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ISSN 1463-2438

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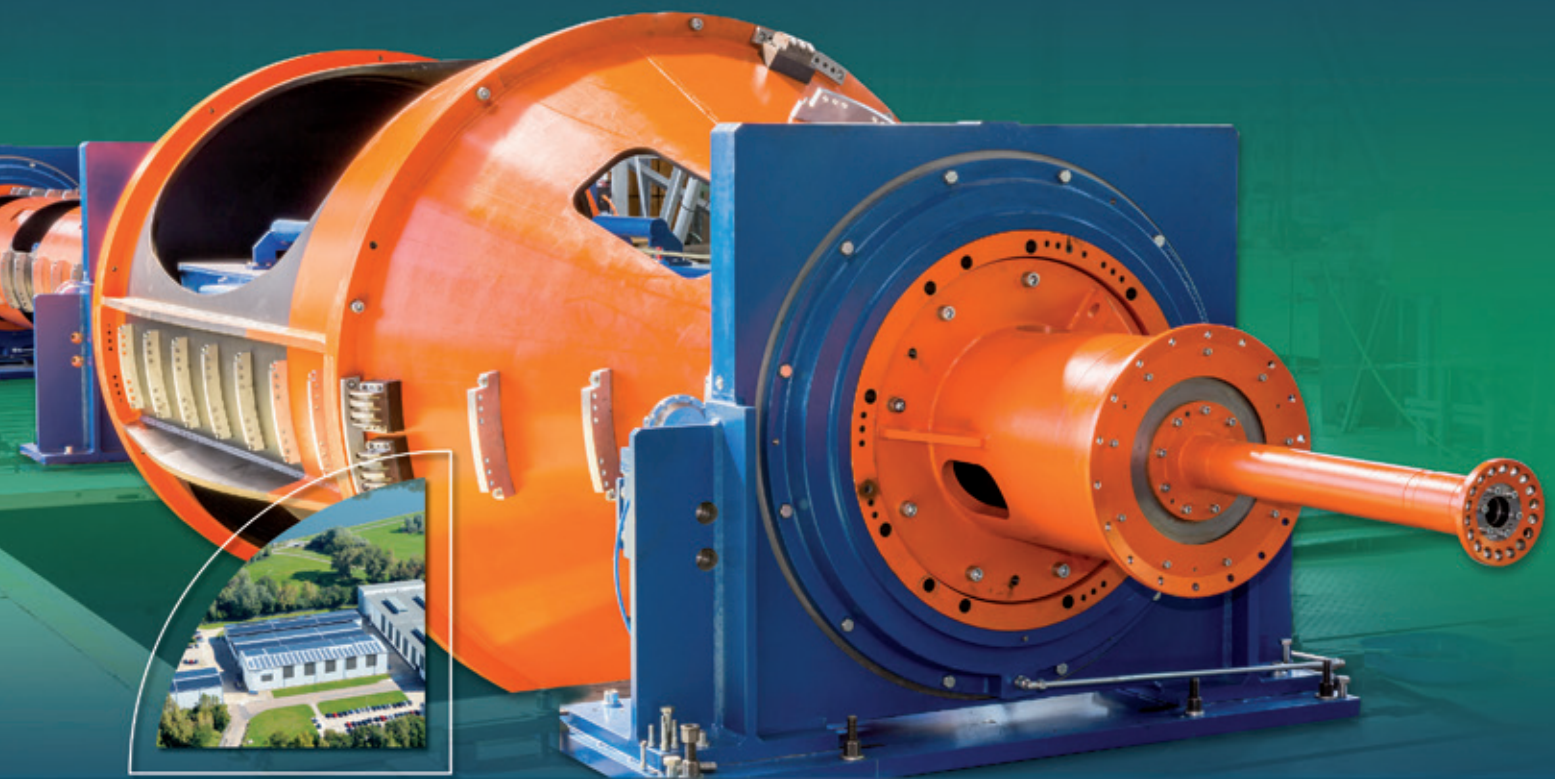
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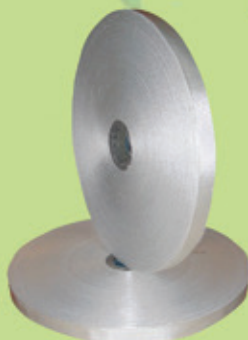
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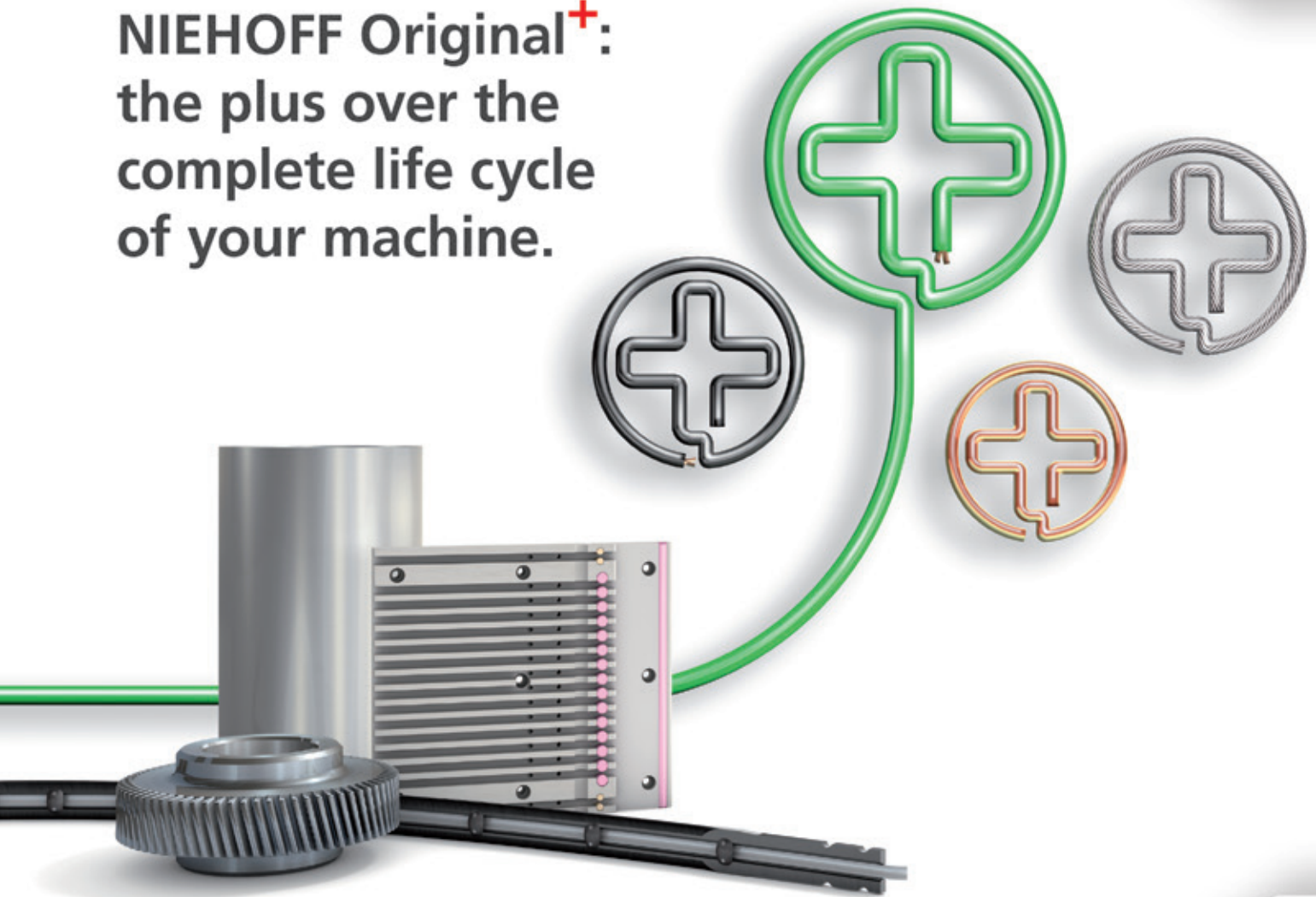
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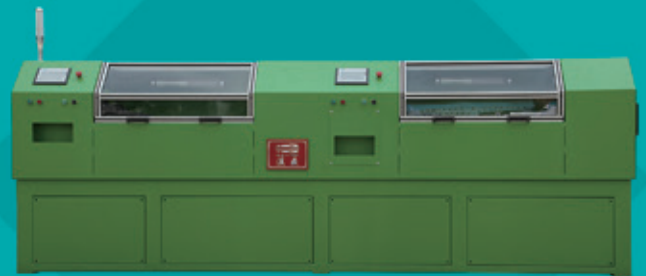
**汉鼎**

**EXT  $\Phi$ 30- $\Phi$ 200 High efficiency extrusion line**

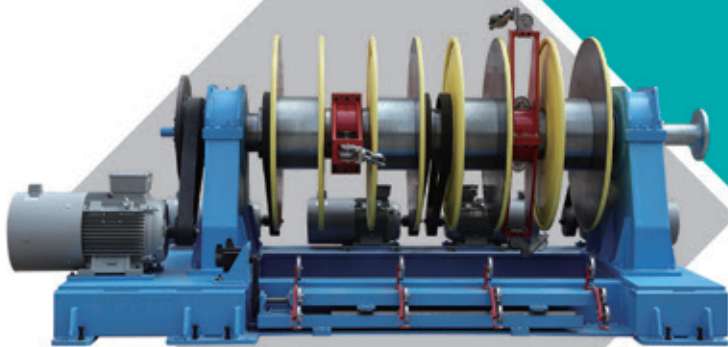
High efficiency extruder normal extrusion capacity  
• PVC 1200kg/hr • PE 1000kg/hr • HFFR 900kg/hr



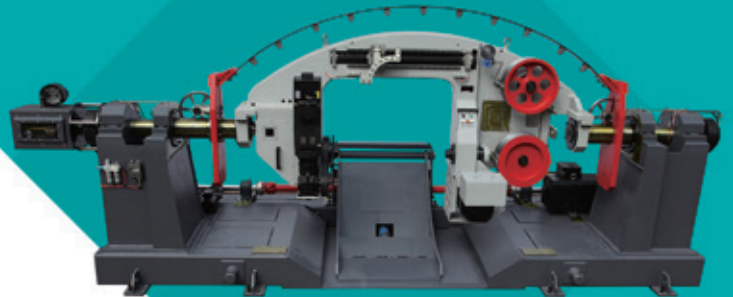
**Horizontal taping machine**



**CS $\Phi$ 1200  
Concentric stranding machine**



**DT $\Phi$ 1000- $\Phi$ 2500  
Double twist  
stranding machine**





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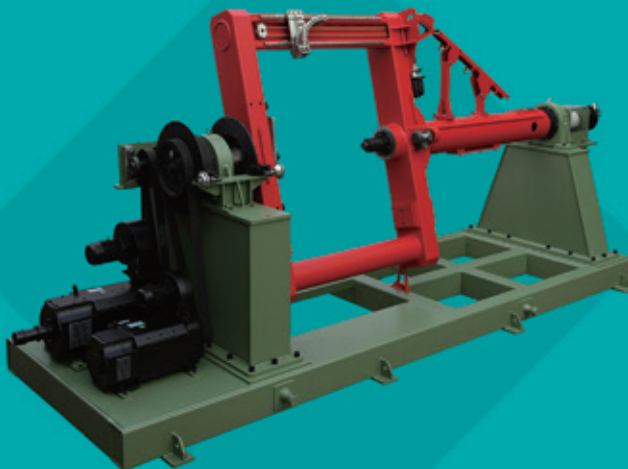
ST $\Phi$ 500- $\Phi$ 2500  
Catilever type single twisting machine



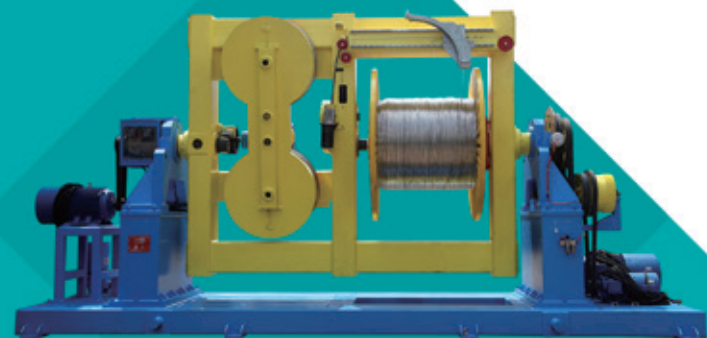
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Single twist armoring machine



ST $\Phi$ 1000- $\Phi$ 2000  
Single twist stranding machine







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 See page 76 for further details

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# A bright new year for the industry...

It would obviously be remiss of me if we didn't take the opportunity to wish all our readers and advertisers a happy, healthy and prosperous new year.

And whilst we have only just entered 2017, planning is already underway for the flagship exhibition in the wire and cable industry – wire 2018 in Düsseldorf, Germany.

Organisers Messe Düsseldorf have already started making provisions for the week-long show, which is being staged from 16<sup>th</sup> to 20<sup>th</sup> April next year. Catch up on the latest details on page 11.

The economy and political issues have also clouded the scene in Brazil, where wire South America takes place in October this year.

However, there is good news on the economic front with recovery expected during the year and the country moving out of recession. See what the experts think on page 12.

Investment from companies also seems high on the list of priorities this month, with William Hughes ploughing £250,000 into the latest technology at its Dorset, UK, headquarters. Full details can be found on page 16.

Investment also comes from Asia with Indonesian film producer PT Kencar Sukses Investama adding two new Davis-Standard machines to its facility in Sidoarjo, Indonesia.

This is again something of a boon for the USA company, which has now installed four machines at the site in the last five years. Full details can be found on page 18.

Educationally, new technologies in cable and connectivity materials, products, processes and applications are well catered for with the announcement of the UL and IWCS China Cable Connectivity Symposium being held in April. Full story on page 21.



David Bell  
 Editor



# 2016 EMPLOYEE OF THE YEAR



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## Next Issue

Getting Technical:  
The principle of online  
fault location on HVAC and  
HVDC cables during test  
and operation

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# Interwire

9–11 May:

**Interwire** –  
trade exhibition –  
Atlanta, Georgia, USA

**Organisers:**  
Wire Association International

**Fax:** +1 203 453 8384

**Email:** sales@wirenet.org

**Website:** www.wirenet.org

## dates for your diary ...

2017

### June

5–8 June:

**wire Russia** –  
trade exhibition –  
Moscow, Russia

**Organisers:**  
Messe Düsseldorf and VNIKP

**Fax:** +7 499 246 9277

**Email:** info@wire-russia.com

**Website:** www.wire-russia.com

### September

19–21 September:

**wire Southeast Asia** –  
trade exhibition –  
Bangkok, Thailand

**Organisers:**  
Messe Düsseldorf Asia Pte Ltd

**Fax:** + 65 6337 4633

**Email:** wire@mda.com.sg

**Website:** www.wire-southeastasia.com

### October

3–5 October:

**wire South America** –  
trade exhibition –  
São Paulo, Brazil

**Organisers:**  
Messe Düsseldorf GmbH

**Fax:** +49 211 4560 668

**Email:** info@wire-south-america.com

**Website:** www.wire-south-america.com

8–11 October:

**IWCS Technical Symposium** –  
conference and exhibition –  
Orlando, Florida, USA

**Organisers:**

IWCS

**Tel:** +1 717 993 9500

**Email:** phudak@iwcs.org

**Website:** www.iwcs.org

### November

7 November:

**CabWire 2017** – conference –  
Düsseldorf, Germany

**Organisers:** IWMA

**Fax:** +44 121 781 7404

**Email:** info@iwma.org

**Website:** www.iwma.org



bigstockphoto.com "Centennial Park in Atlanta, Georgia", Copyright: Sean Ravaine





▲ Visitors flock to the halls at wire 2016 in Düsseldorf, Germany. Photographs courtesy of Messe Düsseldorf

## 'Join the best – worldwide'

TRADE fairs for metal production, processing and finishing, for wires, cables and tubes, iron and steel have a long tradition in Düsseldorf, Germany. 'Join the best – worldwide' – this is the slogan summing up the international portfolio of wire, cable and tube trade fairs.

For more than 30 years, the wire and Tube trade fairs have taken place jointly in Düsseldorf. As the number one trade fairs for their industries, they have gained a reputation as international top players in their industries and have significance far beyond the state capital city of Düsseldorf. They have contributed to Düsseldorf, the business hub of North Rhine-Westphalia, acquiring an excellent reputation around the globe as a platform for industrial innovation.

Meanwhile, there are ten international satellite trade fairs for the wire and tube industries. As of now, they will present

themselves with a unified logo to show that they belong to a single umbrella brand. A single corporate design ensures the uniform appearance of the individual trade fairs while simultaneously demonstrating that they are members of a single product family.

The appearance of each fair has been designed so that their logos have a uniform appearance in terms of form, colour and lettering. "In terms of content and visual appearance, the 'Join the best – worldwide' portfolio with its lead wire and Tube trade fair in Düsseldorf and its ten international satellites will present themselves as coming from a single home," said Friedrich-Georg Kehrer, global portfolio director metals and flow technologies at Messe Düsseldorf GmbH.

In addition to the wire and Tube trade fair in Düsseldorf, the international portfolio of metal trade fairs, which united under the

'Join the best – worldwide' slogan, includes satellite trade fairs such as wire China and Tube China in Shanghai, wire and Tube India in Mumbai, wire and Tube Russia in Moscow, Russia, wire and Tube Southeast Asia in Bangkok, Thailand, and the wire South America and Tubotech trade fair in São Paulo, Brazil. The portfolio spans the globe and offers further potential for growth.

Be it in Germany, Brazil, China, India, Russia, Thailand or the US – together with its foreign subsidiaries and in cooperation with international industry and business associations as well as local organisers, Messe Düsseldorf is the host of outstanding regional satellite events. They have gained a reputation as information and ordering platforms for their respective catchment areas.

**Messe Düsseldorf GmbH – Germany**  
**Website:** [www.messe-duesseldorf.com](http://www.messe-duesseldorf.com)



## Awards time for Repsol's chemicals business

REPSOL has been recognised as the Petrochemical Company of the Year by the prestigious Petroleum Economist magazine.

This award is recognition of the strategy of the company's chemicals business and the transformation process undertaken in recent years.

The judges panel at the Petroleum Economist Awards highlighted the competitiveness of Repsol's chemicals business, its introduction of differentiated products with high added value, and its geographical diversification.

In addition to investments made to increase the flexibility of the raw materials used in its petrochemical plants the panel also took into account the modernisation project that Repsol has carried out at its petrochemical facilities, using innovative solutions that allowed the company to increase its profit margins significantly in 2016.

Increased efficiency, with high availability at its plants, and operational improvements carried out by Repsol in its chemicals business have strengthened the company and allowed it to make the most of favourable industry conditions, as well as improve its key figures.

Additionally, thanks to increased margins and sales, the chemicals business significantly increased its profits during the first half of 2016.

This is the third award the Repsol chemicals business has received in the past year. In June, Repsol also received the award for Best High-Density Polyethylene (HDPE) Producer in Europe 2016 and

the Overarching Award on Innovation, which covers all types of polymers. Both awards were presented by the Polymers for Europe Alliance.

Repsol's chemicals business and all of its other business units work hard to create safer, more efficient, and environmentally sustainable energy systems that respond to the needs of society.

**Repsol – Spain**  
**Website:** [www.repsol.com](http://www.repsol.com)

## Looking for a better economic Brazil

The international trade fairs wire South America and Tubotech will take place against the background of expectations for an economic recovery in the coming year in Brazil. As before, they will be held jointly at the São Paulo Expo Exhibition & Convention Centre, from 3<sup>rd</sup> to 5<sup>th</sup> October 2017.

Economic experts believe that the Brazilian economy is set to step out of its current recession in 2017. Although it is still uncertain how dynamic this recovery will be, the experts are spreading cautious optimism. Following the pattern of the previous event, the trade fairs are likely to attract around 500 exhibitors from 24 countries on an exhibition space of over 32,000m<sup>2</sup> (gross) and more than 11,000 trade visitors.

**wire South America – Brazil**  
**Website:** [www.wire-south-america.com](http://www.wire-south-america.com)

## PTFE Coaxial taping machine

*RBJ-Z series driven taping machine (vertical, horizontal) is the special equipment for producing communication cable, control cable, aircraft cable etc. This machine is specially suitable for small-tension, easily-stretching tape material, and it has the function of displaying tension change through the tension sensor.*

*10% up of speed for the braiding machine*  
GSB-1A: 165r.p.m.  
GSB-2: 110r.p.m.



*Please contact us for more details about our machines:*

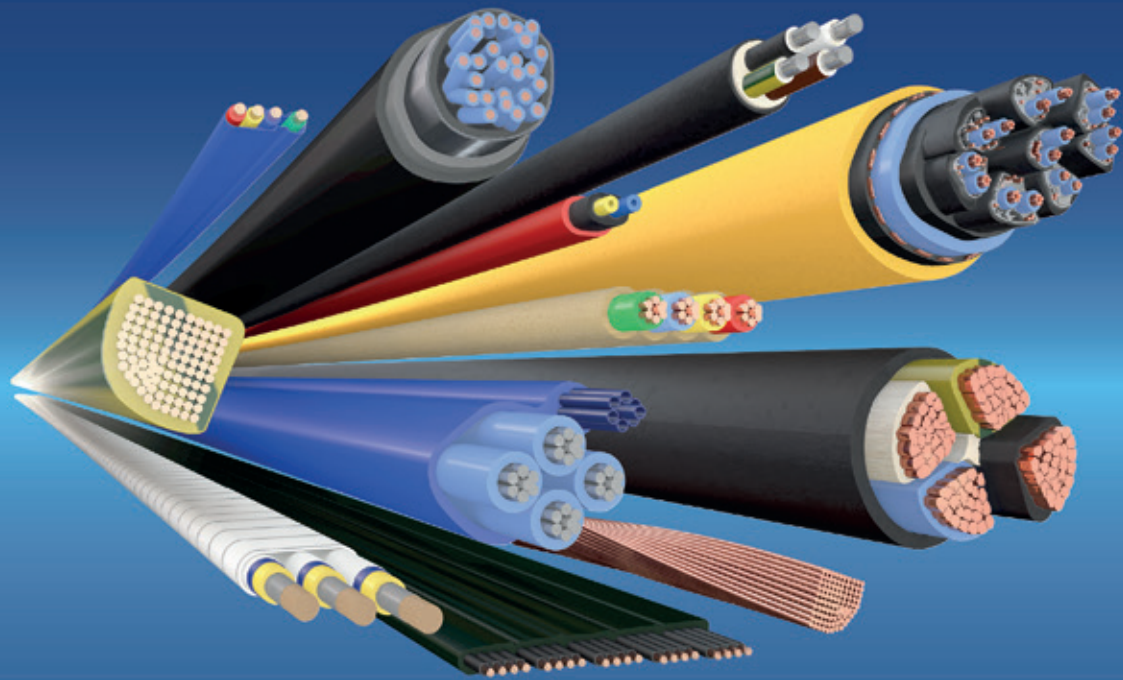
- GSB series high speed braider*
- GSB-Z series heavy braider*
- WGSB series horizontal heavy braider*
- LRBJ series vertical taping machine*
- WRBJ series horizontal taping machine line*
- Extruding line*
- Pay-off and take-up*



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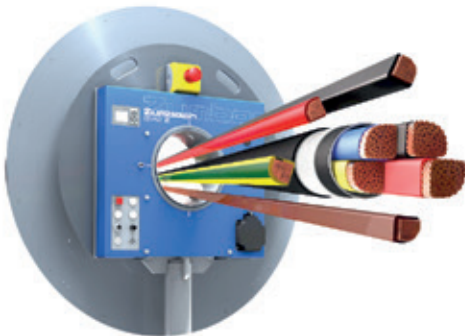
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## ABB to divest cable business to NKT Cables

NKT Cables is acquiring ABB's global high-voltage cable system business with a total enterprise value of €836m (US\$934 million). High-voltage cables are key components in sustainable energy networks, used for transmitting large amounts of electricity over long distances. The business is part of ABB's Power Grids division.

NKT Cables designs, manufactures and supplies power cables for low-, medium- and high-voltage solutions mainly in the alternating current (AC) area. It has major production facilities in Europe and China as well as sales offices around the world, and employs around 3,200 people. In 2015, revenue was €1.2bn.

"We are combining two strong cable portfolios rooted in a shared Nordic heritage that will be more competitive on a larger scale under NKT Cables' ownership, while maintaining access to supply through a long-term strategic partnership," said ABB CEO Ulrich Spiesshofer. "The combination of our niche cable system business with the strength of NKT Cables demonstrates our commitment to active portfolio management, a key element of our Next Level strategy."

ABB's high-voltage cable technology and manufacturing as well as service footprint is highly complementary with NKT Cables' activities, making the combined business suited to serve the rising global demand for long-distance power transmission cable systems. The combined operational scale and reach of the two businesses is expected to lead to even better service for global customers.

"ABB's high-voltage cable business will add considerable strength to our portfolio and bring us a world-class manufacturing operation. We will leverage the technology, domain competence and highly skilled workforce to grow this business," said Michael Hedegaard Lyng, president and CEO of NKT Cables. "We look forward to ramping up our long-term partnership that will serve future projects all around the world."

ABB's cable system business offers turnkey solutions including design, engineering, supply, installation, commissioning and service. It had adjusted stand-alone revenues of US\$524 million in 2015, employs around 900 people, and has state-of-the-art manufacturing and R&D capabilities

for high-voltage submarine and underground cables in Karlskrona, Sweden.

The transfer of assets also includes a new, cutting-edge cable-laying vessel, currently under construction. With experience of over a century, the business serves a range of applications and has commissioned hundreds of alternating current and direct current links around the world.

"As part of the strategic partnership, ABB and NKT Cables will work together on future projects to access market opportunities in areas like sub-sea interconnections and direct current (DC) transmission links," said Claudio Facchin, president of ABB's Power Grids division. "This transaction will simplify and focus the Power Grids portfolio."

The transaction is anticipated to close in Q1 2017, subject to regulatory clearances and fulfilment of the closing conditions. Goldman Sachs acted as exclusive financial advisor to ABB and Freshfields Bruckhaus Deringer was the legal advisor.

**ABB – Switzerland**  
**Website:** [www.abb.com](http://www.abb.com)

## Malaysia conference for lubricant manufacturer



▲ *The Metalube team at the conference in Malaysia*

UK lubricants manufacturer Metalube hosted a conference at the Saujana Hotel in Kuala Lumpur, Malaysia, for its Asia team. Delegates travelled from Turkey, UAE, India, Malaysia, Thailand, Indonesia and China, covering almost the entire region.

Douglas Hunt, commercial director, said: "This type of event is valuable in so many ways. It gives us a platform to train our Metalube teams, share new product developments and to highlight sales techniques. However, most importantly it allows our employees, who are scattered across the region,

to meet up, form relationships and convey their personal experiences."

Metalube manufactures a range of non-ferrous drawing oils and maintenance lubricants as well as a variety of corrosion protection and forming oils. The experienced exporter has offices in China, India, Brazil and UAE.

**Metalube Ltd – UK**  
**Website:** [www.metalube.co.uk](http://www.metalube.co.uk)

## High carbon wire production lines



▲ Continuous innovation from the R&D team at Eurolls

IN today's world, the word progress has become synonymous with expectations of better quality. In the sector of high carbon steel wire, the evolution of the chemical composition of these wires, with increasing carbon contents, has meant a continuous innovation of both the wire production equipment and the entire production process.

This increase in the mechanical properties of the wire has amplified the difficulties of high-speed drawing due to the development of high temperatures.

Much has been done to optimise the drawing process, with new die angles and significant developments in lubricant quality, but existing capstan cooling systems in the wire drawing machines have meant that it has not been possible to exceed certain limits.

The R&D department of Eurolls, recognised in the design and production of rolls and cold rolling cassettes, has developed a solution that permits exceeding existing limits by the introduction of a new cold

rolling cassette specifically designed for high carbon wire production.

The cold rolling process, due to a lower friction coefficient and an innovative wire lubrication system, generates less heat thereby lowering wire temperature during the reduction process.

All recent Eurolls wire drawing lines have been supplied with the possibility to adopt this new cold rolling system.

Furthermore, these same new lines have not only an improved capstan cooling system but also benefit from the development of a new internal coating specifically studied by Eurolls R&D.

This internal coating ensures a reduced formation of deposits and rust while guaranteeing an increase in heat transmission (the same cooling capacity but with a lower quantity of cooling water).

**Eurolls SpA – Italy**  
Website: [www.eurolls.com](http://www.eurolls.com)

## VNT in the China spotlight

Ajex and Turner's newly developed VNT dies were the centre of attention for visitors at last year's wire China exhibition.

Many new potential customers also visited the booth and witnessed the company's upgraded wire polishing and regrinding machine TCD-10 with air pressure, grind and polish angles and bearing in one operation, which saves time and energy, and is also very cost effective.

