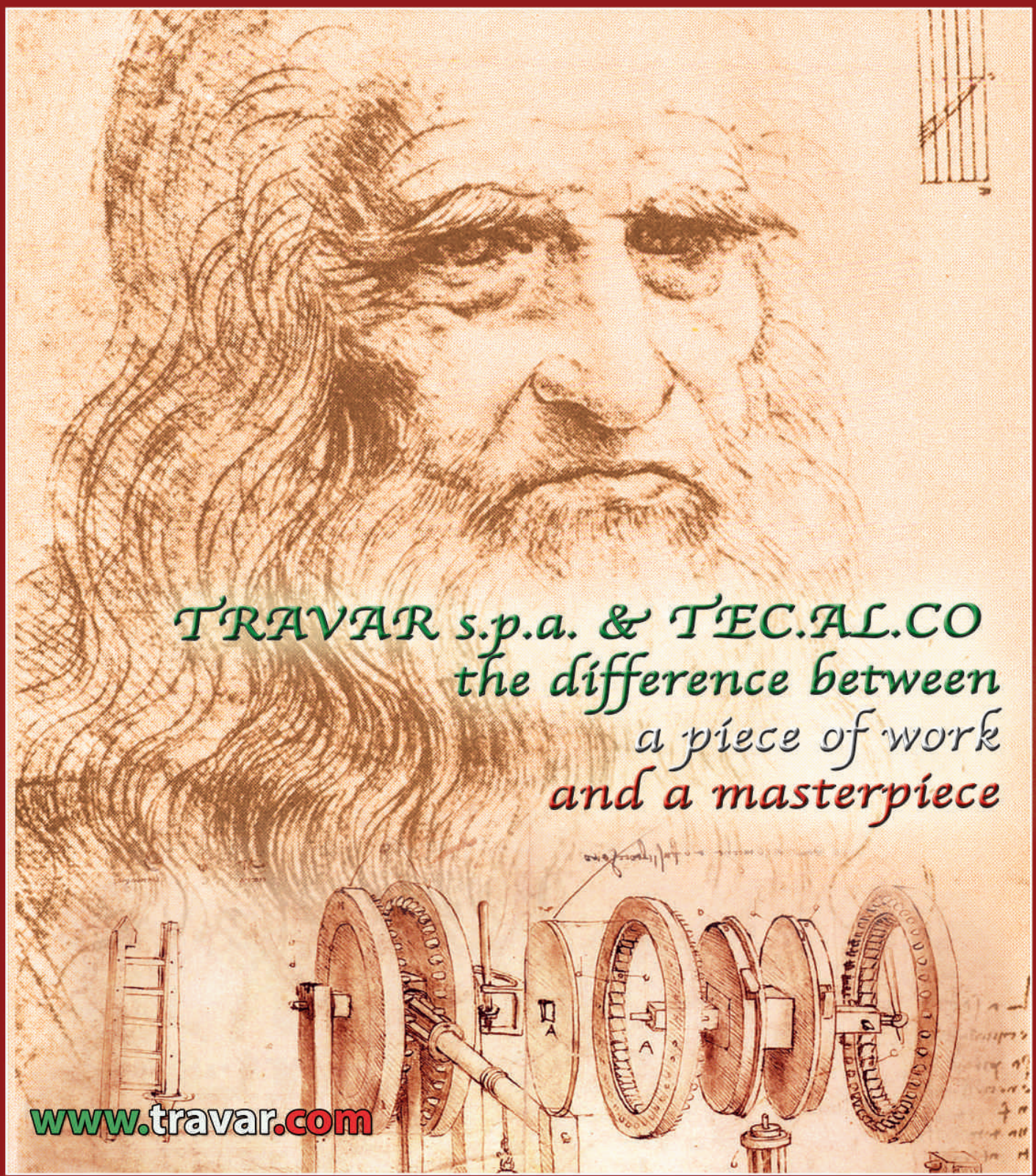
November 2007 • US$28*

# EUROwire

The International Magazine for the Wire & Cable Industries




ISSN 1463-2438

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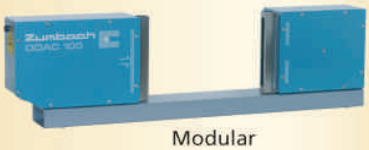
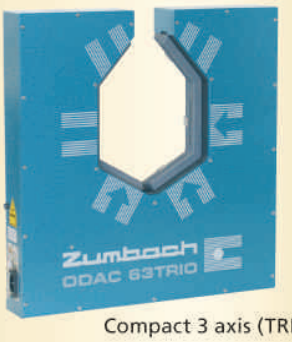


Modular

Compact 2 axis (X/Y)



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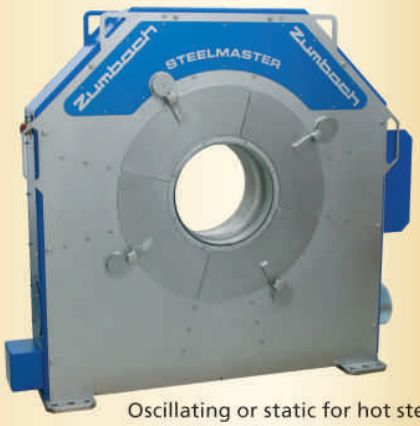

Oscillating or static for hot steel


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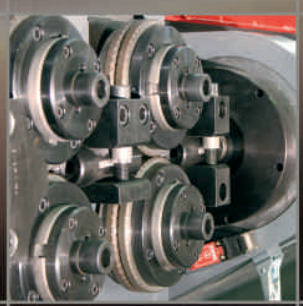

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# Scrooge? You'd better believe it!

Merry Christmas and a happy new year. It may seem a little early to be offering seasonal greetings, but this is the last time I'm able to do that to both readers and advertisers alike.

You may have noticed the word 'prosperous' missing from the greeting as well. It's not that I don't wish you a prosperous new year, it's because – if reports are to be believed – prosperity is something that will sadly be lacking in Britain next year.

There have been a number of financial shock-waves felt around the globe recently. Spurred on by consumer spending and cheap money, banks and other lending companies are carrying too much debt and have been hit hard when people simply have not been able to pay that debt back.

In other words, banks, building societies and other lending institutions are tightening their belts. That led, in September, to the Bank of England stepping in to support Northern Rock – one of the biggest mortgage lenders in the UK.

Customers panicked, wanting to withdraw their life savings after fears that the company was going to the wall.

Another warning shot comes from the Centre for Economics and Business Research (CEBR). If its predictions are right, it will be a long time before anyone feels festive!

One of those predictions is that economic growth next year will be weakest in the UK for 16 years. That is, in fact, since Britain stumbled out of the recession in 1992.

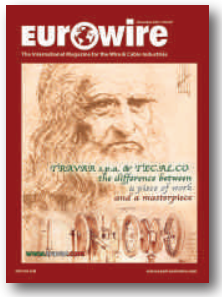
That gloomy forecast is mirrored by Citigroup which is warning that the British economy could hit the buffers if interest rates aren't cut. At the moment it is the reverse that's happening – mortgage rates, loan rates and credit card rates are all rising.

I appreciate it doesn't make heart-warming reading, and it probably will not be foremost in your thoughts when tucking into your Christmas Day feast, but it's well worth bearing in mind when planning ahead for the next 12 months.

**David Bell**




## The International Magazine for the Wire and Cable Industries

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***See page 100 for further details***

**EDITOR:** David Bell
**FEATURES EDITOR (USA):** Dorothy Fabian
**EDITORIAL ASSISTANT:** Christian Bradley
**DESIGN/PRODUCTION:** Julie Tomlin
**PRODUCTION:** Lisa Benjamin
**SALES MANAGER:** Paul Browne
**SALES & MARKETING (INTERNATIONAL):** Giuliana Benedetto *Italian speaking sales*; Hendrike Griffin *German speaking sales*; Linda Li *Chinese speaking sales*; Jeroo Vandrevala *Indian sales*
**ADVERTISEMENT COORDINATOR:** Liz Hughes
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**SUBSCRIPTIONS:** Liz Hughes
**PUBLISHER:** Caroline Sullens
**FOUNDER:** John C Hogg

**INTRAS OFFICES**

**EUROPE:**
46 Holly Walk, Leamington Spa
Warwickshire CV32 4HY, UK
**Tel**: +44 1926 334137
**Fax**: +44 1926 314755
**Email**: intras@intras.co.uk
**Website**: www.intras.co.uk
**Website**: www.read-eurowire.com

**USA:**
**EDITORIAL**
Dorothy Fabian
272 First Avenue, Apt 12G
New York, NY 10009, USA
**Tel**: +1 212 614 9266
**Fax**: +1 212 614 9266
**Email**: dfabian@rcn.com

**INDIA:**
**Jintras Ltd**, Jeroo Vandrevala
Subarna (Ground Floor)
P21/N, Block A, New Alipore
Kolkata 700 053, India
**Tel**: +91 33 2407 07 01
**Fax**: +91 33 2407 07 00
**Email**: jeroov@vsnl.com
**Website**: www.jintras.com

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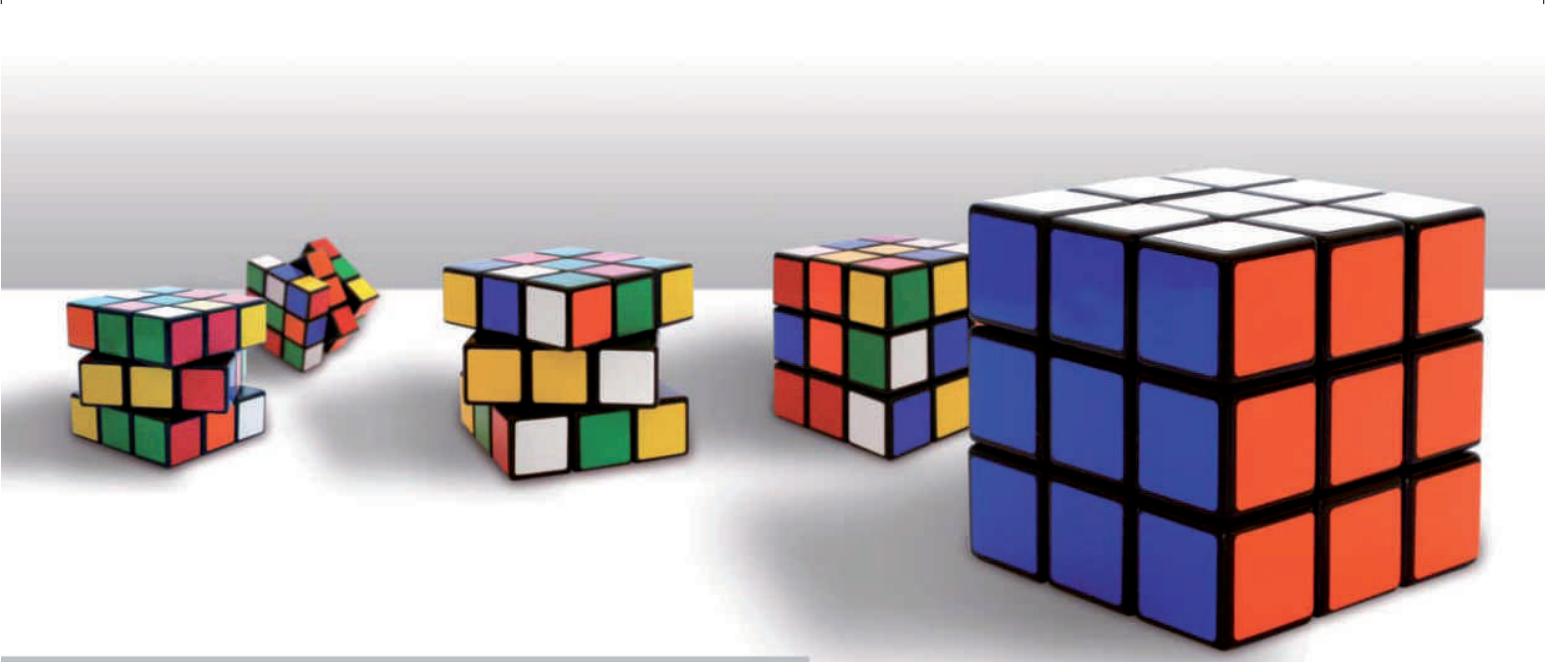

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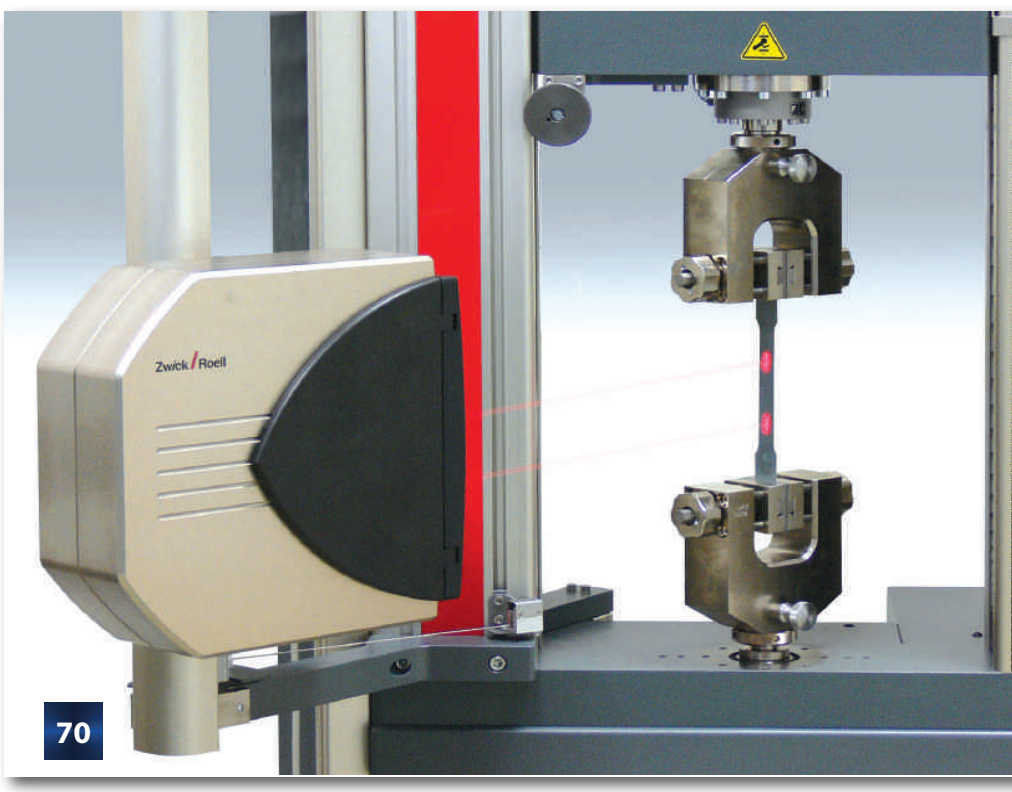

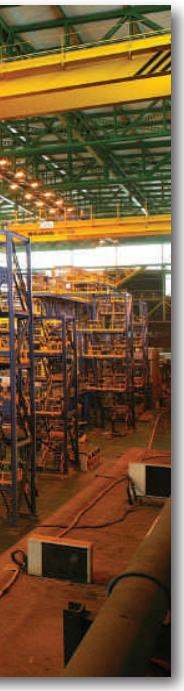




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Preview of
wire Düsseldorf 2008


## Features On

- Reels & spools
- Copper & aluminium cables

## Getting Technical

A novel aerial air-blown solution for FTTH networks using pre-terminated fibre & micro cables

# word on the wire

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

## Export to South East Asia in 2008

Dear Sir

With the market for machine tools, tooling and associated metrology in South East Asia worth a combined revenue of around US$2,205 million a year, MTA Malaysia 2008 is the ideal event for companies to break into this ever-expanding market.

The event, between 7th and 11th May 2008 at the Putra World Trade Centre in Kuala Lumpur, is expected to attract more than 25,000 visitors and includes a large number of Government-sponsored conferences, vendor presentations and association meetings.

**Overseas Exhibition Services Ltd, Westminster Tower, 3 Albert Embankment, Lambeth, London. SE1 7SP. UK.**

## Gearing up for '09

Dear Sir

Fastener Tech™ '09 – the second of the unique concept in fastener industry trade shows – is scheduled to take place in Rosemont, Chicago, USA, between 8th and 10th June 2009.

Described as 'the all-fastener-industry event in the heart of the fastener industry,' Fastener Tech™ '09 strives to offer attendees and exhibitors a valuable, cost-effective and easy-to-attend event that provides value to all types of fastener industry professionals: manufacturers, distributors, users and suppliers.

The biennial event will feature an exhibition, education seminars, conferences, a keynote breakfast, an all-industry reception, and other networking opportunities.

**Fastener Technology International, 1867 West Market Street, PO Box 5452, Akron, OH, 44313, USA.**

## We're sorry . . .

Due to technical reasons beyond our control, we have not received a number of emails during September. We apologise for this for this inconvenience.

Some editorials submitted during the month may not feature in this issue of EuroWire.

Should you have any queries, please do not hesitate to email **david@intras.co.uk**

## Have your say here!

Want to get something off your chest, or simply to get your point across? Word on the Wire – EuroWire's letters page – gives you the ideal platform to do just that!

Letters submitted to the Editor should be written in English, and should be concise (around a maximum of 250 words).

All letters must include the sender's name and address. If you wish to remain anonymous please state this clearly on the letter.

The Editor reserves the right to amend and withhold letters.

Letters should be sent to: Word on the Wire, EuroWire, 46 Holly Walk, Leamington Spa, Warwickshire, CV32 4HY. England.

Alternatively you can send them via email to **david@intras.co.uk**

## Thank you . . .

Dear Sir

I am just writing a quick note to say thank you for publishing the 'LUL approval for the Draka Firetuf range' press release in the latest edition of EuroWire. I am very grateful to you for running the article and everyone at FS Cables was delighted at how it looked.

**Owen Dale, FS Cables, Wellington Road, London Colney, Hertfordshire. AL2 1EY. UK.**

# Construction begins on DSM's China campus

Construction has begun of the DSM China Campus in the Zhangjiang Hi-Tech Park in the Pudong new area of Shanghai (PRC).

The campus will comprise both Shanghai offices of the DSM (China) Ltd Holding and several business groups and the R&D labs of DSM in China.

The DSM China Campus will house about 600 people and, as well as being the headquarters of DSM China, it will be company's biggest and most important research facility outside Europe and the USA.

During the groundbreaking ceremony, Jan Zuidam, deputy chairman of DSM's managing board of directors, said: "China is important for all three drivers of DSM's strategy Vision 2010 – Building on Strengths: market-driven growth and innovation, increased presence in emerging economies and operational excellence.

"The ground-breaking ceremony is a major milestone for us in China. The DSM China Campus will act not only as the headquarters of DSM in China, but also as the new incubator of our innovation competences."

In its design and execution, the DSM China Campus will aim to achieve 'Gold' certification within the LEED programme. LEED stands for Leadership in Energy and Environmental Design.

"DSM takes sustainable and responsible entrepreneurship very seriously," said Weiming Jiang, president of DSM (China) Ltd.

"For the third consecutive year we have been elected the most sustainable chemical company worldwide in the Dow Jones Sustainability Index.

"Therefore it was only logical that we would go for a 'green' design for our new DSM China Campus."

**DSM – Netherlands**
**Fax**: +31 45 571 9753
**Email**: media.relations@dsm.com
**Website**: www.dsm.com


▲ *An artist's impression of the new DSM campus in Shanghai*

## corporate at a glance

It has been a case of 50 not out for Swiss on-line measuring and control system manufacturer, Zumbach.

The champagne corks have been popping in the German city of Neusäß as Krenn staff celebrated the company's 60th anniversary – the diamond anniversary!


An important signing commemorating the 300th CV line ordered took place between Maillefer SA and Energya Industries during the Interbuild show in Cairo, Egypt, in June.


Sikora's purchasing department has moved into a new building at the company's HQ in Bremen, Germany.

## 300th CV line for Maillefer

An important signing commemorating the 300th CV line ordered took place between Maillefer SA and Energya Industries during the Interbuild show in Cairo, Egypt, in June.

Hesham H El Sewedy, CEO of Energya Industries, and Pentti Hätälä, CEO of Maillefer SA, took up the pen for the event and a handshake between the two men sealed the deal.

The order represents the 300th complete CV line sold in the history of Maillefer. Manufacturing is underway on the equipment, which is scheduled to ship from the company's Finnish facility during the latter part of this year.

Energya Industries has earmarked the new Continuous Vulcanization (CV) line for its Jeddah Cable plant in Jeddah, Saudi Arabia. Building preparations and tower construction are underway to accommodate the line, which measures around 115m high.

The CV line ordered is a vertical tower model destined to the production of high-voltage and extra high-voltage insulated cables of up to 500 kV and a cross-section of 3,000mm$^2$.

It incorporates unique technology for quality production, which is characterised by cable roundness and homogeneity across all insulation and semi-conductor layers.


▲ *Pentti Hätälä, of Maillefer, left, and Hesham H El Sewedy, of Energya, on the right, signed the agreement for the CV line*

Maillefer CV lines are designed as best in class for manufacturing energy cables that offer long-term reliability in the field. An option was signed to deliver an identical line to the Energya Cables operations in Egypt where major expansions are underway to increase capacity and expand the product range of Energy Cables.

Maillefer has been a privileged partner to Energya Industries and, in particular, Jeddah Cable Company for more than 20 years. JCC is a leading manufacturer of a complete range of cable products in the ME&A region with the most recent and most modern manufacturing processes in the region.

A large majority of cable manufacturing equipment installed originates from Maillefer. The 300th CV line once again confirms the high level of confidence that both partners place in each other.

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

## Three more years for WCISA president

Thomas Copp, president of Reelex Packaging Solutions, and current WCISA president, has been elected to a second, three-year term as the organisation's chief.

▲ *Tom Copp*

The following existing WCISA board members were elected to new three-year terms: William E Crowle, president, QED Wire Lines Inc; David Kiddoo, global business manager, AlphaGary Corp; Mike Patel, industry manager, Wire & Cable Compounds, Teknor Apex Co; Rahul Sachdev, vice-president sales and marketing, Wire & Plastic Machinery Corp; Joseph Snee, sales manager, Huestis Industrial; and John Zachow, business area manager, Davis-Standard Corp.

Long time board members, Bob Fulop, president, Wire Lab Company, and Jeff Swinchatt, president, Sikora International Corporation, decided not to seek re-election. The following have been elected to three-year terms as new WCISA board members: Neville Crabbe, president, Leoni Wire Inc; John Falls, sales representative, Fiber-Line Inc; Rob Fulop, vice president and general manager, Wire Lab Company; Rene Mayer, technical sales, Mossberg Reel LLC; and Terri Terry, senior marketing specialist, CommScope BiMetals Product Group.

**WCISA – USA**
**Fax**: +1 330 864 5298
**Email**: info@wcisa.org
**Website**: www.wcisa.org



## Heading for Germany in 2008?

A new international conference – Polyolefin Additives 2008 – will take place at the Maritim Hotel, Cologne, Germany, between 14th and 16th April next year.

The conference will provide an international forum, bringing together material specifiers, compounders, raw materials suppliers and equipment manufacturers.

Lively interaction between the international panel of speakers and delegates will aim to stimulate debate in all sectors and the event will provide a comprehensive overview of the latest materials, technology and business trends.

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## DIARY OF EVENTS

**NOVEMBER**

5-7: **Wire '07 Bologna** – conference – Bologna, Italy
**Organisers**: ACIMAF, CET, IWMA & WAI
**Fax**: +44 1926 314755
**Email**: info@iwma.org
**Website**: www.iwma.org

11-14: **IWCS** – conference – Florida, USA
**Organisers**: IWCS
**Fax**: +1 732 389 0991
**Email**: admin@iwcs.org
**Website**: www.iwcs.org

13-16: **Central Asia Machinery** – trade exhibition – Almaty, Kazakhstan
**Organisers**: Central Asia International Exhibitions
**Fax**: +7 3272 663684
**Email**: info@expocentralasia.com
**Website**: www.expocentralasia.com

**MARCH/APRIL 2008**

31-04: **wire Düsseldorf** – trade exhibition – Düsseldorf, Germany
**Organisers**: Messe Düsseldorf GmbH
**Fax**: +49 211 45 6087 7793
**Email**: info@messe-duesseldorf.de
**Website**: www.messe-duesseldorf.de

**JUNE**

7-11: **Wire Expo 2008** – trade exhibition – Pittsburg, USA
**Organisers**: Wire Association Int
**Fax**: +1 203 453 8384
**Email**: info@wirenet.org
**Website**: www.wirenet.org

**SEPTEMBER**

23-26: **wire/Tube China** – trade exhibition – Shanghai, China
**Organisers**: Messe Düsseldorf China
**Fax**: +86 21 5027 8138
**Email**: info@mdc.com.cn
**Website**: www.messe-duesseldorf.de

**OCTOBER**

21-25: **EuroBLECH** – trade exhibition – Hanover, Germany
**Organisers**: MackBrooks
**Fax**: +44 1727 814 401
**Email**: info@euroblech.com
**Website**: www.euroblech.com

**NOVEMBER**

20-22: **Wire and Cable India** – trade exhibition – Mumbai, India
**Organisers**: Confederation of Indian Industry
**Fax**: +91 22 2493 9463
**Email**: darryl.dasilva@ciionline.org
**Website**: www.wirecableindia.com

## Girls get in on the act . . .

▲ *Pupils at the 'Engineering for Girls' day*

More than 70 girl students between the ages of 12 and 14 from six South Yorkshire, UK, secondary schools took part in a design and technology challenge that gave them an insight into the huge career opportunities in engineering.

The MasMicro 'Engineering for Girls' day was organised by Sheffield Hallam University in association with NAMTEC (National Metals Technology Centre) and held at Swinden House in Rotherham.

Students were specially selected who had shown an interest in science and engineering subjects.

The challenge they were set was to design and produce a bubble blower, which the pupils manufactured on the day from Perspex.

This involved practical engineering techniques, such as soldering, shaping and moulding the product as well as testing their IT, design and marketing skills.

**NAMTEC – UK** **Fax**: +44 1709 724 999
**Email**: info@namtec.co.uk **Website**: www.namtec.co.uk

## Morgan ventures into the Czech market

Morgan Construction Company will provide a bar in coil outlet for wire rod and bar producer Třinecké Železárny AS in Třinec, Czech Republic, that incorporates a heat retention tunnel to achieve specific mechanical properties.

With the new equipment, Třinecké will be able to produce bar coils from 16mm in diameter up to 50mm with coil sizes of 1,350mm in outside diameter, using special steels – high-alloyed and micro-alloyed steels as well as cold heading grade steel.

Attached to Třinecké's pre-existing bar mill, the bar in coil outlet will also be capable of producing small lots of half-weight coils up to 2 tons.

The contract also includes the supply of two strap compactors and a belly banding strap machine. Start up is expected by the end of April 2008.

**Morgan Construction Company – USA** **Fax**: +1 508 755 6111
**Email**: sales@morganco.com **Website**: www.morganco.com

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As leading providers of advanced polyolefin compounds for the global wire and cable industry, Borealis' and Borouge's solutions are widely used in low, medium and high voltage energy transmission and distribution cables, in data and communication cables and in building and automotive wires.

Our focus is on innovating the way cables are produced and installed as a direct response to the needs of the value chain.

We are committed to addressing global challenges, such as energy, with innovative plastics solutions in infrastructure, automotive and advanced packaging.

From simple everyday products that make life easier to step-changing technological developments, Borealis and Borouge are leading the way.

**Visit us at K 2007 Hall 6 Stand C58**

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www.borealisgroup.com

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SHAPING the FUTURE with PLASTICS

## On the road!

Prysmian Telecom Cables and Systems really have put the show on the road – with a major roadshow covering much of Europe.

The latest initiative to support the growing uptake of Fibre To The Home (FTTH) technology in Europe got underway on 4th September in the UK and visited the Netherlands, Denmark, Norway, Sweden, Germany, Czech Republic, Slovakia, Poland, Hungary, Austria, Slovenia, Italy, Spain and France.

The adoption of FTTH is expanding rapidly around the world and activities in Europe are now finally gathering momentum with many municipalities and local authorities – as well as the more traditional telecom operators starting to build optical 'last mile' networks.

The roadshow featured a specially constructed, interactive exhibition trailer full with all of Prysmian's latest FTTH passive product solutions blown fibre, miniature blown cables, pre-connectorised customer solutions, new vertical riser systems for multi dwelling units and a range of new FTTH connectivity products.

Information was also available on Prysmian's range of optical fibres, including CasaLight™, the bend insensitive fibre developed by Prysmian specifically for FTTH applications.

**Prysmian Spa – Italy**
**Fax**: +39 02853 54451
**Email**: info@prysmian.com
**Website**: www.prysmian.com

## Latest member

Sylvin Technologies has become the latest company to join the WCISA .

Sylvin is an ISO 9001:2000 certified manufacturer of PVC and thermoplastic alloy compounds for electrical wire and cable insulation and jacketing applications, and also offers a complete line of electrical grade injection moulding compounds. All materials used are RoHS compliant and numerous grades are UL, CUL and CSA listed.

**WCISA – USA**
**Fax**: +1 330 864 5298
**Email**: info@wcisaonline.org
**Website**: www.wcisaonline.org

## Tenova buys Takraf

The Techint Group has announced the acquisition of Takraf GmbH, Leipzig, Germany, which produces mining and bulk handling equipment.

The acquisition is conducted through Tenova, a Techint fully-owned organisation, specialised in technologies and equipment for the steel and bulk handling industries. The operation is subject to the approval of the Anti-trust authorities.

Takraf, with about 550 employees and an estimated turnover for 2007 of more than €200m, is a company that can boast a strong international presence and high skills in the engineering and supply of open pit mining and bulk material handling equipment.

Takraf has subsidiaries in India, Brazil, Chile, Australia, South Africa, Bulgaria, United States and Canada, and operates worldwide, serving mining companies, especially iron ore, copper ore and coal extraction companies, port terminals and final users of the bulk materials.

"The operation will allow Tenova, thanks to the broad portfolio of products, to compete with the major players in a rapidly growing sector," declared Gianluigi Nova, CEO of Tenova.

**Tenova – Italy**
**Email**: tenova@tenovagroup.com
**Fax**: +39 02469 3026
**Website**: www.tenovagroup.com

## Zumbach leading the field . . .

▲ *Zumbach headquarters and main facility in Orpund, Switzerland*

It has been a case of 50 not out for Swiss on-line measuring and control system manufacturer, Zumbach.

For the company, based in Orpund, celebrated its 50th anniversary in May and continues to offer the wire and cable industry the most complete line of measuring and monitoring instruments using the highest technology.

Zumbach Electronic operates globally with 13 companies throughout Europe, USA, South America and Asia – and an additional 40 agents.

Zumbach is a world leader in several key technologies such as lasers/optics, ultrasonics, x-ray, high-voltage technology, computer hardware and software.

This enables the company to apply to each application the most appropriate technology, and allows it to develop new and unique solutions. Numerous patents obtained around the world demonstrate the company's strength in innovation.

**Zumbach Electronic AG – Switzerland**
**Email**: sales@zumbach.ch
**Fax**: +41 32356 0430
**Website**: www.zumbach.com

www.kiswire.com

# Wire connects the world

As the cars move you through the day, as an elevator connects you to the building, as a bridge connects you to the road and as a ship connects you to the ocean...
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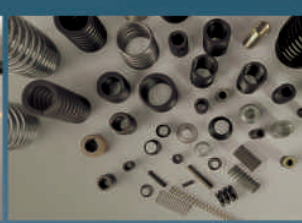

Oil Tempered Spring Wire/Steel Tire Cord & Bead Wire/Steel Wire Rope/High Carbon Steel Wire Products/Guy & PC Strand

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## Diamond celebrations for Krenn

The champagne corks have been popping in the German city of Neusäß as Krenn staff celebrated the company's 60th anniversary – the diamond anniversary!

In 1947 the spring specialist Albert Krenn senior founded the company at Augsburg for the production of technical springs, lathing the springs by hand with his wife, Zenta.

Two years later the company founder and skilled toolmaker developed a new kind of steel cutter for the building industry – a tool that is still in production today.

At its 10th anniversary the fast-growing company moved into newly-built rooms in the neighbouring city of Neusäß, and in 1975 Albert Krenn junior, the son of the company founder, took over the business.

In order to better concentrate the company's resources, the manufacturing of springs was stopped and the production of steel cutters with three-edged replaceable blades was extended.

Krenn now represents Europe's most extensive steel cutter programme, and apart from the 'classic steel cutters', the manual steel cutters, and pneumatic tools have been part of production since the 1980s.


▲ *Albert Krenn, managing director, outside the newly built offices at Neusäß near Augsburg, Germany*

This production has also now extended to include electro-hydraulic steel cutters, as well as special tools for the cutting of chains, wire ropes and other material. The most powerful cutting tools have a cutting capacity up to 50mm in diameter.

During the last few years the accessories range has been enlarged by products for more efficient working processes, among them steel strapping cutters, balancers and suspension bars. "We are looking ahead with a positive feeling, because we have cutting solutions for all kind of needs," said managing director Albert Krenn. "Due to our policy of enlarging our product range, it was possible to conquer important business fields."

Krenn also produces a catalogue for the complete product range, which is also listed on the company's website.

**Werkzeugfabrik Albert Krenn – Germany**
**Fax**: +49 821 207 9330
**Email**: info@krenn.de
**Website**: www.krenn.de

## SMS modernisation of Tata mill

Tata Iron and Steel, India, has awarded SMS Demag a contract for the modernisation of its hot strip mill in Jamshedpur.

For the roughing mill the contract includes the replacement of the drive trains, the installation of new hydraulic adjusting systems, as well as a new Level 1 automation system with gauge and width control.

For the finishing mill SMS Demag will supply new drive trains for mill stands F1 to F5.

The SMS-designed and built compact hot strip mill went in operation in 1993, producing around 3.1 million tons of hot strip per year. Production after the revamp can be raised to more than 3.5 million tons per year.

The rise in production will be accomplished by increasing the drive power in the roughing stand and finishing mill.

An important factor is the 25% rise of power level in the roughing stand, which allows the number of passes to be reduced and makes the design of pass schedules easier.

To be able to transmit the higher torques, new drive spindles, larger work rolls and Morgoil® bearings with higher load-bearing capacity as well as modified roll chocks will be installed.

In the finishing mill the power of the motors will be increased by around 10%.

SMS Demag will replace the main gear units of F1 to F4 and the pinion gear units of F1 to F5 or their gear wheel sets. On F1 and F2, new Sieflex® gear spindles will be installed.

A detailed concept was developed together with Tata Steel in order to minimise the times of production stoppages that are needed for the revamping job.

The roughing-stand area will be modernised in the autumn of 2008 as part of an 18-day shutdown.

Work in the area of the finishing mill has been scheduled for the summer of 2009 during the regular short-time and continuous shutdown periods.

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

## Bulgarian contracts for Tenova

Tenova strip processing business unit has been awarded two contracts by the Bulgarian company Intertrust Holding, of Botunetz, Sofia.

These acquisitions are part of a cold mill complex, a strategic project for Tenova strip processing, which also involves other Tenova business units.

The commissioning includes the design of the plant's global lay-out and the definition of the production cycles. The automation of both lines will be supplied through Presind, the Tenova internal department dedicated to strip processing lines automation.

The first order is for a push-pull pickling line with acid regeneration plant. The pickling line will have a production capacity of 400,000 tons/year, while the acid regeneration plant will provide capacity of 2,500 litres/hour. The facility is scheduled to begin operations in the latter part of 2008.

The technology of acid regeneration, a field in which Tenova possesses full in-house know-how after the acquisition of Key Technologies, permits the construction of lines with extremely low environmental impact.

The second order is for a hot dip galvanising line. The 250,000 ton/year line is equipped for the future installation of an additional galvanising dip tank for the production of an aluminum-zinc alloy that enhances metal resistance to corrosion in countries with hot climates.

The project has been granted together with the Italian office of Tenova LOI Italimpianti, which will be responsible for the design and supply of the thermic section.

**Tenova Srl – Italy**
**Email**: info@techint.it
**Fax**: +39 02 469 3026
**Website**: www.techint.it

## Freight dates for IWMA members

The IWMA and ITA have confirmed that Schenker in the UK has been appointed the official freight forwarder for the UK and associations' group of exhibitors at wire/Tube Düsseldorf, Germany, in March 2008.

The association will also be using Schenker for Fabtech 2007 in Chicago, Tube India 2008 in Delhi, Tube Russia 2008 in Moscow and wire/Tube China 2008 in Shanghai.

Contact details for the UK office are: Craig Yiasoumi, Schenker Ltd, Fairs and Exhibitions Services, Unit 6, West Mayne Industrial Park, Bramston Way Southfields Industrial Estate, Laindon, Essex SS15 6TP, United Kingdom.

**Schenker Ltd – UK**
**Fax**: +44 1268 416 490
**Email**: craig.yiasoumi@schenker.com
**Website**: www.schenker.co.uk

**IWMA – UK**
**Fax**: +44 1926 314755
**Email**: info@iwma.org
**Website**: www.iwma.org

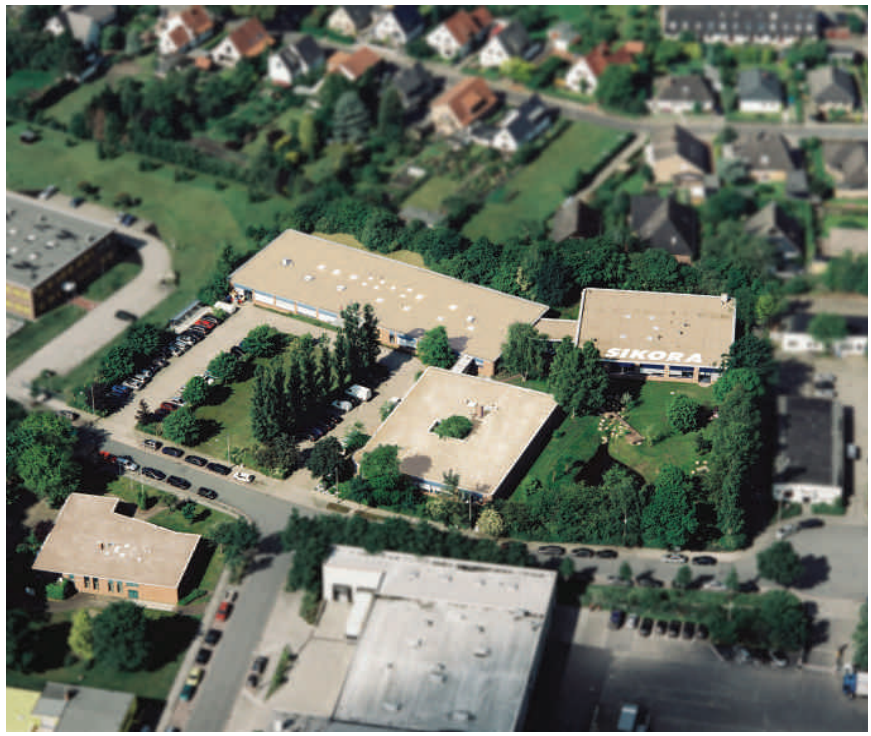
## Expansion is the way forward for Sikora

Sikora's purchasing department has just moved into a new building adjoining the company's headquarters in Bremen, Germany. The move follows the move in January which gave production, research and development 1,000m² more space.

The move follows a 15% increase in turnover compared to the previous year. The expansion in the measuring and control technology sector follows an increase in contract volume and workforce.

Sikora has increasingly invested in research in order to meet all requirements for powerful and innovative products. The success is already reflected in various new measuring devices such as X-Ray 8000 NXT, Laser 2003 XY, Centreview 800 or the processor-based system Ecocontrol 1000.

**Sikora AG – Germany**
**Fax**: +49 4214890090
**Email**: sales@sikora.net
**Website**: www.sikora.com




▲ *View over the Sikora business premises in Bremen*

## Record levels for fibre optics in 2007 – CRU

Cable market analysis group, CRU, UK, has reported that the fibre optic cable market has recovered from the collapse of 2001.

CRU's wire and cable team, which includes newly acquired KMI Research, has documented double-digit growth in demand for 2005 and 2006.

Fibre demand in 2007 is likely to exceed the previous peak year, 2001. Quarter-by-quarter analysis of markets for fibre and cable is given in CRU's bi-monthly Optical Fibre and Fibre Optic Cable Monitor.

The recent surge has been driven by local-loop upgrades, mainly to provide faster Internet access and new services, such as IPTV.

CRU concludes that the current rise in the market is more solidly based than the telecom bubble that burst in 2001.

In the last boom too many competing telecom carriers invested to serve the same geographic markets. Carriers are now funding network upgrades without excessive borrowing, keeping capital expenditures within safer limits.

New in-depth reports from CRU-KMI, such as Worldwide Optical Fibre and Cable Markets and Markets for Fibreoptics in Broadband Access Networks, show that FTTx (fibre to the curb, home or node) will account for most demand growth over the next five years.

In North America, where AT&T and Verizon have massive projects underway, FTTx already accounts for more than half of single-mode demand. In other regions, FTTx is a smaller percentage of demand, but is growing fast.

The amount of fibre installed for FTTx globally will increase with 23% CAGR from 2006 to 2010. This contrasts with only 3% CAGR for fibre in other applications.

**CRU the Independent Authority – UK**
**Email**: sarah.webster@crugroup.com
**Fax**: +44 207 903 2152
**Website**: www.crumonitor.com

## In Brief . . .

CableOrganizer.com, one of the leading purveyors of cable, wire and equipment management-related products for use in business and at home, has been named in the 26th annual Inc 500 list of fastest growing private companies in America, in the September issue of Inc magazine.

