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- purest material and highly qualitative end products due to automated sorting
- efficient production without time-outs and scrap
- suitable for different applications independent of material and color



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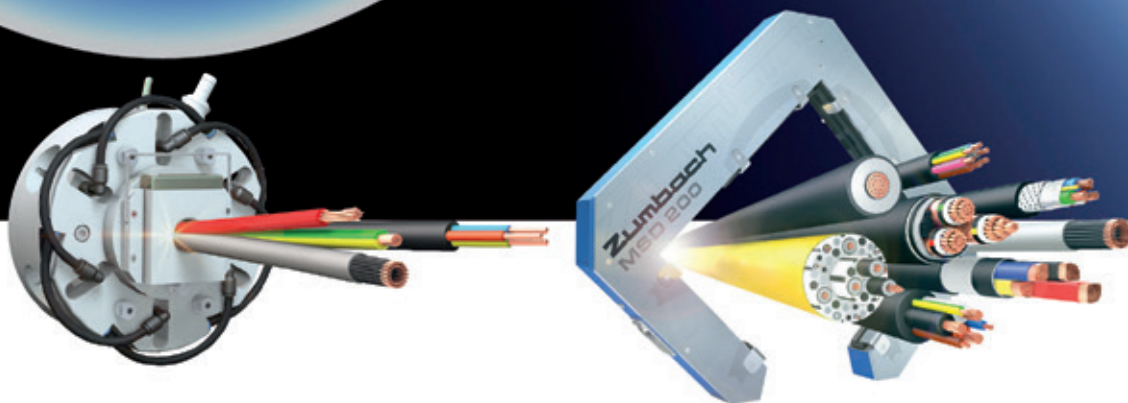


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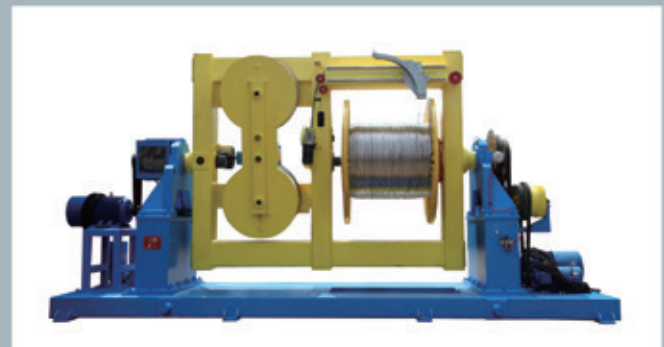
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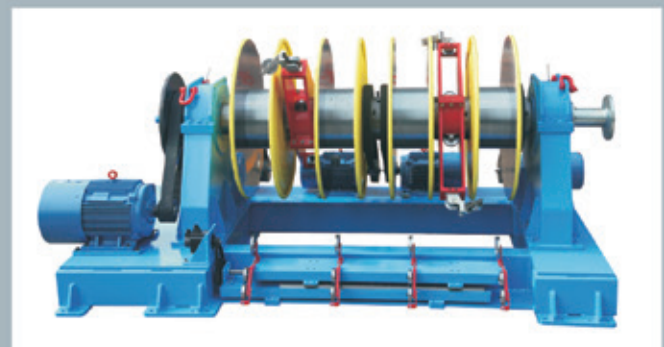
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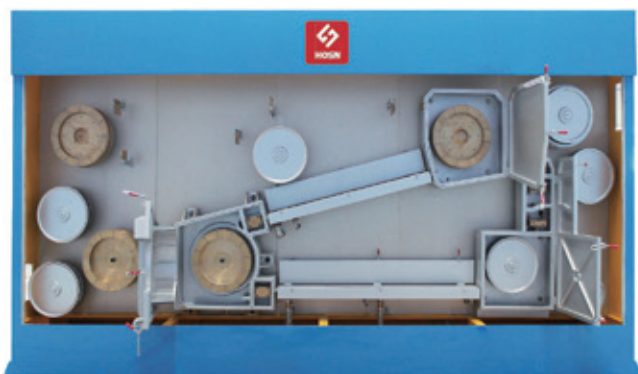
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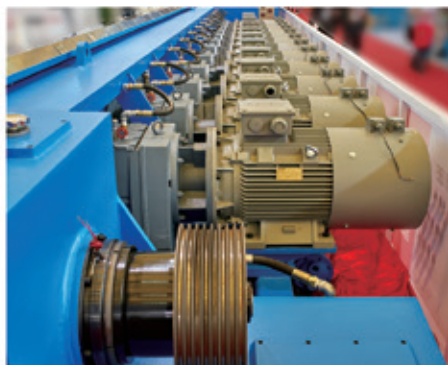
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Düsseldorf Germany

4-8 April 2016
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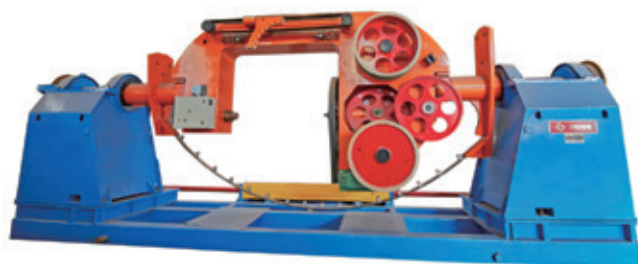
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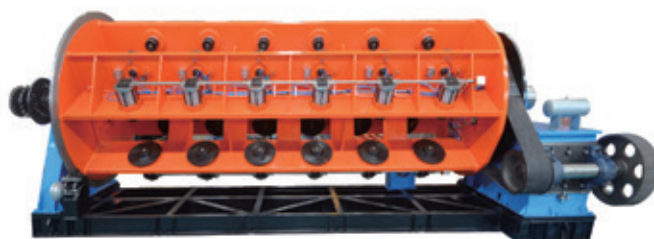
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 See page 116 for further details

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Bright start to 2016!

Happy new year!

A quick glance through this issue of *EuroWire* provides an encouraging start to 2016 with expansion plans, new sites, training and charity donations all at the forefront.

A new laboratory for UK-based specialist lubricant manufacturer Metalube features on page 11. The company has doubled the size of its laboratory in Manchester and spent an additional £100,000 in providing new equipment.

Niehoff's move to a new home is now complete, with the German company now having all its facilities under one roof in Schwabach. The full story can be found on page 12.

Training is on the mind of Tratos. The Italian company will host its first training modules at the site in Knowsley, UK, later this year.

The training, in modules, will allow new employees and long-standing colleagues to further understand the business. See page 17 for more.

Helukabel also has one eye on the future – this time in the form of a new building in Windsbach, Germany. The \$22m investment will see new office space, laboratory and production space created in a 96,875ft² plant. Find out more on page 20.

Charity in the form of Life is good Playmakers benefitted from the generosity of S&E Specialty Polymers when it staged its third annual charity golf tournament. Profits from registrations, donations and sponsorship amounted to \$24,000. You can read all about it on page 29.

This issue would also not be complete without mention of wire 2016 in Düsseldorf. Our coverage of the week-long exhibition starts on page 64 with the exhibitors listing for the show, which runs from 4th to 8th April.

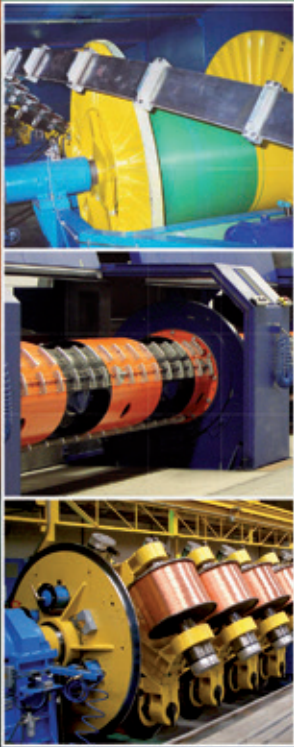


David Bell
 Editor



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Getting Technical:

The effect of cable construction on flame retardancy in moisture-cure compounds

Feature

wire Düsseldorf 2016
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dates for your diary ...

2016

May

11-14 May:

Lamiera – trade exhibition –
Bologna, Italy

Organisers: Ucimu-Systems

Fax: +39 0226 255 894

Email: lamiera.esp@ucimu.it

Website: www.lamiera.net

June

8-9 June:

Wire Expo – trade exhibition –
Uncasville, Connecticut, USA

Organisers: Wire Association
International

Fax: +1 203 453 8384

Email: sales@wirenet.org

Website: www.wirenet.org

September

26-29 September:

wire China – trade exhibition –
Shanghai, China

Organisers: SECRI and Messe
Düsseldorf (Shanghai) Co Ltd

Fax: +86 216 169 8301

Email: shanghai@mdc.com.cn

Website: www.wirechina.net

October

5-7 October:

wire India – trade exhibition –
Mumbai, India

Organisers:

Messe Düsseldorf India Pvt Ltd

Fax: +91 112 697 1746

Email: info@wire-india.com

Website: www.wire-india.com

25-29 October:

EuroBLECH – trade exhibition –
Hanover, Germany

Organisers:

Mack Brooks Exhibitions Ltd

Fax: +44 1727 814 401

Email: info@euroblech.com

Website: www.euroblech.com

wire Düsseldorf 2016

April

4-8 April:

wire/Tube Düsseldorf – trade exhibition –
Düsseldorf, Germany

Organisers: Messe Düsseldorf GmbH

Fax: +49 211 45 60668

Email: wire@messe-duesseldorf.de

Website: www.wire.de



▲ *Eurolls was strengthened in 2015 with the acquisition of Vitari*

Eurolls' integrated solutions spark international interest

EUROLLS SpA has been focusing on advanced integrated solutions which have generated significant interest from the major international producers of reinforcement and industrial wires.