Though Ajex is continuously developing different technologies in the field of wire dies, tooling and machines, the China fair was a learning experience, where the company could get to know the different needs of the customers.

Ajex has been participating in wire and cable exhibitions for many years as it understands that this is the platform where its products can be witnessed by the maximum number of potential customers.

**Ajex & Turner – India**

Website: [www.ajexturner.com](http://www.ajexturner.com)

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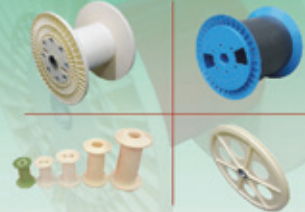
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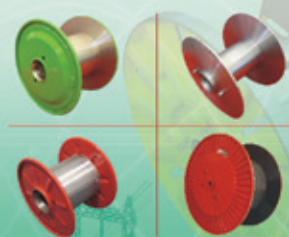
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## £250,000 investment in the latest technology

WILLIAM Hughes, a specialist manufacturer of springs and bent wire components for the global automotive and aerospace industries, has invested more than £250,000 in a high technology twin robot welding cell.

The new welding cell was supplied by Bauomat with Fanuc robots, all installed at William Hughes' new UK headquarters in Stalbridge, Dorset.

The unit features advanced weld monitoring and recording ensuring that the highest standards of quality and consistency are maintained for its customers.

"We have been very successful in winning significant new business from our automotive customers and this has meant that we needed to increase our production capacity for our welded seat frame assemblies," said Emma Burgon, engineering director.

"The Fanuc twin robot welding cell was the obvious choice as we already have a number of Fanuc machines within our organisation and are familiar with their programming and operation.

"The twin robot version more than halves the time required for the welding process and this has provided a significant increase in our manufacturing capacity."

The welding cell is in operation 24 hours a day during the working week and is currently being used for the bulk manufacture of seat frame backs for an SUV. This particular assembly has 56 welds and uses 25 wires.



▲ The twin robot welding cell

As well as the improved quality and consistency of the finished product provided by the twin robot cell, the welding process is much quicker, enabling parts to be produced in just 1 minute 40 seconds compared with 3 minutes 45 seconds previously.

Furthermore, to ensure throughput speed is maximised, the weld jigs are all designed by William Hughes engineers using the latest CAD software and manufactured using CNC milling machines.

This recent investment in the latest manufacturing technology continues William Hughes' programme of continued growth which includes the opening in October 2014 of a new 87,000ft<sup>2</sup> factory at its UK base in Stalbridge.

The company also continues to invest in the growth of its manufacturing facility in Bulgaria, which is servicing the needs of its European customers.

**William Hughes Ltd – UK**  
**Website:** [www.wmhughes.co.uk](http://www.wmhughes.co.uk)

### Capacity expansion for Huber

The Fire Retardant Additives (FRA) business unit, part of the Huber Engineered Materials division of J M Huber Corporation (Huber), has announced a 10 per cent capacity expansion of its Martinal® fine precipitated alumina trihydrate production at its newly acquired Martinswerk Plant in Bergheim, Germany.

The additional capacity is projected for completion by the third quarter of 2017. This addition follows a 20 per cent capacity expansion in precipitated alumina trihydrate just completed at Huber's Bauxite, Arkansas, facility in the United States.

The investment by Huber in additional capacity in Bergheim commenced only seven months after the February acquisition of Martinswerk GmbH, including the joint venture interest in Magnifin Magnesiaprodukte GmbH & Co KG.

Huber is a global leader in the production of fine precipitated alumina trihydrate and magnesium hydroxide, both non-halogenated fire retardants. Its FRA business unit has four manufacturing sites in North America and two in Europe.

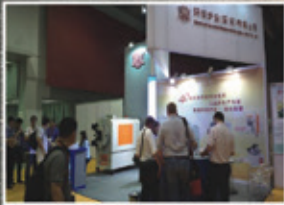
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## More Davis-Standard machines on the way

INDONESIAN film producer PT Kencar Sukses Investama is expanding its presence in the Southeast Asian film market by adding two more Davis-Standard cast film machines to its facility in Sidoarjo, Indonesia.

This brings its total to four Davis-Standard machines in just over five years. It has introduced several innovative food-packaging films to the region, accounting for a rapid growth rate and strong customer base.

Kencar was the first company in Southeast Asia to introduce five-layer CPP films, and with the additional Davis-Standard machines will become the first with six-layer capabilities. This will enable it to support markets for high barrier CPP as well as CPE films that offer better thickness uniformity and clarity than comparable blown films.

Kencar president Eddy Soelayman said: "The Southeast Asia flexible packaging market is growing at more than eight per cent per year and Kencar has outpaced that growth by more than 50 per cent. We see a transition in the CPP market from commodity to high-performance films that have superior barrier, metal adhesion, gloss and heat seal properties.

"We are currently producing five-layer CPP films with heat seal properties like CPE with excellent gloss and metal adhesion. With the new machines we can take that a step further by producing CPP films with unique barrier properties



▲ PT Kencar Sukses Investama is expanding its presence in the Southeast Asian film market by adding two more Davis-Standard cast film machines

that allow converters to down gauge and reduce conversion steps to save cost."

The Davis-Standard cast film machines will be higher speed versions of the original two. Both machines will feature next-generation DSB® barrier screws to handle Kencar's diverse range of materials and film applications. Feedblock and die technology will accommodate up to seven distinct layers in a structure.

The "ironing" roll will be included on the winder for consistent roll conformity. Kencar appreciates Davis-Standard's proven technology, which produces

films with higher surface treatment retention, better metal adhesion and improved oxygen and water vapour barrier properties, all critical in flexible packaging.

"Davis-Standard has been excellent in providing creative solutions for the unique films we continue to introduce to the market," added Mr Soelayman. "They have a good understanding of polymer processing and know-how to transform our vision into final products."

**Davis-Standard LLC – USA**  
**Website:** [www.davis-standard.com](http://www.davis-standard.com)

## Hectic time for Wire and Plastic with China, India and USA trips

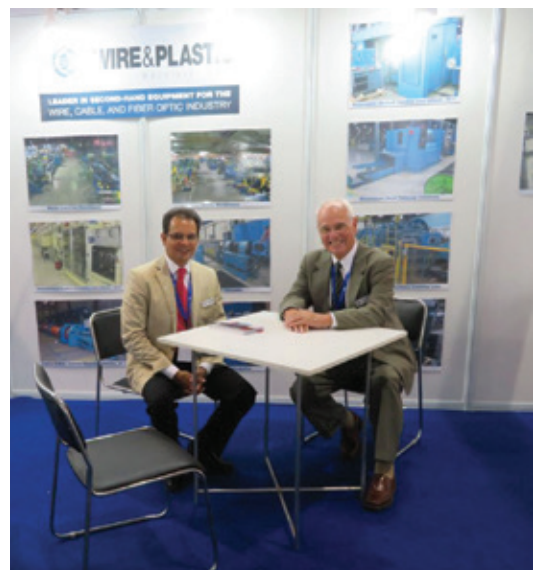
Wire and Plastic Machinery has recently taken part in three major wire and cable trade shows. Rahul Sachdev and Erik Macs were on hand for the four-day wire China exhibition in Shanghai, China, as part of the North American Pavilion.

Mr Sachdev was also representing the Wire and Cable Industry Suppliers Association (WCISA) as immediate past president and, along with executive director Mike McNulty, assisted incoming president Drew Richards of Richards-Apex with his ceremonial duties.

A large group of people visited the stand to discuss the nuances of used and rebuilt machinery. The International Wire and Cable Symposium was held the following week in Providence, Rhode Island, USA, and primarily highlighted the optical fibre and datacomms processing machinery inventory.

Rick Narang, Greg Malcervelli, Erik Macs and Denis Godin handled the discussions with the steady stream of existing and new customers through the booth. Wire and Cable India was held in Mumbai, India, with Rahul Sachdev and David Forber working the booth, entertaining new and returning customers.

Wire and Plastic Machinery Corp has also been very active in the purchase of new inventory to fill its existing warehouse space. Equipment is being offered for immediate sale.



▲ Wire and Plastic Machinery's Rahul Sachdev and David Forber at Wire and Cable India

**Wire & Plastic Machinery Corp – USA**      **Website:** [www.wireandplastic.com](http://www.wireandplastic.com)

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Photograph courtesy of Jiangsu Handling Machinery Co Ltd

## IWCS heads to China

THE UL and IWCS China 2017 Cable & Connectivity Symposium is the premier Asian venue to learn of new technologies in cable and connectivity materials, products, processes and applications.

IWCS Inc, producer of the International Cable & Connectivity Symposium, and UL, a global independent safety science company, have collaborated to establish a regional Asian conference in Shanghai, China.

The UL and IWCS China 2017 Cable & Connectivity Symposium is the region's leading forum for the exchange of information on technical innovations and solutions in the industry. Based on the IWCS educational symposium format, the China symposium will be held from 25<sup>th</sup> to 27<sup>th</sup> April 2017 at the Marriott Shanghai City Centre.

"We were pleased to be asked by UL, a prominent and respected global organisation, to offer this additional regional conference in China," said Robert Wessels Jr, chairman of IWCS.

"This is our 65<sup>th</sup> year of the global symposium conducted in the United States and we are now looking forward to presenting topics to a broader audience in Asia, particularly to those who cannot travel here."

The IWCS Symposium has been the leading worldwide conference for peer reviewed papers and presentations on technologies and trends in cable and connectivity for the communications, data, electronics, power, industrial, automotive and aerospace industries.

LF Lai, vice president and general manager of UL's Wire and Cable division agrees, adding: "The IWCS Connectivity Symposium is an internationally reputable conference for the wire and cable industry with a well-established history."

Reliable and higher speed connectivity is an increasing need, which is being fulfilled by the fast development of emerging technologies from global industry players.

"As China is the largest market for wire and cable connectivity with the strongest need for acquiring the knowledge of latest innovations, it is logical to establish this regional event in China as the premier venue to learn of new technologies in cable and connectivity materials, products, processes and applications," he added.

"IWCS is the most renowned and influential global symposium organiser in the field of connectivity technologies, and

we believe that IWCS is the most effective at presenting technical papers."

In the technical conference, speakers present peer reviewed papers on timely, informative topics selected from hundreds of submitted abstracts from top firms around the globe. A keynote speaker addresses the attendees at a plenary luncheon.

The executive track features prominent speakers and topics of interest to general

and commercial management. The professional development programme includes core courses in fibre, copper and materials, and new courses on the issues and technologies of high concern such as codes and standards. A supplier exhibition displays the latest products and services from the important suppliers in the cable and connectivity industry.

**IWCS – USA**  
**Website:** [www.iwcs.org](http://www.iwcs.org)

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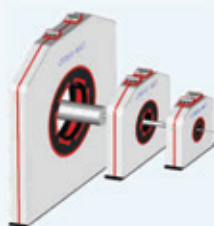


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## All aboard for 25<sup>th</sup> anniversary celebration

GERMAN Machine Tools of America (GMTA) celebrated the company's 25<sup>th</sup> anniversary during the IMTS (International Manufacturing & Technology Show) in Chicago, USA.

The celebration took place aboard the *Anita Dee II*, a private yacht charter, on Wednesday evening after the show concluded for the day. A crowd of over 150 customers and business associates boarded the yacht on the east end of McCormick Place for an evening of wining and dining while cruising the waters of Lake Michigan. The evening was hosted by Walter Friedrich, president of GMTA, Scott Knoy, vice-president of sales, and Claudia Hambleton, CFO.

Mr Friedrich welcomed the crowd with a short speech thanking them for their support over the last 25 years. He gave a bit of company history and mentioned the recent opening of the newest office in Queretaro, Mexico.

Guests enjoyed a lavish dinner buffet, open bar and the music of a live band playing tropical party music. The ship cruised along the illuminated Chicago skyline, past Buckingham Fountain and along Navy Pier for several hours before returning guests to Navy Pier.

GMTA, located in Ann Arbor, Michigan, is the USA subsidiary of Profilator GmbH. It represents various lines of German machine tools and metal fabricating



▲ *The Chicago skyline from the Anita Dee II*

equipment, including gear cutting and honing machines including the patented Hard Scudding® process for gear-making, parts washing systems, special machine tools, tooling, laser welding machines, surface grinding and deburring machines, multi-spindle lathes, multi-station vertical turning machinery and more.

GMTA markets to automotive OEMs and various Tier suppliers, plus off-highway equipment, bearing and other power transmission builders.

**German Machine Tools of America (GMTA) – USA**  
**Website:** [www.gmtamerica.com](http://www.gmtamerica.com)

## Experience and more management power for a stronger future

Koch is putting itself on track for the future with a bigger executive board. Managing partner Jochen Koch is getting a double helping of expert assistance in the form of Thomas Voss as sales director and Harald Udelhoven as technical director.

With these three leaders at its helm, the company aims to build up its innovation leadership in the global market.

Experienced sales expert Thomas Voss returned to Koch on 1<sup>st</sup> September 2016, after four years away. Based on his years of experience in the wire machine industry – 34 of them at Koch – he will be aiming to strengthen the company's sales activities as sales director.

Harald Udelhoven will complete the team as the new technical director. The 55-year-old has worked for many years in leading electrical engineering businesses. He studied mechanical engineering specialising in construction technology, as well as business management. Most recently he worked as head of global quality management and head of high-vacuum systems product lines.

"Harald Udelhoven has a massive amount of knowledge in different disciplines that will provide our company with some important momentum," added Mr Koch.

Experience, innovative strength and a broader outlook: this



▲ *The newly formed management, from left, Thomas Voss, Jochen Koch and Harald Udelhoven*

to Jochen Koch is the "best mix" by which the company will be able to tackle the challenges of an increasingly complex global market.

**Ernst Koch GmbH & Co KG – Germany**  
**Website:** [www.koch-ihmet.de](http://www.koch-ihmet.de)



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# UK cable loom and harness manufacturer celebrates ten years in business

CONVERT Ltd, a UK manufacturer of cable looms and harnesses, is celebrating ten years in business.

The Kent-based company initially employed nine people when it was set up in 2006. It has grown significantly over the past decade and now employs 30 members of staff and turns over £1 million.

Operating predominantly in the automotive, public transport and scientific/medical sectors, Convert manufactures cable harnesses for car head and rear lights, passenger gates at railway stations and a range of scientific equipment. It boasts some top industry names amongst its customers such as Wipac, Bibby Scientific Ltd, GKN Hybrid Power, Cubic Transportation and OEM Automatic Ltd, as well as leading luxury and sports car manufacturers.

Dave Lord, managing director, said: "We are delighted to be celebrating our tenth anniversary. I'd like to thank our customers and staff for their commitment over the past decade. From the outset we've been lucky enough to work with some fantastic customers for whom we will bend over backwards to meet any engineering challenge.

"Equally, we've been fortunate to have attracted highly skilled staff who really know their stuff when it comes to electrical engineering, allowing us to manufacture high quality cable looms and harnesses which meet customer specifications."



▲ The Convert team celebrates ten years in business

Convert prides itself on happy staff, satisfied customers and family feel. Its youngest employee, Bianka Makroczi, is 22 years old and has been with the company since May 2015. The oldest employee, Barbara Wenman, who works in production, is 79 years old and has been with the company from the outset.

Convert also works with local schools to take on work experience students, as well as sponsoring the local football club and supporting local charity, Kent Air and Rescue.

**Convert Ltd – UK**

**Website:** [www.convertltd.co.uk](http://www.convertltd.co.uk)

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## New managing director

Windsor Kunststofftechnologies GmbH, based in Hanau, Germany, has appointed Peter Kochs as its new managing director. Windsor is the Europe-wide representative for hydraulic and servo-hydraulic injection moulding machines for the Taiwanese manufacturer FCS (Fu Chun Shin Group).



▲ Peter Kochs

In addition, it is the representative in Germany of JSW Ltd (The Japan Steel Works, Tokyo), manufacturer of all-electric injection moulding machines. Mr Kochs has taken over the position following the sudden and unexpected death of Reiner Nowacki in June 2016. He has been with Windsor since 2008, more recently as COO sales and authorised signatory. He will now have a significantly wider key range of responsibilities at his disposal.

**Windsor Kunststofftechnologies GmbH – Germany**

**Website:** [www.windsor-gmbh.de](http://www.windsor-gmbh.de)



# Cables

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## Delfingen opens new Moroccan plant

DELFINGEN, global automotive supplier and manufacturer of on-board network protection solutions and fluid transfer tubing, has inaugurated a new site in Tangier, Morocco, an area considered by many as the new Detroit of North Africa.

The company has been active in Morocco since 2000 with a production plant in Casablanca followed by a logistics centre in Tangier in 2003.

The company now enters a new stage of strategic importance with the launching of a production facility of over 8,500m<sup>2</sup> in the Tangier Free Zone (TFZ).

This significantly strengthens Delfingen's industrial footprint in the area.

This new site, with already over 100 co-workers, meets the company's standards of industrial excellence, and will specialise in the manufacturing of technical tubing and sleeves for automotive wiring harness protection, and in the assembly services for sealing systems in partnership with the Hutchinson company.

This new step reflects the group's commitment to continuously assist its customers by being near their sites to enable higher reactivity and, thus, better service.

Gérald Streit, CEO, said: "The impressive economic take-off of the automotive industry in Morocco, the trust we have in the governance of the country, together with our experience in



▲ *The ribbon cutting at the new plant*

local production for over 15 years prompt us to make significant investments in this area of the world over the next three years."

The opening ceremony took place in presence of Bernard Streit, president of the Delfingen Group, Gérald Streit, and the executive committee. Representatives of the TFZ, local authorities, as well as many customers and partners joined them to celebrate the event.

**Delfingen Industry SA – France**  
**Website:** [www.delfingen.com](http://www.delfingen.com)



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# Development of the cable market

Interview with Harry Prunk, executive board of Sikora AG

SIKORA presented its measuring, control, inspection and sorting technology at Wire China in Shanghai and at Wire & Cable India in Mumbai.

## Which trends in terms of technology did you recognise in the wire and cable industry?

From what we see, cable suppliers have re-focused, as the market has changed in regards of quality demands, costs and production efficiency. Therefore, all companies are currently focusing on optimising their extrusion processes. Repeatability of the process is the keyword, as quality is not only required today, but every day up to 24 hours of production.

A few years ago, diameter measuring devices were used exclusively for monitoring the quality-relevant parameters. In recent years, we see a change here: only if the line is controlled in automatic mode, the human influences on the processes are eliminated, the quality measurably improved. Today, we see that further steps had been taken already.

## What are these further steps?

Here are five examples: At the manufacturing of optical fibres, we see that manufacturers care about temperature, they care about airlines in the fibre cladding and they consequently monitor the detection of even the shortest lumps in the coating of the fibre.

In the area of data cables, manufacturers



▲ Harry Prunk, member of the executive board of Sikora AG

always did a capacitance measurement. Today they also need online information on the structural return loss (SRL). At the manufacturing of automotive cables, manufacturers look for a perfect adhesion of the insulation to the conductor as those cables are in the following steps automatically processed, which requires high uniformity of the product.

In the area of cable sheathing, manufacturers look for concentricity in order to reduce cost; and in the field of high voltage cables, manufacturers demand absolute cleanliness of the insulating material in order to avoid cost resulting from breakdowns at discharge tests. I conclude that manufacturers rechecked and redefined all of their processes.

## What are your comments on the global cable market outlook in the near term?

The global cable market is still faced with major challenges which must be addressed, amongst others, in terms of infrastructure – not only in the developing countries, but also in highly developed countries. We see all of these changes globally, when it comes to the power supply based on wind and solar energy. Furthermore, we see the discussions about electrically operated vehicles and the increasing demand for higher data volumes in communication. All these changes present new challenges for us – not only in the near future but also in the long term.

**Sikora AG – Germany**

**Website:** [www.sikora.net](http://www.sikora.net)

## Using its broad skills for clients

Involved in the fields of tungsten carbide tools since 1870 and machinery for decades, French company Agir Technologies takes advantage of its broad skills to provide the best to all its clients.

The investments recently made in the company, such as a wire cutting EDM with two-wire spool of 0.03mm, a 5-axis CNC machine to cut the electrodes, and new CAD/CAM software, allow Agir to expand its range of high precision and quality tools.

The company specialises in the production of tungsten carbide tools

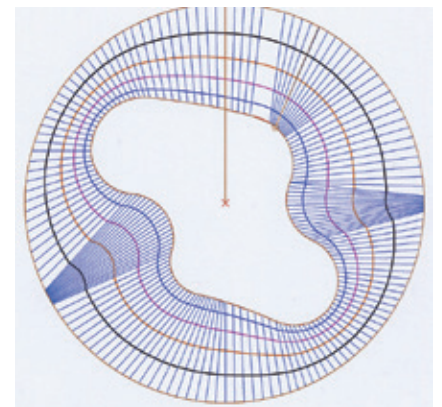
for wire and cable manufacturing and other wire transformation, including wire drawing dies (round, shaped, pressure), drawing dies and plugs, cable extrusion tools, straightening tools, wire-guides, and tools for welding rods and plated wires.

Thanks to its software, Agir is also able to calculate any drawing station for round wire.

The company exports to five continents and over 60 countries.

**Agir Technologies – France**

**Website:** [www.agir-technologies.com](http://www.agir-technologies.com)



▲ Shape die from Agir

## New role in Germany

DAVIS-STANDARD has appointed Paul Knorsch as the aftermarket group and business development leader at the company's German subsidiary, ER-WE-PA GmbH. In his new role, Mr Knorsch will work closely with the global aftermarket team to support Davis-Standard products, locations and initiatives worldwide. He will be based in Erkrath, Germany, and report to Kai Möllendorf, ER-WE-PA's managing director.



▲ Paul Knorsch

Mr Knorsch will play an integral role in driving aftermarket growth and supporting customers. He will be dedicated to further enhancing the existing aftermarket offerings in spare parts management, retrofits and rebuilds, as well as control upgrades.

In addition, he will promote the latest technology to demonstrate how Davis-Standard can improve customers' existing extrusion lines. He has worked for decades with customers on specialised solutions around the world.



▲ John Aagaard

The company has also appointed John Aagaard as product manager, reclaim-fibre. In his new role, Mr Aagaard will focus on sustainable business growth, offering sales support to both new and existing customers.

Prior to joining Davis-Standard, he worked for American Maplan d.b.a. Battenfeld-Cincinnati-USA, as project sales engineer in the packaging division. He also worked for Raytheon Missile Systems as a mechanical designer and project engineer.

**Davis-Standard LLC – USA Website:** [www.davis-standard.com](http://www.davis-standard.com)

## Joe heads for T&T

Joe Maglich has recently joined T&T Marketing Inc as account manager, mid-Atlantic. He is a graduate of the Ohio University Russ College of Engineering programme with a degree in chemical engineering. He has spent over six years focused on technical sales and customer support for DuPont and later at its spin-off, Axalta Coating Systems.



▲ Joe Maglich

**T&T Marketing Inc – USA Website:**  
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## LEADING MAGAZINES

for the tube and pipe  
industries



## Leica Camera and Huawei launch R&D centre

HUAWEI and Leica Camera AG have expanded their strategic collaboration with the establishment of a jointly operated research and innovation centre, the Max Berek Innovation Lab. The launch comes seven months after the public announcement of their long-term technology partnership in the field of optical engineering, and five months after the launch of the globally successful, multi-award-winning Huawei P9 and P9 Plus smartphones.

The new lab, located at Leica's global HQ in Wetzlar, Germany, will drive further development of optical systems and software-based technologies to improve imaging quality in a wide range of photographic and mobile device applications.

Additional outcomes will include the creation of computational imaging, augmented reality (AR) and virtual reality (VR) solutions. In addition to R&D resources from both companies, Huawei and Leica plan to collaborate with German and international universities and research institutions.

The lab's establishment is the result of the vision and support of Dr Andreas Kaufmann, majority shareholder and chairman of the advisory board of Leica Camera AG, and Ren Zhengfei, founder of Huawei.

"With the founding of the Max Berek Innovation Lab, Huawei and Leica Camera AG are expanding the scope of their successful strategic relationship and are laying the foundation for

close collaboration in research and development of ground-breaking technologies in the imaging segment," emphasised Dr Kaufmann.

"In the future, over 90 per cent of the data traffic will be images and videos," said Mr Ren. "The Max Berek Innovation Lab provides the capacity to establish an even closer partnership with Leica, leading to continuous improvements in image and video quality. As a result, we will deliver the most advanced innovations in the smartphone camera market and bring greater value to consumers."

"Huawei and Leica share not only enormous innovation power and years of research experience, but also their dedication to providing the highest quality standards. The Max Berek Innovation Lab offers us a historic opportunity to unite the resources and

extensive expertise of both companies to pioneer game-changing technologies," confirmed Markus Limberger, chief operating officer of Leica Camera AG and director of the Max Berek Innovation Lab.

The R&D centre is named in memory of Max Berek (1886-1949), the German pioneer of microscopy and creator of the first Leica lenses. He was also responsible for the optical design of more than 20 lenses for the legendary 35mm camera, invented and built by Oskar Barnack.

Thanks to the exceptional imaging performance and perfect harmonisation of the lenses, coupled with Mr Barnack's ingenious construction, Leica achieved worldwide success in 35mm photography.

**Huawei Technologies Co Ltd – China**  
**Website:** [www.huawei.com](http://www.huawei.com)

### A true taste of India

Cable Tapes UK Ltd, a supplier of mica tapes to the cable industry, sponsored the successful "Taste of Mumbai" event at the Wire & Cable India exhibition in Mumbai, India, in October last year.

Up to 100 guests enjoyed a vibrant evening and an authentic Mumbai experience. The Royal Gardens of the ITC Maratha Hotel hosted the evening of traditional Punjabi entertainment and cuisine. Traditional dance and music provided a fitting backdrop to the evening.

Joining in with the celebrations were guests from IWMA's industry partner and exhibition organisers Messe Düsseldorf GmbH and Messe Düsseldorf India, as well as global IWMA member companies.

**Cable Tapes UK Ltd – UK**  
**Website:** [www.cabletapesuk.com](http://www.cabletapesuk.com)

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# Transatlantic Cable

## The Trump economy

▶ The American people have acted. Now they, and the rest of the world, wait to see what they have wrought

This much at least can be declared with certainty about the election of the quixotic Donald J Trump as the 45<sup>th</sup> president of the United States: Americans want radical change.

"They soon will get their wish," wrote Lonnie Shekhtman of the *Christian Science Monitor* (Boston) on 10<sup>th</sup> November, two days after the election. "Though what that change will mean for the wellbeing of Americans and the economy, no one can predict – given that Mr Trump has an economic plan that's not aligned with the plans of his [Republican] party, and no history of government service to reference."

Ms Shekhtman might have added that the many contradictory statements made from the campaign trail by candidate Trump further confound the effort to make even a rough economic sketch of his presidency. Even so, like journalists across America in the wake of Mr Trump's stunning electoral upset, she combed the available evidence for hints to what may lie ahead.

Here, much abridged and lightly edited, are the main takeaways from her preview ("The American Economy Under a President Trump: a Primer"):

- ▶ Global investors were caught off-guard by Mr Trump's victory – the polls had predicted a different outcome – and stock futures plunged late on Election Day. But the market rebounded by the start of the following business day, and indications are that markets have taken the results in stride.
- ▶ A Trump presidency likely means less regulation of some industries plus corporate and individual income tax cuts. In the short term, economists say, these cuts could support economic growth. Michelle Meyer, head of US Economics at Bank of America Merrill Lynch Global Research, said in a 9<sup>th</sup> November call with reporters that the country will likely see 1.8 per cent growth in gross domestic product (GDP) in 2017.

Ms Meyer and other analysts predicted that the uncertainty surrounding the new president would prevent a previously anticipated rate hike by the Federal Reserve in December, and could dampen business spending in the first half of the year.

- ▶ One thing Mr Trump has made abundantly clear is his intention to bring blue-collar jobs back to the USA by

renegotiating trade deals with Mexico, Canada, China, and other countries that would make it more expensive for American companies to manufacture their products overseas.

He also has said he wants to spur economic growth by cutting taxes across the board, curbing immigration to free up jobs for Americans, and repealing the Affordable Care Act ("Obamacare") in favour of tax-free "health savings accounts," tax-deductible insurance premiums, and the sale of health insurance across state lines.

## A more isolationist direction

▶ Some analysts worry that Mr Trump's thrust could affect global relations. A decline in trade also could dampen USA economic growth by raising the price of imports and reducing the amount of goods and services available at home.

Said Ms Meyer of BA/Merrill Lynch: "We're just going have to sit tight for now and see what he ends up attempting to push through in the beginning of his term."

- ▶ Companies in Silicon Valley fear that a curb on trade and immigration could make it harder for them to do business overseas and to hire foreign engineers. And some economists predict that Trump tax cuts will help only the wealthy.