The company ranked in the top 25% (126th) of companies named on the coveted list having realised astounding three-year sales growth of 1,413%!

Shattering sales forecasts year after year, earlier this year CableOrganizer.com landed a coveted spot on Internet Retailer magazine's 'Top 500 Retail websites' list – the one and only ranking of America's 500 largest e-retail businesses based on 2006 online sales.

**CableOrganizer.com Inc – USA**
**Fax**: +1 954 861 2001
**Email**: sales@cableorganizer.com
**Website**: www.cableorganizer.com

◆◆◆

Verlinde Technologies has appointed Simon Rothechild as business development manager for the UK and Ireland. Mr Rothechild was formerly UK sales manager for the company.

**Verlinde – France**
**Fax**: + 33 2 37 38 95 99
**Email**: info@verlinde.com
**Website**: www.verlinde.com

## Altana posts robust growth in the first six months of 2007

Speciality chemicals company Altana AG substantially increased sales and earnings in the first six months of 2007 compared to the previous year.

Sales increased by 7%, rising from €659m to €705.7m. Adjusted for negative exchange rate effects of 3%, as well as slightly positive acquisition effects, the operating sales growth rate was 9%. The growth in sales was particularly strong in Europe (+10%) and Asia (+8%).

Earnings before interest, taxes, depreciation and amortisation (EBITDA) grew by 22% from €103.1m to €125.2m, based on double-digit earnings increases in all divisions.

"In the first half-year of our new group structure as a pure specialty chemicals company we have demonstrated a very satisfying development and were able to increase sales and earnings substantially," said Dr Matthias Wolfgruber, CEO of Altana AG.

"We have successfully lived up to the confidence placed in us by the capital markets and the general public after the new start of Altana and we are well positioned to continue our path of profitable growth into the future."

**Altana AG – Germany**
**Fax**: +49 281 670 1114
**Email**: info@altana.com
**Website**: www.altana.com

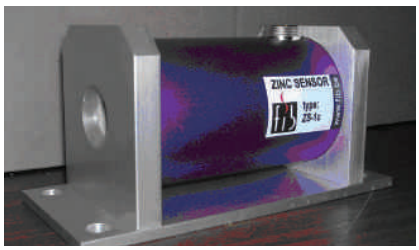
## Fasteners getting ready for 2008

The Ricoh Arena, Coventry, UK, will host Fastener Fair Coventry on 11th and 12th June 2008.

Fastener Fair Coventry is exclusively for the markets of the UK and Ireland, and represents all aspects of the fastener and fixing market. The Ricoh Arena is less than two hours' drive for almost 75% of the population of Britain.

**Fastener Fair Coventry – UK**
**Email**: jerry@fastfair.net
**Website**: www.fastenerfair.com

## Orders booming at FIB




▲ *A zinc sensor from FIB*

Le Four Industriel Belge (FIB), Belgium, has picked up a third order from UZPS in Yekaterinburg, Russia, for two annealing and galvanising lines. Both are provided with specific bath and wiping system for Galfan®. These two lines come in addition to two others in 2003 and 2005.

Based in Brussels, FIB has also received five orders for specific lines for zinc/aluminium coating during the past 12 months – three in western Europe and two in Asia. It has also received an order from HAS CELIK, Turkey, for a patenting and galvanising line.

**Le Four Industriel Belge SA – Belgium**
**Fax**: +32 2 376 37 11
**Email**: info@fib.be
**Website**: www.fib.be

## Jamey on-board at Windak

Windak Inc, supplier of automated packaging and material handling solutions, has a new mechanical service engineer in the form of Jamey Cook.

▲ *New recruit Jamey Cook*

Mr Cook joined the service team at the Hickory, North Carolina, USA, location in May and is helping to implement, modify, and upgrade new and existing equipment. He has a BS in Mechanical Engineering technology and was formerly a mechanical service engineer for Georg Manufacturing Systems.

**Windak Inc – USA**
**Fax**: +1 (828) 322 1716
**Email**: info@windakusa.com
**Website**: www.windakusa.com

## New offices for QED

QED Wire Lines Inc has relocated to a new central office, located between its Eastern and Western offices, at 5261 Route Harwood, Vaudreuil-Dorion, Québec, Canada.

The company has also announced the appointment of Carla Kerkhoven, whose duties will include handling the accounting, office management and spare parts contracts.

The company's latest contracts include its first venture into the Chinese market with Baoan International, a FastHeat™ Fluidbed furnace for a customer in Turkey, two new galvanising lines for South East Asia, and a HighTurbulence® pickling system sold to Iowa Steel & Wire, USA.

QED's latest FastHeat™ Fluidbed furnace uses precision flow valves and the company's Production Proportional Algorithm PLC control to provide both austenitising and annealing heat treatment. The system gives tight control of fluidising rates and increased furnace efficiency.

QED is also supplying its CWC automatic coating weight control system to a North American company.

This technology accurately and consistently controls coatings on multiple wires in high speed process lines.

Using an innovative sensor, computer interface and flow control valves with precision nitrogen wiping nozzles, the system promises improved quality, higher production and savings on zinc, aluminium or Galfan®.

**QED Wire Lines Inc – Canada**
**Fax**: +1 450 451 6465
**Email**: qed@qedwire.com
**Website**: www.qedwire.com

## Ready for Cables 2008?

Cables 2008 takes place between 3rd and 5th March next year in Cologne, Germany.

The eighth Cables conference and exhibition will continue the tradition of providing a unique business forum looking in detail at polymer development in the cable industry and identifying future business trends.

Sponsorship opportunities also exist.

**AMI Plastics – UK**
**Fax**: +44 117 989 2128
**Email**: info@amiplastics.com
**Website**: www.amiplastics.com


▲ *Staff at the new Vietnam office of the Zwick Roell Group*

## New office in Vietnam

The Zwick Roell Group recently opened its 56th local office in Ho Chi Minh City, Vietnam.

Guest of honour at the event was Dr Heinz-Peter Seidel, Consul General of the Federal Republic of Germany to Vietnam.

The event, held at the company's office in the prestigious e-Town building, was also attended by customers and key partners from Ho Chi Minh.

The stable growth and increasing need for improved technology in Vietnam has resulted in demand for advanced material testing systems.

The Zwick Roell Group aims to promote and enhance this growth by bringing together advanced testing solutions and the specific needs of companies in Vietnam.

**Zwick GmbH & Co KG – Germany**
**Fax**: +49 7305 10200
**Email**: info@zwick.de **Website**: www.zwick.com

## Condat buys Henkel wire drawing lubricant business

Condat's purchase of Henkel will expand its core business – and increase turnover by €10m. The two companies have agreed on the closing date for the French company to assume control of Henkel's wire drawing lubricant business.

Due to Henkel's technology, its worldwide presence and product range, together with the experience of its personnel, this acquisition was seen as a perfect opportunity for Condat to further expand its core business. The transaction involves production equipment including 'pellets' technology, allowing the manufacture of soaps that generate no dust.

In addition, Condat will also supplement its renowned Vicafil range with famous brand names such as Steelskin, Galvasmooth, Stearlube and Steagel.

**Condat – France** **Fax**: +33 47807 3539
**Email**: info@condat.fr **Website**: www.condat.fr

## Cologne conference

The Fire Resistance in Plastics Conference is being held at the Maritim Hotel, Cologne, Germany, between 19th and 21st November 2007.

**Applied Market Information (AMI) – UK**
**Fax**: +44 117 989 2128
**Email**: consult@amiplastics.com
**Website**: www.amiplastics.com

## New technical manager at UK site

Teknor Apex has appointed Bhawan Patel as thermoplastic elastomer (TPE) technical manager for the European operations of the company's Thermoplastic Elastomer Division.

Patel will be based at the UK headquarters of Chem Polymer Ltd, a Teknor Apex subsidiary.

Patel brings 30 years of management, research, and technical support experience with polymer technology, practically all of it in the rubber industry. As an inventor or co-inventor, he has received 12 patents involving rubber formulation and processing.

Patel comes to Teknor Apex from Milliken Specialty Elastomers Ltd, which he joined in 1983 and served in technical management positions before becoming director of development in 2001.

▲ *Bhawan Patel*

He holds several certificates and degrees in polymer technology, including a Master of Science degree from De Montfort University in Leicester, UK.

**Teknor Apex – USA**
**Email**: tpe@teknorapex.com
**Fax**: +1 401 728 5680
**Website**: www.teknorapex.com

## New office and warehouse for Goodwin

Goodwin Machinery Ltd has moved to new office and warehouse facilities in Bolton, near Manchester, UK, where it has 100% covered storage with easy access to the UK motorway network and convenient for Manchester and Liverpool airports.

The premises offer many advantages over the previous warehouse, including increased storage capacity and full overhead crane facilities for loads up to 10 tons.

Goodwin is the largest and most pro-active UK used cable and wire machinery stockist, offering everything from complete factory evaluations and purchases including dismantling, removal and re-installation.

The company can also offer machinery to suit customer need ie 'as seen', cleaned and painted or completely refurbished.

**Goodwin Machinery Ltd – UK**
**Email**: goodwin-ltd@btconnect.com
**Fax**: +44 1204 534415
**Website**: www.goodwinmachinery.co.uk

## Adding strength in Asia Pacific

Prysmian Cables and Systems has bought New Zealand cable manufacturer, International Wire & Cable Company Limited (IWC).

The acquisition further strengthens Prysmian's presence in the Asia Pacific region.

In Australia, Prysmian already has a well established presence with two manufacturing plants supplying a wide range of power and telecommunications cables as well as accessories for joining and terminating power cables.

IWC has been producing power cables, with expertise in the aluminium/neutral screened cables, in New Zealand for more than 60 years and employs 65 people with approximate revenues of €20m in 2006.

The Prysmian investment will build on IWC's existing infrastructure in the North and South islands of New Zealand and will add to its supply capabilities through the expanded product range and research and development facilities of the Prysmian Group.

The acquisition of IWC's Auckland operations will allow Prysmian to extend its market in New Zealand, particularly in power distribution.

**Prysmian Telecom Cables & Systems – Italy**
**Fax**: +39 02 6442 2640
**Email**: info@prysmian.com
**Website**: www.prysmian.com

# 300. CV-Linie für Maillefer

Eine wichtige Unterzeichnung, welche die Bestellung der 300.CV-Linie bedeutete, fand zwischen Maillefer SA und Energya Industries während der Ausstellung Interbuild in Kairo, Ägypten, im Juni statt.

Hesham H El Sewedy, CEO von Energya Industries, und Pentti Hätälä, CEO von Maillefer SA, nahmen für dieses Ereignis den Kugelschreiber in die Hand und besiegelten anschließend das Geschäft mit einem Händedruck.

Der Auftrag stellt die 300. verkaufte komplette CV-Linie in der Geschichte von Maillefer dar. Derzeit wird die Ausstattung gefertigt, deren Lieferung im Verlauf des letzten Teils des Jahres vom finnischen Werk des Unternehmens geplant ist. Energya Industries hat die neue kontinuierliche Vulkanisierungslinie (CV - Continuous Vulcanization) für seine Anlage Jeddah Cable in Jeddah, Saudi Arabien, bestimmt.

Die Vorbereitungen des Gebäudes sowie der Turmkonstruktion um die zirka 115m hohe Linie aufzunehmen, werden gerade durchgeführt.

Die bestellte CV-Linie ist ein vertikales Turmmodel, das zur Herstellung von isolierten Starkstrom- und Sonderstarkstromleitungen bis zu 500 kV und mit einem Querschnitt von 3.000mm² bestimmt ist. Diese CV-Linie enthält eine einzigartige Technologie für eine hochwertige Produktion, die durch eine Kabelrundheit und -Homogenität durch alle Isolierungs- und Halbleiterschichten hindurch gekennzeichnet ist. Maillefers CV-Linien sind als "best in class" für die Herstellung von Energiekabeln entworfen worden, was eine langfristige Zuverlässigkeit im Betrieb bietet. Eine Option wurde unterzeichnet, um den Betrieben von Energya Cables in Ägypten eine identische Linie zu liefern, wo derzeit durch große Expansionen die Leistungsfähigkeit erhöht und die Produktauswahl von Energya Cables erweitert wird.


▲ *Pentti Hätälä von Maillefer, links, und Hesham H El Sewedy, von Energya, rechts, unterzeichnen das Abkommen für die CV-Linie*

Maillefer ist seit über 20 Jahren ein bevorzugter Partner von Energya Industries und insbesondere von Jeddah Cable Company. JCC ist ein führender Hersteller einer kompletten Auswahl an Kabelprodukten im Mittleren Osten und Afrika mit den neuesten und modernsten Herstellungsverfahren in der Region.

Die meisten installierten Kabelherstellungsanlagen wurden von Maillefer erzeugt. Die 300. CV-Linie bestätigt noch einmal den hohen Stand an Vertrauen, den beide Partner zueinander haben.

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

## Tenova kauft Takraf

Die Techint Group hat den Erwerb von Takraf GmbH, Leipzig, Deutschland, bekanntgegeben, die Bergbau- und Massengutumschlagsanlagen herstellt.

Der Erwerb wird durch Tenova geleitet, eine 100%ige Organisation von Techint, die in Technologien und Anlagen für die metallurgische Industrie sowie für die Umschlagsanlagenindustrie spezialisiert ist. Die Transaktion steht unter dem Vorbehalt der Zustimmung der Kartellbehörden.

Takraf, mit etwa 550 Mitarbeiter und einem für 2007 geschätzten Umsatz von über 200 Mio.

Euro, ist ein Unternehmen, das für eine starke internationale Präsenz und dem großen Fachwissen im Bereich Engineering und Lieferung von Tagebau- und Massengutumschlagsanlagen bekannt ist.

Takraf verfügt über Tochterunternehmen in Indien, Brasilien, Chile, Australien, Südafrika, Bulgarien, den Vereinigten Staaten und Kanada, und ist weltweit für Bergbauunternehmen tätig, insbesondere bedient Takraf Eisenerz-, Kupfererz- und Kohleextraktionsunternehmen, Hafenterminals und Endanwender von Massengütern.

**Tenova – Italien**
**Fax**: +39 02469 3026
**Email**: tenova@tenovagroup.com
**Website**: www.tenovagroup.com

## 3 weitere Jahre für Präsident von WCISA

Thomas Copp, Präsident von Reelex Packaging Solutions, und derzeit Präsident von WCISA, wurde vor kurzem zu einer zweiten Amtszeit von drei Jahren als Organisationsleiter gewählt.

▲ *Präsident Tom Copp*

Folgende bekannte WCISA-Vorstandsmitglieder wurden zu einer neuen Amtszeit von drei Jahren gewählt: William E Crowle, Präsident, QED Wire Lines Inc; David Kiddoo, Global Business Manager, AlphaGary Corp; Mike Patel, Industrieleiter, Wire & Cable Compounds, Teknor Apex Co; Rahul Sachdev, Vize-Präsident für Verkauf und Vertrieb, Wire & Plastic Machinery Corp; Joseph Snee, Verkaufsleiter, Huestis Industrial, und John Zachow, Business Area Manager, Davis-Standard Corp.

Die langjährigen Vorstandsmitglieder, Bob Fulop, Präsident, Wire Lab Company, und Jeff Swinchatt, Präsident, Sikora International Corporation, entschieden sich nicht mehr zur Wahl anzutreten.

Als neue Vorstandsmitglieder von WCISA mit einer Amtszeit von drei Jahren wurden gewählt: Neville Crabbe, Präsident, Leoni Wire Inc; John Falls, Vertriebsvertreter, Fiber-Line Inc; Rob Fulop, Vize-Präsident und Generaldirektor, Wire Lab Company; Rene Mayer, technischer Vertrieb, Mossberg Reel LLC; und Terri Terry, Senior Marketing-Spezialist, CommScope BiMetals Product Group.

**WCISA – USA**
**Email**: info@wcisa.org
**Fax**: +1 330 864 5298
**Website**: www.wcisa.org

## Condat erwirbt Drahtziehfirma

Condat und Henkel haben den Endtermin des Abkommens erreicht, durch das Condat in Besitz des Drahtziehschmierstoffsunternehmens von Henkel kommen wird.

Dank der Technologie von Henkel sowie deren weltweiter Präsenz und Produktauswahl, samt der Erfahrung seines Personals, wurde dieser Erwerb als eine perfekte Möglichkeit für Condat betrachtet, um sein Kerngeschäft zu erweitern, und den Umsatz in Höhe von 10 Mio. Euro zu steigern.

Die Transaktion umfaßt die Produktionsausrüstungen, einschließlich der "Pellets"-Technologie, mit der Seifen hergestellt werden können, die keinen Staub erzeugen.

Darüber hinaus wird Condat auch seine renommierte Vicafil-Auswahl mit bekannten Markennamen, wie z. B. Steelskin, Galvasmooth, Stearlube und Steagel hinzufügen.

**Condat – Frankreich**
**Email**: info@condat.fr
**Fax**: +33 47807 3539
**Website**: www.condat.fr

## Mädchen nach vorn!

Über 70 Schülerinnen zwischen 12 und 14 Jahren aus sechs Mittelschulen aus South Yorkshire, UK, haben an einer Entwurfs- und Technologieherausforderung teilgenommen, durch welche sie einen Einblick in die enormen Berufsmöglichkeiten des Ingenieurwesens werfen konnten.

Es wurden die Schülerinnen ausgewählt die ein besonderes Interesse an wissenschaftlichen und technischen Fächern gezeigt hatten Der MasMicro "Engineering for Girls"-Tag wurde von der Sheffield Hallam University in Zusammenarbeit mit NAMTEC (National Metals Technology Centre) organisiert und fand im Swinden House in Rotherham statt. Die wurden eigens unten denen. Die Herausforderung lag darin einen Seifenblasenring zu entwerfen und herzustellen, den die Schülerinnen im Laufe des Tages aus Perspex herstellten. Dabei wurden praktische Engineeringtechniken einbezogen, wie das Löten, Formen und Modellieren des Produkts sowie Prüfung des IT-, Entwurfs- und Marketingfachwissens.

▲ *Schülerinnen am "Engineering for Girls"-Tag*

**NAMTEC – UK**
**Fax**: +44 1709 724 999
**Email**: info@namtec.co.uk
**Website**: www.namtec.co.uk

## Altana gibt großen Zuwachs in den ersten sechs Monaten 2007 bekannt

Das Spezialchemieunternehmen Altana AG hat im Vergleich zum letzten Jahr, in den ersten sechs Monaten von 2007 seine Verkaufszahlen und Einkommen wesentlich erhöht.

Die Verkaufzahlen erhöhten sich um 7%, mit einer Steigerung von 659 Mil. Euro auf 705,7 Mil. Euro. Unter Berücksichtigung negativer Währungseffekte von 3%, sowie minimaler positiver Akquisitionseffekte, lag das operative Wachstum bei 9%. Das Umsatzwachstum war besonders in Europa (+10%) und Asien (+8%) stark.

Das Ergebnis vor Zinsen, Steuern und Abschreibungen (EBITDA) stieg um 22% von 103,1 Mio. Euro auf 125,2 Mio. Euro, basierend auf zweistelligen Ergebniszuwächsen in allen Geschäftsbereichen.

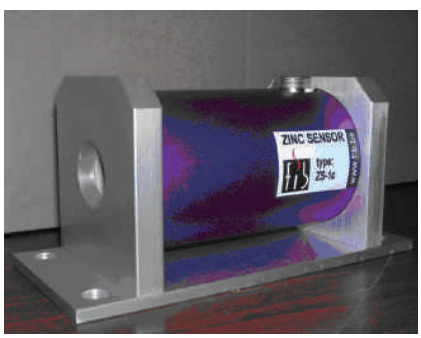
"Im ersten Halbjahr unserer neuen Gruppenstruktur als reines Spezialchemieunternehmen haben wir eine sehr zufriedenstellende Entwicklung bewiesen und konnten Umsatz und Ergebnis wesentlich erhöhen," sagte Dr Matthias Wolfgruber, CEO von Altana AG.

"Wir sind dem Vertrauen erfolgreich gerecht geworden, das die Kapitalmärkte und die Öffentlichkeit in uns gesetzt haben nach dem neuen Start von Altana und sind gut positioniert, um unseren profitablen Wachstumsweg zukünftig fortzusetzen."

**Altana AG - Deutschland** **Fax**: +49 281 670 1114
**Email**: info@altana.com **Website**: www.altana.com

## Aufträge boomen bei FIB

Le Four Industriel Belge (FIB), Belgien, hat einen dritten Auftrag von UZPS in Yekaterinburg, Rußland, für zwei Glüh- und Verzinkungsanlagen erhalten. Beide sind mit dem spezifischen Bade- und Abwischsystem für Galfan® ausgestattet.




▲ *Ein Zinksensor von FIB*

Diese beiden Anlagen werden den anderen beiden im Jahre 2003 und 2005 gelieferten Anlagen hinzugefügt.

Das in Brüssel ansässige Unternehmen FIB hat in den letzten 12 Monaten auch fünf Aufträge für spezifische Anlagen für zink-/aluminiumbeschichtung erhalten – drei davon aus Westeuropa und zwei aus Asien.

Einen Auftrag erhielten sie auch von HAS CELIK, Türkei, für eine Patentier- und Verzinkungsanlage.

**Le Four Industriel Belge SA - Belgien** **Fax**: +32 2 376 3711
**Email**: info@fib.be **Website**: www.fib.be

## Bereit für Cables 2008?

Cables 2008 findet nächstes Jahr zwischen dem 3. und 5. März in Köln, Deutschland, statt. Die achte Ausstellung Cables wird die Tradition mit einem einzigartigen Geschäftsforum weiterführen, das einen detaillierten Blick auf die Polymerentwicklungen in der Kabelindustrie wirft sowie zukünftige Geschäftstendenzen identifiziert.

**AMI Plastics – UK** **Fax**: +44 117 989 2128
**Email**: info@amiplastics.com **Website**: www.amiplastics.com

# Трехсотая линия непрерывной вулканизации от компании «Майефер»

Церемония подписания контракта между компаниями «Майефер СА» (Maillefer SA) и «Энергия индастриз» (Energya Industries), знаменующая поставку трехсотой линии непрерывной вулканизации (НВ) компании «Майефер СА», состоялась во время выставки Interbuild в г. Каире (Египет) в июне месяце. Глава компании «Энергия индастриз» Хешам Х. Эль Севеди (Hesham H El Sewedy) и глава компании «Майефер СА» Пентти Хятяля, (Pentti Hätälä) поставили свои подписи под контрактом и скрепили сделку рукопожатием.


▲ *Пентти Хятяля из компании «Майефер» (слева) и Хешам Х. Эль Севеди из компании «Энергия» (справа) подписали контракт на поставку линии НВ*

Это – трехсотый заказ на поставку комплектной линии НВ в истории «Майефер». Компания уже приступила к изготовлению оборудования, поставка которого с завода в Финляндии намечена на конец текущего года. «Энергия индастриз» предполагает установить новую линию НВ на своем предприятии по производству кабеля в г. Джидде (Саудовская Аравия). В настоящее время идет подготовка помещения и строительство башни для размещения линии, высота которой составляет около 115 м.

Заказанная линия НВ в вертикальном исполнении предназначена для производства изолированного кабеля высокого и сверхвысокого напряжения до 500 кВ и сечением 3000 мм$^2$. В ней применяется уникальная технология, гарантирующая высокое качество продукции, отличающейся равномерно круглым сечением кабеля и однородностью всех изоляционных и полупроводящих слоев.

Линии НВ производства компании «Майефер» имеют непревзойденные характеристики в сегменте оборудования для производства силовых кабелей, отличающихся надежностью при длительной эксплуатации. Был подписан дополнительный контракт на поставку такой же линии для завода компании «Энергия индастриз» в Египте, на котором идут работы по масштабному увеличению производства и расширению ассортимента выпускаемых силовых кабелей.

«Майефер» является одним из основных поставщиков компании «Энергия индастриз» и, в частности, компании «Джидда кейбл компани» (Jeddah Cable Company) в течение более 20 лет. «Джидда кейбл компани» – ведущий производитель полного ассортимента кабельной продукции в странах Ближнего Востока и Африки, который использует новейшие и самые передовые производственные технологии в регионе. Большая часть установленного оборудования для производства кабеля поставлена компанией «Майефер». Трехсотая линия НВ еще раз подтверждает высокую степень взаимного доверия партнеров.

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

## А вы готовы к выставке Cables 2008?

Выставка Cables 2008 состоится с 3 по 5 марта будущего года в г. Кёльне (Германия).

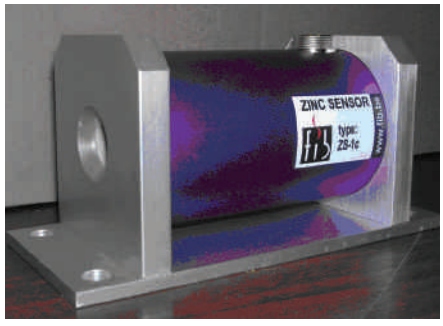
Восьмая по счету выставка, как и все предыдущие, станет уникальным деловым форумом, который даст возможность детально познакомиться с последними достижениями в области разработки полимеров для кабельной промышленности и определить дальнейшие перспективы развития конъюнктуры рынка. Предлагаются также возможности для реализации выставочных и спонсорских программ.

**«Эй-эм-ай плэстикс» (Великобритания)**
**Факс**: +44 117 989 2128
**Адрес электронной почты**: info@amiplastics.com
**Web-страница**: www.amiplastics.com

## Растущий портфель заказов «ФИБ»

Бельгийская компания «Ле фур индустриэль Белж» (Le Four Industriel Belge) («ФИБ») получила третий заказ от ЗАО «Уральский завод прецизионных сплавов» (г. Екатеринбург, Россия) на поставку двух линий отжига и оцинковки. Для обработки продукции с гальфановым (Galfan®) покрытием обе линии снабжены специальными ваннами и системами обтира. Эти две линии дополнят две существующие, которые были поставлены в 2003 и 2005 гг.

Находящаяся в Брюсселе компания «ФИБ» в течение последних 12 месяцев также получила пять заказов на специальные линии для нанесения цинкалюминиевого покрытия – три из Западной Европы и два из Азии. Она также получила заказ от турецкой компании «ХАШ ЧЕЛИК» (HAS CELIK) на поставку линии патентирования и цинкования.




▲ *Измеритель толщины цинкового покрытия производство компании «ФИБ»*

**«Ле фур индустриэль Белж СА» (Бельгия)**
**Адрес электронной почты**: info@fib.be
**Факс**: +32 2 376 37 11
**Web-страница**: www.fib.be

## «Алтана» демонстрирует уверенный рост в первом полугодии 2007 года

По сравнению с прошлым годом объемы продаж и прибыль компании «Алтана АГ» (Altana AG), специализирующейся на производстве специальных химических продуктов, в первом полугодии 2007 года значительно увеличились.

Продажи выросли на 7 % – с 659 млн. до 705,7 млн. евро. После внесения коррективов на негативное влияние обменного курса в размере 3 %, а также на слабо позитивное влияние произведенных приобретений, рост операционных продаж составил 9 %. Рост объема продаж был особенно заметен в Европе (+10 %) и Азии (+8 %).

Доход до учета процентов, налогов, износа и амортизации (EBITDA) вырос на 22 % – с 103,1 млн. до 125,2 млн. евро, при этом рост по всем подразделениям выражался в двузначных числах.

«В первом полугодии нашего существования в новом составе группы как предприятия, ориентированного на производство специальных химических продуктов, мы показали весьма удовлетворительный рост и смогли значительно увеличить объем продаж и доходов», – сказал д-р Матиас Вольфгрубер (Matthias Wolfgruber), главный исполнительный директор компании «Алтана АГ».

«Мы успешно оправдали доверие, оказанное нам рынками капитала и обществом в целом после нового старта компании «Алтана», и мы готовы продолжить идти по пути рентабельного развития в будущее».

**«Алтана АГ» (Германия)**
**Факс**: +49 281 670 1114
**Адрес электронной почты**: info@altana.com
**Web-страница**: www.altana.com

## «Тенова» покупает «Такраф»

«Текинт груп» (Techint Group) объявила о поглощении компании «Такраф ГмбХ» (Takraf GmbH) из г. Лейпцига (Германия), производящей горное и грузоперевалочное оборудование. Поглощение состоялось через компанию «Тенова» (Tenova), которая полностью принадлежит компании «Текинт» и специализируется на технологиях и оборудовании для сталелитейной промышленности и бестарной транспортировки сыпучих грузов.

Сделка ещё должна быть одобрена антимонопольными органами. Компания «Такраф», в штате которой насчитывается около 550 работников, и оборот которой в 2007 году предположительно превысит 200 млн. евро, может похвастаться заметным присутствием на международном рынке и серьезными наработками в области производства и поставки оборудования для горных разработок открытым способом и оборудования для перевалки сыпучих грузов.

«Такраф» имеет дочерние компании в Индии, Бразилии, Чили, Австралии, Южной Африке, Болгарии, США и Канаде и работает по всему миру, обслуживая горнодобывающие компании, преимущественно занятые добычей железной руды, медной руды и угля, а также портовые терминалы и конечных потребителей. «Эта сделка позволит «Тенове», благодаря широкой гамме выпускаемых изделий, конкурировать с основными игроками этого быстроразвивающегося сектора», – объявил Джанлуиджи Нова (Gianluigi Nova), главный исполнительный директор компании «Тенова».

**«Тенова» (Италия)**
**Факс**: +39 02469 3026
**Адрес электронной почты**: tenova@tenovagroup.com
**Web-страница**: www.tenovagroup.com

# 300ème ligne CV pour Maillefer

Une signature importante de commémoration de la 300ème ligne CV commandée a eu lieu entre Maillefer SA et Energya Industries durant l'exposition Interbuild au Caire, Égypte en juin dernier.

Hesham H El Sewedy, PDG de Energya Industries, et Pentti Hätälä, PDG de Maillefer SA, ont apposé leur signature pour l'événement et une poignée de main a scellé la transaction.

La commande représente la 300ème ligne CV complète vendue dans l'histoire de Maillefer. L'équipement est en cours de fabrication et devrait être livré par l'établissement finnois de la société vers la fin de l'année.

Energya Industries a assigné la nouvelle ligne de Vulcanisation Continue (CV) à son établissement Jeddah Cable situé à Jeddah, Arabie Saoudite. Les préparations des bâtiments et la construction du pylône sont en cours pour installer la ligne d'une hauteur de 115 m environ.

La ligne CV commandée est un modèle de pylône vertical destiné à la production de câbles isolés haute tension et extra-haute tension jusqu'à 500kV et une section transversale de 3 000mm$^2$.

La ligne englobe une technologie unique en son genre en termes de qualité de la production, caractérisée par la rondeur et l'homogénéité des câbles à travers les couches de l'isolement et des demi-conducteurs.

Les lignes CV de Maillefer sont conçues comme les meilleures de leur catégorie en ce qui concerne la production de câbles d'énergie offrant une fiabilité à long terme dans le secteur.


▲ *Pentti Hätälä, de Maillefer, à gauche, et Hesham H El Sewedy, de Energya, à droite, ont signé l'accord pour la ligne CV*

Une option a été également signée pour la livraison d'une ligne identique aux établissements de Energya Cables opérations en Égypte où des expansions remarquables sont en cours pour augmenter la capacité et élargir la gamme de produits de Energya Cables.

Maillefer a été un partenaire privilégié de Energya Industries et, en particulier, de la société Jeddah Cable pendant plus de 20 ans.

JCC est un producteur leader d'une gamme complète de produits de câbles au Moyen Orient et en Afrique grâce aux processus de production les plus récents et les plus modernes de la région.

Une grande majorité d'équipements pour la production de câbles installés provient de Maillefer. La 300ème ligne CV confirme encore une fois le haut niveau de confiance que les deux partenaires placent l'un en l'autre.

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

## Condat rachète l'activité lubrifiants de tréfilage de Henkel

Les sociétés Condat et Henkel sont arrivées au terme de leur négociation permettant à Condat d'acquérir l'activité lubrifiants de tréfilage de Henkel.

Grâce à la technologie de Henkel, à son internationalisation, à sa vaste gamme de produits ainsi qu'à l'expérience de son personnel, ce rachat a représenté une opportunité unique pour Condat pour étendre davantage son activité principale, et réaliser un chiffre d'affaires de 10M€.

La transaction comprend les équipements de production ainsi que la technologie "pellets" qui permet de fabriquer des savons de tréfilage non générateurs de poussière. Avec cette acquisition, Condat étend également sa gamme Vicafil renommée avec des marques très connues comme Steelskin, Galvasmooth, Stearlube et Steagel.

**Condat – France**
**Email**: info@condat.fr
**Fax**: +33 47807 3539
**Website**: www.condat.fr

## Le président de WCISA reste en place encore trois ans

Thomas Copp, président de Reelex Packaging Solutions, et président actuel de WCISA, a été récemment élu pour un deuxième mandat de trois ans en tant que dirigeant de l'organisation.

Les membres du conseil d'administration actuel suivants ont été élus pour de nouveaux mandats de trois ans: William E Crowle, président, QED Wire Lines Inc; David Kiddoo, Responsable des ventes internationales de AlphaGary Corp; Mike Patel, chef d'entreprise, Wire & Cable Compounds, Teknor Apex Co; Rahul Sachdev, vice-président des ventes et du marketing, Wire & Plastic Machinery Corp; Joseph Snee, directeur commercial, Huestis Industrial, et John Zachow, responsable commercial de zone, Davis-Standard Corp.

▲ *Le Président Tom Copp*

Les membres anciens du conseil d'administration Bob Fulop, président de Wire Lab Company, et Jeff Swinchatt, président de Sikora International Corporation, ont décidé de renoncer à la réélection.

Les personnes suivantes ont été réélues pour des mandats de trois ans comme membres du conseil d'administration de WCISA: Neville Crabbe, président, Leoni Wire Inc; John Falls, représentant des ventes, Fiber-Line Inc; Rob Fulop, vice-président et Directeur général, Wire Lab Company; Rene Mayer, directeur technico-commercial, Mossberg Reel LLC; et Terri Terry, ancien spécialiste marketing, CommScope BiMetals Product Group.

**WCISA – États-Unis** **Fax**: +1 330 864 5298
**Email**: info@wcisa.org **Website**: www.wcisa.org

## Nouveaux bureaux pour QED

La société QED Wire Lines Inc s'est transférée dans un nouveau bureau central, situé entre ses bureaux orientaux et occidentaux au Canada 5261 Route Harwood, Vaudreuil-Dorion, Québec.

La société a également annoncé la désignation de Carla Kerkhoven, dont les tâches entraîneront la gestion de la comptabilité, la direction du bureau et les contrats concernant les pièces de rechange.

Les derniers contrats signés par la société comprennent la première entreprise sur le marché chinois avec Baoan International, un four à lit fluidisé FastHeat™ pour un client en Turquie, deux nouvelles lignes de galvanisation pour l 'Asie du Sud Est, et un système de décapage HighTurbulence® vendu à Iowa Steel & Wire, États-Unis.

Le tout dernier four à lit fluidisé FastHeat™ réalisé par QED, utilise des soupapes de débit de précision et le Production Proportional Algorithm PLC mis au point par la société pour fournir un traitement thermique d'austenitisation et de recuit.

**QED Wire Lines Inc – Canada** **Fax**: +1 450 451 6465
**Email**: qed@qedwire.com **Website**: www.qedwire.com

## Les jeunes filles entrent en scène

Plus de 70 étudiantes âgées de 12 à 14 ans provenant de six lycées du secondaire situés à South Yorkshire au Royaume-Uni ont participé à un projet et à un défi technologique qui leur a offert un aperçu des énormes opportunités de carrière dans le secteur de l'ingénierie.

La journée MasMicro 'Engineering for Girls' a été organisée par Sheffield Hallam University en association avec NAMTEC (National Metals Technology Centre) et s'est tenue à Swinden House à Rotherham.

Les étudiantes sélectionnées ont été celles qui avaient démontré un intérêt spécifique envers les sujets scientifiques et techniques.

Le défi que les étudiantes ont dû relever consistait en la conception et en la production d'une boucle de plastique pour faire les bulles que les écoliers ont réalisées pendant la journée en utilisant du Perspex. La réalisation a requis des techniques telles que le soudage, le façonnage et le moulage du produit, en mettant ainsi à l'épreuve leurs compétences IT, de conception et de marketing.

▲ *Écoliers participant à la journée dédiée à l'événement 'Engineering for girls'*

**NAMTEC – Royaume-Uni**
**Fax**: +44 1709 724 999
**Email**: info@namtec.co.uk
**Website**: www.namtec.co.uk

## Altana annonce une croissance solide pour le premier semestre 2007

La société Altana AG spécialisée en produits chimiques a radicalement augmenté ses ventes et ses profits durant le premier semestre 2007 par rapport à l'année précédente.

Les ventes ont augmenté de 7% en passant de 659m€ à 705,7m€. En tenant compte d'un ajustement pour les effets du taux de change négatif de 3% ainsi que des effets d'acquisition légèrement positifs, la croissance des ventes s'est attestée à 9%. La croissance des ventes a été particulièrement forte en Europe (+10%) et en Asie (+8%).

Les résultats avant intérêts, impôts et amortissements (EBITDA) ont augmenté de 22% de 103,1m€ à 125,2m€, sur la base d'augmentations à deux chiffres dans toutes les divisions.

"Durant le premier semestre de notre nouvelle structure du groupe en tant que société exclusivement spécialisée en produits chimiques spécifiques, nous avons démontré un développement très satisfaisant et nous avons été en mesure d'augmenter substantiellement nos ventes et nos revenus," a déclaré Dr Matthias Wolfgruber, PDG de Altana AG.

"Nous nous sommes montrés à la hauteur de la confiance placée en nous par les marchés des capitaux et du public général après le nouveau démarrage de Altana et nous sommes bien positionnés pour poursuivre notre parcours de croissance profitable dans le futur."

**Altana AG – Allemagne** **Fax**: +49 281 670 1114
**Email**: info@altana.com **Website**: www.altana.com

## Commandes en croissance chez FIB

La société Four Industriel Belge (FIB), Belgique, a signé une troisième commande avec UZPS située en Yekaterinburg (Russie), pour deux lignes de revenu et galvanisation. Les deux lignes sont équipées d'un bain spécifique et d'un système de nettoyage pour Galfan®.

Ces deux lignes s'ajoutent à deux autres lignes commandées en 2003 et en 2005.

Basée à Bruxelles, FIB a également reçu cinq commandes pour des lignes spécifiques de revêtement de zinc/aluminium au cours des 12 derniers mois – trois en Europe occidentale et deux en Asie.

La société a également remporté une commande de HAS CELIK, Turquie, pour une ligne de patentage et de galvanisation.

**Le Four Industriel Belge SA – Belgique**
**Fax**: +32 2 376 37 11
**Email**: info@fib.be **Website**: www.fib.be

## Êtes-vous prêts pour Câbles 2008?

Câbles 2008 aura lieu entre le 3 et le 5 mars prochain à Cologne en Allemagne. Le huitième événement Câbles continue sa tradition en offrant un forum commercial unique en son genre, en analysant en détail le développement des polymères dans l'industrie des câbles et en identifiant les tendances commerciales futures.

**AMI Plastics – Royaume-Uni** **Fax**: +44 117 989 2128
**Email**: info@amiplastics.com **Website**: www.amiplastics.com

# 300ª linea CV per Maillefer

Una firma importante è stata apposta da Maillefer SA ed Energya Industries per la commemorazione della 300a linea CV ordinata durante l'esposizione Interbuild al Cairo, (Egitto) nel giugno scorso.

Hesham H El Sewedy, CEO di Energya Industries, e Pentti Hätälä, CEO di Maillefer SA, hanno apposto la propria firma per l'evento ed una stretta di mano ha suggellato la transazione.

L'ordine rappresenta la 300a linea CV completa che è stata venduta nella storia di Maillefer. L'equipaggiamento è in corso di fabbricazione e si prevede la spedizione dallo stabilimento finlandese della società verso la fine dell'anno. Energya Industries ha assegnato la nuova linea di Vulcanizzazione Continua (CV) al proprio stabilimento Jeddah Cable situato a Jeddah, in Arabia Saudita. Sono in corso i preparativi degli stabilimenti e la costruzione della torre per l'installazione della linea ad un'altezza di 115m.

La linea CV ordinata è un modello di torre verticale destinata alla produzione di cavi isolati alta tensione e tensione extra alta fino a 500kV ed una sezione trasversale di 3.000mm$^2$. Questa linea comprende una tecnologia unica per qualità della produzione, caratterizzata dalla rotondità e dall'omogeneità dei cavi attraverso tutti gli strati d´isolamento e dei semi-conduttori.

Le linee CV di Maillefer sono progettate come le migliori della categoria per quanto riguarda la produzione di cavi di potenza e offrono un'affidabilità a lungo termine nel settore. É stata anche firmata un'opzione per la spedizione di un'identica linea agli stabilimenti di Energya Cables operations in Egitto dove sono in corso consistenti espansioni per aumentare la capacità ed ampliare la gamma dei prodotti di Energya Cables.


▲ *Pentti Hätälä, di Maillefer, a sinistra, e Hesham H El Sewedy, di Energya, a destra, hanno firmato l'accordo per la linea CV*

Maillefer è stato un partner privilegiato di Energya Industries e, in particolare, della società Jeddah Cable per oltre 20 anni. JCC è un produttore leader di una gamma completa di prodotti per cavi nel medio Oriente e in Africa grazie ai processi di produzione più recenti e più moderni della regione. Una vasta maggioranza di equipaggiamenti per la produzione di cavi installati proviene da Maillefer. La 300a linea CV conferma ancora una volta l'elevato livello di fiducia che i due partners ripongono l'uno nell'altro.

