This has two results. First, cable jacket thickness is becoming as small as possible and second, the cables are being pulled with more strength to fill raceways and conduits with more fibre. Both of these issues can affect reliability and performance of the fibre.

As the smaller fibre cables are pulled, the jackets are stretched. As they shrink back over time, enough friction is generated to push the buffered fibres back. This action results in a localised area of excess fibre, known as a microbend, as the jacket shrinks.



▲ **Figure 2:** Experimental fixture to simulate 5lb (2.25kg) hand pull on cable jacket of conventional patch cord



As optical cable sizes were reduced to 1.6mm, this phenomenon was caused by as little as a few ounces of force instead of pounds. Thus, as optical cables became smaller, more delicate handling was required during installations.

This new category of cables became known as “small form factor” cables because they could no longer pass the same testing as their larger counterparts. Tensile gradings went from 22 pounds to nine pounds, allowing minimal amounts of Aramid yarn and decreased jacket thickness. But it also resulted in products that required much more care in handling than any copper wire.

The challenge was to develop a new fibre cable design for small form factor products

that could meet the requirements for more density while providing wire-like strength that would allow it to be handled and pulled without causing attenuation and other performance issues. The challenges were met by solving three major issues – strength, connectivity and thermal balancing.

3 Achieving copper-like strength

To provide the strength of copper in a 1.6mm fibre optic cable was the first challenge. Installers should be able to pull the cable in a straight line like copper wire without needing to wrap it around a mandrel to keep from damaging the

jacket. At the same time, the jacket must be about one-third the size of conventional jackets. The free space around the glass needed to be reduced to make the cable as small as possible. Yet, the cable had to meet all impact, resistance and crush strength testing.

As small form factor cables are handled, the fibre can actually migrate to one side or the other of the jacket as the loose yarns give way. Once that occurs, the fibre is less protected on one axis and no longer provides the protection that was conceptually designed into it.

By using a tape with an adhesive matrix material, a custom tooling was designed to wrap several times around the fibre in a longitudinal fashion. The longitudinal tape wrapping ensures the centring of the fibre while only a very thin outer jacket bonds to the tape. This bonding allows installers to perform reasonable hand pulling or hand setting of the cable without stretching the jacket.

By enabling the tape and jacket to bond as a single entity, the fibre cable could be handled much like a piece of copper wire in terms of strength.

While many micro-cables are available today, they typically use Aramid yarns intertwined around the fibre. None have actually coupled the yarns, jacket and fibre together.

This cable is unique because it uses an Aramid tape instead of loose yarns. The tape can also be stripped using conventional copper cable stripping machines or copper wire stripping machines. Lineman’s scissors can even be used to strip these cables – the first time this has been achievable with a coated fibre without requiring a specialised tool.

It should also be noted that RBR fibre, rapidly becoming the standard in FTTX solutions and central offices/data centres, also adds to the handling qualities of these new fibres. Smaller cables can be bent around tighter configurations to fit various types of modules and installations.

4 Connectorisation

The bonding of the tape and jacket, however, created a new challenge with connectorisation. Bonding the two together eliminated the space required for the fibre to “push back” from the connector. Therefore, connectors had to be re-designed specifically for use with these new fibres. These new connectors take into account that the fibre has no push back, or compression capability, within the jacket.

Traditional fibre cables allow the fibre to slide back in the jacket enough for connectors to be attached, sometimes as much as two millimetres.

Thus, connectors were designed with backshells that can account for the lack of additional empty space in the cores. These connectors still conform to GRS 326 performance levels or higher.

5 Thermal balancing

Finally, since the tape and jacket are bonded together around the glass, thermal performance balancing was required to enable the entire cable to perform under standard thermal conditions. Each material – glass, tape and jacket – has a different level of thermal coefficient of linear expansion.

This means that each material within the cable will expand or contract at different rates under different temperature conditions. For example, plastics typically expand and contract up to two orders of magnitude more than glass.

In designing this new fibre, Aramid yarn was known to have a negative coefficient of linear expansion. But bonding everything together, most of the effects of thermal coefficients of linear expansion were virtually neutralised.

In the end, the cable behaves very similar to the actual glass in terms of expansion and contraction, performing from -40 degrees Celsius to 70 degrees Celsius with minimal attenuation changes.

Conventional plenum rated cables typically perform from 0 degrees Celsius to 50 degrees Celsius – as required by plenum cable standards.

6 Conclusions

As optical fibre solutions evolve to areas where copper once ruled, the importance of having the same handling, installation and management characteristics as copper wire cannot be underestimated.

Optical cables need to have enough strength to be pulled, twisted and cornered similar to copper without affecting performance.

By designing new cables that eliminate air and space inside the cable, smaller footprints can be achieved. Replacing the loose Aramid yarns with tape wraps and bonding the cable elements together is enabling a new evolution in small form factor optical micro-cables.

This, in turn, will expand the available system solutions to a broader section of customers, while providing optimal density, flexibility and performance of fibre in enterprise applications. ■

7 Acknowledgments

The author would like to acknowledge the help of Ken Nardone, Henry Rice, Bill Jacobsen and Aly Fahd in obtaining data and test information for this paper.

This paper was presented at the IWCS symposium November 2012.

Hochmoderne Passivierungsanlage

UM seinen Kunden noch komplettere Service-Levels zu bieten, hat William Hughes Ltd, der Hersteller von Fachfedern, Biegedrahtform und Bausätzen, eine hochmoderne automatisierte Passivierungsanlage in seinem UK-Hauptsitz in Stalbridge, Dorset, installiert.

Diese Aktion ermöglicht nicht nur die wichtigen Durchlaufzeiten zu reduzieren, die durch die Vergabe an Subunternehmen entstehen, sondern auch dem Unternehmen einen weiteren Prozess Nadcap (National Aerospace and Defense Contractors Accreditation Program) für die Kunden im Bereich Raumfahrt zu bieten.

„Die Entscheidung mit dem Passivierungskonzept zu beginnen, ergab sich weil einer unserer wichtigen Kunden im Bereich Raumfahrt diese Tätigkeit einstellte“ erklärte der Leiter von Sondervorfahren, Shaun Tattershall. „Infolgedessen haben wir begonnen verschiedene Installationsoptionen zu untersuchen und eine Anfrage zur Bearbeitungsfreigabe von unserem wichtigsten Kunden im Bereich Raumfahrt initiiert.“

Die neue Passivierungsanlage bei William Hughes stellt eine beträchtliche Investition dar und bietet eine neue Funktionalität weil kein manuelles „Eintauchen“ der Komponenten-Körbe von einer Station zur anderen vorgesehen wird, wie dies bei traditionellen Systemen der Fall ist.

Die Anlage führt dagegen eine



▲ Die automatisierte Passivierung wird zu einer wesentlich Reduzierung der Durchlaufzeiten beitragen

„Flüssigkeitsübertragung“ durch, indem chemische Lösungen von den Haltetanks zur Hauptbearbeitungseinheit bewegt werden, je nach Bedarf. Das ganze Verfahren ist automatisch und SPS-gesteuert. Typische Behandlungen sind Salpetersäure/Natriumdichromat und Spülzyklen. Darauf folgt eine Endspülung im deionisierten Wasser vor einem Abtrocknungszyklus.

Weitere innovative Anlagenfunktionalitäten schließen eine Ultraschall-Passivierungsanlage und eine Drehoption ein, in der die Drehung von Teilen in der Lösung ermöglicht wird und somit z. B. Luftspalten in komplexeren und rohrartigen Komponenten gefüllt werden.

Einige Prüfungen werden mit Einsatz intelligenter Maschinentfunktionen durchgeführt. Die SPS-gesteuerte Passivierungsanlage bei William Hughes wird z. B. die pH-Niveaus im Spülwasser überwachen und automatisch einstellen, sowie die Leitfähigkeit im deionisierten Wassertank bei der Endverarbeitung kontrollieren.

Seit der Installation der Passivierungsanlage hat William Hughes seine Nadcap-akkreditierten Wärmebehandlungs- und Ultraschall-Reinigungs-ausrüstungen im selben Bereich verlegt, und somit eine brandneue Verfahrensabteilung geschaffen.

William Hughes Ltd – UK
Website: www.wmhughes.co.uk

Aufruf zur Einreichung von Konferenzbeiträgen

Die führenden internationalen Draht- und Kabelindustrieverbände arbeiten wieder für die 6. CabWire World Conference zusammen, die im Palazzo Turati in Mailand, Italien, am Montag den 4. November 2013 stattfinden wird.

Das diesjährige Thema wird „Innovationen, die weltweit die Draht- und Kabelmärkte fördern“ sein. Eine Gruppe von Fachreferenten im Bereich Eisen und Nichteisen sind vorgesehen, die Beiträge über die neuesten technologischen Entwicklungen im Sektor vorstellen werden.

Diese Konferenz wird auch Tabletop-Ausstellungen präsentieren sowie die Möglichkeit bieten an einem

Galadinner im naheliegendem Palazzo Reale (Königlichen Palast) teilzunehmen, von dem man aus den historischen Piazza del Duomo überschauen kann. Eine Betriebsführung ist außerdem für Dienstag den 5. November vorgesehen.

Zur Vorstellung eines Berichts oder um sich als Delegierten einzutragen, finden Sie weitere Informationen unter www.cabwire.com

Die Konferenz ist in Zusammenarbeit mit ACIMAF, CET, IWCEA, IWMA und WAI organisiert.

International Wire and Machinery Association – UK
Website: www.iwma.org

Kostengünstige Lösungen

WINDAK ist auf automatische Verpackungslösungen für die Draht- und Kabelindustrie spezialisiert, mit Niederlassungen in Schweden, USA, Australien und Estland.

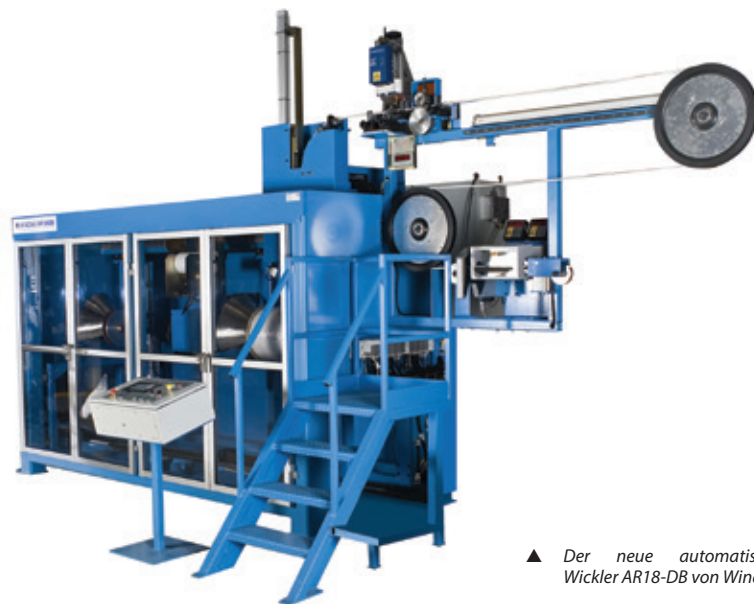
Auf kostengünstige Lösungen für den Kunden fokussiert, entwickelt das Unternehmen fortlaufend neue innovative Produkte, wie z. B. den neuen automatischen Wickler AR18-DB und den automatischen Aufwickler SW6-14.

Während der Interwire hat Windak eine neue automatische Wickleranlage AR18-DB vorgestellt, ein vollautomatischer Wickler, der für die automatische Verpackung von Kabel- und Drahtprodukten auf Spulen oder Rollen in Gesamtdurchmessern zwischen 216 und 460mm (8,5-18 Zoll) entworfen wurde.

Die Anlage kann sowohl Inline (direkte Verbindung mit dem Extruder) wie Offline laufen und mit automatischem Beladen sowie Entladen der leeren Rollen. Dazu gehört das Einwickeln der Spule mit Dehnfolie um das geschnittene Ende zu enthalten. Die Maschinenleistung entspricht zwei Rollen je Minute.

SW6-14 ist ein Doppelkopfaufwickler, der für eine vollautomatische Verpackung von Kabel- und Drahtprodukten auf Spulen mit einem Gesamtdurchmesser zwischen

165mm (6,5 Zoll) und 360mm (14 Zoll) entwickelt wurde. Der Betrieb ist mit Inline- sowie Offline-Anwendungen möglich. Zur Komplettierung der Anlage kann ein automatischer Palletierer, eine Folienverpackungseinheit, ein Pallettenförderer, eine Etikettiermaschine für die Rollen, Prüfausrüstungen und ein Metersignator auf den Kabeln integriert werden. SW6-14 kann Spulen automatisch be- und entladen. Die geschnittenen Enden werden mit Dehnfolie gesichert.



▲ Der neue automatische Wickler AR18-DB von Windak

Bei SW6-14 wird derselbe zuverlässige Fang- und Schneidmechanismus wie bei SW6 Hochgeschwindigkeit-Aufwickler eingesetzt.

Dieser bewährte Entwurf ermöglicht eine Stopzeit von zirka einer Sekunde. Die kurze Stopzeit erhöht die Anlagenleistung bis zu 30-40 Prozent im Vergleich zu traditionellen Aufwicklern.

Windak OU – Estland
Website: www.windakusa.com

Erfolgversprechende Zukunft mit FutureCom

Corning Cable Systems GmbH & Co KG, Teil des Telekommunikationsbereichs von Corning Incorporated hat das FutureCom™ xs500 Modul auf den Markt gebracht, die neueste Ergänzung in der FutureCom EA Produktlinie – das 10Gbit/s Ethernet-Kupferverkabelungssystem von Corning.

Das xs500 ist ein vollständig geschirmter, normgerechter Kat6A Kupferanschluss, der eine Anwendungsflexibilität bietet und die Installation für Hochleistungs-Kupferverkabelungsprojekte beschleunigt. Der Anschluss ist dauerhaft und dessen kompaktes Gehäuse schließt eine integrierte Staubschutzklappe ein, die geschlossen werden kann wenn Ports nicht genutzt werden.

Das xs500 Modul ist 14,5mm breit. Durch seinen engen Aufbau können im Anschluss drei Ports untergebracht werden, wo die meisten anderen Anschlüsse nur zwei Ports vorsehen

können. Bei Fussboden-Kästen können Installateure mit xs500 statt lediglich 9 bis zu 12 Anschlüsse je Kasten installieren.

„Corning hat einen Ruf für Qualität, und xs500 kann nun dem Mittelstand eine komplette Kupferlösung von Anfang bis Ende bieten, die erschwinglich ist und nicht die erwartete Qualität beeinträchtigt,“ so Jan-Sebastian Ziegler, Leiter von LAN Marketing, Enterprise Networks, EMEA bei Corning Cable Systems.

„Das xs500 bietet den Kunden einen Effektivwert, wird entsprechend unseren üblichen hohen Standards gefertigt und ist voll bestückt. Wir vertrauen darauf, dass es vom Markt gut aufgenommen werden wird und hohe Ziele für das Mittelstand-Segment setzen wird.“

Das Low Profile Keystone-Footprint von FutureCom xs500 eignet sich ideal für die unterschiedlichsten

Installationsszenarien, und die Einheit ist mit einer großen Auswahl von Hardwareoptionen von Auslassdosen zu den Tafeln kompatibel.

Ein innovatives zweiteiliges Design von FutureCom xs500 trägt zu einfacheren und schnelleren Kupferkabelinstallationsprojekten bei, weil keine speziellen Werkzeuge notwendig sind um die Kabel mit den Anschlüssen zu verbinden oder die Anschlüsse in den Auslassdosen zu installieren.

Mit dem mittelgroßen xs500 Modul, das die Auswahl FutureCom EA ergänzt, bietet Corning ein gesamtes Anschlussystem für Anschlüsse, Kabel, Auslassdosen und Tafeln, das dazu beiträgt die Qualitätskompromisse gemischter Quellensysteme zu beseitigen.

Corning Cable Systems GmbH & Co KG – Deutschland
Website: www.corning.com

Vom Lichtwellenleiterkabel zum optischen Draht – eine evolutionäre Auffassung

Von Wayne Kachmar, Fellow, Electro-Optical Engineering, TE Connectivity, North Bennington, Vermont

Übersicht

Diese Präsentation leitet einen neuen Aufbau von Lichtwellenleiterkabeln ein, dank welcher Kabel mit kleinem Formfaktor (SFF) die Möglichkeit haben Handlungseigenschaften zu erzielen, die so gut wie Kupferdraht sind oder sogar besser.

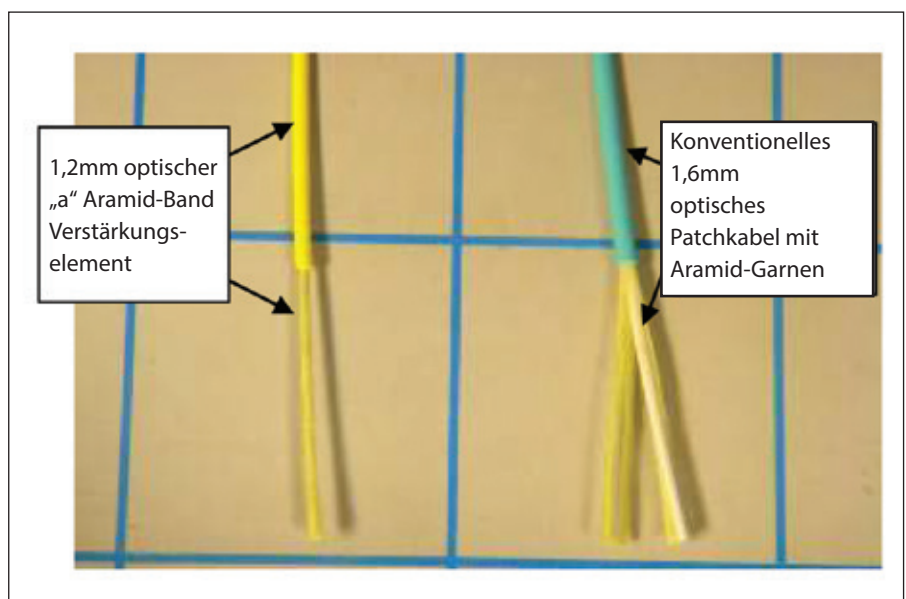
Die meisten Lichtleiter sind derzeit in Kabelaufbauten untergebracht, die einem traditionellen, auf einem von drei Grundkabeltypen basierenden Entwurfsprotokoll folgen, bzw.: Hohlader, Band oder Vollader.

Alle fordern sehr spezifische Handlungstechniken, die eine besonderen Pflege vorsehen und nicht einfach von den Installateuren durchgeführt werden können, die daran gewöhnt sind mit Kupfer umzugehen.

Dennoch wird die Nachfrage nach einer eher wie Kupfer wirkenden Faser immer offensichtlicher je mehr die Kabelabmessungen abnehmen während die Anwendungen – wie z. B. Vermittlungsstellen, Rechenzentren, Unternehmen, Glasfaser bis in die Wohnung/Glasfaser bis zum Schreibtisch (FTTH/FTTD) – dabei eine höhere Faserdichte verlangen. Ein Lichtwellenleiterkabel mit den Verhaltenseigenschaften eines Kupferkabels wird die Installationen in Bezug auf Zeit, Flexibilität und Kosten verbessern.

1 Einleitung

Viele neue Entwicklungen bei Lichtwellenleiterkabeln haben in jüngster Vergangenheit stattgefunden, wie z. B. Fasern mit reduziertem Biegeradius (RBRF), Füllmaterialien aus Nano-Verbundstoff, neue Materialien für die Festigkeit, Stecker-Technik, neue Richtlinien für die Regelüberwachung (ROHS, REACH) und Abmessungs-/Kostenbeschränkungen. Während dieser Zeit haben die



▲ Bild 1: 1,2mm gegen konventionelle 1,6mm

Kabelaufbaulösungen angenommen, dass ein Lichtwellenleiterkabel ein Verbundprodukt sei, in dem gesonderte Elemente (Vollader, Aramid-Garn-Polymermantel) nicht gebunden waren. Demzufolge wurden verschiedene Handhabungs- und Installationsanforderungen festgelegt basierend auf einen nicht gekoppelten Kernaufbau. In vielen Fällen wurden Installationsbeanspruchungen einfach durch die Abmessung oder Materialfestigkeit überwunden.

Viele ähnliche Vergleiche zu Kupfer wurden im Kabelbereich durchgeführt. Neben den Spezialprodukten, wie z. B. geführte „Torpedo“-Fasern, wurde keine andere echt optische Nachbildung zum Draht entwickelt. In der Regel enthalten Kabel einen oder mehrere isolierte Leiter und zusätzliche Bauelemente um Mechanik-, Umwelt- oder andere Leistungskriterien zu erzielen. Derzeit setzen die meisten Lichtwellenleiteraufbauten einen „losen Kern“ ein, um technisierte Leistungen in einem Lichtwellenleiterkabel zu erzielen

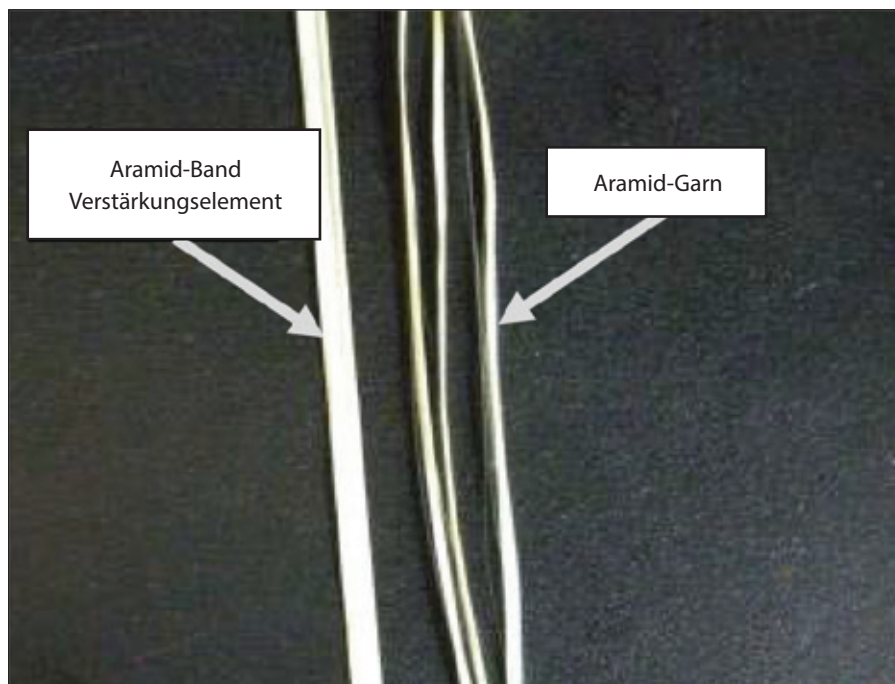
– und sogar Einzelfaserkabel, die einen geringen Schutz erfordern.