Those solutions have now been strengthened and broadened into wire processing by Eurolls' acquisition of Vitari in January 2015.

The past year has seen a succession of important results culminating in an open house presentation of new high productivity solutions for a reinforcement

plant with two lattice girder lines with innovative in-line wire production process and cold rolling line connected directly to bar production line, static coiler and fully automatic spooler, high resistance chain production line.

Eurolls has further strengthened its presence in the concrete reinforcement sector with the delivery of four new lines.

Three were cold rolling/stretching lines, to different clients, with production capacity to 16mm Grade 500B/500C ribbed reinforcement.

The fourth line was a high-speed straightening and cutting line (the third line delivered to same client) with a 6m/sec production of 12m bars.

Being able to resolve specific requests and problems was highlighted by a contract with a leading international company, specialised in wire for marine applications, for supply of non-stop pay-offs and take ups in a treatment plant for Ø26mm high carbon wires.

Eurolls SpA – Italy
Website: www.eurolls.com

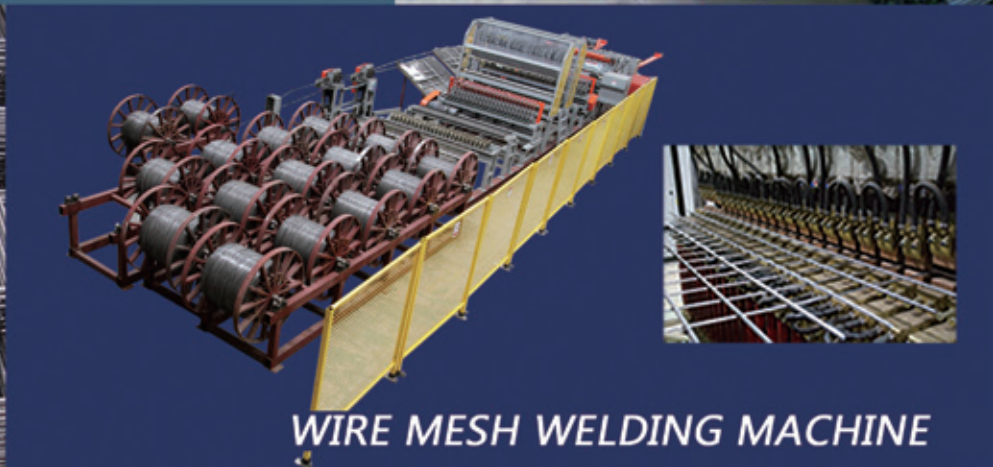
See page 64 for our wire 2016 exhibitor listing



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E-mail: tjk@tjkmachinery.com

Metalube doubles up on new laboratory space

METALUBE'S brand new Manchester, UK, laboratory is now fully operational, having doubled its capacity to 126m².

The state-of-the-art space provides a bright and airy workplace that is ideal for solving tough everyday technical challenges. It is purpose-built and fitted with specialist furniture and equipment. The facility meets all the requirements for a modern day lubricant developer, allowing the company to produce first class products.

Along with the new laboratory Metalube has also invested over £100,000 in new equipment to further enhance development capability.

This new equipment includes a Seta 4-ball tester, Mettler differential scanning calorimeter and Liebsch Kesternich cabinet, and covers the key functional properties of friction and wear, thermal stability and corrosion protection.

Technical director Chris Nettleship said: "As award winning innovators we needed to update our laboratory facilities accordingly. We have, in recent years, increased our number of chemists by 25 per cent and the new lab provides them with a fabulous contemporary 21st century environment to work from."

Metalube manufactures a range of non-ferrous drawing oils and maintenance lubricants as well as a variety of corrosion protection and forming oils.

Metalube Ltd – UK

Website: www.metalube.co.uk



▲ The new laboratory has doubled Metalube's capacity to 126m²

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New purpose-built home for Niehoff



▲ *The new Niehoff factory with its eye-catching office building*

MASCHINENFABRIK Niehoff has moved its location to Walter-Niehoff-Strasse 2, D 91126 Schwabach, Germany. All Niehoff facilities in Schwabach are now accommodated in the new plant, which has direct access to the European highway E 50. The factory, located at Walter-Niehoff-Strasse 2 in memory of the company's founder, is according to the company, visible proof of

Niehoff's future-orientated thinking and that it is and will remain a competent and reliable business partner in which customers can trust – now and in future.

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Website: www.niehoff.de

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Son steps up after death of company president

DOUG Thornton, president of Nano-Diamond America Inc, has died at the age of 73, following a battle with cancer.

Renowned for his hard work and enthusiasm, Mr Thornton introduced nano dies to the industry 11 years ago, and led his company up until two weeks before his death.

Australian-born, he served as a naval officer and during his training studied engineering at London University, UK. He was awarded the Queen's medal for academic excellence in 1965. Following his death, son Christopher Thornton has taken the lead role in continuing Nano-Diamond America Inc's success.

The company is recruiting team members to take the business to a new level in the coming years. Nano-Diamond America produces a special application of nano-technology and coating technology to the benefit of the wire and cable industry – the Nano-Die™.

This uses the hardest, smoothest configuration of nano-crystalline diamond on the die market today. Taking advantage of a low fuss/low cost marketing strategy, the company intends to continue to expand and supply throughout more than 50 countries, via its growing North America headquarters, by offering solutions in innovative, new generation compacting and drawing dies.

Christopher and his team are continuing to expand current sales and services in its compacting and stranding dies to the cable manufacturers and drawing dies to the wire manufacturers.

It is planning to expand its shaped die capacity from simple shapes to more sophisticated ones. This will enable shaped wire manufacturers to obtain better control of the shape and better finish on the wire, as well as longer die life compared to the TC dies that are commonly used.

Nano-Diamond America Inc – USA
Website: www.nano-die.com



▲ President Doug Thornton who died recently after a battle with cancer



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Spanish acquisitions for MFL Group

ITALY'S MFL Group (Mario Frigerio/Frigecco) has confirmed its acquisition of Construcciones Mecánicas Caballé SA (Caballé), the Spanish cable machinery manufacturer, and its other operations.

According to the press release the transaction, "will significantly strengthen MFL Group's scope of supply for non-ferrous wire drawing, stranding and extrusion equipment".

The acquisition includes Caballé, OM Lesmo and Eurodraw Energy brands, together with their corresponding intellectual property.

"These well established brands, along with MFL Group's financial muscle, our 120 years of industry experience, and the broadest engineering and manufacturing knowledge base in the sector, further reinforce our commitment to our non-ferrous wire and cable customers," the release said.

"By exploiting the combined history of Caballé, OM Lesmo, Eurodraw Energy and Frigecco, we can guarantee continuous technical improvement and unmatched customer service. We are looking forward to strengthen our business relationship with our customers and suppliers around the world."

Mario Frigerio SpA – Italy
Website: www.mflgroup.com

High fibre

Prysmian Group has manufactured and supplied a record-breaking 1,728-fibre cable for a Vocus data centre in Sydney, Australia. The fibre density is believed to be a record for a single cable.

Vocus, which serves customers in Australia and New Zealand, faced the challenge of combining as many fibres as possible into a single conduit during a "one shot" installation for a data centre customer. The high fibre count was made possible by using a combination of Prysmian's Flextube fibre cable technology with its new BendBrightXS 200-µm fibre. The new fibre enabled Prysmian to increase the Flextube cable's fibre count from a previous high of 720 to the 1,728 used in this application. The cable measures 23mm in diameter.

"This is a first for the telecommunications industry, globally," said Alex West, COO at Vocus. "As part of our commitment to building the fibre network of the new millennium, we've been trialling this Flextube fibre cable in smaller formats for three years, and to see a world-first being installed now is very exciting.

"One of the main benefits of this cable is the reduced cost per fibre pair," Mr West continued. "It costs roughly the same to install a 1,728-fibre Flextube cable as it does to install a traditional 624-fibre loose-tube cable. Using the large-fibre-count 1,728-fibre cable more than halves the cost per installed fibre. This is a great advantage in what is a very competitive market."

Prysmian Group – Italy
Website: www.prysmiangroup.com

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Contact person : Stephen Chen

Leoni revises forecasts for 2015 and 2016

NUREMBERG, Germany-based Leoni AG determines a downtrend in earnings in the third quarter following a very solid second quarter. The Q3 earnings before interest and taxes (EBIT) of approximately €30m turned out significantly weaker than anticipated.

This was due to surprisingly heavy charges in the wiring systems division, particularly in September when accelerated start-ups of complex projects combined with an unexpected rise in unit output figures resulted in increased costs and reduced efficiency.

In addition, there were premature ends to profitable projects. Furthermore, the structural measures applied in the context of ongoing globalisation are not yet exerting the intended effect.

By contrast, the wire and cable solutions division's third quarter sales and earnings performance was, on the whole, in line with expectations.

The weaker performance in the wiring systems division can be expected to continue to weigh on earnings in the fourth quarter.

Leoni consequently now projects that the earnings before interest and taxes (EBIT) of €200m forecast for fiscal 2015 will not be achieved. Consolidated sales are still expected to be at a level of at least €4.3 billion.

Leoni does not retain its targets set for the 2016 financial year. Although the company will continue to give top priority to

raising profitability, the aforementioned adverse factors in the wiring systems division will again weigh on earnings in the upcoming fiscal year. This will be aggravated by losses of sales that are now expected and consequently the missing earnings contributions.

The company's business prospects are being affected by the worsened economic conditions in China and Russia, which will probably lead to reduced demand, while USA business with the commercial vehicle industry as well as the amount of sales to some customers will likely not be at the previously budgeted level.

Leoni has therefore lowered its sales forecast for 2016 from €4.8 billion before to about €4.6 billion now. The company will be significantly short of the previously set target of a 7 per cent EBIT margin.