"Historically Republicans get elected promising tax cuts, and they deliver," Aaron Klein, an economist at the Brookings Institution, a public policy think tank, told the *Monitor*. But, noted Mr Klein, "Those tax cuts have traditionally benefited the holders of capital – which exacerbates income inequality."

Analyses from the Tax Policy Center, another think tank, support this view. They suggest that tax cuts could add trillions to the national debt, and that nearly half of the cuts would profit the highest-income one per cent of households. A 2013 analysis by the *Washington Post* produced similar results.

- ▶ As Ms Shekhtman observed, tax cuts "are tried and true Republican territory." But Mr Trump is also known to favour something that has been more of a Democratic priority: shoring up America's crumbling infrastructure.

The incoming president has pledged to spend \$1 trillion to rehabilitate America's roads, tunnels, ports and bridges in a national project that he claims would create millions of jobs.

# Transatlantic cable

How Washington might afford such a massive investment is, of course, not yet known. But Merrill Lynch economists consulted by the *Monitor* pointed out that Mr Trump has proposed getting American companies to bring home the \$2.5 trillion in profits they have stashed overseas – using lower taxes as a sweetener. (At 35 per cent, the USA has the world's highest corporate tax rate.)

If the persuasion should succeed, this could both help float the infrastructure project and offset the income losses stemming from lower taxes.

- President Barack Obama also sought to introduce an infrastructure spending programme to boost the economy, but was thwarted by a Republican Congress. Mr Trump, who inherits another Republican Congress, has a better shot – but his advantage is not absolute.

Having essentially run his own remarkably bitter and acrimonious campaign for the presidency, he won as the result of a populist insurgency and owes nothing to the Republican establishment. Many in its ranks take a jaundiced view of the new chief executive, and viceversa.

Even so, as noted by Mr Klein of the Brookings Institution, in addition to his new bully pulpit Mr Trump comes into office with the freedom and flexibility “to break the logjam over simple, common sense solutions such as investing in infrastructure.”

## Entrepreneurship

▶ London is ‘the European centre of the tech world,’ and City Hall aims to hold on to the distinction

“According to innovation foundation Nesta and the European Digital Forum’s European Digital City Index, the capital is still the best city in Europe for start-ups, thanks to its access to capital, buzzing entrepreneurial culture, and access to a skilled workforce.”

The capital in question is London; and Rebecca Smith, who covers transport and infrastructure for the London-based news site *City AM*, had more to report about the leadership position it retained for a second straight year. London came ahead of second-place Stockholm, third-place Amsterdam, and fourth-place Helsinki, with Paris rounding out the top five.

In both start-ups and scale-ups, London also “came top” in ten core metrics, including mentoring and business environment. (“London’s Still the Number One City in Europe for Digital Start-ups,” 18<sup>th</sup> November)

The ranking of 60 European cities finds nine in the UK, with six of these in the top 20. Ready access to mentoring earned Cambridge the 12<sup>th</sup> spot, while Bristol was 13<sup>th</sup>, Oxford 15<sup>th</sup>, and Manchester 16<sup>th</sup>.

“This is welcome news and, once again, highlights the global importance of London’s diverse tech community,” Romilly Dennys, executive director of the Coalition for a Digital Economy (Coadec), a UK-wide community of tech startups, told *City AM*. She said also that the recognition accorded London demonstrates the need to encourage tech-driven growth across every city and region of the UK, with access to talent – both global and domestic – the chief concern.

Ms Dennys’s assertion that “clamping down further on skilled immigration is not the answer” receives a receptive hearing in City Hall.

Rajesh Agrawal, London’s deputy mayor for business, told Ms Smith that the city’s growing success as a tech hub is built upon its world-class pool of talent. Thus, he said, it is “more important than ever that companies in London and across Britain have access to the global talent they need to grow and create jobs and prosperity.”

Mr Agrawal also said that his boss, Mayor Sadiq Khan, would continue to make the case to government to ensure a flexible approach to bringing in global talent.

- There is support for the access-to-talent initiative in the London business/technical community. Gerard Grech, the CEO of Tech City UK, said that the management consultancy is working closely with government to make sure it understands that companies and entrepreneurs need to be able to continue recruiting highly skilled staff from around the world.

Mr Grech pointed to Google’s recent announcement that it was going ahead with its \$1.2 billion London headquarters. He told Ms Smith, “As Google has shown with its renewed commitment to King’s Cross, with plans to create 3,000 more jobs here, London remains the European centre of the tech world and we intend to work hard to keep it that way.”

## Competitiveness

▶ Once again, the world’s three most competitive economies are Switzerland, Singapore and the United States of America

Another London-based journalist, Lianna Brinded, the finance editor of *Business Insider*, also found a home-team advantage in recent news: the UK moved up three places to be named the seventh most competitive economy in the world last year.

The certifying authority is the World Economic Forum (WEF), which publishes an annual Global Competitiveness Report on the state of the world’s economies. The 2016–2017 edition of this comprehensive assessment was published in late autumn.

The WEF looks at data on areas as varied as the soundness of banks to the sophistication of businesses in each country, then uses the data to compile a picture of the individual economies.

Ranking is according to the “12 pillars of competitiveness,” including macro-economic environment, infrastructure, health and primary education, and labour market efficiency.

Here, lightly edited, are Ms Brinded’s capsule summaries of the economies topping the WEF list, from her article “The 31 Most Competitive Countries in the World” (28<sup>th</sup> September):

1 (with a WEF ranking of 5.81) Switzerland.

Switzerland retained its position and even improved on its scores in previous years.

The country not only makes it into the top ten of eleven of the “pillars” – it leads in four of them: labour market efficiency, business sophistication, innovation, and technological readiness.



# Transatlantic cable

## 2 (WEF 5.72) Singapore.

The island nation stays in second place for the sixth year in a row. While it aced all the other sub-indexes, if it hopes ever to be number one the WEF said it must improve its scores in business sophistication and innovation.

## 3 (WEF 5.70) The United States of America.

A stable macroeconomic situation and a falling budget deficit keep this powerful economy near the top spot. Says the WEF: "The position of the United States is driven by innovation, business sophistication, market size, financial market development, labour market efficiency, and higher education and training."

## Tied for 4 (WEF 5.57) The Netherlands.

The Dutch economy moves up in the ranking again this time after having boosted its standing through "small improvements across all three subindexes, with a solid and even performance across the pillars." It earned scores in the top ten for infrastructure, health and primary education, higher education and training, goods market efficiency, technological readiness, business sophistication, and innovation."

## Tied for 4 (WEF 5.57) Germany.

The German economy drops one place in the latest rankings because, although its macroeconomic environment is generally stable, with a very low government deficit, "like the rest of the euro zone it faces near-zero inflation."

Sweden, the UK, Japan, Hong Kong and Finland account for the lower tier of the WEF's top ten competitive economies for 2016-2017.

- The list-making tendency that sprouts with the New Year turned up another interesting datum on London. As per the luxury travel magazine *Condé Nast Traveler*, the capital of the United Kingdom (with 19.88 million overnight visitors in 2016) was the second-most-visited city in the world for the year, after Bangkok, Thailand (with 21.47 million visitors). Paris, Dubai and New York rounded out the top five most-visited cities.

## Automotive

▶ Hundreds of thousands of buy-back 'dirty diesels' present Volkswagen with a daunting storage problem in the USA

In November, Volkswagen Group of America was set to begin buying back 2.0-litre diesel VW and Audi cars sold between 2009 and 2015, the first of close to half a million caught up in the VW diesel emissions scandal.

Writing in *Green Car Reports*, John Voelcker, senior editor for Internet Brands Automotive Group, considered what the company might do with those vehicles once it had taken legal possession.

He learned that the cars would not, as might be expected, routinely be disabled, "parted out" and recycled.

Their disposition depends on the outcome of negotiations between the company and both the USA Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) over proposed modifications to some of the cars. ("What Will VW Do with TDI Diesel Buyback Cars? It's Not What You Think," 3<sup>rd</sup> November)

In advance of EPA and CARB approval, it appears that VW will have to store the vehicles, possibly hundreds of thousands of them. As the buy-backs got under way it would likely have to rent storage fields and warehouses all over the USA.

According to a 25<sup>th</sup> October decision by a federal judge, ultimately VW may take any of these courses of action with the bought-back diesels:

- modify and resell them as used cars, with proper disclosure to the buyer
- export them for resale abroad
- render them inoperable and recycle them, or salvage them for parts that may be sold in the USA or exported

Mr Voelcker reported that the affected vehicles in the initial roundup fall into three groups.

The 67,000 cars in Group 1 exceed legal emission limits less than earlier diesel models, thus may be the best candidates for modification approval.

They use a newer 2.0-litre engine and are fitted with tanks for the diesel emission fluid necessary for selective catalytic reduction (SCR) exhaust after-treatment to reduce pollutants.

The 90,000 cars in Group 2 use an older 2.0-litre diesel engine but are equipped with the SCR system and tanks for the urea fluid it requires.

Most of the non-compliant diesel cars (325,000 units) are in Group 3 – those that were not fitted with the SCR system but only with a Lean NOx Trap. They are by far the dirtiest, and would likely be very expensive to modify.

Wrote Mr Voelcker, "To comply with emission standards they might require installation of catalytic converters, urea tanks, and many engine modifications they were never designed to accommodate."

The cars in this category are most likely to be rendered inoperable and scrapped, probably in a process similar to the "Cash for Clunkers" programme for older vehicles conducted in the USA in 2009.

## Steel

▶ A 'Nixon-to-China' moment, extraordinarily favourable to the American steel industry, may be at hand

"In other words, if Democrat Obama had succeeded it would have been socialism. If [Republican] Trump succeeds he's Making America Great Again."

Tom Balcerek, who formerly handled North American coverage for *Steel Business Briefing*, is senior editor of *S&P Global Platts* (also London-based).

In a recent issue he considered the present prospects of the American steel industry in starkly political terms and concluded that "things are looking great." ("US Infrastructure May Soon Have Its Nixon-To-China Triumph," 18<sup>th</sup> November)

Mr Balcerek noted that steelmakers' share prices surged in the immediate aftermath of Donald Trump's election to the USA presidency, presumably on Mr Trump's commitment to put America first by fighting "unfair" trade deals and imports.

# Transatlantic cable

Among his campaign pledges was to “bring back steel.” Additionally, his commitment to boosting infrastructure spending brightens the outlook for American steel.

Much steel will be needed for all those new roads and bridges, locks and dams, airports and railways. According to a Morgan Stanley estimate cited by *S&P Global Platts*, candidate Trump’s \$550 billion stimulus plan would increase demand by 20 per cent annually for five years.

The calculation is for an incremental 22 million tons of steel demand for each year the programme is in effect.

Getting a huge infrastructure programme through Congress is no easy matter. Passage was denied President Barack Obama for years by Republicans, who still command a majority in both houses. But Mr Balcerk thinks it will likely be different now. He recalled the surprising move to open USA relations with Red China proposed in 1972 by President Richard Nixon, a Republican.

Could a left-leaning Democratic president have achieved the historic breakthrough? Never. In that period of intense anti-communist fervour in the USA, only the hard-liner Mr Nixon, a reliably old-school crusader against communism, could muster the popular support sufficient to realise his purpose.

- ▶ Mr Balcerk sees a “Nixon-to-China situation” in the making now. He asserted that a Republican – and only a Republican – could push massive infrastructure spending through a Republican Congress, something politicians of all stripes know “in the back of their minds” is the single best way to help their country. And Mr Trump is a Republican, if of fairly recent provenance.

Moreover, wrote Mr Balcerk in *S&P Global Platts*, “Trump is a builder, so construction is something he understands.”

## Aluminium

### ▶ Protesting a Chinese company’s bid for a Cleveland area aluminium maker, lawmakers assert injury to America’s industrial base

In a 2<sup>nd</sup> November letter addressed to Treasury Secretary Jack Lew, a dozen US senators asked the Obama administration to block a Chinese company’s \$1.1 billion bid to take over a USA aluminium manufacturer.

The senators said the deal should be rejected because it would “directly undermine [our] national security, including by jeopardising the USA’s manufacturing base for sensitive technologies.”

Zhongwang USA LLC in August had agreed to buy Aleris Corp (Beachwood, Ohio) from its private-equity owners in a deal that would mark the highest price ever paid by a Chinese firm for an American metals producer.

Zhongwang USA is an investment company owned by Zhongwang International Group Ltd, the parent company of China Zhongwang.

Liu Zhongtian, who controls Zhongwang USA and is also founder and chairman of Chinese aluminium giant China Zhongwang Holdings Ltd, has said the deal would offer a “complementary business foothold” for his operations in America.

Scott Patterson, who covers financial regulation for the *Wall Street Journal* from Washington, DC, reported on the contents of the senators’ letter, which asserted that Treasury’s Committee on Foreign Investment in the USA – which can recommend blocking or modifying foreign investments on national security grounds – should take into account when a foreign investment deal “creates potential for military know-how and sensitive technology to be transferred to China’s government.”

Aleris, which has 14 plants around the world and annual revenue of about \$3 billion, has supplied aluminium plate used by the American military, including for armoured vehicles. As reported by Mr Patterson, an Aleris spokesman said less than one per cent of the company’s 2015 volume went to defence applications, none of which is produced in the USA.

A Zhongwang spokeswoman said the deal “will bring in additional resources and capital” to Aleris, which will “continue to be run independently.” (“A Dozen US Senators Ask Treasury to Block Zhongwang Takeover of Aleris,” 2<sup>nd</sup> November)

- ▶ Based in eastern China, China Zhongwang is one of the world’s biggest makers of aluminium extrusions used to make goods such as car parts, appliances and window frames. Mr Patterson took note of earlier *Wall Street Journal* reporting on the company:
- ▶ In September, China Zhongwang was the subject of a page-one article detailing allegations that firms linked to Mr Liu had routed aluminium through Mexico in an effort to disguise its Chinese origin and avoid USA tariffs. Mr Liu denied any connection to the Mexico metal.
- ▶ Also in September, the *Journal* reported that the Commerce Department was looking into whether a New Jersey company, Aluminum Shapes LLC, had imported aluminium pallets from China Zhongwang and then fabricated it as a way around punitive tariffs. Aluminum Shapes denied this, saying it was only storing the metal.

### Elsewhere in metals ...

- ▶ Copper will surge more than 40 per cent from this year through to 2020 as the global market swings to a shortage, according to Japan’s biggest producer. These views echo those of Citigroup Inc, the New York-based multinational investment banking and financial services corporation.

The metal essential for power generators and cables will average \$7,000 a metric ton in four years, up from \$4,800 in 2016 and \$5,200 this year, Pan Pacific Copper Co said in a presentation on 3<sup>rd</sup> October in Tokyo. The expectation is for demand to exceed supply by 52,000 tons in 2017 after a surplus of 110,000 tons last year, with shortfalls continuing through the end of the decade.

As reported by Masumi Suga and Ichiro Suzuki of *Bloomberg News* (2<sup>nd</sup> October), Citigroup said the previous week that it was optimistic on copper prices over the ensuing 12 months because new supply had reached capacity and demand had increased in China, the world’s biggest user.

Copper was the worst-performing metal on the London Metal Exchange in the year through to September 2016 after mine output surged in the first half. The Australian banking and financial services corporation Macquarie Group Ltd cut its September forecasts on “persistent oversupply.”

**Dorothy Fabian**  
USA Editor





▲ Straightening and cutting machine for wires, tubes and complex profiles

## Italian technology for straightening and cutting

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- MRTV: Wire-straightening machine with fly cutting system designed to straighten and cut wires automatically in aluminium, copper, brass, steel, silver and gold
- RFTS/RFTC: straightening machines with saw blade or shears cut for round and complex profiles up to 10mm
- MRTSA: straightening machine with saw blade cut for circular and complex profiles up to 25mm

**Violi Srl – Italy**

**Website:** [www.violimacchine.it](http://www.violimacchine.it)

### AVC1500 series from Hannay Reels

The AVC1500 series of portable cable storage reels from Hannay Reels features rugged steel and aluminium construction with a non-reflective matte black finish.

The reels come with permanently attached standard direct cranks and velcro cable fasteners. The manual rewind models feature spring actuated pin-lock and cam-lock drag brake. Optional heavy-duty locking caster wheel set, frame mounted carry handles, and divider discs can be added upon request.

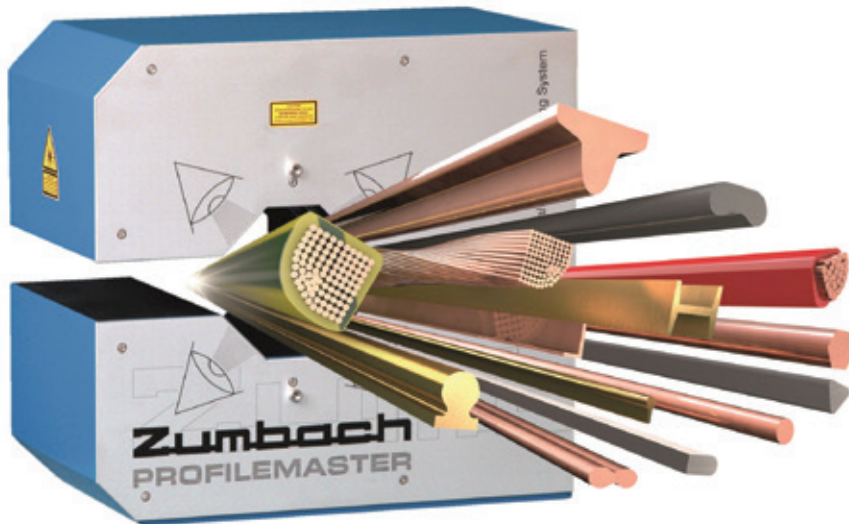
**Hannay Reels – USA**

**Website:** [www.hannay.com](http://www.hannay.com)



▲ One of the new AVC1500 series portable cable storage reels

## In-line profile and shape measurement and monitoring



▲ The Profilemaster system from Zumbach

AS a pioneer of on-line measurement committed to extensive research and development activities, Zumbach Electronic has continuously strived in its manufacture of on-line measuring and control systems.

The company's Profilemaster® systems are developed from a core set of proprietary mega pixel camera/laser modules and software technologies. The application of these technologies has been adapted to serve the specific measurement, monitoring and flaw detection needs of all profiles, shaped wire, cables, tubes made of plastic, rubber, metal, steel and other materials.

Customer benefits include:

- Provides 100 per cent inspection
- Reduces start-up time
- Increases the accuracy of the end product
- Improves process control
- Reduces scrap
- Saves raw material and post processing costs
- Increases product quality, ie higher end customer satisfaction
- Integrates in a seamless way the PC-based system with your network

Depending on the Profilemaster model, one to eight laser/camera modules measure the cross section of the moving profile on-line and continuously. A powerful PC-based processor combines straight lines and radii extracted from the images of the single cameras to yield the momentary cross-section of the profile.

All relevant dimensions such as width, height, angle and radius or other geometric quantities are computed to characterise

the full cross-sectional picture. An operator-friendly graphic display of this data allows the product to be monitored during production.

The nominal values for the profile can be directly imported from the CAD design files, which allows easy and problem-free configuration of the device. Changes in speed and twist within normal limits have no influence on the measurement.

Special regard was taken to develop user-friendly and flexible software for the Profilemaster system. The program has three working modes:

- Operation: For measurements during production. All operational steps have been simplified as far as possible. The desired functions for the measurement of a particular product, eg conditions for start/end and records, are only entered once and stored in the memory together with the measured data
- Entering product data: Enter the measurement requirement and define how the measured data should be processed. The flexible functions in the software program can be configured to allow products to be measured exactly as the customer requires
- Service and system configuration: The functions in the program can be selected according to the operator's requirements during the initial installation of the system. Moreover, the default values used for pre-processing can be changed to suit each product

**Zumbach Electronic AG – Switzerland**  
Website: [www.zumbach.com](http://www.zumbach.com)

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wire, Spring steel wire, Baling wire.  
Wire diameter: 0.15mm - 14mm  
Zinc coating: up to 850g/m<sup>2</sup>



## Straightening and cutting machine series EvoCUT

Tecno Impianti Srl has developed a new series of straightening and cutting machines which are a combination of design, technology and strength.

The machines have been designed for use in sectors where customers consider high precision in cutting and strict tolerances in length as the rule and not just as an optional feature.

Although these machines can be utilised in the straightening and cutting of ribbed wire, they give their best in the smooth wire sector, for use with stainless steel, brass, copper and bronze wire.

For some special materials, tooling with specific geometries and materials has been developed.

The use of brushless servomotors and high quality planetary gearboxes for the management of the axes ensure an excellent

performance in dynamic, dimensional and quality terms on the finished product.

Proportional valves for pressure control allow the operator to store the settings regarding pulling and position transducer for each single application, ensuring the consistency of the set values over time.

The software developed for the EvoCUT machines is high performing, with a simple and intuitive graphical interface; this allows time optimisation needed for diameter change.

The machines are available in two models, EvoCUT3080 (for Ø3-8mm) and EvoCUT6012 (for Ø6-12mm), which will soon be joined by a third model for smaller wire diameters.

**Tecno Impianti Srl – Italy**

**Website:** [www.tecnoimpianti-italy.com](http://www.tecnoimpianti-italy.com)

## New extrusion head features (MAGS) adjustment

GUIL Tool has introduced the new 500 Series crosshead with MAGS gum space adjustment. The 500 Series is designed specifically for the flow characteristics and unique processing challenges of elastomeric compounds.

One of the key features engineered by Guill on this new crosshead design is the mechanically assisted gum space (MAGS) adjustment system.

This new method of gum space adjustment allows the operator to make an effortless adjustment from a single point using a common socket wrench.

It removes the need to struggle with multiple nuts and bolts in order to adjust gum space, which leads to faster adjustments. The visual indicator on the core tube allows the operator to see how far the gum space has been moved, making those adjustments much more accurate and repeatable.

The hardware-free and patented cam lock design of the new 500 Series from Guill means no time is wasted unbolting and re-securing fasteners for disassembly and re-assembly.

Only half of a rotation of the cam nut is required to loosen and automatically extract the deflector from the head body, which is another time saver.

Also, with no undercuts on the deflector, there are no material hang-ups when extracting the deflector, allowing for faster and easier cleaning and changeover.

The 500 Series also features the latest Centre-Stage concentricity adjustment system that significantly reduces pressure

▲ Guill Series 500 crosshead with (MAGS) adjustment, specially designed for the flow characteristics of elastomeric compounds

on the tooling, allowing easier and more precise concentricity adjustments without loosening the face bolts.

Easy-Out inserts for the adjusting bolts also allow simple replacement of locked or damaged adjusting bolts, which further saves on repair and downtime.

Another innovative feature of this new rubber/silicone crosshead is a cast aluminium liquid-fed cooling sleeve that allows the user to switch out the cooling jacket in the event of a line obstruction, again reducing downtime compared to traditional integrated cooling systems.

The 500 Series crosshead with MAGS gum space adjustment is a drop-in replacement on most existing NRM lines, but the crosshead design can also be

adapted to fit any extruder design or line layout.

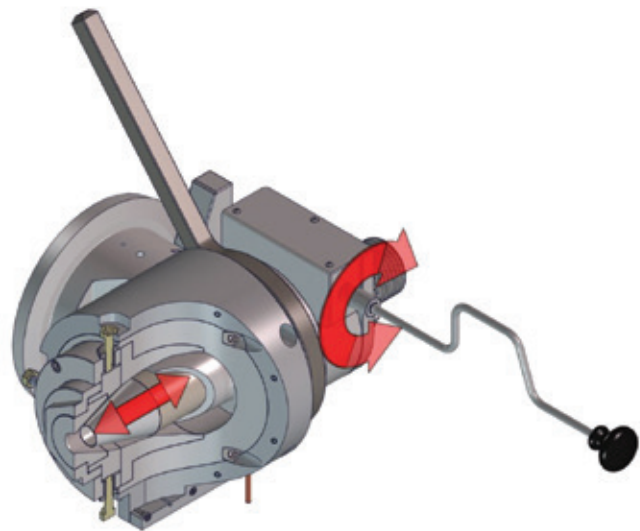
The addition of a newly designed flow inlet channel reduces the shear and heat that is generated as the materials are being processed.

This leads to lower head pressures, allowing the material to move through the head in a much more balanced and even flow.

All crossheads supplied by Guill are furnished with a tool kit for assembly and disassembly as well as a detailed operator's instruction manual.

**Guill Tool and Engineering – USA**

**Website:** [www.guill.com](http://www.guill.com)





▲ The spark tester Spark 6030 HF with removable self-test and calibration module

## Sikora spark tester with removable self-test module

ACCORDING to European standards, openly operated measuring and testing equipment has to be checked regularly.

Therefore, spark testers are tested with regard to the accuracy of the supplied high-voltage, the short circuit current and function (sensitivity).

The Sikora spark tester Spark 6030 HF offers (optionally) a three-step self-test and calibration system including the Sikora App for mobile monitoring and analysis of the measuring results. As each test probe has to be calibrated, the testing module has to be controlled regularly as well.

To support this process, Sikora developed the module of the Spark 6030 HF further. New is the easy-to-change module that combines all testing functions and which can easily be exchanged from an additional opening in the housing of the Spark 6030 HF.

In order to meet the requirements of the ISO 9001 standards, Sikora recommends a yearly calibration of the spark tester by simply exchanging the test module.

Due to the fact that all functions are directly mounted at the module, the complete module is exchanged for calibration.

Therefore, a submission of the complete device to Sikora as well as the assignment of a service engineer is not necessary.

As for the previous version of the module, the sensitivity and short circuit current tests are generated. For the sensitivity test, 20 discharges are simulated in 20 seconds. All of these discharges have to be completely detected by the spark tester.

For the short circuit current test, an error caused by the contact of a user and the bead chain electrode during the operation is simulated. Here, a defined value must not be exceeded in order to guarantee the safety of the user.

The calibration module measures continuously the accuracy of the testing voltage. The standard for spark testers requests an accuracy of  $\pm 5$  per cent. The test is successful if this criterion is met.

**Sikora AG – Germany**  
Website: [www.sikora.net](http://www.sikora.net)

[www.candorsweden.com](http://www.candorsweden.com)

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## Goodwin's new take on an industry standard

GOODWIN Machinery, in collaboration with Cable & Wire Technical Services, has designed and manufactured a rod breakdown machine that is based on the industry standard Winget Syncro F-13.

This innovatively designed machine was manufactured on time and within budget and is now running "very successfully" in a factory in Europe.

This CWF-13 non-ferrous rod breakdown machine can draw down from 8mm copper or 9.5mm diameter aluminium and has many features like the small floor space required (4.6 x 1.55m), a top production rate of 30.6 MPS, and many more.

The design, manufacture and assembly were all done in the UK, the parts being manufactured using a mix of Goodwin Machinery and Cable & Wire preferred suppliers, with the final assembly and test being performed at Goodwin's Bolton factory.

The test run was carried out in the presence of the customer, who noted how quiet the machine was running. This can be attributed to the fact that all the gears

are case hardened and ground, and the design of the machine facilitates the use of helical gears with no back-shaft/hypoid or spiral bevels.

The machine comes with an optional lubrication system for either copper or aluminium plus an optional pay-in stand.

There is also a low-noise screw-type oil pump for the main gearbox which fits neatly to the back of the machine, making it ideal for maintenance access, filter cleaning, etc. The machine is also complete with a 300HP/constant torque

motor and drive. This machine is a suitable replacement for existing rod breakdown machines, with the team of engineers/electricians being able to synchronise with any existing down line equipment.

However, in the event of the customer wanting a complete line, Goodwin can also supply new annealers and spoolers with all interface wiring and controls.

**Goodwin Machinery Ltd – UK**  
**Website:** [www.goodwinmachinery.co.uk](http://www.goodwinmachinery.co.uk)



▲ The new machinery from Goodwin



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 T +49(0)2542/9555-290  
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## Specialists in straightening and cutting machines

Delisi specialises in manufacturing automatic straightening and cutting machines for smooth and ribbed wires from 1 to 20mm in diameter.

Its machines are characterised by rapid change of diameter, rapid change of lengths and fast set up: about one minute to change the diameter of the work. The spinner is supplied with a straightening unit of pre-regulated jaws for each diameter of wire to be worked.

This allows installation of a suitable straightening unit, according to the wire to be handled and the spinner will be ready to work without wasting material and time. Delisi machines do not damage the wire.

The wire in the spinner is straightened through a series of bends that do not

damage it while it is moving. With the flying cut, the shears run during the cut. After finishing the cut, they quickly return back to the starting point, without the wire stopping.

For a high number of short cuts, for example when working electrodes, Delisi can supply the machine with a continuous cutting disc, so the cutting speed is higher and the maximum production of 400 pieces per minute can easily be reached.

The machines can be supplied with an electronic programmer, different types of pay-offs and rod collection beds, and other special devices.