Das Ergebnis ist, dass bei vielen Aufbauten ein Installationshandling erforderlich ist, das sich von den traditionellen Installationen für Kupferkabel unterscheidet. Mehrere Mängel sind ein direktes Resultat der Unkenntnis von Installateuren im Umgang mit Sonderhandhabungen, die von traditionellen Innenkabeln mit Simplex- oder Duplex-Fasern erfordert werden. Demzufolge ist die Notwendigkeit einer Faser wichtig, die in Bezug auf die Handhabung eher wie Kupfer wirkt, weil sich die Faser an Anwendungen anpasst bei denen Kupfer einst die Spitzenlösung war. Viele Installateure sind der Meinung, dass Fasern mit denselben Methoden der Kupfervorgänger gehandhabt und installiert werden können. Glas bleibt jedoch immerhin Glas, und die Leistung eines traditionellen Faserkabels kann nach wie vor durch eine unsachgemäße Handhabung und Installation beeinflusst werden.

Warum ist dann also diese Meinung von Bedeutung? In der heutigen Umgebung werden optische Systemlösungen einer viel umfangreicheren Kundenauswahl angeboten. Viele dieser Installationsfachleute haben große Erfahrung mit der Kupferinstallationspraxis. Obwohl die meisten davon nicht mit der Installationspraxis der Faserkabel vertraut sind, die sie nun zu installieren haben. Demzufolge obliegt es den Faserkabelherstellern sie über die annehmbare Handhabungspraxis zu schulen. Noch wichtiger ist jedoch, dass wir Produkte liefern müssen, die unter neuen Kriterien erfolgreich sind, um die Akzeptanz von Lichtwellenleitersystemen in neuen Anwendungen zu verbessern. Bezüglich Lichtwellenleiterkabeln, müssen wir Produkte entwerfen, deren Verhalten dem kupferisolierten Draht bei der Faserkabelhandhabung, -bestückung und -management so ähnlich wie möglich ist.

Dank der neuen optischen Wellenleiter wurde diese Option durchführbar, jedoch müssen wir als Kabelhersteller die Entwicklung und den Aufbau installierbarer „Kabel“ (Drähte) fortsetzen, die die Kundenanforderungen erfüllen und eine neue Klasse optischer Wellenleiterprodukte bestimmen.

Die hier vorgestellte Ausführung ist ein geometrischer Kernaufbau bei dem der Lichtwellenleiter in der Mitte des Kerns angeordnet ist und geometrische Verstärkungselemente anstatt lose Garne eingesetzt wurden. Diese Verstärkungselemente bieten mehrere Funktionen, wie z. B. Außenmantelhaftung



▲ Bild 3: Neues geometrisches Verstärkungselement gegen alte Verstärkungselemente aus losen Garn

(um beim manuellen Ziehen mitzuwirken) Faserbeschichtung (Buffering) (gegen Stoßbelastungen und maximale Zuladung) und zuverlässiger Zugang zum Lichtwellenleiter für Fusionsspleißen oder Feld-Steckverbindung. Wie bei allen Kommunikationsvorrichtungen, muss eine höhere Leistung ausgeführt werden während die Anschaffungskosten gesichert werden. Aufbauten, die diese neuen Anforderungen erfüllen aber kostspielig und schwierig herzustellen sind, werden keinen Erfolg haben. Die

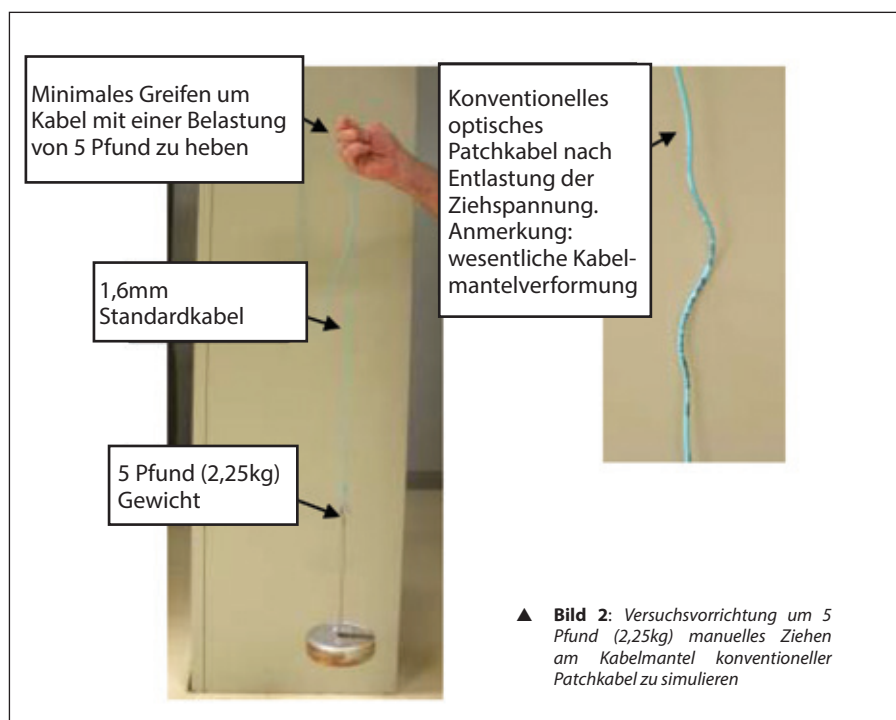
Kabel müssen auch fähig sein auf typischen Kabelausrüstungen massenproduziert zu werden mit annehmbaren Erträgen und Qualitätsleistungen.

2 Herausforderungen zum „optischen Draht“

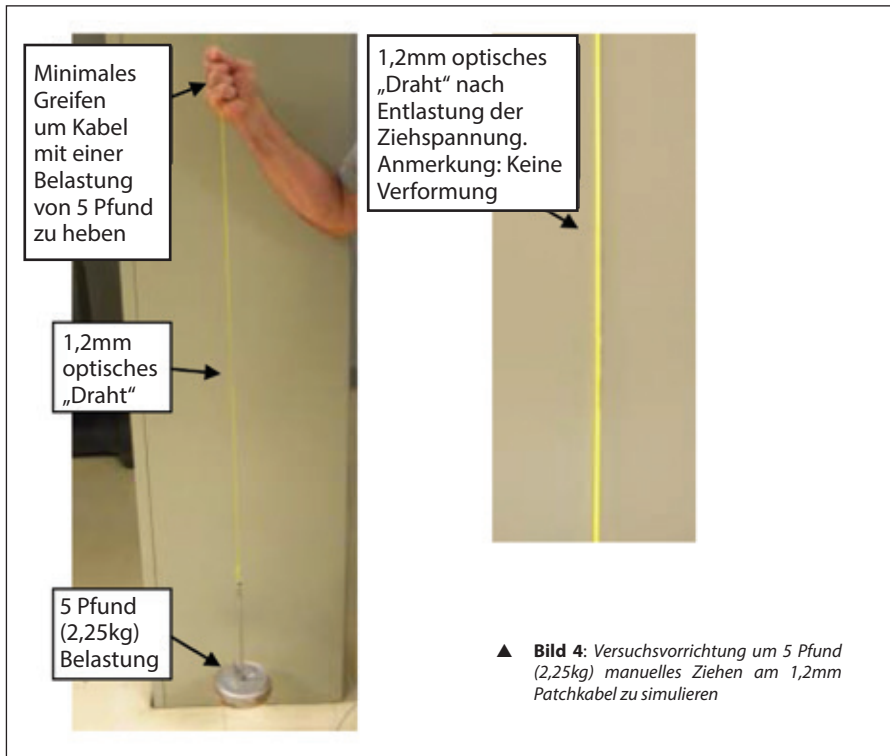
Traditionelle Simplex-/Duplex-Lichtwellenleiterkabel, die in den letzten 30 Jahren oder darüber hinaus entwickelt wurden, umfassen einen Hohladaufbau mit Aramid-Garne für die Festigkeit. Die Glasfaser wird in der Mitte der Garne mit einer Volladerbeschichtung aus Polymer eingebettet, um starke Biegungen oder Belastung zu vermeiden.

Aramid-Garne kommen zum Einsatz damit beide Ende sicher an die Stecker befestigten werden können. Wenn demzufolge ein Stecker gezogen wird, werden eigentlich die sich nicht dehnenen Garnen gezogen und nicht dieselbe Faser oder derselbe Mantel. Die Herausforderung bei einer derartigen Festigkeit der Faserkabel liegt darin, dass wenn wir sie durch die Isolierung ziehen, als wären sie Kupferdrähte, wir eigentlich an einem Stück Polymerkunststoff mit einer sehr geringen Festigkeit ziehen. Das Ziehen des Fasermantels dehnt das Polymer zeitweilig aus während die Glaslänge konstant bleibt.

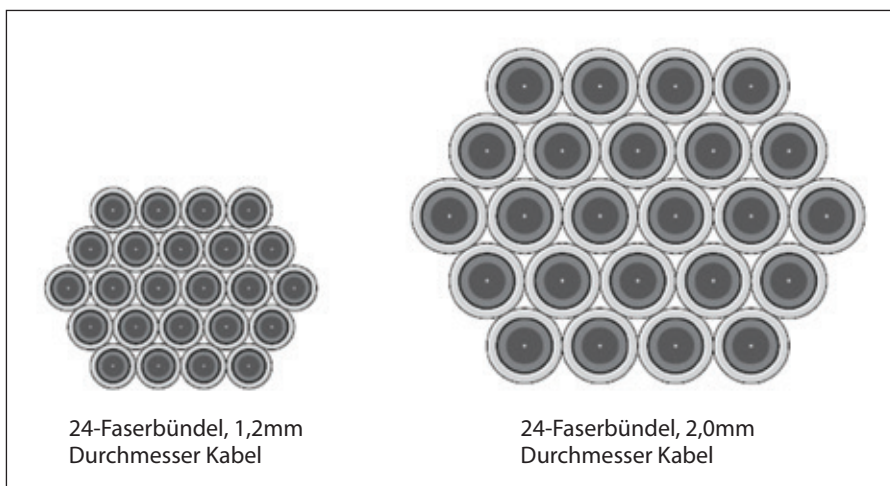
Das führt zu einer mechanischen Entkoppelung der Faser vom Verstärkungselement und vom Polymermantel



▲ Bild 2: Versuchsvorrichtung um 5 Pfund (2,25kg) manuelles Ziehen am Kabelmantel konventioneller Patchkabel zu simulieren



▲ Bild 4: Versuchsvorrichtung um 5 Pfund (2,25kg) manuelles Ziehen am 1,2mm Patchkabel zu simulieren



▲ Bild 5: Größenvergleich eines gebündelten Kabels von 1,2mm und 2,0mm

und ermöglicht das Bündeln des Außenmantels sowie eine ungeplante Bewegung der beschichteten Faser, was wiederum eine Überlänge auf einer Seite des Ziehens verursacht und eine auf der anderen Seite entstehende Zugbedingung. Das resultiert in der Regel aus großen Makrobiegeverlusten sowie mögliches Übertreffen des Mindestbiegeradius des Lichtwellenleiters und kann die Lebensdauer des Kabels wesentlich reduzieren.

Bei der Entwicklung von 3mm Faserkabeln waren die Mäntel relativ dick – in einigen Fällen entsprachen sie fast einen Millimeter. Damit wurde eine etwas höhere inhärente Festigkeit im Kunststoffpolymer geliefert bevor es gedehnt wurde.

Frühere Installateure waren mehr mit Handlingseigenschaften beschäftigt. Heutzutage ist Dichte gefragt, deswegen werden Faserkabeln immer kleiner. Daraus ergeben sich zwei Ergebnisse: einerseits wird die Kabelmanteldicke so klein wie möglich und andererseits werden die Kabel mit mehr Kraft gezogen um Kabelkanäle und –schläuche mit mehr Fasern zu füllen. Diese beiden Themen können die Zuverlässigkeit und Leistung der Faser beeinflussen.

Während die kleineren Faserkabel gezogen werden, werden die Mäntel gedehnt. Wenn die Mäntel mit der Zeit rückschrumpfen, wird ausreichend Reibung erzeugt um die beschichteten Fasern zurückzuschieben. Diese Wirkung resultiert in einem örtlichen

begrenzten Gebiet von übermäßiger Faser, die als Mikrobiegung bekannt ist, während der Mantel schrumpft. Mit der Reduzierung der Abmessungen des Lichtwellenleiterkabels auf 1,6mm, wurde dieses Phänomen durch die Kraft von nur einigen Unzen anstatt Pfund verursacht. Während demzufolge Lichtwellenleiterkabel kleiner werden, wurde eine feinere Handhabung während der Installation gefordert. Diese neue Kategorie von Kabeln wurde als Kabel mit „kleinem Formfaktor“ bekannt, weil sie nicht mehr dieselben Prüfungen der größeren Gegenstücke bestehen konnten.

Die Zugsorten erstreckten sich von 22 Pfund bis auf 9 Pfund, ermöglichten Kleinstmengen von Aramid-Garn und reduzierten die Manteldicke. Jedoch resultierte dies auch in Produkten, die im Vergleich zu irgendeinem Kupferdraht eine viel höhere Sorgfalt bei der Handhabung forderten.

Die Herausforderung lag darin, einen neuen Faserkabelaufbau für Produkte mit kleinem Formfaktor zu entwickeln, der die Anforderungen nach einer höheren Dichte erfüllen konnte und dabei eine drahtähnliche Festigkeit anzubieten, dank welcher das Faserkabel ohne eine Dämpfung oder andere Leistungsprobleme zu verursachen, gehandhabt und gezogen werden konnte. Die Herausforderungen wurden erfüllt indem drei Hauptprobleme gelöst wurden – Festigkeit, Verbindung und Temperatenausgleich.

3 Kupferähnliche Festigkeit erzielen

Die Festigkeit des Kupfers in einem 1,6mm Lichtwellenleiterkabel zu bieten war die erste Herausforderung. Installateure sollten imstande sein, das Kabel in einer geraden Linie wie Kupferdraht zu ziehen ohne es um einen Dorn wickeln zu müssen, um die Beschädigung des Mantels zu vermeiden. Gleichzeitig sollte die Abmessung des Mantels zirka ein Drittel jener traditionellen Mäntel sein. Der Freiraum um das Glas musste reduziert werden, um die Abmessung des Kabels so weit wie möglich zu senken. Das Kabel musste dennoch alle Belastungs-, Widerstands- und Bruchfestigkeitsprüfungen bestehen.

Während Kabel mit kleinem Formfaktor gehandhabt werden, kann die Faser eigentlich zu einer oder zur anderen Seite des Mantels wandern während die losen Garne nachgeben. In diesem Fall ist die Faser an einer Achse weniger geschützt und bietet nicht mehr den Schutz, mit dem sie konzeptionell entworfen wurden.

Durch den Einsatz eines Bands mit einem haftenden Matrixmaterial wurde eine kundenspezifische Werkzeugbestückung entworfen, um mehrmals längslaufend um die Faser zu wickeln. Dank dem längslaufenden Bandwickeln wird die Zentrierung der Faser gesichert während nur ein sehr dünner Außenmantel am Band haftet. Dank dieser Haftung wird es den Installateuren ermöglicht, ein angemessenes manuelles Ziehen bzw. manuelle Einstellung des Kabels durchzuführen ohne den Mantel zu dehnen. Indem die Möglichkeit geboten wird, das Band und den Mantel als eine einzelne Einheit zu binden, könnte das Faserkabel in Bezug auf Festigkeit so ähnlich wie ein Stück Kupferdraht gehandhabt werden.

Während viele Mikrokabel heute verfügbar sind, setzen sie in der Regel verflochtene Aramid-Garne um die Faser ein. Allerdings hat keins davon tatsächlich die Garne, den Mantel und die Faser zusammengekoppelt. Dieses Kabel ist einzigartig weil es ein Aramid-Band anstatt lose Garne einsetzt.

Das Band kann auch abisoliert werden mit Einsatz konventioneller Kupferkabel- oder Kupferdraht-Abisoliermaschinen. Elektrikerscheren können auch eingesetzt werden um diese Kabel abzuisolieren – das wurde hier zum ersten Mal mit einer beschichteten Faser erzielt, ohne dass dabei Sonderwerkzeuge erforderlich sind.

Hervorzuheben ist auch, dass die RBR-Faser – die schnell der Standard bei FTTX-Lösungen und Vermittlungsstellen/Rechenzentren wird – auch zu den Handhabungsqualitäten dieser neuen Fasern beitragen. Kleinere Kabel können um engere Aufbauten gebogen werden, um sich verschiedenen Typen von Modulen und Installationen anzupassen.

4 Steckverbindung

Das Haften vom Band und Mantel stellt jedenfalls eine neue Herausforderung mit der Steckverbindung her. Durch das Zusammenhaften dieser beiden Elemente wird der geforderte Freiraum für die Faser beseitigt, um gegenüber dem Stecker „zurückgeschoben“ zu werden. Demzufolge mussten die Stecker insbesondere für den Einsatz mit neuen Fasern umgeplant werden. Diese neuen Stecker berücksichtigen, dass die Faser nicht die Fähigkeit besitzt zurückgeschoben, oder innerhalb des Mantels zusammengedrückt zu werden.

Durch traditionelle Faserkabel kann die Faser in den Mantel ausreichend zurückgleiten damit die Stecker angeschlossen werden können,

manchmal soweit wie zwei Millimeter. Demzufolge wurden Stecker mit Endgehäusen entworfen, die den Mangel an zusätzlichem Freiraum in den Kernen ausgleichen können. Diese Stecker entsprechen weiterhin den GRS 326 Leistungsniveau oder darüber hinaus.

5 Temperatenausgleich

Schließlich, da das Band und der Mantel um das Glas zusammengebunden werden, wurde ein Ausgleich der thermischen Leistungsfähigkeit gefordert, damit das ganze Kabel unter thermischen Standardbedingungen funktionieren kann. Jedes Material – Glas, Band und Mantel – weist ein unterschiedliches Niveau des Wärmeausdehnungskoeffizienten der linearen Ausdehnung auf.

Das bedeutet, dass sich jedes Material im Kabel bei verschiedenen Raten unter unterschiedlichen Temperaturbedingungen ausdehnen oder zusammenziehen wird.

Im Vergleich zu Glas erfolgt zum Beispiel bei Kunststoff in der Regel das Ausdehnen und das Zusammenziehen um zwei Größenordnungen.

Beim Entwurf dieser neuen Faser war bekannt, dass Aramid-Garn einen negativen Koeffizient der linearen Ausdehnung hatte. Indem alles zusammengehaftet wurde sind die meisten Wirkungen der Wärmeausdehnungskoeffizienten der linearen Ausdehnung jedoch praktisch neutralisiert worden.

Schließlich ist das Verhalten des Kabels, in Bezug auf Ausdehnung und Zusammenziehen, dem eigentlichen Glas sehr ähnlich, in dem es von -40 Grad Celsius bis 70 Grad Celsius mit minimalen Dämpfungswechsel funktioniert.

Konventionelle plenum-eingestufte Kabel funktionieren in der Regel von 0 Grad Celsius bis 50 Grad Celsius – entsprechend den Anforderungen des Plenumkabelstandards.

6 Schlussfolgerungen

Mit der Entwicklung von Lösungen für Lichtwellenleiter in Bereichen in denen zuvor Kupfer vorherrschend war, ist es von großer Bedeutung, dieselben Handhabungs-, Installations- und Managementeigenschaften wie Kupferdraht zu besitzen.

Lichtwellenleiterkabel müssen ausreichend widerstandsfähig sein um

ähnlich wie Kupfer gezogen, verdrillt und mit Kanten versehen zu werden ohne die Leistung zu beeinflussen.

Um neue Kabel zu entwerfen, die Luft und Raum im Kabel beseitigen, können kleinere Stellflächen erzielt werden. Durch das Ersetzen der losen Aramid-Garne mit Bandwicklungen und das Zusammenhaften der Kabelelemente wird eine neue Entwicklung in optischen Mikrokabeln mit kleinem Formfaktor ermöglicht.

Das wird wiederum die verfügbaren Systemlösungen auf eine höhere Kundenauswahl erweitern, während man für optimale Dichte, Flexibilität und Leistung der Faser in Unternehmensanwendungen sorgt. ■

7 Danksagungen

Der Autor möchte sich bei Ken Nardone, Henry Rice, Bill Jacobsen und Aly Fahd bedanken, für deren Unterstützung um die Daten und Prüfinformationen des vorliegenden Artikels zu erhalten.

Ультрасовременный завод пассивации

Для предоставления более высокого уровня обслуживания своим клиентам компания «William Hughes Ltd», являющаяся высококлассным производителем пружинной проволоки, изогнутой проволоки и деталей, возвела ультрасовременный автоматизированный завод пассивации на территории своего центрального офиса в городе Сталибридж, графстве Дорсет в Великобритании.

Такой шаг не только существенно сократит время реализации заказа, указанное в требованиях к подрядчику, но и позволит компании предоставлять еще и программу по сертификации подрядчиков фирм-исполнителей на выполнение работ по заказам НАСА и Министерства обороны США для клиентов аэрокосмической области.