Board resignation

Dr Andreas Brand has resigned from his position as a member of Leoni's management board with responsibility for the wiring systems division with immediate effect.

Management board members Mr Dieter Bellé and Dr Frank Hiller will temporarily assume his duties until a successor is appointed.

Leoni AG – Germany
Website: www.leoni.com



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NDC measures up on the quality front

NDC Technologies' quality management system (QMS) has been recertified for ISO 9001:2008 by DNV-GL Business Assurance for the design, manufacture and service of continuous process measurement and control equipment.

This recertification applies to all of NDC's manufacturing facilities, including its headquarters in Irwindale, California, USA, and facilities in Maldon, UK, and Dayton, Ohio, USA.

"DNV-GL is a world-class ISO 9001 certification body," said Andy Hall, quality and compliance director at NDC.

"With their help, our organisation has now achieved a higher standard of QMS certification. As our business and customer base continues to grow, this certification not only differentiates us from other measurement solution providers but demonstrates our ongoing commitment to continuous quality improvement and maintaining the highest levels of customer satisfaction."

ISO 9001:2008 certification is based on quality management principles including strong customer focus, leadership and motivation of upper management, the process approach, and continual improvement and review.

Certification to this standard requires an accredited third-party auditing organisation to thoroughly review the company's internal quality management system processes, to ensure it is capable of consistently delivering products and services that meet customers' needs and expectations.



▲ NDC Technologies headquarters at Irwindale, California, USA

The ISO QMS standard has been the basis for NDC's internal processes for a number of years. NDC Technologies was formed in 2014 as a merger between NDC Infrared Engineering and Beta LaserMike (both part of the Spectris plc family of companies).

Prior to the merger, both companies were ISO certified and managed their internal processes in accordance with strict ISO and in-house quality management standards.

NDC Technologies – USA
Website: www.ndc.com

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wire and cable equipment

Academy training at Tratos

AN academy to further develop the skills of the Knowsley, UK, employees of cable manufacturer Tratos will deliver the first of its training modules this year.

The idea for the academy prompted an in-depth survey of the Merseyside workforce, an exercise which revealed significant optimism about the future of the plant and Tratos' ambitions for the company as a whole. It also helped assess current skills and knowledge and included views of senior management and the sales team as well as the Knowsley workforce.

Described as an education approach, the academy's structure will allow modules to be delivered anywhere across the company around the world, and will be open to long-standing colleagues as well as new employees.

Investment in professional development has been singled out by the senior management team as particularly important, with work rapidly completed on delivering the content for the academy's modules.

"Tratos has such ambition, and it recognises that to succeed at the highest level it has to develop its people rapidly so there is in-depth expertise and a strong understanding of the product and the direction for the business," said Tratos Ltd CEO Maurizio Bragagni.

Because Tratos is in a high-growth cycle, its training has to keep pace. Consequently the project which was decided upon late last year is already up and running.

While Tratos also manufactures in Italy, and the academy's courses will be delivered across the board, it is its UK plant that has been first to see it in action. Training and assessment programmes

New communications chief

Ulrich Steiner has taken over as head of investor relations and corporate communications at Schmolz + Bickenbach, Lucerne, Switzerland. He succeeds Stefan Steiner who has left the company.

The 51-year-old from Zurich joins from speciality chemicals group Clariant, where he was head of group communications and investor relations. Prior to this he held several management and specialist functions in industry, finance and academia.

Mr Steiner holds an MSc in Chemistry and a PhD in Technical Sciences (Dr sc techn), from the Swiss Federal Institute of Technology in Zurich (ETHZ).

Schmolz + Bickenbach AG – Switzerland
Website: www1.schmolz-bickenbach.com



▲ Employees who attended the recent training module at Tratos' academy in Knowsley, UK

for Tratos are seen as highly positive investments, particularly at the Knowsley manufacturing base.

Longer term, the plan will be to increase the scope of the academy. The initial stages of the work involves skills alignment with the Tratos culture and ambition – and the values so important to its Italian owners – integrity, transparency and putting people first.

The preparatory survey examined the staff's views on the company's stance on unethical behaviour (zero tolerance), its optimism for the future, collaborative working, trust and fairness, knowledge, expertise and more.

Graduates of the Tratos Academy will receive internal recognition and qualifications, with many having the option to undertake additional training.

Tratos Cavi SpA – Italy
Website: www.tratos.eu



▲ Ulrich Steiner, the new head of investor relations and corporate communications at Schmolz + Bickenbach AG

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This series of Lead Extruder is used to continuous coat lead layer for marine cable or rubber cable.



Copper rod continuous casting and rolling line, Aluminum rod continuous casting and rolling line

Copper CCR line is used to produce 8mm of copper rod from scrap copper and cathode copper. it consists of a refraction furnace, five-wheel casting machine, front haul-off unit, straightener, continuous rolling machine and down coiler take-up unit. Users can choose different furnace system according to different raw material and output capacity.

It's show success in São Paulo

MORE than 11,000 trade visitors headed to São Paulo, Brazil, for the second concurrent staging of wire South America and TUBOTECH.

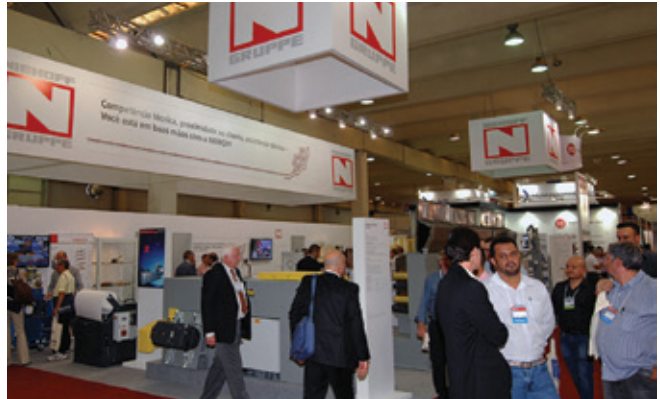
wire South America and TUBOTECH occupied 344,400ft² of gross exhibit space with approximately 500 brands at the São Paulo Expo Exhibition & Convention Center in Brazil.

The 11,000 international trade visitors attending the three-day event primarily came from the oil and gas, automotive and construction industries, as well as metal construction and mining sectors.

At wire South America 2015, about 150 exhibitors from 25 countries presented the latest technologies from the wire and cable industry. For the first time, the trade show featured a German group exhibit with 22 companies.

Although Brazil's economic growth has slowed down and despite the negative growth expected for 2016, the products of the wire, cable and tube industries remain of high importance for Brazilian industry. Demand is particularly high in the construction and automotive sectors as well as for household electronics in general, and manufacturers' objective to be present on the South American market remains strong.

"The Brazilian market continues to be highly attractive for our exhibitors," said Erhard Wienkamp, division director of Messe Düsseldorf. "Even in tense economic times it is important to fly your flag, make contacts, strengthen partnerships and prepare business deals."



▲ Exhibitors at this year's wire South America in São Paulo, Brazil

Organised by Messe Düsseldorf in cooperation with the Italian partners of the Fiera Milano Brazil, wire South America was supported by leading international associations: IWMA – International Wire & Machinery Association, IWCEA – International Wire & Cable Exhibitors Association, WCISA – Wire and Cable Industry Suppliers Association (USA) and ACIMAF – Italian Wire Machinery Manufacturers Association.

wire South America and TUBOTECH will again be held concurrently from 3rd to 5th October 2017 at the São Paulo Expo Exhibition & Convention Center.

Messe Düsseldorf GmbH – Germany
Website: www.wire-south-america.com

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Breaking ground for the future



▲ From left, Andreas Leninger from Planungsbüro GCA, Helukabel Windsbach factory technical manager Thomas Mann, Helukabel founder Helmut Luksch, the mayor of Windsbach Matthias Seitz, along with district administrator Jürgen Ludwig at the ground-breaking ceremony

CABLE manufacturer Helukabel held a ground-breaking ceremony for the construction of a new expansion at its manufacturing plant in Windsbach, Germany.

Once completed later this year, the new building will offer more than 96,875ft² of additional office, laboratory and production space. The expansion also allows Helukabel to combine its global research and development capabilities with its test and inspection facilities in the new technology centre.

The planned investment of around

\$22.4m is a clear commitment to the Windsbach site. "We have been manufacturing here since 1988," said CEO Helmut Luksch. "Thanks to the largest ever investment in this facility to date, we are confident that we can meet future market demand."

"As a family company, we feel closely tied to the region and our employees, and further underpin our relationship with the decision to expand in Windsbach."

Helukabel GmbH – Germany
Website: www.helukabel.de

Vessel selection

Global Marine Systems' cable-laying vessel, the *CS Sovereign*, has been chartered by the Prysmian group from mid-2016 into early 2017 to carry out the inter-array submarine cabling at the Wiking offshore wind farm in the Baltic Sea.

The vessel is equipped with two powered 2,300-tonne basket turntables, designed to operate at a maximum linear speed of 900m per hour.

The multi-role DPS-2 vessel is capable of undertaking both cable maintenance and installation projects. Her open deck enables her to deploy a variety of subsea vehicles. The ship was used for the installation and burial of 80 inter-array cables at Global Tech 1, Thornton Bank in 2011, and Denmark's Horns Rev 2.

The 350MW Wiking project is located 45km off the German coast. It is under development by Iberdrola and will use 70 Adwen 5MW turbines. Adwen is the offshore joint venture formed by Areva and Gamesa.

Global Marine Systems Ltd – UK
Website: www.globalmarinesystems.com



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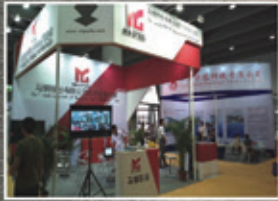


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Training at the top with Rosendahl Nextrom



▲ The team from Rosendahl Nextrom's seven sales and service units

AROUND the world, seven sales and service units as well as approximately 40 representative offices on six continents are at work for Rosendahl Nextrom's customers.