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

## Tenova acquisisce Takraf

Il Gruppo Techint ha annunciato l'acquisizione di Takraf GmbH, Leipzig (Germania), società specializzata nella produzione di attrezzature per l'estrazione mineraria e per la movimentazione di materiali sfusi.

L'acquisizione è gestita da Tenova, un'organizzazione di proprietà esclusiva di Techint, specializzata in tecnologie ed equipaggiamenti per il settore siderurgico e la movimentazione di materiali sfusi. La transazione è soggetta all'approvazione delle autorità antitrust.

Takraf, con circa 550 impiegati ed un volume d'affari stimato di oltre 200 milioni di euro nel 2007, è una società che può vantare una presenza internazionale ed elevate competenze nel settore dell'ingegneria e della fornitura di attrezzature per l'estrazione mineraria a cielo aperto e per la movimentazione di materiali sfusi.

Presente con filiali in India, Brasile, Cile, Australia, Sudafrica, Bulgaria, Stati Uniti e Canada, la società Takraf opera in tutto il mondo, al servizio delle società minerarie, in particolare specializzate nell'estrazione di minerale di ferro, minerale di rame e carbone, terminali portuali e utilizzatori finali di materiali alla rinfusa.

"L'operazione permetterà a Tenova, grazie alla sua ampia gamma di prodotti, di competere con i maggiori attori di un settore in rapida crescita", ha dichiarato Gianluigi Nova, CEO di Tenova.

**Tenova – Italia**
**Fax**: +39 02469 3026
**Email**: tenova@tenovagroup.com
**Website**: www.tenovagroup.com

## Il presidente di WCISA resta in carica altri tre anni

Thomas Copp, presidente di Reelex Packaging Solutions, e attuale presidente di WCISA, è stato recentemente eletto per un secondo mandato di tre anni in qualità di dirigente dell'organizzazione.

I seguenti membri dell'attuale consiglio di amministrazione sono stati eletti per nuovi mandati di tre anni: William E Crowle, presidente, QED Wire Lines Inc; David Kiddoo, Responsabile delle vendite internazionali di AlphaGary Corp; Mike Patel, direttore d'azienda, Wire & Cable Compounds, Teknor Apex Co; Rahul Sachdev, vice-presidente delle vendite e del marketing, Wire & Plastic Machinery Corp; Joseph Snee, direttore commerciale, Huestis Industrial, e John Zachow, responsabile commerciale di zona, Davis-Standard Corp.

▲ *Il Presidente Tom Copp*

Gli ex membri del consiglio di amministrazione Bob Fulop, presidente di Wire Lab Company, e Jeff Swinchatt, presidente di Sikora International Corporation, hanno deciso di rinunciare alla rielezione.

Le seguenti persone sono state rielette per mandati di tre anni in veste di membri del consiglio di amministrazione di WCISA: Neville Crabbe, presidente, Leoni Wire Inc; John Falls, rappresentante delle vendite, Fiber-Line Inc; Rob Fulop, vice-presidente e direttore generale, Wire Lab Company; Rene Mayer, direttore tecnico-commerciale, Mossberg Reel LLC; e Terri Terry, ex specialista di marketing, CommScope BiMetals Product Group.

**WCISA – Stati-Uniti**
**Email**: info@wcisa.org
**Fax**: +1 330 864 5298
**Website**: www.wcisa.org

## Condat acquisisce l'attività lubrificanti per trafilatura di Henkel

Le società Condat e Henkel sono giunte al termine della loro trattativa consentendo a Condat di acquisire l'attività dei lubrificanti per trafilatura di Henkel.

Grazie alla tecnologia di Henkel, alla sua presenza a livello internazionale, alla sua vasta gamma di prodotti e all'esperienza del proprio personale, quest'acquisizione ha rappresentato un'opportunità unica per Condat di espandere ulteriormente la propria attività centrale ed aumentare il fatturato di 10 milioni di euro.

La transazione comprende equipaggiamenti di produzione e la tecnologia dei "pellets" che consente di fabbricare saponi per trafilatura che non producono polvere. Grazie a questa acquisizione Condat amplia inoltre la rinomata gamma Vicafil con marchi molto noti come Steelskin, Galvasmooth, Stearlube e Steagel.

**Condat – Francia**
**Email**: info@condat.fr
**Fax**: +33 47807 3539
**Website**: www.condat.fr

## Ordini in rapido aumento presso FIB

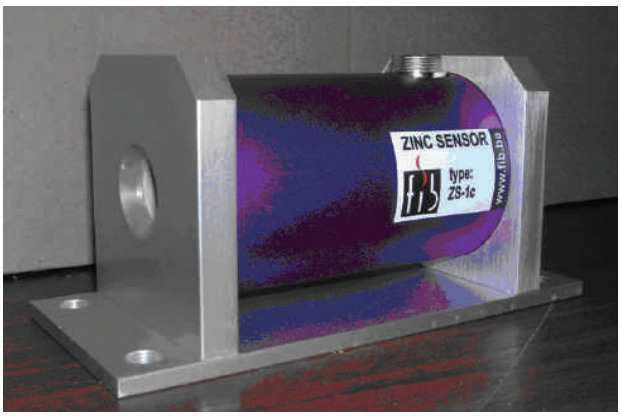
La società Four Industriel Belge (FIB), Belgio, si è aggiudicata un terzo ordine con UZPS, Yekaterinburg (Russia), per due linee di ricottura e galvanizzazione.

Le due linee sono equipaggiate con un bagno specifico e con un sistema di pulitura per Galfan®.

Queste due linee si aggiungono ad altre due linee ordinate nel 2003 e nel 2005.

La società FIB con sede a Bruxelles, si è inoltre aggiudicata cinque ordini per linee specifiche di rivestimento di zinco/alluminio durante gli ultimi 12 mesi – tre in Europa occidentale e due in Asia.

La società ha inoltre ottenuto un ordine da HAS CELIK, Turchia, per una linea di patentamento e di galvanizzazione.




▲ *Sensore allo zinco realizzato da FIB*

**Le Four Industriel Belge SA – Belgio**
**Fax**: +32 2 376 37 11 **Email**: info@fib.be **Website**: www.fib.be

## Altana annuncia una crescita solida per il primo semestre del 2007

La società Altana AG specializzata in prodotti chimici ha radicalmente aumentato le proprie vendite ed i profitti durante il primo semestre del 2007 rispetto l'anno precedente.

Le vendite sono aumentate del 7% passando da 659 milioni di euro a 705,7 milioni di euro. Considerando un aggiustamento degli effetti negativi del tasso di cambio del 3% nonché gli effetti dell'acquisizione lievemente positivi, la crescita delle vendite è stata del 9%. La crescita delle vendite è stata particolarmente forte in Europa (+10%) e in Asia (+8%).

Gli utili prima degli interessi, delle tasse dell'ammortamento (EBITDA) sono aumentati del 22% da 103,1 milioni di euro a 125,2 milioni di euro, sulla base degli aumenti a due cifre in tutte le divisioni.

"Durante il primo semestre della nostra nuova struttura del gruppo, come società esclusivamente specializzata in prodotti chimici speciali, abbiamo dimostrato uno sviluppo molto soddisfacente e siamo stati in grado di aumentare sostanzialmente le vendite e gli utili" ha dichiarato Dr Matthias Wolfgruber, CEO di Altana AG.

**Altana AG – Germania**
**Fax**: +49 281 670 1114
**Email**: info@altana.com
**Website**: www.altana.com

▲ *Studenti partecipanti alla giornata dedicata all'evento "Engineering for girls"*

## Le ragazze entrano in scena!

Più di 70 studentesse dai 12 ai 14 anni provenienti da sei scuole secondarie del South Yorkshire nel Regno Unito hanno partecipato ad un progetto e ad una sfida tecnologica che hanno dato loro un'idea delle enormi opportunità di carriera nel settore dell'ingegneria.

La giornata MasMicro 'Engineering for Girls' è stata organizzata dalla Sheffield Hallam University in collaborazione con NAMTEC (National Metals Technology Centre) e si è tenuta a Swinden House a Rotherham.

Sono state selezionate le studentesse che hanno dimostrato particolare interesse per gli argomenti scientifici e tecnici. La sfida che le studentesse hanno dovuto raccogliere è consistita nella progettazione e nella produzione di un anello per bolle di sapone che gli studenti hanno realizzato nel corso della giornata utilizzando del Perspex.

Il confezionamento ha richiesto l'utilizzo di tecniche quali la saldatura, la formatura e la molatura del prodotto, mettendo così alla prova le loro abilità di IT, progettazione e marketing.

**NAMTEC – Regno Unito**
**Email**: info@namtec.co.uk
**Fax**: +44 1709 724 999
**Website**: www.namtec.co.uk

# Maillefer vende su 300ª línea CV

Maillefer SA y Energya Industries firmaron durante la feria Interbuild celebrada en junio en El Cairo, en Egipto, un trascendental contrato que representa el 300ª pedido de la línea de vulcanización en continuo de Maillefer.

Hesham H El Sewedy, director general de Energya Industries, y Pentti Hätälä, director general de Maillefer SA, sellaron el acuerdo con una firma y un apretón de manos.

El pedido representa la 300ª línea CV completa vendida en la historia de Maillefer. El equipo se encuentra actualmente en fase de producción y su despacho desde la planta finlandesa de la empresa está fijado para finales de este año. Energya Industries ha destinado la nueva línea de vulcanización continua a su planta Jeddah Cable sita en Jeddah, en Arabia Saudita. En estos momentos se está preparando la nave y se está construyendo la torre donde se instalará la línea, que mide unos 115m de altura.

La línea CV encargada es un modelo de torre vertical destinado a la producción de cables aislados de alta y muy alta tensión de hasta 500kV y 3.000mm$^2$ de sección. Incluye tecnología única para una producción de calidad, que se caracteriza por la redondez y homogeneidad de los cables en todas las capas aislantes y semiconductoras.

Las líneas CV de Maillefer son las mejores de su categoría para fabricar cables para la distribución y transmisión de energía fiables a largo plazo. Se ha firmado una


▲ *Pentti Hätälä, de Maillefer, a la izquierda, y Hesham H El Sewedy, de Energya, a la derecha, quienes firmaron el contrato de venta de la línea CV*

opción para entregar una línea idéntica para las operaciones de Energya Cables en Egipto donde se están llevando a cabo importantes expansiones para aumentar la capacidad y ampliar la gama de productos de Energya Cables.

Maillefer ha sido un socio privilegiado para Energya Industries y, en concreto, para Jeddah Cable Company durante más de 20 años. Jeddah Cable Company es productor líder de una completa gama de productos para cables en Medio Oriente y África. Utiliza los procesos de fabricación más innovadores de la zona.

Gran parte de los equipos de fabricación de cables instalados son de Maillefer. La 300ª línea CV confirma una vez más la gran confianza depositada por cada socio en el otro.

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

## Altana registra un fuerte crecimiento en el primer semestre de 2007

El grupo químico-farmacéutico Altana AG incrementó significativamente sus ventas y beneficios en los primeros seis meses de 2007 respecto a las cifras registradas el año anterior. Las ventas subieron un 7% pasando de 659 millones a 705,7 millones de euros. Los efectos negativos del tipo de cambio en 3 puntos porcentuales y los efectos positivos de la adquisición se vieron reflejados en un crecimiento de un 9% en las ventas operativas.

El crecimiento de las ventas fue especialmente fuerte en Europa (+10%) y en Oriente (+8%). Los beneficios antes de intereses, impuestos, depreciaciones y amortizaciones (EBITDA) crecieron un 22%, pasando de 103,1 millones a 125,2 millones de euros, basándose en los aumentos de beneficios de doble dígito en todas las divisiones.

"En el primer semestre de Altana AG como grupo eminentemente químico hemos demostrado un nivel de desarrollo altamente satisfactorio y hemos podido incrementar nuestras ventas y beneficios significativamente", dijo Matthias Wolfgruber, director general de Altana AG.

"Hemos hecho honor a la confianza que han depositado en nosotros los mercados de capitales y el público en general tras el lanzamiento de la nueva Altana y tenemos una sólida posición que nos permitirá seguir con este rentable crecimiento hacia el futuro".

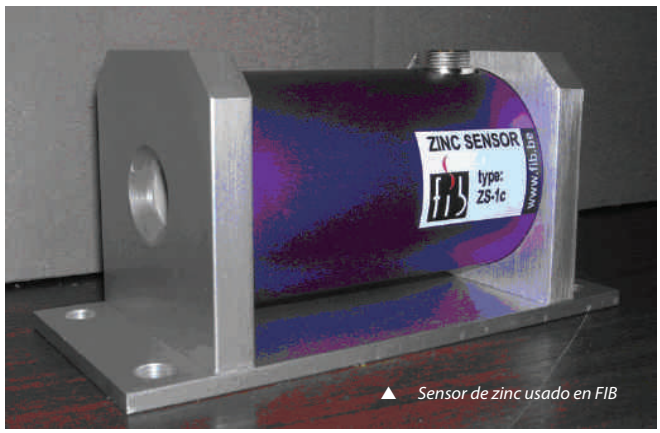
**Altana AG – Alemania**
**Fax**: +49 281 670 1114
**Email**: info@altana.com
**Website**: www.altana.com

## Los pedidos proliferan en FIB

La sociedad rusa UZPS de Yekaterinburg ha hecho un tercer pedido, constituido por dos líneas de recocido y galvanización, a la sociedad belga Le Four Industriel Belge (FIB). Las dos están equipadas con un sistema de baño y limpieza de Galfan®.

Estas dos líneas han sido encargadas después de otros dos pedidos realizados anteriormente en 2003 y 2005.

FIB, con sede en Bruselas, también ha recibido otros cinco pedidos de líneas de revestimiento de zinc-aluminio en los últimos 12 meses, tres de ellos de Europa Occidental y dos de Oriente. También ha recibido un pedido de la sociedad turca Has Celik para una línea de temple interrumpido y galvanización.



▲ *Sensor de zinc usado en FIB*

**Le Four Industriel Belge SA – Bélgica** **Fax**: +32 2 376 37 11 **Email**: info@fib.be **Website**: www.fib.be

## Tenova adquiere Takraf

El Grupo Techint ha anunciado su adquisición de la sociedad alemana Takraf GmbH de Leipzig, que produce sistemas de transporte de materiales y minerales.

La adquisición está siendo realizada a través de Tenova, sociedad enteramente de propiedad del Grupo Techint, especializado en tecnologías y equipos para los sectores del transporte de acero y materiales.

La transacción está sujeta a la aprobación de las autoridades anti-trust.

Takraf, con unos 550 empleados y un volumen de ventas estimado en más de 200 millones de euros en 2007, es una sociedad que puede reforzar una presencia internacional ya fuerte y las elevadas capacidades en el sector de la ingeniería, además de suministrar sistemas de transporte de materiales y minerales en canteras.

Takraf tiene subsidiarias en La India, Brasil, Chile, Australia, Sudáfrica, Bulgaria, Estados Unidos y Canadá y opera a nivel mundial abasteciendo a las compañías mineras, especialmente a las compañías extractoras de hierro, cobre y carbón, zonas portuarias y usuarios finales de estos materiales.

"Gracias a la vasta gama de productos, la operación permitirá a Tenova competir con los principales productores de este sector que tan rápido está creciendo", declaró Gianluigi Nova, director general de Tenova.

**Tenova – Italia**
**Fax**: +39 02469 3026
**Email**: tenova@tenovagroup.com
**Website**: www.tenovagroup.com

## Las chicas también toman parte!


▲ *Estudiantes el día de la "Ingeniería para chicas"*

Más de 70 chicas estudiantes de entre 12 y 14 años de seis centros de secundaria de South Yorkshire, en el Reino Unido, participaron en una prueba de diseño y tecnología que les ofreció la ocasión de comprender mejor las enormes oportunidades profesionales que brinda la ingeniería.

El día de la "Ingeniería para chicas" del proyecto MasMicro fue organizado por la Sheffield Hallam University en colaboración con NAMTEC (National Metal Technology Centre – Centro Nacional de Tecnología de Metales) y celebrado en Swinden House en Rotherham.

Las estudiantes fueron seleccionadas detenidamente entre las que habían mostrado interés por la ciencia y la ingeniería.

La prueba que tuvieron que afrontar consistía en diseñar y fabricar un soplador de pompas de jabón, que las alumnas fabricaron con Plexiglás en el día.

Tuvieron que usar técnicas de ingeniería prácticas como soldar, conformar y moldear el producto, además de probar sus capacidades IT, de diseño y marketing.

**NAMTEC – Reino Unido** **Fax**: +44 1709 724 999
**Email**: info@namtec.co.uk **Website**: www.namtec.co.uk

# Transatlantic Cable

## Near miss on Okinawa highlights the importance of a nut-and-bolt assembly in the wing of Boeing's most popular jetliner

On 30th August, the Transport Ministry of Japan said that it had identified the same fault in a Boeing 737-800 which not two weeks earlier had caused a fire in a plane landing at a Japanese airport. As reported by Thomson Financial (delivered by Newstex), the ministry said the second plane, which belongs to Air Nippon, was the sole 737-800 of 23 in service in Japan to have the problem. But it added that four faulty Boeing 737-800s had been found outside Japan.

On 20th August, a Boeing 737-800 operated by Taiwan's China Airlines caught fire after landing at Naha airport, on the southern Japanese island of Okinawa. All 165 people aboard evacuated safely seconds before the plane exploded. Investigators in Japan found that a bolt from a right wing slat had pierced the fuel tank of the Taiwanese jetliner. (Together with flaps that come out of the rear edge of the wings, slats slide out from the front edge of the main wings during takeoff and landing, to stabilise the aircraft.) A fuel leak through that hole likely caused the fire, according to the chief investigator of Japan's Aircraft and Railway Accidents Investigation Commission. Boeing Co, the builder of the 737-800, is based in Chicago. On 25th August, the US Federal Aviation Administration (FAA) issued an emergency airworthiness directive that clearly referenced the near-catastrophe on Okinawa, although China Airlines was not mentioned. Citing reports of parts of a main slat track downstop assembly coming off the main slat track, the directive read: "In one case, a nut fell into the slat track housing ('slat can') and, during a subsequent slat retraction, the track made contact with the nut, pushing it into the wall of the can and puncturing it."

FAA officials ordered inspections of the wing slats on all newer Boeing 737 jetliners. The directive applies to owners and operators of 783 US aircraft, but the FAA said it was likely to be imposed by other countries on the entire worldwide fleet of 2,287 newer 737s. The FAA order called for a detailed inspection within 24 days to be sure that the downstop assembly, which limits how far the slats can emerge from the wing, is installed properly and repaired if necessary. It also ordered that the nut and bolt that hold the assembly in place be tightened to specifications. And it ordered that this process be repeated at least every 3,000 take off and landing cycles.

In an ironic indication of the derisory cost of these critical safety measures, the FAA estimated the total for the entire US fleet of planes at $62,640.

## Europe and the US

## Shaken by America's mortgage-market scare, the European Union is looking into the methods of US ratings agencies

In a very prompt response to the midsummer turmoil in global markets deriving from the troubled American mortgage loan sector, the European Union announced that it would investigate whether such US ratings agencies as Moody's and Standard & Poor's were adequately alerting investors to the risks of securities backed by sub-prime mortgages. [Broadly, these are property loans extended to borrowers whose credit histories disqualify them for the best market interest rates.]

A spokeswoman for the European Commission said on 16th August that the inquiry – to be led by the EC's internal markets commissioner, Charlie McCreevy – would concentrate on 'concerns we have as to their slowness with regard to market deterioration since mid-2006.' This is a fairly pointed reference to the fact that the US ratings agencies have actively pursued downgrades of mortgage-backed securities only this year, even though problems were apparent for some time. Because the American ratings services are paid by the very issuers whose products they evaluate, conflict of interest is of concern to the European officials. Mr McCreevy could call for a new rule that those who use the agencies' research must finance the system, rather than those being rated. Change on such a scale would probably require an entirely new set of international regulations and the concurrence of Mr McCreevy's counterparts in US agencies, including the Securities and Exchange Commission.

The EC could, of course, adopt a less stringent approach, but even a call for a tightened-up code of conduct and a more stringent warning system could constrain the US ratings agencies to be more transparent in their decision-making. While this could scarcely be a welcome prospect, no immediate howls of outrage came down the transatlantic relays. Indeed, when the EC investigation was announced, those speaking for the US ratings agencies were at pains to express a constructive, cooperative, wholly collegial state of mind. This is as strong a sign as any that last summer's mortgage-market scare, with its global repercussions, was being taken very seriously by those at the epicentre.

Moody's and S&P have cut their previous forecasts and ratings on bad sub-prime loans and reassessed billions of dollars of debt. McGraw-Hill, which owns Standard & Poor's, on 31st August announced it was replacing the president of S&P, effective immediately. No explanation was given.

## Telecommunications

## An open secret is confirmed: US telecoms cooperated in government wiretapping

After more than a year of trying to protect a 'state secret,' National Intelligence Director Mike McConnell confirmed that American telecommunications companies played a crucial role in the National Security Agency's domestic eavesdropping programme. The disclosure was made in the course of a remarkably wide-ranging interview with the *El Paso Times,* a transcript of which was posted 22nd August on the Texas newspaper's website.

Mr McConnell clearly wished to justify the broadened federal wire-tapping authority that had just been approved by Congress, despite prior misgivings and subsequent 'buyer's remorse' felt by many of the lawmakers who voted for it.

But he had another purpose, going forward: telling Congress it must confer retroactive legal immunity on the telecoms that assisted in the programme. Without it, he said, lawsuits over their participation could bankrupt these companies. "Under the president's programme, the terrorist surveillance programme, the private sector had assisted us," Mr McConnell said. "Because if you're going to get access, you've got to have a partner."

The apparently casual reference to the threat that frightens voters and cows lawmakers is standard practice for a Bush Administration spokesman. What was new from Mr McConnell was his acknowledgment of another threat, this time to the nation's largest telecoms. Several major carriers are being sued over their heretofore unconfirmed role in the surveillance programme, which permitted eavesdropping without warrants on the international communications of Americans who had come under suspicion. Like some congressional legislators, these telecoms may be about to repent at leisure their haste to give the executive branch of government whatever it demanded in the wake of 9/11. Meantime, Mr McConnell's pre-emptive strike in their behalf has produced some unintended consequences. The Electronic Frontier Foundation, the leader in a lawsuit against AT&T, said it might ask the court to consider Mr McConnell's comments in deciding whether to throw out the government's state-secrets argument.

Cindy Cohn, the group's legal director, said: "They've really undermined their own case."

***Elsewhere in telecom . . .***

- Finland's Nokia, the world's biggest mobile-phone maker, on 17th August filed a complaint with the US International Trade Commission against Qualcomm Inc (San Diego, California), the latest in a running battle between the two companies over royalties for chips that run cellphones. According to the commission's website, the complaint relates to patents for 'wireless communication chips and chip sets.' Nokia and Qualcomm, – the world's second-biggest maker of the chips for mobile phones – have been haggling over a new agreement since the old licence expired on 9th April. Nokia claims Qualcomm is demanding too much in royalties for third-generation phones, which provide faster Internet access. A Qualcomm complaint against Nokia already before the trade agency was scheduled for trial in September.

***In brief . . .***

- The planned $2.7 billion acquisition of Tele Atlas (Lebanon, New Hampshire) by Tom Tom, based in the Netherlands, would position the Dutch company to gain market share in the small but growing American market for car navigation devices. Tom Tom hopes to build its US presence on the strength of a constantly updating digital map, a motorist's aid dependent in part on information supplied by users.

  The acquisition of Tele Atlas, which uses more than 50,000 sources including satellite and local photographs, will enhance Tom Tom's digital map database. Until recently, Global Positioning System (GPS) equipage was confined almost exclusively to high-end cars, but prices are dropping quickly. According to Tele Atlas, 15% of cars in Europe and about 8% in North America have GPS devices.

- Canadian auto parts giant Magna International Inc, on 30th August, won approval from the European Union for its plan to sell a large stake in the company to Russian national Oleg Deripaska for $1.54 billion. Under the deal, Mr Deripaska, who is said to be close to Russian President Vladimir Putin, will take an estimated 18% stake in the company, giving him the power to nominate six members of its 14-member board of directors. Like Magna, the firm headed by Mr Deripaska – Russian Machines – sells interior mirrors for light commercial vehicles in Europe, and the European Commission regulators concluded that the combination would not significantly reduce competition. Magna (Aurora, Ontario) was expected to seek immediate final court approval for the agreement, which it said it hoped would close by the end of September.

## Economics

### Expectations for growth in the US economy are scaled back

Most US economists still look for growth overall, into 2008. But the summer's financial crisis, deriving from a cascade of sub-prime mortgage defaults, has taken its toll of optimism.

# Transatlantic Cable

Heading into fall, many analysts were tamping down their expectations and trimming their economic forecasts. On 22nd August, Citigroup issued a new forecast indicating that growth would fall short of its earlier estimates. On the following day Goldman Sachs, which had already reduced its forecast to 1.9%, warned that the housing market was probably overpriced by more than 15%. Other forecasters also now believe that the housing slump, which has had only a modest effect on consumer spending and economic growth, will lead to a slowdown over the next year or two.

Global Insight (Waltham, Massachusetts) on 23rd August predicted markedly slower growth for the third quarter, and reduced its forecast for all of 2007 to 1.9% from 2.1%. The research firm also sees dimmer prospects for growth in 2008.

Negative factors – along with high oil prices and slower growth in productivity – are the stasis in housing and a credit squeeze in the wake of the countrywide lending spree. As always, the view from Washington tends to be sunnier than from other places.

Also on 23rd August, the Congressional Budget Office (CBO) predicted that the summer's turmoil in markets would not retard economic growth, even as the agency warned of uncertainties and pared its earlier forecast for growth this year to 2.1%, from 2.3%.



The CBO brought the same double perspective to the federal budget. Noting that the budget deficit would decline this year to $158 billion, the lowest level since 2002, it also reiterated warnings that the trend is 'unsustainable' in the long term. The budget office estimated that – if tax cuts introduced by President George W Bush are extended indefinitely beyond their expiration date in 2010, and Congress continues to protect most taxpayers against increases in the alternative minimum tax – over the next 10 years government revenue would fall $3.4 trillion short of the baseline forecast. Deficits would return to high levels of more than $200 billion a year.

Celebrating the decline in the budget deficit, Mr Bush said: "It shows that our government is on a path to meeting the goal I set forth of putting the budget into surplus by 2012." Of course, if the goal is not met it will be the problem of Mr Bush's successor – who will have his or her hands full on many other counts, as well.

## And now for something new: the average American grows poorer

Data published in late August by the Internal Revenue Service show that in 2005, for the fifth consecutive year, Americans earned a smaller average income than in the peak year of 2000. Except for a single year since the end of World War II in 1945, this experience of income contraction is unique. Nearly half of Americans reported incomes of less than $30,000 in 2005; two-thirds made less than $50,000.

The new tax statistics show that, while the combined income of all Americans in 2005 was slightly larger than it was in 2000, population growth over the period makes for a smaller average income. The growth in total income (as distinguished from average income) was concentrated among those making more than $1 million. Over the five years to 2005, the number of these taxpayers grew by more than 26%, to 303,817, from 239,685 in 2000.

A sore point with Citizens for Tax Justice, a private advocacy group for low and middle-income Americans, is that the millionaires, who constitute less than a quarter of 1% of all taxpayers, accounted for almost 47% of the total income gains in 2005 as compared with 2000. According to a separate analysis by the group, whose headquarters is in Washington, DC, people with million-plus incomes also received 62% of the savings from the reduced tax rates on long-term capital gains and dividends that President George W Bush signed into law in 2003. The nearly 90% of Americans who make less than $100,000 a year collected 5.3% of the total savings from reduced tax rates on investment income. They saved an average $318 on their investments.

A White House spokesman, Tony Fratto, said the fact that those in the upper-income brackets accounted for nearly all of the income growth and that the majority of investment tax breaks went to those making more than $1 million was 'not a very interesting story.' Mr Fratto attributed the drop in average income to 'the significant wrenching hits that [the US] economy took in 2001 and 2002, so no one should be surprised that what a bubble economy created in the late 1990s and 2000, where economic data were skewed, would take some time to recover."

## Against the trend, Hispanic immigrants to the US boost their earnings

If the income of the average American is shrinking, one group is conspicuously bucking the trend. According to another study centred on the year 2005 and released 21st August by the Pew Hispanic Center, over the past decade Latino immigrants in the US have steadily moved out of jobs paying the lowest wages and into middle-income employment. (The Pew Hispanic Center is a non-partisan research organisation founded in 2001 to improve understanding of the US Hispanic population and to chronicle the growing impact of Latinos on the nation.) According to a Pew analysis of US Census data, foreign-born Latino workers made up 36% of labourers earning low wages (less than $8.50 per hour) in 2005, compared with 42% in 1995. The advance of Latino immigrant wage-earners to the middle-income level – outpacing that of native-born workers – is largely attributable to the boom in the nation's construction industry, which hires millions of foreign-born workers but which has slowed down of late.

The Pew profile of foreign-born Latinos – who make up 5.8% of the population of the US but account for 7.2% of its workers – suggests a motivated population with a strong work ethic. Pew notes that Latino immigrants who arrived in the past few years are older, better educated, and less likely to be employed in low-paying jobs than earlier arrivals. Some immigrants boosted their incomes by opening businesses, enabling them to move quickly from the low-paying service sector into wealthy entrepreneurship.

## US emigration to Canada reaches a 30-year high

Over the past five years there has been a significant increase in the number of US citizens moving north to Canada, and last year it hit 10,942, compared with 9,262 in 2005 and 5,828 in 2000. According to the Association for Canadian Studies, this represents a 20% increase over 2005 and is almost double the total for 2000. "The number hasn't exceeded 10,000 since 1977," said Jack Jedwab, the association's executive director. Earlier in that decade, Canada admitted between 22,000 and 26,000 Americans a year, most of them evading military draft during the Vietnam War. Now, the American armed services are all-volunteer.

But from the anecdotal evidence Mr Jedwab ascribes the current increase in US emigration to Canada largely to similar, if less urgent, social and political motivations.

"They're coming because many of them don't like the politics, the Iraq War, and the security situation in the US," he told *ABC News* (31st July). "By comparison, Canada is a tension-free place. People feel safer."

# Transatlantic Cable

Mr Jedwab also noted that those choosing Canada over the US have the highest levels of education. These are not, he said, 'people who can't get a job in the States.'

While Americans moving to Canada are still outnumbered by Canadians going in the opposite direction, the imbalance is shrinking. Last year, 23,913 Canadians moved to the United States – a significant decrease from 29,930 in 2005.

## Over objections, long-distance Mexican trucks may ply American roads for a year

A federal appellate court on 31st August refused to issue a temporary order to block a Bush administration 'demonstration project' allowing as many as 100 Mexican trucking companies to freely haul their cargo anywhere within the US for one year.

The decision by the US Circuit Court of Appeals for the 9th District cleared the way for the controversial pilot programme for testing the safety of Mexican trucks on US highways.

The Teamsters union, the Sierra Club (an environmental group), the consumer-advocacy group Public Citizen, and other American opponents of the project had filed suit to prohibit the long-haul Mexican truck traffic, arguing that there would be inadequate oversight of the drivers. They also claimed that a hasty and ill-considered effort to wrench the US into full compliance with provisions of the North American Free Trade Agreement (NAFTA) would put public safety in jeopardy.

NAFTA requires that all roads in the United States, Mexico, and Canada be open to carriers from all three countries. Canadian trucking companies have had full access to American roads right along, but Mexican trucks have been permitted to travel only about 20 miles inside the US from a few border crossings such as those at San Diego (California) and El Paso (Texas).

The court declined to forestall the effort to put the preferential treatment to the test. In a brief order released shortly before the start of the long Labor Day weekend, a three-judge panel in San Francisco denied the request for an emergency motion to block the pilot programme.

The Federal Motor Carrier Safety Administration had said earlier that it expected to open the border to Mexican trucks as early as the following week.

**Dorothy Fabian**
**USA Editor**

# Tenova technology heads for China

▲ *High-speed tinning line heading for China*

Tenova has been awarded a contract for a 250,000 tons per year new high-speed electrolytic tinning line with insoluble anodes in China for Jiangsu Dajiang Metal, Sunshine Group.

The electrolytic tin-plating line will be one of the world's fastest lines (700m/minute at entry/exit and 550 at the process section), for annual production of 250,000 tons. The steel strip will be 700-1,250mm wide and 0.15-0.55mm thick and the line will process all the main grades of steel for a product mix which will satisfy the most recent demand of the high-quality market.

The improvements in technology have been developed and enhanced over the last few years with a project carried on by the strip processing R&D department at Ternium-Siderar in Argentina, jointly with the materials development centre CSM in Italy. The Tenova patented experience lies in a particular system for the tin dissolution reactors where it is possible to achieve a very low tin loss in the sludges (max 4%). This represents a very positive aspect for both economical and environmental issues.

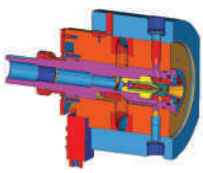
The insoluble anodes will permit an easier handling of the process section with higher safety for operations. A further improvement in the quality of the tin plate has been achieved through the development of special edge-masks. These devices prevent the 'white border defects' due to tin overcoating at the edge while processing strips with different widths. Tenova edge-mask design guarantees easy inspection and access to the cell.

The line will be delivered at the end of 2008.

**Tenova Spa – Italy**
**Fax**: +39 02469 3026
**Email**: info@techint.it
**Website**: www.techint.it

## technology at a glance

Rosendahl has developed a new addition to its Rocomat series – the Rocomat 5L, especially designed for the processing of flame retardant materials



GER SA, a supplier of good second-hand wire and cable machinery, has launched a new continuous resistance annealer for copper wire

## Backing for Sylvin

Sylvin Technologies, a custom vinyl compound manufacturer, has received approval from Canadian Standards Association International for its line of 105°C lead-free, RoHS compliant vinyl compounds designed for flexible chords and cables.

The CSA approval is a first for the company and strengthens a strategic goal of placing more focus on wire and cable products.

Sylvin's newly approved 105°C vinyl insulation and jacketing compounds received recognition under CSA Class 7999-01 polymeric raw materials for wire and cable compounds.

Four compounds were approved by CSA – Sylvin 5170-85 and 5175-92 for wire insulation and 6168-80 and 6185-80 for wire jacketing. Each of the four compounds received approval for 105°C SJTOOW with -40°C low temperature approvals.

**Sylvin Technologies Inc – USA**
**Fax**: +1 717 336 0547
**Email**: info@sylvin.com
**Website**: www.sylvin.com



▲ *Nordson PURBlue EC Melter*

## Simplifying use of PUR adhesives

The new PURBlue EC melters from Nordson Corporation simplify use of reactive polyurethane (PUR) adhesives.

A unique 'easy-to-clean' design makes clean-up and maintenance quick and effortless.

Efficient operation and maintenance helps increase productivity and reduce waste.

Melter components in contact with PUR adhesive, including tank, grid, reservoir and pump block, can be easily dismantled for cleaning.

To further simplify maintenance, PURBlue EC melters feature pump shut-off valves and quick-disconnect heater and sensor cables.

Daily operation is also easy with user-friendly controls, week/day timer and I/O interfaces.

The tank accommodates 18kg (39.68lb) adhesive slugs measuring 280mm (11in) in diameter.

An inert gas blanket protects adhesive from moisture to prevent premature curing.

**Nordson Corporation – USA**
**Fax**: +1 770 497 3656
**Email**: info@nordson.com
**Website**: www.nordson.com

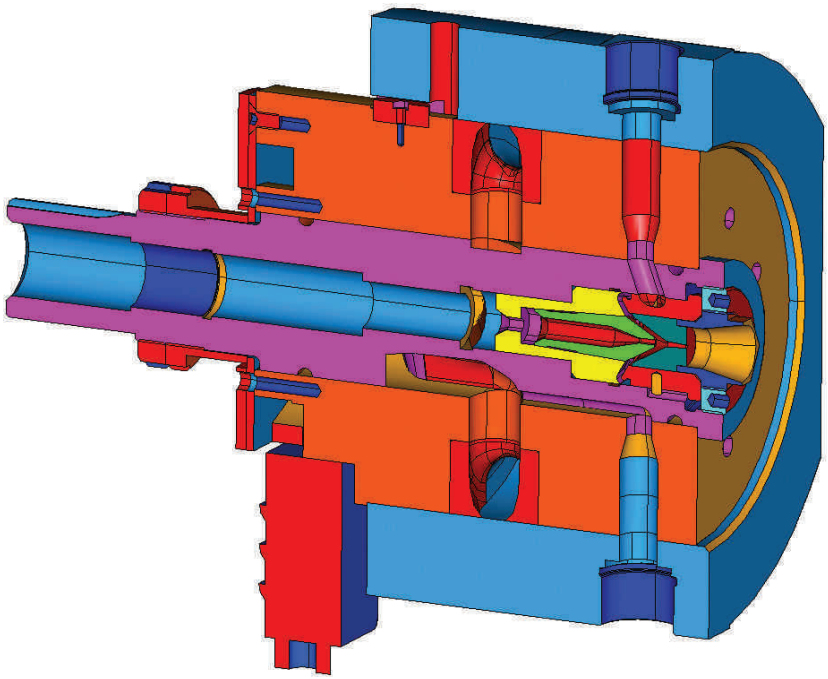
## New addition to range at Rosendahl

Rosendahl has developed a new addition to its Rocomat series – the Rocomat 5L, especially designed for the processing of flame retardant materials. The innovation features the possibility of an increased output quantity, eg 400l/h PVC, which is being mastered by the same system.

The Rocomat 5L is developed with the same design as the preceding model, with a rotating shaft in the crosshead. The crosshead is designed in a larger format with deeper channels in order to reduce the pressure build-up.

A shorter extruder adaptor favours the flame retardant materials, since the colour change takes place inside the shaft, which requires that only the mass within the distributor shaft needs to be rinsed. Additionally, this process results in minor colour change lengths for the flame retardant materials.

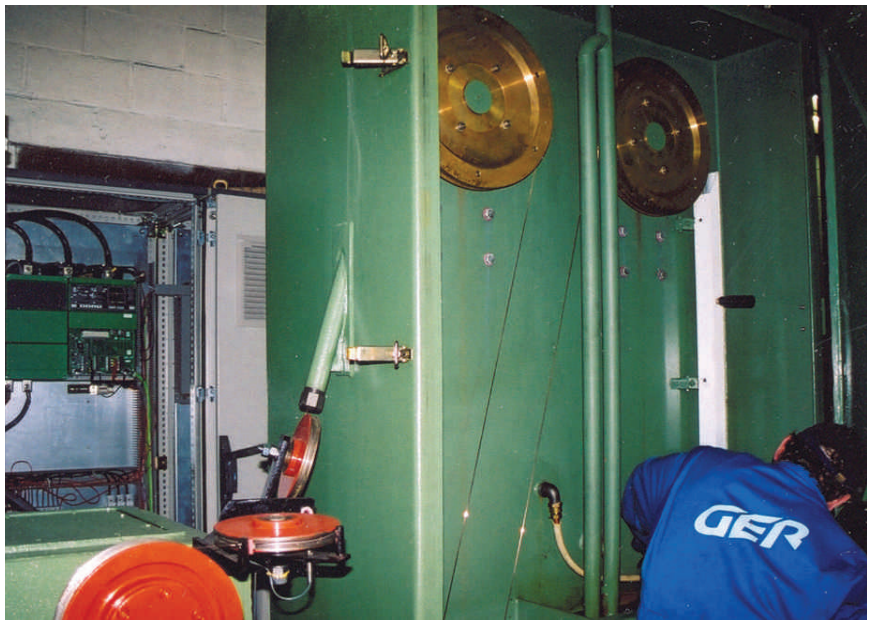
This gives the possibility to purge the unused extruder or to use this extruder for an inner skin layer. The colour change shaft is also used to realise the bypass function on all extruders. This unique solution is applicable in any Rosendahl automotive line.



▲ *Rosendahl – increasing output quantity*

Some processes are: change of layer, which requires two extruders, skin or strip change – three extruders as well as layer and strip changes which requires four extruders.

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




▲ *Second-hand is the way forward from GER*

## New annealer from GER

GER SA, a supplier of second-hand wire and cable machinery, has launched a new continuous resistance annealer for copper wire. This stand-alone model can be synchronised with any make of rod breakdown machine thanks to its own motorisation.

This annealer model, with an AC 22 kW motor, has a wire diameter range from 1.0-3.5mm.

The rating is 3,000 Amp and the annealing voltage is approximately 45V. The annealing transformer and control system are built in two separate cabinets. A steam generator with sufficient capacity is included. Other annealer sizes are being offered, as well as intermediate or fine wire drawing machines.

**GER SA – Belgium**
**Fax**: +32 87 260 201
**Email**: ger@ger.be
**Website**: www.ger.be



## New thermoplastic elastomer from Teknor Apex

Teknor Apex is launching a new Elexar® thermoplastic elastomer (TPE) compound which meets stringent UL criteria for flame retardance while providing the rubber-like flexibility and toughness required over a wide temperature range for flexible cord and industrial cable.

The Thermoplastic Elastomer Division introduced the new compound, designated Elexar® EL-1392B, at IWCS/Focus in Florida, USA.