**Delisi Srl – Italy**  
**Website:** [www.delisisrl.com](http://www.delisisrl.com)

## Expanding range of products

GURFIL enterprise started serving the cable industry in 1981 with raw materials for cable manufacturers and today the company has expanded its product range to a three main groups with more than 100 products, including:

- Foil, film, tape group
- Machinery group
- Wire group

Because of fast-growing demand for flame-retardant cables, cable manufacturers should purchase new equipment to increase their capacity. In order to meet important fire safety standards, following the international market trends by the end of 2016 Gurfil increased its production by 20 per cent and supplying with not only fire-retardant raw materials such as Mica tape and fibreglass tape but also with a full machinery line for its application to the cable.

Providing European cable manufacturers with both raw materials and machinery, in 2016 Gurfil signed many new contracts offering commissioning, after-sales service and all spare parts from its own warehouse with professional service team.

With 35 years' experience Gurfil features in the global cable market among braiding machine and Mica taping machine suppliers.

A wide range of electrical component options in the high-speed braiding machines and spool Mica taping machines along with CE certification choice give Gurfil's customers flexibility.

Gurfil claims to be one of the first



▲ Gurfil has expanded its product range to three main groups

companies that come to mind when a cable manufacturer has to fulfil its needs in a braiding machine or a Mica taping machine. To continue its success in the cable market Gurfil constantly drives innovation in its machines and products and offers new developments to customers in an increasing number of markets.

**Gurfil – Turkey**  
**Website:** [www.gurfil.com](http://www.gurfil.com)

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Established in 2015, Istanbul TEL Fair may still be in its infancy but has grown to become an influential industry-trading platform connecting suppliers in the Middle East and North Africa with decision-makers from around the world in a wide range of industries.

TEL features an array of product zones to address the ever-increasing industry demand in the region, and beyond.

The fair is an ideal location to cultivate new business relationships, as well as assisting suppliers, distributors and exporters to reach their target customers from the wire and cable industry.

[www.tel-fair.com](http://www.tel-fair.com)





# Istanbul **TEL** Fuari **2017** wire fair



Photo credit: digistockphoto.com, "Hagia Sophia, Istanbul, Turkey", Photographer: senegalsiv





## TEL 2017 Exhibitor listing

23<sup>rd</sup>-25<sup>th</sup> March 2017 (Thursday – Saturday), İstanbul Expo Center, Yeşilköy, İstanbul  
Opening times daily 10am-6pm

3-S Mühendislik.....	<a href="http://www.3-s.com.tr">www.3-s.com.tr</a>	Inductotherm Heating .....	<a href="http://inductothermhww.com">inductothermhww.com</a>
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ARB Metal .....	<a href="http://arbmatal.com">arbmatal.com</a>	Nirotec GmbH.....	<a href="http://www.nirotec.de">www.nirotec.de</a>
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# Wire cleaning, treatments & finishes



Photo courtesy of Candor Sweden AB

Even the heftiest wire presents a challenge in cleaning, treatment and finishing: as compared to broad-and-deep, a long-and-thin workpiece allows for a much narrower margin of error.

This puts a premium on experience, especially in light of the number and variety of processes available. The specialist in these techniques will have hands-on skill with chemicals,

furnaces and acid baths; a working knowledge of stabilisation and stress relief; and a ready familiarity with the behaviours of auxiliary materials.

This interactive expertise is highly prized and carefully cultivated in a state-of-the-art wire mill.

As always, the main beneficiaries are the customer and end user.



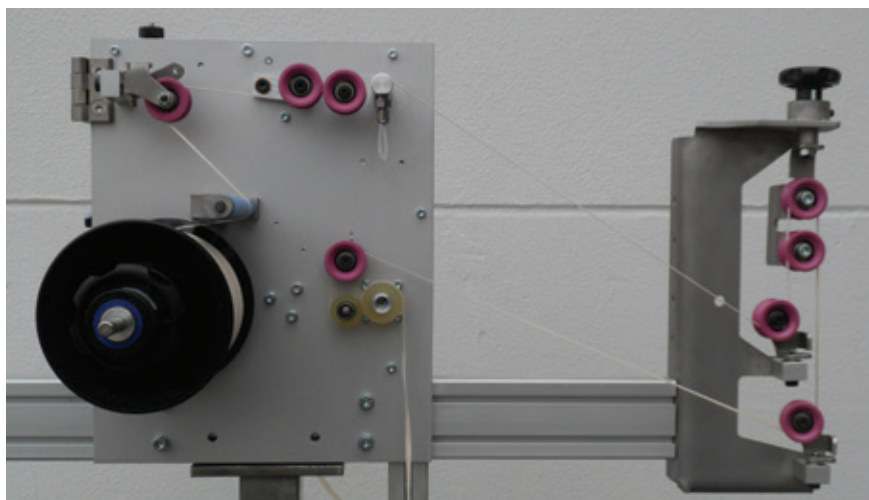
## The complex made easy

Cleaning wire in a linear process at line speeds between 10 and 2,000m/min, whereby contamination and metallic particles have to be reduced, partly removed or completely removed from the wire surface, is a complex process. Various systems are now available including mechanical systems like brushes or textile wipes up to aqueous methods assisted by high pressure and/or ultrasonic. Nevertheless, the appropriate method is still difficult to determine at first glance.

The definition of the cleaning target and the analysis of the surface texture should be at the beginning of the search. It is therefore essential to define the terms wire surface and viewing the wire surface texture. In many technical papers it is agreed that the deformation of a metal surface considerably changes the metal structure even to an almost amorphous condition. Hereby the deformation of the surface is considerably increased when compared to a smooth 'ideal' surface.

These increases are normally in the form of cracks, overlaps, defects, etc, and are filled with a mixture of residual drawing lubes, metal particles and oxides. Normally the purpose is to remove this contamination from the wire surface. In order to achieve the required result the various cleaning processes and the cleaning liquids used must be systematically considered in their physical mode of action, based on the level of cleanliness required and the surface condition of the wire.

With mechanical cleaning, the contamination is removed by the mechanical frictional force of normally solid cleaning materials such as brushes, textiles and microfibres. To remove gross



▲ GEO making life a little easier for wire cleaning

contamination from the wire surface, cleaning with brushes or textile materials is very effective. However, since the surface characteristics of the wire are far from ideal due to, for example, fine cracks and defects, these methods quickly reach their limits. Chemical cleaning means in most cases that a fluid exposure performs the cleaning. The performance of these methods is considerably improved by increasing the velocity of the liquid by means of high pressure, ultrasonic or steam relaxation.

Cleaning processes with liquids, supported by ultrasonic, high pressure or steam, can substantially meet the challenging task of removing dirt even from the smallest surface defects. Finally, the effectiveness of the cleaning process depends on how targeted the cleaning power (force or impulse) can be applied to the contamination for a certain time. Since the choice of the appropriate cleaning method is determined by many factors, the comprehensive analysis of

all parameters is precisely the approach that GEO-Reinigungstechnik (GEO) has selected. For the last two decades GEO has explicitly dealt with the cleaning of continuous profiles such as wires, ribbons, strands and cables. It offers a complete range of ultrasonic, high-pressure jet nozzle, steam and mechanical wire cleaning systems both for single wire and multi-wire applications.

True to the company philosophy to consider individual process steps are not isolated, GEO has completed the cleaning of welding wires after the drawing process by systems for coating with welding wire finish and subsequent quality control. The procedures can be tested under near-production conditions at GEO's test laboratory, and from the knowledge gained suitable solutions can be selected and implemented.

**GEO-Reinigungstechnik GmbH – Germany**  
**Website:** [www.geo-reinigungstechnik.de](http://www.geo-reinigungstechnik.de)

## Spheroidising specialists to get a clean surface

Rad-Con designs and manufactures Bell type furnaces for spheroidise annealing of wire and rod for the production of cold heading quality wires (CHQ). Many of the largest fastener manufacturers use Rad-Con equipment. Rad-Con specialises in one type of furnace – Bell-type, one type of process annealing, and has very specific knowledge in spheroidising of alloy steel hot-rolled wire rod and drawn wires, resulting in a clean surface that is free of decarburisation.

▼ Rad-Con specialises in one type of Bell furnace



The company is headquartered in the USA, and operates globally, with more than half of the turnover outside the USA over the last ten years. It offers an advanced system worldwide for annealing wire and wire rod, medium-carbon and alloy steels, to cold-heading quality (CHQ) specifications.

The H2SHC™ system provides a high convection to produce uniform mechanical properties necessary for the manufacture of high quality fasteners. Rad-Con's proportional-pulse control system design produces a stable thermal cycle that is a key to achieving 90-100 per cent spheroidisation – which leads to greater die life and better flow during the cold forming process.

It uses a 100 per cent hydrogen protective atmosphere along with patented AC/APEx™ control system to ensure surface quality free of decarburisation – another important element in the production of CHQ wires.

**Rad-Con – USA**

**Website:** [www.rad-con.com](http://www.rad-con.com)

## A unique partner for wire cleaning

Candor Sweden AB, founded in 1946, specialises in advanced wire cleaning and plating plants for various applications.

The company was founded as a chemical supplier and it uses this know-how and experience in chemical processes with the advanced equipment for cleaning and plating of wire.

Candor has a wide selection of wire cleaning plants to offer, such as hot water spray cleaning, ultrasonic cleaning and electrolytic cleaning. Which technology to use is a balance between wire speed, cleaning requirements, type of lubricant used and environmental aspects.

In many cases, especially for high speed applications, the processes can be combined as separate steps after each other in a plant.

This way a hot water cleaning unit can be dedicated to remove sodium-based lubricants and an acid ultrasonic or electrolytic process can make the fine tuning of the already pre-cleaned wire if required.



▲ The multi-wire ultrasonic cleaning plant for removal of calcium and sodium wire lubricants

Candor also offers single- and multi-wire plating lines for ferrous and non-ferrous materials, and all plants are tailor made to the customer's specification.

**Candor Sweden AB – Sweden**

**Website:** [www.candorsweden.com](http://www.candorsweden.com)

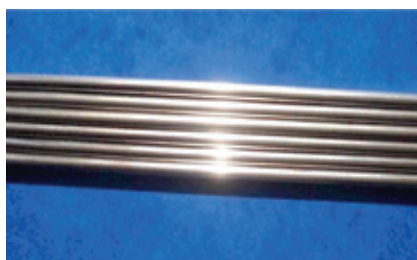
## Wire green cleaning for plating and decorative bright finish

The PWC system simultaneously performs drawn wire cleaning and polishing, in-line with the wire drawing machine in a totally green application.

Exceptional cleanliness obtained in a glossy finish and the plating quality permits wire direct brass coating, copper coating, galvanising, plating, Al and Cu cladding and wire cleaning prior to heat treatment.

For a clean mirror reflective wire finish, for decorative applications, the system can be used with a conventional emulsion diluted with water at 3-5 per cent concentration.

The PWC incorporates new technology that enables normal plant cold water to be converted into a unique cleaning medium generating pressure wetting/contaminants extreme pressure extrusion/



▲ Wire cleaned for decorative finish by the PWC system

hydrodynamic cavitations displacement and contaminants flush out. The PWC-S system effectively loosens and removes lubricant residue from base material and is particularly recommended for cleaning applications with wires drawn upon severe conditions resulting in increased heat and burnt lubricant tightly bound to the wire surface and embedded in micro-cavities which are further smoothly

polished under high pressure generated by the unit, enabling wire exiting the unit to be very clean, of white-metal appearance with reflective finish and totally dry.

The PWC-S system provides the ultimate combination of simplicity and effectiveness: acid-free, caustic-free, without ultrasonic, without chemicals, hermetically sealed zero-emission system, no fumes and no foam.

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

**Decalub – France**

**Website:** [www.decalub.com](http://www.decalub.com)

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# Investigating effects of freezing conditions on micro-duct air-blown cables

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## Abstract

In some cold areas, freezing conditions are a potential threat to micro-duct air-blown cables. In order to study the effects of freezing conditions on the transmission performance of optical fibres in micro-duct air-blown cables, two different experiments were designed and carried out in this paper.

The test results reveal that both freezing in micro-ducts and that around end caps have insignificant influence on the transmission performance of the fibres and no visual physical damage to the cable has been detected after the experiments.

## 1 Introduction

With the development of FTTx network construction, micro-duct air-blown cables are more frequently used due to the lack of duct resources, even in some cold regions. In this case, the water permeated into the micro-duct will be frozen under such low temperatures.

Some concern such as the cable performance deterioration will discourage the wide application of micro-duct air-blown cables all over the world.

In order to study the effects of freezing conditions on the transmission performance of optical fibres, freezing tests were designed to simulate the cold climate with the aid of a temperature cycling chamber.

During the tests, the attenuation change of the fibres was monitored, and the appearance of the cable was checked.

The test procedures are described in detail and the test results are carefully analysed.

Cable type	Stranded loose tube structure with G.652D fibres
Fibre count	96
Cable OD	6.1mm
Micro-duct type	HDPE
OD/ID of micro-duct	10/8mm
TCT cycles	2

▲ Table 1: Common test conditions

## 2 Freezing test conditions

Two experiments were designed to simulate the conditions of water frozen in the micro-duct and around the end caps respectively with the aid of a temperature cycling chamber.

The common test conditions in two experiments are shown in Table 1.

## 3 Test for water frozen in micro-duct

This experiment is designed to study the impact of freezing conditions on fibre attenuation while water is frozen in the micro-duct, and performed in accordance with IEC60794-1-22 Method F15: cable external freezing test. A 1.8km-long micro-duct air-blown cable and 80m-long micro-duct are used in this experiment.

### 3.1 Test procedures

First, rewind the micro-duct onto a cable drum and blow the cable into the duct.

Then, soak the 80m-long micro-duct (with cable inside) in a pool for 24 hours to make sure that the duct is completely filled with water, as shown in Figure 1.



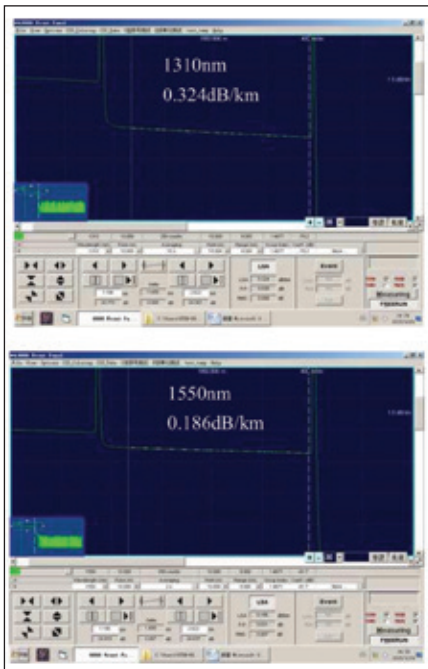
▲ Figure 1: Micro-duct with cable soaked in water

After that, seal the duct with end caps before taking the cable drum out of the pool. Finally, put the cable drum into the temperature cycling chamber to perform the temperature cycling test. Before that, record the attenuation of each fibre at room temperature (23°C).

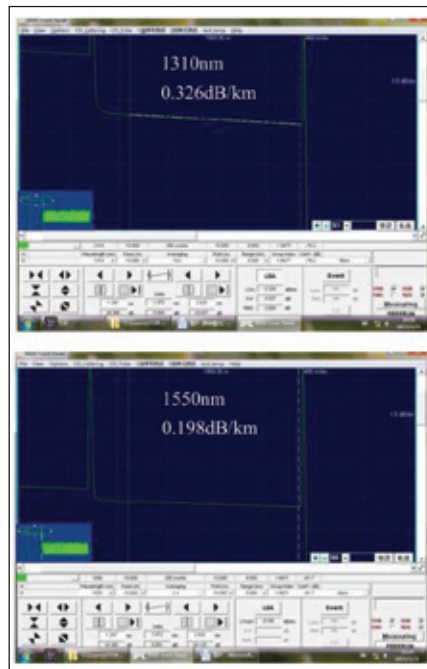
### 3.2 Temperature cycling programme

The temperature cycling programme is set as follows (one cycle):

- 1 Lower the temperature from 23°C to 3°C within 30 minutes and hold this temperature for eight hours.
- 2 Then lower the temperature to -40°C within 30 minutes and hold it until the water is completely frozen and the ice temperature is -10°C or lower (by using a temperature monitoring device).



▲ **Figure 2:** OTDR graphs of the fibre with largest attenuation values at -2°C



▲ **Figure 3:** OTDR graphs of the fibre with the largest attenuation values at -40°C

- 3 Raise the temperature to -2°C and hold this temperature for one hour.
- 4 Raise the temperature to 65°C. Maintain the temperature until the water reaches 15°C. Then, return the temperature to 23°C and hold the temperature until the water reaches 23°C ±5°C.

At every stage of temperature cycling test, record the attenuation of each fibre.

### 3.3 Results

After the test, attenuation changes of all fibres are really small. The largest attenuation values at -2°C are shown in Figure 2, at 1,310nm and 1,550nm wavelengths respectively.

### 3.4 Additional test

Considering extremely cold weather conditions, the temperature cycling programme is changed and the above test is repeated.

#### 3.4.1 Temperature cycling programme (for extremely cold weather)

- 1 Lower the temperature from 23°C to -40°C within 30 minutes and hold this temperature for 12 hours. Perform attenuation measurement
- 2 Raise the temperature to 65°C within 30 minutes and hold it for 12 hours. Perform attenuation measurement
- 3 Return the temperature to 23°C within 30 minutes and hold this temperature for 12 hours. Perform attenuation measurement

#### 3.4.2 Results (for extremely cold weather):

During the test, attenuation changes of all fibres are also small and the OTDR curves

are very smooth. The test results at -40°C should be the worst. Therefore, the largest attenuation values at -40°C in Figure 3 are displayed, at 1,310nm and 1,550nm wavelengths respectively.

### 3.5 Analysis

After data process, it can be demonstrated the largest fibre attenuation values in each loose tube at different temperature points during the above two tests, at 1,310nm and 1,550nm wavelengths respectively, as illustrated in Figure 4.

Considering the micro-duct is rarely full of water and the actual temperature change rate is much slower than that in the experiments, the impact of ice in micro-ducts on air-blown cables can be regarded as insignificant.

Until all the above tests have been finished, the cable is blown out of the duct by compressed air. It shows that the blowing performance of the cable is still good and no visual damage to the cable sheath has been found.

## 4 Test for water frozen around end caps

This experiment is designed to study the impact of freezing conditions on fibre attenuation while water is frozen around end caps. A 1.8km-long micro-duct air-blown cable and 6m-long micro-duct are used in this experiment. Move the micro-duct to the middle of the cable and record the distance from the test end of the cable to the micro-duct.

### 4.1 Test procedures

First, seal one end of the micro-duct with an end cap and fill water into the duct until it is full of water. Then seal the other end of the duct with another end cap and keep two end caps at the same height.

Before the experiment, record the attenuation of each fibre at room temperature (23°C). After that, put the cable into the temperature cycling chamber to perform the temperature cycling test.

### 4.2 Temperature cycling programme

- 1 Lower the temperature from 23°C to -40°C within 30 minutes and hold this temperature for 12 hours. Perform attenuation measurement
- 2 Raise the temperature to 70°C within 30 minutes and hold it for 12 hours. Perform attenuation measurement
- 3 Return the temperature to 23°C within 30 minutes and hold this temperature for 12 hours. Perform attenuation measurement

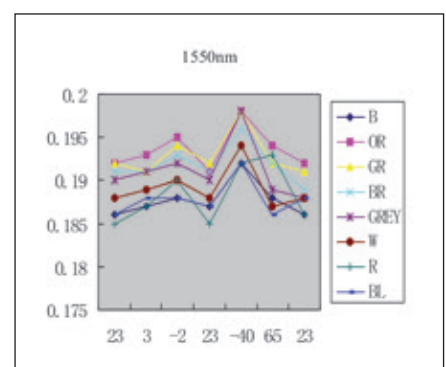
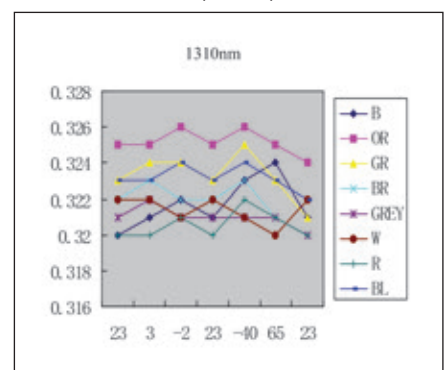
### 4.3 Results and analysis

Check the end caps at -40°C. Some ice can be found around them. Therefore, the experiment has successfully simulated the situation where water freezes around end caps, as shown in Figure 5.

Pay much attention to the positions where the end caps are located on the attenuation curves during measurement.

All the OTDR curves are very smooth. Figure 6 shows the largest attenuation

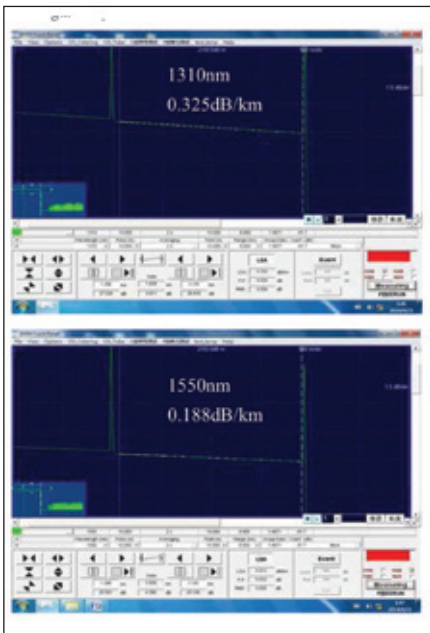
▼ **Figure 4:** Largest attenuation values in each loose tube at different temperature points







▲ **Figure 5:** Water frozen around end caps



▲ **Figure 6:** OTDR graphs of the fibre with the largest attenuation values at -40°C during the end cap test

values at -40°C, at 1,310nm and 1,550nm wavelengths respectively.

After the test, attenuation changes of all fibres are really small and no visual damage to the cable sheath has been found.

## 5 Conclusion

When micro-duct air-blown cables are used in cold areas, the influence of freezing condition on optical fibre transmission should be taken into consideration. In order to study this subject, two experiments are designed to evaluate such influence.

Based on the test results in this paper, it can be concluded that the effects of frozen water on micro-duct air-blown cables are insignificant.

However, the long-term effect during the cable lifetime should be also considered and further investigated. Thus, protective measures to avoid the penetration of water into micro-ducts should not be ignored. ■

## 6 References

- 1 IEC 60794-1-22 Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods
- 2 IEC 60794-5-10 Optical fibre cables – Part 5-10: Outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing

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# “Join the best - worldwide” mit den Flaggschiffen wire und Tube Düsseldorf

MESSEN für Metallherstellung, Metallver- und -bearbeitung, für Draht, Kabel und Rohre, Eisen und Stahl haben in Düsseldorf eine lange Tradition. “Join the best – worldwide” – so der Slogan, der das internationale Portfolio der Draht-, Kabel- und Rohrfachmessen zusammenfasst.

Seit über 30 Jahren finden wire und Tube gemeinsam in Düsseldorf statt. Als Nr. 1 der Messen für ihre Industriebereiche haben sie sich weit über die Landeshauptstadt Düsseldorf hinaus einen Namen als internationale Top-Player ihrer Branchen gemacht. Sie haben dazu beigetragen, dass sich die nordrhein-westfälische Wirtschaftsmetropole Düsseldorf rund um den Globus einen exzellenten Ruf als Plattform für industrielle Innovationen erworben hat.

Zehn internationale Satellitenmessen gibt es mittlerweile für die Industriebereiche von wire und Tube. Diese präsentieren sich ab sofort mit einheitlichen Logos, stehen also unter einer gemeinsamen Dachmarke. Ein einheitliches Corporate Design sorgt für einen unverwechselbaren Auftritt der einzelnen Messen und weist sie gleichzeitig als Mitglied einer Produktfamilie aus.

Das Erscheinungsbild jeder einzelnen Messe ist so gestaltet, dass sich die Logos in Form, Farbgebung und Schriftzug gleich präsentieren. „Nicht nur inhaltlich sondern auch optisch soll sich das Portfolio “Join the best - worldwide” mit seinen Leitmessen wire und Tube in Düsseldorf und den zehn internationalen Satelliten-Messen künftig aus einem Guss präsentieren“, so Friedrich-Georg Kehrer, Global Portfolio Director Metals and Flow Technologies der Messe Düsseldorf GmbH.

Zum internationalen Metallmesse-Portfolio unter dem Slogan „Join the best - worldwide“ gehören neben wire und Tube Düsseldorf die Satelliten-Messen wire China und Tube China in Shanghai, wire und Tube India in Mumbai, wire und Tube Russia in Moskau, Russland, wire und Tube Southeast Asia in Bangkok, Thailand und wire South America



▲ wire und Tube – internationale Top-Player in der Industrie. Aufnahme mit freundlicher Genehmigung der Messe Düsseldorf GmbH

und Tubotech in São Paulo, Brasilien. Ein weltumspannendes Portfolio mit weiterem Wachstumspotenzial.

Ob in Deutschland, Brasilien, China, Indien, Russland, Thailand oder den USA - die Messe Düsseldorf veranstaltet weltweit gemeinsam mit ihren ausländischen Tochtergesellschaften und in Kooperation mit internationalen Verbänden aus Industrie und Wirtschaft sowie Organisatoren

vor Ort herausragende regionale Satellitenveranstaltungen. Sie haben sich als Informations- und Orderplattform für das jeweilige Einzugsgebiet einen Namen gemacht.

Informationen zu den Messen und ihren weltweiten Satelliten finden Sie im Portal unter [www.wire.de](http://www.wire.de) und [www.tube.de](http://www.tube.de)

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## AVC1500 Baureihen von Hannay

Die AVC1500 Baureihen von tragbaren Spulen zur Lagerung von Kabeln von Hannay Reels zeichnen sich durch den robusten Stahl- und Aluminiumbau mit einer nicht reflektierenden, matten, schwarzen Lackierung aus.



▲ Die neue AVC1500-Baureihen tragbarer Spulen zur Lagerung von Kabeln

sind mit Verriegelungsstift mit Spannfeder und Cam-Lock Brems-/Verzögerungssystem ausgestattet. Optional können auf Anfrage ein Satz hochbelastbarer blockierender Lenkrollen, am Rahmen eingebaute Griffe und Trennscheiben hinzugefügt werden.

Diese Spule wird mit fest eingebauter serienmäßiger direkten Kurbel und einem Kabelklettverschluss geliefert. Die manuellen Umwickelungsmodelle

**Hannay Reels – USA**  
**Website:** [www.hannay.com](http://www.hannay.com)



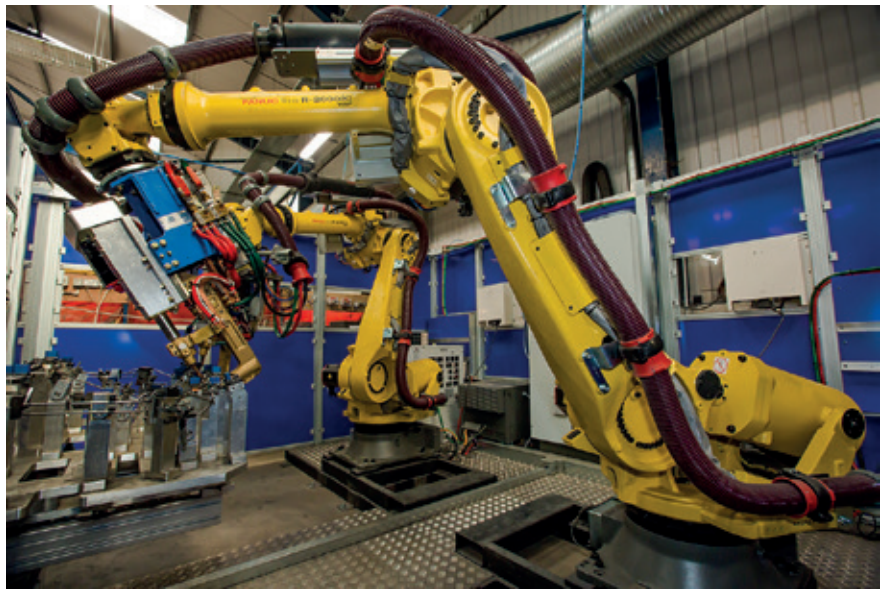
## 250.000 Pfund Investition in neueste Schweißtechnologie

WILLIAM Hughes, der auf Federn und Drahtbiegeteile für die weltweite Automobil- und Raumfahrtindustrie spezialisierter Hersteller, hat über 250.000 Pfund in eine hochtechnologische Twin-Roboter-Schweißzelle investiert.

Die neue Schweißzelle wurde von Bauomat gemeinsam mit Fanuc-Robotern geliefert und im neuen Hauptsitz von William Hughes in UK, in Stalbridge, Dorset, installiert. Die Einheit ist mit einer fortschrittlichen Schweißüberwachung und -datenerfassung ausgestattet, durch die gewährleistet wird, dass die höchsten Qualitäts- und Konsistenzstandards für seine Kunden erhalten bleiben.