It has become tradition that these "satellites" hone their radar in on Pischelsdorf (Austria) and Vantaa (Finland).

The Rosendahl and Nextrom brand names have launched many new developments and technologies on the market in a short period of time. As such, representatives, partners and colleagues are regularly brought up to date regarding the latest state-of-the-art technologies, and trained in a professional fashion.

In October, representatives from various markets were trained in the latest developments concerning both theory and practice.

The training for the representatives took place directly in Pischelsdorf and Vantaa – right where ideas become reality.

By means of special training and live presentations on location at the production lines, Rosendahl Nextrom offers its representatives and, in turn, its customers the utmost in service.

To this end, the ideal infrastructure has been laid down at the newly established Technology Centre.

Rosendahl training topics include: Extrusion technology; crosshead technology; material processing for high-temperature applications; new silicon extrusion technology; production of automotive cables; production of high-voltage cables; and SZ stranding technology.

Nextrom training topics include: Expanded preform technology; high-speed fibre draw for telecoms and speciality fibres; UV coating and post-draw technology; and upgrades and retrofit solutions.

Rosendahl Nextrom GmbH – Austria
Website: www.rosendahlnextrom.com

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New challenges: WTM provides the answers

WITH easier communications, new business opportunities emerge on a daily basis. Although good, this provides a new challenge for companies with existing businesses facing competition from new and aggressive firms.

One solution for companies is improving the technology level on the offered products. In the cable industry, there is a strong demand for lightweight and easier cable handling, higher frequencies and higher quantities of data transmission, and so on.

What pushes engineers to study new materials and new processes and, of course, to design equipment is the ability to use them with the highest precision and consistency in order to grant the industrialisation of the final product. WTM is among the companies involved in the challenge.

Its philosophy is to stay a step ahead of what the market is asking for. The latest series of tape wrapping machines produced by WTM lead its customers to reach targets that were only dreams until last year.

A challenge won by WTM is wrapping cables with the new Cogebi EasyStrip® mica tape, which is based on inorganic material support and not on fibreglass support. This tape makes the cable more flexible, lighter, smaller in overall diameter and most of all allows the end-user to save a large amount of time in stripping it: even with an ordinary stripper, at the first stroke, the copper in the cable is ready to be connected.

Composite contract

JDR Cable has been awarded a subcontract by Siem Offshore Contractors to supply submarine composite power cables for the Veja Mate offshore wind farm.

The Veja Mate offshore wind farm is located 115km off the German coast, within the German Bight sector of the North Sea. The 67x 6MW Siemens-supplied wind turbine generators will be inter-connected by an inner array grid of JDR-designed and manufactured 33kV medium voltage alternating current cables with a total length of around 97km.

JDR will also deliver hang-offs, connectors and other necessary cable accessories, and will be providing topside termination and testing services through its global services division.

JDR – UK
Website: www.jdrglobal.com

Over the past few years, the company has designed a wrapping line fully dedicated to the application of copper silver plated screening strip on the production of the highest frequency coaxial cables. The concept for this line is never bending the cable, with the exclusion of the collecting reel, and the process is monitored with WTM's Viso System.

For data transmission cables, WTM has won another challenge with its wrapping lines for coaxial, twinax and trinax, with

performances never achieved before. Companies using these wrapping machines have succeeded in at last doubling the data transmission speed of the cable, according to WTM.

Today, with WTM data cable wrapping lines, it is possible to produce 34 AWG cables: such a small dimension is not yet standardised.

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Website: www.wtmachinery.com

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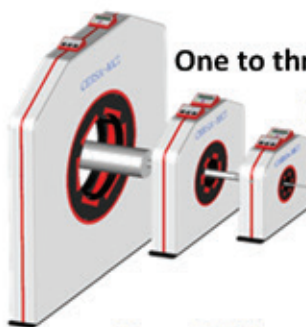
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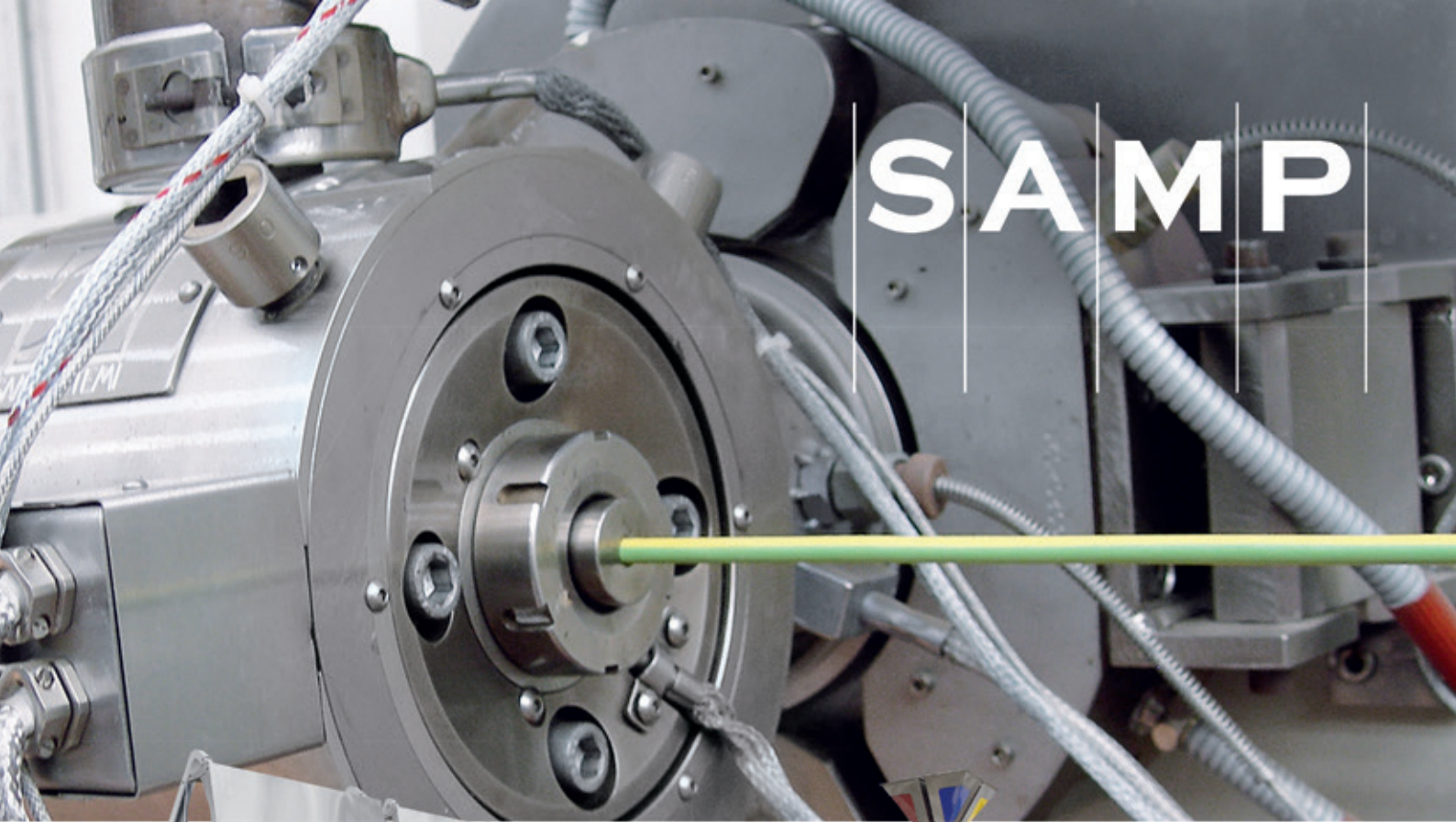
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Shipping and fishing are the cable culprits

THE international cable protection committee (ICPC) has released an analysis of the main causes of submarine cable breaks.

According to the ICPC, ships' anchoring and fishing activities are the main cause of cable failure, accounting for 65-75 per cent of all cable faults. Natural phenomena, such as subsea landslides and ocean currents, are responsible for up to 10 per cent of faults, while cable component failure accounts for a further five per cent.

The cause of around 10-20 per cent of faults cannot be determined, but the ICPC says it is unlikely to be sharks because bites leave evidence in the form of tooth imprints, or even teeth, embedded in the sheathing.

Historically, between 1901 and 1957 – a period dominated by subsea telegraphic cables – at least 28 cables were damaged by fish bites, including sharks. During 1959 to 2006 – a span that encompasses coaxial cables, and their replacement by fibre optic systems

Altair acquires Click2Cast

Altair has acquired Click2Cast, including an office in Barcelona, Spain, as well as the company's technology and employees.

The addition of Click2Cast technology adds simple and quick casting simulation technology to the Altair suite of products.

Having practical applications in both design and engineering, Click2Cast software will be made available through Altair's solidThinking and HyperWorks business lines. The technology has been available through the Altair Partner Alliance to HyperWorks users since 2013.

Click2Cast offers an easy casting process simulation, within an innovative and user-friendly interface. The software requires no special training and does not require the user to have an extensive technical background. It is a very effective and powerful design tool, with possible applications in a wide variety of industries.

"We are very excited to further our relationship and make Click2Cast part of Altair's software offering," said Martin Solina, general manager of Click2Cast.

Altair – USA
Website: www.altair.com

in 1988 – around 11 cables needed repair. Fish bites accounted for 0.5 per cent of all cable faults.

The first recorded shark bites of a deep ocean fibre optic cable occurred off the Canary Islands around 1985 to 1987, damaged by crocodile sharks (*Pseudocarcharias kamoharai*) biting through a cable's polyethylene sheath. This led to improvements in sheathing technology.