«Замысел построить завод по пассивации возник после того, как один из наших крупных заказчиков в сфере авиакосмической промышленности прекратил свою деятельность», – пояснил управляющий по специальным технологиям Шон Таттершел. «Впоследствии мы начали разрабатывать разнообразные варианты завода и отправили запрос на одобрение технологии нашему крупному заказчику в авиакосмической промышленности».

Новый завод пассивации «William Hughes», который представляет выгодный объект инвестиций, предлагает уникальные функциональные возможности, не



▲ Автоматизированная пассивация поможет значительно сократить время выполнения заказа

требующие ручного «смачивания» корзины для деталей от станции к станции в отличие от традиционных систем.

Вместо этого на заводе осуществляется «перенос жидкой среды», при котором химические растворы перемещаются из баков-сборников в главную технологическую установку, как и требуется. Весь процесс автоматизирован и управляется ПЛК. Стандартная обработка осуществляется путем применения азотной кислоты/бихромата натрия и циклов промывки. Далее производится окончательная промывка в деионизированной воде до цикла осушки. Другие инновационные функциональные возможности завода включают ультразвуковое

оборудование пассивации и опцию вращения, когда части могут вращаться в растворе, таким образом, к примеру, заполняя воздушные полости в более сложных и трубчатых компонентах.

Некоторые проверки осуществляются при использовании интеллектуальных функций оборудования. К примеру, на заводе пассивации «William Hughes», управляемом ПЛК будет контролироваться и автоматически устанавливаться уровни pH в промывочной воде, а также поддерживаться проводимость в резервуаре окончательной химически деионизированной воды.

«William Hughes Ltd» - Великобритания
Вебсайт: www.wmhughes.co.uk

Конференция по презентации докладов

Ведущие международные ассоциации кабельной и проволочной промышленности вновь соберутся на 6 всемирной конференции «CabWire» в Милане в Palazzo Turati в Италии в понедельник 4 ноября 2013.

В этом году тема звучит как «Инновации на международном рынке проволоки и кабелей», в выставке примут участие как эксперты по железосодержащим материалам, так и не железным, представив доклады по самым современным технологическим открытиям в данной сфере.

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Конференция организована совместно при поддержке «ACIMAF», «CET», «IWCEA», «IWMA» и «WAI».

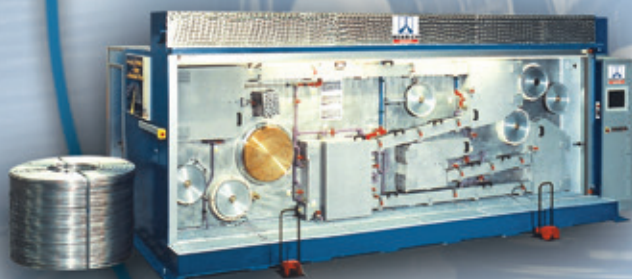
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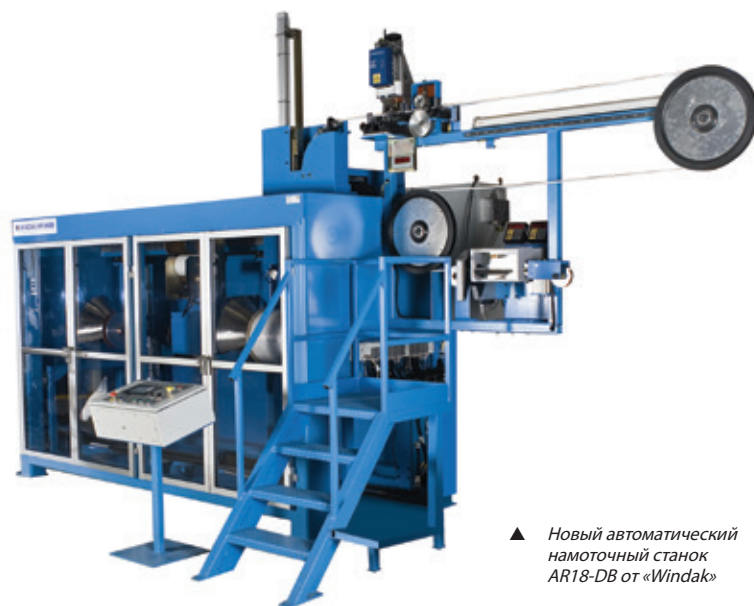
SKET Verseilmaschinenbau GmbH
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39104 Magdeburg · Germany
Тел.: + 49 (0) 391 40558-0
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Интернет: www.SKETVMB.de

Выгодные решения

«Windak» специализируется в решениях автоматической комплектации для кабельной и проволочной промышленности в Швеции, США, Австралии и Эстонии. Предлагая своим клиентам выгодные решения, компания постоянно разрабатывает новую инновационную продукцию, такую как новый автоматический намоточный станок AR18-DB и автоматическая катушечная мотальная машина SW6-14.

«Windak» на выставке «Interwire» представила новую линию автоматических намоточных станков AR18-DB, полностью автоматический станок, разработанный для автоматической упаковки кабельной и проволочной продукции и намотки на катушки или бобины общим диаметром между 216-460мм (8.5дюймов-18дюймов). Они могут функционировать как сетевые приборы (напрямую подключенные к экструдеру), так и в автономном режиме и погружать и разгружать пустые катушки автоматически. Это включает также натяжную обмотку катушки для соединения оборванных концов. Производительность станка – две катушки в минуту.

SW6-14 – это мотальная машина с двумя головками для полностью автоматической упаковки кабельной и проволочной продукции наматыванием ее на катушки общим



▲ Новый автоматический намоточный станок AR18-DB от «Windak»

диаметром между 165 мм (6.5 дюймов) и 360 мм (14 дюймов). Она может работать как от сети, так и в автоматическом режиме. Комплектация может включать автоматический погрузчик на поддоны, лентопротяжный механизм, плиточный транспортер, маркировочную машину катушек, оборудование для испытаний и метровки на кабеле. SW6-14 погружает и разгружает катушки автоматически. Оборванные концы закрепляются натяжной обмоткой. В SW6-14 применяется тот же надежный

механизм закрепления оборванных концов, что и в высокоскоростных мотальных машинах SW6. Данный испытанный временем дизайн обеспечивает время остановки примерно одну секунду. Быстрое время остановки увеличивает производительность линии до 30-40% по сравнению с обычными мотальными машинами.

«Windak OU» – Эстония
Вебсайт: www.windakusa.com

Светлое будущее “FutureCom™”

“Corning Cable Systems GmbH & Co KG” – часть сегмента “Corning Incorporated’s Telecommunications” представили FutureCom™ xs500, самое последнее дополнение в линии продукции FutureCom EA – 10 гигабитовая Ethernet система медного кабеля. xs500 – это полностью защищенный, соответствующий стандартам Cat6A медный разъем, обеспечивающий гибкость системы и быструю установку для высокопроизводительных проектов с медным кабелем. Разъем является прочным, и его компактный корпус включает встроенную пылезащитную крышку, которую можно закрывать, когда отверстие не используется.

xs500 14,5 мм шириной, и его узкий профиль позволяет разъему поддерживать три выходных отверстия, тогда как большинство разъемов поддерживают только два отверстия. В электрораспределительных коробках xs500 позволяет наладчикам

подключать до 12 разъемов к коробке вместо девяти.

“Corning» завоевал имидж высококачественной компании, и xs500 может в настоящее время предложить среднему рынку укомплектованное от начала до конца медное решение, которое является доступным и не уступает ожидаемому качеству», – заявил Ян-Себастьян Циглер, директор отдела маркетинга по кабелям для передачи данных, «Enterprise Networks», «EMEA», в «Corning Cable Systems».

«xs500 предлагает клиенту настоящее качество, которое соответствует нашим высоким стандартам и является полнофункциональным. Мы уверены, что данная продукция будет иметь успех на рынке, и что она будет доступна для потребителя среднего рыночного сегмента. Благодаря своей компактности и основным габаритам FutureCom xs500 идеален

для применения при различных типах установок, устройство обеспечивает совместимость с большим диапазоном технических средств: от выходных отверстий до панелей. Инновационный двухкомпонентный профиль FutureCom xs500 помогает осуществить укладку кабеля проще и быстрее, так как при этом не требуется соединять кабель с разъемом или устанавливать разъемы в выходные отверстия.

Вместе с xs500 среднего размера, дополняющего серию FutureCom EA, «Corning» предоставляет полностью укомплектованную систему соединения для соединительных разъемов, кабелей, выходных отверстий и панелей, что помогает избежать компромиссы качества для смешанных исходных систем.

«Corning Cable Systems GmbH & Co KG» – Германия
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От оптического кабеля до оптической проволоки - эволюционный подход

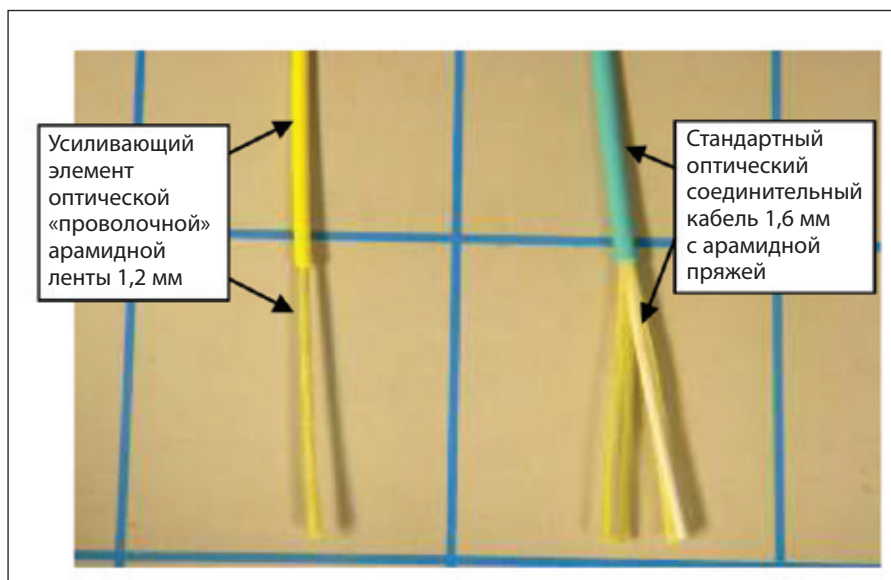
Вейн Кахмар, Fellow, Electro-Optical Engineering, "TE Connectivity", North Bennington, штат Вермонт

Аннотация

Данная презентация предоставит информацию по новому дизайну волоконнооптического кабеля, который позволяет кабелю с одним оптическим волокном иметь характеристики управляемости, которые будут лучше или такие же, как у медной проволоки. В настоящее время, большинство оптических волноводов устанавливаются в кабельные дизайны, который повторяет традиционный дизайн по регламенту на основе трех кабельных типов: трубка со свободной укладкой волокон, лента или вторичное буферное покрытие. Для всех данных типов необходимы особые способы обработки, которые требуют особой аккуратности, и просто не могут быть выполнены теми же самыми монтажниками, которые работают с медью. Тем не менее, необходимость волокна обладать характеристиками меди, становится все более актуальной, так как размеры кабеля уменьшаются, а для применения в таких сферах, как центральные АТС, центры обработки данных, на предприятиях, для стекловолокна, необходима большая плотность волокна. Волоконный кабель с техническими характеристиками медного кабеля улучшит установку, ускорив процесс, увеличив гибкость и уменьшив стоимость.

1 Введение

За последнее время большое количество открытий было сделано в сфере волоконнооптических кабелей, к примеру, волокно с маленьким радиусом изгиба, нанокompозитные материалы-заполнители, новые материалы повышенной прочности, коннекторная технология, разработки в области соблюдения нормативных требований, ограничения цены/



▲ Рисунок 1. 1,2 мм и стандартные 1,6 мм

размера. За это время были приняты решения кабельного дизайна, согласно которым, оптоволоконный кабель считается композитной продукцией, где отдельные элементы (туго фиксированный кабель, арамидная пряжа полимерной оболочки) не были связаны. Следовательно, различные способы обработки и требования по установке были основаны на непарной конструкции жилы. Во многих случаях, напряжение при установке преодолевалось за счет самой структуры или прочности материала.

Неоднократно проводились сравнения с медью в сфере кабеля. Не было разработано ни одного оптического аналога кабелю, помимо такой специальной продукции, как управляемое торпедное волокно. Обычно кабели состоят из одного или более изолированных проводников и дополнительных конструкционных

элементов для соответствия механическим, экологическим и другим эксплуатационным характеристикам. На сегодняшний день в большинстве волоконных дизайнах используется разовый литейный стержень для соответствия инженеринговым рабочим характеристикам оптического кабеля, даже в одноволоконных кабелях, которым требуется минимальная защита.

В результате для большинства профилей требуется особая обработка при установке, отличающаяся от традиционной установки медного кабеля. Многие поломки являются следствием незнания монтажниками того факта, что одно- и двухволоконные кабели в помещениях нуждаются в особой обработке при установке. Таким образом, становится важной потребность волокна иметь характеристики обработки, схожие с

медью, так как волокно используют там, где раньше медь была единственной альтернативой. У многих монтажников существует мнение, что волокно можно обрабатывать и устанавливать, используя те же методы, что применялись ранее при обращении с медью. Однако, стекло есть стекло, и неправильная обработка и установка могут существенно отразиться на эксплуатационных характеристиках традиционного оптоволоконного кабеля.

Так почему же такой взгляд является немаловажным? В современном мире решения в области оптической системы предоставляются более широкому диапазону клиентов. Многие из данных экспертов по установке обладают богатым опытом установки медных материалов. И все же большинство из них незнакомы со способами установки волоконных кабелей, которые им приходится зачастую монтировать. Таким образом, производители оптоволоконных кабелей обязательно должны обучать их приемлемым способам обработки.

Более важным является тот факт, для увеличения применения оптоволоконных систем мы должны предоставить продукцию, которая будет отвечать новым критериям. Среди оптоволоконных кабелей необходимо разработать продукцию, которая по методам обработки, установки и обращения с ней, будет больше похожа на медную изолированную проволоку.

Новые оптические волноводы сделали данную опцию реальной, но мы, будучи кабельными специалистами, должны продолжить данную эволюцию и разработать разрешенные к установке кабели (проволоки), которые соответствуют потребностям клиента и определяют новый класс продукции оптических волноводов.

Профиль, представленный здесь, имеет геометрическую конструкцию, где оптоволоконно находится посередине, а арамидная пряжа удалена в области геометрически расположенных усиливающих элементов.

Данные усиливающие элементы выполняют множество функций таких, как связность наружного кожуха (для облегчения ручного метода определения длины волокна), амортизация волокна (при силовом воздействии и максимальных нагрузках), а также надежный доступ к оптоволокону для сплайс склейки и установки соединения на площадке. Как и с устройствами коммуникации, улучшенные рабочие характеристики должны достигаться при обеспечении доступности. Бессмысленно разрабатывать профили,

отвечающие новым требованиям, с дорогостоящим изготовлением, но продающиеся по низкой цене. Также необходимо обеспечить массовое производство кабеля для стандартного кабельного оборудования с приемлемыми параметрами и качеством функционирования.

2 Вызовы «оптической проволоке»

Традиционные симплексные/дуплексные оптоволоконные кабели, разработанные за последние 30 лет или более, имеют профиль со свободно лежащим оптическим модулем и арамидной пряжей для прочности.

Стекловолокно помещается в центр пряжи с плотным буферным покрытием для предотвращения чрезмерного изгиба или деформации. Арамидная пряжа устанавливается таким образом, что оба конца надежно закрепляют соединители.

Так, если вытягивается соединитель, на самом деле вытягивается не растягивающаяся арамидная пряжа, а не волокно или сам кожух. Проблема повышения прочности оптоволоконной изоляции, как это делается с медной проволокой, на самом деле вытягивается часть полимерного пластика с очень низкой прочностью. Вытяжение волоконного кожуха временно

вытягивает полимер, в то время как длина стекла остается постоянной.

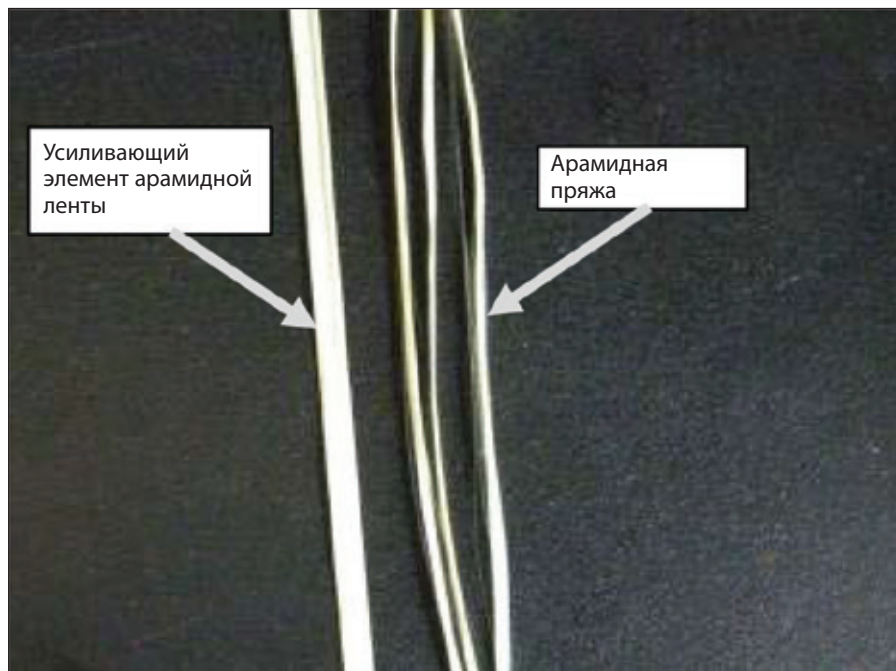
Это вызывает механическое отделение волокна от усилителей и полимерного кожуха, что, в свою очередь, приводит к скрутке внешнего кожуха и неконтролируемому смещению буферного волокна для увеличения длины на одной стороне вытяжения и чрезмерному натяжению на другой стороне. Обычно результатом становятся большие потери макроизгиба, а также вероятность превышения радиуса минимального изгиба оптоволоконной. Это может значительно сократить срок службы кабеля.

При разработке 3 мм оптоволоконной, кожухи были относительно плотными, в некоторых случаях, толщиной почти миллиметр. Это обеспечило небольшое увеличение прочности в пластическом полимере до его вытяжения. Ранее монтажники были более заинтересованы параметрами обработки. Сегодня растет потребность высокой плотности, а количество оптоволоконной снижается до минимума. Это привело к двум последствиям. Во-первых, толщина кожуха становится минимальной, а во-вторых, кабели вытягиваются большей силой для более плотного заполнения кабелепроводов и кабельных трасс волокном. Обе данные проблемы могут сказаться на надежности и функционировании волокна.

Когда вытягиваются меньшие оптоволоконные, растягиваются кожухи. Когда со временем, они дают усадку,



▲ Рисунок 2. Экспериментальное крепление для моделирования ручного вытяжения кабельного кожуха 5 фунтов (2,25 кг) при стандартном соединительном кабеле



▲ Рисунок 3. Новый геометрический усиливающий элемент и старые усиливающие элементы пряжи

создается достаточное трение для проталкивания буферных волокон обратно. В результате этого в определенном месте возникает избыточное волокно, известное как микроизгиб при усадке кожуха. Так как размеры оптоволокна были уменьшены до 1,6 мм, данный процесс был вызван всего лишь несколькими унциями, а не фунтами мощности. Таким образом, если оптоволокно становится меньше, при установке требуется еще более аккуратное обращение. Данная категория кабелей получила название кабели с «компактным форм-фактором», поскольку для них требовались другие типы испытаний, чем для обычных кабелей.

Эластичные кабели выдерживали нагрузку от 22 фунтов до девяти фунтов при минимальном содержании арамидной пряжи и уменьшенной толщине кожуха. Кроме того, это привело к возникновению продукции, с которой необходимо намного более аккуратное обращение, чем с медной проволокой.

Вызовом стала разработка нового профиля оптоволокна для продукции с компактным форм-фактором, которая отвечает требованиям увеличенной плотности и длине, как у проволоки, которая обеспечит способы обработки и вытяжения без потери энергии сигнала и другом негативном влиянии на функционирование.

Решение было найдено благодаря работе над тремя характеристиками - прочность, связь и тепловой баланс.

3 Достижение медной прочности

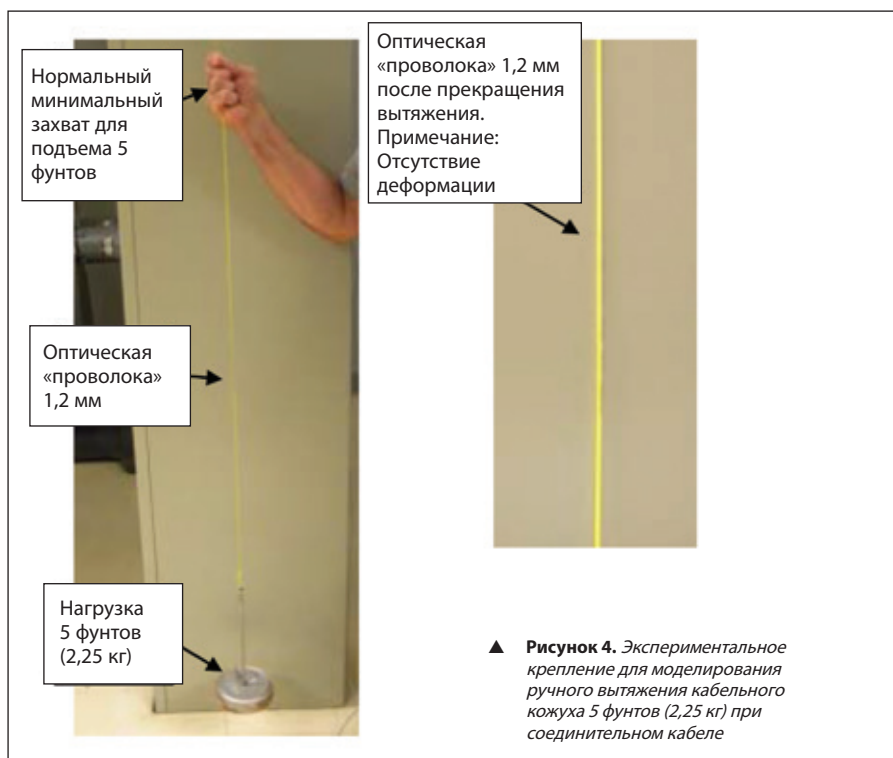
Обеспечение медной прочности в оптоволоконном 1,6 мм кабеле было первоочередной задачей. Монтажники должны иметь возможность вытягивать кабель в прямую линию, как медную проволоку без необходимости наматывания его на шпindel для

предотвращения повреждения кожуха. В то же время, длина кожуха должна составлять около одной трети длины современных кожухов.