Die Schweißzelle ist 24 Stunden am Tag in der Arbeitswoche im Einsatz und wird derzeit für die Massenproduktion von Sitzrückenrahmen für ein SUV-Fahrzeug genutzt. Dieser besondere Aufbau weist 56 Schweißungen auf und setzt 25 Drähte ein.

Genauso wie die erhöhte Qualität und Beständigkeit des Fertigprodukts, die durch die Twin-Roboter-Zelle geboten wird, läuft auch das Schweißverfahren viel schneller und ermöglicht somit, dass Werkstücke in nur 1 Minute und 40 Sekunden erzeugt werden, statt in 3 Minuten und 45 Sekunden,



▲ Die Twin-Roboter-Schweißzelle

die zuvor dafür erforderlich waren. Darüber hinaus, um die Maximierung der Durchlaufgeschwindigkeit zu gewährleisten, sind alle Schweißvorrichtungen von den Ingenieuren bei William Hughes entworfen worden. Dabei wurden die neueste CAD-Software und bei der Fertigung CNC-Fräsmaschinen eingesetzt.

Diese jüngste Investition in die neueste Produktionstechnologie führt das

Wachstumsprogramm von William Hughes weiter, dazu zählt auch die Eröffnung im Oktober 2014 des neuen 87.000ft<sup>2</sup> (ca. 8.000m<sup>2</sup>) großen Werks, in dessen UK-Niederlassung in Stalbridge, Dorset. Das Unternehmen investiert auch weiter in das Wachstum seiner Fertigungsanlagen in Bulgarien, um den Anforderungen seiner europäischen Kunden gerecht zu werden.

**William Hughes Ltd – UK**  
**Website:** [www.wmhughes.co.uk](http://www.wmhughes.co.uk)

### Auf Industriestandard basierende neue Maschine von Goodwin

Goodwin Machinery hat in Zusammenarbeit mit dem Cable & Wire Technical Services eine Grobdrahtziehmaschine entwickelt und gefertigt, basierend auf dem Industriestandard Winget Syncro F-13.

Diese innovativ gestaltete Maschine wurde zeitgerecht und im Budgetrahmen hergestellt und läuft nun "sehr erfolgreich" in einem Werk in Europa.

Die CWF-13 NE-Grobdraht-Ziehmaschine kann Kupfer ab 8mm oder Aluminium ab 9,5mm Durchmesser herabziehen und zeichnet sich durch viele Merkmale aus, wie z. B. den minimalen geforderten Platzaufwand (4,6 x 1,55m), bei einer hochwertigen Produktionsrate von 30,6MPS uvm.

Entwurf, Herstellung und Montage fanden komplett im Vereinigten Königreich statt: die Bestandteile wurden von verschiedenen von Goodwin Machinery und Cable & Wire bevorzugten Lieferanten hergestellt, wobei die Endmontage und -abnahme im Werk von Goodwin in Bolton durchgeführt wurden.

Während des Probelaufs, der im Beisein des Kunden durchgeführt wurde, bemerkte dieser wie leise die Maschine lief. Das kann darauf zurückgeführt werden, dass alle Getriebeelemente einsatzgehärtet und geschliffen waren sowie dass der Maschinenentwurf den Einsatz von Schraubenradgetrieben ohne hintere Welle/Hypoidrad oder Spiralkegel erleichtert.

Die Maschine wird mit einem optionalen Schmiersystem sowohl für Kupfer wie für Aluminium geliefert sowie zuzüglich eines optionalen Aufwicklers.

Zur Verfügung steht auch eine geräuscharme Schraubenölpumpe für das Hauptgetriebe, die gut in die Rückseite der Maschine passt und sich somit ideal für den Zugang für die Wartung, Filterreinigung usw. eignet. Darüber hinaus ist die Maschine auch mit einem 300HP Motor und Antrieb mit konstantem Drehmoment ausgestattet.

**Goodwin Machinery Ltd – UK**  
**Website:** [www.goodwinmachinery.co.uk](http://www.goodwinmachinery.co.uk)

# Untersuchung über die Auswirkungen von Einfrierbedingungen bei luftgeblasenen Mikrorohrkabeln

von Yunfang Ruan, Zhuang Xiong, Xiaoli Liu und Wenjing Ye, State Key Laboratory of Optical Fibre and Cable Manufacture Technology, Yangtze Optical Fibre and Cable Joint Stock Co Ltd, und Huawei Technologies Co Ltd, Shenzhen, Guangdong, China

## Übersicht

In einigen kalten Gebieten sind Einfrierbedingungen eine potentielle Gefahr für luftgeblasene Mikrorohrkabel. Um die Einflüsse der Einfrierbedingungen bezogen auf die Übertragungsleistung der Lichtwellenleiter in luftgeblasene Mikrorohrkabel zu untersuchen, wurden für diesen Artikel zwei unterschiedliche Versuche entworfen und durchgeführt.

Die Prüfergebnisse zeigen, dass sowohl das Einfrieren in Mikrorohren als auch das Einfrieren um die Endkappen, einen geringfügigen Einfluss auf die Übertragungsleistung haben; außerdem wurde kein sichtbarer physikalischer Schaden gegenüber den Kabel nach den Versuchen erfasst.

## 1 Einleitung

Mit der Entwicklung des FTTx-Netzaufbaus, werden luftgeblasene Mikrorohrkabel öfter eingesetzt aufgrund der begrenzten Verfügbarkeit an Rohren, vor allem in einigen kalten Gebieten.

In diesem Fall wird jedoch das im Mikrorohr eingedrungene Wasser bei solchen niedrigen Temperaturen einfrieren.

Darüber hinaus gibt es gewisse Bedenken, dass dieser Kabeltyp einer Verschlechterung der Leistungen ausgesetzt sein könnte und das würde weltweit von der verbreiteten Anwendung luftgeblasener Mikrorohrkabel abhalten. Um den Einfluss der Einfrierbedingungen

Kabeltyp	Aufbau verseilter Hohlader mit G.652D-Fasern
Faseranzahl	96
Kabel-Außendurchmesser	6.1mm
Mikrorohrtyp	HDPE
Außendurchmesser/Innendurchmesser des Mikrorohrs	10/8mm
Zyklen Temperaturwechselkammer	2

▲ **Tabelle 1:** Einheitliche Prüfbedingungen

auf die Übertragungsleistung von Lichtwellenleitern zu untersuchen, wurden Einfriertests entworfen, um das kalte Klima anhand einer Temperaturwechselkammer zu simulieren.

Während der Tests wurden der Dämpfungswechsel der Faser überwacht und das Aussehen des Kabels geprüft. Die Prüfverfahren sind im Detail beschrieben und die Prüfergebnisse werden sorgfältig analysiert.

## 2 Bedingungen im Einfriertest

Zwei Versuche wurden entworfen, um die Bedingungen des im Mikrorohr gefrorenen Wassers und des Wassers, das die Endkappen umgibt, jeweils anhand der Temperaturwechselkammer zu simulieren.

Die einheitlichen Prüfbedingungen in zwei Versuchen sind in der *Tabelle 1* dargestellt.

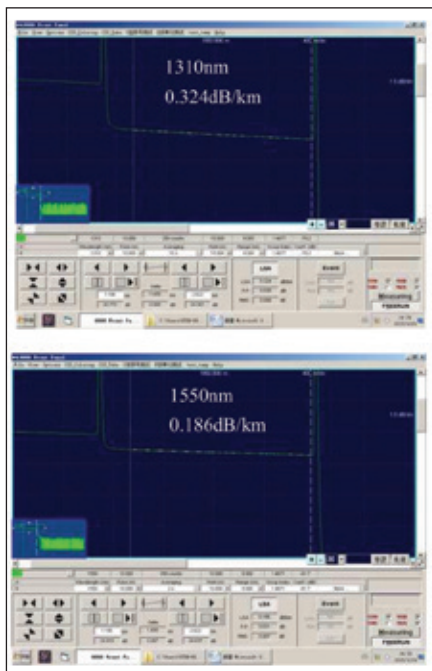


▲ **Abb. 1:** Mikrorohr mit gewässertem Kabel

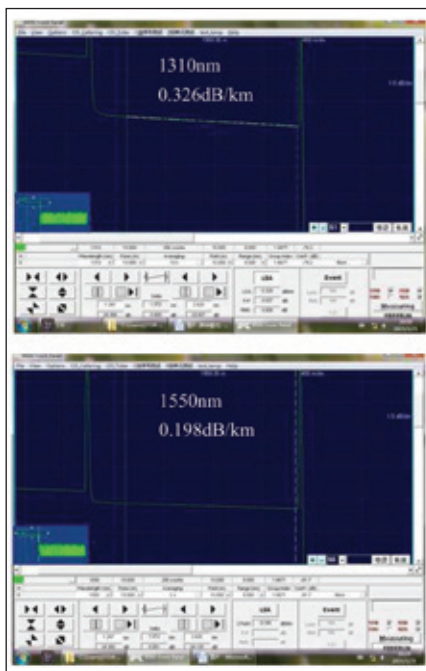
## 3 Test für das in Mikrorohren gefrorene Wasser

Dieser Versuch wurde ausgelegt, um den Einfluss der Einfrierung auf die Faserdämpfung bei gefrorenem Wasser im Mikrorohr zu untersuchen; der Versuch wurde entsprechend der IEC60794-1-22 Methode F15 durchgeführt: äußerer Kabel-Einfriertest.





▲ **Abb. 2:** OTDR graphische Darstellung der Faser mit den höchsten Dämpfungswerten bei -2°C



▲ **Abb. 3:** OTDR graphische Darstellung der Faser mit den höchsten Dämpfungswerten bei -40°C

Ein 1,8km langes luftgeblasenes Mikrorohrkabel und ein 80m langes Mikrorohr werden in diesem Versuch eingesetzt.

### 3.1 Prüfverfahren

Zunächst ist das Mikrorohr auf eine Kabeltrommel umzuspulen und das Kabel ins Rohr einzublase. Danach das 80m lange Mikrorohr (mit einem Kabel im Innenteil) in einem Becken 24 Stunden lang wässern, um sicherzustellen, dass das Rohr völlig mit Wasser gefüllt ist, wie in der Abb. 1 dargestellt.

Danach, das Rohr mit Endkappen abdichten bevor die Kabeltrommel aus dem Becken genommen wird. Schließlich, die Kabeltrommel in die Temperaturwechselkammer stellen, um die Prüfung des Temperaturwechsels durchzuführen. Davor die Dämpfung jeder Faser bei Raumtemperatur (23°C) erfassen.

### 3.2 Temperaturwechselprogramm

Das Temperaturwechselprogramm wird wie nachfolgend beschrieben festgelegt (ein Zyklus):

- 1 Die Temperatur von 23°C auf 3°C innerhalb 30 Minuten absenken und diese Temperatur 8 Stunden lang beibehalten
- 2 Daher die Temperatur auf -40°C innerhalb 30 Minuten absenken und, solange das Wasser nicht ganz gefroren ist und die Eistemperatur -10°C entspricht oder niedriger ist, diese Temperatur beibehalten (dabei eine Temperaturüberwachungseinrichtung benutzen)

- 3 Die Temperatur auf -2°C erhöhen und 1 Stunde lang beieinhalten
- 4 Die Temperatur auf 65°C erhöhen. Diese Temperatur solange beibehalten bis das Wasser 15°C erreicht. Danach die Temperatur wieder auf 23°C bringen und solange beibehalten bis das Wasser 23°C ±5°C erreicht

Bei jeder Stufe der Prüfung des Temperaturwechsels, die Dämpfung je Faser erfassen.

### 3.3 Ergebnisse

Nach der Prüfung sind die Dämpfungswechsel aller Faser geringfügig. Die höchsten Dämpfungswerte bei -2°C sind in der Abb. 2, je bei 1.310nm und 1.550nm Wellenlängen dargestellt.

### 3.4 Zusätzliche Prüfung

In Anbetracht extrem kalter Witterungsbedingungen wird das Temperaturwechselprogramm geändert und die oben beschriebene Prüfung wiederholt.

#### 3.4.1 Temperaturwechselprogramm (für extrem kalte Witterung)

- 1 Die Temperatur von 23°C auf -40°C innerhalb 30 Minuten absenken und diese Temperatur 12 Stunden lang beibehalten. Die Dämpfung messen.
- 2 Die Temperatur auf 65°C innerhalb 30 Minuten erhöhen und diese Temperatur 12 Stunden lang beibehalten. Die Dämpfung messen.
- 3 Die Temperatur wieder auf 23°C innerhalb 30 Minuten bringen und diese Temperatur 12 Stunden lang beibehalten. Die Dämpfung messen.

#### 3.4.2 Ergebnisse (für extrem kalte Witterung)

Während der Prüfung sind die Dämpfungswechsel aller Faser ebenfalls geringfügig und die Kurven des OTDR (Optische Zeitbereichsreflektometer) sind sehr gleichmäßig.

Die Prüfergebnisse bei -40°C sollten die schlechtesten sein. Demzufolge sind die höchsten Dämpfungswerte bei -40°C in der Abb. 3, je bei 1.310nm und 1.550nm Wellenlängen, dargestellt.

### 3.5 Analyse

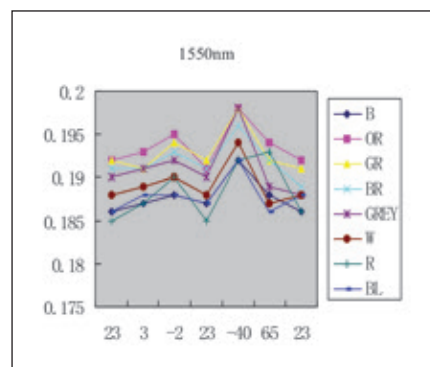
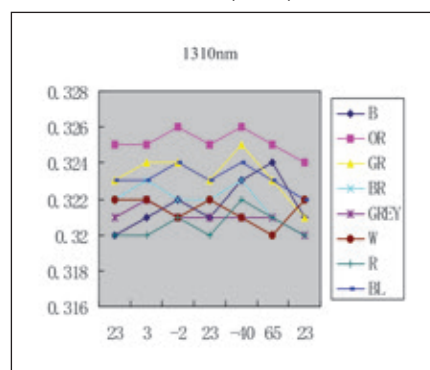
Nach der Datenverarbeitung können die höchsten Faserdämpfungswerte in jeder Hohlader bei unterschiedlichen Temperaturpunkten während der obengenannten zwei Prüfungen, je bei 1.310nm und 1.550nm Wellenlängen, demonstriert werden, wie in der Abb. 4 dargestellt.

Wenn man berücksichtigt, dass das Mikrorohr selten mit Wasser gefüllt ist und die Änderungsrate der Ist-Temperatur viel langsamer als bei den Versuchen ist, so kann der Einfluss des Eises bei in Mikrorohren luftgeblasenen Kabeln als unwesentlich angesehen werden.

Nachdem alle obengenannten Prüfungen beendet werden, wird das Kabel durch Druckluft aus dem Rohr geblasen.

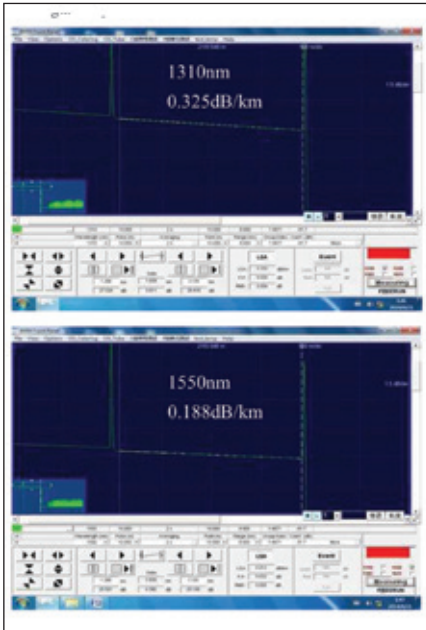
Das zeigt, dass die Blasleistung des Kabels noch gut ist und keine sichtbaren Schäden an der Kabelummantelung festgestellt wurden.

▼ **Abb. 4:** Höchste Dämpfungswerte in jeder Hohlader in unterschiedlichen Temperaturpunkten





▲ **Abb. 5:** Gefrorenes Wasser um die Endkappen



▲ **Abb. 6:** OTDR graphische Darstellung der Faser mit den höchsten Dämpfungswerten bei -40°C während der Prüfung der Endkappen

## 4 Test mit gefrorenem Wasser um die Endkappen

Dieser Versuch wurde ausgelegt, um den Einfluss der Einfrierbedingungen auf die Faserdämpfung zu untersuchen, bei eingefrorenem Wasser um die Endkappen herum.

Ein 1,8km luftgeblasenes Mikrorohrkabel und 6m langes Mikrorohr werden in diesem Versuch eingesetzt. Das Mikrorohr auf die Mitte des Kabels ziehen und den Abstand zwischen dem Versuchsende des Kabels und dem Mikrorohr messen.

### 4.1 Prüfverfahren

Zunächst ein Ende des Mikrorohrs mit einer Endkappe abdichten und das Rohr mit Wasser füllen.

Danach das andere Ende des Rohrs mit einer anderen Endkappe abdichten und zwei Endkappen auf die gleiche Höhe halten. Vor dem Versuch die Dämpfung jeder Faser bei Raumtemperatur (23°C) messen.

Danach das Kabel in die Temperaturwechselkammer stellen, um die Prüfung des Temperaturwechsels durchzuführen.

### 4.2 Temperaturwechselprogramm

- 1 Die Temperatur von 23°C auf -40°C innerhalb 30 Minuten absenken und diese Temperatur 12 Stunden lang beibehalten. Die Dämpfung messen
- 2 Die Temperatur auf 70°C innerhalb 30 Minuten erhöhen und diese Temperatur 12 Stunden lang beibehalten. Die Dämpfung messen
- 3 Die Temperatur wieder auf 23°C innerhalb 30 Minuten bringen und diese Temperatur 12 Stunden lang beibehalten. Die Dämpfung messen

### 4.3 Ergebnisse und Analyse

Die Endkappen bei -40°C prüfen. Es ist ersichtlich, dass sich etwas Eis ringsum gebildet hat. Demzufolge hat der Versuch erfolgreich die Situation simuliert wo Wasser um die Endkappen einfriert, wie in der Abb. 5 dargestellt.

Große Aufmerksamkeit ist den Positionen zu schenken, in denen sich die Endkappen auf den Dämpfungskurven während der Messung befinden. Alle OTDR-Kurven sind sehr gleichmäßig. Abb. 6 zeigt die höchsten Dämpfungswerte bei -40°C, je bei 1.310nm und 1.550nm Wellenlängen, dargestellt.

Nach der Prüfung sind die Dämpfungswechsel aller Faser geringfügig und kein sichtbarer Schaden wurde an der Kabelummantelung festgestellt.

## 5 Schlussfolgerung

Wenn luftgeblasene Mikrorohrkabel in kalten Gebieten eingesetzt werden, sollte der Einfluss der Erfrierungsbedingungen auf die Lichtwellenleiterübertragung berücksichtigt werden.

Um dieses Thema zu untersuchen wurden zwei Versuche ausgelegt, um diesen Einfluss zu bewerten.

Basierend auf den Prüfergebnissen in diesem Artikel, kann der Schluss gezogen werden, dass die Einflüsse des gefrorenen Wassers auf luftgeblasene Mikrorohrkabel geringfügig sind.

Dennoch sollte der langfristige Einfluss während der Lebensdauer des Kabels ebenfalls berücksichtigt und weiter untersucht werden.

Demzufolge sollten Schutzmaßnahmen, um das Eindringen von Wasser in Mikrorohren zu vermeiden, nicht außer Acht gelassen werden. ■

## 6 Literatur

- 1 IEC 60794-1-22 Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods
- 2 IEC 60794-5-10 Optical fibre cables – Part 5-10: Outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing.

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## «Присоединяйтесь к лучшему - во всем мире» с ведущими отраслевыми выставками wire and Tube в Дюссельдорфе

Отраслевые выставки по производству, переработке и обработке металла, по проволоке, кабелям и трубам, железу и стали имеют давнюю традицию в Дюссельдорфе. «Присоединяйтесь в лучшему во всем мире» - это слоган, характеризующий международную линейку отраслевых выставок по проволоке, кабелю и трубам. На протяжении более 30 лет отраслевые выставки по проволоке и трубам проходили совместно в Дюссельдорфе. В качестве отраслевых выставок номер один, они завоевали репутацию как международные игроки с высоким рейтингом в своих отраслях и имеют значимость гораздо выше города-административного центра Дюссельдорфа. Они внесли вклад в Дюссельдорф, деловых центров Северной Рейн-Вестфалии, завоевав отличную репутацию по всему миру в качестве платформы для международных инноваций.



▲ wire and Tube – международные ведущие игроки в отрасли. Фотография предоставлена Messe Düsseldorf GmbH

Тем временем, по проволочной и трубной отраслям есть 10 международных вспомогательных отраслевых выставок. В настоящее время они будут представлены с единым логотипом, чтобы показать, что они принадлежат к одному зонтичному бренду. Единый корпоративный дизайн обеспечивает единое оформление отдельных отраслевых выставок, в то же время демонстрируя, что все данные выставки являются членами одной продуктовой семьи. Внешний вид каждой выставки был разработан таким образом, чтобы их логотипы имели одинаковый внешний вид в части формы, цвета и шрифтов. В части

содержания и визуальной формы международное портфолио 'Join the best – worldwide' («Присоединяйтесь к лучшему - по всему миру») с ведущими отраслевыми выставками по проволоке и трубам в Дюссельдорфе и 10 международным вспомогательным выставкам будут представлены как из одного источника», - сказал Фридрих-Георг Керер, глобальный директор по металлам и технологиям расхода на Messe Düsseldorf GmbH.

В дополнение к отраслевой выставке по проволоке и трубам в Дюссельдорфе международное портфолио отраслевых выставок по металлу, которое

объединено под международным слоганом 'Join the best – worldwide', включает вспомогательные отраслевые выставки, такие как выставка по проволоке в Китае и Tube China в Шанхае, выставка по проволоке и трубам в Индии в Мумбае, выставка по проволоке и трубам в Москве, России, выставка по проволоке и трубам в юго-восточной Азии в Бангкоке, Таиланде и выставка по проволоке в Южной Америке и отраслевая выставка Tubotech в Сан-Паулу, Бразилии. Портфолио, которое вращает мир и предлагает возможности для дальнейшего роста.

Будь то Германия, Бразилия, Китай, Индия, Россия, Таиланд или США - вместе со своими дочерними предприятиями и в сотрудничестве с международной отраслью и бизнес-ассоциациями, а также с местными организаторами, Messe Düsseldorf организует и проводит выдающиеся региональные вспомогательные события. Компания завоевала репутацию в качестве информационных платформ и платформ заказа по своим соответствующим зонам обслуживания. Информация по отраслевым выставкам и их вспомогательным всемирным выставкам представлена на нашем веб-портале [www.wire.de](http://www.wire.de) и [www.tube.de](http://www.tube.de)

### Серия AVC1500 от Hannay

Серия AVC1500 портативных подающих катушек для гибких кабелей от Hannay Reels сделана из особо прочной стали и алюминиевой конструкции с неотражающей матовой черной поверхностью.

Данная система катушек со встроенной стандартной прямой рукояткой и липким кабельным хомутом. Модели с ручной перемоткой поставляются с пружинным фиксатором и быстроразъемным прихватывающим тормозом. Дополнительный роликовый комплект для применения в тяжелых условиях эксплуатации, рукоятки для переноски, монтируемые на раму и диск разделителя могут быть добавлены по запросу.



▲ Новая серия AVC1500 портативных подающих катушек

Hannay Reels – США

Вебсайт: [www.hannay.com](http://www.hannay.com)

Messe Düsseldorf GmbH – Германия  
Вебсайт: [www.messe-duesseldorf.com](http://www.messe-duesseldorf.com)

# Инвестиции в размере £250 000 в новейшие технологии сварки

William Hughes, компания-специалист по производству пружин и компонентов гнутой проволоки для глобальной автомобильной и аэрокосмической отраслей, инвестировал более 250 000 фунтов в высокотехнологичный автоматический двойной гибкий сварочный модуль. Новый сварочный модуль был поставлен Vaugomat с роботами Fanuc, все установлены в головном офисе William Hughes в Великобритании в Сталбридже Дорсете. Характеристики установки усовершенствованного контроля сварки и отчетности, обеспечивающие самые высокие стандарты качества и надежности, сохранены для клиентов.

«Мы очень успешно привлекали существенно новый бизнес, сотрудничая с нашими заказчиками в автомобильной отрасли, а это означало, что нам необходимо было увеличить объемы производства для рамы в сборе приварного седла», - заявила Эмма Бургон, директор по инжинирингу.

Двойной сварочный автоматический модуль Fanuc был очевидным выбором, так как в нашей компании уже есть большое число машинного оборудования от Fanuc, и мы знакомы с их программированием и эксплуатацией. Двойная автоматическая версия более чем в два раза уменьшает время, требуемое для процесса сварки, и это обеспечивает значительное увеличение объемов производства. Сварочный модуль функционирует 24 часа в день во время рабочей недели, и в настоящее время используется для крупного производства спинок рамы сидений для внедорожников. Для данной сборки необходимо 56 сварных швов и использование 25 проволок.

Помимо улучшенного качества и надежности готовой продукции, предоставленной благодаря двойному сварочному модулю, процесс сварки гораздо быстрее, что обеспечивает производство частей за 1 минуту 40 секунд по сравнению с прежними 3 минутами 45 секундами. Кроме того, для



▲ Двойной сварочный модуль

обеспечения максимальной скорости производительности, все сварочные зажимы были разработаны инженерами William Hughes при использовании самого современного ПО для 3D моделирования и изготовлены при использовании фрезерных станков CNC.

Данное недавнее инвестирование в самую современную технологию производства продолжает программу роста William Hughes, которая включает открытие нового завода площадью 87 000 кв. футов в Великобритании в Сталбридже, Дорсете в октябре 2014 года. Компания также продолжает инвестировать в рост своих производственных предприятий в Болгарии, которые удовлетворяют потребностям европейских заказчиков.

**William Hughes Ltd** – Великобритания  
**Вебсайт:** [www.wmhughes.co.uk](http://www.wmhughes.co.uk)

## Соответствие Goodwin новому отраслевому стандарту

Goodwin Machinery в сотрудничестве с Cable & Wire Technical Services разработали и изготовили волоочильную машину, которая основана на отраслевом стандарте Winget Syncro F-13. Данная инновационная разработанная машина была изготовлена вовремя и в рамках бюджета и сейчас очень успешно эксплуатируется на заводе в Европе. Данная волоочильная машина CWF-13, применяемая для цветных металлов, может обрабатывать медь диаметром от 8 мм или алюминий диаметром 9,5 мм и имеет много характеристик, таких как отсутствие требований к наличию большого количества места на полу (4,6 x 1,55м) с самой высокой скоростью производства 30,6 м/с и многие другие.

Разработка, производство и сборка были осуществлены в Великобритании, части были изготовлены при участии предпочтительных поставщиков Goodwin Machinery с окончательной сборкой и испытаниями, которые проводились на фабрике Goodwin в Болтоне. Во время испытаний, которые приводились в присутствии заказчика, заказчик отметил бесшумность оборудования. Это обусловлено тем, что все устройства передачи упрочнены и отшлифованы, а дизайн оборудования позволяет использовать винтовые передачи без вала шестерен заднего

хода/гипоидной передачи или конической передачи со спиральными зубьями. Машинное оборудование поставляется с дополнительной системой смазки либо для меди, либо для алюминия плюс дополнительная стойка намотки. В комплекте также присутствует маломощный винтовой масляный насос для основной коробки передач, который идеально встроен в заднюю часть станка, что обеспечивает легкий доступ для проведения технического обслуживания, очистки фильтра и т.д. Машинное оборудование также поставляется в комплекте с двигателем с постоянным крутящим моментом и приводом. Данное машинное оборудование - идеальная замена существующих волоочильных станков группой инженеров/электриков, которые способны синхронизировать его с любым существующим оборудованием далее по технологической цепочке, однако, в случае наличия желания у заказчика по получению полной линейки Goodwin может также поставить новые печи отжига и намоточные станки со всеми соединительными проводами и устройствами управления.

**Goodwin Machinery Ltd** – Великобритания  
**Вебсайт:** [www.goodwinmachinery.co.uk](http://www.goodwinmachinery.co.uk)



# Исследование влияния условий замерзания на микротрубчатые пневматические кабели

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## Аннотация

На некоторых холодных участках условия замерзания являются потенциальной угрозой для микротрубчатых пневматических кабелей. Для изучения влияния условий замерзания на скорость передачи оптоволокна в микротрубчатых пневматических кабелях были разработаны и осуществлены два различных эксперимента, изложенных в данной работе.

Результаты испытаний показали, что замерзание как в микротрубках, так и вокруг торцевых заглушек имеет незначительное влияние на скорость передачи волокна, и физическое повреждение кабеля не было обнаружено после экспериментов.