The RoHS-compliant Elexar EL-1392B styrenic block copolymer TPE compound can be used in insulation, jacketing, and moulded plugs and connectors.

It meets flame test requirements specified in UL 94 V-0 for thicknesses of 0.06". (1.5mm), passes the VW-1 vertical flame test per Method 1080 of UL 1581 as both insulation and jacket, has an oxygen index of 28%, and exhibits no dripping when burned. The compound has a UL 1581 continuous use rating of 105˚C. Wires with both insulation and jacketing made of Elexar EL-1392B have passed 7-day oil-resistance tests at 60˚C.

Recommended applications for the new TPE include cable and connector products for outdoor devices, power tools, appliances, industrial robots, welding equipment, and entertainment audio and lighting systems.

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

## Cost-effective Vistalon

ExxonMobil Chemical Company has introduced Vistalon™ EPM* rubber 722 which can cost effectively improve processability and cable flexibility in medium and low-voltage wire and cable applications.

In comparison with conventional EPDM, the metallocene-based product can provide processing improvements while exhibiting similar performance.

Compared with cross-linked polyethylene (PE), it offers improved performance and excellent flexibility at low temperatures. And, it has improved electrical properties compared with metallocene EPDMs.

"We have developed Vistalon EPM 722 for customers looking for improved productivity during cable manufacture and increased flexibility and durability in final cable construction," said Ulf Nilsson, global EPDM product manager.

The new product is supplied in pellet form, making it clean and easy to use.

**ExxonMobil Chemical Company – USA**
**Fax**: +1 281 870 6353
**Email**: info@exxonmobilchemical.com
**Website**: www.exxonmobilchemical.com

▲ *New Vistalon™ EPM rubber 722 improves processability and cable flexibility in medium and low voltage wire and cable applications*

## Faro finding the solution!

Faro Industriale SpA specialises in manufacturing radial, axial (or a combination of) cylindrical and needle roller bearings.

Thanks to technological expertise acquired over 30 years, Faro is the ideal alternative to those OEM or end-users who cannot find a solution through the standard product offering for their design problems.

Great care is given in selecting the highest quality of bearing steel or components. A strict quality assurance system is in place, ensuring that the bearings are 100% traceable and certified.

The product range comprises radial and axial roller bearings between a 20mm inner (0.80") to a 1,450mm (60") outer diameter.

**Faro Industriale SpA – Italy**
**Email**: info@faro-spa.it
**Fax**: +39 0523 760 315
**Website**: www. www.faro-spa.it

## 20 years' experience from ATE

ATE Applicazioni TermoElettroniche has been designing and manufacturing induction heating equipment and plants with related control and supervisor systems since 1987. ATE technology and experience not only guarantees all the advantages of induction heating, but also a design capacity targeted towards customer needs, careful testing and fast, accurate after-sales services.

ATE's production programme includes:
- plants for through-heating of steel, copper, brass and aluminium
- induction heat-treatment plants (hardening, tempering and annealing)
- melting furnaces for ferrous and non-ferrous metals and precious alloys
- plants for induction welding and brazing
- equipment for special applications of induction heating

**ATE Applicazioni TermoElettroniche srl – Italy**
**Fax**: +39 0444 406434
**Email**: info@ate.it
**Website**: www.ate.it

## New system gives PCC control

Process Control Corporation, a supplier of auxiliary equipment for the plastics processing industry, has expanded its product line to include the Gravimetric Inventory Management System.

With an increased number of processors searching for a method to weigh and store either re-pelletised material or delivered raw pellet materials, PCC recognised the need for an inventory management system.

The system will accurately weigh re-pelletised materials prior to being re-processed or stored as inventory. The system can also be used to verify delivered resins before entering them into inventory.

▲ *Entire system controlled with touch-screen interface*

The system can be configured to operate in a continuous mode for loading silos or other surge bins for storage or as a batching system for loading Gaylord boxes for storage.

The system can provide totals for a given production shift, a complete production run or an overall running total of material. It runs automatically with little or no operator intervention logging shift weight totals.

Pellet material is conveyed either from a pelletiser, storage or delivery unit into a surge hopper via a pressure or vacuum system.

The surge hopper has a high level view window for quick visual inspection of the material level within the bin, as well as a clean-out door and a high-level proximity sensor.

The high level proximity sensor is provided to shut down the conveying system and prevent the system from over-filling.

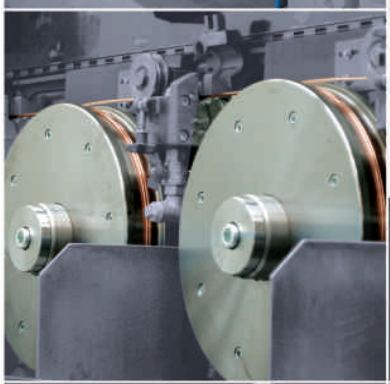
The material is then discharged from the surge hopper through a slide-gate into a weighed hopper.

Finally, the material is discharged through a second metering gate into either a Gaylord box or is conveyed to either a storage silo or storage bin via a vacuum or pressure system.

The entire system is controlled with an easy-to-use touch-screen interface. The inventory data can be printed or transferred to an existing supervisory type inventory control system.

**Process Control Corporation – USA**
**Fax**: +1 770 449 5445
**Email**: info@process-control.com
**Website**: www.process-control.com

www.niehoff.de



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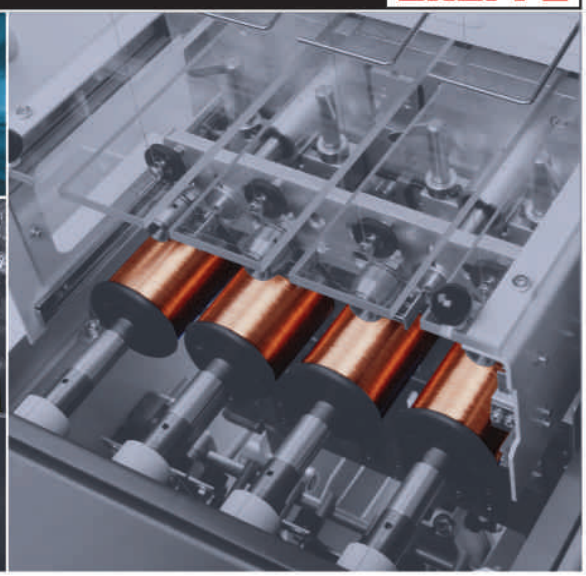


**MASCHINENFABRIK NIEHOFF GmbH & Co. KG,** Germany, Phone +49-9122-977-0, Fax +49-9122-977-155, E-Mail: info@niehoff.de, Internet: www.niehoff.de · **NIEHOFF ENDEX NORTH AMERICA INC.,** USA, Phone 856-467-4884, Fax 856-467-0584, E-Mail: sales@niehoffendex.com **MASCHINENFABRIK NIEHOFF GmbH & Co. KG,** Germany, Pho ne +49-8342-7008-0, Fax +49-8342-7008-40, E-Mail: info@niehoff.de · **MASCHINENFABRIK NIEHOFF s.r.o.,** Nymburk, Phone +42-325 519 751, Fax +42-325 519 755, E-Mail: info@niehoff.cz · **NIEHOFF-HERBORN MÁQUINAS Ltda.,** Brasil, Phone 11-41 98 43 22, Fax 11-41 98 42 34, E-Mail: diret@niehoff.com.br · **NIPPON NIEHOFF Co., Ltd.,** Japan, Phone 3-3257-0911, Fax 3-3257-0910, E-Mail: s.kanazawa@nippon-niehoff.co.jp · **MASCHINENFABRIK NIEHOFF GmbH & Co. KG,** Singapore Representative Office, Phone 63369936, Fax 63364070, E-Mail: niehoff@pacific.net.sg · **MASCHINENFABRIK NIEHOFF GmbH & Co. KG, Germany,** Shanghai Representative Office, P.R. China, Phone 21-63906191, Fax 21-63906192, E-Mail: nscc@public1.sta.net.cn · **NIEHOFF of INDIA Private Limited,** India, Phone +91 8455 224-391, -392, -393 , Fax +91 8455 224-394, E-Mail: daniel@noi.sify.net · **NIEHOFF of Russia,** Phone 7-495-230-5537, Fax 7-495-230-5539, E-Mail: info@niehoff.de

▲ *Hochgeschwindigkeit-Verzinnungslinien schauen nach China*

# Tenova wendet sich nach China

Tenova wurde ein Auftrag für eine 250.000 Jato neue elektrolytische Hochgeschwindigkeit-Verzinnungslinie mit unlöslichen Anoden in China für Jiangsu Dajiang Metal, Sunshine Group, erteilt.

Die elektrolytische Verzinnungslinie wird eine der weltweit schnellsten Linien sein (700m pro Minute bei Einlauf/Auslauf und 550 beim Verfahrensabschnitt), für eine jährliche Produktion von 250.000 Tonnen.

Das Stahlband wird 700-1.250mm breit und 0,15-0,55mm dick sein und die Linie wird alle wichtigsten Stahlklassen für einen Produktmix bearbeiten, der die neusten Anforderungen hochqualitativer Märkte erfüllen wird.

Die Verbesserungen in der Technologie wurden in den letzten Jahren durch ein Projekt entwickelt und umgesetzt, das von der Forschungs- und Entwicklungsabteilung für die Bandbehandlung bei Ternium-Siderar in Argentinien in Zusammenarbeit mit dem Materialentwicklungszentrum CSM in Italien durchgeführt wurde.

Die patentierte Erfahrung von Tenova liegt in einem besonderen System für die Zinnauflösungs-Reaktoren, wo es ermöglicht wird einen sehr niedrigen Zinnverlust im Schlamm (max. 4%) zu zielen. Dies stellt einen sehr positiven Aspekt dar was die Ökonomie und die Umwelt betrifft.

Die unlöslichen Anoden ermöglichen eine einfachere Handhabung des Verfahrensabschnitts mit erhöhter Sicherheit der Arbeitsvorgänge. Eine weitere Qualitätsverbesserung wurde beim Weißblech durch die Entwicklung spezieller 'edge masks' genannten Schablonen erreicht.

Diese Vorrichtungen vermeiden die "Mängel des weißen Rands" aufgrund des Zinnüberzugs bei den Ecken während der Bearbeitung von Bänder mit unterschiedlichen Breiten.

Der 'edge-mask-Aufbau' von Tenova sichert eine einfache Inspektion und den Zugang zur Zelle. Die Ablieferung der elektrolytischen Linie an Jiangsu Sunshine wird von Tenova für Ende 2008 geplant.

**Tenova Spa – Italien**
**Fax**: +39 02469 3026
**Email**: info@techint.it
**Website**: www.techint.it

## Kostengünstiges Vistalon

ExxonMobil Chemical Company hat das Vistalon™ EPM* Gummi 722 auf den Markt gebracht, das eine kostengünstige Verbesserung der Verarbeitung bieten kann sowie Kabelflexibilität bei Draht- und Kabelanwendungen im Bereich Mittel- und Niederspannung. Im Vergleich zu konventionellem EPDM kann das metallocenbasierte Produkt Verarbeitungsverbesserungen mit ähnlichen Leistungen vorzeigen.

Verglichen zum vernetzten Polyethylen (PE), werden erhöhte Leistungen und eine hervorragende Flexibilität bei niedrigen Temperaturen erzielt. Darüber hinaus werden verbesserte elektrische Eigenschaften im Gegensatz zu Metallocen-EPDM geboten. Das neue Produkt wird als Pellets geliefert und kann somit sauber und einfach benutzt werden.

**ExxonMobil Chemical Company – USA**
**Fax**: +1 281 870 6353
**Email**: info@exxonmobilchemical.com
**Website**: www.exxonmobilchemical.com

## Neue Ergänzung zur Produktauswahl

Rosendahl hat eine neue Ergänzung seiner Baureihe Rocomat – die Rocomat 5L - entwickelt, die spezifisch für die Verarbeitung flammwidriger Materialien entworfen wurde.

Die Innovation bietet die Möglichkeit einer erhöhten Ausbringungsmenge, d. h. 400l/h PVC, die vom selben System gemeistert wird.

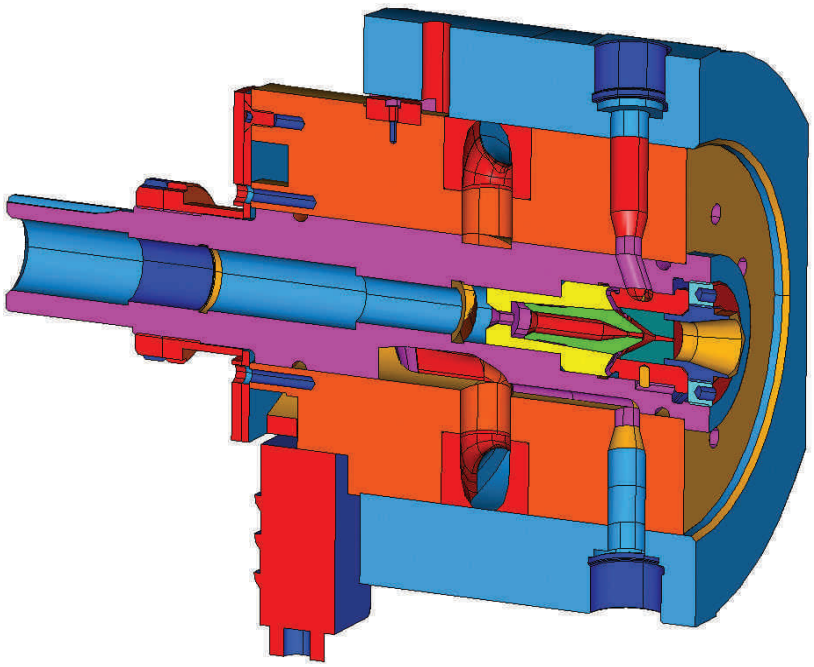
Rocomat 5L ist mit demselben Aufbau wie das vorherige Modell entworfen worden, mit einem Drehschaft im Querkopf.

Der Querkopf ist in einem größeren Format mit tieferen Rinnen entworfen worden, um den Druckaufbau zu reduzieren.

Ein kürzerer Extruderadapter begünstigt flammwidrige Materialien, da der Farbwechsel im Schaft erfolgt und somit nur die Masse innerhalb des Verteilerschafts gespült werden muß.

Darüber hinaus ergibt dieses Verfahren kürzere Farbwechselzeiten für flammwidrige Materialien.

Demzufolge wird somit die Möglichkeit gegeben den unbenutzten Extruder zu reinigen oder diesen Extruder für eine innere Skinschicht zu verwenden.



▲ *Rosendahl – erhöhte Ausbringungsmenge*

Der Farbwechselschaft wird ebenfalls verwendet, um die Umgehungsfunktion bei allen Extrudern durchzuführen.

Diese einzigartige Lösung ist in allen Automobillinien von Rosendahl anwendbar, einige dieser Verfahren sind: Schichtwechsel, wozu zwei Extruder erforderlich sind, Skin- oder Bandwechsel, bei denen drei Extruder verlangt werden und Schicht- und Bandwechsel, wozu vier Extruder vorgesehen werden müssen.

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

## Neuer thermoplastischer Elastomer von Teknor Apex

Teknor Apex bringt einen neuen Elexar® thermoplastischen Elastomer (TPE) Compound auf den Markt, der die strengsten UL-Kriterien für Flammbeständigkeit erfüllt, wobei gummi-ähnliche Flexibilität und Festigkeit geboten werden, die über einen breiten Temperaturbereich bei flexiblen Leitungen und Industriekabeln erforderlich sind.

Die Thermoplastic Elastomer Division hat diesen neuen Elexar® EL-1392B genannten Compound während der Konferenz IWCS/Focus in Florida, USA, vorgestellt. Das den RoHS-Richtlinien entsprechende Elexar EL-1392B Styrol-Block-Copolymer TPE Compound kann für Isolierungen und Ummantelungen sowie für spritzgegossene Elektro-Bauteile und Steckverbinder eingesetzt werden.

Es erfüllt die in UL 94 V-0 spezifizierten Flammtest-Anforderungen für 0,06 Zoll (1,5mm) Dicken, besteht den VW-1 vertikalen Flammtest durch die Methode 1080 von UL 1581 sowohl für Isolierung wie für Ummantelung, weist einen Sauerstoffindex von 28% auf und tropft nicht beim Verbrennen. Das Compound weist eine UL 1581 kontinuierliche Betriebstemperatur von 105°C auf. Drähte mit Isolierung und Ummantelung aus Elexar EL-1392B haben die 7-tägigen Ölwiderstandstests bei 60°C bestanden.

Die empfohlenen Anwendungen für die neuen TPE schließen Kabel- und Steckverbinderprodukte für Vorrichtungen im Außenbereich, Elektrowerkzeuge, Geräte, Industrieroboter, Schweißausrüstungen sowie Bühnen-, Audio- und Beleuchtungssysteme ein.

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

## Vereinfachte Anwendung von PUR-Klebstoffen

Die neuen PURBlue EC-Schmelzgeräte von Nordson Corporation vereinfachen die Anwendung von Klebestoffen aus reaktivem Polyurethan (PUR).

Schmelzkomponenten, die mit PUR-Klebestoff in Verbindung kommen, einschließlich Tank, Schmelzplatte, Reservoir und Pumpenblock, können einfach zur Reinigung demontiert werden. Um die Wartung noch mehr zu vereinfachen, bieten die PURBlue EC-Schmelzgeräte Pumpen-Absperrventile sowie Schnellverschlüssen für Heizungs- und Fühlerleitungen.

Tägliche Verfahren sind ebenfalls durch benutzerfreundliche Steuerungen, Wochen/Tag-Zeitschaltuhr und I/O-Schnittstellen vereinfacht. Der Tank ist für 18kg (39,68 Pfund) Klebekartusche mit einem Durchmesser von 280mm (11 Zoll) ausgelegt. Eine Inertgas-Überlagerung schützt die Klebestoffe vor Feuchtigkeit, damit vorzeitiges Ausreagieren vermieden wird.

**Nordson Corporation – USA**
**Fax**: +1 770 497 3656
**Email**: info@nordson.com
**Website**: www.nordson.com

▲ *Высокопроизводительная линия лужения отправляется в Китай*

# «Тенова» берет курс на Китай

Компания «Тенова» (Tenova) получила контракт на поставку в Китай новой высокоскоростной линии электролитического лужения с нерастворимыми анодами производительностью 250 000 тонн в год для «Джангсу Даджанг метал» (Jiangsu Dajiang Metal) – компании в составе «Саншайн груп» (Sunshine Group).

Линия электролитического лужения будет одной из самых скоростных линий в мире (700 м/мин на входе и выходе и 550 м/мин на технологическом участке), с годовой производительностью в 250 000 тонн. Стальная полоса будет иметь ширину от 700 до 1250 мм, толщину от 0,15 до 0,55 мм, и линия позволит вести обработку всех основных марок стали, причем ассортимент продукции сможет удовлетворить самые последние требования рынка высококачественных продуктов.

В последние несколько лет технология развивалась и оттачивалась в рамках работ, которые проводились научно-исследовательским отделом по обработке полосовой стали в Терниум-Сидерарe (Аргентина) совместно с центром по разработке новых материалов (ЦРМ) в Италии. Запатентованная технология компании «Тенова» основана на использовании особой системы реакторов для растворения олова, в которых можно добиться очень низких потерь олова в шламе (не более 4 %). Это – важное достижение как с экономической, так и с экологической точек зрения.

Применение нерастворимых анодов позволит упростить управление производственным процессом и сделать его более безопасным. Дальнейшее повышение качества лужения было обеспечено благодаря разработке особых краевых масок. Эти приспособления предотвращают появление дефектов в виде белых полос из-за нанесения на кромки избыточного слоя олова при обработке полос разной ширины.

Конструкция краевой маски компании «Тенова» гарантирует легкость наблюдения и доступа к рабочей емкости. Ожидается, что «Тенова» поставит электролитическую линию для «Джангсу саншайн» в конце 2008 года.

**«Тенова спа» (Италия)**
**Факс**: +39 02469 3026
**Адрес электронной почты**: info@techint.it
**Web-страница**: www.techint.it

## Экономичный «Висталон»

Компания «ЭксонМобил кемикал компани» (ExxonMobil Chemical Company) представила «Висталон» (Vistalon™) – этиленпропиленовый мономерный (ЭПМ) каучук 722, который позволяет с наименьшими затратами улучшить технологичность и увеличить эластичность кабельно-проводниковых изделий среднего и низкого напряжения.

По сравнению со сшитым полиэтиленом (ПЭ) у него более высокие эксплуатационные качества и прекрасная эластичность при низких температурах. Кроме того, он обладает улучшенными по сравнению с металлоценовыми ЭПДМ электрическими свойствами.

Новый продукт поставляется в виде гранул, что делает его использование простым и экологически чистым.

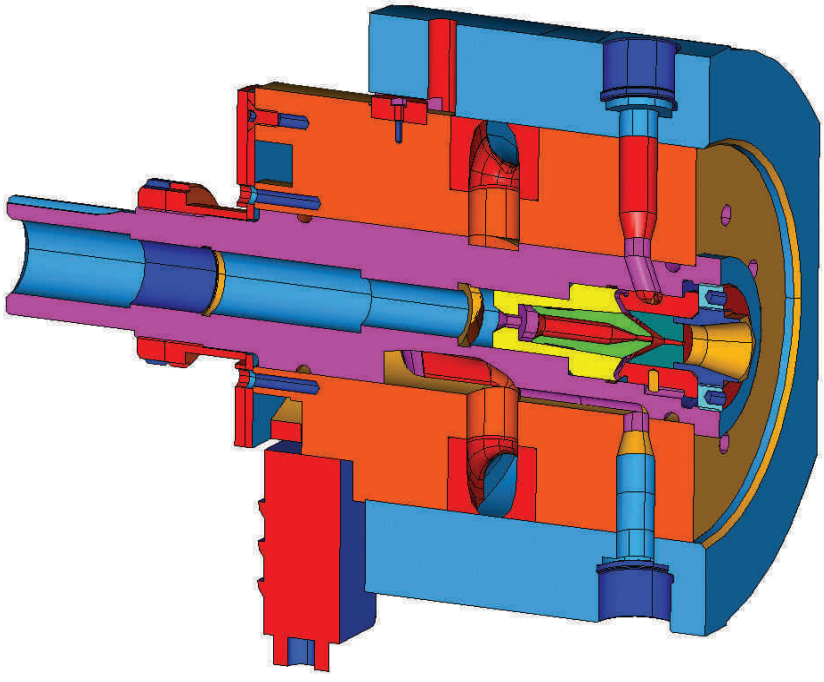
**«ЭксонМобил кемикал компани» (США)**
**Факс**: +1 281 870 6353
**Адрес электронной почты**: info@exxonmobilchemical.com
**Web-страница**: www.exxonmobilchemical.com

## Пополнение в производственной линейке

Компания «Розендал» (Rosendahl) дополнила список выпускаемых ею устройств серии Rocomat новой моделью, Rocomat 5L, которая специально предназначена для обработки не поддерживающих горения материалов.

Среди возможностей новой системы – автономно регулируемое увеличение объема выпускаемой продукции, например, до 400 л/ч при использовании ПВХ.

Конструктивно система Rocomat 5L выполнена аналогично предыдущей модели и также оборудована вращающимся валом в направляющей головке. Направляющая головка имеет более крупную конструкцию с углубленными каналами для уменьшения давления.



▲ *Компания «Розендал»: объемы выпускаемой продукции увеличиваются*

Укороченный адаптер экструдера оптимально подходит для обработки материалов, не поддерживающих горения, поскольку изменение окраски происходит внутри вала, для чего требуется, чтобы промывалась только масса, находящаяся внутри вала распределителя. Кроме того, в результате использования данного процесса продолжительность смены окраски материалов, не поддерживающих горения, незначительна.

Это позволяет проводить чистку неиспользуемого экструдера или использовать этот экструдер для формирования внутреннего слоя пленочной изоляции. Вал смены окраски также используется в качестве байпаса для всех экструдеров системы.

Данная уникальная система может использоваться на любой линии для производства автомобильных проводов компании «Розендал» для следующих операций: смены окраски внутреннего слоя, для которой требуются два экструдера; смены окраски наружного слоя или полосы, для которой требуются три экструдера, а также смены окраски внутреннего слоя и полосы, для которой требуются четыре экструдера.

**«Розендал машинен ГмбХ» (Австрия)**
**Факс**: +43 3113 510059
**Адрес электронной почты**:
office@rosendahlaustria.com
**Web-страница**: www.rosendahlaustria.com

## Новый термопластичный эластомер от «Текнор эйпекс»

Компания «Текнор эйпекс» (Teknor Apex) начинает выпуск нового термопластичного эластомера (ТПЭ) под торговой маркой Elexar®, который соответствует жестким требованиям стандартов Лаборатории по технике безопасности США (UL) на распространение пламени и при этом обладает высокой пластичностью и прочностью, которые требуются при использовании гибких шнуров и промышленных кабелей в широком диапазоне температур.

Подразделение термопластичных эластомеров впервые представило новый компаунд под маркой Elexar® EL-1392B на конференции Международного симпозиума по кабелям и проводам (IWCS/Focus) во Флориде (США).

Термопластичный эластомерный компаунд на основе стирольного блок-сополимера Elexar EL-1392B, соответствующий требованиям директивы ЕС, ограничивающей содержание вредных веществ (RoHS), может быть использован для производства изоляции, оболочки и литых вилок и разъемов.

Рекомендуемые сферы применения нового ТПЭ включают в себя производство кабельных изделий и соединительных элементов для наружных устройств, электроинструментов и электробытовых приборов, промышленных роботов, сварочного оборудования, а также звуковых и осветительных приборов для индустрии развлечений.

**«Текнор эйпекс компани» (США)**
**Факс**: +1 401 729 0166
**Адрес электронной почты**: info@teknorapex.com
**Web-страница**: www.teknorapex.com

## Работать с полиуретановым клеем становится проще

Новые плавильные устройства PURBlue EC, разработанные компанией «Нордсон корпорэйшн» (Nordson Corporation) упрощают работу с отверждающимися полиуретановыми (ПУ) клеями.

Уникальная легкоочищаемая конструкция позволяет быстро и без усилий чистить и обслуживать устройство. Эффективность эксплуатации и обслуживания позволяет увеличить производительность и снизить потери.

**«Нордсон корпорэйшн» (США)**
**Факс**: +1 770 497 3656
**Адрес электронной почты**:
info@nordson.com
**Web-страница**: www.nordson.com

▲ *Ligne d'étamage haute vitesse*

# Tenova se tourne vers la Chine

Tenova a remporté un contrat pour une nouvelle ligne d'étamage électrolytique haute vitesse de 250,000 tonnes par an avec anodes insolubles pour Jiangsu Dajiang Metal, Sunshine Group, Chine.

La ligne d'étamage électrolytique sera l'une des lignes les plus rapides du monde (700m/minutes à l'entrée/sortie et 550 à la section de traitement), avec une production annuelle de 250,000 tonnes.

La bande d'acier aura une largeur de 700-1 250mm et une épaisseur de 0,15-0,55mm et la ligne traitera les principales nuances d'acier pour une gamme de produits permettant de satisfaire la demande actuelle du marché de produits haute qualité.

Les perfectionnements technologiques ont été développés et améliorés pendant ces dernières années avec un projet réalisé par le département Recherche et Développement pour le traitement des bandes d'acier dans l'établissement Ternium-Siderar en Argentine, en collaboration avec le centre de développement de matériaux CSM en Italie.

L'expérience brevetée de Tenova réside dans un système particulier pour des réacteurs de dissolution de l'étain permettant de réduire au minimum les pertes d'étain dans les dépôts (4% max.)

Ce résultat représente un aspect très positif d'un point de vue économique et environnemental.

Les anodes insolubles consentent une manutention simplifiée de la section de traitement ainsi qu'une sécurité majeure durant les opérations.

Une amélioration supplémentaire a été réalisée dans la qualité de la tôle étamée grâce au développement de gabarits spécifiques appelés "edge masks".

Ces dispositifs permettent d'éviter les bords blancs dus au surcouchage de l'étain à l'extrémité durant le traitement des bandes avec des largeurs différentes.

Les "edge masks" de Tenova facilitent l'inspection et l'accès à la cellule. Tenova prévoit de livrer la ligne électrolytique à Jiangsu Sunshine fin 2008.

**Tenova Spa – Italie**
**Fax**: +39 02469 3026
**Email**: info@techint.it
**Website**: www.techint.it

## Vistalon économiquement rentable

ExxonMobil Chemical Company a lancé le caoutchouc Vistalon™ EPM* 722, pouvant améliorer l'ouvrabilité et la flexibilité des câbles de façon économiquement efficace dans les applications de fils et des câbles moyenne et basse tension. Par rapport à l'EPDM conventionnel, le produit à base de métallocène peut offrir des améliorations du processus à égalité de performances.

Par rapport au polyéthylène réticulé (PE), ce produit offre des performances supérieures et une excellente flexibilité à de basses températures. En outre, il présente des propriétés électriques améliorées par rapport aux produits EPDM à base de métallocène.

**ExxonMobil Chemical Company – États-Unis**
**Fax**: +1 281 870 6353
**Email**: info@exxonmobilchemical.com
**Website**: www.exxonmobilchemical.com

## Nouvelle addition à la gamme

Rosendahl a élargi sa série Rocomat avec le nouveau produit Rocomat 5L, expressément conçu pour le traitement de matériaux ignifuges.

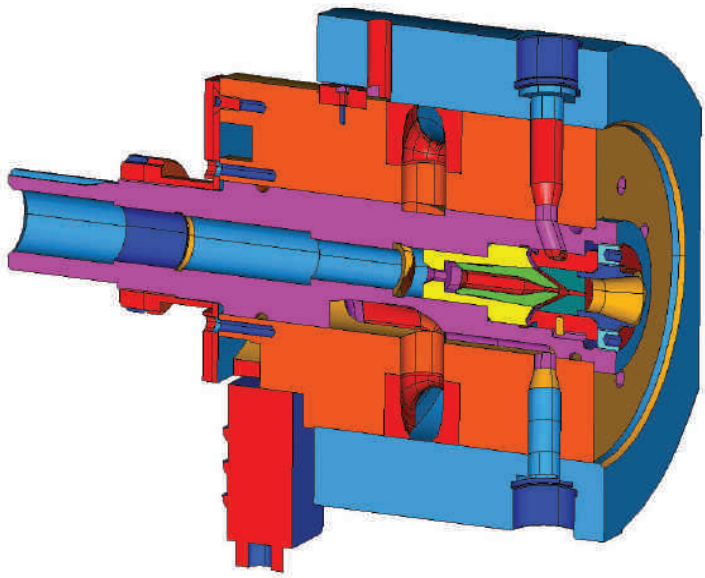
Cette innovation offre la possibilité d'une productivité supérieure, par exemple 400l/h de PVC, qui est maîtrisée par le même système.

Le Rocomat 5L est développé avec la même conception que le modèle précédent, avec un arbre rotatif dans la tête d'injection.

La tête d'injection est conçue dans un format de dimensions supérieures et des chenaux plus profonds afin de réduire l'augmentation de pression.

Un adaptateur pour extrudeuse plus court est avantageux pour les matériaux ignifuges étant donné que le changement de couleur a lieu à l'intérieur de l'arbre, et par conséquent il est nécessaire de rincer uniquement le composé qui se trouve à l'intérieur de l'arbre de distribution.

En outre, ce processus entraîne des temps de changement de couleur inférieurs pour les matériaux ignifuges.



▲ *Rosendahl – augmente son rendement*

Il est donc possible de nettoyer l'extrudeuse non utilisée ou d'utiliser cette extrudeuse pour une couche de peau intérieure. L'arbre de changement couleur est également utilisé comme by-pass sur toutes les extrudeuses.

Cette solution unique est applicable à toute ligne automobile Rosendahl et comprend les processus suivants: changement de couche, exigeant deux extrudeuses; changement de peau ou de bande exigeant trois extrudeuses et changements de couche et de bande exigeant quatre extrudeuses.

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

## Nouvel élastomère thermoplastique de Teknor Apex

Teknor Apex a lancé un nouveau composé appelé Elexar®, un élastomère thermoplastique (TPE) qui répond aux strictes exigences de résistance aux flammes prévue par les normes UL. Le nouveau produit offre également une flexibilité similaire à celle du caoutchouc et la résistance à une vaste gamme de températures requise pour les câbles flexibles et les câbles industriels.

La Division des élastomères thermoplastiques de la société a présenté le nouveau composant appelé Elexar® EL-1392B, durant la conférence IWCS/Focus en Floride (Etats-Unis). Le composé Elexar EL-1392B est un élastomère à base de copolymère styrénique séquence TPE conforme aux directives RoHS et peut être utilisé pour les isolements, les revêtements, les fiches et les connecteurs moulés sous pression.

Le produit est conforme aux exigences des essais à la flamme spécifiées dans la norme UL 94 V-0 pour des épaisseurs de 0,06 pouces (1,5mm), il a passé avec succès l'essai vertical d'inflammabilité VW-1 (Section 1080 de UL 1581) avec un indice d'oxygène de 28% pour l'isolement et le revêtement, et ne présente aucun égouttement en cas de combustion.

Le composé est caractérisé par des températures de fonctionnement continu de 105°C conforme à la norme UL 1581. Les fils réalisés avec l'isolement et le revêtement d'Elexar EL-1392B ont passé avec succès les essais de résistance à l'huile de 7 jours à une température de 60°C.

Les applications recommandées pour le nouveau TPE comprennent les câbles et les connecteurs pour dispositifs extérieurs, les outils électriques, les appareils, les robots industriels, les équipements de soudage et les systèmes audio et d'éclairage de divertissement.

**Teknor Apex Company – États-Unis**
**Email**: info@teknorapex.com
**Fax**: +1 401 729 0166
**Website**: www.teknorapex.com

## Utilisation simplifiée des adhésifs PUR

Les nouvelles unités de fusion PURBlue EC de Nordson Corporation permettent de simplifier l'utilisation des adhésifs à base de polyuréthane réactif (PUR).

Les composants de l'unité de fusion en contact avec les adhésifs PUR, y compris le réservoir, la grille, le réservoir et le bloc pompes, peuvent être aisément démontés pour les opérations de nettoyage. Afin de faciliter davantage l'entretien, les unités de fusion PURBlue EC sont équipées de soupapes d'arrêt pompe et d'un chauffeur à déconnexion rapide et de câbles capteurs.

Le fonctionnement quotidien est également facilité grâce aux commandes conviviales, à un temporisateur semaine/jour et aux interfaces d'entrée/sortie.

**Nordson Corporation – États-Unis**
**Fax**: +1 770 497 3656
**Email**: info@nordson.com
**Website**: www.nordson.com

▲ *Linea di stagnatura ad alta velocità*

# Tenova volge lo sguardo verso la Cina

Tenova si è aggiudicata un contratto per una nuova linea di stagnatura elettrolitica ad alta velocità da 250.000 tonnellate l'anno con anodi insolubili per Jiangsu Dajiang Metal, Sunshine Group, Cina.

La linea di stagnatura elettrolitica sarà une delle linee più rapide del mondo (700m/minuti all'ingresso/uscita e 550 alla sezione di trattamento), con una produzione annuale di 250.000 tonnellate. Il nastro d'acciaio avrà una larghezza di 700-1.250mm ed uno spessore di 0,15-0,55mm e la linea tratterà le principali qualità d'acciaio per una gamma di prodotti che consentono di soddisfare la richiesta attuale del mercato di prodotti di alta qualità.

I perfezionamenti tecnologici sono stati sviluppati e migliorati durante questi ultimi anni con un progetto realizzato dal reparto Ricerca e Sviluppo per il trattamento dei nastri d'acciaio presso lo stabilimento Ternium-Siderar in Argentina, in collaborazione con il centro di sviluppo di materiali CSM in Italia. L'esperienza brevettata di Tenova consiste in un sistema particolare per reattori di dissoluzione dello stagno che consentono di ridurre al minimo le perdite di stagno nei depositi (4% max.) Questo risultato rappresenta un aspetto molto positivo dal punto di vista economico ed ambientale.

Gli anodi insolubili consentono una manutenzione semplificata della sezione di trattamento ed una maggiore sicurezza durante le operazioni. Un ulteriore miglioramento è stato realizzato nella qualità della lamiera stagnata grazie allo sviluppo di speciali sagome chiamate "edge masks". Questi dispositivi consentono di evitare i "difetti dei bordi bianchi" dovuti alla sovrapposizione di strati di stagno alle estremità durante la lavorazione dei nastri con larghezze diverse.

Le "edge masks" di Tenova facilitano l'ispezione e l'accesso alla cellula. Tenova prevede di consegnare la linea elettrolitica a Jiangsu Sunshine alla fine del 2008.

**Tenova Spa – Italia**
**Fax**: +39 02469 3026
**Email**: info@techint.it
**Website**: www.techint.it

## Vistalon economico

ExxonMobil Chemical Company ha lanciato la gomma Vistalon™ EPM* 722, un prodotto in grado di migliorare la lavorabilità e la flessibilità dei cavi in modo economico nelle applicazioni dei fili e dei cavi di media e bassa tensione.

Rispetto all'EPDM tradizionale, il prodotto a base di metallocene può apportare miglioramenti al processo a parità di prestazioni.

Rispetto al polietilene reticolato (PE), questo prodotto offre prestazioni superiori ad una flessibilità eccezionale e a basse temperature. Inoltre, presenta proprietà elettriche migliorate rispetto ai prodotti EPDM a base di metallocene.

**ExxonMobil Chemical Company – Stati Uniti**
**Fax**: +1 281 870 6353
**Email**: info@exxonmobilchemical.com
**Website**: www.exxonmobilchemical.com

## Ampliamento della gamma di prodotti

Rosendahl ha ampliato la propria serie Rocomat con il nuovo prodotto Rocomat 5L, specificamente progettato per il trattamento di materiali ignifughi.

Questa innovazione offre la possibilità di una maggiore produttività, come ad esempio 400l/h di PVC, che è gestita dallo stesso sistema.

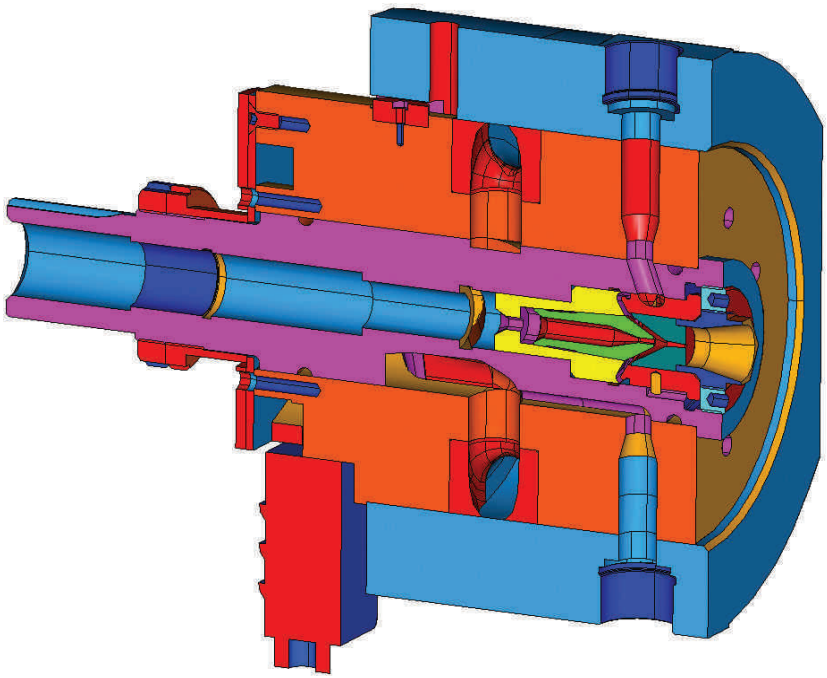
Rocomat 5L è sviluppato con la stessa concezione del modello precedente, con un albero rotativo nella testa di iniezione.

La testa di iniezione è progettata in un formato di dimensioni superiori e canali più profondi al fine di ridurre l'aumento di pressione.

Un adattatore per estrusori più corti è vantaggioso per i materiali ignifughi dato che il cambio di colore avviene all'interno dell'albero, e pertanto è necessario risciacquare solamente il composto che si trova dentro l'albero del distributore.

Inoltre, questo processo comporta tempi di cambio di colore inferiori per i materiali ignifughi.

É dunque possibile pulire l'estrusore non utilizzato o utilizzare questo estrusore per uno strato di pelle interno.



▲ *Rosendahl – aumenta la produttività*

L'albero di cambio colore è inoltre utilizzato come by-pass su tutti gli estrusori.

Questa soluzione particolare è applicabile a qualsiasi linea automobilistica Rosendahl e comprende i processi seguenti: cambio di strato, che richiede due estrusori; cambio di pelle o di nastro, che richiede tre estrusori e cambio di strato e di nastro che richiede quattro estrusori.

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

## Nuovo elastomero termoplastico di Teknor Apex

Teknor Apex ha lanciato un nuovo composto chiamato Elexar®, un elastomero termoplastico (TPE) conforme ai rigorosi requisiti ignifughi previsti dalle norme UL. Il nuovo prodotto offre inoltre una flessibilità simile a quella della gomma e la resistenza ad una vasta gamma di temperature richieste per i cavi flessibili ed i cavi industriali.

La Divisione Elastomeri Termoplastici della società ha presentato il nuovo composto chiamato Elexar® EL-1392B, durante la conferenza IWCS/Focus tenutasi in Florida (Stati Uniti).