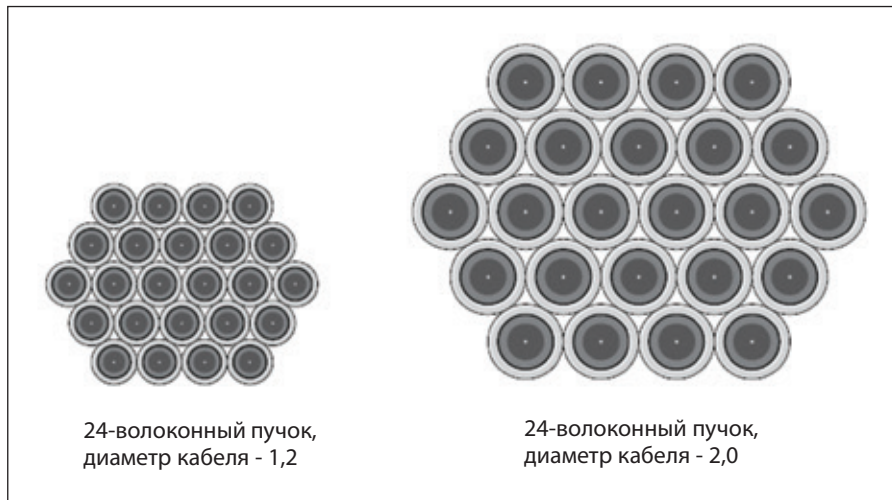
Свободное место вокруг стекла необходимо уменьшить, сделав кабель, уменьшив его. В то же время, кабель отвечать всем характеристикам механического воздействия, сопротивления и испытаниям на прочность к раздавливанию.

При обработке кабелей с компактным форм-фактором, волокно может перемещаться с одной стороны кожуха на другую при смещении арамидной пряжи. Если это происходит, волокно становится менее защищенным по одной оси и больше не обеспечивает защиту - функцию, которая закладывается при проектировании.

При использовании ленты с клейким связующим материалом, была разработана специальная оснастка для продольного оборачивания волокна несколько раз. Продольное оборачивание ленты обеспечивает центральное положение волокна только пока очень тонкий внешний кожух связан с лентой. Данная связь позволяет монтажникам осуществлять необходимое ручное определение метода длины волокна или ручной набор кабеля без растяжения кожуха. При обеспечении связи ленты и кожуха как единого целого оптоволоконный кабель можно обрабатывать как кусок медной проволоки с такими же параметрами прочности.



▲ Рисунок 4. Экспериментальное крепление для моделирования ручного вытяжения кабельного кожуха 5 фунтов (2,25 кг) при соединительном кабеле



▲ Рисунок 5. Сравнение размера кабельных жгутов 1,2 мм и 2,0 мм

Тогда как многие микрокабели доступны сегодня, почти во всех из них используется арамидная пряжа вокруг волокна. Ни в одном пряжа не соединена вместе с кожухом и волокном. Данный кабель является уникальным, так как в нем используется арамидная лента вместо свободно закрепленной пряжи. Лента может также отделяться при использовании стрипперных машин для стандартного медного кабеля или стрипперных машин для медной проволоки. Для очистки таких кабелей могут использоваться даже ножницы «Lineman» первый раз это возможно было сделать для волокна с покрытием без специализированного оборудования.

Следует также отметить, что волокно с уменьшенным радиусом сгиба быстро становится стандартным оптоволоконным решением для использования в центральных офисах/центрах сбора данных, что также предоставляет преимущества для качества обработки данных типов волокон. Кабели меньшего размера могут быть согнуты вокруг более жесткой конфигурации для соответствия различным типам модулей и установок.

4 Порядок установления соединений

Связь ленты и кожуха, однако, создала дополнительные проблемы с порядком установления соединений. Их соединение сократило пространство, необходимое для волокна при «отталкивании» от коннектора. Следовательно, коннекторы должны быть модифицированы для

использования специально с данным типом волокна. При разработке новых коннекторов нужно учитывать, что данное волокно не обладает свойством отталкивания или возможностью сжатия в пределах кожуха.

Стандартные оптоволоконные кабели позволяют волокну соскользнуть обратно в кожух в достаточной мере для соединения коннекторов, иногда всего лишь на два миллиметра.

Таким образом, были разработаны коннекторы с внешней оболочкой, которая может компенсировать недостаток дополнительного свободного пространства в центре. Данные коннекторы соответствуют уровням функционирования GRS 326 или выше.

5 Тепловой баланс

В конечном счете, при соединении ленты и кожуха вокруг стекла был необходим тепловой баланс для обеспечения функционирования кабеля при стандартных тепловых условиях. Каждый материал - стекло, лента и кожух - имеет различный уровень теплового коэффициента линейного расширения. Это означает, что каждый материал кабеля будет расширяться или сокращаться на различную длину при различных температурных условиях. К примеру, пластик обычно расширяется и сокращается в пропорции до 2 к 1 по сравнению со стеклом.

При разработке данного нового типа волокна, учитывался тот факт, что арамидная пряжа негативно сказывается на коэффициенте линейного расширения. Но при соединении вместе всех элементов

большинство эффектов термального коэффициента линейного расширения были существенно нейтрализованы. В конечном итоге, кабель по своим параметрам расширения и сокращения стал похож на стекло, изменение длины которого происходит от -40 градусов Цельсия до 70 градусов Цельсия с минимальными изменениями затухания. Стандартные кабели класса «пленум» обычно функционируют от 0 градусов Цельсия до 50 градусов Цельсия, как и требуется для кабелей данного класса.

6 Заключение

Так как волоконные решения возникают в сфере, где раньше использовалась только медь, важность обработки, установки, и характеристик управления, схожих с медной проволокой, нельзя недооценивать. Оптоволоконные кабели должны быть достаточно прочными для вытяжения, способными сплетаться и сгибаться без отрицательного влияния на функционирование.

При разработке новых кабелей, которые уменьшают воздух и пространство внутри кабеля, можно получить меньшие габариты. Замена обмотки арамидной пряжей на ленточную обмотку и соединение кабельных элементов является эволюцией в сфере оптических микрокабелей с компактным форм-фактором. Это, в свою очередь, расширяет доступные системы решений для более широкого круга клиентов, предоставляя оптимальную плотность, гибкость и функционирование волокна в промышленном применении. ■

7 Признательность

Автор хотел бы выразить признательность за помощь Кена Нардона, Генри Райса, Била Якобсена и Али Фада за предоставление информации и результатов испытаний для данной работы.

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Installation de passivation de pointe

POUR améliorer le service offert à ses clients, William Hughes Ltd, société spécialisée dans la production de ressorts spécifiques, de formes de fil courbe et d'ensembles de composants métalliques, a installé une usine de passivation automatisée auprès de son siège central de Stalbridge, dans le Dorset au Royaume-Uni.

La société pourra ainsi réduire le considérable temps de livraison nécessaire pour la sous-traitance de ce processus, mais également offrir un autre processus Nadcap (National Aerospace and Defense Contractors Accreditation Program) à ses clients du secteur aéronautique.

"L'idée d'inclure la passivation parmi ses services est venue lors de la cessation de l'activité de l'un de nos clients importants du secteur aéronautique", a expliqué Shaun Tattershall, responsable des procédés spéciaux. "Par conséquent, nous avons commencé à examiner différentes options pour l'installation et nous avons sollicité une requête pour l'approbation du procédé à notre principal client du secteur aéronautique".

M. Tattershall a réussi à acheter des équipements conçus et réalisés conformément aux exigences spécifiques de William Hughes, et caractérisés par le contrôle optimisé du procédé selon la spécification AMS 2700.

La nouvelle installation de passivation de William Hughes, ayant éliminé l'immersion manuelle des paniers des composants d'une station à l'autre comme dans le cas des systèmes conventionnels, représente un



▲ La passivation automatisée permettra de réduire considérablement les temps de livraison

investissement considérable pour la société et offre une nouvelle fonctionnalité.

Dans la nouvelle installation, par contre, on effectue un "transfert de liquide" amenant les solutions chimiques des citernes de stockage à l'unité de processus principale, en fonction des nécessités. La totalité du processus est automatique et contrôlée au moyen d'API. Les traitements typiques sont effectués avec l'acide azotique et/ou le dichromate de sodium et des cycles de rinçage. Ces traitements sont suivis par un dernier rinçage en eau déionisée avant le cycle de séchage.

Les caractéristiques innovantes de l'installation comprennent également une installation de passivation ultrasonique et un système rotatif conçu pour la rotation des composants dans la solution en permettant ainsi de remplir les trous d'air

dans les composants plus complexe et du type tubulaire par exemple.

Quelques vérifications sont effectuées au moyen de fonctions intelligentes de la machine. Par exemple, l'installation de passivation contrôlée au moyen d'API de William Hughes est conçue pour contrôler et régler automatiquement les niveaux de pH dans l'eau de rinçage et, en outre, elle surveillera la conductivité du réservoir de l'eau déionisée du processus final.

Dès l'installation du système de passivation, William Hughes a transféré ses équipements de traitement thermique et de nettoyage ultrasonique accrédités par Nadcap dans la même zone, en créant ainsi un département de traitement tout nouveau.

William Hughes Ltd – Royaume-Uni
Website: www.wmhughes.co.uk

Appel à communication

Les associations internationales leaders dans le secteur du câble et du fil collaborent actuellement pour célébrer la 6ème Conférence Internationale sur le câble et le Fil qui se tiendra au Palais Turati de Milan, en Italie, lundi 4 novembre 2013.

Le thème de cette année concernera les "Innovations qui guident les marchés mondiaux du fil et du câble" et comptera sur la présence d'un comité d'experts en matériaux ferreux et non ferreux, qui illustreront les tout derniers développements technologiques du secteur.

La conférence sera en outre caractérisée par des tables rondes et il sera possible de participer à un dîner de gala au Palais

Royal de Milan, qui donne sur la célèbre Piazza del Duomo. Le programme prévoit également une visite guidée de l'usine mardi 5 novembre.

Pour plus d'informations concernant les modalités de présentation d'un article ou pour s'inscrire comme délégués, visiter la page web www.cabwire.com

La conférence est organisée conjointement par ACIMAF, CET, IWCEA, IWMA et WAI.

International Wire and Machinery Association – Royaume-Uni
Website: www.iwma.or

Solutions rentables

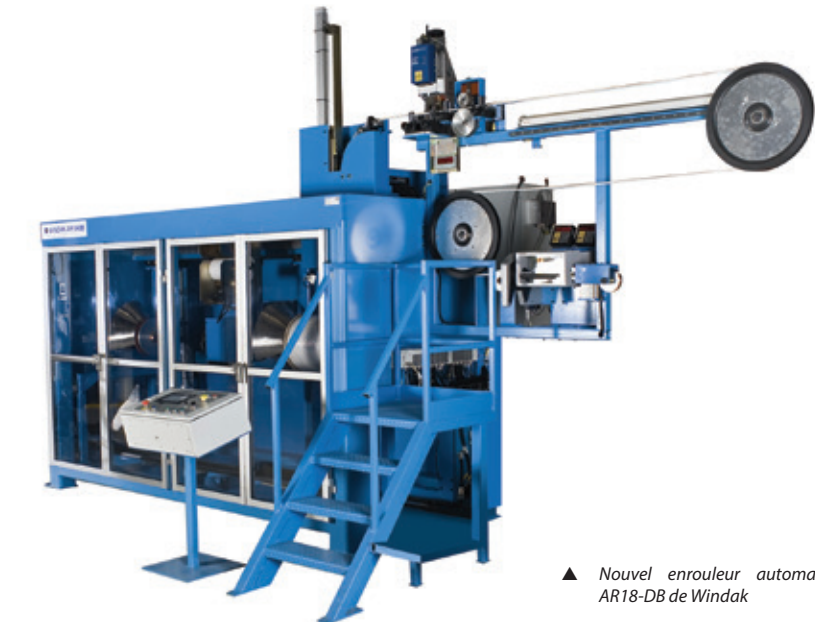
LA société Windak est spécialisée en solutions d'emballage automatique pour le secteur du câble et du fil et possède des bureaux en Suisse, aux États-Unis, en Australie et en Estonie.

La société, orientée à offrir des solutions rentables pour ses clients, est constamment engagée dans l'étude de produits innovants tels que le nouvel enrouleur automatique AR18-DB et le bobinoir automatique SW6-14.

À Interwire, Windak a présenté son nouvel enrouleur automatique AR18-DB, un enrouleur entièrement automatique développé pour l'emballage automatique des câbles ou de fils sur bobines ou dévidoirs de 216-460mm (8,5"-18") de diamètre total.

La machine peut fonctionner en ligne (avec accouplement direct à l'extrudeuse) et hors-ligne et chargement et déchargement des dévidoirs vides de façon automatique. En outre, le dispositif effectue l'emballage avec une pellicule extensible pour contenir l'extrémité coupée. Le rendement de la machine est de deux bobines par minute.

Le bobinoir SW6-14 est un bobinoir à deux têtes développé pour l'emballage entièrement automatique de câbles et de fils sur des bobines de 165mm (6,5") à 360mm (14") de diamètre total. Il est



▲ Nouvel enrouleur automatique AR18-DB de Windak

conçu pour des applications en ligne et hors ligne. La ligne peut être complétée avec un palettiseur automatique, un système d'emballage avec pellicule, un convoyeur à palettes, une étiqueteuse de dévidoirs, des équipements d'essai et un dispositif pour le marquage métrique sur les câbles. Le bobinoir SW6-14 charge et décharge les bobines de façon automatique. Les extrémités coupées sont fixées au moyen d'une pellicule extensible.

Le SW6-14 utilise le même mécanisme fiable d'accrochage et de coupe utilisé dans les bobinoirs haute vitesse SW6. Sa conception testée permet des temps d'arrêt d'environ une seconde.

L'arrêt très bref augmente le rendement de la ligne jusqu'à environ 30-40% par rapport aux bobinoirs traditionnels.

Windak OU – Estonie
Website: www.windakusa.com

La ligne FutureCom promet bien

Corning Cable Systems GmbH & Co KG, faisant partie du segment de télécommunications de Corning Incorporated, a présenté le module FutureCom™ xs500, le tout dernier composant de sa ligne de produits FutureCom EA, le système de câblage de cuivre Ethernet de 10Gbit/s de Corning.

Le module xs500 est un connecteur de cuivre de Cat.6A entièrement blindé et conforme aux normes, caractérisé par une haute flexibilité de déploiement et par une installation rapide dans les projets de câblage de cuivre hautes performances. Le connecteur est durable et son boîtier compact comprend une housse de protection intégrée pouvant être fermée lorsque le port n'est pas utilisé.

Le xs500 a une largeur de 14,5mm. Sa structure étroite permet au connecteur de loger trois ports alors que la majorité des connecteurs ne peuvent supporter que

deux ports. Dans les boîtes au sol, le xs500 permet aux installateurs d'installer jusqu'à 12 connecteurs par boîte au lieu de neuf boîtes seulement.

"La société Corning jouit d'une réputation de fabricant de qualité et elle est maintenant en mesure d'offrir au marché moyen une solution complète de cuivre de bout-en-bout, qui est accessible sans compromettre la qualité à laquelle les clients s'attendent", a déclaré Jan-Sebastian Ziegler, chef du marketing LAN, Enterprise Networks, EMEA auprès de Corning Cable Systems.

"Le xs500 offre la valeur réelle au client, il est réalisé conformément à nos standards élevés et est tout à fait complet. Nous sommes persuadés qu'il sera bien accueilli par le marché et qu'il va relever le niveau du segment du marché moyen."

Le Keystone-Footprint bas profil de

FutureCom xs500 est idéal pour différents scénarios d'installation et est compatible avec une vaste gamme d'options de matériel allant des boîtes de dérivation aux panneaux.

La conception innovante à deux pièces du FutureCom xs500 contribue à simplifier et à accélérer les projets d'installation des câbles de cuivre, aucun outil spécial n'étant requis pour connecter les câbles aux connecteurs ni pour installer les connecteurs dans les boîtes de dérivation.

Grâce au xs500, de dimensions moyennes, pour compléter la gamme FutureCom EA, Corning offre un système de connexion total pour connecteurs, câbles, boîtes de dérivation et panneaux, permettant d'éliminer les compromis de qualité des systèmes de sources mixtes.

Corning Cable Systems GmbH & Co KG – Allemagne
Website: www.corning.com

Du câble optique au fil optique: une approche évolutive

Par Wayne Kachmar, Membre, Electro-Optical Engineering, TE Connectivity, North Bennington, Vermont

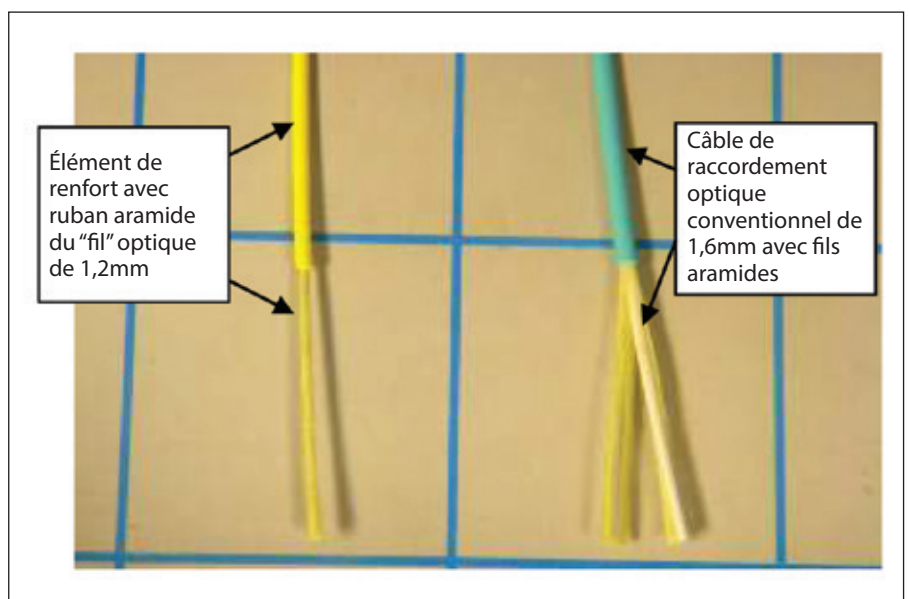
Résumé

Cet article présente une nouvelle structure de câble à fibre optique permettant aux câbles à facteur de forme réduit d'offrir des caractéristiques de manutention aussi bonnes que le fil de cuivre voire même meilleures. Actuellement, les conducteurs optiques sont généralement contenus dans des structures suivant un protocole de conception traditionnel basé sur un des trois types de câbles principaux, c'est-à-dire: tubes à structure libre (loose tube), à ruban ou à gainage serré (tight buffer). Tous prévoient des techniques de manutention très spécifiques exigeant un soin particulier et les installateurs de câbles, habitués à manipuler le cuivre, ne doivent donc pas les manipuler de la même façon.

Toutefois, avec la réduction des dimensions des câbles et la nécessité d'une majeure densité de fibres pour des applications telles que les centrales téléphoniques, les centres informatiques, les entreprises et les fibres FTTH/D (fibres jusqu'au logement/bureau), le besoin d'une fibre ayant une fonction plus similaire à celle du cuivre est toujours plus évident. Un câble à fibres possédant des caractéristiques de comportement d'un câble en cuivre entraîne une amélioration des installations en termes de temps, de flexibilité et de coûts.

1 Introduction

Nombreux sont les nouveaux développements dans le secteur des câbles à fibres optiques qui se sont vérifiés récemment et concernant notamment les fibres à rayon de courbure réduit (RBRF), les matériaux de bourrage à base de nanocomposites, les nouveaux matériaux pour la technologie de renforcement et de connexion, les nouvelles directives (ROHS, REACH) et les nouvelles contraintes concernant les dimensions et le coût. Durant cette période, dans les solutions



▲ Figure 1: 1,2mm par rapport à 1,6mm traditionnels

de conception des câbles, le câble à fibres optiques était considéré comme un produit composite, dans lequel les éléments séparés (fibres avec revêtement du type à gainage serré et revêtement polymérique de fils aramides) n'étaient pas reliés. Par conséquent, il a été nécessaire d'établir des spécifications de manutention et d'installation différentes basées sur une structure de noyau non accouplée. Dans plusieurs cas, les contraintes d'installation ont été tout simplement dépassées par les dimensions ou la résistance du matériau.

Dans le secteur du câble, de nombreuses comparaisons similaires ont été effectuées avec le cuivre. Excepté les produits spécifiques, tels que les fibres «torpedo» guidées, aucun produit optique similaire au fil n'a été développé. Généralement, les câbles contiennent un ou plusieurs conducteurs isolés et des éléments structurels additionnels pour satisfaire aux normes de performances mécanique et environnementale et à d'autres encore. Jusqu'à ce jour, la majorité des structures

des fibres optiques, utilise un "noyau libre" pour obtenir les performances techniques d'un câble optique, y compris les câbles à une seule fibre, exigeant une protection minimale.

Il résulte que de nombreuses structures exigent une manutention différente pour l'installation par rapport au câble de cuivre traditionnel. De nombreux défauts sont le résultat direct du manque de familiarité de la part de l'installateur avec les techniques de manutention spécifiques requises pour les câbles d'intérieur traditionnels simple ou duplex. Par conséquent, la nécessité qu'une fibre possède des caractéristiques plus similaires à celles du cuivre, en termes de manipulation, est importante vu la diffusion de l'utilisation de la fibre dans les applications qui prévoyaient autrefois un usage prédominant du cuivre.