## 1 Введение

С разработкой конструкции сетей оптическое волокно до точки X микротрубчатые пневматические кабели чаще используются из-за отсутствия ресурсов трубок, даже в некоторых холодных регионах. В данном случае вода, проникшая в микротрубку, замерзнет при таких низких температурах.

Некоторые проблемы, такие как замедление скорости передачи препятствуют широкому применению микротрубчатых пневматических кабелей, испытания на замерзание были разработаны для моделирования холодного климата при помощи камеры термоциклирования.

Во время данных испытаний наблюдалось изменение затухания

Тип кабеля	Конструкция скрученных трубок со свободной укладкой волокон G.652D
Количество волокон	96
Внешний диаметр кабеля	6.1 mm
Тип микротрубки	ПЭНД
Внешний/внутренний диаметр микротрубки	10/8 mm
Циклы истинной температуры кристаллизации	2

▲ Таблица 1: Общие условия испытаний

волокна, и проверялись визуальные характеристики кабеля. Процедуры испытаний подробно описаны, и результаты испытаний тщательно проанализированы.

## 2 Условия испытаний на замерзание

Было разработано два эксперимента для моделирования условий замороженной воды в микротрубках и вокруг концевых заглушек соответственно при помощи камеры термоциклирования. Общие условия испытаний показаны в Таблице 1.

## 3 Испытание с водой, замороженной в микротрубке

Данный эксперимент был разработан для изучения влияния условий замерзания на затухание волокна при замерзании воды в микротрубке и выполнен в

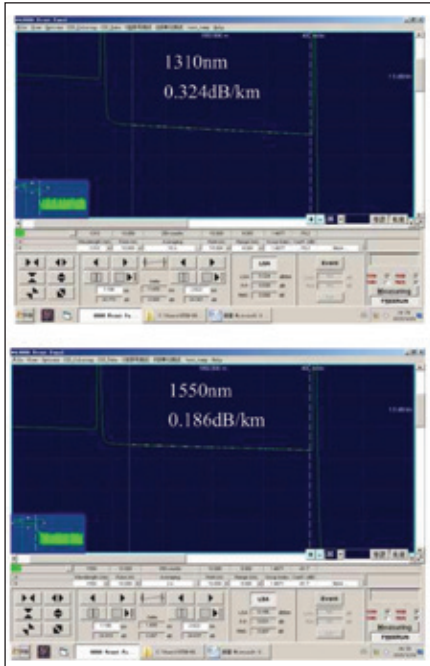


▲ Рисунок 1: Микротрубка с кабелем в воде

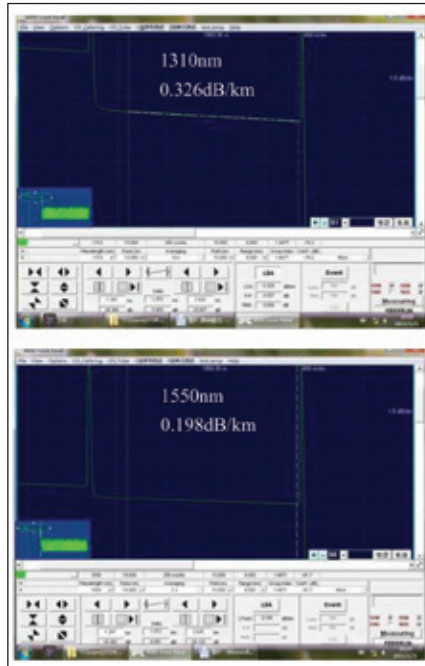
соответствии с IEC60794-1-22 Метод F15: испытание наружного замерзания кабеля. В данном эксперименте использовался микротрубчатый пневматический кабель длиной 1,8 км и микротрубка длиной 80 м.

### 3.1 Процедуры испытаний

Сначала намотать кабель на кабельную катушку и пропустить кабель в трубку. Затем опустить микротрубку длиной 80 м (с кабелем внутри) в бассейн на 24 часа для полного заполнения трубки водой, как показано на Рисунке 1.



▲ **Рисунок 2:** Графики оптической временной рефлектометрии волокна с самыми большими показателями затухания при -2°C



▲ **Рисунок 3:** Графики оптической временной рефлектометрии волокна с самыми большими показателями затухания при -40°C

После этого герметично закрыть трубку концевыми заглушками до вынимания катушки из бассейна.

Далее поместить кабель в камеру термоциклирования для выполнения испытания на стойкость к термоциклированию.

До этого зарегистрировать затухание каждого волокна при комнатной температуре (23°C).

### 3.2 Программа термоциклирования

Программа термоциклирования построена следующим образом (один цикл):

1. Снизить температуру с 23°C до 3°C в течение 30 минут и сохранять данную температуру в течение восьми часов.
2. Затем снизить температуру до -40°C в течение 30 минут и сохранять ее до тех пор, пока вода полностью не замерзнет, а температура льда будет составлять -10°C или ниже (при использовании устройства контроля температуры).
3. Повысить температуру до -2°C и сохранять данную температуру в течение часа.
4. Повысить температуру до 65°C. Сохранять данную температуру до тех пор, пока температура воды не достигнет 15°C. Затем вернуть температуру на уровень 23°C и сохранять данную температуру, пока температура воды не достигнет 23°C ± 5°C.

На каждом этапе испытания термоциклирования измерять затухание в каждом волокне.

### 3.3 Результаты

После испытания изменения затухания в каждом волокне действительно небольшие. Самый большой показатель затухания при -2°C продемонстрирован на Рисунке 2, на длине волны 1 310 Нм и 1 550 Нм соответственно.

### 3.4 Дополнительные испытания

С учетом крайне суровых погодных условий программа термоциклирования изменена, и вышеуказанные испытания проведены повторно.

#### 3.4.1 Программа термоциклирования (для крайне суровых погодных условий)

1. Снизить температуру с 23°C до -40°C в течение 30 минут и сохранять данную температуру в течение 12 часов. Выполнить измерение затухания.
2. Повысить температуру до 65°C в течение 30 минут и сохранять данную температуру на протяжении 12 часов. Выполнить измерение затухания.
3. Вернуть температуру на уровень 23°C в течение 30 минут и сохранять данную температуру на протяжении 12 часов. Выполнить измерение затухания.

#### 3.4.2 Результаты (для крайне суровых погодных условий):

Во время испытаний изменения

затухания во всех волокнах также оказались незначительными, а график оптической временной рефлектометрии очень плавным. Результаты испытаний при -40°C должны были быть самыми худшими.

Таким образом, самые высокие показатели затухания при -40°C продемонстрированы на Рисунке 3, на длине волны 1 310 Нм и 1 550 Нм соответственно.

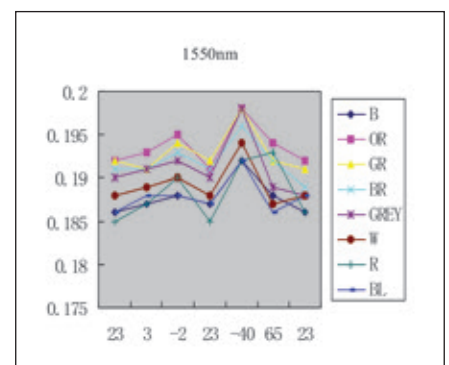
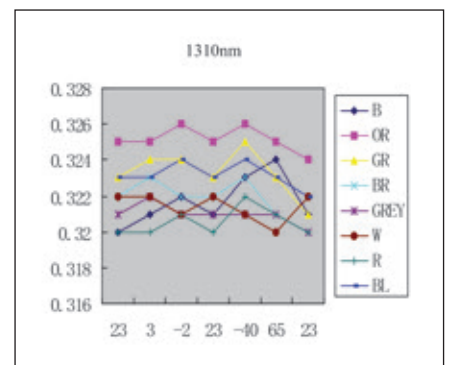
### 3.5 Анализ

После обработки данных могут быть продемонстрированы самые высокие показатели затухания в волокне в каждой отдельной трубке в различных температурных точках во время двух вышеуказанных испытаний, на длине волны 1310 Нм и 1550 Нм соответственно, как показано на Рисунке 4.

Учитывая редкое полное заполнение водой микротрубки и гораздо более медленную фактическую скорость изменения температуры, чем та, что была в экспериментах, влияние наличия льда в микротрубках на пневматические кабели может считаться незначительным.

Когда все вышеуказанные испытания были завершены, кабель извлекается из трубки сжатым воздухом. Это показывает, что характеристики вдувания кабеля все еще надлежащие, и визуальное повреждение кожуха не обнаружено.

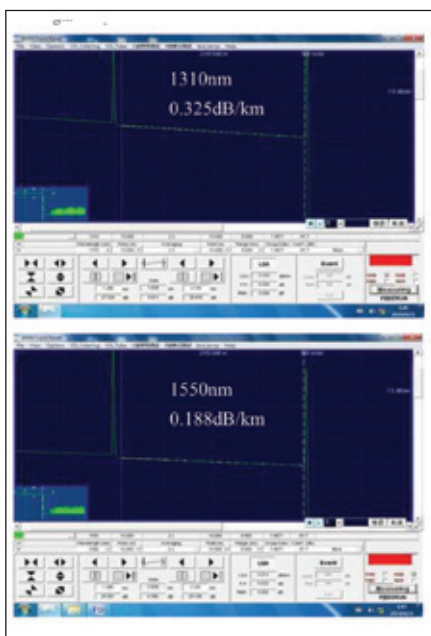
▼ **Рисунок 4:** Самые высокие показатели затухания в каждой отдельной трубке при различных температурных точках







▲ **Рисунок 5:** Замороженная вода у концевых заглушек



▲ **Рисунок 6:** Графики оптической временной рефлектометрии волокна с самыми высокими показателями затухания при  $-40^{\circ}\text{C}$  во время испытания с концевыми заглушками

## 4 Испытание с водой, замороженной вокруг концевых заглушек

Данный эксперимент разработан для изучения влияния условий замерзания на затухание в волокне при замороженной воде у концевых заглушек. В эксперименте используются микроотрубчатый пневматический кабель длиной 1,8 км и микроотрубка длиной 8 м. Микроотрубка сдвигается к середине кабеля, и измеряется расстояние от конца кабеля, используемого для испытаний до кабеля микроотрубки.

### 4.1 Процедуры испытаний

Сначала герметично закрыть микроотрубку концевой заглушкой и заполнить водой до полного заполнения. Затем герметично закрыть с другого конца трубки и сохранять две заглушки на одной высоте.

До эксперимента измерить затухание в каждом волокне при комнатной температуре ( $23^{\circ}\text{C}$ ).

После этого поместить кабель в камеру термоциклирования для выполнения циклических испытаний.

### 4.2 Программа термоциклирования

1. Снизить температуру с  $23^{\circ}\text{C}$  до  $-40^{\circ}\text{C}$  в течение 30 минут и поддерживать данную температуру на протяжении 12 часов. Выполнить измерение затухания.
2. Повысить температуру до  $70^{\circ}\text{C}$  в течение 30 и сохранять ее в течение 12 часов. Выполнить измерение затухания.
3. Вернуть температуру на уровень  $23^{\circ}\text{C}$  в течение 30 минут и сохранять данную температуру в течение 12 часов. Выполнить измерение затухания

### 4.3 Результаты и анализ

Проверить концевые заглушки при  $-40^{\circ}\text{C}$ . Возле них может быть обнаружен лед. Следовательно, моделирование эксперимента прошло успешно, так как возникла ситуация, при которой вода замерзает вокруг концевых заглушек, как показано на Рисунке 5.

Необходимо обратить внимание на позиции, когда концевые заглушки расположены на графиках затухания во время измерения. Все графики оптической временной рефлектометрии очень плавные. На Рисунке 6 показаны самые большие показатели затухания при  $-40^{\circ}\text{C}$ , на длине волны 1310 нм и 1550 нм соответственно.

После проведения испытаний изменения затухания во всех волокнах действительно незначительны, и визуальные повреждения кожуха кабеля не обнаружены.

## 5 Заключение

При использовании микроотрубчатых пневматических кабелей на холодных участках, необходимо учитывать влияние условий замерзания на скорость передачи оптического волокна.

Для изучения данного аспекта были разработаны два эксперимента с целью изучения такого влияния.

На основании результатов испытаний, изложенных в данной работе, можно сделать вывод о том, что влияние замороженной воды на микроотрубки пневматических кабелей незначительно.

Однако, долговременное влияние на протяжении всего срока службы кабеля должно также учитываться и подробно исследоваться. Таким образом, нельзя пренебрегать защитными мерами для предотвращения попадания воды в микроотрубки. ■

## 6 Источники

- 1 IEC 60794-1-22 Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods
- 2 IEC 60794-5-10 Optical fibre cables – Part 5-10: Outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing

*Работа опубликована с разрешения 64-го Технического симпозиума IWCS, прошедшего в октябре 2015 в городе Атланта штате Джорджия, США.*

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## “Join the best – worldwide” avec les salons fares wire et Tube à Düsseldorf

LES salons consacrés à la production, à la transformation et à la finition des métaux, pour les fils, les câbles et les tubes, le fer et l'acier ont une longue tradition à Düsseldorf. “Join the best – worldwide” (Retrouvez le top des entreprises dans le monde entier): c'est le slogan qui résume le portefeuille international des salons du fil, du câble et du tube.

Depuis plus de 30 ans, les salons wire et Tube ont lieu en même temps à Düsseldorf. S'étant imposés comme des salons leaders pour leurs industries de référence, wire et Tube se sont distingués comme meilleurs acteurs internationaux dans le cadre de leurs secteurs respectifs et leur renommée a dépassé les limites de la ville de Düsseldorf, ils ont en outre contribué à faire acquérir au centre d'affaires de la Rhénanie-du-Nord-Westphalie, une excellente réputation dans le monde entier en tant que plate-forme pour l'innovation industrielle.

Entretemps, il y a 10 salons internationaux satellites pour le secteur industriel de wire et Tube. À partir de maintenant, ces derniers se présenteront avec des logos unifiés pour prouver qu'ils appartiennent à une seule marque commune. Un seul concept d'entreprise est en mesure de garantir une image uniforme à chaque salon tout en démontrant qu'il fait partie d'une seule famille de produits.

L'image de chaque foire a été conçue afin que les logos présentent un aspect uniforme en termes de forme, couleur et graphisme. “En ce qui concerne le contenu et le côté esthétique, le portefeuille “Join the best – worldwide”



▲ Wire et Tube – Les principaux acteurs internationaux dans l'industrie. Photographie imprimée avec l'autorisation de Messe Düsseldorf GmbH

avec ses principales foires leader wire et Tube à Düsseldorf et ses 10 foires satellites internationales se présenteront comme provenant d'un seul organisme”, a déclaré Friedrich-Georg Kehrer, directeur général de Global Portfolio Director Metals and Flow Technologies pour Messe Düsseldorf GmbH. En plus du salon wire et Tube de Düsseldorf, le portefeuille international des foires du métal, réunies sous le slogan “Join the best – worldwide”, comprend des salons satellites comme wire China et Tube China à Shanghai, wire et Tube India à Mumbai, wire et Tube Russia à Moscou, Russie, wire et Tube Southeast Asia à Bangkok, en Thaïlande, et wire South America et Tubotech à São Paulo au Brésil. Un portefeuille d'envergure mondiale offrant un potentiel de croissance supplémentaire.

Que ce soit en Allemagne, au Brésil, en Chine, en Inde, en Russie, en Thaïlande ou aux États-Unis, en collaboration avec ses filiales à l'étranger et en coopération avec des associations industrielles et commerciales internationales ainsi que des organisateurs locaux, Messe Düsseldorf organise d'excellents événements satellites régionaux. Ils ont acquis une réputation en tant que plateformes d'information et de commande pour leurs cibles commerciales respectives.

Les informations sur les salons et leurs satellites sont disponibles sur notre portail Internet [www.wire.de](http://www.wire.de) et [www.tube.de](http://www.tube.de)

**Messe Düsseldorf GmbH – Allemagne**  
**Website:** [www.messe-duesseldorf.com](http://www.messe-duesseldorf.com)

### Serie AVC1500 di Hannay

La série AVC1500 de bobines de stockage de câbles portables de Hannay Reels est dotée d'une construction robuste en acier et aluminium avec une finition noire mate antireflet.

Cette bobine est livrée équipée d'une manivelle standard fixe directe et un serre-câble en velcro. Les modèles à rembobinage manuel sont équipés d'un

verrouillage à broche et d'un frein de traînée du type cam-lock. Sur demande, il est possible d'ajouter un ensemble de roues pivotantes à verrouillage pour usage industriel, des poignées de transport montées sur châssis et des disques diviseurs.

**Hannay Reels – États-Unis**  
**Website:** [www.hannay.com](http://www.hannay.com)



▲ Nouvelle série AVC1500 de bobines de stockage pour câbles portables



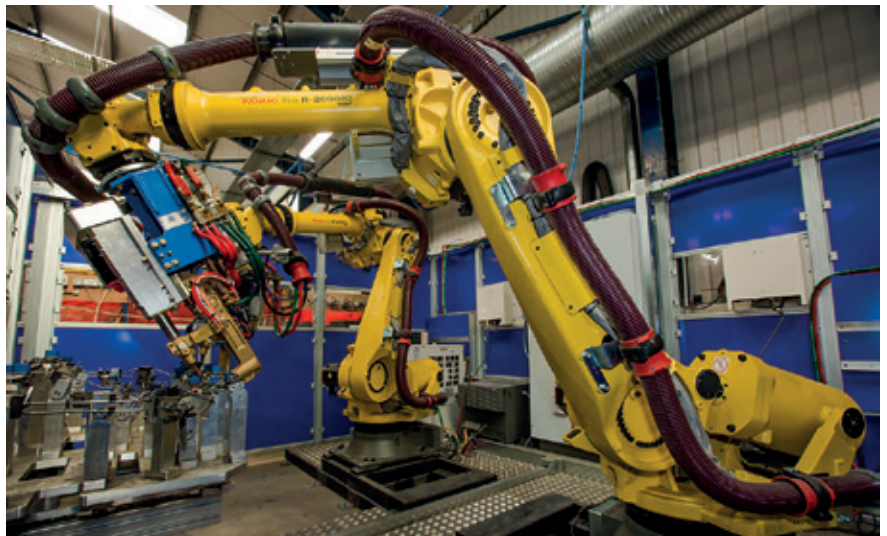
# Investissement de £250 000 dans la toute dernière technologie de soudage

WILLIAM Hughes, fabricant spécialisé de ressorts et de composants de fil courbe pour les industries automobiles et aérospatiales mondiales, a investi plus de £250 000 dans une cellule de soudage à robot Twin de haute technologie.

La nouvelle cellule de soudage a été fournie par Bauomat avec des robots Fanuc, tous installés au nouveau siège britannique de William Hughes à Stalbridge, Dorset. L'unité dispose d'un système de surveillance de soudage et de collecte des données avancé garantissant à ses clients le maintien des standards les plus élevés en termes de qualité et de cohérence.

La cellule de soudage est en service 24 heures sur 24 pendant la semaine de travail et elle est actuellement utilisée pour la production en série de dossiers de sièges pour SUV. Cet assemblage particulier présente 56 soudures et utilise 25 barres.

La qualité et l'uniformité du produit fini fourni par la cellule avec robot Twin sont meilleures et le processus de soudage est beaucoup plus rapide. En effet il permet de produire les composants en une seule minute et 40 secondes par rapport aux 3 minutes et 45 secondes du passé. De plus, afin de garantir une vitesse de production



▲ Cellule de soudage avec robot Twin

maximale, les gabarits de soudage sont tous conçus par les ingénieurs de William Hughes qui utilisent le dernier logiciel de CAO et ces derniers sont fabriqués à l'aide de fraiseuses à contrôle numérique.

Cet investissement récent dans la dernière technologie de fabrication poursuit le programme de croissance constante de William Hughes incluant l'ouverture en octobre 2014

d'une nouvelle usine de 87 000ft<sup>2</sup> (env. 8 000m<sup>2</sup>) à Stalbridge dans le Dorset en Grande-Bretagne.

La société continue également à investir dans la croissance de ses installations de production en Bulgarie pour répondre aux besoins de ses clients européens.

**William Hughes Ltd – Royaume-Uni**  
**Website:** [www.wmhughes.co.uk](http://www.wmhughes.co.uk)

## Nouvelle machine de Goodwin basée sur une norme de l'industrie

Goodwin Machinery, en collaboration avec Cable & Wire Technical Services, a conçu et fabriqué une tréfileuse pour fil machine basée sur la norme industrielle Winget Syncro F-13.

Cette machine de conception novatrice a été fabriquée conformément aux délais fixés et dans les limites du budget et elle fonctionne actuellement avec des résultats excellents dans une usine en Europe. La tréfileuse pour fil machine non-ferreux CWF-13 est conçue pour réaliser une réduction de diamètre du fil machine de 8mm dans le cuivre ou de 9,5mm dans l'aluminium. La machine présente de nombreuses caractéristiques comme un encombrement réduit (4,6 x 1,55m), un taux de production supérieur de 30,6 MPS et de nombreuses autres propriétés..

La conception, la fabrication et l'assemblage ont été réalisés entièrement au Royaume-Uni: les pièces ont été fabriquées par différents fournisseurs sélectionnés par Goodwin Machinery et par Cable & Wire, et l'assemblage et la réception finale ont été effectués dans l'usine de Bolton de Goodwin.

L'essai effectué en sa présence a permis au client d'apprécier le fonctionnement silencieux de la machine lorsqu'elle était en marche. Cela peut être attribué au fait que tous les engrenages sont durcis et que la conception de la machine facilite l'utilisation d'engrenages hélicoïdaux sans arbre postérieur/hypoïdes ou coniques à denture spirale. La machine est équipée d'un système de lubrification optionnel pour le cuivre et l'aluminium plus un stand d'enroulement en option.

Il existe également une pompe à huile peu bruyante du type à vis pour la boîte de vitesse principale, qui s'adapte parfaitement à l'arrière de la machine, garantissant ainsi un accès optimal pour toute opération d'entretien, de nettoyage du filtre, etc. La machine est en outre équipée d'un moteur à couple constant de 300HP.

**Goodwin Machinery – Royaume-Uni**  
**Website:** [www.goodwinmachinery.co.uk](http://www.goodwinmachinery.co.uk)

# Étude des effets des conditions de gel sur les câbles insufflés dans les micro-conduits

Par Yunfang Ruan, Zhuang Xiong, Xiaoli Liu and Wenjing Ye, State Key Laboratory of Optical Fibre and Cable Manufacture Technology, Yangtze Optical Fibre and Cable Joint Stock Co Ltd, et Huawei Technologies Co Ltd, Shenzhen, Guangdong, Chine

## Résumé

Dans certaines régions froides, les conditions de gel représentent une menace potentielle pour les câbles d'air soufflé dans les micro-conduits.

Afin d'étudier les effets des conditions de gel sur les performances de transmission des fibres optiques dans les câbles soufflés dans des micro-conduits, deux expériences différentes ont été conçues et réalisées dans le présent document.

Les résultats de l'essai révèlent que le gel dans les deux micro-conduits et autour des bouchons d'extrémité ont une influence négligeable sur les performances de transmission des fibres et aucun dommage physique visuel du câble n'a été détecté après les expériences.

## 1 Introduction

Avec le développement de la construction du réseau FTTx, les câbles soufflés dans les micro-conduits sont plus fréquemment utilisés en raison du manque de conduits, surtout dans certaines régions froides.

Dans ce cas, toutefois, l'eau pénétrée dans le micro-conduit gèlera à des températures aussi basses. En outre, un certain nombre de soucis liés à la baisse du niveau des performances du câble découragera la vaste application des câbles soufflés dans les micro-conduits dans le monde entier.

Afin d'étudier les effets des conditions de gel sur les performances de transmission des fibres optiques, des tests de congélation ont été conçus pour simuler le climat froid à l'aide d'une chambre d'essai de cycles de température.

Type de câble	Structure du type à tubes assemblés toronnée avec fibres G.652D
Nombre de fibres	96
Diamètre extérieur du câble	6.1mm
Type de micro-conduit	HDPE
Diamètre extérieur/intérieur du micro-conduit	10/8mm
Cycles de l'essai de variation de la température	2

▲ **Tableau 1:** Conditions communes de l'essai

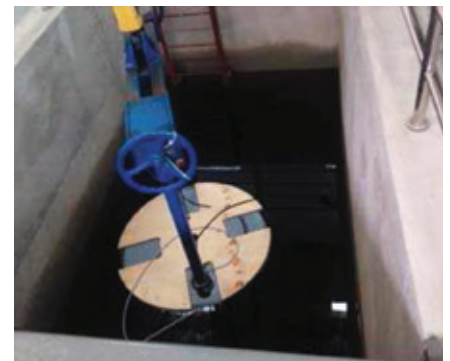
Au cours des essais, la variation de l'affaiblissement des fibres a été vérifiée ainsi que l'aspect du câble. Les méthodes d'essai sont décrites en détail et les résultats des essais ont été soigneusement analysés.

## 2 Conditions de l'essai de congélation

Deux expériences ont été mises au point pour simuler les conditions de l'eau congelée respectivement dans le micro-conduit et autour des bouchons d'extrémité, à l'aide d'une chambre de variation des cycles de température. Les conditions d'essai communes dans les deux expériences sont illustrées au *Tableau 1*.

## 3 Essai de l'eau congelée dans le micro-conduit

Cette expérience a été conçue pour étudier l'impact des conditions de gel sur l'affaiblissement de la fibre lorsque l'eau est gelée dans le micro-conduit et elle



▲ **Figure 1:** Micro-conduit avec câble trempé dans l'eau

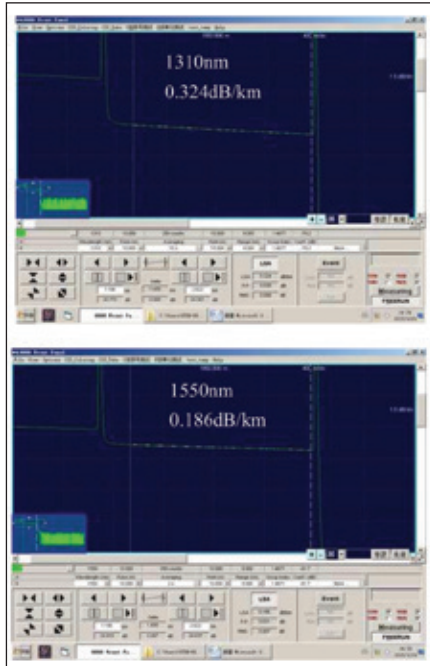
a été réalisée conformément à la norme IEC60794-1-22 Méthode F15: essai de congélation extérieure du câble. Dans cette expérience on a utilisé un câble soufflé dans un micro-conduit de 1,8km et un micro-conduit de 80m de long.

### 3.1 Méthodes d'essai

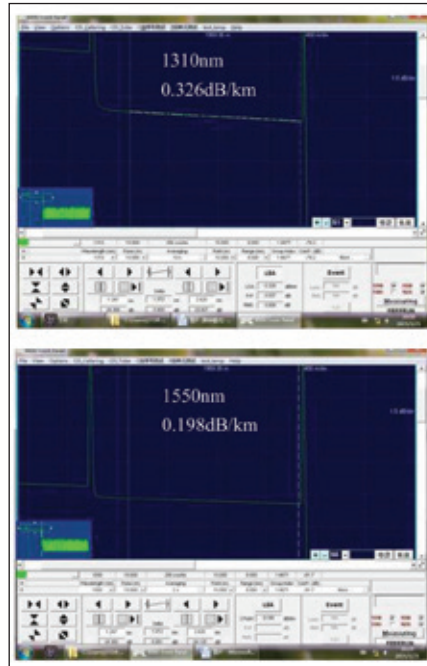
Tout d'abord, rembobiner le micro-conduit sur un touret de câble et souffler le câble dans le conduit.

Ensuite, tremper le micro-conduit de 80m (avec le câble à l'intérieur) dans de l'eau pendant 24 heures pour s'assurer que le conduit est complètement rempli d'eau, comme illustré à la *Figure 1*.





▲ **Figure 2:** Diagrammes OTDR de la fibre avec les valeurs d'affaiblissement les plus élevées à -2°C



▲ **Figure 3:** Diagrammes OTDR de la fibre avec les valeurs d'affaiblissement les plus élevées à -40°C

Par la suite, sceller le conduit avec les bouchons d'extrémité avant d'extraire du bassin le touret de câble.

Enfin, placer le touret de câble dans la chambre pour réaliser l'essai de variation des cycles de température. Avant ce test, enregistrer l'affaiblissement de chaque fibre à la température ambiante (23°C).