The latest analysis, covering 2007 to 2014, recorded no cable faults attributable to sharks. Due to increased shipping and fishing activities on the continental shelf, fibre optic cables are now protected by the addition of steel wire armour, as well as burial up to 3m below the seabed.

International Cable Protection Committee – UK
Website: www.iscpc.org

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om **LESMO**

S&E to the fore in charity golf tournament

S&E Specialty Polymers LLC, a producer of speciality plastic compounds, recently sponsored its third annual charity golf tournament at the Sterling National Country Club in Sterling, Massachusetts, USA, in support of Life is good Playmakers, the non-profit action arm of The Life is good Company.

The annual tournament, called 'Play Fore Playmakers,' was a resounding success and all profits from registrations, donations and sponsorships have been donated directly to the Playmakers organisation.

Duane Shooltz, president and managing partner, and Jay Munsey, national sales director of S&E, have since presented Life is good Playmakers with a cheque for \$24,000 at the Life is good headquarters in Boston.

"We were pleased that in its third year, this was our best tournament yet," said S&E's Mr Shooltz. "Most importantly, it generated \$24,000 for a very worthy cause that S&E is truly proud to support."

Mr Munsey said: "It was very gratifying to see our friends and colleagues join us to support Life is good Playmakers. This has become a yearly tradition and we're proud to sponsor such a great tournament."

The Life is good Playmakers is a non-profit organisation that helps young children who have been hurt by trauma, such as violence, abuse, poverty and illness. For more information please visit www.lifeisgood.com/playmakers

Kyle Blakely, seven-time RE/MAX World Long Drive Championship



▲ The money was handed over at a cheque presentation at the Life is good headquarters in Boston

finalist, once again appeared at the tournament to help raise money. Kyle appeared on behalf of Charity Golf International and appears at up to 60 events per year.

The tournament generated a tremendous response from S&E's customers, suppliers and friends. David Fisher, president of James Monroe Wire & Cable Corporation, said "I have been doing business with S&E for a long time, and they are wonderful people to deal with. Their tournament is a very well-run event and we are happy to contribute to it. I look forward to participating once again next year!"

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International web portal for the industry

THERE are several ways for companies operating in the wire and cable industry to promote their products and activities and to reach potential customers.

There is also an alternative, innovative way, called Expometals.net. The international web portal dealing with metallic wire, springs, fasteners and related industries (including machines, lubricants, spare parts and services) was born with the aim of offering to companies of these fields a tool to help them in their internationalisation process and in the search for customers, partners and suppliers, using the full potential of the Internet.

The best way to get an overview of what Expometals can do for the promotion of a business is to visit www.expometals.net or to meet the staff during the wire show in Düsseldorf, during which a new version (the fourth one), will be presented to the public.

Founded as a start-up near Lecco, Italy, more than ten years ago by Davide Dell'Oro, a former machine designer, the



▲ An alternative way of reaching customers

platform has achieved, year after year, version after version, 230,000 annual visitors, certified by Google Analytics.

Plus, there are more than 14,000 registered users and 5,500 registered firms receiving the newsletter, and 280 sponsor companies actively using the network.

An improved presence on search engines, direct requests, a powerful interaction with social networks – these are some of the advantages Expometals can offer. The site is in six languages – English,

Italian, Spanish, French, German and Russian – catering for visitors from all over the world. Professionals in the field, web experts and advertising people making up the staff of the portal are a key factor in the success of the project, because they are able to closely support customers in their communication needs, providing decisive added value in corporate marketing management.

One of the major benefits of joining Expometals is the chance to monitor the results, which is crucial when talking about advertising investments.

Expometals.net, independent since its creation, cooperates with several magazines, associations, information media and trade shows. Access to the site is free and you will find it divided into categories and subcategories, specialised news, updates on trade fairs and events, and technical articles dedicated to those operating in the field.

Expometals.net – Italy
Website: www.expometals.net



**THE REVOLUTION IN
TC DIE MANUFACTURING**

Tratos on track with Italy and UK manufacturing

CABLE manufacturer Tratos, which produces cable in Italy and the UK, has won a framework contract worth up to €3m to supply railway signalling and power cables for Rete Ferroviaria Italiana (RFI).

The company's hard-surface, high resistance, ultra-flexible cabling is built to withstand abrasion and high stress-levels, so is ideally suited for rail applications.

The combination of a European manufacturing base's standards, high performance and the cable's generous bending radius for easier installation won particular favour over imports from the Far East, and the company will supply the special 3kV cable over the next five years.

Albano Bragagni, president of Tratos, said: "This order is evidence that we can be competitive even though we produce in Italy and UK. In a straight comparison we succeed thanks to the high quality of our products, and the support and service that goes with them." Tratos, which operates in the UK from a base in



▲ Albano Bragagni, president of Tratos

Knowsley, Merseyside, has operations worldwide which support the key industry sectors in which it works.

The company has been working with Rete Ferroviaria Italiana (RFI) for more than 40 years and has supplied cable for high speed lines to RFI previously. The specified product is regarded as one of the strongest in the market for oil, abrasion and UV resistance. RFI is responsible for Italy's track

infrastructure, stations and installations. Its responsibilities cover access to the railway network, infrastructure work, maintenance and the safe operation of the whole network. It also manages the investment in upgrading of railway lines (high speed and conventional) and associated technological development.

RFI promotes the integration of the Italian infrastructure in the European railway network, working collaboratively with other European infrastructure managers. As of January 2015, its operational lines accounted for approximately 16,750 km, with more than 11,900 km electrified and around 7,500 km double track. Stations and stops amounted to almost 2,200.

In 2013, 33 railway companies operated on Italy's national railway network, for more than 333 million train km. RFI employed approximately 27,000 people and invested about €2.8 billion per year.

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ISO 14001 is the principal management system standard which specifies the requirements for the formulation and maintenance of an EMS.

This helps to control environmental aspect, reduce impacts and ensure legal compliance.

Chris Nettleship, Metalube's technical director, said: "We're extremely proud to have achieved certification. As a business, we're committed to reducing our impact on the environment, and having an environmental management system in place is not only helping us to do this, it's also allowing us to make



▲ Lesley Hallam, quality manager at Metalube

continuous improvements to our systems and procedures. And improving our performance doesn't just benefit us, it benefits our customers too."

• Chemist Naomi Pells recently attended a three-day Cambridge University tribology course (friction, wear and lubrication).

Approximately 31 people from all over the world (including Eastern Europe, Canada and USA) attended the course, where prominent lecturers included Ian Hutchings from the Institute for Manufacturing, University of Cambridge and Dr Glyn Roper formerly from Shell UK.

Commenting on the course, Naomi said: "The course gave me a fantastic insight as to how the metallic parts that we lubricate are produced and tested and how they work out in the field.

"I particularly benefitted from exploring friction types ranging from sliding, rolling, impact and cavitation giving me a greater understanding of the strains the parts are under. I am now keen to implement my new knowledge at Metalube."

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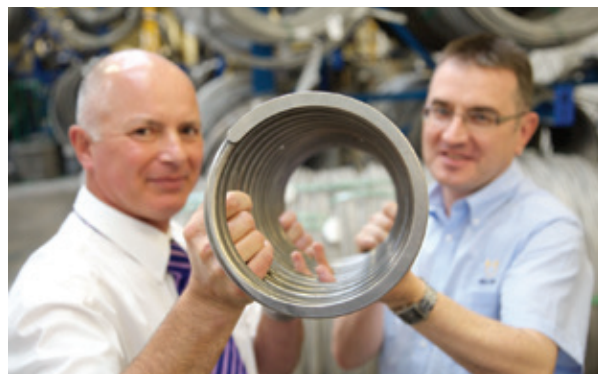
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Alloy Wire targets new nuclear opportunities



▲ Huw Jenkins, left, Fit For Nuclear assessor, and Mark Venables, managing director of Alloy Wire

A UK manufacturer is setting its sights on a share of the £60bn nuclear sector after securing a new funding boost.

Alloy Wire, which makes round, flat, shaped profile and electrical resistance wires in a range of exotic nickel alloys, has become one of the first companies in the West Midlands to start the Fit For Nuclear (F4N) journey.

The Brierley Hill-based firm will benefit from a £10,000 grant to help it develop a new strategy for targeting this market and ensuring it meets exacting health and safety and performance standards required by the major contractors.

It is anticipated that this funding – combined with ongoing support from manufacturing experts at the Business Growth Service – will unlock nearly £750,000 of potential contracts.

Alloy Wire will spend the next five months working its way through the Fit For Nuclear programme, working with assessor Huw Jenkins and expert consultants Start 2 Finish Marketing and Initiative Quality and Safety Ltd.

With the additional funding, the company has started to produce a nuclear specific brochure/website and is looking to attend a number of exhibitions to showcase its capabilities.

The company supplies wire from 0.025mm (0.001") to 21mm (0.827") and currently works with 4,000 customers in 15 sectors.

Fit For Nuclear has been developed by the Nuclear AMRC with the support of its nuclear industry partners, and is delivered to businesses in the UK in partnership with the Manufacturing Advisory Service (MAS), now part of the Business Growth Service.

The expanded Fit For Nuclear programme, which is supported by the Regional Growth Fund, aims to help UK manufacturers measure their capabilities against industry standards and take the necessary steps to close any gaps.

Alloy Wire Ltd – UK
Website: www.alloywire.com

Long-distance data transmission

ALCATEL-LUCENT Submarine Networks (ASN), the undersea cables subsidiary of Alcatel-Lucent, has achieved a breakthrough record of data transmission over a distance of 10,000km. The trial used real-time processing prototypes of a new, cost effective, 300Gbp/s modulation technology, designed to optimise the performance of submarine cable systems.