L'opinion la plus répandue parmi de nombreux installateurs est que la fibre peut être manipulée et installée suivant les mêmes méthodes utilisées précédemment

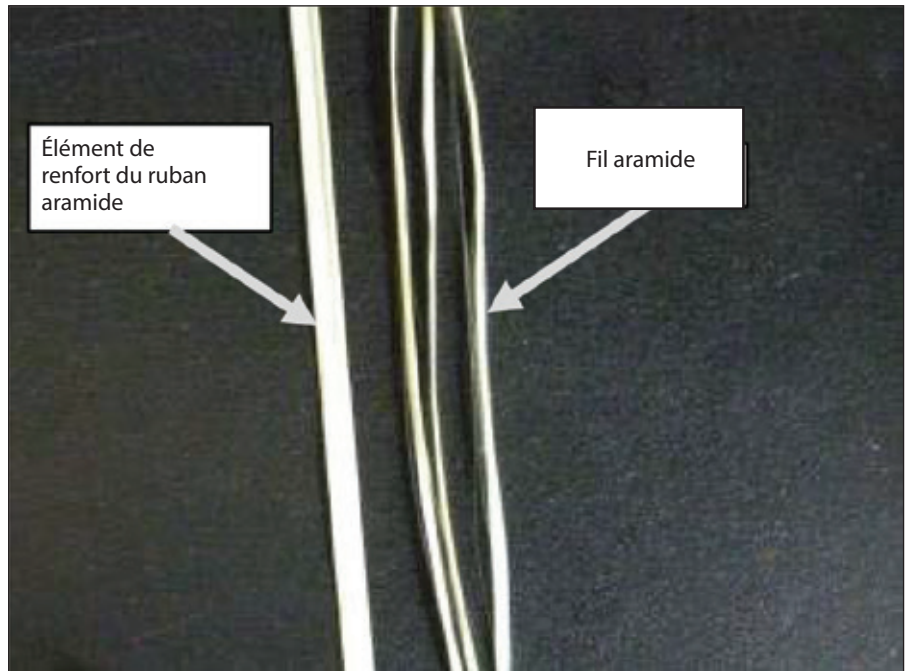
pour le cuivre. Quoi qu'il en soit, du verre c'est du verre et les performances du câble de fibre traditionnel peuvent néanmoins être influencées par une manipulation et une installation incorrectes.

Donc, pourquoi cette opinion est-elle importante? Aujourd'hui, les solutions avec des systèmes optiques sont offertes à une clientèle beaucoup plus ample. Nombre de ces installateurs professionnels possèdent une expérience significative en ce qui concerne les méthodes d'installation du cuivre.

Toutefois, dans la majorité des cas, ils n'ont aucune familiarité avec les techniques d'installation des câbles à fibres optiques qu'ils doivent actuellement installer. Par conséquent, les producteurs de câbles à fibre optiques doivent leur fournir toutes les informations nécessaires concernant les techniques d'installation acceptables.

Pour améliorer l'acceptabilité des systèmes de fibres optiques dans les nouvelles applications, nous devons notamment fournir des produits qui s'adaptent aux nouveaux critères. En termes de fibres optiques, nous devons concevoir des produits dont les caractéristiques s'approchent le plus possible à celles du fil de cuivre isolé en ce qui concerne la manipulation, l'installation et la gestion du câble en fibre.

Les nouveaux guides d'onde optiques ont permis cette option, mais nous, en qualité de producteur de câbles, nous avons besoin de poursuivre le développement et la conception de "câbles" (fils) installables répondant aux exigences du client et permettant de caractériser une nouvelle



▲ **Figure 3:** Nouvel élément de renfort géométrique comparé aux éléments de renfort des fils libres précédents

classe de produits de guides d'onde optiques. Le projet présenté dans cette étude consiste en une structure de noyau géométrique dans lequel la fibre optique est positionnée au centre du noyau et où les fils libres ont été remplacés par des éléments de renfort géométriques.

Ces éléments de renfort remplissent plusieurs fonctions telles que permettre l'adhésion au revêtement extérieur (pour favoriser la traction manuelle), le revêtement de la fibre (buffering) (contre des charges d'impact e charges maximales) et un accès fiable à la fibre

optique pour le raccord par fusion et la connectivisation sur site. Comme pour la totalité des dispositifs de communication, les performances supérieures doivent être réalisées en assurant la viabilité financière.

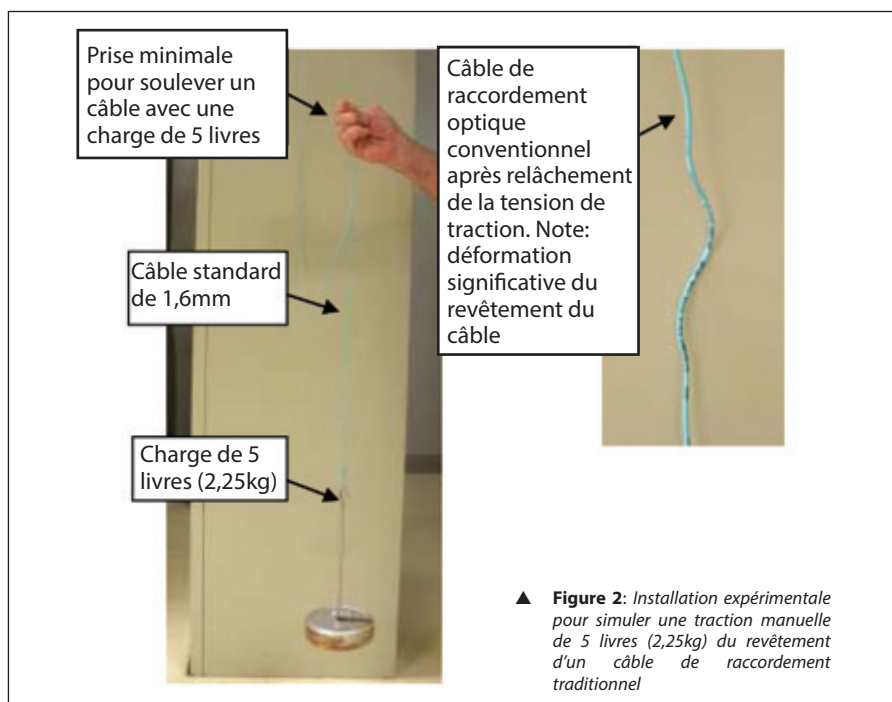
Les conceptions répondant à ces exigences, mais coûteuses et difficiles à réaliser, n'auront pas de succès. Il faut donc qu'il soit possible de fabriquer le câble en grandes séries sur des équipements traditionnels avec des rendements et des performances de qualité acceptables.

2 Défis au "fil optique"

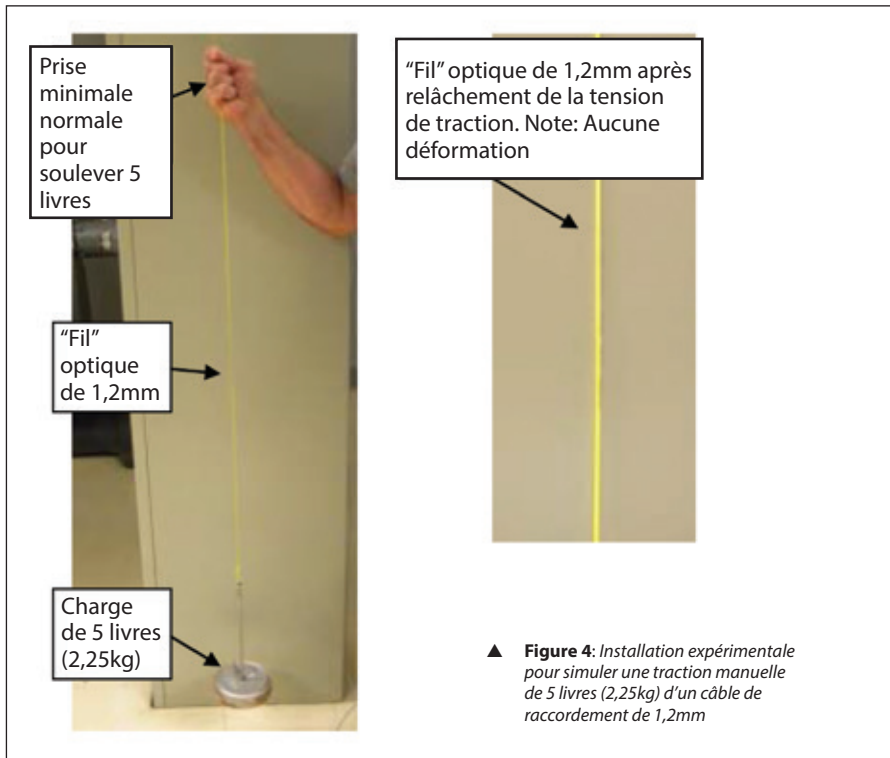
Les câbles traditionnels à fibres optiques simplex/duplex développés au cours des 30 dernières années ou plus, sont constitués d'une structure du type libre (loose tube) avec des fils aramides ayant une fonction de renfort.

La fibre en verre est noyée au centre des fils avec un revêtement polymérique du type à gainage serré pour prévenir de graves courbures ou impacts. Les fils aramides sont installés de manière à ce que les deux extrémités puissent être solidement fixées aux connecteurs. Par conséquent, si un connecteur est tiré, ce sont les fils non élastiques qui sont effectivement tirés, et non pas la fibre ou le revêtement eux-mêmes.

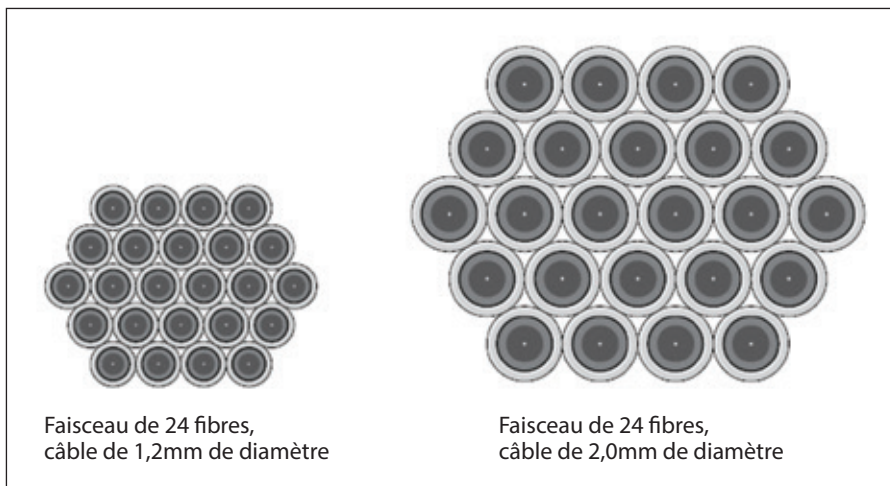
Le défi posé par ce type de résistance des câbles à fibres, consiste en le fait que si l'on tire les câbles par l'isolement comme s'il s'agissait de fils de cuivre, en réalité l'on tire une pièce de plastique polymérique avec une résistance très faible.



▲ **Figure 2:** Installation expérimentale pour simuler une traction manuelle de 5 livres (2,25kg) du revêtement d'un câble de raccordement traditionnel



▲ **Figure 4:** Installation expérimentale pour simuler une traction manuelle de 5 livres (2,25kg) d'un câble de raccordement de 1,2mm



▲ **Figure 5:** Comparaison des dimensions d'un câble en faisceaux de 1,2mm et 2,0mm

En tirant le revêtement de la fibre, le polymère s'allonge temporairement alors que la longueur du verre reste constante.

Cela entraîne un désaccouplement mécanique de la fibre des éléments de renfort et du revêtement polymérique et un repliement du revêtement extérieur ainsi qu'un mouvement non programmé de la fibre revêtue qui cause à son tour un excès de longueur sur un des côtés tirés et une condition de tension sur l'autre.

Généralement cela entraîne des pertes par macrocourbure significatives et la possibilité de dépasser le rayon minimum de courbure de la fibre optique, en réduisant considérablement la durée du câble.

Lorsqu'on développait des câbles à fibres de 3mm, les revêtements étaient relativement épais: dans certains cas presque un millimètre. Il s'ensuit que la résistance intrinsèque était légèrement supérieure au polymère plastique avant de l'allonger. Et les premiers installateurs étaient plus concernés par les caractéristiques de manipulation.

Aujourd'hui, il y a surtout une demande de densité et donc les dimensions des câbles à fibres sont toujours plus réduites.

Cela entraîne deux conséquences. Premièrement, l'épaisseur du revêtement du câble est réduite au maximum; deuxièmement, les câbles sont tirés avec plus de force pour remplir les conduites et les tubes avec plus de fibre.

Ces deux solutions peuvent influencer la fiabilité et les performances de la fibre.

En tirant les plus petits câbles, les revêtements s'allongent. Lorsque les revêtements se rétractent au fil du temps, une friction suffisante est générée pour repousser en arrière les fibres revêtues. Cette action se traduit par un excès de fibre dans une zone localisée, définie comme microcourbure, alors que le revêtement se rétracte. Avec la réduction des dimensions du câble optique à 1,6mm, ce phénomène était causé par une force de quelques onces seulement et non plus de livres. Par conséquent, avec la réduction des dimensions des câbles optiques, une manipulation plus délicate a été nécessaire durant l'installation.

Cette nouvelle catégorie de câbles a été définie comme catégorie de câbles à «facteur de forme réduit» compte tenu que les câbles ne pouvaient plus passer les mêmes essais que leurs homologues de dimensions supérieures. Les degrés de tension variaient de 22 à 9 livres en permettant d'utiliser des quantités minimales de fils aramides et de réduire l'épaisseur du revêtement. Signalons toutefois que des produits exigeant une manipulation nettement plus soignée, par rapport à tout fil de cuivre, ont également été obtenus.

Le défi consistait donc à développer une nouvelle structure de câble à fibres pour des produits à facteur de forme réduit pouvant satisfaire aux exigences d'une majeure densité, tout en offrant une résistance similaire à celle du fil pour pouvoir manipuler le câble de fibre sans causer aucune atténuation ni aucun autre problème de performances. Les défis furent surmontés grâce à la solution de trois problèmes principaux: résistance, connectivité et équilibre thermique.

3 Obtenir une résistance similaire à celle du cuivre

Le premier défi posé consistait à fournir la même résistance que le cuivre dans un câble à fibres optiques de 1,6mm. Les installateurs devaient pouvoir tirer le câble en ligne droite comme dans le cas du cuivre sans avoir la nécessité de l'envelopper autour d'un mandrin pour éviter d'endommager le revêtement. En même temps, les dimensions du revêtement doivent être approximativement un tiers par rapport à celles des revêtements traditionnels. Il a été nécessaire de réduire l'espace libre autour du verre pour réduire au maximum les dimensions du câble.

Toutefois, le câble devait passer tous les essais d'impact, de résistance et de résistance à la compression.

Durant la manipulation des câbles à facteur de forme réduit, la fibre peut effectivement émigrer vers un côté ou l'autre du revêtement au fur et mesure que les fils libres cèdent; par conséquent la fibre est moins protégée sur un axe et ne fournit plus la protection pour laquelle elle a été conçue.

En utilisant un ruban avec un matériau matrice adhésif, des outillages faits sur commande ont été conçus pour envelopper longitudinalement la fibre plusieurs fois. L'enroulement longitudinal avec le ruban assure le centrage de la fibre alors qu'un seul revêtement extérieur très mince adhère au ruban. Cette adhésion permet aux installateurs d'effectuer des tractions manuelles raisonnables ou d'installer manuellement le câble sans étendre le revêtement. L'union du ruban et du revêtement, de façon à ne former qu'une seule unité, permet une manipulation du câble à fibre quasiment identique à celle d'un morceau de fil de cuivre en termes de résistance.

De nombreux microcâbles actuellement disponibles, utilisent normalement des fils aramides entrelacés autour de la fibre. En fait, aucun ne présente les fils, le revêtement et la fibre accouplés.

Ce câble est unique parce qu'il utilise un ruban en aramide au lieu des fils libres. En outre, le ruban peut être retiré en utilisant des équipements traditionnels pour le dénudage de câbles ou des fils de cuivre. En outre, pour le dénudage de ces câbles, l'on peut utiliser des ciseaux d'électricien: c'est la première fois que cela a été possible avec une fibre revêtue sans avoir recours à des outils spécifiques.

Il faut également remarquer que la fibre RBR, qui est rapidement en train de devenir un élément standard dans les solutions FTTX, dans les centrales téléphoniques et dans les centres informatiques, élève la qualité de manipulation de ces nouvelles fibres. Il est possible de courber des câbles plus petits autour des structures plus étroites pour les adapter à différents types de modules et d'installations.

4 Connectorisation

Toutefois, l'union du ruban et du revêtement a posé un nouveau défi en ce qui concerne la connectorisation. L'union de ces deux éléments a entraîné l'élimination de l'espace nécessaire afin que la fibre puisse "se retirer" par rapport au connecteur.

Par conséquent, il a été nécessaire de concevoir de nouveau les connecteurs pour les utiliser en particulier pour ces nouvelles fibres. La conception de ces nouveaux connecteurs tient compte du fait que la fibre n'a pas la capacité de se retirer ni la capacité de compression à l'intérieur du revêtement.

Les câbles de fibre traditionnels consentent à la fibre de glisser suffisamment en arrière dans le revêtement, parfois jusqu'à deux millimètres. Par conséquent, des connecteurs équipés de coquille d'enrobage pour compenser le manque d'espace libre additionnel dans les noyaux ont été conçus. Ces connecteurs sont conformes aux niveaux de performances indiqués dans la spécification GRS-326 et aux niveaux supérieurs.

5 Équilibre thermique

Enfin, étant donné que le ruban et le revêtement sont reliés ensemble autour du verre, il a été nécessaire d'équilibrer les performances thermiques pour permettre le fonctionnement de la totalité du câble dans des conditions thermiques standard. Chaque matériau (verre, ruban et revêtement) est caractérisé par un coefficient d'expansion thermique linéaire différent. Cela signifie que chaque matériau à l'intérieur du câble s'étend ou rétrécit à des vitesses différentes et à des conditions de température différentes. Par exemple, normalement les plastiques s'étendent et rétrécissent jusqu'à deux ordres de grandeur en plus du verre.

Lors de la conception de cette nouvelle fibre, l'on savait que le fil aramide avait un coefficient d'expansion thermique linéaire négatif. Toutefois, en reliant tous les éléments ensemble, la majorité des effets des coefficients d'expansion thermique linéaire a été pratiquement neutralisée. À la fin, le comportement du câble est similaire à celui du verre en termes d'expansion et de contraction, et fonctionne de -40 degrés Celsius à 70 degrés Celsius avec des variations d'atténuation linéaire. Généralement, les câbles plénum traditionnels fonctionnent de 0 à 50 degrés Celsius, comme requis par les normes correspondantes.

6 Conclusions

Avec l'évolution des solutions de fibres optiques dans des secteurs où autrefois régnait le cuivre, l'importance d'avoir les mêmes caractéristiques de manipulation, d'installation et de gestion ne peut être sous-estimée. Les câbles optiques doivent présenter une résistance suffisante pour

être tirés, tordus et courbés comme le cuivre sans en compromettre les performances.

Grâce à la conception de nouveaux câbles éliminant l'air et l'espace à l'intérieur du câble, l'on peut réduire les dimensions. Le remplacement des fils aramides libres avec des enroulements de ruban et l'union des éléments du câble permettent une nouvelle évolution vers les microcâbles optiques à facteur de forme réduit.

Cela permettra par la suite de développer des solutions de système disponibles s'adressant à une plus ample panoplie de clients et de fournir la densité, la flexibilité et des performances de fibre optimales dans les applications industrielles. ■

7 Remerciements

L'auteur souhaite remercier Ken Nardone, Henry Rice, Bill Jacobsen, et Aly Fahd de leur collaboration pour toutes les données et les informations fournies concernant les essais cités dans cette étude.

Impianto di passivazione d'avanguardia

AL fine di migliorare il servizio offerto ai propri clienti, William Hughes Ltd, società specializzata nella produzione di molle speciali, forme di filo curvo e insiemi di componenti metallici, ha installato un impianto di passivazione automatizzato presso la propria sede centrale di Stalbridge, nel Dorset (Regno Unito).

La società potrà così ridurre i rilevanti tempi di consegna necessari per il subappalto di questo trattamento, ma anche offrire un altro processo Nadcap (National Aerospace and Defense Contractors Accreditation Program) ai clienti del settore aerospaziale.

“L’idea di includere la passivazione è nata al momento della cessazione dell’attività di uno dei nostri clienti importanti del settore aerospaziale”, ha spiegato Shaun Tattershall, responsabile dei processi speciali. “Pertanto, abbiamo cominciato ad esaminare diverse opzioni per l’installazione ed abbiamo avviato una richiesta per l’approvazione del processo da parte del nostro cliente principale del settore aerospaziale”.

Tattershall è riuscito ad acquistare degli equipaggiamenti progettati e realizzati in conformità con le richieste specifiche di William Hughes, e caratterizzate dal controllo ottimizzato del processo secondo la norma AMS 2700.

Il nuovo impianto di passivazione di William Hughes, che ha eliminato l’immersione manuale delle ceste dei componenti da una stazione all’altra come nei sistemi tradizionali, rappresenta un investimento fondamentale per la società e offre una nuova funzionalità.



▲ La passivazione automatizzata permetterà di ridurre notevolmente i tempi di consegna

Nell’impianto, invece, avviene un “trasferimento di liquido” che comporta lo spostamento di soluzioni chimiche dai serbatoi di stoccaggio all’unità di lavorazione principale, secondo necessità. L’intero processo è automatico ed è controllato mediante PLC. I trattamenti tipici vengono effettuati con l’acido nitrico e/o dicromato di sodio e dei cicli di lavaggio. Questi trattamenti sono seguiti da un ultimo lavaggio in acqua deionizzata prima del ciclo di asciugatura.