### 3.2 Programme de cycles de température

Le programme de cycles de température est affiché comme suit (un cycle):

- 1 Baisser la température de 23°C à 3°C dans les 30 minutes et maintenir cette température pendant 8 heures
- 2 Ensuite, baisser la température à -40°C pendant 30 minutes et la maintenir jusqu'à ce que l'eau soit complètement gelée et la température de la glace soit de -10°C ou inférieure (en utilisant un dispositif de contrôle de la température)
- 3 Augmenter la température jusqu'à -2°C et maintenir cette température pendant une heure
- 4 Augmenter la température jusqu'à 65°C. Maintenir la température jusqu'à ce que l'eau atteigne 15°C. Ensuite, reporter la température jusqu'à 23°C et la maintenir jusqu'à ce que l'eau atteigne 23°C ±5°C

À chaque étape de l'essai de cycles de variation de la température, enregistrer l'affaiblissement de chaque fibre.

### 3.3 Résultats

Après le test, les changements de l'affaiblissement de la totalité des fibres sont négligeables.

Les plus grandes valeurs de l'affaiblissement à -2°C sont représentées à la Figure 2, respectivement à des longueurs d'onde de 1 310nm et 1 550nm.

### 3.4 Essai supplémentaire

Ensuite, en supposant des conditions de froid extrême, le programme de variation des cycles de température est modifié et l'essai susmentionné est répété.

#### 3.4.1 Programme de variation des cycles de température (pour des conditions de froid extrême)

- 1 Baisser la température de 23°C à -40°C dans les 30 minutes et la maintenir pendant 12 heures. Mesurer l'affaiblissement
- 2 Augmenter la température jusqu'à 65°C dans les 30 minutes et la maintenir pendant 12 heures. Mesurer l'affaiblissement
- 3 Reporter la température à 23°C dans les 30 minutes et la maintenir pendant 12 heures. Mesurer l'affaiblissement

#### 3.4.2. Résultats (pour des conditions de froid extrême)

Pendant l'essai, les variations de la totalité des fibres sont réduites et les courbes OTDR (Réflectomètre Optique dans le Domaine Temporel) sont très uniformes.

Les résultats de l'essai à -40°C devraient être en principe les plus mauvais.

Par conséquent, comme illustré à la Figure 3, les plus grandes valeurs d'affaiblissement sont obtenues à -40°C, respectivement à 1 310nm et à 1 550nm.

### 3.5 Analyse

Après le traitement des données, l'on peut démontrer que l'affaiblissement le plus élevé dans la totalité des structures du type à tubes assemblés, se produit à différentes valeurs de la température au cours des deux tests ci-dessus, respectivement aux longueurs d'onde de 1 310nm et 1 550nm, comme illustré à la Figure 4.

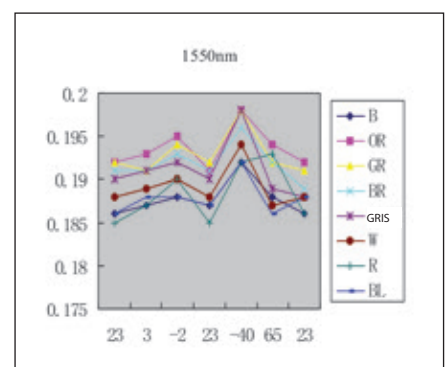
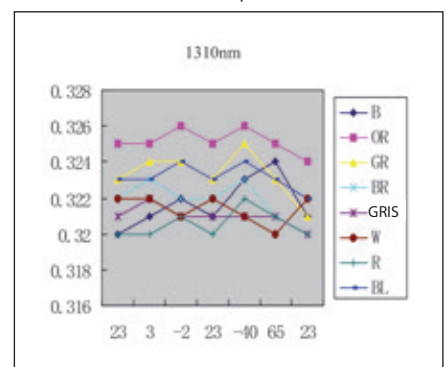
En tenant compte du fait que le micro-conduit est rarement rempli d'eau et que le taux de variation de la température réelle est beaucoup plus lent que dans les expériences, l'impact de la glace dans des câbles soufflés dans les micro-conduits peut être considéré comme négligeable.

Après avoir complété les tests ci-dessus, le câble est soufflé hors de la conduite au moyen d'air comprimé. L'on peut remarquer que le soufflage du câble a été bien exécuté et qu'aucun dommage visuel de la gaine du câble n'a été constaté.

## 4 Test de l'eau gelée autour des bouchons d'extrémité

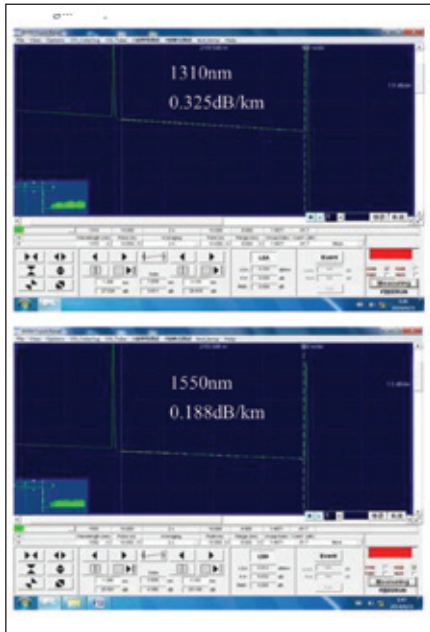
Cette expérience a été mise au point pour étudier l'impact des conditions de congélation sur l'affaiblissement de la fibre en présence d'eau congelée autour des bouchons d'extrémité. Pour cette expérience on utilise un câble soufflé

▼ **Figure 4:** Les plus grandes valeurs d'affaiblissement dans chaque structure à tubes assemblés à différentes valeurs de température





▲ **Figure 5:** Eau gelée autour des bouchons d'extrémité



▲ **Figure 6:** Graphiques OTDR de la fibre avec les valeurs d'affaiblissement les plus élevées à -40°C au cours de l'essai des bouchons d'extrémité

dans un micro-conduit de 1,8km et dans un micro-conduit de 6m. Déplacer le micro-conduit au milieu du câble et mesurer la distance entre l'extrémité d'essai du câble et le micro-conduit.

#### 4.1 Procédures d'essai

Tout d'abord, sceller une extrémité du micro-conduit avec un bouchon d'extrémité et remplir d'eau le conduit. Ensuite, sceller l'autre extrémité du conduit avec un autre bouchon d'extrémité et garder deux bouchons à la même hauteur. Avant l'expérience, mesurer l'affaiblissement de chaque fibre à la température ambiante (23°C). Enfin, placer le câble dans la chambre pour effectuer l'essai de cycles de température.

#### 4.2 Programme de cycles de température

- 1 Baisser la température de 23°C à -40°C dans les 30 minutes et la maintenir pendant 12 heures. Mesurer l'affaiblissement
- 2 Augmenter la température à 70°C dans les 30 minutes et la maintenir pendant 12 heures. Mesurer l'affaiblissement

- 3 Reporter la température à 23°C dans les 30 minutes et la maintenir pendant 12 heures. Mesurer l'affaiblissement

#### 4.3 Résultats et analyses

Vérifiez les bouchons d'extrémité à -40°C. L'on peut constater que de la glace s'est formée autour de ces derniers. Par conséquent, l'expérience a simulé avec succès la situation dans laquelle l'eau gèle autour des bouchons d'extrémité, comme représenté à la Figure 5.

Accorder une attention particulière aux positions des bouchons d'extrémité sur les courbes d'affaiblissement pendant la mesure. Les courbes OTDR sont très uniformes.

La Figure 6 représente les plus grandes valeurs d'affaiblissement à -40°C, respectivement aux longueurs d'onde de 1310nm et 1550nm.

Après le test, les variations d'affaiblissement de la totalité des fibres sont vraiment modestes et aucun dommage de la gaine du câble n'est visible.

## 5 Conclusions

Lorsque des câbles soufflés dans les micro-conduits sont utilisés dans des zones froides, il faut tenir compte de l'influence du gel sur la transmission à fibres optiques. Afin d'étudier ce sujet, deux expériences ont été conçues pour évaluer une telle influence. Sur la base des résultats des essais illustrés dans cet article, l'on peut conclure que les effets de l'eau gelée sur les câbles soufflés dans les micro-conduits sont négligeables.

Toutefois il serait également utile d'apprécier et d'approfondir l'effet à long terme pendant la durée du cycle de vie du câble. Par conséquent, les mesures de protection visant à éviter la pénétration de l'eau dans les micro-conduits ne doivent pas être ignorées. ■

## 6 Références bibliographiques

- 1 IEC 60794-1-22 Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods
- 2 IEC 60794-5-10 Optical fibre cables – Part 5-10: Outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing

Cet article a été présenté avec l'autorisation du 64<sup>ème</sup> International Wire and Cable Symposium, Atlanta, Georgia, États-Unis, octobre 2015.

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# “Join the best – worldwide” con le più prestigiose fiere wire e Tube a Düsseldorf

LE fiere dedicate alla produzione, alla lavorazione e alla finitura di metalli per fili, cavi e tubi, ferro e acciaio hanno una lunga tradizione a Düsseldorf. “Join the best – worldwide” (unisciti ai migliori in tutto il mondo): è questo lo slogan che riassume in sé il portafoglio internazionale delle fiere campionarie del filo, del cavo e del tubo.

Da oltre 30 anni, le fiere wire e Tube si tengono congiuntamente a Düsseldorf. Affermatesi come fiere leader per le loro industrie, wire e Tube si sono distinte come principali attori internazionali nei rispettivi settori con una risonanza che va ben oltre il capoluogo di Düsseldorf e hanno contribuito a far acquisire al nodo commerciale del Nord Reno-Westfalia, un'eccellente reputazione in tutto il mondo come piattaforma per l'innovazione industriale.

Nel frattempo, ci sono 10 fiere internazionali satelliti per il settore industriale di wire e Tube. A partire da ora, si presenteranno con loghi unificati per dimostrare che appartengono a un “marchio distintivo” comune. Un'unica immagine aziendale garantisce un aspetto uniforme delle singole fiere e dimostra contemporaneamente l'appartenenza ad un'unica famiglia di prodotti.

L'immagine di ciascuna fiera è stata progettata in modo che i loghi presentino un aspetto uniforme in termini di forma, colore e grafica. “Per quanto riguarda i contenuti e l'aspetto estetico, il portafoglio “Join the best - worldwide” con le sue importanti fiere leader wire



▲ wire e Tube – principali attori internazionali nell'industria. Per cortese autorizzazione di Messe Düsseldorf GmbH

e Tube a Düsseldorf e le sue 10 fiere satellite internazionali si presenteranno come provenienti da un unico ente”, ha dichiarato Friedrich-Georg Kehrer, direttore generale di Global Portfolio Director Metals and Flow Technologies per la Messe Düsseldorf GmbH.

Oltre a wire e Tube Düsseldorf, il portafoglio internazionale delle fiere del metallo, che si sono unite sotto lo slogan “Join the best – worldwide”, comprende alcune fiere satellite come wire China e Tube China a Shanghai, wire e Tube India a Mumbai, wire e Tube Russia a Mosca, Russia, wire e Tube Southeast Asia a Bangkok, Thailandia, e wire South America e Tubotech a São Paulo, Brasile. Un portafoglio di portata mondiale che offre un ulteriore potenziale di crescita.

Che si tratti della Germania, del Brasile, della Cina, dell'India, della Russia, della Thailandia o degli Stati Uniti, insieme alle sue controllate estere e in collaborazione con associazioni commerciali e industriali internazionali provenienti dall'industria e dall'economia, nonché organizzatori locali, Messe Düsseldorf organizza eccezionali eventi satellite regionali. Questi si sono distinti come piattaforme di informazione e di ordinazione per i rispettivi bacini di utenza.

Le informazioni sulle fiere campionarie e sulle relative fiere satellite in tutto il mondo sono disponibili sul portale web all'indirizzo [www.wire.de](http://www.wire.de) e [www.tube.de](http://www.tube.de)

**Messe Düsseldorf GmbH – Germania**  
**Website:** [www.messe-duesseldorf.com](http://www.messe-duesseldorf.com)

## Serie AVC1500 di Hannay

La serie AVC1500 di bobine di stoccaggio per cavi portatili di Hannay Reels presenta una robusta struttura in acciaio e alluminio con una finitura antiriflesso color nero opaco.

Questa bobina viene fornita con una manovella standard fissa diretta e un fermacavo in velcro. I modelli di riavvolgimento manuale sono dotati di chiusura azionata a molla e freno motore del tipo camlock. Set di ruote girevoli di bloccaggio per uso industriale, manopole montate su telaio e dischi divisorii in opzione possono essere aggiunti su richiesta.

**Hannay Reels – Stati Uniti**

**Website:** [www.hannay.com](http://www.hannay.com)



▲ La nuova serie AVC1500 di bobine di stoccaggio per cavi portatili

## Nuova macchina di Goodwin basata su uno standard industriale

Goodwin Machinery, in collaborazione con Cable & Wire Technical Services, ha progettato e realizzato uno sbizzizzatore che si basa sullo standard industriale Winget Syncro F-13.

Questa macchina progettata in modo innovativo è stata realizzata entro i tempi previsti e nei limiti del budget ed è attualmente in funzione con eccellenti risultati in uno stabilimento in Europa.

Lo sbizzizzatore di vergella non ferrosa CWF-13 è in grado di effettuare una riduzione di diametro di vergella di 8mm nel rame o 9,5mm nell'alluminio e presenta molte caratteristiche come una superficie d'ingombro molto piccola

(4,6 x 1,55m), un tasso di produzione superiore del 30,6MPS e molte altre.

La progettazione, la produzione e il montaggio sono stati interamente eseguiti nel Regno Unito: i componenti sono stati prodotti dai vari fornitori prescelti di Goodwin Machinery e di Cable & Wire e l'assemblaggio e il collaudo finali sono stati eseguiti presso lo stabilimento di Bolton di Goodwin.

La prova effettuata in sua presenza ha consentito al cliente di apprezzare la silenziosità della macchina durante il funzionamento. Ciò può essere attribuito al fatto che tutti gli

ingranaggi sono temprati e molati e che la progettazione della macchina facilita l'utilizzo di ingranaggi elicoidali senza albero posteriore/ipoidi o conici spirodali.

È inoltre fornita una pompa dell'olio a bassa rumorosità del tipo a vite per la trasmissione principale che si inserisce perfettamente sul retro della macchina rendendo ideale l'accesso per la manutenzione, la pulizia del filtro ecc. La macchina è inoltre equipaggiata con un motore ed azionamento a coppia costante da 300HP.

**Goodwin Machinery Ltd – Regno Unito**  
**Website:** [www.goodwinmachinery.co.uk](http://www.goodwinmachinery.co.uk)

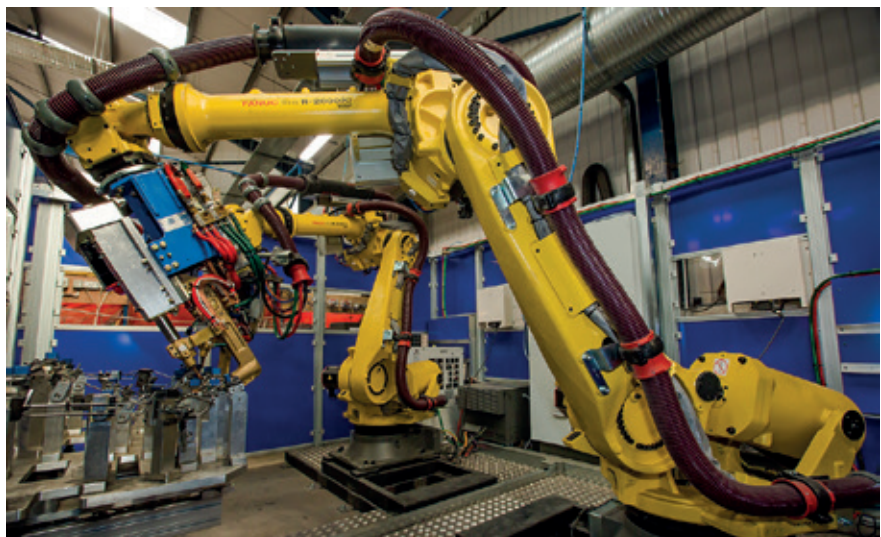
# Investimento da 250.000 sterline nella più recente tecnologia di saldatura

**WILLIAM Hughes**, produttore specializzato di molle e componenti in filo piegato per i settori automobilistico e aerospaziale a livello mondiale, ha investito oltre 250.000 sterline in una cella di saldatura con robot Twin ad alta tecnologia.

La nuova cella di saldatura è stata fornita da Bauomat assieme ai robot Fanuc, installati presso la nuova sede britannica di William Hughes a Stalbridge, Dorset. L'unità è dotata di un avanzato sistema di controllo e raccolta dati della saldatura che garantisce il mantenimento dei più elevati standard di qualità e di uniformità per i propri clienti.

La cella di saldatura è in funzione 24 ore al giorno durante la settimana lavorativa ed è attualmente in uso per la produzione di massa di schienali per sedili per SUV. Questo particolare assieme presenta 56 saldature e utilizza 25 barre.

Così come vengono fornite una migliore qualità e uniformità del prodotto finito dalla cella con robot Twin, il processo di saldatura è molto più veloce e consente di produrre i componenti in solo 1 minuto e 40 secondi rispetto ai 3 minuti e 45 secondi del passato. Inoltre, per garantire che la velocità di produzione



▲ Cella di saldatura con robot Twin

sia massimizzata, le maschere di saldatura sono tutte progettate dagli ingegneri di William Hughes che utilizzano il più recente software CAD e sono realizzate con fresatrici a controllo numerico.

Questo recente investimento nella più avanzata tecnologia di fabbricazione prosegue il programma di crescita costante di William Hughes che include

l'apertura nel mese di ottobre 2014 di un nuovo stabilimento di 87.000ft<sup>2</sup> (ca. 8.000m<sup>2</sup>) presso la sua base britannica a Stalbridge, Dorset. L'azienda continua inoltre a investire nella crescita dei propri impianti di produzione in Bulgaria, che è al servizio delle esigenze dei suoi clienti europei.

**William Hughes Ltd – Regno Unito**  
**Website:** [www.wmhughes.co.uk](http://www.wmhughes.co.uk)



# Studio degli effetti delle condizioni di congelamento sui cavi soffiati in microcondotti

A cura di Yunfang Ruan, Zhuang Xiong, Xiaoli Liu e Wenjing Ye, State Key Laboratory of Optical Fibre and Cable Manufacture Technology, Yangtze Optical Fibre and Cable Joint Stock Co Ltd, e Huawei Technologies Co Ltd, Shenzhen, Guangdong, Cina

## Riassunto

In alcune zone fredde, le condizioni di congelamento rappresentano una potenziale minaccia per i cavi soffiati in microcondotti. Al fine di studiare gli effetti delle condizioni di congelamento sulla trasmissione delle fibre ottiche nei cavi soffiati in microcondotti, in questo articolo sono stati progettati e realizzati due diversi esperimenti. I risultati della prova mostrano che il congelamento nei microcondotti e attorno ai terminali ha un'influenza trascurabile sulle prestazioni di trasmissione delle fibre; inoltre, non è stato rilevato alcun danno fisico visivo sul cavo in seguito agli esperimenti.

## 1 Introduzione

Con lo sviluppo della costruzione della rete FTTH, i cavi soffiati in microcondotti sono utilizzati più frequentemente a causa della scarsa disponibilità di condotti, soprattutto in alcune regioni fredde. In questo caso, tuttavia, l'acqua penetrata nel microcondotto si congelerà a temperature così basse. Inoltre, una certa preoccupazione legata al calo di prestazioni del cavo, scoraggerà la diffusione dei cavi soffiati in microcondotti in tutto il mondo.

Al fine di studiare gli effetti delle condizioni di congelamento sulle prestazioni di trasmissione delle fibre ottiche, sono state messe a punto delle prove di congelamento per simulare il clima freddo con l'ausilio di una camera per la variazione della temperatura. Durante le prove, è stata monitorata la variazione di attenuazione delle fibre ed è stato controllato l'aspetto del cavo.

Tipo di cavo	Struttura del tipo "loose tube" trefolata con fibre G.652D
Numero di fibre	96
Diametro esterno cavo	6.1mm
Tipo di microcondotto	HDPE
Diametro esterno/interno del microcondotto	10/8mm
Cicli del test di variazione della temperatura	2

▲ Tabella 1: Condizioni comuni della prova

Le procedure di prova sono descritte in dettaglio e i risultati della prova vengono analizzati attentamente.

## 2 Condizioni della prova di congelamento

Sono stati messi a punto due esperimenti per simulare le condizioni di acqua congelata rispettivamente nel microcondotto e attorno ai terminali con l'ausilio di una camera per la variazione della temperatura. Le condizioni di prova comuni in due esperimenti sono riportate nella Tabella 1.

## 3 Prova dell'acqua congelata nel microcondotto

Questo esperimento è stato ideato per studiare l'impatto del congelamento sull'attenuazione della fibra in presenza di acqua congelata nel microcondotto;

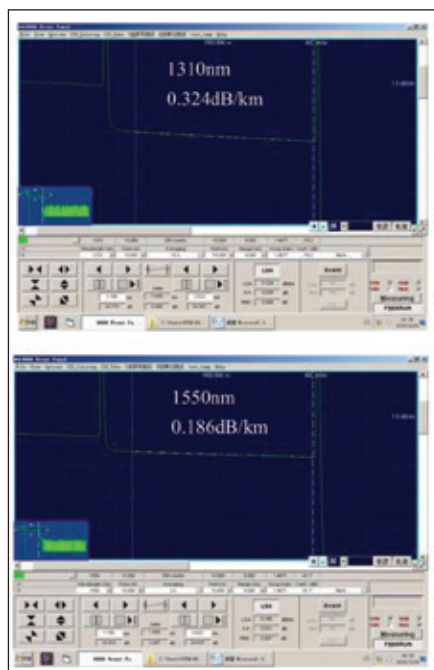


▲ Figura 1: Microcondotto con cavo immerso nell'acqua

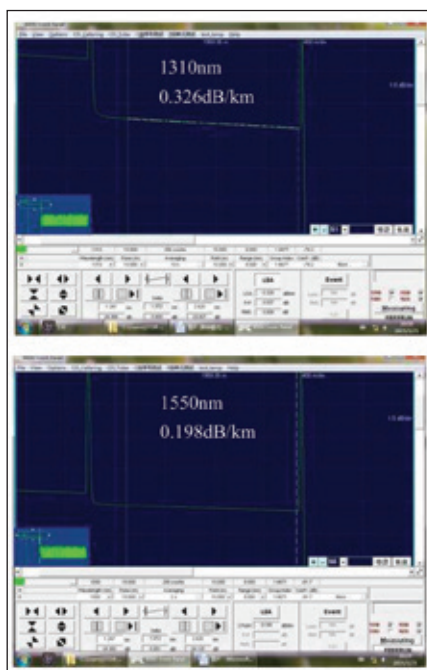
l'esperimento è stato realizzato in conformità con la norma IEC60794-1-22 Metodo F15: prova di congelamento esterno del cavo. In questo esperimento vengono utilizzati un cavo soffiato in microcondotto da 1,8km e un microcondotto da 80m.

### 3.1 Procedure di prova

Innanzitutto, riavvolgere il microcondotto su un tamburo per cavo e soffiare il cavo nel condotto. Immergere il microcondotto di 80m (con il cavo all'interno) in acqua per 24 ore per assicurarsi che il condotto si riempia completamente di acqua, come mostrato nella Figura 1.



▲ **Figura 2:** Grafici OTDR della fibra con i valori di attenuazione più alti a -2°C



▲ **Figura 3:** Grafici OTDR della fibra con i valori di attenuazione più alti a -40°C

Quindi, sigillare il condotto con i terminali prima di estrarre il tamburo con il cavo dalla vasca. Infine, porre il tamburo con il cavo nella camera per eseguire la prova di variazione ciclica della temperatura.

Prima di ciò, registrare l'attenuazione di ciascuna fibra a temperatura ambiente (23°C).

### 3.2 Programma di variazione ciclica della temperatura

Il programma di variazione ciclica della temperatura è impostato come segue (un ciclo):

- 1 Abbassare la temperatura da 23°C a 3°C in 30 minuti e mantenere tale temperatura per 8 ore
- 2 Quindi abbassare la temperatura a -40°C entro 30 minuti e mantenerla finché l'acqua non si congela completamente e la temperatura del ghiaccio non raggiunga i -10°C o una temperatura inferiore (utilizzando un dispositivo di monitoraggio della temperatura)
- 3 Aumentare la temperatura a -2°C e mantenerla per un'ora
- 4 Aumentare la temperatura a 65°C. Mantenere tale temperatura fino a quando l'acqua non raggiunge 15°C. Quindi, riportare la temperatura a 23°C e mantenerla fino a quando l'acqua non raggiunge 23°C ±5°C

In ogni fase della prova di variazione ciclica della temperatura, registrare l'attenuazione di ciascuna fibra.

### 3.3 Risultati

Dopo la prova, le variazioni di attenuazione di tutte le fibre sono irrilevanti.

I valori di attenuazione più elevati a -2°C sono riportati nella *Figura 2*, a lunghezze d'onda rispettivamente pari a 1.310nm e 1.550nm.

### 3.4 Prova supplementare

Successivamente, ipotizzando condizioni climatiche di freddo estremo, viene modificato il programma di variazione ciclica della temperatura e viene ripetuta la prova sopra descritta.

#### 3.4.1 Programma di variazione ciclica della temperatura (per condizioni di freddo estremo)

- 1 Abbassare la temperatura da 23°C a -40°C entro 30 minuti e mantenerla per 12 ore. Misurare l'attenuazione
- 2 Aumentare la temperatura a 65°C entro 30 minuti e mantenerla per 12 ore. Misurare l'attenuazione
- 3 Riportare la temperatura a 23°C entro 30 minuti e mantenerla per 12 ore. Misurare l'attenuazione

#### 3.4.2 Risultati (per condizioni di freddo estremo)

Durante la prova, anche le variazioni di attenuazione di tutte le fibre sono ridotte e le curve OTDR (riflettometro ottico nel dominio del tempo) sono molto uniformi. I risultati della prova a -40°C dovrebbero essere teoricamente i peggiori.

Pertanto, come si può vedere nella *Figura 3*, i valori di attenuazione maggiori si ottengono a -40°C, a lunghezze d'onda rispettivamente di 1.310nm e 1.550nm.

### 3.5 Analisi

Dopo aver elaborato i dati, si può dimostrare che l'attenuazione più elevata

della fibra in tutte le strutture del tipo "loose tube" si verifica a diversi valori di temperatura durante le due prove di cui sopra, a lunghezze d'onda rispettivamente pari a 1.310nm e 1.550nm, come illustrato nella *Figura 4*.

Considerando che il microcondotto è raramente pieno d'acqua e che il tasso di variazione della temperatura reale è molto più lento di quello degli esperimenti, l'impatto del ghiaccio nei cavi soffiati in microcondotti può essere considerato irrilevante.

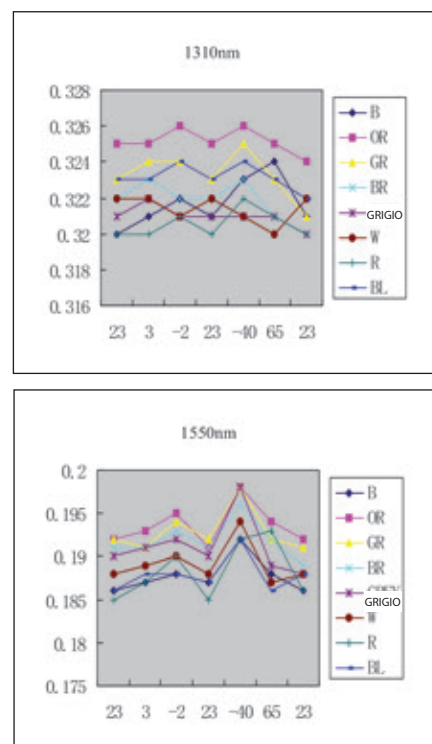
Dopo aver completato le suddette prove, il cavo viene soffiato fuori dal condotto mediante aria compressa. Si può osservare che la soffiatura del cavo è stata eseguita correttamente e che non è stato riscontrato alcun danno visivo alla guaina del cavo.

## 4 Prova dell'acqua gelata attorno ai terminali

Questo esperimento è stato messo a punto per studiare l'impatto delle condizioni di congelamento sull'attenuazione della fibra in presenza di acqua congelata attorno ai terminali.

In questo esperimento vengono utilizzati un cavo soffiato in un microcondotto da 1,8km e un microcondotto di 6m.