The trial has been achieved on the 10,000km of ASN's test bed, combining the innovative 300G 8QAM (8 quadrature amplitude modulation) technology of ASN's 1620 Softnode platform and second-generation coherent submarine fibre (CSF-2).

8QAM technology can optimise both new and existing undersea cable systems, enabling operators to deliver over 15Tbit/s per fibre pair on transoceanic systems – equivalent to 2.25 million simultaneously streamed HDTV channels.

Olivier Gautheron, chief technology officer of Alcatel-Lucent submarine networks, said: "This breakthrough underlines ASN's strategic focus in R&D to raise the bar for undersea fibre optic technology. Our researchers continue to develop new solutions to further apply our own innovation to help traditional and web-scale operators cope with increasing requirements for speed, capacity and cost-effectiveness."

Leveraging the largest research and development capabilities in the submarine cable industry, ASN has achieved several breakthroughs in both repeated and unrepeated submarine cable systems.

Alcatel-Lucent – France
Website: www.alcatel-lucent.com

New advanced ship

ABB has placed an order for what is believed to be the world's most advanced cable-laying vessel. The new 140m ship will be custom-built at Kleven shipyard in Norway, with delivery expected in 2017.

The vessel will be constructed in such a way that fire and flooding can be contained and will not compromise positioning and other essential systems.

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Beyond cybersecurity: sabotage of fibre optic cables in Northern California imperils tech, academia, and USA national security

"I always remind people that planet Earth is a single point of failure. Just ask the dinosaurs."

Hunter Newby, the founder and CEO of New York-based Allied Fiber, made this observation to the *New York Times* in reference to a series of so-called fibre cuts in the San Francisco Bay Area – at least 16 of them over the last year. His company builds alternative dark fibre networks that customers can "light" (ie shoot data through them using laser pulses akin to Morse code) to diversify their routing.

"Think of dark fibre networks as private access toll roads you can jump into to avoid traffic jams," wrote the *Times's* Kate Murphy, whose coverage of the Bay Area fibre cuts makes plain why such expedients have become necessary and are gaining in adoption.

According to the Federal Bureau of Investigation (FBI), someone or some group has been going through manholes to sever fibre optic cables that supply telecommunications to large sections of the region, which is home to technology companies, academic institutions, and Lawrence Livermore National Laboratory, overseer of the USA's arsenal of nuclear weapons. ("The Cyberthreat Under the Street," 7th November)

As reported by Ms Murphy, following each incident (usually occurring late at night and involving two or three separate fibre cuts) residents could not make land or mobile calls, not even to the emergency number 911; or send texts or emails; or use credit cards or ATMs or watch TV.

Online medical records could not be accessed. Wired households lost their enviable interconnected efficiencies. (For security reasons, the Lawrence Livermore lab declined to say how the cuts affected its operations.)

Central to all these interruptions is the Internet which, Ms Murphy observed, is not amorphous. She wrote: "You may access it wirelessly, but ultimately you're relying on a bunch of physical cables that are vulnerable to attack. It's something that's been largely forgotten in the lather over cybersecurity. The threat is not only malicious code flowing through the pipes but also, and perhaps more critically, the pipes themselves."

Of major concern to experts are the throughways and junctures that handle enormous amounts of Internet traffic; and,

surprisingly, there does not exist a good reference to these Internet locations that, if taken out, would severely hamper the system.

"Everybody assumes somebody knows, but after a while you find out nobody actually knows," Paul Barford, a professor of computer science at the University of Wisconsin, told the *Times*.

Dr Barford, who has made it his mission to locate the vulnerabilities – the "points of failure" cited by Allied Fiber's Mr Newby – recently completed a map of the long-haul Internet infrastructure of the USA.

'Avoid giving bad guys a map'

The effort to draw an even reasonably reliable map of stretches of at least 30 miles of Internet connectivity among population centres of at least 100,000 people required four years of gathering information from commercial broadband providers and public records. Notably, observed Ms Murphy, Dr Barford's research was partly funded by the US Department of Homeland Security and can be accessed only by DHS-approved researchers.

"What we're trying to avoid is giving bad guys a map to do bad things," he said. "Now that we can see the possible pinch points in the US, we are looking at ways to mitigate them."

Security experts and networking engineers said they were most concerned about where major networks converge: Internet exchange points, or IXPs, where networks come together like highway interchanges to trade traffic, a process known as "peering." Ms Murphy provided this basic information:

- There are about 80 IXPs in the USA but only a handful, including those in New York City, Miami, Los Angeles, Seattle and outside Washington, are vital interchanges for domestic as well as international traffic carried by undersea cables from abroad (also vulnerable to cuts by mislaid anchors or submarine sabotage);
- Plugging into these major hubs are hundreds of Internet and mobile service providers, as well as content delivery networks such as Google, Apple, Amazon, Facebook and Microsoft. If taken out by natural disaster (earthquake, hurricane) or a strategic attack, much of the USA, if not much of the world, would have hindered Internet access or none at all, depending on the severity and sophistication of the strikes.

"It's crazy to see . . . unprotected buildings containing all this physical cabling that's interconnecting continents as well as

Transatlantic cable

all of North America," the *Times* was told by John Savageau, an information and communications technology consultant who formerly managed IXPs owned by CoreSite Realty Corp (Denver, Colorado), a major player in security systems.

"If one of these major nodes goes down, you're going to have pain because customer performance will be seriously degraded. But if you have a coordinated attack on multiple locations, that's a nightmare scenario."

Because IXPs are crucial to the efficient operation of the Internet but most of them are privately held, with very few controls, addressing concerns like those of Mr Savageau and Dr Barford presents complex regulatory as well as physical challenges.

Until a broad strategy for securing IXPs is developed, fibre optic cables can still be disabled in one quick cut; and so the "cyberthreat beneath the street" persists.

"The only way to solve this problem is to create a more robust network so you don't have these single points of failure," said Mr Newby, of the earlier dinosaur reference. In the meantime, companies that can't wait are turning to businesses like Allied Fiber, CoreSite, Zayo (Boulder, Colorado), and Integra (Vancouver, Washington) – builders of alternative dark fibre networks.

Automotive

All roads lead to Silicon Valley – but how much more high-tech talent can be squeezed in?

Martyn Warwick, the editor-in-chief of London-based *TelecomTV*, clearly has endured a few too many traffic jams in Silicon Valley – the southern portion of Northern California's San Francisco Bay Area and a precinct of magnetic attraction for high-tech companies.

Mr Warwick devoted the better part of his recent report on a new Toyota Motor Corp initiative in Silicon Valley to the execration of conditions in "what is now one of the most expensive and crowded places on the planet in which to be and do business."

On 6th November the Japanese multinational automotive conglomerate announced a five-year plan for the establishment of the Toyota Research Institute (TRI), to be built in the vicinity of Stanford University.

The new laboratory will be one of the largest and costliest such facilities anywhere, with an emphasis, Toyota says, on artificial intelligence (AI) as a bridge between "cutting-edge science and commercial engineering."

The initial work, by 200 R&D scientists and engineers, will be on smarter and safer cars, self-driving vehicles, improved in-vehicle voice recognition systems, and on "AI to aid senior citizens with both outdoor and indoor mobility."

While Mr Warwick took glancing blows at "projects that run the gamut from the intriguing and possibly useful through to the grandiose and the downright scary," his misgivings about the TRI mainly concern its location. ("Cram 'Em In! Toyota to Build \$1 Billion AI Lab in Silicon Valley - even though the Place Is Full to the Bursting Point," 8th November)

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According to the *TelecomTV* editor, the density of the commuter population of Silicon Valley increases by the day and is putting immense strain on already creaking transport infrastructure and housing stocks. He wrote: "From San Francisco all the way down some 45 miles to the back end of San Jose the roads are almost continually full to choking point – as are the trains and buses – and the constraints of physical geography mean there is no easy way (or perhaps no way at all) to bring relief."

- But despite the "nightmare traffic" and associated air pollution, the "ludicrous expense" of living and working in the area, the persistent drought in the USA far West, and the prospect of water rationing in California, Mr Warwick observes that more companies all the time are drawn to Silicon Valley.

The crowded conditions apparently agree with the AI and robotics people who throng the area. The Toyota lab is to be led by Dr Gill Pratt, formerly of the US Defense Advanced Research Projects Agency (DARPA), who oversaw the recent DARPA Robotics Challenge – a bruising competition among 25 advanced automata. Dr Pratt told Mr Warwick: "The density of people doing this kind of work [AI and robotics] in Silicon Valley is higher than any other place in the world."

- For his part, Mr Warwick noted that Silicon Valley's main artery is Route 84 – El Camino Real, there since California was an outpost of Spain and donkeys were the fastest things on the road. He wrote: "Were there any donkeys on the Royal Road today they'd probably still be the fastest things on it."

Covering 250 to 300 incident-free miles a day, researchers along for the ride set a 1,500-mile record for a self-driving car

While tech companies and auto makers have been testing self-driving cars on the roads of North America for some time now, few accounts have emerged of the passenger experience on such a ride. Recently the *IEEE Spectrum*, published by the Institute of Electrical and Electronics Engineers (New York), carried a report from one member of the four-person crew aboard an experimental car that set a record for a "no hands" road trip from the USA to Mexico border south to Mexico City.

The self-driving car was a 2010 Volkswagen Passat Variant known as Autonomos. The modified vehicle can automatically control speed, direction and braking without human intervention, but it also relies upon the US Global Positioning System (GPS) to safely follow preset routes. The researchers also prepared customised maps containing terabytes of data detailing the number of lanes, highway markings, exits, intersections and traffic lights. ("Autonomous Car Sets Record in Mexico," 26th October)

"We covered 250 to 300 miles daily, so it took a week to arrive in Mexico City," said Raúl Rojas, a professor of computer science and mathematics at the Free University of Berlin and a visiting professor at the University of Nevada (Reno), in a press release. "Some parts of the highway were scary, but we had no important safety incidents." "We" were Dr Rojas and three colleagues from Germany. Taking it in turns, one person kept an eye on the road from the driver's seat and one person watched the computer and navigation systems to learn what moves the autonomous car planned next. The other two followed in a support vehicle.