Le altre funzionalità innovative dell’impianto comprendono inoltre un sistema di passivazione ultrasonico e un’opzione rotativa progettata per la rotazione dei componenti nella soluzione e che consente, ad esempio, il riempimento di intercapedini di aria nei componenti più complessi e di tipo tubolare.

Alcune verifiche vengono effettuate mediante funzioni intelligenti della macchina. Ad esempio, l’impianto di passivazione controllato tramite PLC di William Hughes è progettato per il controllo e la regolazione automatica dei livelli di pH nell’acqua di risciacquo, nonché per il monitoraggio della conduttività del serbatoio dell’acqua deionizzata durante il processo finale.

Dall’installazione dell’impianto di passivazione, William Hughes ha trasferito i propri equipaggiamenti di trattamento termico e di pulizia ultrasonica accreditati da Nadcap nella stessa area, creando così un reparto di trattamento completamente nuovo.

William Hughes Ltd – Regno Unito
Website: www.wmhughes.co.uk

Invito a presentare contributi per una conferenza

Le principali associazioni internazionali del settore del filo e del cavo stanno nuovamente collaborando per celebrare la 6a CabWire World Conference che si terrà presso Palazzo Turati a Milano lunedì 4 novembre 2013.

Il tema di quest’anno sarà “Innovazioni che trainano i mercati del filo e del cavo nel mondo” e sarà presente un comitato di esperti sui materiali ferrosi e non ferrosi che illustreranno gli ultimi sviluppi tecnologici del settore.

La conferenza sarà inoltre caratterizzata da tavole rotonde e sarà possibile partecipare ad una serata di gala al Palazzo

Reale di Milano, che dà sulla storica Piazza del Duomo. Il programma prevede inoltre una visita guidata dello stabilimento martedì 5 novembre.

Per ulteriori informazioni circa le modalità di presentazione di un articolo o per iscriversi come delegati, visitare la pagina web www.cabwire.com. La conferenza è organizzata congiuntamente da ACIMAF, CET, IWCEA, IWMA e WAI.

International Wire and Machinery Association – Regno Unito
Website: www.iwma.or

Soluzioni economiche

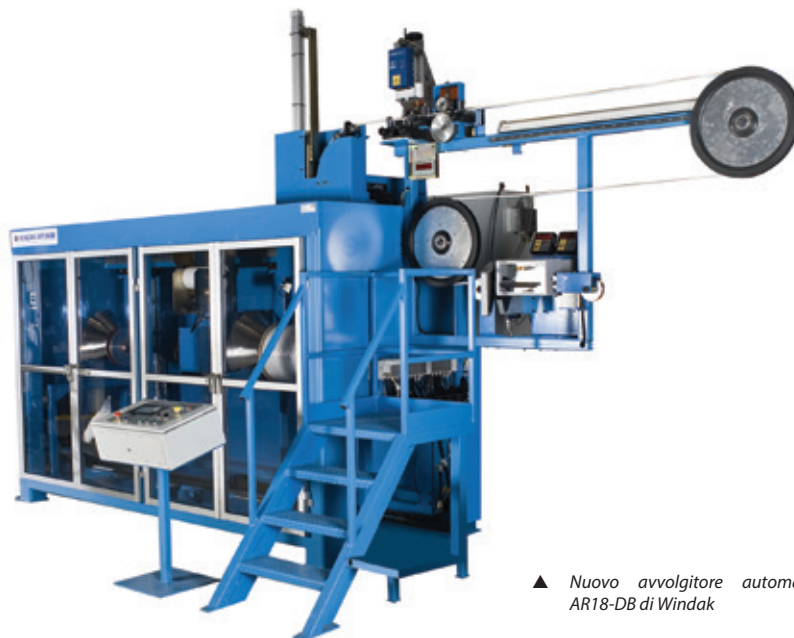
LA società Windak è specializzata in soluzioni d'imballaggio automatico per il settore del cavo e del filo e possiede uffici in Svezia, negli Stati Uniti, in Australia e in Estonia.

Orientata ad offrire soluzioni economiche ai suoi clienti, Windak è costantemente impegnata nello studio di prodotti innovativi quali la nuova bobinatrice automatica AR18-DB e l'avvolgitore automatico SW6-14.

In occasione di Interwire, Windak ha presentato la nuova bobinatrice automatica AR18-DB, una bobinatrice completamente automatica sviluppata per l'imballaggio automatico dei cavi o dei fili su bobine o aspi del diametro complessivo da 216 a 460mm (8,5"-18").

La macchina può funzionare in linea (con accoppiamento diretto all'estrusore) e fuori linea con carico e scarico automatico degli aspi vuoti. Inoltre, il dispositivo effettua l'imballaggio con pellicola estensibile della bobina per contenere l'estremità tagliata. Il rendimento della macchina è di due bobine il minuto.

L'avvolgitore SW6-14 è un avvolgitore a due teste sviluppato per l'imballaggio completamente automatico dei cavi e dei fili su bobine da 165mm (6,5") a 360mm (14") di diametro totale ed è progettato per applicazioni in linea e fuori linea. La linea può essere



▲ Nuovo avvolgitore automatico AR18-DB di Windak

completata con un palettizzatore automatico, un sistema di imballaggio con pellicola, un trasportatore a pallet, un'etichettatrice per bobine, degli equipaggiamenti di prova ed un dispositivo per la marcatura metrica sui cavi. L'avvolgitore SW6-14 carica e scarica le bobine automaticamente. Le estremità tagliate sono fissate per mezzo di una pellicola estensibile.

L'avvolgitore SW6-14 utilizza lo

stesso meccanismo affidabile per l'aggancio e il taglio, utilizzato nelle bobinatrici ad alta velocità SW6. La sua progettazione collaudata consente tempi di arresto pari a circa un secondo. Il breve tempo di arresto aumenta il rendimento della linea fino a circa il 30-40% rispetto alle bobinatrici tradizionali.

Windak OU – Estonia
Website: www.windakusa.com

La linea FutureCom promette bene

Corning Cable Systems GmbH & Co KG, che fa parte del segmento di telecomunicazioni di Corning Incorporated, ha presentato il modulo FutureCom™ xs500, il componente più avanzato della sua linea di prodotti FutureCom EA, il sistema di cablaggio di rame Ethernet da 10Gbit/s di Corning.

Il modulo xs500 è un connettore di rame di Cat.6A completamente blindato e conforme alle norme, caratterizzato da un'elevata flessibilità di impiego e da un'installazione rapida nei progetti di cablaggio di rame ad alte prestazioni. Il connettore è durevole e il suo alloggiamento compatto include una copertura di protezione dalla polvere incorporata che può essere chiusa quando la porta non è utilizzata.

Il modulo xs500 ha una larghezza di 14,5mm. La sua struttura stretta consente al connettore di alloggiare tre porte mentre la maggior parte dei connettori ne può supportare solo due. Nelle scatole da

pavimento, il modulo xs500 consente agli installatori di installare fino a 12 connettori per scatola anziché soltanto nove.

"La società Corning gode di una reputazione di fabbricante di qualità ed è ora in grado di offrire al mercato medio una soluzione completa di rame da estremità a estremità che è accessibile e non compromette la qualità che si aspetta la gente", ha dichiarato Jan-Sebastian Ziegler, responsabile del marketing LAN, Enterprise Networks, EMEA presso Corning Cable Systems.

"Il modulo xs500 offre il valore reale al cliente, è realizzato conformemente ai nostri standard elevati ed è completamente accessorizzato. Siamo certi che riceverà una buona accoglienza dal mercato e che innalzerà il livello del segmento di mercato medio".

Il Keystone-Footprint a basso profilo di

FutureCom xs500 è ideale per diversi scenari di installazione ed è compatibile con una vasta gamma di opzioni di hardware dalle scatole di derivazione ai pannelli.

La struttura innovativa in due pezzi di FutureCom xs500 contribuisce a semplificare e ad accelerare i progetti di installazione dei cavi di rame, non essendo richiesto alcuno strumento specifico per collegare i cavi ai connettori né per installare i connettori alle scatole di derivazione.

Grazie al modulo xs500, di medie dimensioni, per completare la gamma FutureCom EA, Corning offre un sistema di connessione totale per connettori, cavi, scatole di derivazione e pannelli, permettendo di eliminare il compromesso di qualità dei sistemi di sorgenti miste.

Corning Cable Systems GmbH & Co KG – Germania
Website: www.corning.com

Dal cavo ottico al filo ottico: un approccio evolutivo

A cura di Wayne Kachmar, Fellow, Electro-Optical Engineering, TE Connectivity, North Bennington, Vermont

Riassunto

Questa presentazione introduce una nuova struttura di cavo di fibra ottica che consente ai cavi di fattore di forma ridotto di offrire caratteristiche di manipolazione altrettanto buone se non addirittura migliori del filo di rame.

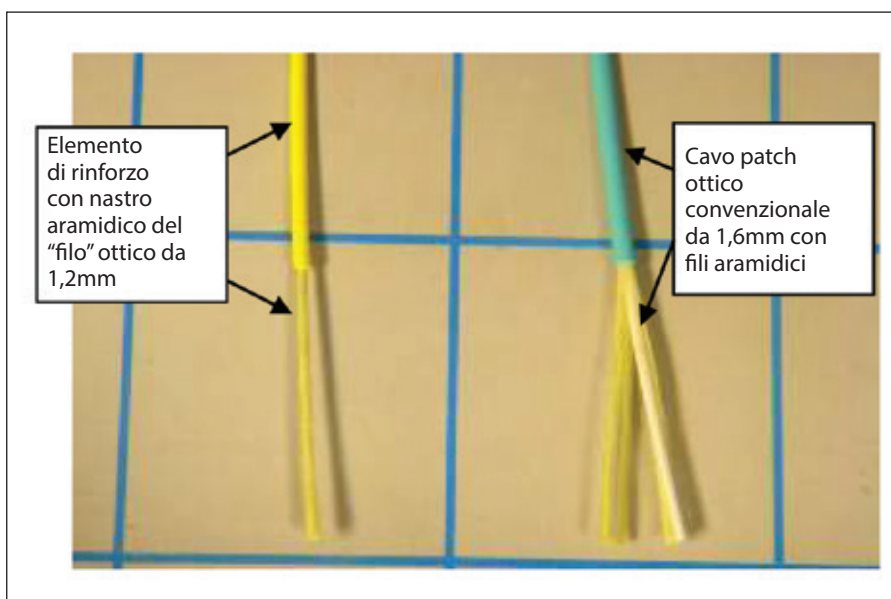
Attualmente, i conduttori ottici sono perlopiù contenuti nelle strutture di cavi che seguono un protocollo di progettazione tradizionale basato su uno dei tre tipi di cavi principali, ovvero: loose tube, a nastro o tight buffer.

Tutti richiedono delle tecniche di manipolazione molto specifiche che prevedono una cura particolare e, semplicemente, non possono essere manipolati allo stesso modo dagli installatori abituati a manipolare il rame. Tuttavia, con la riduzione delle dimensioni dei cavi e la necessità di una maggiore densità di fibre per applicazioni come centrali terminali, centri informatici, aziende, fibre FTTH/D (fibre fino a domicilio/ufficio), cresce sempre più il bisogno di avere una fibra che abbia una funzione più simile al rame.

Un cavo di fibra che possiede le caratteristiche di comportamento di un cavo di rame migliorerà le installazioni in termini di tempo, flessibilità e costi.

1 Introduzione

Numerosi sono i nuovi sviluppi nel settore dei cavi a fibre ottiche emersi di recente e riguardanti in particolare le fibre con raggio di curvatura ridotto (RBRF), i materiali di riempimento a base di nanocompositi, i nuovi materiali per la tecnologia di rafforzamento e connessione, nuove direttive (ROHS, REACH) e nuove restrizioni relativamente alle dimensioni e al costo. Durante questo periodo, nelle soluzioni di progettazione dei cavi il cavo a fibre ottiche era considerato come un prodotto composito, nel quale gli elementi



▲ Figura 1: 1,2mm rispetto a 1,6mm tradizionali

separati (fibre con rivestimento del tipo tight buffer e rivestimento polimerico di fili aramidici) non erano legati. Pertanto, è stato necessario stabilire requisiti di manipolazione e installazione distinti basati su una struttura di nucleo non accoppiata. In molti casi, le sollecitazioni da installazione sono state semplicemente superate dalle dimensioni o dalla resistenza del materiale.

Nel settore del cavo sono state effettuate numerose comparazioni simili con il rame. A parte i prodotti speciali, quali le fibre "torpedo" guidate, non è stato sviluppato alcun prodotto ottico analogo al filo.

Generalmente, i cavi contengono uno o più conduttori isolati ed elementi strutturali aggiuntivi per soddisfare gli standard di prestazioni meccaniche, ambientali e altre ancora. Ad oggi, la maggior parte delle strutture di fibre ottiche, utilizza un "nucleo libero" per ottenere le prestazioni tecniche in un cavo ottico – inclusi i cavi a fibra singola che richiedono una protezione minima.

Il risultato è che numerose strutture richiedono una manipolazione diversa per l'installazione rispetto al cavo di rame tradizionale. Numerosi difetti sono il risultato diretto della mancanza di familiarità dell'installatore con le tecniche di manipolazione speciali richieste per i cavi da interno tradizionali simplex o duplex. Pertanto, la necessità che una fibra possieda delle caratteristiche più simili a quelle del rame in termini di manipolazione è quanto mai importante vista la diffusione e l'utilizzo della fibra in applicazioni che in passato prevedevano un impiego predominante del rame.

La convinzione più diffusa fra numerosi installatori è che la fibra si possa manipolare e installare seguendo gli stessi metodi utilizzati precedentemente per il rame.

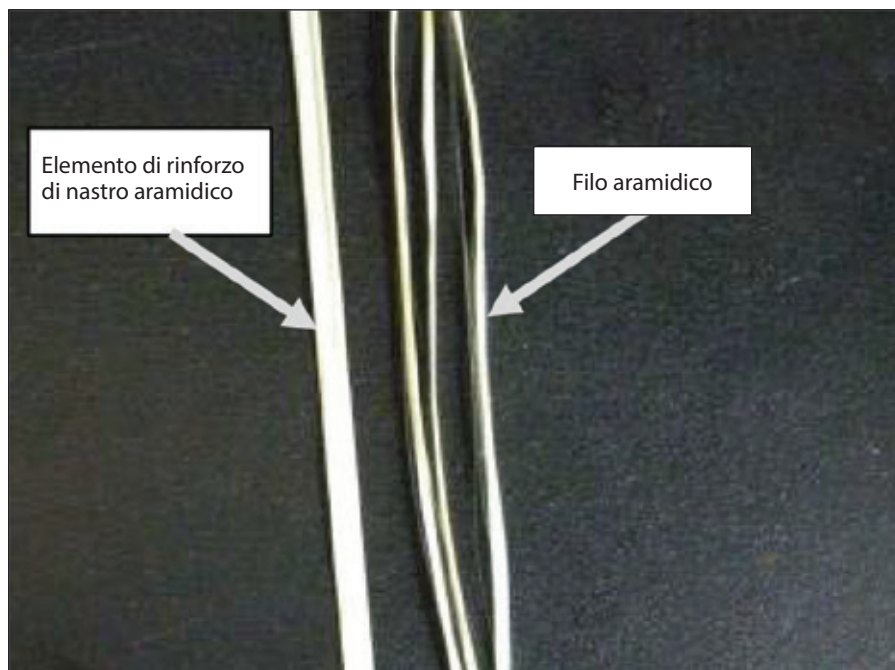
Comunque sia, il vetro è vetro, e le prestazioni del cavo di fibra tradizionale possono comunque essere condizionate da manipolazione e installazione inadeguate.

Quindi, perché questa convinzione è importante? Oggi vengono offerte soluzioni con sistemi ottici a una clientela molto più ampia. Molti di questi installatori professionisti hanno un'esperienza significativa nelle procedure di installazione del rame. Tuttavia, nella maggior parte dei casi, essi non hanno familiarità con le procedure d'installazione dei cavi in fibra che devono ora installare.

Pertanto, i produttori di cavi di fibre ottiche devono istruirli su procedure di manipolazione accettabili. Soprattutto, per migliorare l'accettazione dei sistemi di fibre ottiche in nuove applicazioni, dobbiamo fornire prodotti che si adattino ai nuovi criteri. In termini di cavi di fibre ottiche, dobbiamo progettare prodotti le cui caratteristiche si avvicinano il più possibile a quelle del filo di rame isolato per quanto riguarda la manipolazione, l'installazione e la gestione del cavo in fibra.

Le nuove guide d'onda ottiche hanno reso possibile questa opzione, ma noi, in qualità di produttori di cavi, abbiamo bisogno di proseguire lo sviluppo e la progettazione di "cavi" (fili) installabili che soddisfino le necessità del cliente e consentano di caratterizzare una nuova classe di prodotti di guide d'onda ottiche.

Il progetto presentato in questo studio è una struttura di nucleo geometrico nel quale la fibra ottica è posizionata nel centro del nucleo e in cui i fili liberi sono stati sostituiti da elementi di rinforzo geometrici. Questi elementi di rinforzo svolgono numerose funzioni quali consentire l'adesione al rivestimento esterno (per favorire la trazione manuale),



▲ **Figura 3:** Nuovo elemento di rinforzo geometrico comparato con gli elementi di rinforzo di fili liberi precedenti

il rivestimento della fibra (buffering) (contro carichi d'urto e carichi massimi) e l'accesso affidabile alla fibra ottica per la giunzione per fusione e la connettorizzazione in campo.

Come per tutti i dispositivi di comunicazione, le prestazioni superiori devono essere realizzate assicurando la sostenibilità finanziaria.

Progetti che soddisfano questi nuovi requisiti, ma che sono costosi e difficili da produrre, non avranno successo. È quindi necessario che sia possibile fabbricare

il cavo in serie su equipaggiamenti tradizionali con rendimenti e prestazioni di qualità accettabili.

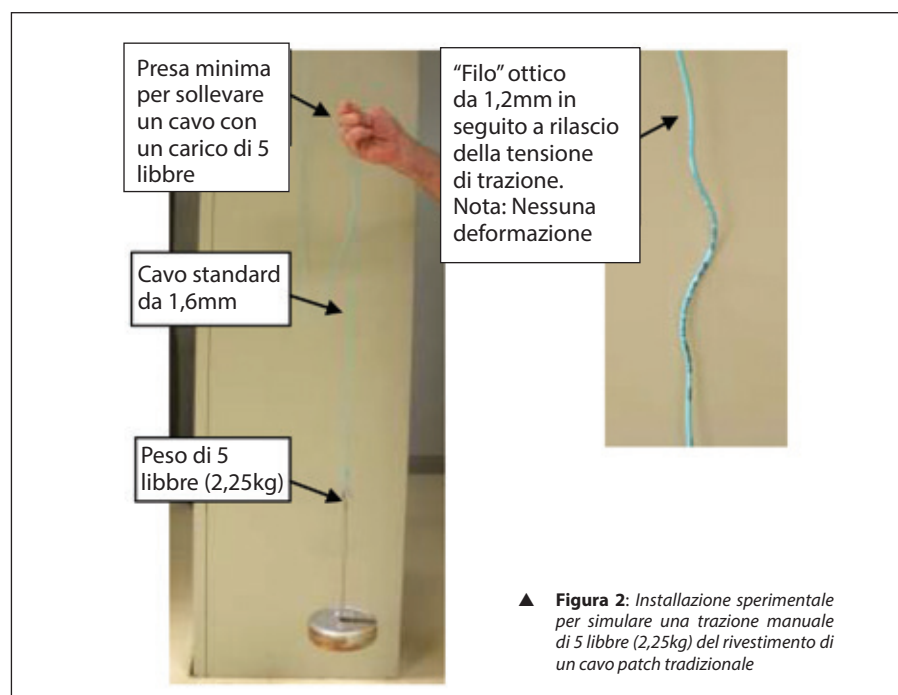
2 Sfide al "filo ottico"

I cavi tradizionali di fibra ottica simplex/duplex sviluppati durante gli ultimi 30 anni o più, sono costituiti da una struttura del tipo loose tube con armatura aramidica con funzione di rinforzo.

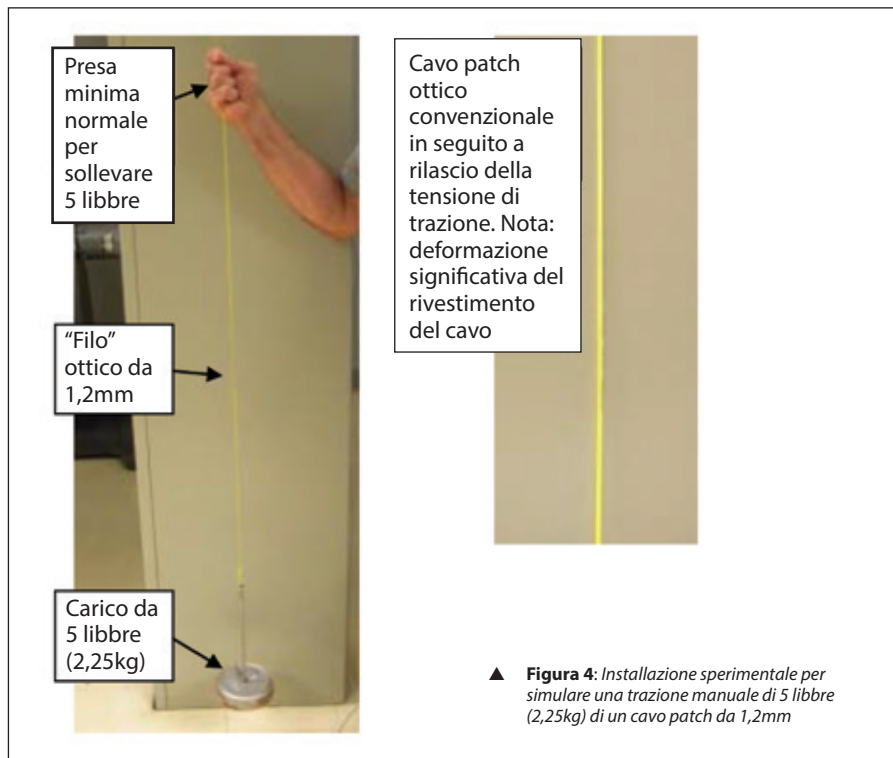
La fibra di vetro è inghiessata al centro dei fili con un rivestimento polimerico del tipo tight buffer per prevenire gravi curvature o impatti. I fili aramidici sono installati in modo che entrambe le estremità possano essere saldamente collegate ai connettori. Pertanto, se un connettore viene tirato, sono i fili non elastici che vengono effettivamente tirati, non la fibra o il rivestimento.