Il composto Elexar EL-1392B è un elastomero a base di copolimero stirenico a blocchi TPE conforme alle direttive RoHS e può essere utilizzato per isolamenti, rivestimenti, prese e connettori pressofusi.

Il prodotto è conforme alle esigenze delle prove alla fiamma specificate nella norma UL 94 V-0 per spessori di 0,06 pollici (1,5mm), ha superato la prova d'infiammabilità verticale VW-1 (Sezione 1080 di UL 1581) con un indice d'ossigeno del 28% per l'isolamento ed il rivestimento, e non presenta sgocciolamento in caso di combustione.

Il composto è caratterizzato da temperature di funzionamento continuo pari a 105°C conforme alla norma UL 1581. I fili realizzati con l'isolamento ed il rivestimento di Elexar EL-1392B hanno superato le prove di resistenza all'olio della durata di 7 giorni ad una temperatura di 60°C.

Le applicazioni raccomandate per il nuovo TPE comprendono i cavi ed i connettori per i dispositivi esterni, gli strumenti elettrici, gli apparecchi, i robot industriali, gli equipaggiamenti di saldatura ed i sistemi audio e di illuminazione d'intrattenimento.

**Teknor Apex Company – Stati Uniti**
**Email**: info@teknorapex.com
**Fax**: +1 401 729 0166
**Website**: www.teknorapex.com

## Utilizzo semplificato degli adesivi PUR

Le nuove unità di fusione PURBlue EC di Nordson Corporation consentono di semplificare l'utilizzo degli adesivi a base di poliuretano reattivo (PUR).

I componenti dell'unità di fusione in contatto con gli adesivi PUR, compresi il serbatoio, la griglia, il serbatoio ed il blocco pompe, possono essere facilmente smontati per le operazioni di pulizia.

Il funzionamento quotidiano è inoltre facilitato grazie ai comandi di facile utilizzo, ad un temporizzatore settimana/giorno e alle interfacce di ingresso/uscita. Il serbatoio può contenere 18kg (39,68 libbre) di cartucce di adesivo da 280mm (11 pollici) di diametro.

**Nordson Corporation – Stati Uniti**
**Fax**: +1 770 497 3656
**Email**: info@nordson.com
**Website**: www.nordson.com

▲ *Línea de estañado de alta velocidad*

# Tenova se dirige a China

Tenova se ha adjudicado un contrato para una nueva línea de estañado electrolítico de alta velocidad con ánodos insolubles de 250.000 toneladas al año en China con Jiangsu Dajiang Metal, del Sunshine Group.

La línea de estañado electrolítico será una de las líneas más veloces del mundo (700m/minuto a la entrada/salida y 550 en la sección de proceso), con una producción anual de 250.000 toneladas.

El fleje de acero tendrá 700-1.250mm de anchura y 0,15-0,55mm de espesor y la línea procesará todas las calidades de acero principales con una variedad de productos que permitirá satisfacer la demanda actual del mercado de productos de alta calidad.

En los últimos años, el departamento de investigación y desarrollo de procesamiento de flejes de Ternium-Siderar en Argentina, junto con el centro de desarrollo de materiales CSM en Italia, ha realizado un proyecto que ha permitido obtener mejoras tecnológicas.

Gracias a su experiencia, Tenova ha patentado un sistema especial aplicado a los reactores de disolución de estaño, que permite tener pérdidas de estaño muy bajas en los lodos (máximo 4%). Esto representa un adelanto tecnológico rentable que paliará problemas económicos y ambientales.

Los ánodos insolubles permitirán gestionar fácilmente la sección de proceso con una mayor seguridad durante las operaciones.

Otra mejora de la calidad de la placa de estaño ha sido obtenida con el desarrollo de plantillas laterales especiales (edge masks).

Estos dispositivos permiten evitar la formación de bordes blancos debidos a un revestimiento excesivo en los bordes cuando se procesan flejes de anchuras diferentes.

El diseño de las plantillas laterales de Tenova facilita el acceso a la celda y su inspección. Tenova prevé entregar la línea electrolítica a Jiangsu Sunshine a finales de 2008.

**Tenova Spa – Italia**
**Fax**: +39 02469 3026
**Email**: info@techint.it
**Website**: www.techint.it

## Vistalon rentable

ExxonMobil Chemical Company ha presentado el caucho Vistalon™ EPM* 722, un producto que puede mejorar de manera rentable la procesabilidad y la flexibilidad del cable en las aplicaciones de alambres y cables de media y baja tensión.

Respecto al caucho EPDM, el producto a base de metaloceno ofrece mejor procesabilidad con prestaciones similares.

Respecto al polietileno reticulado (PE), ofrece mejores prestaciones y una excelente flexibilidad a bajas temperaturas. Además, mejora las propiedades eléctricas respecto a los cauchos EPDM a base de metaloceno. El nuevo producto es suministrado en gránulos, que son limpios y fáciles de usar.

**ExxonMobil Chemical Company – Estados Unidos**
**Fax**: +1 281 870 6353
**Email**: info@exxonmobilchemical.com
**Website**:
www.exxonmobilchemical.com

## Nuevo producto de Rosendahl

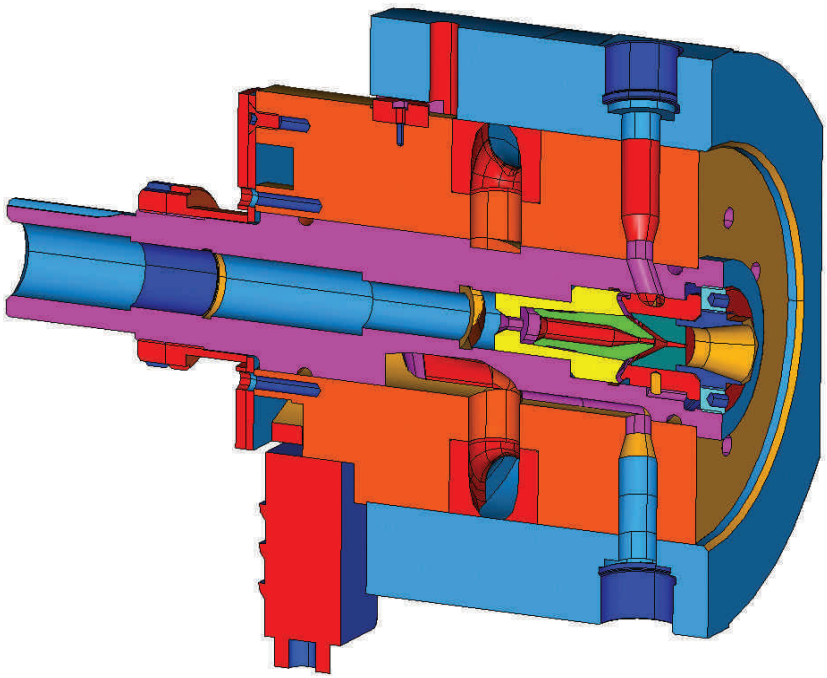
Rosendahl ha ampliado su serie Rocomat con el nuevo Rocomat 5L, diseñado especialmente para la elaboración de materiales retardantes de la llama.

La innovación consiste en la posibilidad de aumentar la productividad, por ejemplo 400l/h de PVC, que es administrada por el sistema mismo.

Rocomat 5L presenta el mismo diseño que el modelo anterior, con un eje giratorio en el cabezal inyector.

El cabezal es más grande con canales más profundos para reducir el aumento de presión.

La extrusora tiene un adaptador más corto que es ventajoso para los materiales retardantes de la llama, dado que el cambio de color ocurre dentro del eje y, por lo tanto, es suficiente enjuagar solamente el compuesto que se encuentra dentro el eje del distribuidor.



▲ *Rosendahl – aumento de productividad*

Además, el proceso requiere tiempos de cambio de color inferiores para los materiales retardantes de la llama.

Esto permite purgar la extrusora no utilizada o usar esta extrusora para un estrato de piel interior. El eje del cambio de color es utilizado también como derivación (bypass) en todas las extrusoras.

Esta solución única se puede aplicar en todas las líneas automotrices Rosendahl. Algunos de los procesos que realizan son: cambio de estrato que requiere dos extrusoras, cambio de piel o tira que requiere tres extrusoras, y cambios de estrato y tira que requiere cuatro extrusoras.

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

## Nuevo elastómero termoplástico de Teknor Apex

Teknor Apex ha presentado un nuevo compuesto denominado Elexar®, un elastómero termoplástico (TPE) que cumple los exigentes requisitos de retardo a la llama de las normas UL. El nuevo producto ofrece una flexibilidad parecida a la del caucho y resistencia a una amplia gama de temperaturas requerida por el cable flexible y el cable industrial.

La división de elastómeros termoplásticos de la compañía ha presentado el nuevo compuesto, llamado Elexar® EL-1392B, durante la conferencia IWCS/Focus celebrada en Florida, Estados Unidos.

El compuesto Elexar EL-1392B es un elastómero basado en copolímeros en bloque de estireno que cumple las directivas de la Unión Europea en materia de restricciones a la utilización de sustancias peligrosas (RoHS) y puede ser usado para aislamientos, cubiertas, y para tomas y conectores moldeados.

El producto cumple los requisitos del ensayo de inflamabilidad especificados en la norma UL 94 V-0 para un espesor de 0,06 pulgadas (1,5mm), ha superado el ensayo de llama vertical VW-1 (Sección 1080 de UL 1581) con un índice de oxígeno de un 28% tanto del aislamiento como de la cubierta, y no presenta goteo cuando se quema. El compuesto ha sido clasificado para el funcionamiento continuo a 105°C según la norma UL 1581. Los alambres con aislamiento y cubierta de Elexar EL-1392B han superado los ensayos de resistencia al aceite de 7 días a 60ºC.

Los usos recomendados del nuevo elastómero termoplástico comprenden cables y conectores para dispositivos externos, herramientas eléctricas, electrodomésticos, robots industriales, equipos de soldar, y sistemas de audio e iluminación de entretenimiento.

**Teknor Apex Company – Estados Unidos**
**Email**: info@teknorapex.com
**Fax**: +1 401 729 0166
**Website**: www.teknorapex.com

## Uso más simple de los adhesivos PUR

Los nuevos fusores de adhesivo PURBlue EC de Nordson Corporation permiten simplificar el uso de adhesivos de poliuretano reactivo (PUR).

Los componentes de los dispositivos de fusión en contacto con los adhesivos PUR, incluidos el tanque, la rejilla, el depósito y el bloque de bombas, pueden ser desmontados fácilmente para las operaciones de limpieza.

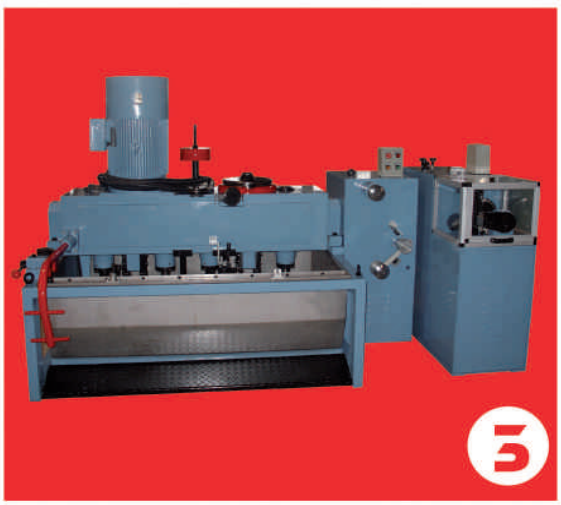
El funcionamiento diario es facilitado por controles simples, temporizador semana/día e interfaces de E/S.

El tanque puede contener 18Kg (39,68lb) de cartuchos de adhesivo de 280mm (11 pulgadas) de diámetro.

**Nordson Corporation – Estados Unidos**
**Fax**: +1 770 497 3656
**Email**: info@nordson.com
**Website**: www.nordson.com

# JIANGSU JINTAILONG

JIANGSU JINTAILONG is the largest equipment manufacturer in China for the steel cord making industry. Over the years we have made high-quality, cost-effective machinery for some of the best-known steel cord producers in the global tyre market. Long-term relationships with our customers have been built upon our proven innovation and our ability to take designs through development and into real-time production. Come to JIANGSU JINTAILONG for high-quality, cost-effective steel cord equipment.



1 plating line

2 dry drawing machine

3 23 Wet drawing machine

4 double twisting strande

5 wet drawing machine

6 wrapping machine


**JIANGSU JINTAILONG MECHANICAL AND ELECTRICAL EQUIPMENT MANUFACTURER**

Address: NO.288 DAQING.E.RD.TAIXING CITY, JIANGSU PROVINCE P.R.CHINA

Area cood: 225400

Tel: 0086-523-7668197

Fax: 0086-523-7760660

Email: jstl@vip.163.com

cellphone: 0086-13905264693

website: www.jsjintai.cn

# Cutting & Welding

Wire cutting is the very model of a simple, straightforward operation. But it has an extraordinary requirement for precision, and always has had.

The highly mechanised, top-speed wire cutter of 2007 can trace a direct connection to the wire shears that enjoyed pride of place in the workshop of an artisan of the middle industrial period. This was a precision tool from its first appearance.

The electronic servo feeder on a modern cut-to-length line ensures that precision to an extraordinary degree, featuring a control with display, speed potentiometer, safety guard and powerful shock absorbers. Guide rollers keep the feedstock straight and perfectly perpendicular to the cut. At the same time, shearing knife clearances can be preset – with a screw adjustment – by hand.

Wire welding, too, was and is a hands-on operation – even if, these days, those hands are on the keyboard of a console. A renowned institute of welding technology declares on its website: "Necessity being the mother of invention, we developed our own."

Butt welding. Spot welding. Arc welding. MIG. TIG. Stick. Orbital. Each serves a special need; and, impressive as it is, this partial list will grow. Welding is an evolutionary process if there ever was one.

Cutting and welding may serve the obverse functions of separating and joining, but they have this in common: they began as bench operations in the service of high ideals of craftsmanship. And they have never lost touch with their origins.


▲ *The Strecker type SS 120*

## Meeting demand for high quality welds

August Strecker has recently increased its contacts in the fastener industry – adding to its 75 years' experience in providing buttwelding equipment to the wire and cable industry. The increase is to meet the demand for a high performance reliable welder to produce excellent weld quality at the feed of individual lines for manufacturing cold-heading wire parts.

A typical machine for this process would be the Strecker type SS 120, working a range of steel wires from 8-24mm in diameter. The welder is mounted on a platform that can be moved into a working position close to the wire ends to be joined. This unit works with two upset cycles to produce welds of high quality (the heat-affected liquid material is almost completely pressed out of the joint), and incorporates an automatic de-burring cycle producing flash-free joints of identical cross-section compared to the original materials.

Another feature is that welding and, if necessary, annealing, can be done on the same working height as often it is not possible to reposition the welded/de-burred wire into annealing clamps on another level.

**August Strecker GmbH & Co KG – Germany**
**Fax**: +49 5431 44221
**Email**: strecker@strecker-limburg.de **Website**: www.strecker-limburg.de

## Unique technical specifications from GEM

Marta System is a CNC integrated resistance welding cell, manufactured by the Italian company GEM. This equipment provides unique technical specifications and, for the first time, joins together the advanced technologies of the electric drive of all the welding heads, replacing the traditional pneumatic cylinders, and medium frequency transformers.

The machine frame consists of two linear axes, with a C welding gun fitted with one upper and one lower electrode.

The maximum working range is 2,300 x 1,250mm – but larger working ranges are available to meet customer specifications.

Both welding heads are fully CNC controlled. They can rotate at 360° around their own axis, and slide vertically.

On the side of the big gun, a smaller scissor gun is fitted with three axes. Even the arms are servo-operated.

▲ *The Marta System from GEM*

The two stations turntable is of the electrical-mechanic cam type, ensuring high repeatability and reliability.

The steel linear slides are of the re-circulating ball type, while the system drive is provided by high efficiency brushless motor (Siemens), coupled with gear boxes and re-circulating ballscrews.

All the slides are protected by suitable dust and spray proof bellows. The machine is fitted with a constant current welding control, with storage of up to 15 different welding programs. Each program can be automatically recalled by the part-program.

The CNC, with integrated PLC, is located in the cabinet.

The programming is made by self-teaching, through an ergonomic terminal, while the cabinet, turntable, guarding, and access door with interlocked switch, are integrated in the frame, so that the machine can be easily loaded/unloaded, reducing the installation and commissioning time. The loading area is protected by a double photoelectric cell barrier.

Marta System's 9 AX gun is especially suitable for assembling of wire and steel products in 2 and 3 dimensions.

**GEM Srl – Italy**
**Fax**: +39 011 9241002
**Email**: rovera@gemwelding.com
**Website**: www.gemwelding.com

## The ideal solution among automatic cutting machines

The new PowerCut 3700 is an automatic cutting machine for measuring and cutting larger round and flat materials.

Its powerful pneumatic cutter head guarantees a clean, perpendicular cut and may be used for a wide range of applications.

Belt drives provide for high performance cable transport and outstanding length precision.

The combination of high transport speed with short cutting cycle times make Schleuniger's new PowerCut 3700 one of the most productive cutting machines on the market.

But productivity is more than just a fast machine.

The PowerCut 3700 is designed with user-friendliness in mind, featuring reliable adjustment of the variable cable guides and easily readable scales as well as a simple, user-friendly programming interface.

A logically and clearly structured user menu with integrated wire and cable library makes operating the PowerCut 3700 simple and intuitive.

The strong pneumatic cutter head with short cutting cycle times and a sturdy high-performance belt-feed transport unit for high pulling forces allow efficient cutting of various materials.

The application possibilities are almost unlimited. Everything – from flexible wires, flat and system cables to profiles and corrugated tubing – is possible.

Flexible interfaces allow full integration of active and passive peripheral machines to make the PowerCut 3700 the core of a fully automatic processing system.

Proven Schleuniger pre-feeding, marking, printing, stacking or coiling solutions can be easily combined to further enhance the processing capabilities of this high-performance cutting machine.

Of course, the PowerCut 3700 can also be used as a powerful stand-alone machine.

**Schleuniger GmbH**
**– Germany**
**Fax**: +49 7234 95 4095
**Email**: info@schleuniger.de
**Website**: www.schleuniger.de

## Core area of expertise – welding

Complete manufacturing solutions with integrated welding processes have been an integral component of Bihler manufacturing technology for more than 40 years. The company has always managed to fulfil the permanently rising demands of a competitive market through the application of innovative new developments and the expansion of existing welding systems. Intelligent welding controls used in conjunction with highly flexible peripherals for greatest process safety and maximum productivity and profitability ensure these ever-changing demands are met.

In addition, customer orientation and regular customer contact have always been of the highest priority at Bihler. Owing to this partnership cooperation the company is able to constantly develop new fields of application.

**Otto Bihler Maschinenfabrik GmbH & Co KG – Germany**
**Fax**: +49 8368 18105 • **Email**: verkauf@bihler.de • **Website**: www.bihler.de

## Resistance welding equipment from CEA SpA

With 51 years experience in the manufacture of industrial arc and resistance welding equipment, CEA (Costruzioni Elettromeccaniche Annettoni) SpA, provides the industry with a wide range of equipment, such as butt welders for drawing mills (models TR9, N12 and SQ120) which are designed for joining, brass, aluminium and copper rods and are recommended for non-heavy duty applications. TR9 and N12 models are supplied, as standard, with an annealing system and four wheel trolleys. The model SQ120 is equipped with a welding control (only upon request) as well as with annealing system and trolley. TR9 model features opening and closing jaws which are controlled by the use of pedals, while both models N12 and SQ120 are fitted with lever operated jaws. Upon request all models of this series can be supplied with a grinding wheel. Lighted magnifying glass is additionally available for model N3.

**CEA SpA – Italy**
**Fax**: +39 0341 42 26 46
**Email**: info@ceaweld.com
**Website**: www.ceaweld.com

## Tecna is spot on with its welding machines

Tecna produces resistance welding machines for use in the construction field. The machines are used for various purposes, including weld wire, grids, iron rods, ferrous and non-ferrous rolled sections.

Welding components for the design and make up of automatic welding systems are also available.

Tecna uses resistance welding technologies (AC single-phase, DC three-phase, medium frequency three-phase, AC medium frequency three-phase, CDW capacitor discharge) in order to get the best results in every production area.

The company also supplies producers of wire welding machines with components such as welding control units, pneumatic cylinders and transformers.

A complete range of transformers, using medium frequency technology, is available, along with traditional single and three-phase transformers. Tecna also produces a suitable range of modular welding machines for integration in welding systems.

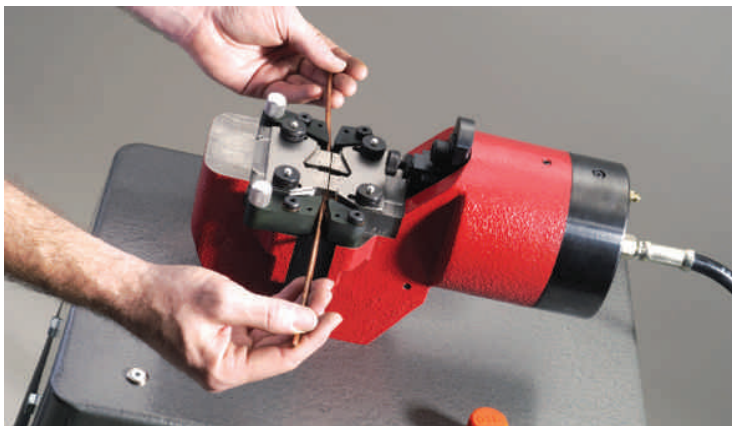

Constant corporate growth, together with the high quality of its products and continuous technological refinement, allows Tecna to be present worldwide.

**Tecna SpA – Italy**
**Fax**: +39 051 6954 490
**Email**: sales@tecna.net
**Website**: www.tecna.net

## Cold comfort

Cold pressure welding offers modern wire and cable manufacturers many benefits.

Compared with electrical welding, the process is quick, clean, 'green' and economical and creates a reliable, permanent weld stronger than the parent material without sacrificing electrical integrity. British company, PWM, designs and manufactures cold welders for a variety of applications.



▲ *The HP100 cold welder is powered by an air/hydraulic intensifier and trolley-mounted for convenience*

Durable, simple to operate and easy to maintain, all PWM machines and dies are precision engineered in the company's own workshops, ensuring total quality control and accountability. PWM's hand-held manual models are ideal for repairing wire breaks quickly and efficiently in confined spaces. Designed to be comfortable to hold and operate, the M10, M25 and M30 machines have capacities of 0.10mm to 1.80mm diameter copper/aluminium.

Trolley-mounted models can be brought to the weld area, saving time, effort and labour. The air/hydraulic HP100 machine has a welding capacity of 1.00mm to 5.00mm on copper/aluminium. The solid steel welding head can be portable, enabling welding to take place where space is very limited, at a strander lay plate for example, or inside a spooler casing.

PWM's larger welders provide an economical method of joining large rod sections.

The powerful P1500, capable of joining large copper rod up to 25mm diameter and aluminium up to 30mm, only requires a small current to drive the hydraulic pump motor. The compact P1000 model, which takes up little factory space due to its small footprint, has a wide capacity of 6mm to 16mm copper and 6mm to 20mm aluminium.

Quick release dies and an easily adjustable die setting mechanism ensure that die changeover is fast and problem-free.

**PWM (Pressure Welding Machines) Ltd – UK**
**Fax**: +44 1233 820591
**Email**: pwm@btinternet.com • **Website**: www.pwmltd.co.uk

## Reducing production time

Sonobond Ultrasonics' ultrasonic splicing technology has significantly reduced production time for a major automotive wire harness manufacturer.

Curt Reynolds, manufacturing director at J&M Products in San Fernando, California, USA, says his company has cut splicing time by 60% since installing Sonobond's SpliceRite™ wire splicers.

J&M Products previously used a mechanical banding and soldering system but wires would sometimes become separated.

Sonobond's SpliceRite™ Ultrasonic Wire Splicer offered J&M Products fast, cost-effective and reliable wiring harness assembly without producing arcs, sparks, or fumes and without the need to crimp, clip, solder, or dip. The SpliceRite™ can also bond oxidised or tinned wires and comes in 1500 and 2500 watt capacity and utilises Sonobond's patented 'Wedge-Reed' system of high vibratory force and low amplitude coupling. Welds can be controlled by height, energy, or time.

The unit's microprocessor is able to interface with a computer via RS232 port.

It can also store and recall up to 250 jobs. Minimal operator training is required.

**Sonobond Ultrasonics – USA**
**Fax**: +1 610 692 0674
**Email**: info@sonobondultrasonics.com
**Website**: www.sonobondultrasonics.com

## Easy-to-operate from Rymer

Rymer Engineering, UK, offers easy-to-operate, wire resistant butt welding machines with a welding range of 0.30mm-9.5mm diameter.

The Microwelder™ range of machines includes the EH and SG series, and is suitable for various materials and adaptable for round, flat, shaped and sections. Grinders are available on both series, with the EH being supplied mounted on a wheeled trolley, while the SG is bench mounted.

**Rymer Engineering – UK**
**Email**:
admin@rymerengineering.info
**Website**:
www.rymerengineering.co.uk

## More efficient and quality service from Tramev

In order to offer customers a more efficient and high quality service, Tramev manufactures wire and rope laying-machines and by-products, shears and special accessories. Cutting, severing, folding and straightening has become an easy operation, with the light and portable tools in the Sommer shears range.

Tramev produces a complete range giving a quick and effective solution for both the production of working with wire, cable, strand, bolts and nuts.

**Tramev – Italy**
**Fax**: +39 031 658 496
**Email**: info@tramev.com
**Website**: www.tramev.com

## Introducing the Unicut from Stema

Stema/Pedax, manufacturers of off-coil machines, has produced a roller type straightening machine called Unicut in 3 models – working up to 12, 14 and 16mm.

The machine can be equipped with a bar collector in various versions and with roller conveyors and collecting pockets for easy evacuation of cut material.


▲ *A standard version Unicut with a two-hook bar collector*

As an option a stress-release-feeding-unit can be added to all three models so that wire with variations in diameter, oval types and uneven stresses can be processed.

**Stema Engineering A/S – Denmark**
**Fax**: +45 4912 7911
**Email**: sales@stema.dk
**Website**: www.stema.dk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## EuroWire – More News, More Features, More Readers

# New machinery & equipment launched in 2007

'New' is a remarkably flexible word.

In an emerging economy, equally it might convey bad (a frivolous luxury item) and good (a piece of equipment whose life expectancy justifies its cost).

In older societies painfully adapting themselves to industries that came into existence only yesterday, new may induce dread. Or hope. Or something in-between.

New may even mean old. Third-world entrepreneurs scour the second-hand markets for antiquated factories to be dismantled and shipped thousands of miles to begin life again in other places.

The word has a special meaning in industries dependent on recycled materials. In a world suddenly and keenly alive to environmental issues, new is a word that loses lustre, and then regains it. Depending on any number of factors, new can mean better – or it can mean worse.

To wire and cable makers, new means newer. Somewhere – in a design studio, a drafting shed, a workshop – the next improvement to machinery and equipment is always taking form, if only in the mind's eye. After extensive research and development and rigorous testing, and not before, it will be featured first in these pages.

In every mature and technically sophisticated industry, the advances year-to-year are probably best appreciated by the people actively engaged in running the machinery of production.

As it happens, such experts abound in wire and cable plants.

Photo: Nexans Deutschland Industries GmbH & Co KG

# new machinery & equipment launched in 2007

## New de-reeler from FUR

The newly designed UWM/ATM 2007 wire de-reeler unit comes into operation for versatile winding tasks in the wire, cable and steel industry. The biggest area of application is the hydraulic hose and heating element industry.

The taping of coils with flat as well as conic flanges is possible, while a new deployed servo motor concept for the main drives and laying guarantee a low-noise and low-vibration run of the machine and a precise layer pitch. Features include touch screen display and automatic stop at wire break or wire ends. High quality coils can be produced at a very high rewinding speed of more than 10m/sec because of the length-measure-device, the laser-flange-scan during the rewinding process and the high-precision controlled de-reeler-brake-system.

The UWM/ATM is designed in modular construction making it possible to use other de-reelers from FUR.

**FUR Wickeltechnologie GmbH – Germany**
**Fax**: +49 30926 9262
**Email**: fur.ruder@t-online.de
**Website**: www.froitzheim-rudert.de

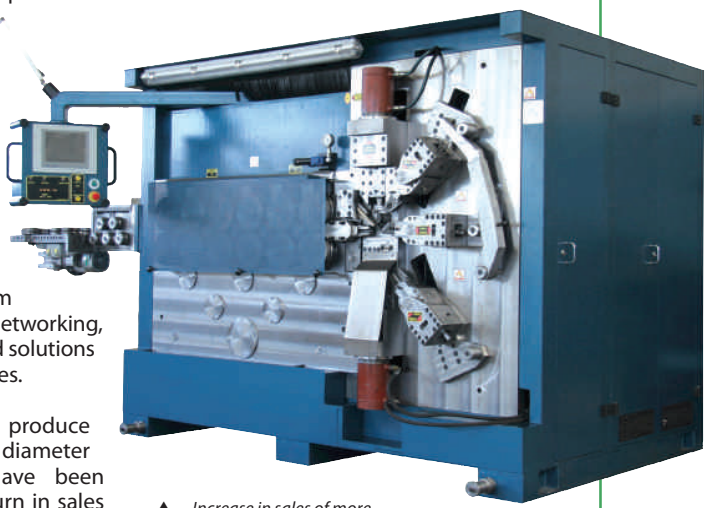
## Springs up to 16mm diameter

Austrian machine manufacturer Fortuna Federn's latest development is the COM-16 CNC multiple axis servo-controlled hydraulic automatic spring making machine – with the capability of producing cylindrical, conical compression and extension springs up to a diameter of 16mm.

Used in conjunction with the newest CNC controlling unit, the COM-16 can be managed from a desktop PC.

This allows the user to monitor the production directly from their desk and with networking, the newest updates and solutions can be viewed in minutes.

The company can produce springs up to 38mm diameter – and its efforts have been rewarded with an upturn in sales of more than 100% during 2007.



▲ *Increase in sales of more than 100% during the last year for Fortuna Federn*

**Fortuna Federn GmbH – Austria**
**Fax**: +43 3465 3704
**Email**: goran@fortunafedern.com
**Website**: www.fortunafedern.com

## Hydropulsor leading the way

Hydropulsor AB, based in Karlskoga, Sweden, is a leading manufacturer of high velocity impact cut off equipment (HVCU). Each model in Hydropulsor's comprehensive line of HVCU equipment uses the adiabatic softening phenomenon and is capable of cutting most metals, round or profile, from bars or coils. The standard line of equipment consists of four models that range in sizes from the HYP30-15, capable of cutting bars or coil from 3-15mm in diameter (equivalent cross section for profile material), to the HYP30-70, capable of cutting bars up to 70mm in diameter (equivalent cross section for profile material).

▲ *Hydropulsor HYP30-15 cut off equipment with automatic bar feeder*

Custom HVCU equipment capable of cutting bars up to 90mm in diameter is also available. All Hydropulsor HVCU equipment can be purchased as stand alone units, or based on each customer's specific needs, each model is offered as a turnkey solution and can include coil pay-off units and straighteners or bar feeders and un-scramblers.

Based on proven performance in industry, Hydropulsor customers know they will receive high quality end cuts, with no burrs, no splits, and minimum pull down. Hydropulsor cut off equipment is environmentally friendly, using no coolants or cutting fluids and produces no scrap in the form of chips. Length or volume tolerances based on effective production rates exceed those found with either saws or shears. Tool life can range into the millions of cuts per die set with over a hundred thousand cuts between each sharpening. Tooling changes from one diameter material to another can take less than 10 minutes.

**Hydropulsor AB – Sweden**
**Fax**: +46 586 649 65 **Email**: info@hydropulsor.com **Website**: www.hydropulsor.com

## 360° check from CPA

A new innovation from CPA Srl is the ability to check the whole screw through 360° for possible impact defects or overlapping threads.

The company already uses high resolution digital cameras to execute dimensional checks to screws and nuts for cracks (eddy current) and for keyhole depth. All of the tests are made on the rotation table, without the need to stop it, using running-up angular stations.

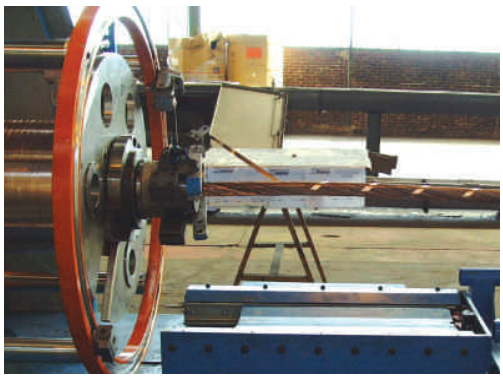
▲ *Dimensional checks from CPA SrL*

**CPA Srl – Italy**
**Fax**: +39 030 707169
**Email**: stefanovigano@cpasrl.it **Website**: www.cpasrl.it

## Gauder's range to suit all needs

The Gauder Group has designed and manufactured a comprehensive range of innovative concentric heads for multi-wire and taping applications.

Pourtier's latest development enables cable manufacturers to enhance their taping/screening process for the production of LV, MV and HV, as well as control and special cables. The 'TEC 630-95-dc' model is used to place a screen, armour or a counter helix on a bundle of insulated conductors – tape or multi-wire – at high speed (up to 600rpm).



▲ *Capacity 30 times greater with Gauder's latest development*

The product capacity of the 630mm reel (600kg) being 30 times greater than one of a single pad used on tangential heads, allows the operator to save 85 minutes for pad change! Other main characteristics are a fine tuned tension control by two AC motors with vector drives (for independent driving of screening/taping head and reel) and an accurate lay length thanks to encoder for precise adjustment to linear speed.

This version proves to be particularly interesting for counter helix application, especially with the double loading 'dc' doubling the product capacity.

As an example, to apply a counter-helix tape of 10mm width and 0.2mm thick around a cable of 20mm diameter with a lay length of 400mm, the length of tape on the reel would be 33,700m, which represents almost three hours of production time at a rotation speed of 500rpm.

**Setic - Gauder Group – France**
**Fax**: +33 4 77 71 10 85
**Email**: sales.setic@gaudergroup.com **Website**: www.gaudergroup.com

## Making it even easier for you!

In January this year, Propack launched Propaflex, designed to guarantee total, high quality protection for all products sold in rolls.

Propaflex is a plastic sheet extruded so as to obtain two different surfaces: the inner one is smooth and clings perfectly to rounded surfaces, the outer one is specially undulated, reduces friction with other materials and is capable of withstanding violent impacts, heavy weights, shocks or compressions.

▲ *Adding the plastic band makes it easier for users*

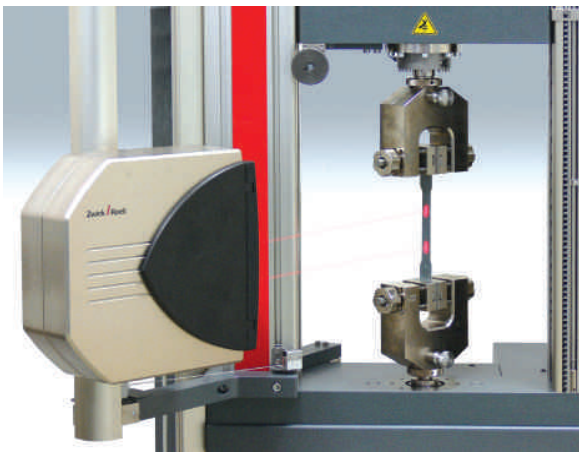
An addition to this is that the company has now put a plastic band on Propaflex to facilitate the packaging of the rolls. Studying the needs of the users, Propack discovered that it was important to have the ability to steady Propaflex when the reel is completely packed. The best way of doing this was to use a plastic band in the Propaflex external surface. This allows the user to roll up the reel with Propaflex and then to easily fasten it with the plastic band.

**Propack SpA – Italy**
**Fax**: +39 011 9507808 **Email**: info@propackgroup.com **Website**: www.propackgroup.com

## Zwick scores top marks for not marking the specimen

The Zwick Roell Group, is pleased to announce that they have developed a new product which will revolutionise the measurement of strain. Designed for both the measurement of young's Modulus and strain at specimen failure using only one device, the world's most technically advanced extensometer laserXtens makes no contact with the specimen under test and requires no specimen marking.

For research and development applications, the laserXtens brings major benefits due to its high resolution, accuracy and flexibility, whilst for production control especially using robot technology, the lack of specimen marking and operator involvement enables cost effective, safe and easy to use operation.



▲ *Zwick's new extensometer has perfect vision – no contact and no marks*

The laserXtens meets class 1 of ISO 9513 (Class B2 of ASTM E83), and is designed to test materials in applications where a contact extenso-meter might be unsuitable due to its physical contact with the specimen or the whiplash experienced at specimen failure.

It also enables the testing of complex component shapes which would preclude the attachment of a traditional contact extensometer.

Due to their mechanical construction traditional clip-on extensometers have limited capability when testing small components. The laserXtens can measure strain with a gauge length as low as 1.5mm. An optional transverse measuring system enables the measurement of r values.

The features of the laserXtens are totally integrated into Zwick's testXpert® software and make the total testing system very powerful and easy to use.

Zwick believes that the laserXtens extensometer will bring major benefits to the metal, composite, plastics, and rubber industry, and component testing in the aerospace, automotive, medical, and the building industry.

**Zwick GmbH & Co KG – Germany**
**Fax**: +49 7305 10200
**Email**: info@zwick.de **Website**: www.zwick.com



## Central taping machine – binding head

The taping machine is designed as a central spinner and is suitable for binding core strand bundles with polyester yarn.

The achievable length of twist of the wound reinforcement helix is in the region of two to four times the diameter of the strand bundles. The maximum inner diameter for strand bundles is 30mm.

▲ *Suitable for binding strand bundles with polyester yarn*

The central taping machine consists of a hollow shaft with a mount for a yarn case and/or a yarn spool. A generously-sized hood enables easy access and changing of the spool.

During operation the spool can be observed through a viewing window and the hood can be opened upwards from the operating side and is electromechanically locked during operation. The central taping machine is available in left and right-handed versions.

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

## New line of systems from SIF

SIFMDC Measuring Devices Control is launching a new line of control and measurement systems for electrical wire and piping production lines. The systems are the result of meticulous planning and extensive research and development into satisfying specific customer requirements.

SIF's new 'STM', mistakenly identified as a spark tester, is actually an advanced control system designed for the in-line testing of the defective insulation of wires and piping. Its highly innovative functions allow excellent testing performance, which offers outstanding product quality and a considerable saving. Developed using microprocessor technology, the STM system guarantees a high level of immunity to noises thanks to a design that groups all of its parts into a single unit: module for generation, regulation and control of frequency, which runs on AC from 50Hz to 3kHz or DC, and a test voltage from 0 to 40kV; module for processing signals, faults, signal I/O, analogue (0-10V or 0-20mA) and digital (RS232 e RS485) communication interfaces; control panel with operator interface module; chain or brush-based probe with protective casing and safety switch.

▲ *New STM from SIF*

Using the five-button operator interface, the user can access a software menu to configure the numerous system functions and test parameters. Through its innovative HPS function, the new 'STM' optimises system performance and allows the user to investigate faults, guaranteeing excellent product quality and a substantial saving thanks to the reduced operator intervention time due to non-existent defects. The STM system can be set to different configurations:

- controlled locally through the on-board operator interface
- controlled remotely via RS485, with on-board operator interface
- controlled via remote operator interface
- controlled remotely via RS485, without operator interface

**SIF sas – Italy**
**Fax**: +39 035 258 011 **Email**: claudio.formenti@sifmdc.com **Website**: www.sifmdc.com

## New machine from Agir

Agir Technologies (Mouton) has designed and manufactured the new SH machine. This machine was built to work very small diameters from 0.10-1mm on heights from a few hundreds millimetres to several millimetres, according to the pin rigidity.

The SH machine can calibrate tungsten carbide drawing dies as well as extrusion dies and any kind of pieces in any hard material like ceramic, silicium carbide that can be worked with diamond. With 50 years' experience, Agir produce small grinding machines MI 110 to the MI 410, recognised as being one of the sturdiest and most competitive machines on the market to manufacture drawing or heading dies.

The range of Mouton grinding machines expanded a year ago with the launch of the MU 210 (small universal grinding machine) aimed, among others, at the manufacturing of dies for the shaving of metal wires.


▲ *Mouton grinding machines range expanded a year ago*

**Agir Technologies – France**
**Fax**: +33 3 80518136
**Email**: ferret@agir-technologies.com
**Website**: www.agir-technologies.com

## Big performance from Micro Products

Designed and built by the Micro Products Company, the new model ADX1 butt welder offers big performance in a small size with reliability and consistency. It is ideal for welding steel wire or rod up to 1" in diameter, in the most cost effective manner, in the toughest work environment. The compact size saves valuable floor space and the new SCR welding and annealing circuits provide unmatched precision and repeatability.

The heavy duty ADX1 butt welder offers these new features:

- weld and anneal in the same plane
- super heavy duty straight slide welding headpiece for superior weld results
- compact heavy duty truck design with space saving foot print
- separate welding and annealing circuits built in with SCR controlled settings from 0-99

**Micro Products Company – USA**
**Fax**: +1 630 7879 360
**Email**: info@microweld.com
**Website**: www.microweld.com

## New soldering experience

Cooper Hand Tools has created a new soldering experience with the WR3M Weller, a winner of the red dot design award for 2007.

This versatile repair station is tailored to the needs and requirements of professional repairs to latest-technology electronic sub-assemblies in industrial production engineering. Three independent tool channels with automatic tool detection guarantees the simultaneous operation of three soldering tools.