The 1,500-mile road trip, the first leg of a planned 4,000-mile trip from Reno to Mexico City, kept to Mexico's north-south Highway 15. About five per cent of the route took the self-driving car

through construction work and potholes. But a bigger challenge came from the absence of lane markings along lengthy stretches of highway due to repaving work over the summer. Dr Rojas and his colleagues have outfitted Autonomos as a "driving laboratory" with seven laser scanners, nine video cameras, seven radars and a GPS roof antenna. They previously tested the same car in autonomous driving mode in Germany, on a 190-mile round trip from Berlin to Leipzig.

- As noted by Jeremy Hsu of the *IEEE Spectrum*, Dr Rojas hopes eventually to improve the ability of Autonomos to predict the behaviour of other drivers and also pedestrians. "If a human can drive with two eyes," Dr Rojas said, "I am sure that we will be able to drive autonomously with a computer the size of a notebook and just a handful of video cameras in a few more years."

- Mr Hsu also observed that semi-autonomous features have been "creeping into" existing cars. Tesla Motors recently uploaded new Autopilot software to its Tesla Model S vehicles. And the Mercedes-Benz S Class has since 2014 offered adaptive cruise control and automatic collision prevention.

As Volkswagen presents its remediation plan, the diesel-emissions scandal continues to widen around the company

On 20th November, a little more than two months after the company's cheating on diesel emissions tests was revealed, Volkswagen AG submitted its recall plan to regulators with the California Air Resources Board (CARB) and the US Environmental Protection Agency (EPA).

The German automaker had been negotiating with the authorities on details of a plan to deal with 482,000 2.0-litre diesel vehicles sold in the USA that used deceptive software to evade emissions requirements. Having met California's deadline for submitting a plan, VW awaited the CARB and EPA response. In the interim, the automaker said, it continued to work with both sets of regulators toward an approved remedy.

Focusing on California, Dana Hull and Jeff Plungis of *Bloomberg News* noted that – beyond developing an effective fix for each of three types of non-compliant four-cylinder engines – VW must document any adverse impacts on vehicles and consumers. And, since the emissions scandal centres on Volkswagen's use of a sophisticated defeat device, "Any proposed remedy – whether that's retrofitting cars with new parts or revising software codes – will need to be tested by California technicians before the plan is rolled out to consumers."

The *Bloomberg* reporters reviewed the three categories of cars that are problematic for Volkswagen. The older cars – known as Gen 1 – will be the hardest to fix, as they lack the Selective Catalytic Reduction device that, starting in 2012, VW added to models like its Passat. Retrofits are often difficult and expensive. So-called Gen 2s may need additional hardware as well as software alterations, while Gen 3s may require just a software fix. ("Volkswagen Submits Recall Plan to California Air Regulators," 20th November)

Advocacy groups weigh in on mitigation

But the fixes are not the whole of Volkswagen's problems. California Attorney General Kamala Harris as well as several attorneys general of other states are conducting criminal

Transatlantic cable

Steel

investigations into the company. And, even as *Bloomberg* reported, the diesel-emissions scandal continued to widen. Earlier on 20th November, CARB and EPA said they had expanded a notice of violation to include all 3.0-litre diesel-powered autos from model years 2009 through 2016 that originally went back only to 2014. The broader allegation covers about 85,000 Volkswagen Group vehicles: VW, Audi and Porsche.

Bloomberg also reported that Volkswagen is facing demands for mitigation of the effects of its cheating. They wrote: "Of the almost half a million dirty diesels that VW sold in the USA, roughly 60,000 – or 12 per cent – were sold in California. Many of those belong to relatively affluent, green-minded consumers who live in the San Francisco Bay area and Los Angeles region." But emissions often get blown into the Central Valley, where air quality is among the worst in the state and asthma rates for children among the highest. CARB is developing an inventory of the pollution spewed into the air as a result of VW's cheating by looking at the number of miles driven and the emissions profile of each of the three engine groups. As declared on the CARB website: "VW will be held accountable for the extra emissions that the vehicles released to the air."

➤ Advocacy groups are pushing for a mitigation fund that could total hundreds of millions of dollars to address the excess emissions of smog-producing nitrogen oxide. And the Greenlining Institute, a non-profit based in Berkeley, wants Volkswagen to offer incentives to help low- and moderate-income Californians drive electric vehicles, such as subsidised leases for its electric Golf. Ms Hull and Mr Plungis observed: "[Greenlining] also suggests that VW pay for charging stations and electric-vehicle car-sharing in disadvantaged communities."


Large American steel producers say a WTO reclassification of China as a market economy would render trade cases ineffective

China, which has expanded its domestic steel industry and stepped up its steel exports in recent years, is lobbying for recognition as a market economy when its World Trade Organization designation as a government-controlled economy expires in December 2016.

China joined the WTO in 2001 and has said it believes its agreement with the organisation enables it to attain market-economy status after 15 years. As noted by Alex Nixon in the *Pittsburgh Tribune-Review* (12th November), the changed designation would make it harder for US steel makers to demonstrate the dumping of steel in the American market by Chinese competitors.


The US Commerce Department consults prices in other countries to determine the extent to which steel imports undercut domestic companies. With China's reclassification, import duties would be based on prices in China that are held to whatever level is set by Beijing.

US Steel Corp CEO Mario Longhi and other leading industry executives say the proposed change would decimate struggling American steel producers, expected to face even greater pressure from China as its economy cools and exports grow.



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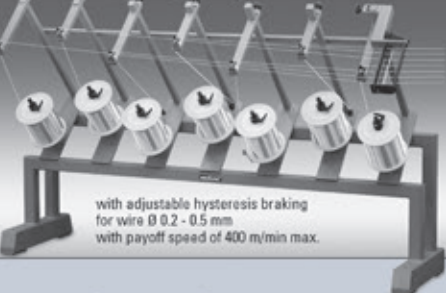
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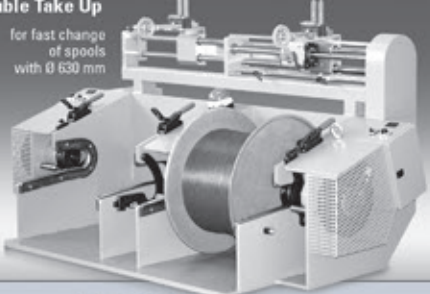
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Surging steel imports are pushing down prices in the American market and hammering US Steel. Citing USA government data, the *Tribune-Review* reported that imports of carbon steel from China jumped 18 per cent through August 2015 to 1.45 million metric tons. Stainless steel imports from China skyrocketed 48 per cent to 147,484mt over the same period. Meanwhile, a benchmark steel price dropped 40 per cent in a year. In the week in which Mr Nixon's article was published, the price per metric ton of hot-rolled coil steel was \$387, down from \$642 at that point in 2014.

- Also in November, the American Iron and Steel Institute, a Washington-based trade group on whose board Mr Longhi sits, released a report examining the economic impact of a reclassification of China as a market economy. The AISI asserts that China, because it owns or subsidises steel mills throughout the country, is a non-market economy, ie one in which the basic laws of supply and demand are not allowed to function naturally. According to the AISI report, if steel import duties are rendered ineffective by a change in China's WTO status, cheap imports will continue and likely increase, causing further mill closings and layoffs in the American steel industry. "It is almost certain," reads the AISI report, that "without the [non-market economy designation], imports from China would have caused significantly more economic disruptions in US manufacturing industries."

China begs to differ on steel exports

Analysts expected Chinese steel makers to ship a record 100 million metric tons-plus of steel products abroad in 2015 to offset shrinking domestic demand amid a slowing economy. *Reuters* reported on 17th November that China has declared an intention to cut steel capacity and to "strengthen" its talks with other countries to solve steel trade disputes. "The overcapacity is a common issue facing the global steel industry which is under restructuring," Shen Danyang, a spokesman for the Ministry of Commerce, told reporters at a briefing in Shanghai. He said that China "is actively taking measures and optimising the industry structure, including slashing large capacities." But Mr Shen rejected the complaints of world steel producers about Chinese steel exports.

In a recent instance, nine international steel associations said in a joint statement earlier in November that the Chinese government plays a big role in the steel sector and that China remains a non-market economy. Wang Li, an analyst with CRU in Beijing, told *Reuters*: "I don't think steel makers in China are subsidised and the government's attitude towards the steel makers is very clear: those that are not competitive should be closed."

Business

A tougher US stance on tax inversions makes it more difficult for companies to avoid taxes by moving their domiciles overseas

The Treasury Department in November issued new rules to limit tax inversions: controversial deals whereby American companies buy smaller, foreign rivals and reincorporate overseas so as to avoid American taxes. The new rules include provisions against "asset stuffing" and "cherry picking." As defined by *Fortune Magazine*, asset stuffing is the manoeuvre in which an American company "shoves" some assets into a foreign entity it is buying to make it big enough to qualify for an inversion. A USA company cherry picks when it uses a third entity to combine with a foreign company in order to relocate the newly formed company to a country with an even lower tax rate.

In its second round of inversion rule changes in 14 months, Treasury said it was reducing the tax benefits of the deals by limiting the ability of an inverted company to transfer its foreign operations to the new foreign parent without paying USA tax. Some of the changes announced on 19th November took effect on that date, while others apply retroactively to inversions completed after 22nd September 2014. In a conference call with reporters, a Treasury Department official said that the biggest impact on inversions will likely come from the new curbs on cherry picking, as some companies have set up units in third countries without any real connection to the transaction. A typical example is that of a Pennsylvania company that "became" Irish for tax purposes by buying a smaller Canadian competitor. Oregon Senator Ron Wyden, the ranking Democrat on the Finance Committee, said in a statement that, while the efforts by Treasury to curb overseas tax inversions are welcome, "Ultimately it's up to Congress to deliver tax policy that better equips companies to compete and succeed by staying in the US." The only way "to end the inversion virus that is plaguing our country" is, he said, through true bipartisan tax reform.