La sfida di questa modalità di resistenza dei cavi di fibra consiste nel fatto che se tiriamo i cavi per l'isolamento come se fossero fili di rame, in realtà si tira un pezzo di plastica polimerica con una resistenza molto scarsa. Tirando il rivestimento della fibra, il polimero si allunga temporaneamente mentre la lunghezza del vetro resta costante.

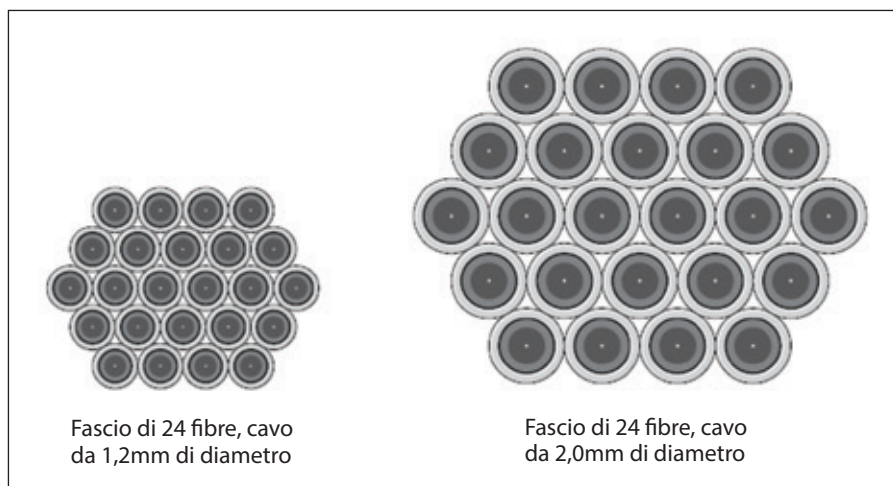
Ciò provoca un disaccoppiamento meccanico della fibra dagli elementi di rinforzo e dal rivestimento polimerico e favorisce un ripiegamento del rivestimento esterno e un movimento non programmato della fibra rivestita che causa a sua volta un eccesso di lunghezza su uno dei lati tirati ed



▲ **Figura 2:** Installazione sperimentale per simulare una trazione manuale di 5 libbre (2,25kg) del rivestimento di un cavo patch tradizionale



▲ **Figura 4:** Installazione sperimentale per simulare una trazione manuale di 5 libbre (2,25kg) di un cavo patch da 1,2mm



▲ **Figura 5:** Comparazione delle dimensioni di un cavo in fasci da 1,2mm e 2,0mm

una condizione di tensione sull'altro. Generalmente ciò determina grandi perdite per macrocurvatura e la possibilità di superare il raggio minimo di curvatura della fibra ottica, riducendo significativamente la durata del cavo.

Quando si sviluppavano cavi di fibra da 3mm, i rivestimenti erano relativamente spessi. In alcuni casi corrispondevano quasi ad un millimetro. Ciò conferiva una resistenza intrinseca lievemente maggiore al polimero plastico prima di allungarlo.

E i primi installatori erano più preoccupati per le caratteristiche di manipolazione. Oggi, la domanda è di densità, e pertanto le dimensioni dei cavi di fibra sono sempre più ridotte. Questo fatto comporta due conseguenze. In primo luogo, lo spessore

del rivestimento del cavo è ridotto al massimo; in secondo luogo, i cavi sono tirati con più forza per riempire le canaline e i tubi con più fibre. Entrambe queste situazioni possono influenzare l'affidabilità e le prestazioni della fibra.

Tirando cavi di fibra più piccoli, i rivestimenti si allungano. Quando i rivestimenti si ritirano con il passare del tempo, si genera una frizione sufficiente per spingere all'indietro le fibre rivestite.

Questa azione si traduce in una fibra in eccesso in un'area localizzata, nota con il nome di microcurvatura, mentre il rivestimento si ritira. Con la riduzione delle dimensioni del cavo ottico a 1,6mm, questo fenomeno era causato da una forza di solo poche onces anziché libbre.

Pertanto, con la riduzione delle dimensioni dei cavi ottici, si rese necessaria una manipolazione più delicata durante l'installazione. Questa nuova categoria di cavi fu definita come categoria di cavi dal "fattore di forma ridotto" poiché i cavi non potevano più superare le stesse prove delle loro controparti di dimensioni più grandi. I gradi di tensione variavano da 22 a 9 libbre consentendo di utilizzare quantità minime di fili aramidici e di ridurre lo spessore del rivestimento. Ma va notato che sono stati anche ottenuti prodotti che richiedevano una manipolazione molto più accurata rispetto a qualsiasi filo di rame.

La sfida consisteva dunque nello sviluppare una nuova struttura di cavo di fibre per prodotti con fattore di forma ridotto che potessero soddisfare i requisiti di una maggiore densità, fornendo una resistenza simile al filo per poter manipolare e tirare il cavo di fibra senza causare attenuazione né altri problemi di prestazioni. Le sfide furono superate grazie alla soluzione di tre problemi principali: resistenza, connettività ed equilibrio termico.

3 Ottenere una resistenza simile a quella del rame

La prima sfida consisteva nel fornire la stessa resistenza del rame in un cavo di fibra ottica da 1,6mm. Gli installatori dovevano poter tirare il cavo in linea retta come per il filo di rame senza necessità di avvolgerlo attorno ad un mandrino per evitare di danneggiare il rivestimento.

Allo stesso tempo, le dimensioni del rivestimento dovevano essere approssimativamente un terzo rispetto a quelle dei rivestimenti convenzionali. Era necessario ridurre lo spazio libero attorno al vetro per ridurre al massimo le dimensioni del cavo. Tuttavia, il cavo doveva soddisfare tutte le prove d'impatto, resistenza e resistenza a compressione.

Durante la manipolazione di cavi con fattore di forma ridotto, la fibra può effettivamente migrare verso un lato o un altro del rivestimento a mano a mano che cedono i fili liberi, e pertanto la fibra è meno protetta su un asse e non fornisce più la protezione per la quale era stata progettata.

Utilizzando un nastro con un materiale matrice adesivo, sono state progettate attrezzature personalizzate per avvolgere longitudinalmente la fibra varie volte. L'avvolgimento longitudinale con il nastro assicura il centraggio della fibra con solo un rivestimento esterno molto sottile

che aderisce al nastro. Questa adesione consente agli installatori di eseguire delle trazioni manuali ragionevoli o di installare manualmente il cavo senza estensione del rivestimento. L'unione del nastro e del rivestimento, in modo da formare un'unica unità, consente una manipolazione del cavo di fibra quasi identica a quella di un pezzo di filo di rame in termini di resistenza.

Numerosi microcavi oggi disponibili, utilizzano normalmente fili aramidici intrecciati attorno alla fibra. Nessuno presenta effettivamente i fili, il rivestimento e la fibra accoppiati. Questo cavo è unico poiché utilizza un nastro di aramide anziché i fili liberi. Inoltre, il nastro può essere spellato impiegando macchinari tradizionali per la spellatura di cavi o fili di rame. Per spellare questi cavi, si possono anche utilizzare delle forbici da elettricista: è la prima volta che ciò è stato possibile con una fibra rivestita senza ricorrere ad attrezzi specifici.

Va inoltre notato che la fibra RBR, che sta rapidamente diventando un elemento standard nelle soluzioni FTTX, nelle centrali terminali e nei centri dati, innalza la qualità di manipolazione di queste nuove fibre. È possibile curvare cavi più piccoli attorno a strutture più strette per adattarsi a vari tipi di moduli e installazioni.

4 Connettorizzazione

Tuttavia, l'unione del nastro e del rivestimento, ha posto una nuova sfida per quanto riguarda la connettorizzazione.

L'unione di questi due elementi ha portato all'eliminazione dello spazio necessario affinché la fibra potesse "ritrarsi" rispetto al connettore. Pertanto, è stato necessario progettare nuovamente i connettori per utilizzarli in particolare con queste nuove fibre. Il progetto di questi nuovi connettori tiene conto del fatto che la fibra non ha la capacità di ritrarsi, né la capacità di comprimersi all'interno del rivestimento.

I cavi di fibra tradizionali consentono alla fibra di scivolare sufficientemente all'indietro dentro il rivestimento, a volte fino a due millimetri. Pertanto, furono progettati dei connettori dotati di guscio posteriore che compensano la mancanza di spazio libero aggiuntivo nei nuclei. Questi connettori sono conformi ai livelli di prestazione indicati nella specifica GRS-326 e a livelli superiori.

5 Equilibrio termico

Infine, dato che il nastro e il rivestimento sono uniti attorno al vetro, è stato

necessario equilibrare le prestazioni termiche per consentire il funzionamento dell'intero cavo in condizioni termiche standard. Ciascun materiale (vetro, nastro e rivestimento) è caratterizzato da un diverso coefficiente di espansione termica lineare.

Ciò significa che ciascun materiale all'interno del cavo si espande o si contrae con diverse velocità a condizioni di temperatura diverse. Ad esempio, le plastiche normalmente si espandono e si contraggono fino a due ordini di magnitudo in più del vetro.

Nel progettare questa nuova fibra, era noto che il filo aramidico aveva un coefficiente di espansione lineare negativo. Tuttavia, unendo tutti gli elementi, la maggior parte degli effetti dei coefficienti di espansione termica lineare fu praticamente neutralizzata. Alla fine, il cavo si comporta in modo molto simile al vetro in termini di espansione e contrazione, funzionando dai -40 gradi Celsius ai 70 gradi Celsius con variazioni di attenuazione minime. Generalmente, i cavi plenum tradizionali funzionano da 0 a 50 gradi Celsius, come richiesto dalle norme corrispondenti.

6 Conclusioni

Con l'evoluzione delle soluzioni di fibra ottica in ambiti in cui prima dominava il rame, non può essere sottovalutata l'importanza di avere le medesime caratteristiche di manipolazione, installazione e gestione del filo di rame. I cavi ottici devono avere una sufficiente resistenza per essere tirati, torti e curvati come il rame senza comprometterne le prestazioni.

Progettando nuovi cavi che eliminano l'aria e lo spazio all'interno del cavo, si possono ridurre le dimensioni. La sostituzione dei fili aramidici con avvolgimenti di nastro e l'unione degli elementi del cavo consentono una nuova evoluzione verso microcavi ottici di fattore di forma ridotto. Ciò permetterà successivamente di estendere le soluzioni di sistema disponibili ad una più ampia fascia di clienti, e di fornire densità, flessibilità e prestazioni di fibra ottimali nelle applicazioni industriali. ■

7 Ringraziamenti

L'autore desidera ringraziare Ken Nardone, Henry Rice, Bill Jacobsen, e Aly Fahd per la collaborazione prestata nel fornire i dati e le informazioni sulle prove citate nel presente studio.

Planta de pasivado innovadora

PARA mejorar el servicio que ofrece a sus clientes, William Hughes Ltd, fabricante experto en resortes, alambre curvado y conjuntos de componentes metálicos, ha instalado una innovadora planta de pasivado automatizada en su sede central de Stalbridge, en Dorset.

Con esta decisión no sólo se reducirá notablemente el tiempo de entrega respecto a cuando se subcontrataba este tratamiento, sino que además la empresa podrá ofrecer otro proceso Nadcap (National Aerospace and Defense Contractors Accreditation Program) a sus clientes del sector aeroespacial.

“La idea de incluir el pasivado entre sus servicios surgió al cesar la actividad uno de nuestros clientes importantes del sector aeroespacial”, explicó el jefe de procesos especiales, Shaun Tattershall.

“Esto dio pie a que empezáramos a pensar en distintas opciones para la planta y a que solicitáramos la aprobación del proceso a nuestro principal cliente aeroespacial”.

El Sr. Tattershall consiguió maquinaria diseñada y fabricada para las exigencias específicas de William Hughes, y dotada de control optimizado del proceso conforme a la especificación AMS 2700.

La nueva planta de pasivado de William Hughes, que ha supuesto una inversión considerable para la empresa, ofrece novedosas funciones donde se ha eliminado el “mojado” manual de las cestas de componentes de una estación a otra



▲ El pasivado automatizado permitirá reducir considerablemente los tiempos de entrega

como sucede, en cambio, en los sistemas tradicionales.

En la nueva planta se efectúa un “traslado de líquidos”, llevando las soluciones químicas de los tanques a la unidad de procesado principal. Todo el proceso es automático y controlado por PLC. Los tratamientos típicos se hacen con ácido nítrico-bicromato sódico y ciclos de enjuagado. Sucesivamente, se realiza un enjuagado final en agua desionizada antes del ciclo de secado.

Entre las características innovadoras de la planta tenemos también un equipo de pasivado ultrasónico y un sistema rotativo para girar las piezas en la solución que permite cubrir los huecos de aire de los componentes de forma compleja y tubular, por ejemplo.

Algunas verificaciones son realizadas mediante funciones inteligentes de la máquina.

Por ejemplo, la planta de pasivado controlada por PLC de William Hughes monitorizará y ajustará automáticamente los niveles de pH del agua de enjuagado y, además, vigilará la conductividad del tanque de agua desionizada del proceso final.

Desde que instaló la planta de pasivado, William Hughes ha trasladado su equipo de limpieza ultrasónica y tratamiento térmico acreditado por Nadcap a la misma zona, dando origen así un nuevo departamento de proceso.

William Hughes Ltd – Reino Unido
Website: www.wmhughes.co.uk

Abierto el plazo de envío de ponencias

Las asociaciones internacionales líderes del sector del cable y alambre están trabajando otra vez conjuntamente para celebrar la 6ª Conferencia Internacional sobre Cable y Alambre en el Palacio Turati de Milán, en Italia, el lunes 4 de noviembre de 2013.

El tema de este año girará en torno a las “Innovaciones que empujan los mercados mundiales del alambre y cable” y contará con la presencia de ponentes expertos en materiales ferrosos y no ferrosos, que expondrán los últimos adelantos tecnológicos del sector.

Durante la jornada se celebrará también una tabla redonda y se podrá asistir a una cena de gala en el Palacio Real de

Milán, que da a la histórica Plaza del Duomo. El programa prevé también una visita guiada a la fábrica el martes 5 de noviembre.

Para más información sobre cómo enviar una ponencia o inscribirse como delegado a la conferencia, visite la página web www.cabwire.com

La conferencia es organizada conjuntamente por ACIMAF, CET, IWCEA, IWMA y WAI.

International Wire and Machinery Association – Reino Unido
Website: www.iwma.org

Soluciones rentables

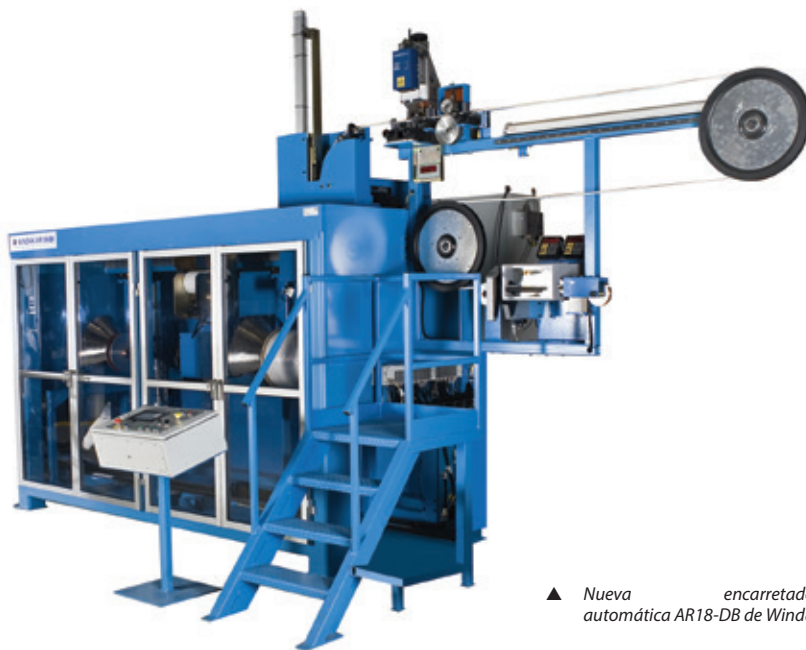
LA empresa Windak está especializada en soluciones de embalaje automáticas para el sector del cable y alambre y cuenta con oficinas en Suecia, Estados Unidos, Australia y Estonia.

La empresa, orientada a la oferta de soluciones rentables para sus clientes, diseña continuamente productos innovadores, tales como la nueva encarretadora automática AR18-DB y la bobinadora automática SW6-14.

En Interwire, Windak presentó su nueva encarretadora automática AR18-DB, una encarretadora totalmente automática desarrollada para embalar automáticamente cable o alambre en bobinas o carretes de 216-460mm (8,5"-18") de diámetro total.

La máquina puede funcionar tanto en línea (con acoplamiento directo a la extrusora) como fuera de línea, y carga y descarga los carretes vacíos automáticamente. Efectúa también la envoltura del carrete, que mantiene sujeto el extremo cortado. El rendimiento de la máquina es de dos carretes por minuto.

La SW6-14 es una bobinadora de doble cabezal desarrollada para embalar cable y alambre de modo totalmente automático en bobinas de 165mm (6,5") a 360mm (14") de diámetro total. Puede funcionar tanto en línea como fuera de línea. La línea puede



▲ Nueva encarretadora automática AR18-DB de Windak

ser complementada con paletizadora automática, sistema de envoltura plástica, transportador de palets, etiquetadora de carretes, equipo de prueba y marcadora de metros de cable. La SW6-14 carga y descarga las bobinas automáticamente. Los extremos cortados quedan sujetos con la envoltura plástica.

La SW6-14 utiliza el mismo mecanismo

fiable de "agarre y corte" que las bobinadoras de alta velocidad SW6. Su diseño probado reduce el tiempo de parada a un segundo aproximadamente. La brevísima parada incrementa el rendimiento de la línea en hasta un 30-40% frente a las bobinadoras tradicionales.

Windak OU – Estonia
Website: www.windakusa.com

La línea FutureCom promete

Corning Cable Systems GmbH & Co KG, parte del segmento de telecomunicaciones de Corning Incorporated, ha presentado el módulo FutureCom™ xs500, el componente más reciente de su línea de productos FutureCom EA, el sistema de cableado de cobre Ethernet de 10Gbit/s de Corning.

El xs500 es un conector de cobre de Cat.6A totalmente apantallado y conforme a las normas, caracterizado por su alta flexibilidad de despliegue y rapidez de instalación en proyectos de cableado de cobre de altas prestaciones. Es un módulo conector duradero de carcasa compacta con tapa integrada para protegerlo del polvo cuando el puerto no es utilizado.

El xs500 mide 14,5mm de ancho. Su estrecho diseño le permite alojar tres puertos, mientras que la mayoría de los conectores sólo tienen cabida para

dos. En las cajas de suelo, el xs500 permite a los instaladores poner hasta 12 conectores por caja en lugar de sólo nueve.

"Corning tiene fama de fabricante de calidad y ahora el xs500 puede ofrecer al mercado medio una completa solución de cobre de extremo a extremo asequible que no compromete la calidad que la gente se espera," declaró Jan-Sebastian Ziegler, jefe de marketing LAN, Enterprise Networks, EMEA en Corning Cable Systems.

"El xs500 le ofrece valor real al cliente, está hecho para nuestros elevados estándares y es muy completo. Estamos seguros de que será bien acogido en el mercado y subirá el listón del segmento del mercado medio."

El módulo keystone de bajo perfil convierte al FutureCom xs500 en el

elemento ideal para varios escenarios de instalación, compatible además con una amplia gama de opciones hardware desde cajas de conexión hasta paneles.

El innovador diseño de dos piezas del FutureCom xs500 simplifica y agiliza los proyectos de instalación de cables de cobre, ya que no se necesitan herramientas especiales para conectar los cables a los conectores ni para instalar los conectores en las cajas de conexión.

Con el xs500, de formato medio, como complemento para la gama FutureCom EA, Corning ofrece un sistema de conexión total para conectores, cables, cajas de conexión y paneles, que permite mantener los estándares de calidad incluso en los sistemas de fuentes mixtas.

Corning Cable Systems GmbH & Co KG – Alemania
Website: www.corning.com

Del cable óptico al hilo óptico – un enfoque evolutivo

Por Wayne Kachmar, miembro de Electro-Optical Engineering, TE Connectivity, North Bennington, Vermont

Resumen

Esta presentación introduce un nuevo diseño de cable de fibra óptica que ofrece a los cables de factor de forma reducido características de manejo mejores o tan buenas como las de los hilos de cobre.

Actualmente, la mayoría de las guías de luz están contenidas en estructuras de cables que siguen un protocolo de diseño convencional basado en uno de los tres tipos de cables de base, es decir de tubo holgado, de cinta o de revestimiento ajustado. Todos necesitan técnicas de manejo muy específicas que requieren un cuidado especial y no pueden ser manejados del mismo modo por los instaladores acostumbrados a manejar cobre.