▲ *WR3M Weller – winner of the red dot design award for 2007*

Precise temperature control performance at the soldering tip is guaranteed by the digital control electro-technology, together with superior-quality sensor and heat-transfer technology. High-speed measured-value acquisition provides for maximum temperature precision and optimum dynamic temperature performance in load situations. All high-speed micro tools from Weller can be connected, while the new Weller hot air pencil HAP 200 offers increased power.

Further advantages for the user are the USB port and the vacuum channel for pick-up. Innovative special functions such as automatic channel changing, temperature pre-selection buttons for each channel and factory calibration check guarantee high operation simplicity. The big LCD display allows clear information and simple handling.

**Cooper Tools GmbH – Germany**
**Fax**: +49 7143 580 108 **Email**: marketing-europe@cooperhandtools.de
**Website**: www.cooperhandtools.com/europe

## Motor-driven de-coiler HSB 200

Bacchetti sas, Italy, specialises in the design and manufacture of motor-driven de-coilers, both for coils and reels, designed for the wire and cable industry for the feeding of spring making machines, straightening machines and cable cutting machines. The de-coiler HSB 200 has been designed for reels (with maximum diameter 760mm and width 315mm) and for the feeding of high performance wire and cable cutting machines. The de-coiler is designed to allow an easy positioning of the reel between the cones using traditional lifting devices.

The material to de-coil goes from the reel to a first diversion device, and then to a pulley. The rotation of the motor is controlled by this loop-control device. All the operating parameters of the de-coiler can be set on the control panel. The maximum speed is 90rpm and the capacity is 200kg. Also in production the de-coiler HSB 80 will provide a maximum capacity of 80kg.

This new product widens the range of de-coilers with horizontal axis of rotation produced by the company.

**Bacchetti sas – Italy**
**Fax**: +39 04977 3997 **Email**: m.bacchetti@tin.it **Website**: www.bacchetti-amb.com

## New generation from M+E

Many years of development and the adoption of innovative technical solutions has allowed M+E to create its new generation of wet drawing machines, significantly reducing or eliminating many quality and production problems.

Operation of M+E wet wire drawing machines at leading wire manufacturers and with different wire types confirmed excellent quality and productivity increases compared to traditional machines, while keeping the die wear constant.

M+E's wet wire drawing machines are particularly noted for drawing of the following steel wires:

- Brass-coated wire (steel cord, saw wire)
- electrolytic or hot dip galvanised wire
- stainless steel wire
- high quality spring wire

▲ *Quality and technical problems overcome through the years*

The M+E production range includes machines with 2, 4 or 6 cones with a maximum of 12, 25 or 33 dies for a finished wire diameter down to minimum 0.08mm (0.0031"). The main wet drawing machine characteristics are:

- straight wire path, without transfer sheaves
- wire drawing only in one direction
- high ratio between ring diameter and wire diameter
- guaranteed proper wire and dies lubrication during stringing-up
- high pressure individual die cleaning system
- water-cooled final die and final capstan
- robust, anti-vibration steel frame
- heavy duty bearings and cone shafts
- cone shafts especially sealed to prevent bearings damage
- compact design with excellent accessibility during stringing-up
- minimum wire slip percentage on cones
- AC main motor with slip-proof belt transmission
- complete accessibility to all components allowing easy maintenance
- completely pre-wired, with incorporated electrical cabinet
- enclosed design with interlocked safety guards conforming to the most stringent safety regulations

M+E wet drawing machines are supplied complete with wire pay-off and traditional or full automatic spooler, which can be supplied for taking up wire on vertical or horizontal axis spools.

**M+E Macchine + Engineering Srl – Italy**
**Fax**: +39 0341 806002
**Email**: info@meitaly.it
**Website**: www.meitaly.it



EUROwire If you would like your company to be included in either of the following features – '**Reels & spools**' or '**Copper & aluminium cables**' appearing in the January 2008 issue of EuroWire, please send your editorial to david@intras.co.uk

# Power Line Monitoring System for Force and Temperature

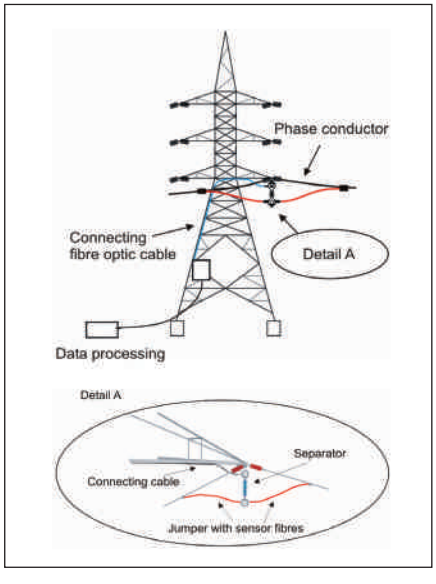
By Reinhard Girbig and Norbert Fink, Draka Comteq Germany GmbH & Co KG, Mönchengladbach, Germany

## 1. Introduction

The deregulation of energy markets with its increasing numbers of wind parks and small power plants is forcing power utilities to look for new strategies in planning and operation of overhead lines.

One of the strategies is the optimisation of power transmission on the existing infrastructure. For such considerations the main parameters are the temperature of the conductor and the mechanical stress of the wire. They determine the existing reserves in transmission capacity limited by the maximum allowed temperature of the metals and the critical sag and ground clearance.

Until now, operation of overhead lines required safety margins for the temperature which is usually evaluated through almost obsolete calculation procedures and assumptions.




▲ **Figure 1**: *Temperature monitoring – Principle set-up*

An economical use of the reserves of an existing line is hardly possible. The presented fibre based overhead line monitoring system allows for on-line and remote measurement of the inner temperature and the mechanical stress of a conductor.

The use of such a system generates a return of investment in very short time on highly loaded lines inside a power grid. High mechanical stress due to ice can also be detected and preventive measures can be taken before the towers collapse.

In addition, it can verify the planning data and assumptions for the construction of grid extensions.

## 2. System Description

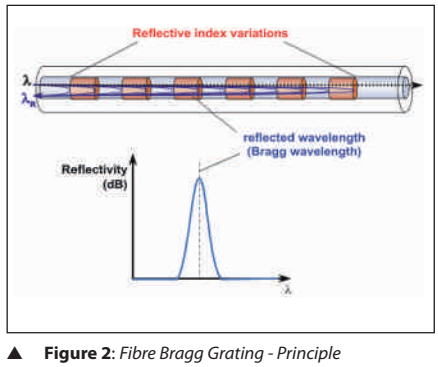
### *2.1 General Overview*

Existing temperature and force monitoring techniques for phase conductors are based either on mechanical or on optical fibre systems. The former have limited lifetime and reliability and are less accurate than optical fibre systems. Fibre systems, so far, use Raman scattering where the ratio of intensity of the Stokes and anti-Stokes line of the scattered spectrum is proportional to the temperature.

For such a system[1], usually a phase conductor has to be replaced by a complete OPPC (Optical Phase Conductor) cable length making the system expensive.

To avoid the installation of a new cable, the presented system uses the correlation between the conductor temperature and temperature of the jumper cable bridging two sections of a line at a tension tower.

Instead of replacing a whole cable length, only a short jumper cable housing a sensor fibre is used.




▲ **Figure 2**: *Fibre Bragg Grating - Principle*

Contrary to the Raman-based fibre system, the sensor is realised as a Fibre Bragg Grating (FBG) using the thermo-optic effect to measure temperature.

One end of the jumper cable is entering a separator where the sensor fibre is spliced to an ordinary fibre leading down the tower for further data transmission; the other end is connected to the phase conductor as usual. *Figure 1* shows the principle of the temperature monitoring system.

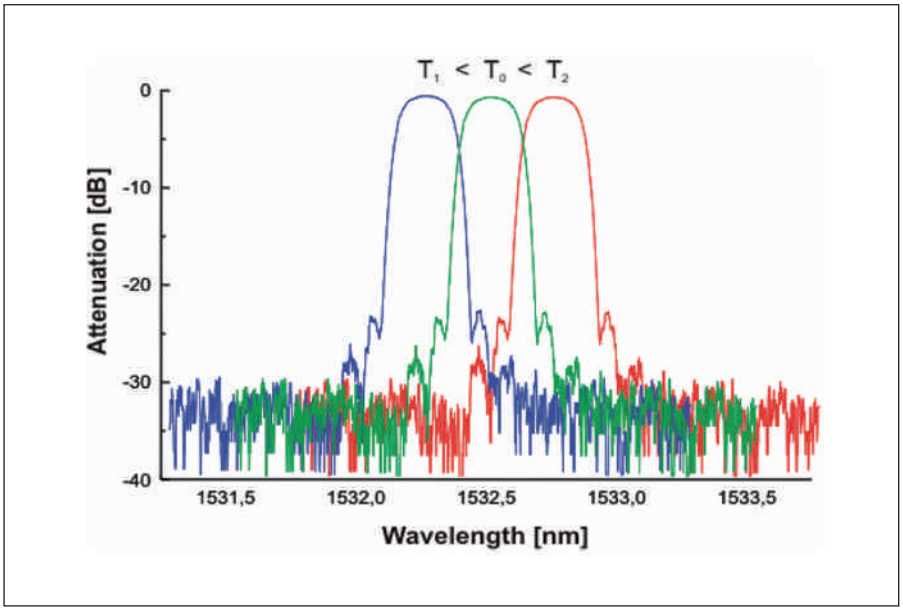
By adding strain sensors, also using FBG technology, and a small weather station mounted on the tower, a complete power line monitoring system has been realised.

The signals from the FBG sensors can be either processed in a small unit mounted to the tower or transported to another location by an optical underground cable or an existing OPGW link.

In both cases, one processing unit can handle signals from several locations.

### *2.2 Fibre Bragg Grating – Principle*

Fibre Bragg Gratings are made by creating a periodic variation in the refractive index of an optical fibre. This can be realised by irradiation of the fibre with intense UV laser light[2,3].




▲ **Figure 3**: *Bragg wavelength shift caused by temperature changes*

Light travelling down such a fibre will be partially reflected at the index variations but only for a small range of wavelengths, where constructive interference occurs, the light will be reflected (*Figure 2*).

The maximum wavelength of the reflected light is the so-called Bragg wavelength:

$$\lambda B = 2 \cdot \Lambda \cdot n^{eff} \quad (1)$$

where Λ is the grating's period and $n^{eff}$ is the effective refractive index.

From the equation(1) it can be deduced that λB is affected by any variation of the grating caused by external influences: strain on the fibre causes changes in both parameters via the elasto-optic effect while temperature alters $n^{eff}$ via the thermo-optic effect.

An example for a wavelength shift caused by temperature changes is given in *Figure 3*. These dependences are used to manufacture very small but highly reliable and precise sensors for strain and temperature [4,5].

### *2.3 System Components*

The following chapters describe in detail the different components of the complete system.

#### *2.3.1 Jumper cable with sensor*

The FBG sensor used for the temperature measurements consists of the FBG itself protected by a 1.5mm diameter stainless steel tube sealed at both ends.

The outgoing fibre is protected by an ordinary plastic tube. The length of the steel tube housing depends on the jumper cable length and ranges from 1.5m to 3m.

To use the sensor efficiently it has to be placed into the core of the jumper cable which is generally of the same type as the phase conductor. In case of the presented system, the phase conductor was a steel/aluminium design with a steel cross section of 39.5mm² and an aluminium cross section of 243.1mm².

Its designation according to EN 50182[6] is 243-AL1/39-ST1A. *Figure 4* shows the cross-sectional view including the FBG sensor.

Another possible way of creating a jumper with an FBG sensor is the use of an OPPC with steel tube design. The sensor can then be placed into the steel tube. In that case, the OPPC design has to be as close as possible to the design of the phase conductor to avoid a correlation mismatch between the conductor and the jumper.

#### *2.3.2 Strain sensor*

The sensor for strain, as already mentioned, is also using FBG sensor technology but is specifically adopted to its main task: strain measurement. It comes in a rectangular shaped housing and is attached to a clevis strap (*Figure 5*).

The existing configuration for the chosen line was using two parallel insulators for anchoring the phase conductor. Therefore, two of the sensors were necessary.

#### *2.3.3 Separator*

For an ordinary power line, the jumper cable is used to bridge the gap between the ends of two phase conductors at a tension tower. It stays on the same high electrical potential as the conductors and transports the same electrical current.

The idea of using a sensor in the jumper raises two questions:

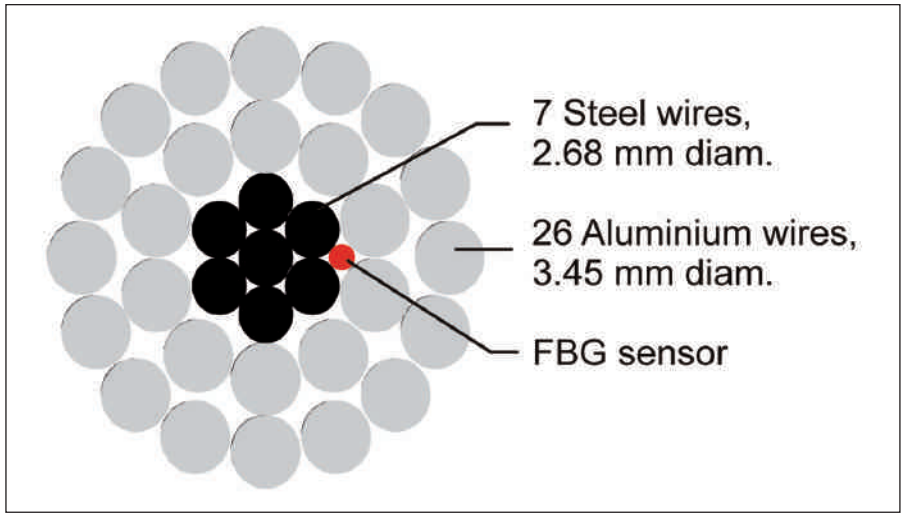
- How is the sensor's fibre end coming down to ground potential?
- Can an uninterrupted current flow be ensured while exiting the sensor's fibre end?

The answer to both questions is simple: Using a specially designed separator, a so-called T-branch type. Separators are normally used to terminate OPPC lines with one cable entry at the 'hot' part. Adding a second entry opposite to the first one results in a T-branch type (*Figure 6*).

A T-branch separator splits the jumper cable into two pieces with two ends allowing for the sensor fibre to exit. Optionally, a second sensor can be used in the other jumper half.

Contrary to the separators for OPPC, the splicing of the sensor fibres to the connecting optical fibre cable can be done on the grounded side of the separator, easing the assembly procedure.

▼ **Figure 4**: *Cross section of 243-AL1/39-ST1A jumper cable including FBG sensor*



▲ **Figure 5**: *FBG strain sensor attached to clevis strap*

▲ **Figure 6**: *T-branch separator*

The electrical current flow is ensured by using appropriate clamps at the entries and a solid aluminium cup.

Short-circuit tests as well as permanent current tests have proven the capability and reliability of the design.

### *2.3.4 Weather station*

In order to complete the monitoring system and to get the relevant environmental data, a small weather station was added. It is independent of a power supply, energised by a solar panel. *Figure 7* shows the weather station mounted on the tower top.

The data, air temperature, humidity, wind speed and direction is transferred to the control computer via a wireless connection.

### *2.3.5 Data processing and control unit*

In order to use the FBG sensors for a monitoring system controlled by an ordinary PC, their wavelength coded optical signals have to be converted into a data stream. Two steps are necessary: first an optical to electrical conversion and finally an A/D conversion. The outgoing data is transferred to a PC via a serial RS232 interface.

The whole µ-processor controlled unit fits into a 19" rack for indoor use or can be delivered in a robust case for outdoor use.

*Figure 8* presents a partial view of the processing unit with four optical fibre cables on the left hand side, carrying the data from the FBG temperature and strain sensors and the outgoing RS232 data.

The monitoring software runs on any PC and can be adopted to the actual situation or needs.

With the data from the weather station sent to the computer, the power line operator gets a comprehensive set of information to manage his lines.

## 3. Field installation

After a simulation of the temperature and strain monitoring system in 2005 which proved the feasibility of the idea, a field installation was performed in April, 2006.

The long time between the feasibility study and the field installation was due to the fact of looking for a power line with an already installed OPPC where a Distributed Temperature System (DTS) based on Raman scattering could be implemented.

After finding an appropriate line and a co-operating power utility, the data of the line and the accompanying conditions were:

- A 110 kV line equipped with a 243-AL1/39-ST1A phase conductor
- Connecting optical underground cable to be blown into a duct between the installation tower and substation building; its length: 1,000m
- Installation time for the connecting cable and system: 2 days, with a 4 hour outage time for the line

In order to fulfill the electrical requirements for the separator, a 123 kV, pollution class IV, T-branch type with a total height of 1.83m and a weight of 33kg was selected. Normally, a separator used on an OPPC line is completely installed on site. But because of the tough time schedule and the sensible work of inserting the FBG sensors into the jumper cables, the jumpers including the separator fixing clamps were already assembled in the plant.

The underground cable blowing was arranged for the first day; that left the second day for the rest of the installation:

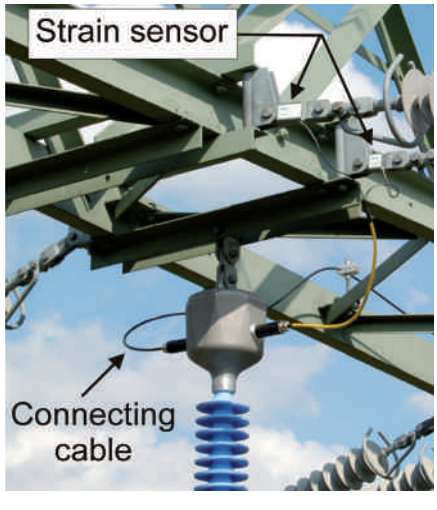
- final assembly of the separator including all splice works and its fixing on the tower

▼ **Figure 7**: *Autonomous, wireless weather station*

▼ **Figure 8**: *Signal processing unit*

▼ **Figure 9**: *Completely assembled separator prior to lifting*


▼ **Figure 10**: *Separator top – details of cable entries*

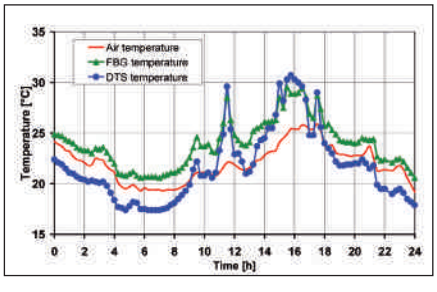


▲ **Figure 11**: *Completely assembled temperature and strain monitoring system*

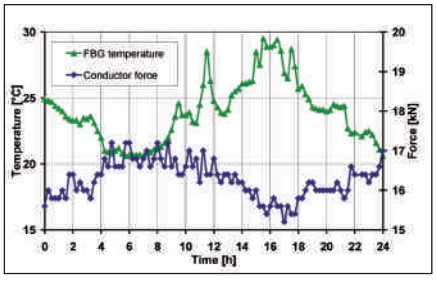
- replacement of the existing extension links by the ones with the FBG sensors
- installation of the weather station on the tower top
- the set-up of the signal processing unit and the computer

The first three items had to be realised within the 4 hour power outage. With the separator completely assembled on the ground including all splice connections to all sensors, the outage time was sufficiently long to finish the work.

The following figures give a picture of the installation: *Figure 9* shows the fully assembled separator including both jumper cables and clevis straps with strain sensors. Details of the separator top with the cable entries and the strain sensors is given in *Figure 10*. The final view of the fully installed temperature and strain monitoring hardware is shown in *Figure 11*.




▲ **Figure 12**: *Comparison between temperatures measured by the different systems*




▲ **Figure 13**: *Correlation between the temperature and the force in the conductor*

## 4. Measurement results

One objective for the field installation was to compare the temperature measurement of the presented system with a system using a DTS on the same power line. Data from both temperature monitoring systems were continuously recorded every 15 minutes and compared with the temperature data from the weather station. *Figure 12* shows the comparison for one day, exemplarily.

Although there is a temperature difference between the systems, the correlation is very good. This behaviour which was observed throughout the whole measurement period of several months justifies the assumption that a local temperature measurement system using FBG sensors in the jumper can predict the temperature behaviour of a whole link.

Another example from the same day presents the correlation between the temperature measured with the FBG sensor and the force in the conductor measured with strain sensor (*Figure 13*).

Although the force in the conductor is not only influenced by the conductor temperature, the general expected behaviour is clearly visible: With increasing temperature, the conductor's elongation increases and hence, the force goes down, and vice versa.

The remaining data, eg wind direction and speed, humidity and electrical current were all recorded but as their relationship with temperature and conductor strain is rather complex, a detailed analysis is still ongoing.

## 5. Conclusions

This demonstrates that a power line monitoring system based on FBG sensors implemented in the jumper is a highly accurate, reliable and cost-efficient system.

The advantages of this monitoring system, its ease of installation, the short power outage time for assembly, its modularity and upgradability makes it an excellent alternative to other systems, eg distributed temperate measurement based on Raman scattering. ■

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**Draka Comteq Germany GmbH & Co KG**
Bonnenbroicher Str 2-14
D-41238 Mönchengladbach
Germany
**Email**: info@draka.com
**Website**: www.draka.com

# Überwachungssystem für Kraft und Temperatur bei Starkstromleitungen

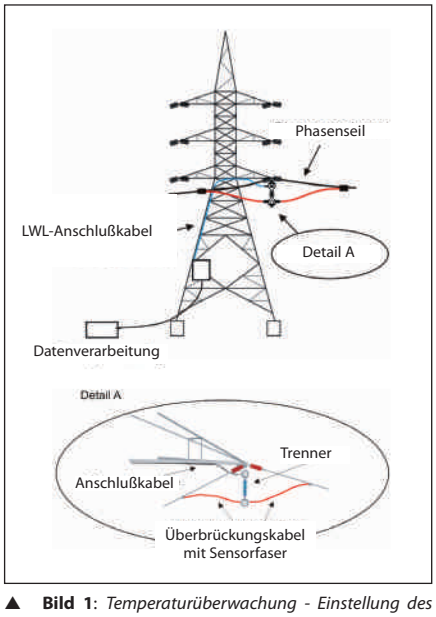
von Reinhard Girbig und Norbert Fink, Draka Comteq Germany GmbH & Co KG, Mönchengladbach, Deutschland

## 1. Einleitung

Die Deregulierung der Energiemärkte mit deren steigender Anzahl an Windparks und kleinen Kraftwerken zwingt Stromversorger zur Suche nach neuen Strategien bei der Planung und beim Betreiben von Freileitungen.

Eine der Strategien liegt in der Optimierung der Stromübertragung durch die bestehenden Infrastrukturen. Bei derartigen Überlegungen stellen die Temperatur des Seils und die mechanischen Belastungen des Drahts die Hauptparameter dar. Diese Parameter bestimmen die vorhandenen Reserven bei der Übertragungskapazität, die durch die genehmigte Höchsttemperatur der Metalle und den kritischen Durchhang und der Bodenfreiheit eingeschränkt sind.

Bisher fordert der Betrieb von Freileitungen Sicherheitsabstände für die Temperaturen,




▲ **Bild 1**: *Temperaturüberwachung - Einstellung des Prinzips*

die meistens durch fast schon als veraltet anzusehende Berechnungsverfahren und Annahmen ermittelt werden. Eine wirtschaftliche Nutzung der Reserven einer bestehenden Leitung ist kaum möglich.

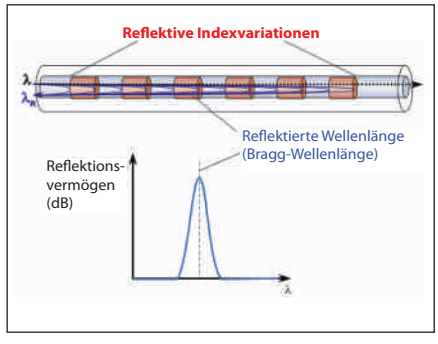
Das beschriebene faserbasierte Freileitungsüberwachungssystem ermöglicht die Online- und Fernmessung der Innentemperatur und der mechanischen Belastungen eines Seils. Die Anwendung eines solchen Systems bewirkt eine Kapitalrendite in sehr kurzer Zeit bei hochbelasteten Leitungen in einem Stromnetz. Hohe mechanische Belastungen aufgrund von Eis können ebenfalls erkannt werden und Vorbeugemaßnahmen ergriffen werden bevor die Maste zusammenbrechen. Darüber hinaus können anhand dieses Systems die Plandaten und -annahmen für den Bau von Netzerweiterungen überprüft werden.

## 2. Systembeschreibung

### *2.1 Allgemeine Übersicht*

Bestehende Techniken im Bereich Temperatur- und Kraftüberwachung für Phasenseile basieren entweder auf mechanischen oder Lichtwellenleiter-Systemen. Die erstgenannten haben eine begrenzte Lebensdauer sowie Zuverlässigkeit und sind ungenauer im Vergleich zu Lichtwellenleiter-Systemen. Bei Fasersystemen benutzt man bis heute Raman-Streuung, wo das Verhältnis der Intensität der Stokes-und Anti-Stokes-Linie des Streuungsspektrums der Temperatur proportional ist. Bei einem solchem System[1] muß das Phasenseil in der Regel durch eine komplette OPPC- (Optical Phase Conductor - Lichtwellenleiter Phasenseil) Kabellänge ersetzt werden, was das System wiederum teuer macht.

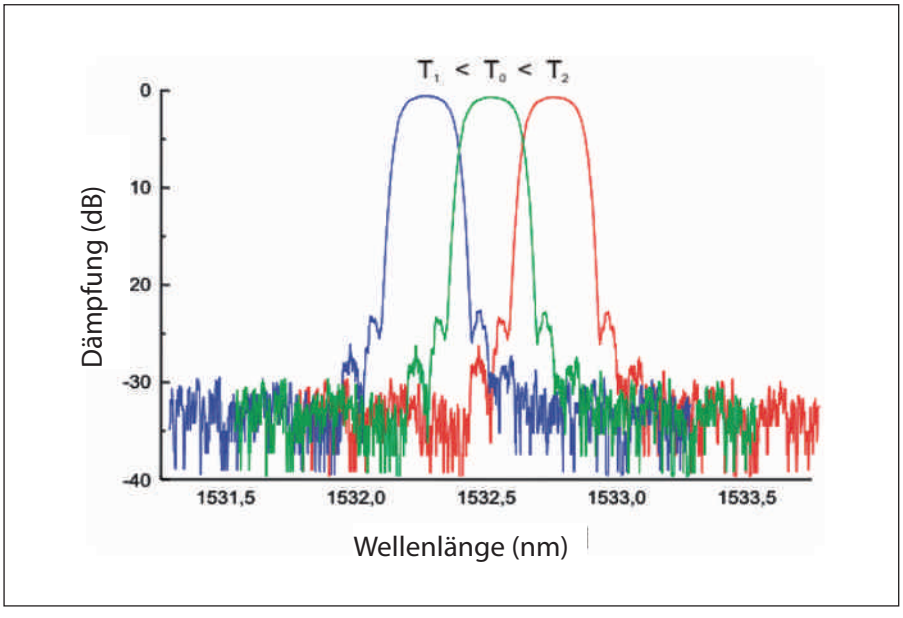
Um die Installation eines neuen Kabels zu vermeiden, nutzt das beschriebene




▲ **Bild 2**: *Faser-Bragg-Gitter – Prinzip*

System die Korrelation zwischen der Seiltemperatur und der Temperatur des Überbrückungskabels, das zwei Kabelabschnitte einer Leitung in einem Spannungsmast überbrückt. Statt eine ganze Kabellänge zu ersetzen, wird lediglich ein kurzes Überbrückungskabel benutzt, das eine Sensorfaser enthält. Im Gegensatz zum Raman-basierten Fasersystem wird der Sensor als ein Faser-Bragg-Gitter (FBG) erzeugt, mit Einsatz der thermooptischen Wirkung, um die Temperatur zu messen. Ein Ende des Überbrückungskabels läuft in einen Trenner, wo die Sensorfaser in eine normale Faser gespleißt wird und abwärts am Mast für weitere Datenübertragungen führt; das andere Ende ist wie immer am Phasenseil angeschlossen. *Bild 1* zeigt das Prinzip des Temperaturüberwachungssystems.

Durch das Hinzufügen von Dehnungssensoren, ebenfalls mit Einsatz der FBG-Technologie, und einer kleinen auf dem Mast montierten Wetterstation, wurde ein komplettes Überwachungssystem der Starkstromleitung realisiert. Die Signale aus den FBG-Sensoren können durch ein optisches erdverlegtes Kabel oder eine bestehende OPGW-Verbindung sowohl in einer kleinen am Mast montierten Einheit bearbeitet oder zu einem anderen Standort transportiert werden. In beiden Fällen kann ein Prozessor Signale aus verschiedenen Standorten behandeln.




▲ **Bild 3**: *Bragg-Wellenlängenverlegung durch Temperaturschwankungen bewirkt*

### *2.2 Faser-Bragg-Gitter – Prinzip*

Faser-Bragg-Gitter werden durch das Kreieren einer periodischen Variation im Brechungsindex eines Lichtwellenleiters hergestellt. Dies kann durch Bestrahlung der Faser mit starkem UV-Laserlicht[2,3] erfolgen.

Das abwärts einer solchen Faser wandernde Licht wird zum Teil bei den Indexvariationen reflektiert, aber nur bei einem kleinen Wellenlängenbereich, wo konstruktive Störungen auftreten, wird das Licht reflektiert (*Bild 2*).

Die höchste Wellenlänge des reflektierten Lichts ist die so genannte Bragg-Wellenlänge:

$$l_B = 2 \bullet L \bullet n_{eff} \quad (1)$$

wo L die Gitterphase ist und $\bullet n_{eff}$ der effektive Brechungsindex. Von der Gleichung(1) kann abgeleitet werden, daß $l_B$ von jeder Änderung des Gitters beeinflußt wird, die durch äußere Einflüsse bewirkt wird: die Faserdehnung bewirkt Änderungen in beiden Parametern durch die elastooptische Wirkung, während die Temperatur den $n_{eff}$-Wert durch die thermooptische Wirkung verändert. Ein Beispiel der durch Temperaturschwankungen bewirkten Wellenlängenverschiebung ist im *Bild 3* dargestellt. Diese Abhängigkeiten werden verwendet, um sehr kleine jedoch im höchsten Maße zuverlässige und genaue Sensoren für Dehnung und Temperatur[4,5] herzustellen.

### *2.3 Systemkomponenten*

In den nachfolgenden Kapiteln werden die verschiedenen Komponenten des gesamten Systems näher beschrieben.

#### *2.3.1 Überbrückungskabel mit Sensor*

Der zur Messung der Temperatur benutzte FBG-Sensor besteht aus dem FBG selbst, der mit einem 1,5mm dicken Edelstahlrohr geschützt und an beiden Enden abgedichtet ist. Die abgehende Faser wird durch ein normales Kunststoffrohr geschützt. Die Länge des Stahlrohrgehäuses hängt von der Länge des Überbrückungskabels ab und liegt zwischen 1,5m und 3m.

Um den Sensor effizient einzusetzen, muß er in die Ader des Überbrückungskabels gelegt werden, die in der Regel dem Phasenseiltyp gleich ist. Im Falle des beschriebenen Systems, hat das Phasenseil einen Stahl-/Aluminiumaufbau, mit einem Stahlquerschnitt von 39,5mm² und einem Aluminiumquerschnitt von 243,1mm². Seine Bezeichnung nach EN 50182[6] ist 243-AL1/39-ST1A. *Bild 4* zeigt eine Schnittdarstellung, einschließlich des FBG-Sensors.

Eine weitere mögliche Art und Weise zur Kreierung eines Überbrückungskabels mit einem FBG-Sensor liegt im Einsatz eines OPPC mit Stahlrohraufbau. Der Sensor kann daher in das Stahlrohr gesetzt werden. In diesem Fall, soll der OPPC-Aufbau so weit wie möglich dem Aufbau des Phasenseils entsprechen, um eine Nichtübereinstimmung der Korrelation zwischen dem Leiter und dem Überbrückungskabel zu vermeiden.

#### *2.3.2 Dehnungssensor*

Bei dem Dehnungssensor wird, wie bereits geschildert, ebenfalls die FBG-Sensortechnologie eingesetzt, jedoch wird sie speziell für deren Hauptaufgabe benutzt, d. h. die Dehnungsmessung. Die Ausführung besteht aus einem rechteckigen Gehäuse und der Sensor ist an einer Gabellasche befestigt (*Bild 5*).

Die bestehende Konfiguration für die ausgewählte Leitung umfaßt zwei parallele Isolatoren zur Verankerung des Phasenseils. Demzufolge sind hier zwei dieser Sensoren erforderlich.

#### *2.3.3 Trenner*

Bei einer normalen Starkstromleitung wird das Überbrückungskabel benutzt um den Abstand zwischen den Enden der zwei Phasenseile an einem Spannungsmast zu überbrücken. Es bleibt bei gleichem hohen elektrischen Potential der Leiter und transportiert denselben elektrischen Strom. Die Idee des Einsatzes eines Sensors im Überbrückungskabel wirft zwei Fragen auf:

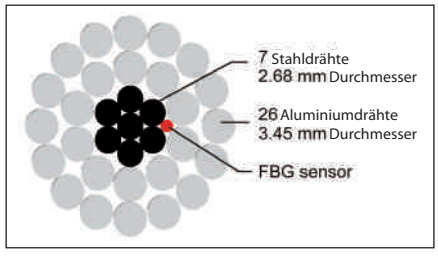
- Wie kommt das Faserende des Sensors zum Erdpotential herunter?
- Kann ein ununterbrochener Stromfluss gesichert werden, während das Faserende des Sensors austritt?

Die Antwort zu beiden Fragen ist einfach: durch Einsatz eines speziell entworfenen Trenners, des so genannten T-Abzweigungstyps. Trenner werden in der Regel benutzt um die OPPC-Linien mit einem Kabeleintritt auf der „heißen" Seite zu beenden. Durch das Hinzufügen eines zweiten Eintritts gegenüber dem ersten, ergibt sich ein T-Abzweigungstyp (*Bild 6*). Ein T-Abzweigungstrenner teilt das Überbrückungskabel in zwei Teile mit zwei Enden und ermöglicht somit den Auslauf der Sensorfaser. Optional kann auch ein zweiter Sensor in der anderen Hälfte des Überbrückungskabels benutzt werden. Im Gegensatz zu den Trennern für OPPC, kann die Spleißung der Sensorfaser zum LWL-Anschlußkabel auf der geerdeten Seite des Trenners erfolgen und somit das Montageverfahren erleichtert werden. Der elektrische Stromfluss wird durch Einsatz geeigneter Klemmen an den Eintritten und einer festen Aluminiumglocke gewährleistet. Kurzschlußtests sowie permanente Stromtests haben die Leistungsfähigkeit und Zuverlässigkeit des Entwurfs erwiesen.

#### *2.3.4 Wetterstation*

Um das Überwachungssystem zu vervollständigen und die entsprechenden Umgebungsdaten zu erhalten, wird eine kleine Wetterstation hinzugefügt, die von einer Stromversorgung unabhängig ist und durch einen Sonnenkollektor versorgt wird.

▼ **Bild 4**: *Querschnitt eines 243-AL1/39-ST1A Überbrückungskabels einschließlich FBG-Sensor*



▲ **Bild 5**: *FBG Dehnungssensor, an der Gabellasche befestigt*

▲ **Bild 6**: *T-Abzweigungstrenner*

*Bild 7* zeigt die auf der Mastspitze montierte Wetterstation. Daten, Lufttemperatur, Feuchtigkeit, Windgeschwindigkeit und -richtung werden zum Überwachungsrechner über eine drahtlose Verbindung übertragen.

### *2.3.5 Datenverarbeitung und Steuereinheit*

Beim Einsatz von FBG-Sensoren für ein Überwachungssystem, das über einen normalen Rechner gesteuert wird, müssen deren wellenlängenkodierten optischen Signale in einen Datenfluß konvertiert werden. Dazu sind zwei Schritte erforderlich: zunächst eine Konversion von optisch zur elektrisch und zuletzt eine A/D-Konversion. Die Ausgangsdaten werden einem Rechner über eine serielle RS232-Schnittstelle übertragen. Die ganze durch µ-Prozessor gesteuerte

Einheit paßt in ein 19-Zoll-Rack für Innengebrauch oder kann in einem robusten Gehäuse für den Außengebrauch geliefert werden. *Bild 8* zeigt eine Teilansicht des Prozessors mit vier Lichtwellenleiterkabeln auf der linken Seite, mit Datenübertragung von den FBG-Temperatur- und Dehnungssensoren und den RS232-Ausgangsdaten.

Die Überwachungssoftware läuft auf jedem Rechner und kann sich der aktuellen Lage oder den Bedürfnissen anpassen. Mit den aus der Wetterstation zum Rechner gesendeten Daten, erhält der Bediener der Starkstromleitung umfassende Informationen um seine Leitungen zu überwachen.

## 3. Feldinstallation

Nach einer Simulation des Temperatur- und Dehnungs-Überwachungssystems im Jahre 2005, welche die Durchführbarkeit der Idee bewies, wurde im April 2006 eine Feldinstallation durchgeführt.

Die lange Zeit zwischen der Studie der Durchführbarkeit und der Feldinstallation ergab sich deswegen, weil man eine Starkstromleitung suchen mußte in der bereits ein OPPC installiert war und wo eine auf Raman-Streuung basierte faseroptische Temperaturmessung (DTS - Distributed Temperature System) implementiert werden konnte.

Nachdem eine geeignete Leitung und eine kooperierende Elektrizitätsgesellschaft gefunden wurden, zeigten die Leitung und die dazugehörigen Bedingungen folgende Daten:

- eine 110 kV Leitung ausgestattet mit einem 243-AL1/39-ST1A Phasenseil.
- Erdverlegtes LWL-Anschlußkabel, das in einen Kanal zwischen dem Installationsmast und dem Umspannwerksgebäude geblasen werden soll; dessen Länge 1000m entspricht.
- Installationszeit für das Anschlußkabel und das System: 2 Tage, mit einer 4-stündigen Ausfallzeit für die Leitung.

Um die elektrischen Anforderungen für den Trenner zu erfüllen, wurde ein 123 kV-Trenner, Verschmutzungsklasse IV, T-Abzweigungstyp mit einer Gesamthöhe von 1,83m und einem Gewicht von 33kg, ausgewählt. In der Regel wird ein in der OPPC-Leitung installierter Trenner komplett vor Ort installiert. Aber wegen des straffen Zeitplans und der empfindlichen Arbeit zur Einführung der FBG-Sensoren in den Überbrückungskabeln, wurden die Überbrückungskabel einschließlich der Befestigungsklammer des Trenners bereits im Werk vormontiert.

Das Blasen des erdverlegten Kabels wurde für den ersten Tag vereinbart; somit konnten am zweiten Tag die übrigen Installationen durchgeführt werden:

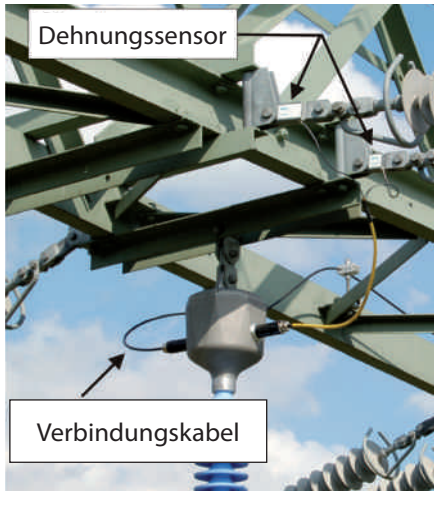
- Endmontage des Trenners einschließlich sämtlicher Spleißarbeiten sowie dessen Befestigung am Mast.

▼ **Bild 7**: *Autonome, drahtlose Wetterstation*

▼ **Bild 8**: *Signalprozessor*

▼ **Bild 9**: *Komplett montierter Trenner vor dem Heben*


▼ **Bild 10**: *Trennerspitze – Detail des Kabeleinlaufs*

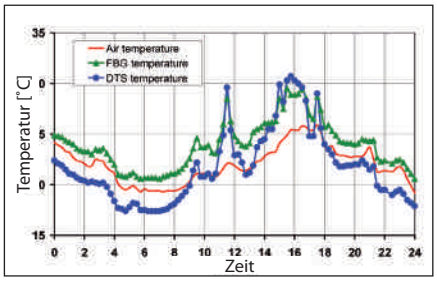


▲ **Bild 11**: *Komplett montiertes Überwachungssystem für Temperatur und Dehnung*

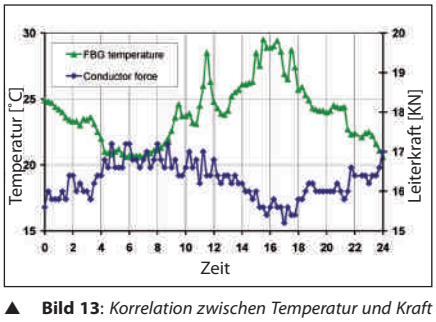
- Ersatz bestehender Erweiterungsverbindungen durch jene mit FBG-Sensoren.
- Installation der Wetterstation an der Mastspitze.
- Einstellung des Signalprozessors und des Rechners.

Die ersten drei Positionen mußten innerhalb des 4-stündigen Stromausfalls durchgeführt werden. Mit dem komplett am Boden montierten Trenner, einschließlich sämtlicher Spleißverbindungen zu allen Sensoren, war die Ausfallzeit lang genug um die Arbeit zu beenden.