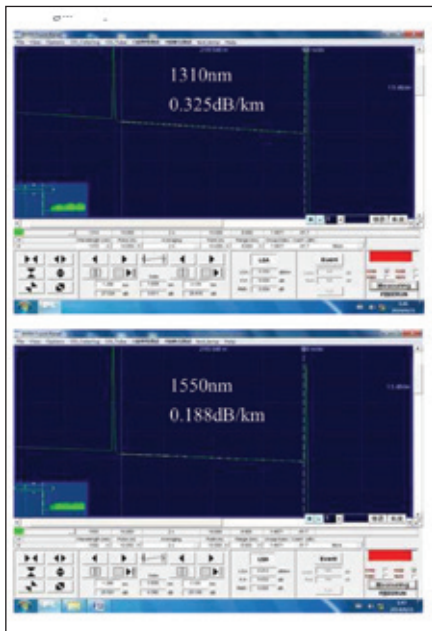
▼ **Figura 4:** I maggiori valori di attenuazione in ciascuna struttura "loose tube" a diversi valori di temperatura







▲ **Figura 5:** Acqua congelata attorno ai terminali



▲ **Figura 6:** Grafici OTDR della fibra con i maggiori valori di attenuazione a -40°C durante la prova dei terminali

Spostare il microcondotto verso la metà del cavo e misurare la distanza fra l'estremità di prova del cavo e il microcondotto.

#### 4.1 Procedure di prova

Innanzitutto, sigillare un'estremità del microcondotto con un terminale e riempire d'acqua il condotto.

Quindi sigillare l'altra estremità del condotto con un altro terminale e mantenere due terminali alla stessa altezza.

Prima dell'esperimento, misurare l'attenuazione di ciascuna fibra a temperatura ambiente (23°C). Infine, porre il cavo nella camera per eseguire la prova di variazione ciclica della temperatura.

#### 4.2 Programma di variazione ciclica della temperatura

- 1 Abbassare la temperatura da 23°C a -40°C entro 30 minuti e mantenere tale temperatura per 12 ore. Misurare l'attenuazione
- 2 Aumentare la temperatura a 70°C entro 30 minuti e mantenerla per 12 ore. Misurare l'attenuazione

- 3 Riportare la temperatura a 23°C entro 30 minuti e mantenere tale temperatura per 12 ore. Misurare l'attenuazione

#### 4.3 Risultati e analisi

Controllare i terminali a -40°C. Si può constatare che si è formato del ghiaccio attorno ad essi.

Pertanto, l'esperimento ha simulato con successo la situazione in cui l'acqua congela intorno ai terminali, come illustrato sulla *Figura 5*.

Prestare molta attenzione alle posizioni in cui si trovano i terminali sulle curve di attenuazione durante la misurazione. Tutte le curve OTDR sono molto uniformi.

La *Figura 6* mostra i valori di attenuazione maggiori a -40°C, a lunghezze d'onda rispettivamente pari a 1.310nm e 1.550nm.

Dopo il test, le variazioni di attenuazione di tutte le fibre sono davvero esigue e non è visibile alcun danno alla guaina del cavo.

## 5 Conclusioni

Quando i cavi soffiati in microcondotti sono utilizzati in zone fredde, è necessario considerare l'influenza del congelamento sulla trasmissione a fibra ottica.

Per studiare questo argomento, sono stati messi a punto due esperimenti con lo scopo di valutare tale influenza.

Sulla base dei risultati delle prove illustrate nel presente articolo, si può concludere che gli effetti dell'acqua congelata sui cavi soffiati in microcondotti sono irrilevanti.

Tuttavia, sarebbe necessario considerare e approfondire ulteriormente anche l'effetto a lungo termine durante la vita operativa del cavo.

Pertanto, non si dovrebbero ignorare le misure di protezione per evitare la penetrazione di acqua nei microcondotti. ■

## 6 Riferimenti bibliografici

- 1 IEC 60794-1-22 Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods
- 2 IEC 60794-5-10 Optical fibre cables – Part 5-10: Outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing

Documento presentato con l'autorizzazione del 64° Simposio Tecnico IWCS, Atlanta, Georgia, Stati Uniti, ottobre 2015.

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## «Join the best – worldwide» con las emblemáticas ferias wire and Tube de Düsseldorf

LAS ferias comerciales del sector de la producción, procesado y acabado de metales para alambre, cables y tubos, hierro y acero tienen larga tradición en Düsseldorf. «Join the best – worldwide» (únete a los mejores, por todo el mundo), éste es el eslogan que reúne a la cartera internacional de ferias comerciales del sector del alambre, cable y tubo.

Las ferias wire and Tube llevan más de 30 años celebrándose conjuntamente en Düsseldorf. Como ferias número uno que son en sus respectivos sectores, son consideradas los mejores eventos del sector a nivel internacional cuya fama ha volado mucho más allá de la ciudad de Düsseldorf. Han contribuido a la excelente reputación que Düsseldorf, nodo comercial de Renania del norte-Westfalia, ha adquirido en todo el mundo como plataforma para la innovación industrial.

Entre tanto, existen 10 ferias satelitales internacionales dedicadas al alambre y al tubo. A partir de ahora, se presentarán con el mismo estilo de logotipo agrupadas bajo una sola marca distintiva. Usando un diseño corporativo único, las distintas ferias comerciales ofrecen uniformidad de imagen a la vez que muestran su pertenencia a una sola familia de productos.

La presentación de cada feria ha sido diseñada intentando dar uniformidad a sus logotipos en cuanto a forma, color y letra. «En lo que se refiere a contenido y aspecto visual, la agrupación amparada bajo el lema «Join the best – worldwide», que reúne a la feria principal wire and



▲ Wire and Tube – eventos líderes internacionales del sector industrial. Fotografía cortesía de Messe Düsseldorf GmbH

Tube celebrada en Düsseldorf y a sus 10 ferias satelitales, se presentará bajo un mismo nombre», comentó Friedrich-Georg Kehrer, director de la cartera global de metales y tecnologías de flujos para Messe Düsseldorf GmbH.

Además de la feria wire and Tube de Düsseldorf, la cartera de ferias de metales internacionales, unidas en esta ocasión bajo el lema «Join the best – worldwide», reúne a ferias satelitales como wire China y Tube China en Shanghái, wire and Tube India en Mumbai, wire and Tube Russia en Moscú (Rusia), wire and Tube Southeast Asia en Bangkok (Tailandia) y la feria wire South America y Tubotech en São Paulo (Brasil). Una cartera que abarca todo el globo y que ofrece mayor potencial de crecimiento.

Tanto si es en Alemania como en Brasil, China, La India, Rusia, Tailandia o en los Estados Unidos, junto con sus subsidiarias en el extranjero y en colaboración con asociaciones comerciales e industriales internacionales, además de organizadores locales, Messe Düsseldorf es anfitriona de excepcionales eventos satélite locales. Se han ganado la reputación de plataformas de información y pedido de sus respectivas áreas de captación.

Para obtener información sobre las ferias comerciales y sus eventos satelitales en todo el mundo visite nuestras páginas web [www.wire.de](http://www.wire.de) y [www.tube.de](http://www.tube.de)

**Messe Düsseldorf GmbH – Alemania**

**Website:**

[www.messe-duesseldorf.com](http://www.messe-duesseldorf.com)

### Hannay lanza su nueva serie AVC1500

La serie AVC1500 de carretes para cable portátiles de Hannay Reels son carretes de estructura sólida de acero y aluminio con acabado negro mate no reflectante.

Este carrete va equipado con manivela directa estándar fija y banda de velcro para sujetar el cable. Los modelos de rebobinado manual van equipados con pasador de fijación accionado por resorte y freno de arrastre con leva de fijación.

El juego de ruedas de bloqueo para uso industrial, las manillas montadas en el armazón y los discos separadores opcionales pueden ser pedidos a parte por el cliente.

**Hannay Reels – Estados Unidos**

**Website:** [www.hannay.com](http://www.hannay.com)



▲ Nueva serie de carretes para cable portátiles AVC1500



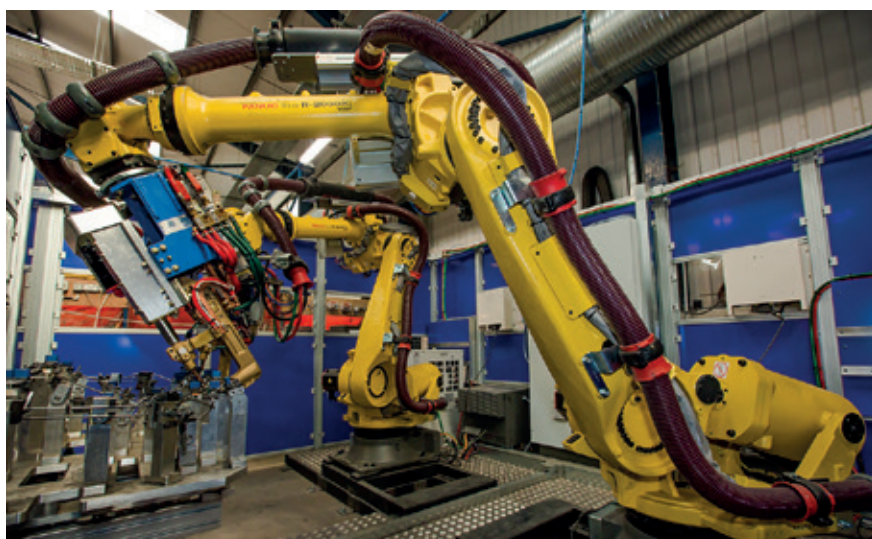
# Inversión de 250.000 libras en última tecnología de soldadura

WILLIAM Hughes, especialista en la fabricación de resortes y componentes de varilla curvados para los sectores automotriz y aeroespacial, ha invertido más de 250.000 libras en una celda de soldar de doble robot de alta tecnología.

La nueva celda de soldar ha sido suministrada por Bauomat con robots Fanuc, instalados todos en las nuevas instalaciones de William Hughes en Stalbridge, Dorset, en el Reino Unido. La celda ofrece monitorización avanzada de la soldadura y registro de datos, características éstas que garantizan los mejores estándares de calidad y uniformidad a sus clientes.

La celda de soldar funciona 24 horas al día durante los días laborales y, actualmente, se está usando para la fabricación masiva de respaldos de asientos para SUV. Para este producto, en concreto, se realizan 56 soldaduras y se usan 25 varillas.

Además de la mejora de calidad y uniformidad del producto acabado aportada por la celda de doble robot, el proceso de soldadura es mucho más rápido permitiendo producir las piezas en solo 1 minuto y 40 segundos, comparado con los 3 minutos y 45 segundos que se tardaban antes. Asimismo, para garantizar



▲ Celda de soldar de doble robot

el incremento de velocidad productiva, las plantillas de soldadura son diseñadas todas por los ingenieros de William Hughes con la última versión de CAD y fabricadas con fresadoras CNC.

Esta reciente inversión en última tecnología de fabricación sigue el programa de crecimiento continuo de William Hughes, que comprende la apertura en

octubre de 2014 de una nueva planta de aproximadamente 87.000ft<sup>2</sup> (8.000m<sup>2</sup>) en su sede central británica de Stalbridge, Dorset. Asimismo, la empresa sigue invirtiendo en el crecimiento de sus plantas productivas de Bulgaria, dedicadas a las necesidades de sus clientes europeos.

**William Hughes Ltd – Reino Unido**  
**Website:** [www.wmhughes.co.uk](http://www.wmhughes.co.uk)

## Nueva máquina de Goodwin basada en estándar industrial

Goodwin Machinery, en colaboración con Cable & Wire Technical Services, ha diseñado y fabricado una desbastadora de alambón basada en el estándar industrial Winget Syncro F-13.

La innovadora máquina fue fabricada a tiempo y respetando el presupuesto, y ahora está funcionando «con gran éxito» en una fábrica europea. La desbastadora de alambón no ferroso CWF-13 puede desbastar alambones de cobre a partir 8mm o de aluminio a partir de 9,5mm y ofrece numerosas ventajas como el reducido espacio que ocupa en el suelo (4,6 x 1,55m), su elevada velocidad de producción de 30,6MP/S y muchas otras.

El diseño, la fabricación y el montaje fueron realizados todos en el Reino Unido; las piezas fueron fabricadas por proveedores favoritos de Goodwin Machinery y de Cable & Wire; y el montaje y pruebas finales realizados en la fábrica de Bolton de Goodwin.

Durante la realización de las pruebas, efectuadas ante el cliente, éste último observó lo silenciosa que era la máquina. Esto se debe al hecho de que todos los engranajes están cementados y pulidos, y el diseño de la máquina facilita el uso de engranajes helicoidales sin eje trasero y con dentado hipoide o espiral.

La máquina va equipada con un sistema de lubricación opcional para cobre o para aluminio, además de un cabrestante enrollador.

También lleva una bomba de aceite de tornillo de bajo ruido para el motorreductor principal que encaja perfectamente en la parte trasera de la máquina, lo cual es ideal para acceder a ella durante el mantenimiento, limpieza del filtro, etc. La máquina también está equipada con un motor de par constante/300HP.

**Goodwin Machinery Ltd – Reino Unido**  
**Website:** [www.goodwinmachinery.co.uk](http://www.goodwinmachinery.co.uk)

# Estudio sobre los efectos de las condiciones de congelamiento en cables soplados en microconductos

Por Yunfang Ruan, Zhuang Xiong, Xiaoli Liu y Wenjing Ye, State Key Laboratory of Optical Fibre and Cable Manufacture Technology, Yangtze Optical Fibre and Cable Joint Stock Co Ltd, y Huawei Technologies Co Ltd, Shenzhen, Guangdong, China

## Resumen

En algunas zonas frías, las condiciones de congelamiento representan una amenaza potencial para los cables soplados en microconductos. Para estudiar qué efectos tienen las condiciones del congelamiento en la transmisión de las fibras ópticas en cables soplados en microconductos, se han ideado y realizado dos experimentos diferentes que se van a describir en este artículo.

Los resultados de las pruebas muestran que el congelamiento tanto dentro de los microconductos como alrededor de las tapas terminales casi no afecta a la transmisión de las fibras; además, no se han detectado daños físicos visuales en el cable después de los experimentos.

## 1 Introducción

Con el despliegue de la red FTTx, los cables soplados en microconductos se usan cada vez más debido a la poca disponibilidad de conductos, sobre todo en regiones frías. En este caso, con temperaturas muy bajas, el agua que entra en el microconducto se congela. Hay una cierta preocupación de que este tipo de cable pueda sufrir una caída de rendimiento, lo cual está frenando la difusión de los cables soplados en microconductos en todo el mundo.

Para estudiar los efectos de las condiciones de congelamiento en la transmisión de las fibras ópticas, se han ideado pruebas de congelamiento para simular el clima frío con la ayuda de una cámara de variación cíclica de la temperatura. Durante las pruebas, se ha monitorizado el cambio de atenuación de las fibras y comprobado el aspecto del cable.

Tipo de cable	Estructura de tubo holgado trenzado con fibras G.652D
Número de fibras	96
Diámetro externo del cable	6.1mm
Tipo de microconducto	HDPE
Diámetro externo/interno del microconducto	10/8mm
Ciclos de la prueba de variación de temperatura	2

▲ **Tabla 1:** Condiciones de prueba comunes

A continuación, se describen con detalle los procedimientos de prueba y se analizan detenidamente los resultados.

## 2 Condiciones de las pruebas de congelamiento

Se han ideado dos experimentos para simular las condiciones de agua congelada en el microconducto y alrededor de las tapas terminales con ayuda de una cámara de variación cíclica de la temperatura. Las condiciones de prueba comunes de los dos experimentos están ilustradas en la *Tabla 1*.

## 3 Prueba de agua congelada en el microconducto

Se ha ideado este experimento para estudiar el impacto del congelamiento en la atenuación de la fibra con presencia de agua congelada en el microconducto; el



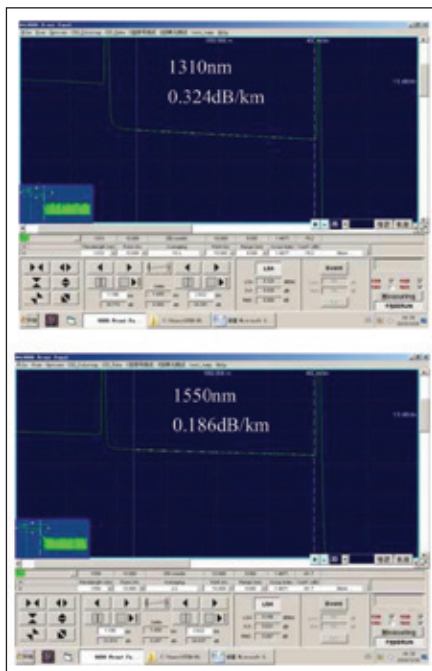
▲ **Figura 1:** Microconducto con cable sumergido en agua

experimento ha sido realizado según la norma IEC60794-1-22 Método F15: prueba de congelamiento externo del cable. Para este experimento se ha usado un cable soplado en microconducto de 1,8km de longitud y un conducto de 80m.

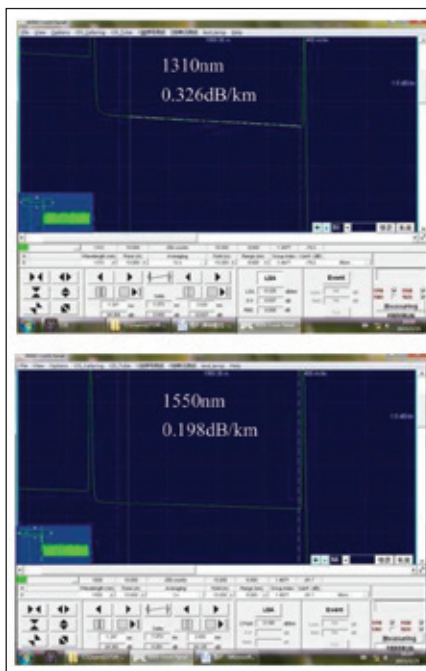
### 3.1 Procedimiento de la prueba

Primero, enrollar el microconducto en un tambor para cable y soplar el cable en el conducto. Luego, sumergir el microconducto de 80m (con el cable dentro) en agua durante 24 horas para asegurarse de que el conducto se llene completamente de agua, como se ilustra en la *Figura 1*.





▲ **Figura 2:** Gráficos OTDR de la fibra con los valores de atenuación más altos a -2°C



▲ **Figura 3:** Gráficos OTDR de la fibra con los valores de atenuación más altos a -40°C

Después, sellar el conducto con las tapas terminales antes de sacar del agua el tambor con el cable. Por último, poner el tambor con el cable en la cámara para efectuar la prueba de variación cíclica de la temperatura. Antes de todo esto, registrar la atenuación de cada fibra a temperatura ambiente (23°C).

### 3.2 Programa de variación cíclica de la temperatura

El programa de variación cíclica de la temperatura es el que se indica a continuación (un ciclo):

- 1 Bajar la temperatura de 23°C a 3°C en un tiempo de 30 minutos y mantener esta temperatura durante 8 horas
- 2 Luego, bajar la temperatura a -40°C en un tiempo de 30 minutos y mantenerla hasta que el agua esté completamente congelada y la temperatura del hielo llegue a -10°C o menos (usar un dispositivo de control de la temperatura)
- 3 Aumentar la temperatura a -2°C y mantenerla durante una hora
- 4 Aumentar la temperatura a 65°C. Mantener la temperatura hasta que el agua llegue a 15°C. Luego, llevar de nuevo la temperatura a 23°C y mantenerla hasta que el agua llegue a 23°C ±5°C

En cada fase del ciclo de variación cíclica de la temperatura, medir la atenuación de cada fibra.

### 3.3 Resultados

Después de la prueba, los cambios de atenuación de todas las fibras son realmente pequeños.

Los valores de atenuación más altos a -2°C están ilustrados en la *Figura 2*, a longitudes de onda de 1.310nm y 1.550nm, respectivamente.

### 3.4 Prueba adicional

Sucesivamente, suponiendo condiciones atmosféricas extremadamente frías, se ha cambiado el programa de variación cíclica de la temperatura y se ha repetido la prueba.

#### 3.4.1 Programa de variación cíclica de la temperatura (para condiciones atmosféricas muy frías)

- 1 Bajar la temperatura de 23°C a -40°C en un tiempo de 30 minutos y mantener esta temperatura durante 12 horas. Medir la atenuación
- 2 Aumentar la temperatura a 65°C en un tiempo de 30 minutos y mantenerla durante 12 horas. Medir la atenuación
- 3 Llevar de nuevo la temperatura a 23°C en un tiempo de 30 minutos y mantenerla durante 12 horas. Medir la atenuación

#### 3.4.2 Resultados (para condiciones atmosféricas muy frías)

Durante la prueba, los cambios de atenuación de todas las fibras son también muy pequeños y las curvas OTDR (reflectómetro óptico en el dominio del tiempo) son muy suaves.

Los resultados de las pruebas a -40°C son los peores. Como se puede ver en la *Figura 3*, los valores de atenuación más altos se obtienen a -40°C a longitudes de onda de 1.310nm y 1.550nm, respectivamente.

### 3.5 Análisis

Después de procesar los datos, se puede demostrar que la atenuación más alta de la fibra en todos los tubos holgados se produce a temperaturas diferentes durante las dos pruebas citadas a longitudes de onda de 1.310nm y 1.550nm, respectivamente, como se ilustra en la *Figura 4*.

Considerando que el microconducto está lleno de agua raramente y que la velocidad efectiva de cambio de temperatura es mucho más lenta que durante los experimentos, el impacto del hielo en los microconductos en cables soplados es prácticamente insignificante.

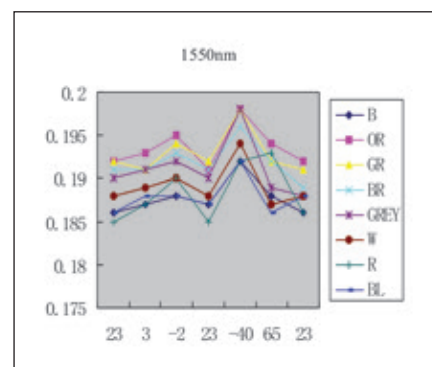
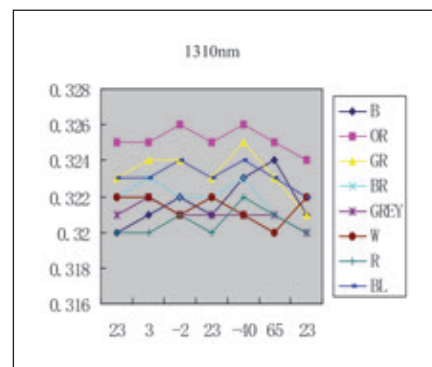
Después de acabar todas las pruebas de arriba, se extrae el cable del conducto con aire comprimido.

Se puede ver que el soplado del cable sigue realizándose bien y no se han encontrado daños de la cubierta del cable.

## 4 Prueba de agua congelada alrededor de las tapas terminales

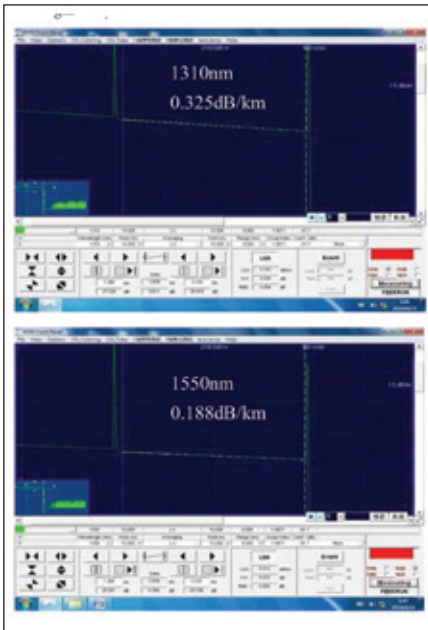
Se ha ideado este experimento para estudiar el impacto del congelamiento en la atenuación de la fibra en presencia de agua congelada alrededor de las tapas terminales.

▼ **Figura 4:** Valores de atenuación más altos en cada tubo holgado a distintas temperaturas





▲ **Figura 5:** Agua congelada alrededor de las tapas terminales



▲ **Figura 6:** Gráficos OTDR de la fibra con los valores de atenuación más altos a -40°C durante la prueba de las tapas terminales

Para este experimento se ha usado un cable soplado en microconducto de 1,8km de longitud y un conducto de 6m.

Desplazar el microconducto hasta la mitad del cable y medir la distancia desde el extremo de prueba del cable hasta el microconducto.

#### 4.1 Procedimientos de la prueba

Primero, sellar un extremo del microconducto con una tapa terminal y llenar de agua el conducto. Luego, sellar el otro extremo del conducto con otra tapa terminal y mantener las dos tapas a la misma altura.

Antes del experimento, medir la atenuación de cada fibra a temperatura ambiente (23°C). Después, poner el cable en la cámara para efectuar la prueba de variación de la temperatura.

#### 4.2 Programa de variación cíclica de la temperatura

- 1 Bajar la temperatura de 23°C a -40°C en un tiempo de 30 minutos y mantener esta temperatura durante 12 horas. Medir la atenuación

- 2 Aumentar la temperatura a 70°C en un tiempo de 30 minutos y mantenerla durante 12 horas. Medir la atenuación
- 3 Llevar de nuevo la temperatura 23°C en un tiempo de 30 minutos y mantenerla durante 12 horas. Medir la atenuación

#### 4.3 Resultados y discusión

Controlar las tapas terminales a -40°C. Se puede ver algo de hielo alrededor de las tapas. Por lo tanto, el experimento ha simulado con éxito las condiciones en que el agua se congela alrededor de las tapas terminales, como se ilustra en la Figura 5.

Prestar mucha atención a las posiciones de las tapas terminales en las curvas de atenuación durante la medición. Todas las curvas OTDR son muy suaves.

La Figura 6 muestra los valores de atenuación más altos a -40°C, a longitudes de onda de 1.310nm y 1.550nm, respectivamente.

Después de la prueba, los cambios de atenuación de todas las fibras son realmente pequeños; además, no se han detectado daños visuales en la cubierta del cable.

## 5 Conclusión

Cuando se usan cables soplados en microconductos en zonas frías, se debería tener en cuenta la influencia del congelamiento en la transmisión de la fibra. Para estudiar este tema y evaluar dicha influencia, se han ideado dos experimentos.

En base a los resultados de este artículo, se puede concluir que los efectos del agua congelada en cables soplados en microconductos son insignificantes.

Sin embargo, se debería considerar y estudiar más a fondo también los efectos a largo plazo, durante la vida operativa del cable. Por lo tanto, no se deben ignorar las medidas de protección para evitar la penetración del agua en los microconductos. ■

## 6 Referencias

- 1 IEC 60794-1-22 Optical fibre cables – Part 1-22: Generic specification – Basic optical cable test procedures – Environmental test methods
- 2 IEC 60794-5-10 Optical fibre cables – Part 5-10: Outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing

*Este documento es presentado por cortesía del 64° Simposio Técnico IWCS, Atlanta, Georgia, EE UU, octubre de 2015.*

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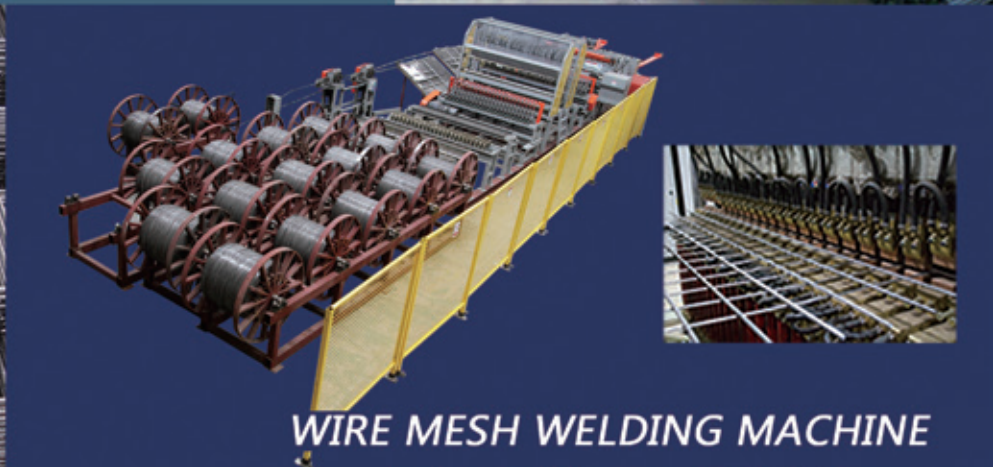
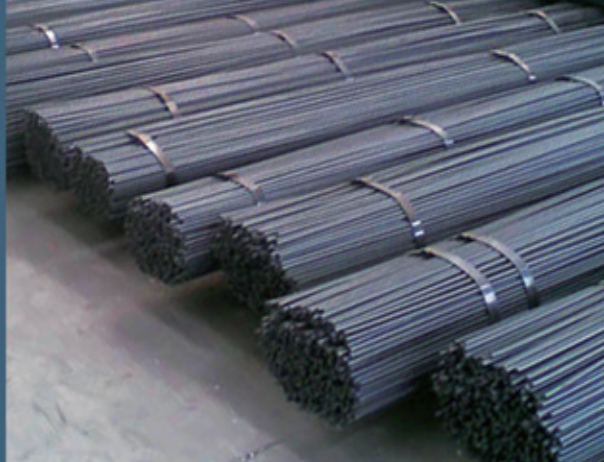
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