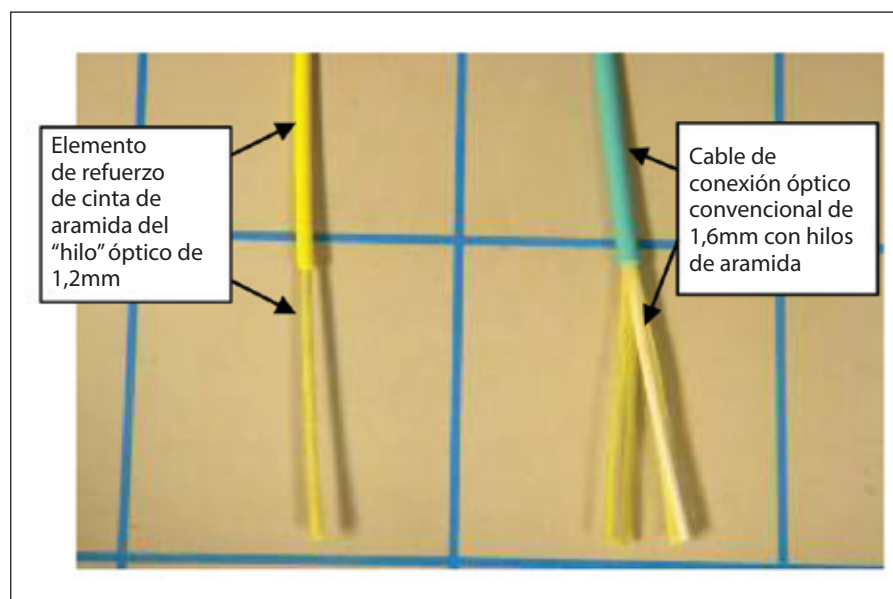
Sin embargo, la necesidad de disponer de una fibra que se comporte como el cobre resulta más evidente a medida que se reducen las dimensiones de los cables y algunas aplicaciones, como centrales terminales, centros de datos, empresas, fibra hasta el hogar/escritorio (FTTH/D), requieren mayor densidad de fibras.

Un cable de fibra con comportamiento similar al de un cable de cobre supondrá una mejora para las instalaciones en términos de tiempo, flexibilidad y coste.

1 Introducción

Recientemente, se han producido muchos avances en el campo de la fibra óptica: fibras con radio de curvatura reducido (RBRF), rellenos de material nanocompuesto, nuevos materiales para la tecnología de refuerzo y conexión, nuevas directivas (ROHS, REACH), y nuevas restricciones por lo que se refiere a dimensiones y coste.

En este tiempo, las soluciones de diseño de cables consideraban el cable de fibra óptica como un producto compuesto,



▲ Figura 1: 1,2mm frente 1,6mm convencional

donde los elementos separados (fibra con revestimiento ajustado, cubierta de hilos de aramida) no estaban pegados.

Por lo tanto, ha sido necesario determinar distintos requisitos de manejo e instalación adecuados para una estructura de núcleo no acoplada. En muchos casos, las tensiones de instalación eran vencidas simplemente por el tamaño o por la resistencia del material.

Se han realizado muchas comparaciones similares con el cobre en el sector del cable. Aparte algunos productos especiales, como los torpedos de fibra óptica, en realidad no se han desarrollado productos ópticos análogos al hilo. Normalmente, los cables contienen uno o más conductores aislados y otros elementos estructurales para cumplir las normas de prestaciones mecánicas, ambientales y demás.

Hasta el día de hoy, la mayoría de los diseños de fibra óptica usan un "núcleo

holgado" para conseguir el rendimiento técnico en un cable óptico, incluidos los cables de una sola fibra que requieren protección mínima.

El resultado es que muchos diseños requieren un manejo diferente para su instalación respecto al cable de cobre convencional. Muchos fallos son el resultado directo de la falta de familiaridad del instalador con las técnicas de manejo especiales requeridas por los cables de interiores convencionales simplex y duplex. Por lo tanto, la necesidad de una fibra que se comporte como el cobre en términos de manejo es importante a medida que la fibra se adapta a aplicaciones donde antes el cobre era el rey.

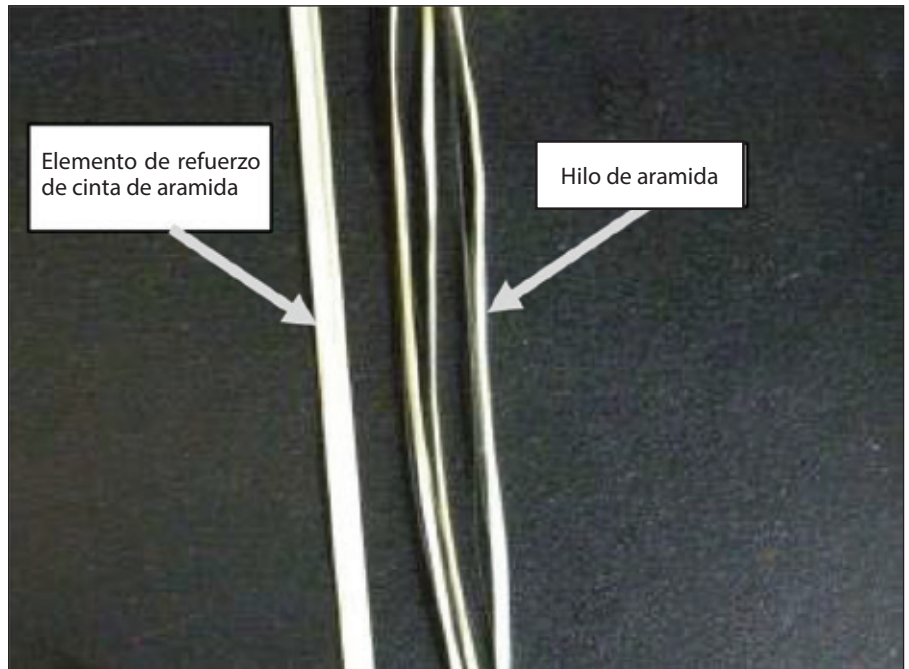
Muchos instaladores creen que la fibra se puede manejar e instalar igual que se hacía antes con el cobre. Sin embargo, el vidrio es vidrio, y el rendimiento del cable de fibra convencional puede verse afectado por un manejo e instalación inadecuados.

Entonces, ¿por qué es importante esta creencia? Hoy en día, se ofrecen soluciones con sistemas ópticos a una clientela mucho más amplia. Muchos de estos instaladores profesionales tienen gran experiencia instalando cobre. Sin embargo, la mayoría de ellos no están familiarizados con los métodos de instalación a seguir con los cables de fibra que tienen que instalar ahora.

Por lo tanto, los productores de cables de fibra deben enseñarles métodos de manejo apropiados. Y más importante todavía, para mejorar la aceptación de los sistemas de fibra óptica en nuevas aplicaciones, tenemos que suministrar productos que cumplan los nuevos requisitos. En términos de cable de fibra óptica, tenemos que diseñar productos que se comporten lo más parecido posible al hilo de cobre aislado por lo que se refiere al manejo, instalación y gestión.

Las nuevas guías de onda ópticas han hecho de ésta una opción viable, pero nosotros, como fabricantes de cables, tenemos que seguir desarrollando y diseñando "cables" (hilos) instalables que respondan a las necesidades del cliente y que determinen una nueva clase de productos de guías de onda óptica.

El nuevo diseño presentado aquí es un diseño de núcleo geométrico en el cual la fibra óptica se halla en el centro del núcleo y los hilos holgados han sido sustituidos por elementos de refuerzo geométricos. Estos elementos de refuerzo desempeñan varias funciones, como favorecer la adhesión a la cubierta externa (para ayudar al tiro manual), el revestimiento



▲ **Figura 3:** Nuevo elemento de refuerzo geométrico frente los elementos de refuerzo de hilos holgados anteriores

de la fibra (contra cargas de impacto y cargas máximas admisibles) y el acceso fiable a la fibra óptica para el empalme por fusión y la conectorización en campo. Como para todos los dispositivos de comunicación, las prestaciones mejoradas deben ser realizadas asegurando su accesibilidad a precios asequibles. Los diseños que cumplan estos nuevos requisitos, pero que sean costosos y difíciles de producir, no tendrán éxito. El cable debe poderse fabricar en serie en equipos convencionales con rendimientos y prestaciones de calidad aceptables.

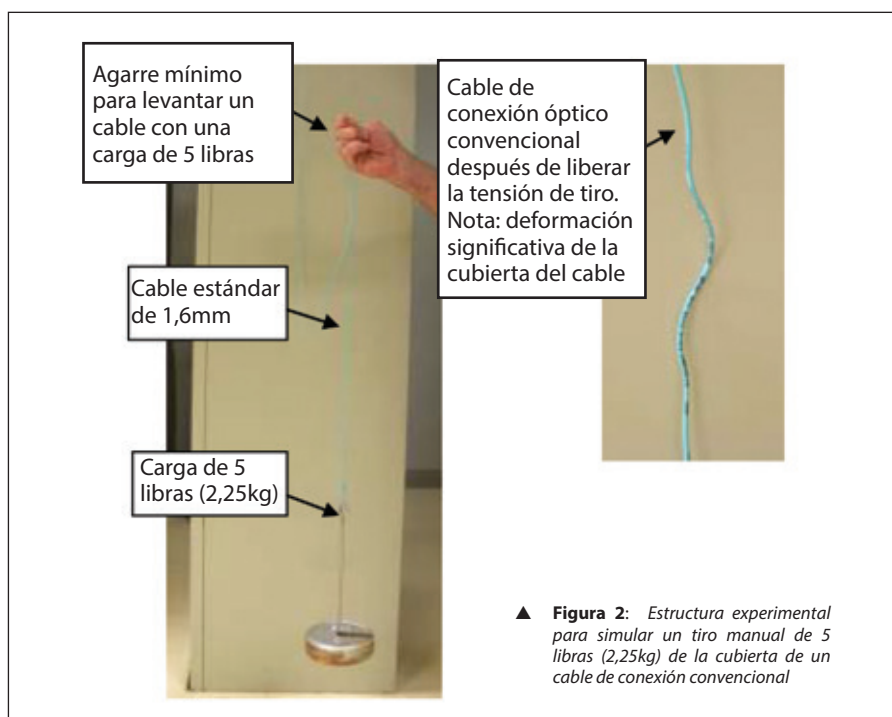
2 Retos del "hilo óptico"

Los cables convencionales de fibra óptica simplex/duplex desarrollados en los últimos 30 años o más consisten en un tubo holgado con hilos de aramida de refuerzo. La fibra de vidrio es incrustada en el centro de los hilos con un revestimiento ajustado polimérico para evitar curvaturas o impactos intensos.

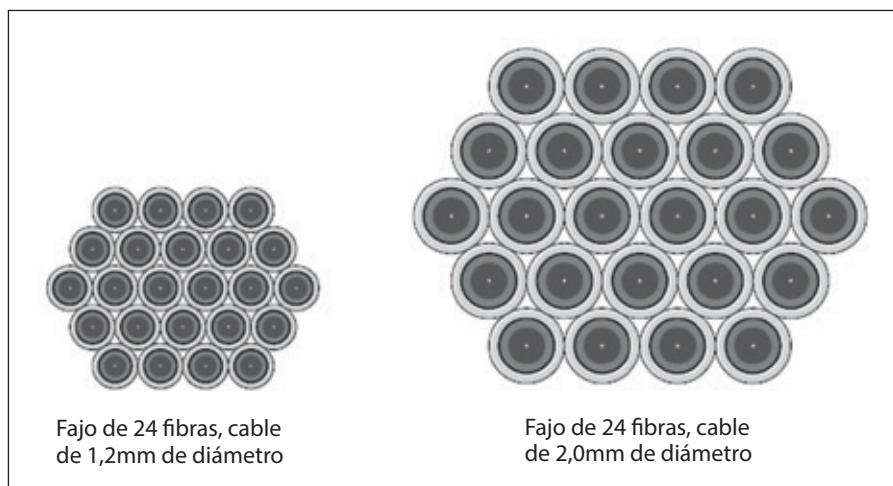
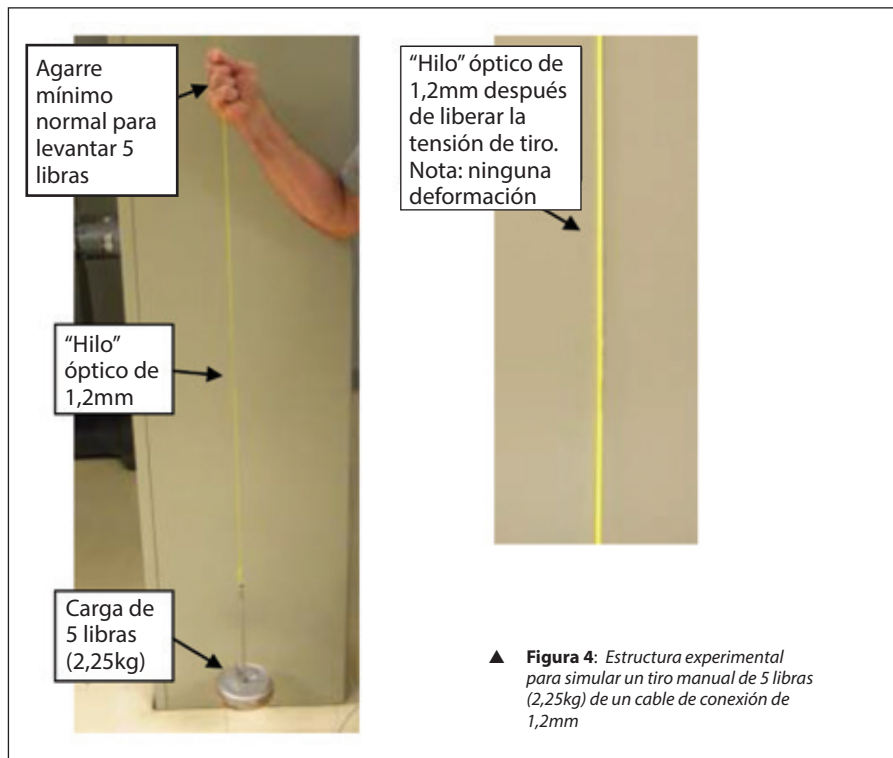
Los hilos de aramida son instalados de manera que los dos extremos puedan empalmarse sólidamente con los conectores. Por lo tanto, si se tira de un conector, en realidad es de los hilos no elásticos de lo que se tira y no de la fibra o de la cubierta. El reto de reforzar los cables de fibra de esta manera es que si tiramos del aislamiento de los cables como si se tratara de hilos de cobre, en realidad estamos tirando de una pieza de plástico polimérico de muy poca resistencia.

Al tirar de la cubierta de la fibra se tensa el polímero temporalmente mientras que la longitud del vidrio no varía.

Esto causa el despegue de la fibra de los elementos de refuerzo y de la cubierta polimérica y el retorcimiento de la cubierta externa, y da a la fibra revestida una libertad de movimiento no planeado que genera un exceso de longitud por uno de los lados de tiro y crea tensión en el otro. Normalmente, este fenómeno causa grandes pérdidas por macrocurvatura y también la posibilidad de superar el radio de curvatura mínimo de la fibra óptica, acortando significativamente la duración del cable.



▲ **Figura 2:** Estructura experimental para simular un tiro manual de 5 libras (2,25kg) de la cubierta de un cable de conexión convencional



Cuando se desarrollaban cables de fibra de 3mm, las cubiertas eran relativamente gruesas, en algunos casos casi de un milímetro.

Esto daba un poco más de resistencia intrínseca al polímero plástico antes de alargarlo. Y los primeros instaladores estaban más preocupados por el manejo. Hoy en día, lo que se pide es densidad, así que los cables de fibra se están volviendo cada vez más pequeños.

Esto tiene dos consecuencias. Primero, el espesor de la cubierta del cable es reducido al máximo, y segundo, los cables son tirados con más fuerza para llenar recorridos y tubos con más fibras. Estas dos consecuencias pueden afectar a la fiabilidad y prestaciones de la fibra.

Cuando se tira de cables de fibra más pequeños, las cubiertas se alargan. Cuando se contraen con el tiempo, se genera suficiente rozamiento como para retraer las fibras revestidas. Esto resulta en una zona localizada de exceso de fibra, conocida como microcurvatura, cuando se contrae la cubierta.

Con la reducción de las dimensiones del cable óptico a 1,6mm, este fenómeno era causado por tan sólo unas onzas de fuerza en lugar de libras. Por eso, a medida que se reducían las dimensiones de los cables ópticos, se requerían técnicas de manejo más delicadas durante la instalación. Esta nueva categoría de cables fue llamada "cables de factor de forma reducido", porque los cables ya no podían superar las mismas pruebas que otros más grandes.

Los grados de tensión iban de 22 a 9 libras, lo que permitía incluir cantidades mínimas de hilos de aramida y utilizar espesores de cubierta más delgados. Pero, el resultado fueron productos que requerían mucho más cuidado durante el manejo que cualquier hilo de cobre.

El reto era desarrollar un nuevo diseño de fibra para productos de factor de forma reducido que pudieran cumplir los requisitos de mayor densidad proporcionando la resistencia de hilo necesaria para poderlos manejar y tirar sin causar atenuación u otros problemas de prestaciones.

Los retos fueron cumplidos resolviendo los tres problemas principales: resistencia, conectividad y equilibrio térmico.

3 Conseguir la resistencia del cobre

El primer reto fue proporcionar la misma resistencia que el cobre con un cable de fibra óptica de 1,6mm. Los instaladores tenían que poder tirar del cable en línea recta, al igual que con el hilo de cobre, sin tener que enrollarlo en un mandril para no dañar la cubierta.

Asimismo, las dimensiones de la cubierta tenían que ser aproximadamente un tercio de las de las cubiertas convencionales.

Se tenía que reducir el espacio libre alrededor del vidrio para reducir al máximo las dimensiones del cable. Además, el cable tenía que cumplir todas las pruebas de impacto, resistencia y aplastamiento.

Durante el manejo de cables de factor de forma reducido, efectivamente la fibra puede migrar de un lado a otro de la cubierta cuando ceden los hilos holgados. Al ocurrir esto, la fibra queda menos protegida por un eje y ya no proporciona la protección para la que había sido diseñada.

Usando una cinta con material matriz adhesivo, se diseñó una herramienta especial para envolver varias veces la fibra longitudinalmente.

La envoltura de cinta longitudinal asegura el centrado de la fibra con tan sólo una cubierta externa muy fina pegada a la cinta. Esta unión permite a los instaladores tirar del cable o instalarlo manualmente de modo razonable sin estirar la cubierta.

Con la cinta y la cubierta unidas en una sola pieza, el cable de fibra puede ser manejado prácticamente como un trozo de hilo de cobre en términos de resistencia.

Aunque actualmente existen numerosos microcables disponibles, se suelen usar hilos de aramida trenzados alrededor de la fibra. En realidad, ninguno tiene hilos, cubierta o fibra juntos. Este cable es único porque usa una cinta de aramida en lugar de hilos holgados.

Además, la cinta puede ser quitada con peladoras de cable o hilo de cobre convencionales. Se pueden incluso usar tijeras de electricista para pelar estos cables: es la primera vez que esto ha sido posible con una fibra revestida sin necesidad de una herramienta especial.

Nótese también que la fibra RBR se está convirtiendo rápidamente en estándar para soluciones FTTX y centrales terminales/centros de datos, lo que se añade también a las características de manejo de estas nuevas fibras.

Se pueden curvar cables más pequeños en estructuras más estrechas para adaptarse a varios tipos de módulos e instalaciones.

4 Conectorización

Sin embargo, la unión de cinta y cubierta supuso un nuevo reto para la conectorización. Uniendo las dos, se eliminó el espacio que la fibra necesita para "retraerse" desde el conector.

Por lo tanto, los conectores tuvieron que ser rediseñados para ser usados concretamente con estas nuevas fibras. Estos nuevos conectores tienen en cuenta la imposibilidad de la fibra para retraerse o comprimirse dentro de la cubierta.

En los cables de fibra convencionales la fibra puede retraerse lo suficiente dentro de la cubierta, a veces hasta dos milímetros, para empalmarla a los conectores.

De modo que se diseñaron conectores con carcasa para resolver el problema de la falta de espacio libre en los núcleos. Estos conectores son conformes a los niveles de rendimiento de la especificación GRS-326 o superiores.

5 Equilibrio térmico

Por último, dado que la cinta y la cubierta están unidas alrededor del vidrio, fue necesario equilibrar las prestaciones térmicas para permitir el funcionamiento de todo el cable en condiciones térmicas estándares.

Cada material (vidrio, cinta y cubierta) tiene diferentes coeficientes de dilatación térmica lineal.

Esto significa que cada material del cable se dilata o se contrae a diferentes velocidades según las diferentes condiciones de temperatura. Por ejemplo, los plásticos normalmente se dilatan y se contraen hasta dos órdenes de magnitud más que el vidrio.

Cuando se inició a diseñar esta nueva fibra, se sabía que el hilo de aramida tenía un coeficiente de dilatación lineal negativo.

Pero, uniendo todos los elementos, la mayoría de los efectos de los diferentes coeficientes de dilatación térmica lineal fueron neutralizados prácticamente.

Al final, el cable se comporta de manera muy similar al vidrio en términos de dilatación y contracción y funciona entre -40 y 70 grados centígrados con cambios de atenuación mínimos.

Los cables plenum convencionales suelen funcionar a temperaturas entre 0 y 50 grados centígrados, como se requiere en las normas correspondientes.

6 Conclusiones

Con la evolución de las soluciones de fibra óptica en campos donde antes se usaba el cobre, la importancia de tener las mismas características de manejo, instalación y gestión del cobre no puede ser subestimada.

Los cables ópticos deben tener suficiente resistencia para ser tirados, trenzados y curvados como el cobre sin afectar a sus prestaciones.

Diseñando nuevos cables que eliminan aire y espacio dentro del cable, se pueden reducir las dimensiones.

Cambiando los hilos de aramida por envolturas de cinta y uniendo los elementos del cable se obtiene una nueva evolución de los microcables ópticos de factor de forma reducido.

A su vez, esto permitirá ampliar las soluciones de sistemas disponibles a una gama de clientes más amplia, proporcionando densidad, flexibilidad y prestaciones de fibra ideales en aplicaciones industriales. ■

7 Agradecimientos

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