Folgende Bilder zeigen die Installation: *Bild 9* zeigt den komplett montierten Trenner, einschließlich Überbrückungskabel und Gabellasche mit Dehnungssensoren. Details über die Trennerspitze mit den Kabeleinläufen und den Dehnungssensoren sind in *Bild 10* beschrieben.




▲ **Bild 12**: *Vergleich zwischen den durch verschiedene Systeme gemessenen Temperaturen*




▲ **Bild 13**: *Korrelation zwischen Temperatur und Kraft im Leiter*

Die Endansicht der vollinstallierten Temperatur- und Dehnungsüberwachungs-Hardware ist in *Bild 11* dargestellt.

## 4. Ergebnisse der Messungen

Eine Zielsetzung für die Feldinstallation bestand darin, die Temperaturmessungen des beschriebenen Systems mit einem System zu vergleichen, das DTS auf der gleichen Starkstromleitung einsetzt. Die Daten aus beiden Temperaturüberwachungssystemen wurden kontinuierlich alle 15 Minuten erfaßt und mit den Temperaturdaten aus der Wetterstation verglichen. *Bild 12* zeigt den Vergleich für einen Tag, exemplarisch.

Obwohl sich ein Temperaturunterschied zwischen den Systemen ergibt, ist die Korrelation sehr gut. Dieses Verhalten, das während der gesamten Messdauer von mehreren Monaten beobachtet wurde, rechtfertigt die Annahme, daß ein lokales Temperaturmesssystem mit Einsatz von FBG-Sensoren im Überbrückungskabel, das Temperaturverhalten einer ganzen Verbindung vorhersagen kann. Ein weiteres am gleichen Tag beobachtetes Beispiel zeigt die Korrelation zwischen der mit FBG-Sensor gemessenen Temperatur und der mit einem Dehnungssensor gemessenen Kraft im Leiter (*Bild 13*).

Obwohl die Kraft des Leiters nicht von der Temperatur des Leiters beeinflußt wird, ist das allgemein erwartete Verhalten klar sichtlich: mit steigender Temperatur, erhöht sich die Verlängerung des Leiters und demzufolge nimmt die Kraft ab und umgekehrt. Die verbleibenden Daten, d. h. Windrichtung und -geschwindigkeit, Feuchtigkeit und elektrischer Strom wurden zwar alle erfaßt, aber da deren Verhältnisse zur Temperatur und zur Leiterdehnung ziemlich kompliziert sind, ist eine detaillierte Analyse immer noch in Bearbeitung.

## 5. Schlussfolgerungen

Hiermit wird bewiesen, daß ein Überwachungssystem einer Starkstromleitungen, das auf mit Überbrückungskabeln implementierten FBG-Sensoren basiert, ein sehr genaues, zuverlässiges und preiswertes System ist. Die Vorteile dieses Überwachungssystem, seine einfache Installation, die kurze Stromausfallzeit für die Montage, seine Modularität und Ausbaufähigkeit machen aus diesem System eine exzellente Alternative zu anderen Systemen, wie z. B. der faseroptischen Temperaturmessung basierend auf Raman-Streuung. ■

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**Draka Comteq Germany GmbH & Co KG**
Bonnenbroicher Str 2-14
D-41238 Mönchengladbach
Deutschland
**Email**: info@draka.com
**Website**: www.draka.com

# Система контроля натяжения и температуры проводов линий электропередачи

Рейнхард Гирбиг и Норберт Финк, компания «Драка комтек Джермани ГмбХ & Ко КГ» (г. Мёнхенгладбах, Германия)

## 1. Введение

Либерализация рынков энергоресурсов, сопровождающаяся увеличением числа ветроэнергетических парков и небольших электростанций, заставляет энергетические компании искать новые подходы к проектированию и эксплуатации воздушных линий электропередачи.

Один из таких подходов состоит в оптимизации передачи электроэнергии с использованием существующей инфраструктуры. Основными параметрами при его рассмотрении являются температура проводника и механическое напряжение провода. Они определяют наличие резервов в пропускной способности, которая ограничивается максимально допустимой температурой металлов, критической величиной провисания проводов и воздушным промежутком.

До сих пор для эксплуатации воздушных линий электропередачи требуется запас надежности по температуре, которая в настоящее время обычно определяется с использованием фактически устаревших методик расчетов и допущений. Хозяйственное использование резервов существующих линий практически невозможно.

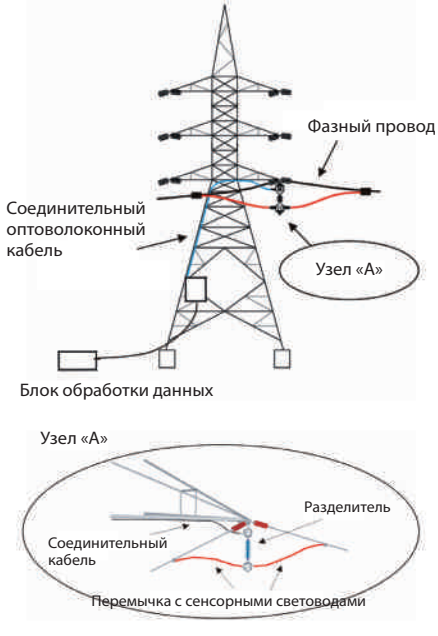
Представленная оптоволоконная система контроля воздушных линий позволяет производить дистанционное измерение внутренней температуры и механического напряжения проводника в режиме реального времени. Использование такой системы на линиях с высоким уровнем нагрузки внутри электроэнергетической сети обеспечивает окупаемость инвестиций в очень короткие сроки. Она также позволяет обнаружить высокое механическое напряжение, возникающее из-за гололедной нагрузки, что дает возможность принять предупредительные меры, чтобы исключить повреждение опор. К тому же система помогает проверить планируемые показатели и допущения для расширения электроэнергетической сети.

## 2. Описание системы

### *2.1 Общий обзор*

Существующие способы контроля температуры и механических напряжений в фазных проводах основаны на использовании механических или оптоволоконных систем. Срок эксплуатации и надежность механических систем ограничены, а их точность ниже, чем у оптоволоконных. В оптоволоконных системах в настоящее время используется эффект рамановского рассеяния, при котором отношение интенсивности стоксовой и антистоксовой линии в рассеянном спектре пропорционально температуре. При использовании такой системы [1] обычно приходится полностью заменять фазный провод по всей длине на оптический кабель в фазном проводе (ОКФП), что приводит к удорожанию всей конструкции.

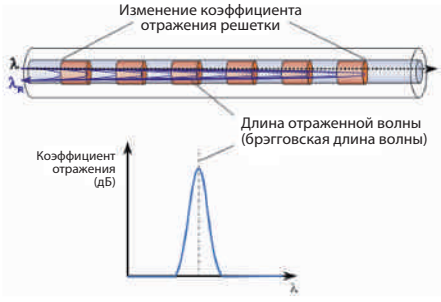
Предлагаемая система использует корреляционную связь между температурой проводника и температурой кабельной перемычки, соединяющей две части линии на анкерной опоре, что позволяет обойтись без монтажа нового провода. Вместо замены всего отрезка кабеля задействуется лишь короткая кабельная перемычка, внутри которой находится сенсорный световод. В отличие от оптоволоконной системы, в которой используется эффект Рамана, датчик выполнен на основе




▲ **Рис. 1.** *Система контроля температуры. Принципиальная схема*

волоконной брэгговской решетки (ВБР), использующей термооптический эффект для измерения температуры. Один конец кабельной перемычки заходит в разделитель, где сенсорный световод стыкуется с обычным волокном, идущим вниз по опоре и служащим для дальнейшей передачи данных, а другой конец соединяется с фазным проводом в обычном порядке. Принципиальная схема системы контроля температуры представлена на рис. 1.

За счет дополнительной установки тензодатчиков, также использующих технологию ВБР, и небольшой метеостанции, монтируемой на опоре, была получена комплексная система контроля линии электропередачи. Сигналы, поступающие от датчиков на основе ВБР, могут или обрабатываться




▲ **Рис. 2.** *Волоконная брэгговская решетка. Принцип действия*

компактным устройством, смонтированным на опоре, или передаваться в другое место по подземному оптоволоконному кабелю или по имеющемуся оптическому кабелю, встроенному в грозозащитный трос (ОКГТ). В обоих случаях одно устройство обработки данных может обрабатывать сигналы, поступающие с нескольких точек.

### *2.2 Волоконная брэгговская решетка. Принцип действия*

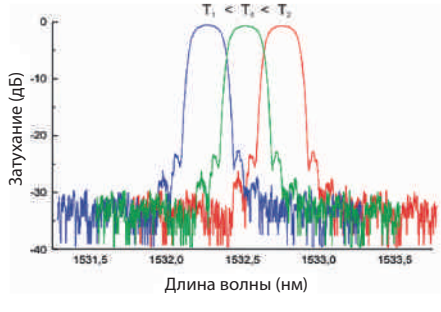
Волоконные брэгговские решетки основаны на периодическом изменении показателя преломления оптического волокна. Это достигается путем облучения волокна интенсивным излучением УФ-лазера [2,3]. Свет, проходящий по такому волокну, частично отражается на полосах решетки с чередующимся показателем преломления, но полное отражение происходит только в узком диапазоне волн, в котором наблюдается аддитивная интерференция (рис. 2).

Максимальная длина волны отраженного света представляет собой так называемую брэгговскую длину волны:

$$\lambda_B = 2 \cdot \Lambda \cdot n_{eff} \qquad (1)$$

где Λ - период решетки, а neff – эффективный показатель преломления. Из уравнения (1) следует, что любое изменение параметров решетки под воздействием внешних факторов влияет на $\lambda_B$.

▼ **Рис. 3.** *Сдвиг брэгговской длины волны, вызванный изменением температуры*




Механические напряжения в волокне приводят к изменению обоих параметров вследствие эластооптического эффекта, в то время как изменение величины $n_{eff}$ при изменении температуры обусловлено термооптическим эффектом.

Пример изменения длины волны, вызванного изменением температуры, представлен на рис. 3.

Такая зависимость используется для изготовления миниатюрных, но высоконадежных и точных датчиков деформации и температуры [4,5].

### *2.3 Основные компоненты системы*

В последующих разделах содержится подробное описание различных компонентов законченной системы.

#### *2.3.1 Кабельная перемычка с датчиком*

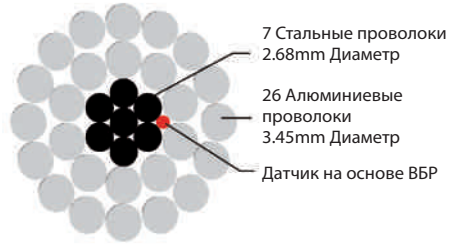
Датчик на основе ВБР, используемый для измерения температуры, состоит из собственно ВБР, заключенной в запаянную с обоих концов трубку из нержавеющей стали диаметром 1,5 мм. Отходящее оптоволокно защищено обычной пластиковой трубкой. Длина кожуха из нержавеющей стали зависит от длины кабельной перемычки и варьируется от 1,5 м до 3 м.

Для обеспечения эффективного использования датчика он должен быть помещен в сердцевину кабельной перемычки, которая обычно бывает того же типа, что и фазный провод. В представленной системе использовался сталеалюминевый фазный провод со стальным сердечником сечением 39,5 мм$^2$ и наружным слоем из алюминия сечением 243,1 мм$^2$. По стандарту EN 50182 [6] он имеет обозначение 243-AL1/39-ST1A. На рис. 4 представлен его вид в разрезе вместе с датчиком на основе ВБР.

Другим возможным способом создания перемычки с датчиком на основе ВБР является использование конструкции ОКФП в стальной трубке. При этом датчик также может быть установлен в стальной трубке. В этом случае конструкция ОКФП должна быть максимально приближена к конструкции фазного провода, чтобы избежать рассогласования между проводом и перемычкой.

#### *2.3.2 Тензодатчик*

В тензодатчике, как уже указывалось, также используется сенсорная технология на основе ВБР, однако он подвергся специальной модификации для выполнения своей главной задачи – измерения механических напряжений проводника. Тензодатчик выпускается




▲ **Рис. 4.** *Перемычка из кабеля 243-AL1/39-ST1A вместе с датчиком на основе ВБР. Вид в разрезе*

▲ **Рис. 5.** *Тензодатчик на основе ВБР, прикрепленный к вилкообразной стыковой накладке*

в корпусе прямоугольной формы и крепится к вилкообразной стыковой накладке (рис. 5).

В нашем случае на выбранной линии для крепления фазного провода использовалась конструкция с двумя параллельными изоляторами. В этой связи потребовались два датчика.

#### *2.3.3 Разделитель*

На обычной линии электропередачи кабельная перемычка используется для соединения двух концов фазных проводов на анкерной опоре. Она находится под таким же высоким напряжением, как и провода, и проводит такой же ток. Идея использования в перемычке датчика вызывает два вопроса:

- Как отвести оптоволокно от датчика к участкам с нулевым потенциалом?
- Можно ли обеспечить свободное прохождение электрического тока, идущего с места отвода оптоволокна от датчика?

На оба вопроса есть простой ответ: путем использования специального разделителя – так называемого тройника. Разделители обычно используются для концевой заделки линий ОКФП с одним кабельным вводом, подключенным к цепи под напряжением. Добавив второй ввод напротив первого ввода разделителя, получаем тройник (рис. 6).

Тройник делит кабельную перемычку на две части с двумя концами, что позволяет вывести сенсорный световод. По желанию во второй половине перемычки может быть установлен дополнительный датчик.

В отличие от разделителей для ОКФП, подсоединение сенсорных световодов к оптоволоконному кабелю может быть произведено в заземленной части разделителя, что упрощает процедуру монтажа. Протекание электрического тока обеспечивается за счет использования соответствующих зажимов на вводах и цельноалюминиевой крышки. Испытания на короткое замыкание, а также испытание на непрерывность прохождения электрического тока подтвердили работоспособность и надежность конструкции.

### *2.3.4 Метеостанция*

Для построения комплексной системы контроля и получения необходимых данных об окружающей среде была дополнительно установлена небольшая метеостанция. Она не зависит от наличия источника электроэнергии, так как оборудована солнечной батареей. На рис. 7 показана метеостанция, установленная в верхней части опоры.

Данные о температуре воздуха, влажности, скорости и направлении ветра передаются на управляющий компьютер с помощью беспроводной связи.

### *2.3.5 Блок управления и обработки данных*

Для использования датчиков на основе ВБР в системе контроля, управляемой обычным персональным компьютером, передаваемые с них спектрально закодированные оптические сигналы должны быть преобразованы в поток данных. Предусматриваются два этапа обработки сигналов: сначала преобразование сигнала из оптического в электрический и, наконец, преобразование аналогового сигнала в цифровой. Исходящие данные передаются на персональный компьютер через последовательный интерфейс RS232. Блок с микропроцессорным управлением целиком размещается в 19-дюймовой стойке для использования в помещении или может поставляться в защищенном корпусе для использования вне помещения.

◀ **Рис. 6.** *Тройниковый разделитель*

На рис. 8 представлен частичный вид блока обработки данных, слева видны четыре оптоволоконных кабеля, по которым передаются данные, поступающие от датчиков температуры и деформации на основе ВБР, и исходящие данные, передаваемые через интерфейс RS232.

Программное обеспечение системы контроля может работать на любом ПК и может адаптироваться под конкретные условия или требования. Вместе с данными, передаваемыми на компьютер с метеостанции, оператор линии электропередачи получает всеобъемлющую информацию для управления ЛЭП, находящимися в его ведении.

## 3. Практическая установка

После проведенного в 2005 году моделирования системы контроля температуры и натяжения проводов, которое подтвердило осуществимость идеи, в апреле 2006 года была выполнена ее практическая установка. Причиной долгого перерыва с момента подготовки технико-экономического обоснования до практического монтажа системы стал поиск ЛЭП с уже установленной линией ОКФП, где можно было бы установить распределенную систему контроля температуры (РСКТ) на основе рамановского рассеяния.

После того как была найдена подходящая ЛЭП и получено согласие готовой к сотрудничеству электроэнергетической компании, были определены характеристики линии электропередачи и сопутствующие условия:

- ЛЭП 110 кВ, использующая фазный провод 243-AL1/39-ST1A;
- соединительный подземный оптический кабель, прокладываемый методом вдувания в кабельный канал между опорой, на которой следовало установить аппаратуру, и зданием подстанции, длиной 1000 м;
- время монтажа соединительного кабеля и аппаратуры – 2 дня, с четырехчасовым снятием напряжения с ЛЭП.

Для выполнения требований к электрическим параметрам разделителя был выбран разделитель тройникового типа на 123 кВ, категория загрязнения IV, общей высотой 1,83 м и весом 33 кг. Обычно разделитель, используемый на линии ОКФП, полностью монтируется на площадке. Но из-за жесткого графика и сложности работы по вставке в кабельные перемычки датчиков на основе ВБР, перемычки, включая зажимы для крепления разделителя, были заранее собраны на заводе.

▲ **Рис. 7.** *Автономная метеостанция с беспроводной связью*

▲ **Рис. 8.** *Блок обработки сигналов*

Вдувание подземного кабеля было запланировано на первый день, в результате чего второй день был полностью отведен на остальные монтажные работы:

- окончательную сборку разделителя, включая его монтаж на опоре и все работы по соединению кабеля;
- замену установленных промежуточных звеньев на звенья с датчиками на основе ВБР;

▼ **Рис. 9.** *Разделитель в сборе перед подъемом*

- монтаж метеостанции в верхней части опоры;
- настройку блока обработки сигналов и компьютера.

Первые три задачи должны были быть выполнены в течение тех 4 часов, на которые отключалось напряжение.

Так как разделитель был полностью собран на земле, включая необходимые подсоединения ко всем датчикам, времени, отведенного на отключение напряжения, было вполне достаточно для завершения работы.Приведенные ниже фотографии дают представление о процессе монтажа: На рис. 9 представлен полностью собранный разделитель с обеими кабельными перемычками и вилкообразными стыковыми накладками с тензодатчиками.

На рис. 10 показана верхняя часть разделителя с кабельными вводами и тензодатчиками.

Окончательный вид полностью установленного оборудования для контроля температуры и натяжения проводов представлен на рис. 11.

## 4. Результаты измерений

Одной из целей установки аппаратуры было сравнение результатов измерения температуры, произведенного представленной системой и системой, использующей РСКТ, на одной и той же линии электропередачи. Данные, полученные с использованием обеих систем контроля температуры, постоянно регистрировались с 15-минутным интервалом и сравнивались с температурными данными, полученными с метеостанции.

▼ **Рис. 10.** *Верхняя часть разделителя с кабельными вводами*


▲ **Рис. 11.** *Система контроля температуры и натяжения в сборе*

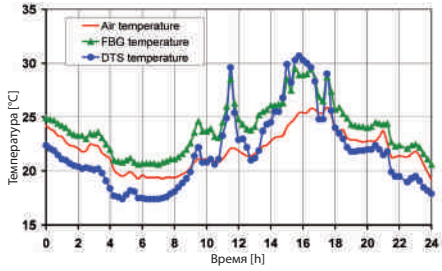
На рис. 12 в качестве примера представлены сравнительные результаты измерений за одни сутки. Несмотря на разницу в температурных показаниях двух систем, корреляция очень хорошая. Динамика данных, отмеченная на протяжении нескольких месяцев измерений, подтверждает предположение, что система локального измерения температуры с использованием установленных в кабельной перемычке датчиков на основе ВБР позволяет прогнозировать характер изменения температуры на всем участке.

Другим примером данных, полученных за те же сутки, является соотношение между температурой, измеренной с использованием датчика на основе ВБР, и силой натяжения проводника, измеренной тензодатчиком (рис. 13).

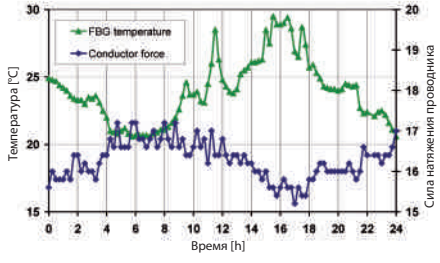
Хотя сила натяжения проводника зависит не только от его температуры, общая ожидаемая динамика очевидна: с повышением температуры увеличивается длина проводника, и, следовательно, уменьшается сила натяжения и наоборот. Остальные данные, например, направление и скорость ветра, влажность и сила тока, также регистрировались, но так как их взаимосвязь с температурой и механическими напряжениями в проводнике достаточно сложна, их детальный анализ в настоящее время продолжается.

## 5. Выводы

Вышесказанное свидетельствует о том, что система контроля линии электропередачи, созданная с использованием вмонтированных в кабельную перемычку датчиков на основе ВБР, является высокоточной, надежной и экономичной. Преимуществами этой системы контроля являются простота монтажа, короткое время отключения напряжения для установки, модульная конструкция и возможность модернизации, что делает ее прекрасной альтернативой другим системам, например, распределенной системе контроля температуры на основе рамановского рассеяния. ■




▲ **Рис. 12.** *Сравнение результатов измерений температуры разными системами*




▲ **Рис. 13.** *Соотношение между температурой и силой натяжения проводника*

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**«Драка комтек Джермани ГмбХ & Ко. КГ»**
Германия, г. Мёнхенгладбах, D-41238, Бонненбройхер штрассе, 2-14
**Адрес электронной почты**: info@draka.com
**Web-страница**: www.draka.com

# Système de contrôle de la force et de la température dans les lignes d'alimentation électrique

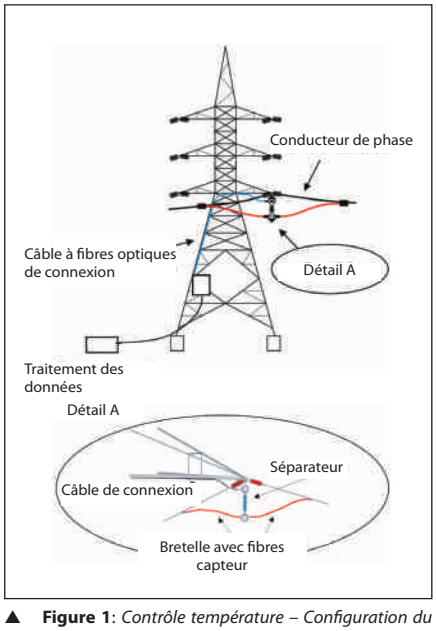
Par Reinhard Girbig et Norbert Fink, Draka Comteq Germany GmbH & Co KG, Mönchengladbach, Allemagne

## Introduction

La déréglementation des marchés de l'énergie, caractérisés par un nombre croissant de parcs éoliens et de centrales électriques de petites dimensions, pousse les services d'énergie à trouver de nouvelles stratégies pour la conception et le fonctionnement des lignes aériennes.

L'une de ces stratégies consiste à optimiser la transmission d'électricité sur les infrastructures existantes. Dans ce cas, les paramètres principaux sont représentés par la température du conducteur et les sollicitations mécaniques du fil.

Ces paramètres déterminent les réserves existantes de la capacité de transmission, limitée par la température maximale admissible des métaux ainsi que la flèche critique et la distance au sol.




▲ **Figure 1**: *Contrôle température – Configuration du principe*

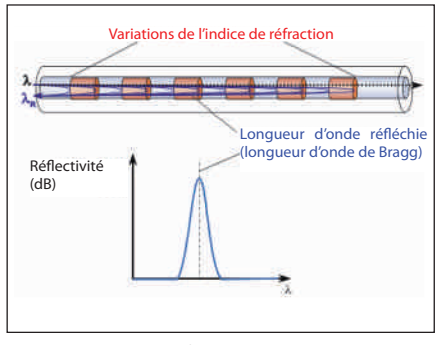
Jusqu'à aujourd'hui on a déterminé les marges de sécurité de la température pour le fonctionnement des lignes aériennes, généralement évalué au moyen de méthodes de calcul et d'hypothèses quasi désuètes, et une utilisation économique des réserves d'une ligne existant déjà est quasi impossible.

Le système de contrôle des lignes aériennes illustré dans cet article, se base sur les fibres optiques et permet d'effectuer la mesure en ligne et à distance de la température interne et des sollicitations mécaniques d'un conducteur. L'utilisation de ce système entraîne un retour sur investissement dans un temps très bref sur les lignes très chargées à l'intérieur d'un réseau électrique. Il est également possible de relever les sollicitations mécaniques élevées causées par la glace, permettant ainsi d'adopter des mesures préventives avant le chargement excessif et l'effondrement des pylônes électriques. En outre, le système permet de vérifier les données de planification et les hypothèses pour la construction d'éventuelles extensions du réseau.

## 2. Description du Système

### *2.1 Vue d'ensemble générale*

Les techniques de contrôle de la température et de la force existant déjà pour les conducteurs de phase se basent sur des systèmes mécaniques ou des systèmes à fibres optiques. Les premiers sont caractérisés par une longévité et une fiabilité limitées et sont moins précis par rapport aux systèmes à fibres optiques. Ces derniers, jusqu'à présent, ont utilisé la dispersion Raman où le rapport entre l'intensité des lignes de Stokes et d'Anti-Stokes du

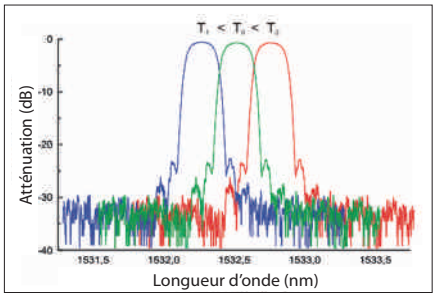



▲ **Figure 2**: *Grille de fibres de Bragg - Principe*

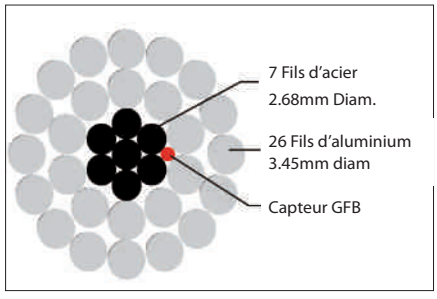
spectre dispersé est proportionnel à la température. Généralement, pour réaliser ce type de système[1], il faut remplacer un conducteur de phase par une longueur complète de câble conducteur de phase à fibres optiques (OPPC ou Optical Phase Conductor) ce qui entraîne une augmentation du coût du système.

Afin d'éviter l'installation d'un nouveau câble, le système illustré utilise la corrélation entre la température du conducteur et la température du câble de raccordement (ou bretelle) en réalisant un branchement entre deux sections d'une ligne à un pylône électrique.

Au lieu de remplacer une longueur de câble entière, on n'utilise qu'un câble de raccordement court logeant une fibre capteur. Contrairement au système à fibres basées sur l'effet Raman, le capteur est réalisé comme une grille de fibres de Bragg (GFB) utilisant l'effet thermo-optique pour mesurer la température. Une extrémité du câble de raccordement entre dans un séparateur où la fibre du capteur est épissée jusqu'à obtenir une fibre ordinaire qui est acheminée vers le bas du pylône pour une transmission de données supplémentaire; l'autre extrémité est connectée au conducteur de phase comme d'habitude.




▲ **Figure 3**: *Déplacement de longueur d'onde de Bragg causé par des changements de température*




▲ **Figure 4**: *Section transversale de câble de raccordement 243-AL1/39-ST1A comprenant capteur GFB*

La *Figure 1* illustre le principe du système de contrôle de la température. En ajoutant des capteurs de déformation, utilisant également la technologie GFB, et une station météorologique de petites dimensions installée sur le pylône, on a réalisé un système de contrôle complet de la ligne d'alimentation électrique. Les signaux provenant des capteurs GFB peuvent être traités dans une petite unité installée sur le pylône ou transportés à un autre point au moyen d'un câble optique souterrain ou d'une liaison OPGW existant déjà. Dans les deux cas, une unité centrale de traitement peut gérer les signaux provenant de plusieurs points.

### *2.2 Grille de fibres de Bragg – Principe*

Les Grilles de Fibres de Bragg sont réalisées en créant une variation périodique dans l'indice de réfraction d'une fibre optique, ce qui peut être obtenu par irradiation de la fibre au moyen d'une lumière à laser UV intense[2,3]. La lumière parcourant une telle fibre vers le bas sera partiellement réfléchie aux variations de l'indice, mais la lumière ne sera réfléchie que pour une gamme réduite de longueurs d'onde, où a lieu une interférence constructive (*Figure 2*).

La longueur d'onde maximale de la lumière réfléchie est la soi-disant longueur d'onde de Bragg:

$$\lambda B = 2 \cdot \Lambda \, n_{eff} \quad (1)$$

où Λ représente la période de la grille et neff est l'indice de réfraction effectif. De l'équation(1) l'on peut déduire que λB est influencé par toute variation de la grille causée par des influences extérieures. La contrainte de la fibre entraîne des changements dans les deux paramètres au moyen de l'effet élasto-optique tandis que la température modifie la valeur neff du fait de l'effet thermo-optique. Un exemple de déplacement de longueur d'onde causé par les variations de température est illustré à la *Figure 3*.

Ces dépendances sont utilisées pour réaliser des capteurs des dimensions extrêmement réduites mais hautement fiables et précis pour la déformation et la température[4,5].

### *2.3 Composants du système*

Les chapitres suivants offrent une description détaillée des différents composants de la totalité du système.

#### *2.3.1 Câble de raccordement avec capteur*

Le capteur GFB utilisé pour la mesure de la température consiste en la grille de fibres de Bragg (GFB) protégée par un tube d'acier inoxydable d'un diamètre de 1,5mm, scellé aux deux extrémités.

La fibre sortant à l'extérieur est protégée par un tube en plastique traditionnel. La longueur du tube d'acier de logement dépend de la longueur du câble de raccordement et varie de 1,5m à 3m.

Afin d'utiliser le capteur de façon efficace, ce dernier doit être placé au centre du câble de raccordement qui est généralement du même type que le conducteur de phase. Dans le cas du système illustré, le conducteur de phase était caractérisé par une structure d'acier/aluminium avec une section transversale en acier de 39,5mm² et une section transversale d'aluminium de 243,1mm². Sa désignation conformément à la norme EN 50182[6] est 243-AL1/39-ST1A.

La *Figure 4* représente la vue en section transversale comprenant le capteur GFB.

Une autre manière de réaliser un câble de raccordement avec un capteur GFB consiste en l'utilisation d'un conducteur OPPC avec une structure à tube d'acier. Le capteur peut être ensuite placé dans le tube d'acier. Dans ce cas, la structure OPPC doit être le plus similaire possible à la structure du conducteur de phase afin d'éviter d'éventuelles incompatibilités de corrélation entre le conducteur et la bretelle.

#### *2.3.2 Capteur de déformation*

Comme mentionné précédemment, même le capteur de déformation utilise la technologie du capteur GFB; toutefois il est spécifiquement adopté pour sa fonction principale: la mesure de la déformation. Le capteur se présente dans un logement de forme rectangulaire et est connecté à une plaque de fixation (*Figure 5*).

La configuration existante pour la ligne choisie utilisait deux isolateurs parallèles pour l'ancrage du conducteur de phase. Par conséquent, deux capteurs étaient nécessaires.

#### *2.3.3 Séparateur*

Pour une ligne électrique ordinaire, le câble de raccordement est utilisé pour combler l'écart entre les extrémités de deux conducteurs de phase à un pylône électrique. Il présente le même potentiel électrique élevé que les conducteurs et transporte le même courant électrique. L'idée d'utiliser un capteur sur le câble de raccordement pose deux questions:

- Comment se réduit au potentiel de terre la la terminaison de la fibre optique du capteur?
- Comment est-il possible d'assurer un flux de courant continu en sortant de la terminaison de la fibre optique du capteur?

La réponse aux deux questions est simple: c'est possible en utilisant un séparateur à raccord en T spécifiquement conçu. Généralement les séparateurs s'utilisent pour terminer les lignes OPPC avec une entrée de câble dans la partie "chaude". En ajoutant une seconde entrée, opposée à la première, on obtient un raccord en T (*Figure 6*).

Un séparateur avec raccord en T divise le câble de raccordement en deux parties avec deux extrémités permettant la sortie de la fibre capteur.

En option, l'on peut utiliser un capteur supplémentaire dans l'autre moitié de la bretelle. Contrairement aux séparateurs pour OPPC, l'épissurage des fibres capteur au câble de fibre optique de connexion peut être effectué sur le côté mis à la terre du séparateur, en facilitant ainsi la procédure d'assemblage.

Le flux de courant électrique est assuré en utilisant des étriers appropriés aux entrées et une cloche d'aluminium solide Les essais pour les courts circuits ainsi que les essais de courant permanent ont confirmé la capacité et la fiabilité de la conception.

#### 2.3.4 Station météorologique

Pour compléter le système de contrôle et obtenir les données environnementales correspondantes, on a également utilisé une petite station météorologique, indépendante en ce qui concerne l'alimentation et alimentée par un panneau solaire. La *Figure 7* montre la station météorologique installée sur le sommet du pylône.

Les données, la température de l'air, l'humidité, la vitesse du vent et la direction du vent sont communiquées à l'ordinateur de contrôle au moyen d'une connexion sans fil.

▲ **Figure 5**: *Capteur de déformation GFB connecté à une plaque de fixation*

▲ **Figure 6**: *Séparateur avec raccordement en T*

### *2.3.5 Traitement de données et unité de commande*

Afin d'utiliser les capteurs GFB pour un système de monitorage contrôlé par un ordinateur personnel traditionnel, les signaux optiques codifiés sur la longueur d'onde doivent être convertis dans un flux de données. Deux opérations sont nécessaires: premièrement les signaux optiques doivent être convertis en signaux électriques et ensuite d'analogiques à digitaux.

Les données de sortie sont transférées à un ordinateur personnel à travers une interface série RS232. L'unité contrôlée par le microprocesseur sera installée dans un bâti de 19" pour utilisation interne ou peut être fournie dans une caisse robuste pour utilisation externe. La *Figure 8* présente une vue partielle de l'unité de traitement avec quatre câbles à fibres optiques sur le côté gauche, transmettant les données provenant des capteurs de température et de déformation GFB et les données RS232 en sortie.

Le logiciel de contrôle fonctionne sur tout ordinateur personnel et peut être adapté à la situation ou aux exigences réelles.

Avec les données provenant de la station météorologique envoyées à l'ordinateur, l'opérateur de la ligne de puissance obtient une série d'informations complètes pour gérer ses lignes.

## 3. Installation en champ

Après une simulation du système de contrôle de la température et des déformations effectuée en 2005 qui a démontré la faisabilité de l'idée, une installation a été réalisée en champ en avril 2006. Le long temps écoulé entre l'étude de faisabilité et l'installation en champ a été dû à la recherche d'une ligne d'alimentation équipée d'un système OPPC déjà installé où un système de capteurs distribués de fibre optique (DTS – Distributed Temperature System) basé sur la dispersion Raman pouvait être réalisé.

Après avoir trouvé une ligne adéquate et une société de fourniture d'énergie coopérante collaboratrice, les données de la ligne et les conditions correspondantes étaient les suivantes:

- Une ligne de 110kV équipée d'un conducteur de phase 243-AL1/39-ST1A
- Un câble optique de connexion souterraine à souffler dans un conduit entre le pylône électrique d'installation et le bâtiment de la sous-station avec une longueur de 1000m
- Temps d'installation du câble de connexion et du système: 2 jours, avec 4 heures d'interruption de la ligne

Afin de satisfaire les exigences électriques requises pour le séparateur, un type de raccord en T de 123kv, classe de pollution IV, avec une hauteur totale de 1,83m et un poids de 33kg a été sélectionné. Généralement, un séparateur utilisé dans une ligne OPPC s'installe complètement sur le site.

Toutefois, du fait du strict programme de temps et du travail délicat requis pour insérer les capteurs GFB dans les câbles de raccordement, les bretelles et les étriers de fixation du séparateur étaient déjà assemblés dans l'installation.

L'insufflage du câble souterrain a été réalisé le premier jour, ainsi le deuxième jour a été laissé libre pour le reste des installations.

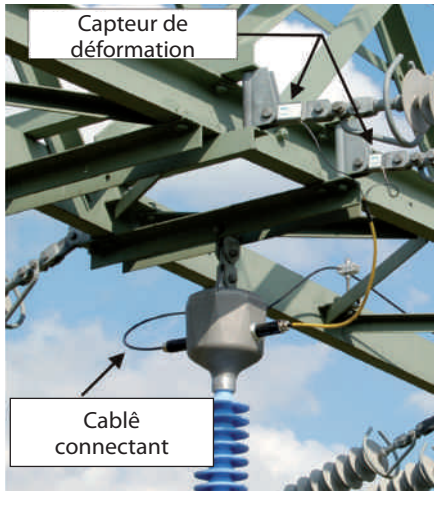
- L'assemblage final du séparateur y compris les opérations d'épissure et de fixation sur le pylône
- Remplacement des liaisons d'extension existant déjà par des liaisons équipées de capteurs GFB
- Installation de la station météorologique sur le sommet du pylône
- La configuration de l'unité de traitement de signaux et de l'ordinateur

▼ **Figure 7**: *Station météorologique sans fil, indépendante*

▼ **Figure 8**: *Unité de traitement de signaux*

▼ **Figure 9**: *Séparateur complètement assemblé avant le levage*


▼ **Figure 10**: *Sommet séparateur – détails des entrées des câbles*

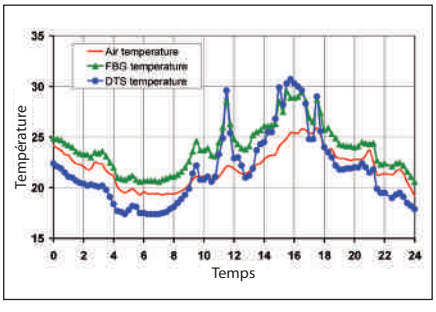


▲ **Figure 11**: *Système de contrôle de la température et de la déformation complètement assemblé*

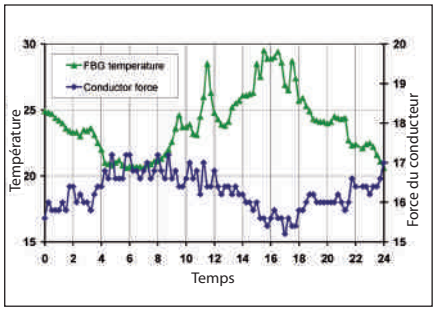
Les trois premiers points ont été réalisés durant la coupure de courant de 4 heures. Avec le séparateur complètement assemblé au sol, y compris les raccordements des câbles aux capteurs, le temps de coupure a été suffisant pour terminer le travail. Les figures suivantes présentent un cadre de l'installation: La *Figure 9* représente le séparateur complètement assemblé avec des câbles de raccordement et les plaques de fixation avec les capteurs de déformation.

Les détails de la partie supérieure du séparateur avec les entrées des câbles et les capteurs de déformation sont représentés à la *Figure 10*.

La vue finale du matériel de contrôle de la température et de la déformation complètement installé est représentée à la *Figure 11*.




▲ **Figure 12**: *Comparaison entre les températures mesurées par les différents systèmes*




▲ **Figure 13**: *Corrélation entre la température et la force dans le conducteur*

## 4. Résultats des mesures

Un objectif de l'installation en champ consistait à comparer les mesures de la température du système présenté avec un système utilisant un dispositif DTS sur la même ligne d'alimentation.

Les données des deux systèmes de contrôle de la température ont été enregistrées constamment tous les 15 minutes et comparés avec les données de la température de la station météorologique.

La *Figure 12* montre la comparaison pendant un jour comme exemple.

Malgré une différence de température entre les systèmes, la corrélation est très satisfaisante. Ce comportement, qui a été observé durant la totalité de la période de mesure de plusieurs mois, justifie l'hypothèse selon laquelle un système de mesure de la température locale utilisant les capteurs GFB installés dans la bretelle peut prévoir le comportement de la température d'une liaison entière.

Un autre exemple du même jour présente la corrélation entre la température mesurée avec le capteur GFB et la force mesurée dans le conducteur au moyen du capteur de déformation (*Figure 13*).

Bien que la force dans le conducteur ne soit pas influencée par la température de ce dernier, le comportement général espéré est clairement visible: avec l'augmentation de la température, l'allongement du conducteur augmente lui aussi et par conséquent la force diminue et vice-versa.

Les autres données, comme par exemple la direction et la vitesse du vent, l'humidité et le courant électrique, ont été enregistrées, mais étant donné que leur relation avec la température et la déformation du conducteur est suffisamment complexe, l'analyse détaillée est encore en cours.

## 5. Conclusions

Le présent article démontre qu'un système de contrôle d'une ligne d'alimentation basé sur des capteurs GFB installés dans une bretelle est hautement précis, fiable et économiquement rentable.

Les avantages offerts par ce système de contrôle, sa facilité d'installation, le bref temps de coupure de courant requis pour l'assemblage, sa modularité et la possibilité d'évolutivité font de ce dernier une alternative excellente aux autres systèmes, comme par exemple la mesure de la température distribuée basée sur la dispersion Raman. ■

## 6. Références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**Draka Comteq Germany GmbH & Co KG**
Bonnenbroicher Str 2-14
D-41238 Mönchengladbach
Allemagne
**Email**: info@draka.com
**Website**: www.draka.com

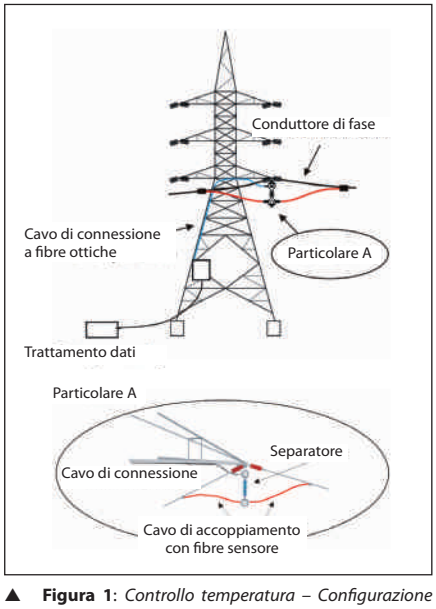
# Sistema di controllo della forza e della temperatura nelle linee di alimentazione elettrica

A cura di Reinhard Girbig e Norbert Fink, Draka Comteq Germany GmbH & Co KG, Mönchengladbach, Germania

## 1. Introduzione

La deregolamentazione dei mercati dell'energia, caratterizzati da un crescente numero di parchi eolici e di centrali elettriche di piccole dimensioni, sta costringendo i servizi di distribuzione dell'energia elettrica a cercare nuove strategie per la progettazione e il funzionamento delle linee elettriche aeree.

Una di queste consiste nell'ottimizzazione della trasmissione di elettricità sulle infrastrutture esistenti. In questo caso, i parametri principali sono rappresentati dalla temperatura del conduttore e dalle sollecitazioni meccaniche del filo. Questi parametri determinano le riserve esistenti della capacità di trasmissione, limitata dalla temperatura massima ammissibile dei metalli nonché dalla freccia critica e dalla distanza da terra.




▲ **Figura 1**: *Controllo temperatura – Configurazione del principio*

Fino ad oggi sono stati determinati i margini di sicurezza della temperatura per il funzionamento delle linee elettriche aeree, generalmente valutate mediante metodi di calcolo ed ipotesi quasi obsoleti, ed un utilizzo economico delle riserve di una linea già esistente è quasi impossibile.

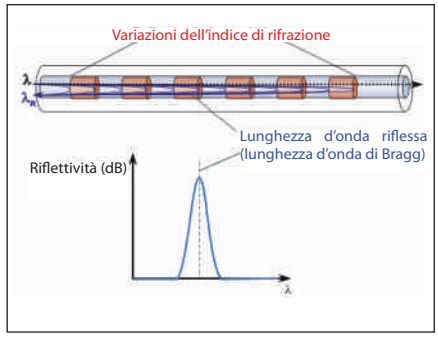
Il sistema di controllo delle linee aeree illustrato nel presente articolo si basa sulle fibre ottiche e consente di eseguire la misurazione in linea e remota della temperatura interna e delle sollecitazioni meccaniche di un conduttore.

L'utilizzo di questo sistema comporta un ritorno d'investimento in un tempo molto breve sulle linee molto caricate all'interno di una rete elettrica. É inoltre possibile rilevare sollecitazioni meccaniche elevate provocate dal gelo, permettendo così di adottare misure preventive prima dell'eccessivo caricamento e crollo dei tralicci. Inoltre, il sistema consente di verificare i dati di programmazione e le ipotesi di costruzione di eventuali ampliamenti di rete.

## 2. Descrizione del sistema

### *2.1 Panoramica generale*

Le tecniche esistenti di controllo della temperatura e della forza nei conduttori di fase si basano su sistemi meccanici o su sistemi a fibre ottiche. I primi sono caratterizzati da durata e affidabilità limitate e sono meno precisi rispetto ai sistemi a fibre ottiche. Questi ultimi, fino ad oggi, hanno utilizzato lo scattering Raman ove il rapporto fra l'intensità delle linee Stokes e anti-Stokes dello spettro disperso è proporzionale alla temperatura. Generalmente, per realizzare questo tipo di sistema[1], è necessario sostituire un

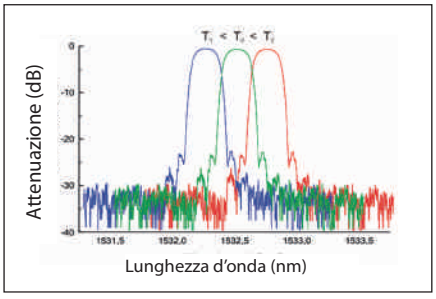



▲ **Figura 2**: *Reticolo di Bragg in fibra ottica – Principio*

conduttore di fase con una lunghezza completa di conduttore OPPC (Optical Phase Conductor) rendendo costoso il sistema.

Al fine di evitare l'installazione di un nuovo cavo, il sistema illustrato utilizza la correlazione fra la temperatura del conduttore e la temperatura del cavo di accoppiamento che collega le due sezioni di una linea ad un traliccio. Anziché sostituire una lunghezza di cavo completa, viene utilizzato solo un cavo di accoppiamento corto provvisto di fibra sensore. Contrariamente al sistema a fibre basate sullo scattering Raman, il sensore è realizzato come un reticolo di Bragg in fibra ottica (FBG - Fibre Bragg Grating) che utilizza l'effetto termo-ottico per misurare la temperatura. Un'estremità del cavo di accoppiamento entra in un separatore ove viene effettuata la giunzione della fibra del sensore per ottenere una fibra ordinaria, che scende dal traliccio per una trasmissione di dati aggiuntiva; l'altra estremità viene connessa al conduttore di fase come al solito. La *Figura 1* illustra il principio del sistema di controllo della temperatura.

Aggiungendo dei sensori di deformazione, che utilizzano anch'essi la tecnologia FBG, e una stazione meteorologica di




▲ **Figura 3**: *Spostamento della lunghezza d'onda di Bragg causata da cambiamenti di temperatura*

piccole dimensioni installata sul traliccio, è stato realizzato un sistema di controllo completo della linea di alimentazione elettrica. I segnali provenienti dai sensori FBG possono essere trattati in una piccola unità montata sul traliccio o trasportati ad un altro punto mediante un cavo ottico interrato o un collegamento OPGW esistente. In entrambi i casi, un'unità centrale di trattamento può gestire i segnali provenienti da più punti.

### *2.2 Reticolo di Bragg in fibra ottica – Principio*

I reticoli di Bragg in fibra ottica sono realizzati creando una variazione periodica nell'indice di rifrazione di una fibra ottica, ottenibile per irradiazione della fibra mediante una luce laser UV intensa[2,3]. La luce che percorre questa fibra verso il basso sarà parzialmente riflessa alle variazioni dell'indice, ma la luce sarà riflessa solamente per una gamma ridotta di lunghezze d'onda, ove ha luogo un'interferenza costruttiva (*Figura 2*).

La lunghezza d'onda massima della luce riflessa è la cosiddetta lunghezza d'onda di Bragg:

$$\lambda B = 2 \cdot \Lambda \, n_{eff} \quad (1)$$

ove Λ rappresenta il periodo del reticolo e neff è l'indice di rifrazione effettivo.

Dall'equazione(1) si può evincere che il valore λB è influenzato da qualsiasi variazione del reticolo causata da influenze esterne: la deformazione della fibra comporta dei cambiamenti in entrambi i parametri mediante l'effetto elasto-ottico mentre la temperatura modifica il valore neff mediante l'effetto termo-ottico.

Un esempio di spostamento della lunghezza d'onda causato dalle variazioni di temperatura è fornito alla *Figura 3*.

Tali dipendenze vengono utilizzate per realizzare sensori di dimensioni estremamente ridotte ma altamente affidabili e precisi per la deformazione e la temperatura[4,5].

### *2.3 Componenti del sistema*

I seguenti capitoli descrivono in dettaglio i diversi componenti dell'intero sistema.

#### *2.3.1 Cavo di accoppiamento con sensore*

Il sensore FBG utilizzato per la misurazione della temperatura è costituito dal reticolo di Bragg in fibra ottica (FBG) protetto da un tubo d'acciaio inossidabile del diametro di 1,5mm, sigillato ad entrambe le estremità. La fibra diretta verso l'esterno è protetta da un comune tubo di plastica. La lunghezza del tubo d'acciaio di alloggiamento dipende dalla lunghezza del cavo di connessione e varia da 1,5m a 3m.

Al fine di utilizzare il sensore in modo efficace, quest'ultimo deve essere posto al centro del cavo di connessione che è generalmente dello stesso tipo del conduttore di fase. Nel caso del sistema illustrato, il conduttore di fase era caratterizzato da una struttura di acciaio/alluminio con una sezione trasversale in acciaio di 39,5mm² ed una sezione trasversale di alluminio di 243,1mm². La sua designazione, conformemente alla norma EN 50182[6], è 243-AL1/39-ST1A. La *Figura 4* rappresenta la vista in sezione trasversale compreso il sensore FBG.

Un altro modo di realizzare un cavo di accoppiamento con un sensore FBG consiste nell'utilizzo di un OPPC con una struttura a tubo d'acciaio. Il sensore può essere quindi posto nel tubo d'acciaio. In questo caso, la struttura OPPC deve essere il più possibile simile alla struttura del conduttore di fase al fine di evitare eventuali incompatibilità di correlazione fra il conduttore e il cavo di accoppiamento.

#### *2.3.2 Sensore di deformazione*

Come precedentemente menzionato, anche il sensore di deformazione utilizza la tecnologia del sensore FBG; tuttavia esso è specificamente adottato per la sua funzione principale: la misurazione della deformazione. Il sensore si presenta in un alloggiamento di forma rettangolare ed è collegato ad una piastrina di fissaggio (*Figura 5*).

La configurazione esistente per la linea selezionata utilizzava due isolatori paralleli per l'ancoraggio del conduttore di fase. Erano pertanto necessari due sensori.

#### *2.3.3 Separatore*

Per una linea elettrica ordinaria, il cavo di accoppiamento viene utilizzato per colmare lo scarto fra le estremità di due conduttori di fase ad un traliccio. Esso presenta lo stesso elevato potenziale elettrico dei conduttori e trasporta la stessa corrente elettrica. L'idea di utilizzare un sensore sul cavo di accoppiamento solleva due quesiti:

- Come si riduce al potenziale di terra la terminazione della fibra ottica del sensore?
- Come è possibile assicurare un flusso di corrente continuo uscendo dall'estremità della fibra ottica del sensore?

La risposta alle due domande è semplice: utilizzando un separatore specificamente progettato, il cosiddetto tipo con derivazione a T. Generalmente, i separatori si utilizzano per terminare le linee OPPC con un ingresso di cavo nella parte "calda". Aggiungendo un secondo ingresso, opposto al primo, si ottiene una derivazione a T (*Figura 6*).

Un separatore con derivazione a T divide il cavo di connessione in due parti con due estremità consentendo l'uscita della fibra sensore. In opzione, si può utilizzare un sensore aggiuntivo nell'altra metà del cavo di accoppiamento. Contrariamente ai separatori per OPPC, la giunzione delle fibre sensore al cavo a fibre ottiche di connessione può essere effettuata sul lato messo a terra del separatore, facilitando così la procedura di assemblaggio.

Il flusso di corrente elettrica è assicurato utilizzando delle staffe appropriate agli ingressi ed una campana di alluminio solido. Le prove per i cortocircuiti e le prove di corrente permanente hanno confermato la capacità e l'affidabilità della concezione.

#### *2.3.4 Stazione meteorologica*

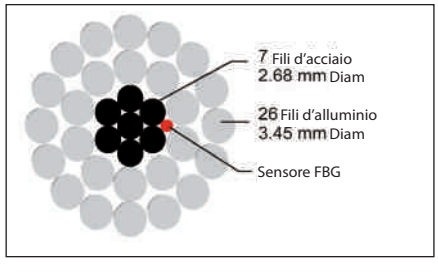
Per completare il sistema di controllo e ottenere i dati ambientali corrispondenti, è stata anche utilizzata una piccola stazione meteorologica, indipendente per quanto riguarda l'alimentazione di energia ed alimentata da un pannello solare. La *Figura 7* illustra la stazione meteorologica installata in cima al traliccio.

I dati, la temperatura dell'aria, l'umidità, la velocità del vento e la direzione del vento vengono comunicati al computer di controllo mediante una connessione senza fili.

#### *2.3.5 Trattamento dei dati e unità di controllo*

Per utilizzare i sensori FBG per un sistema di monitoraggio controllato da un personal computer tradizionale, i segnali ottici codificati sulla lunghezza d'onda devono essere convertiti in un flusso di dati. Due operazioni sono necessarie: in primo luogo i segnali ottici devono essere convertiti in segnali elettrici e quindi da analogici a digitali.

▼ **Figura 4**: *Sezione trasversale del cavo di accoppiamento 243-AL1/39-ST1A comprendente sensore FBG*



▲ **Figura 5**: *Sensore di deformazione FBG collegato ad una piastrina di fissaggio*

▲ **Figura 6**: *Separatore con derivazione a T*

I dati in uscita vengono trasferiti ad un personal computer mediante un'interfaccia seriale RS232. L'unità controllata dal microprocessore sarà installata in un rack da 19" per utilizzo interno o può essere fornita in una robusta cassa per utilizzo esterno.

La *Figura 8* illustra una vista parziale dell'unità di trattamento con quattro cavi a fibre ottiche sul lato sinistro, che trasmette i dati provenienti dai sensori di temperatura e di deformazione FBG ed i dati RS232 in uscita.

Il software di controllo funziona su qualunque personal computer e può essere adattato alla situazione o alle esigenze reali. Con i dati provenienti dalla stazione meteorologica inviati al computer, l'operatore della linea di alimentazione elettrica ottiene una serie di informazioni complete per gestire le proprie linee.

## 3. Installazione in campo

Dopo una simulazione del sistema di controllo della temperatura e della deformazione effettuata nel 2005, che ha dimostrato la fattibilità dell'idea, è stata realizzata un'installazione in campo nell'aprile 2006. Il lungo tempo trascorso fra lo studio di fattibilità e l'installazione in campo, è dovuto alla ricerca di una linea di alimentazione equipaggiata con un sistema OPPC già installato dove poteva essere realizzato un sistema di misurazione della temperatura mediante fibra ottica DTS (Distributed Temperature System) basato sullo scattering Raman.

Dopo aver trovato una linea adeguata ed una società di fornitura di energia cooperante, i dati della linea e le relative condizioni erano le seguenti:

- Una linea di 110kV equipaggiata con un conduttore di fase 243-AL1/39-ST1A
- Un cavo ottico di connessione interrato da insufflare dentro un condotto fra il traliccio elettrico d'installazione e l'edificio della sottostazione con una lunghezza di: 1000m
- Tempo di installazione del cavo di connessione e del sistema: 2 giorni, con 4 ore di tempo d'interruzione della linea

Al fine di soddisfare le condizioni elettriche richieste per il separatore, è stato selezionato un tipo di derivazione a T da 123kV, classe d'inquinamento IV, con un'altezza totale di 1,83m ed un peso di 33kg. Generalmente, un separatore utilizzato in una linea OPPC si installa completamente sul campo. Tuttavia, a causa della rigida programmazione e del lavoro delicato per inserire i sensori FBG nei cavi di connessione, i cavi di accoppiamento e le staffe di fissaggio del separatore erano già assemblati nell'impianto.

L'insufflaggio del cavo interrato è stato effettuato il primo giorno, lasciando così libero il secondo giorno per il resto delle installazioni.

- L'assemblaggio finale del separatore comprese le operazioni di giunzione e di fissaggio sul traliccio
- Sostituzione dei collegamenti di ampliamento esistenti con collegamenti dotati di sensori FBG
- Installazione della stazione meteorologica in cima al traliccio
- La configurazione dell'unità di trattamento dei segnali e del computer

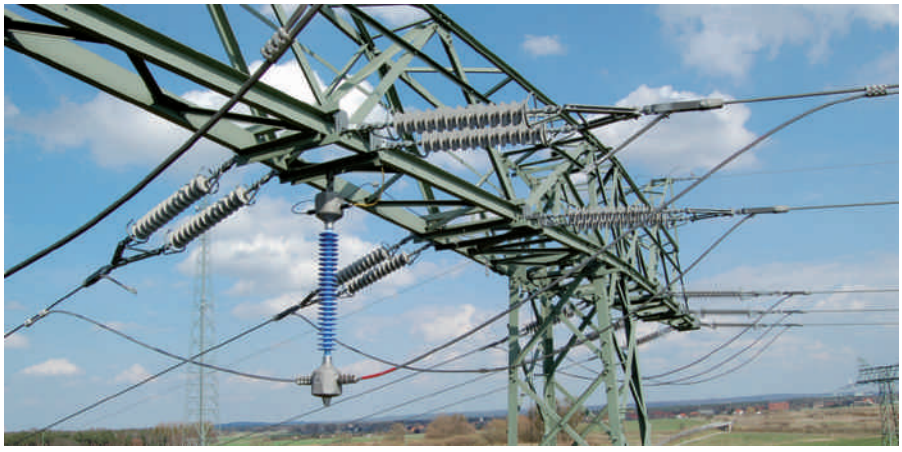
I primi tre punti dovevano essere realizzati durante l'interruzione di corrente di 4 ore. Con il separatore completamente assemblato a terra, compresi i raccordi di giunzione ai sensori, il tempo di interruzione è stato sufficiente per terminare il lavoro.

▼ **Figura 7**: *Stazione meteorologica senza fili, indipendente*

▼ **Figura 8**: *Unità di trattamento segnali*

▼ **Figura 9**: *Separatore completamente assemblato prima del sollevamento*


▼ **Figura 10**: *Parte superiore separatore – dettagli ingressi cavi*

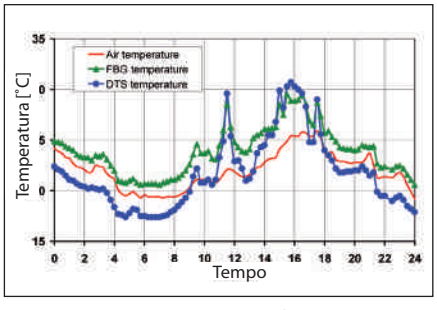


▲ **Figura 11**: *Sistema di controllo della temperatura e della deformazione completamente assemblato*

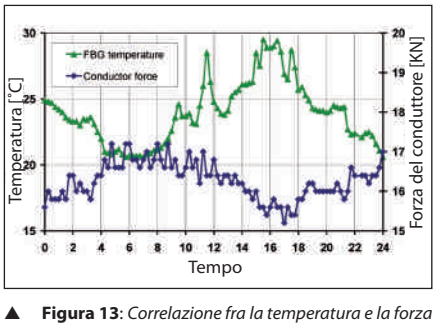
Le seguenti figure danno un quadro dell'installazione: La *Figura 9* rappresenta il separatore completamente assemblato con i cavi di connessione e le piastrine di fissaggio con i sensori di deformazione. I dettagli della parte superiore del separatore con gli ingressi dei cavi ed i sensori di deformazione sono illustrati alla *Figura 10*. L'immagine finale del hardware di controllo temperatura e deformazione completamente installato è fornita alla *Figura 11*.

## 4. Risultati delle misurazioni

Un obiettivo dell'installazione in campo consisteva nel comparare le misurazioni della temperatura del sistema illustrato con un sistema che utilizza un dispositivo DTS sulla stessa linea di alimentazione.




▲ **Figura 12**: *Comparazione fra le temperature misurate dai diversi sistemi*




▲ **Figura 13**: *Correlazione fra la temperatura e la forza nel conduttore*

I dati dei due sistemi di controllo della temperatura sono stati registrati costantemente ogni 15 minuti e comparati con i dati della temperatura della stazione meteorologica.

La *Figura 12* illustra, come esempio, la comparazione riferita ad una giornata.

Nonostante vi sia una differenza di temperatura fra i sistemi, la correlazione è molto buona. Questo comportamento, che è stato osservato durante tutto il periodo di misurazione di parecchi mesi, giustifica l'assunto che un sistema di misurazione della temperatura locale che utilizza i sensori FBG installati nel cavo di accoppiamento può prevedere il comportamento della temperatura di un intero collegamento.

Un altro esempio dello stesso giorno presenta la correlazione fra la temperatura misurata con il sensore FBG e la forza misurata nel conduttore mediante il sensore di deformazione (*Figura 13*).

Nonostante la forza nel conduttore non sia influenzata dalla temperatura di quest'ultimo, il comportamento generale previsto è chiaramente visibile: all'aumentare della temperatura, aumenta anche l'allungamento del conduttore e, conseguentemente, diminuisce la forza, e viceversa.

I dati restanti, come ad esempio la direzione e la velocità del vento, l'umidità e la corrente elettrica, sono stati tutti registrati, ma poiché la loro relazione con la temperatura e la deformazione del conduttore è piuttosto complessa, è ancora in corso un'analisi dettagliata.

## 5. Conclusioni

Il presente articolo dimostra che un sistema di controllo di una linea di alimentazione basato su sensori FBG installati in un cavo di accoppiamento, è altamente preciso, affidabile ed economicamente vantaggioso.

I vantaggi offerti da questo sistema di controllo, la facilità d'installazione, il breve tempo di interruzione di corrente richiesto per l'assemblaggio, la sua modularità e la possibilità di potenziamento lo rendono un'eccellente alternativa ad altri sistemi, come ad esempio la misurazione della temperatura distribuita basata sullo scattering Raman. ■

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**Draka Comteq Germany GmbH & Co KG**
Bonnenbroicher Str 2-14
D-41238 Mönchengladbach
Germany
**Email**: info@draka.com
**Website**: www.draka.com

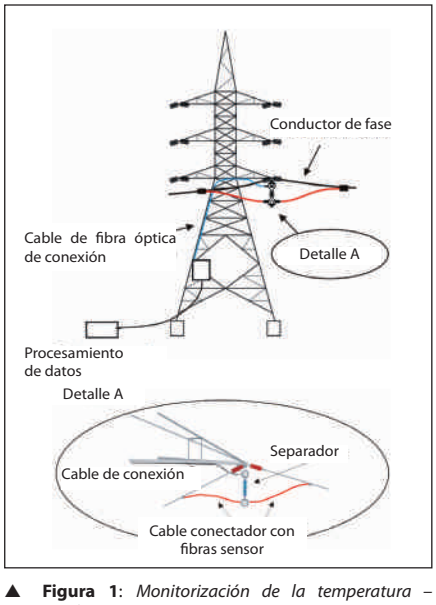
# Sistema de monitorización de fuerza y temperatura en líneas de alimentación eléctrica

Por Reinhard Girbig y Norbert Fink, Draka Comteq Germany GmbH & Co KG, Mönchengladbach, Alemania

## 1. Introducción

La desreglamentación de los mercados de energía, con un número cada vez mayor de parques eólicos y pequeñas centrales eléctricas, está forzando a las empresas de suministro eléctrico a buscar nuevas estrategias para el diseño y el funcionamiento de las líneas aéreas.

Una de estas estrategias es la optimización de la transmisión de energía en las infraestructuras existentes. En este caso, los parámetros principales son la temperatura del conductor y las solicitaciones mecánicas del alambre. Estos parámetros determinan las reservas existentes de capacidad de transmisión limitada por la temperatura máxima permitida de los metales, la flecha crítica y la distancia hacia tierra. Hasta ahora, se han determinado los márgenes de seguridad térmica para el funcionamiento de las líneas aéreas con cálculos casi obsoletos y suposiciones, y el uso rentable de las reservas de una línea existente es prácticamente imposible.




▲ **Figura 1**: *Monitorización de la temperatura – Configuración del principio del sistema*

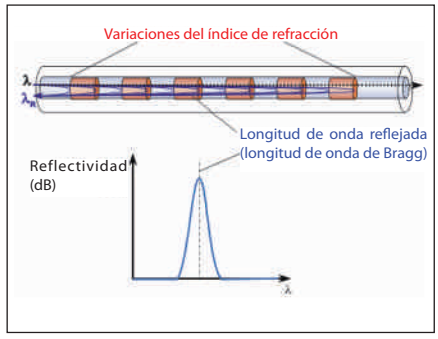
El sistema de monitorización de líneas aéreas presentado en este trabajo se basa en las fibras ópticas y permite la medición en línea y remota de la temperatura interna y de las solicitaciones mecánicas de un conductor. El uso de este sistema permite amortizar el capital invertido en un periodo muy breve en líneas con altas cargas de una red de suministro eléctrico. Se pueden detectar también las altas tensiones mecánicas debidas al hielo que permiten adoptar medidas preventivas antes de que la torre eléctrica se desplome. Además, se pueden verificar los datos de diseño y los datos supuestos para la construcción de ampliaciones de la red.

## 2. Descripción del sistema

### *2.1 Consideraciones generales*

Las técnicas actuales de monitorización de temperatura y fuerza para conductores de fase se basan en sistemas mecánicos o sistemas de fibra óptica. Los primeros tienen una duración y fiabilidad limitadas y son menos precisos que los sistemas de fibra óptica. Hasta ahora los sistemas de fibra han utilizado la dispersión de Raman, donde la relación entre la intensidad de las líneas de Stoke y las líneas anti-Stoke del espectro difundido es proporcional a la temperatura. Normalmente, para obtener este tipo de sistema[1], se debe reemplazar un conductor de fase por un tramo completo de cable compuesto fase óptico OPPC (Optical Phase Conductor), lo que encarece el sistema.

Para evitar la instalación de un cable nuevo, el sistema presentado utiliza la correlación entre la temperatura del conductor y la temperatura del cable conectador (o puente) que conecta dos secciones de una línea en una torre eléctrica. En lugar de reemplazar un tramo entero de cable, se utiliza solamente un cable conectador corto con una fibra sensor.



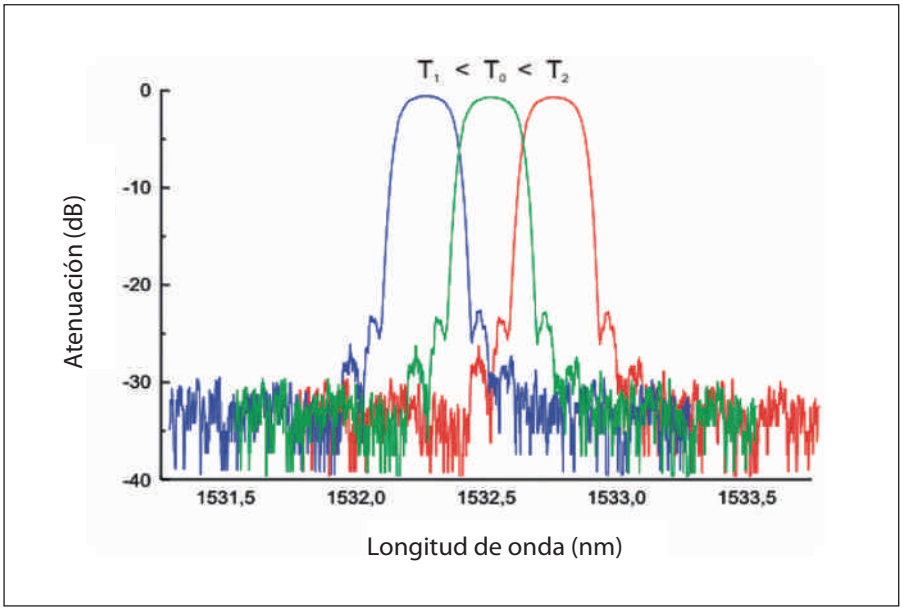

▲ **Figura 2**: *Redes de Bragg – Principio*

Contrariamente al sistema de fibra basado en la dispersión de Raman, el sensor es realizado como una red de Bragg (Fibre Bragg Grating – FBG) usando el efecto termo-óptico para medir la temperatura. Se inserta una extremidad del cable conectador en un separador donde la fibra sensor es empalmada a una fibra normal que se conecta a la torre para una ulterior transmisión de datos; la otra extremidad se conecta al conductor de fase, como se hace normalmente. La *Figura 1* muestra el principio del sistema de monitorización de la temperatura.

Añadiendo sensores de deformación, usando también la tecnología FBG, y una pequeña estación metereológica montada en la torre, se realiza un sistema de monitorización completo de la línea eléctrica. Las señales desde los sensores FBG pueden ser procesados en una pequeña unidad montada en la torre o transportadas a otro lugar a través de un cable óptico subterráneo o un enlace OPGW (cable compuesto tierra óptico) existente. En ambos casos, una unidad de procesamiento puede gestionar las señales desde varios lugares.

### *2.2 Redes de Bragg – Principio*

Las redes de Bragg se realizan creando una variación periódica en el índice de refracción de una fibra óptica. Esto se puede obtener por irradiación de la fibra con luz láser UV intensa[2,3].




▲ **Figura 3**: *Cambios de longitud de onda de Bragg causados por los cambios de temperatura*

La luz que viaja a través de esta fibra será parcialmente reflejada a las variaciones del índice, pero la luz será reflejada solamente en un campo de longitudes de onda limitado, donde tiene lugar la interferencia constructiva (*Figura 2*).

La longitud de onda máxima de la luz reflejada es la que se conoce como longitud de onda de Bragg:

$$\lambda_B = 2 \cdot \Lambda \cdot n_{eff} \quad (1)$$

donde Λ es el periodo de la red y $n_{eff}$ es el índice de refracción efectivo. De la ecuación(1) se puede deducir que $\lambda_B$ es influenciado por cualquier variación de la red causada por influencias externas: la deformación de la fibra modifica ambos parámetros debido al efecto elasto-óptico, mientras que la temperatura altera el $n_{eff}$ debido al efecto termo-óptico.

En la *Figura 3* se ilustra un ejemplo de un cambio de longitud de onda causado por las variaciones de temperatura.

Estas dependencias se usan para fabricar sensores muy pequeños pero altamente fiables para medir la deformación y la temperatura[4,5].

### *2.3 Componentes del sistema*

Los capítulos siguientes describen detalladamente los componentes de un sistema completo.

#### *2.3.1 Cable conectador con sensor*

El sensor FBG usado para las mediciones de temperatura consiste en la misma red de Bragg (FBG) protegida por un tubo de acero inoxidable de 1,5mm de diámetro, sellado en ambas extremidades. La fibra de salida es protegida por un tubo de plástico convencional. La longitud del tubo de acero de alojamiento depende de la longitud del cable conectador (o puente) y varía entre 1,5 y 3m.

Para usar eficazmente el sensor, debe ser puesto en el centro del cable conectador, que es normalmente del mismo tipo que el conductor de fase. En el caso del sistema presentado, el conductor de fase tenía una estructura de acero-aluminio donde el acero tenía una sección transversal de 39,5mm² y el aluminio de 243,1mm². Su designación según la norma EN 50182[6] es 243-AL1/39-ST1A. La *Figura 4* muestra un corte transversal donde se puede apreciar el sensor FBG.

Otra manera de crear un puente con un sensor FBG es usar un cable compuesto fase óptico OPPC con tubo de acero. El sensor puede ser instalado dentro del tubo de acero. En este caso, el diseño OPPC debe ser lo más parecido posible al diseño del conductor de fase para evitar una incompatibilidad en la correlación entre el conductor y el puente.

#### *2.3.2 Sensor de deformación*

El sensor de deformación, como se ha dicho antes, utiliza también la tecnología del sensor FBG, pero es utilizado concretamente por su función principal: la medición de las deformaciones. Presenta una cubierta rectangular y está fijado a un clip de sujeción (*Figura 5*). La configuración actual para la línea escogida utilizaba dos aisladores paralelos para anclar el conductor de fase. Por lo tanto, se necesitaban dos sensores.

#### *2.3.3 Separador*

Para una línea de alimentación normal, el cable conectador es utilizado como puente en el espacio entre las extremidades de dos conductores de fase en una torre eléctrica. Tiene el mismo potencial eléctrico elevado de los conductores y transporta la misma corriente eléctrica. La idea de usar un sensor en el puente plantea dos preguntas:

- ¿Cómo se baja la terminación de la fibra óptica del sensor al potencial de tierra?
- ¿Cómo se puede asegurar un flujo de corriente continuo saliendo de la terminación de la fibra del sensor?

La respuesta a ambas preguntas es simple: se puede, usando un separador de diseño especial con derivación en T. Los separadores se usan normalmente para terminar las líneas OPPC con una entrada de cable en la parte "caliente". Añadiendo una segunda entrada, opuesta a la primera, se forma una derivación de tipo en T (*Figura 6*).

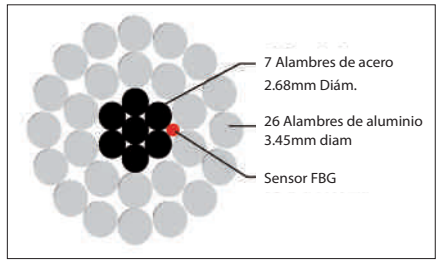
Un separador de derivación en T divide el cable conectador en dos partes con dos extremidades permitiendo la salida de la fibra sensor. Como opción, se puede usar un segundo sensor en la otra mitad del puente. Contrariamente a los separadores para OPPC, el empalme de las fibras de sensor al cable de fibra óptica de conexión se puede hacer en el lado puesto a tierra del separador, facilitando el procedimiento de ensamblaje. El flujo de corriente eléctrica es asegurado por abrazaderas montadas en las entradas y una campana de aluminio sólido. Las pruebas de cortocircuito y las pruebas de corriente permanente han confirmado la capacidad y fiabilidad del diseño.

#### *2.3.4 Estación metereológica*

Para completar el sistema de monitorización y obtener los datos ambientales correspondientes, se ha utilizado también una pequeña estación metereológica, independiente de la fuente de alimentación y alimentada por un panel solar. La *Figura 7* muestra la estación metereológica montada encima de la torre.

Los datos, la temperatura del aire, la humedad, la velocidad y la dirección del viento son transferidos al ordenador de control a través de una conexión inalámbrica.

▼ **Figura 4**: *Sección transversal del cable conectador 243-AL1/39-ST1A con sensor FBG*



▲ **Figura 5**: *Sensor de deformación FBG fijado al clip de sujeción*

▲ **Figura 6**: *Separador con derivación en T*

### *2.3.5 Procesamiento de datos y unidad de control*

Para usar los sensores FBG en un sistema de monitorización controlado por un ordenador personal convencional, sus señales ópticas codificadas en la longitud de onda deben ser convertidas en un flujo de datos. Se requieren dos operaciones: primero las señales ópticas deben ser convertidas en señales eléctricas y luego de analógicas a digitales. Los datos de salida son transferidos a un ordenador personal a través de una interfaz serie RS232.

Toda la unidad controlada por microprocesador puede ser instalada en un bastidor de 19" para interiores o en una caja robusta para exteriores.

La *Figura 8* ofrece una vista parcial de la unidad de procesamiento con cuatro cables de fibra óptica a la izquierda que transmiten los datos desde los sensores de temperatura y deformación FBG y los datos RS232 de salida.

El software de monitorización es ejecutado en un ordenador personal y puede ser adaptado a la situación o necesidades efectivas. Con los datos procedentes de la estación metereológica enviados al ordenador, el operador de la línea de alimentación obtiene una serie de informaciones completas para gestionar sus líneas.

## 3. Instalación en campo

Después de una simulación del sistema de monitorización de temperatura y de deformaciones realizada en 2005, que demostró la viabilidad de la idea, la instalación fue construida en abril de 2006.

El largo tiempo transcurrido entre el estudio de viabilidad y la construcción de la instalación fue debido a la búsqueda de una línea de alimentación ya equipada con sistema OPPC donde se pudiera implementar un sistema de detección de temperatura distribuido (Distributed Temperature System – DTS) basado en la dispersión de Raman.

Después de encontrar una línea adecuada y una empresa de suministro eléctrico cooperante, los datos de la línea y las correspondientes condiciones fueron:

- Una línea de 110kV equipada con conductor de fase 243-AL1/39-ST1A
- Cable óptico de conexión subterráneo a inyectar en un conducto entre la torre de instalación y el edificio de la subestación, de 1000m de longitud
- Tiempo de instalación del cable de conexión y del sistema: 2 días, con 4 horas de parada de la línea.

Para cumplir los requisitos eléctricos del separador, se seleccionó un tipo de derivación en T de 123kV, con clase de contaminación IV, 1,83m de altura total y 33kg de peso. Normalmente, un separador usado en una línea OPPC se instala completamente in situ. Pero, debido al intenso programa de tiempos y al trabajo laborioso necesario para insertar los sensores FBG en los cables conectadores, se ensamblaron en la planta los puentes con las abrazaderas de fijación del separador.

La inyección del cable subterráneo fue realizada el primer día y el segundo día pudo ser dedicado al resto de la instalación.

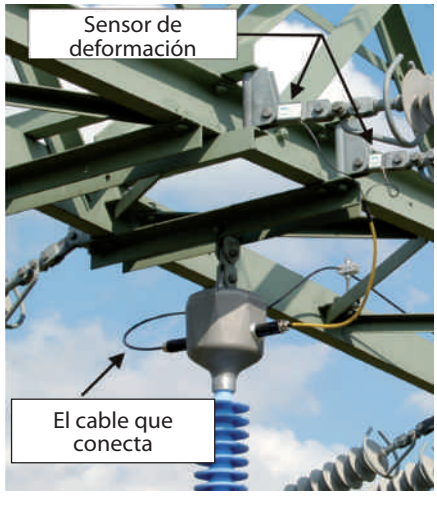
- Ensamblaje final del separador incluidos todos los trabajos de empalme y fijación en la torre
- Sustitución de los enlaces de ampliación existentes por los enlaces provistos de sensores FBG
- Instalación de la estación metereológica encima de la torre
- Puesta a punto de la unidad de procesamiento de señales y del ordenador
- Los primero tres puntos se realizaron dentro de la parada de la red de alimentación de 4 horas.

▼ **Figura 7**: *Estación metereológica inalámbrica autónoma*

▼ **Figura 8**: *Unidad de procesamiento de señales*

▼ **Figura 9**: *Separador completamente ensamblado antes del levantamiento*


▼ **Figure 10**: *Parte superior del separador – detalles de las entradas de los cables*



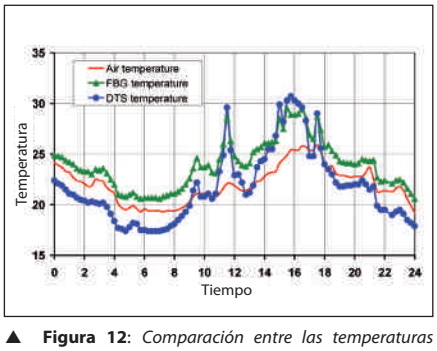
▲ **Figura 11**: *Sistema de monitorización de temperatura y deformación completamente ensamblado*

Con el separador completamente ensamblado a tierra, incluidas todas las conexiones de empalme con todos los sensores, el tiempo de parada fue suficiente para terminar los trabajos.

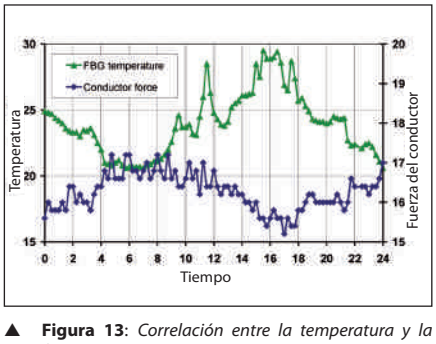
Las figuras siguientes ofrecen un cuadro de la instalación: la *Figura 9* muestra el separador completamente ensamblado con cables conectadores y clips de sujeción con sensores de deformación.

Los detalles de la parte superior del separador con las entradas de los cables y los sensores de deformación se pueden ver en la *Figura 10*.

La vista final del hardware de monitorización de temperatura y deformación completamente instalado se puede apreciar en la *Figura 11*.




▲ **Figura 12**: *Comparación entre las temperaturas medidas por distintos sistemas*




▲ **Figura 13**: *Correlación entre la temperatura y la fuerza en el conductor*

## 4. Resultados de las mediciones

Un objetivo de la instalación en campo era comparar las mediciones de temperatura del sistema presentado con un sistema que utilizaba un sistema DTS en la misma línea de alimentación. Los datos de los dos sistemas de monitorización de temperatura fueron registrados continuamente cada 15 minutos y comparados con los datos de temperatura de la estación metereológica. La *Figura 12* muestra la comparación durante un día, como ejemplo.

Aunque haya una diferencia de temperatura entre los sistemas, la correlación es muy buena. Este comportamiento, que se observó durante todo el periodo de medición de varios meses, justifica el supuesto de que un sistema de medición de la temperatura local usando sensores FBG instalados en el puente puede predecir el comportamiento de la temperatura de un enlace entero.

Otro ejemplo del mismo día presenta la correlación entre la temperatura medida con el sensor FBG y la fuerza del conductor medida con el sensor de deformación (*Figura 13*).

Aunque la fuerza en el conductor no es influenciada por la temperatura del conductor, el comportamiento general esperado es evidente: con el aumento de temperatura, aumenta el alargamiento del conductor y, por lo tanto, disminuye la fuerza y viceversa.

Los demás datos, por ejemplo la dirección y la velocidad del viento, la humedad y la corriente eléctrica, fueron todos registrados, pero, dado que su relación con la temperatura y la deformación del conductor es bastante compleja, el análisis detallado todavía está en fase de desarrollo.

## 5. Conclusiones

Esto demuestra que un sistema de monitorización de líneas de alimentación basado en sensores FBG implementados en un puente es un sistema de alta precisión, fiabilidad y rentabilidad.

Las ventajas de este sistema de monitorización, su facilidad de instalación, los tiempos de parada breves necesarios para el ensamblaje, su modularidad y la posibilidad de actualización lo convierten en una alternativa excelente a otros sistemas, como por ejemplo la medición de temperatura distribuida basada en la dispersión de Raman. ■

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**Draka Comteq Germany GmbH & Co KG**
Bonnenbroicher Str 2-14
D-41238 Mönchengladbach
Alemania
**Email**: info@draka.com
**Website**: www.draka.com

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