- Given the near paralysis of Congress, with Republican and Democratic legislators at daggers drawn, these are wan hopes. But the action taken in November is an important step and not, according to Treasury Secretary Jacob J Lew, the last word. "We continue to explore additional ways to address inversions," Mr Lew said – including potential guidance on earnings stripping. "And we intend to take further action in the coming months."

Dorothy Fabian – USA Editor



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▲ Cost efficient continuous casting technology from Upcast

New line using 100 per cent recycled copper

USING recycled copper in the process of casting OF-Cu rod has long been the target for manufacturers. The reason is simple and obvious: cost efficiency. Upcast Oy has developed the continuous casting technology and machinery to meet the requirements for using 100 per cent recycled material – or scrap as many operators call it – in the OF-Cu rod process.

Using recycled material in the Cu rod casting process has been very challenging with regard to both the quality control and the mechanical processing of the material. The casting process itself does not remove the possible metallurgical impurities of the raw material. Therefore, earlier it was recommended to charge only small quantities of recycled material together with the pure copper cathodes. This required extra manual work from operators.

With consistent development work

and understanding the importance for customers Upcast has been able to change the situation. The first Upcast® OF-Cu rod continuous casting line utilising 100 per cent recycled material from the other internal processes was delivered a year ago and has been in operation ever since.

The automatic charging technology of the new line is designed specifically for recycled material. The final product determines the criteria and limit values for the raw material. Thus, the purity of the recycled material is crucial for the process. Using scrap from other processes of the same manufacturer assures that the material is exactly the kind needed for the casting process.

In the past the charcoal covering the melt in the furnace has caused some problems in the material feeding and melting process of recycled material by preventing smaller pieces from fully

sinking into the melt. Pre-handling of the material can prevent this, and the new line is also equipped with a hydraulic press forcing all the pieces into the melt.

The automated processes together with the new advanced control system have also added to the production efficiency. For example, the automatic transfer of the melt results in less manual work, and this way the probability of human error is minimised.

The remote access system allows for very quick fault detection followed by fast repair actions. This is extremely important in order to avoid any longer disturbances or breaks in the process. Furthermore, the system allows customers to have all the possible process data enabling them to make adjustments for efficiency optimisation.

Upcast Oy – Finland
Website: www.upcast.com

Descaling wire rod in high-speed drawing lines

STEELTEC, a Schmolz + Bickenbach Group company, is a producer of special steels with manufacturing locations in Denmark, Germany, Sweden, Switzerland and Turkey. At its two sites in Emmenbrücke, Switzerland, the company draws wire rod and bar stock into bright steel rods.

The company originally used chemical descaling to clean the wire rod and bars before drawing. It installed its first high-performance single-strand shot blast machines in the 1970s and, over time, mechanical descaling using Wheelabrator's shot blast machines has gradually replaced chemical descaling (in immersion baths).

In 2008 the last pickling bath was decommissioned in Emmenbrücke. All high-speed drawing lines at the two sites now feature an integrated Wheelabrator FL shot blast machine, spanning several generations of the FL-concept.

FL machines are designed to focus the blast media onto narrow work pieces using guide plates, which can be adjusted to suit individual workpiece diameters.

The latest blast machine to join the fleet at Steeltec is an FL-4-37/55, which has been integrated into the most powerful drawing line on site. Due to its high blast power and new blast wheel arrangement, the machine can keep up with the highest drawing speeds, even when processing demanding new materials. For the first time, this latest machine adjusts guide plates automatically to the correct wire diameter, making the overall drawing line more efficient.

Andreas Sieber, head of operations, Plant 1, at Steeltec, commented, "The transition from chemical treatment to mechanical descaling had a range of positive effects on operations here in Emmenbrücke. In addition to much more straightforward waste disposal, we've also noticed the



▲ FL blast machine for wire and rod

wire surface is now much better prepared for the drawing process. Depending on blast media type and size, the blast process creates little pockets on the surface, which improves adhesion and distribution of the drawing oil.

"This is incredibly important in order to achieve the desired drawing quality and to extend the life of drawing dies. Compared to immersion baths, blast machines also take up less room and fit snugly into the drawing line."

Depending on drawing speed, wire or rod

diameter, material and desired surface cleanliness, FL machines can be equipped with three, four or six blast wheel units with a range of motor capacities. The machines are slotted into the line ahead of the drawing machines, from which they fetch relevant settings and parameters. To date, more than 600 FL blast machines have been manufactured and are in operation in wire and rod production around the world.

DISA Industrie AG (Wheelabrator Group) – Switzerland

Website: www.wheelabratorgroup.com



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VNT dies offer multiple advantages

AJEX & Turner Wire Dies has introduced a line of innovative VNT dies (Vitrified Nanocrystalline Technology) that can replace PCD and carbide dies for multiple applications in drawing and compacting.

VNT dies offer more wear resistance, and have an extremely smooth surface with immensely low friction. The dies can draw stainless steel wire or carbon steel wire up to 0.6%C, aluminium or Al alloy wire, and nickel silver wire as well as copper/brass tubes and for compacting/stranding copper and aluminium.

The dies, which are offered for a range of 0.8mm to 70mm for stainless or carbon steel wire, provide a two to three per cent improvement in raw material use for metal savings.

The dies can provide a perfect surface finish, holding a zero tolerance for up to 500 metric tons (stainless steel and carbon steel wire up to 0.6%C) at a price that is 2-10 times lower than PCD dies (depending on bore diameter).

These dies produce a smooth wire due to the unique diamond technology used. "The diamond coating is very thin, thus it will not peel off as in the case of a thick coating, thus increasing the life of the die and providing better performance, which is evident by the overwhelming responses by our overseas customers who have used these dies for copper, aluminium, stainless steel, aluminium alloy, etc," said a statement.

"For high and low carbon, in association with TKT, Italy, we have developed pressure dies for long life. These dies are used for dry and wet drawing respectively. With its revolutionary concept of



▲ VNT dies from Ajex & Turner

disassembled die, it improves lubrication, gives 30 per cent more nib or pallet life and produces higher quality wire.

"Our pressure dies contribute significantly to increase drawing speeds and improve productivity to the wire plant."

By using the pressure die, the re-cutting or refurbishment is eliminated and the wire drawing speed also increases up to 50 metres per second.

Ajex has developed different grades of Masterlube lubricants, which have high viscosity and low consumption.

Ajex & Turner Wire Dies Inc – India
Website: www.ajexturner.com

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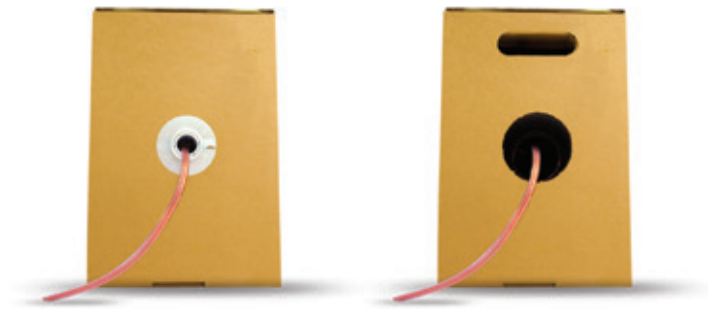
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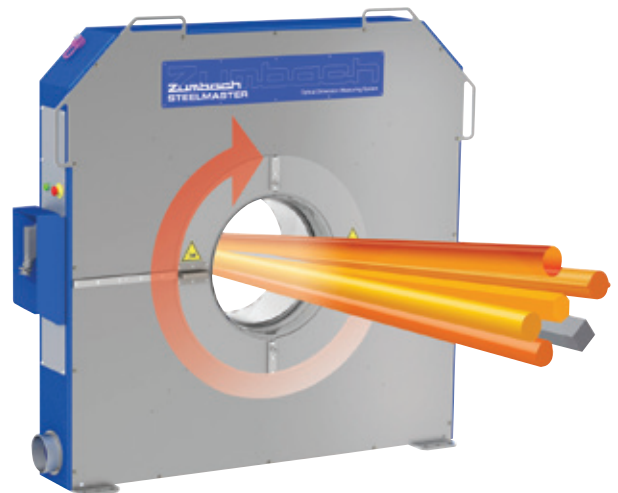
www.messe-duesseldorf.de



Modular rotating gauges for high-speed dimension measurement

ZUMBACH Electronic has introduced new modular additions to its line of rotating gauges. The SMR product line is claimed to offer significant advantages over other gauges in the fast and accurate capture of dimensions in longitudinal and radial direction.

SMR gauges rotate continuously at 60 or 100rpm. Up to three ODAC[®] laser heads take 2,000 measurements per second per head, fully synchronised. This results in up to ten complete profiles per second, which is faster than previous gauges.



▲ Steelmaster SMR 400-S2 modular measuring unit, and a range of equipment possibilities

Alternatively, the SMR can operate in static, orientable mode with 2,000 diameter dimension measurements per second in each direction. At 100m/sec this means a set of measurements every 50mm.

The mechanical concept is simple and robust: no wear parts, no collector rings and no brakes. The transmission of power and signals to and from the laser heads is fully contactless.

Standard and special software features include EPM function for true section display, with polygonal and asymmetric shape deviations; special functions for three-roll mills; head and tail scrap calculation; and flexible, personalised screens.

Benefits include faster start-up, less scrap, tighter tolerances, display of true shape, and trouble-free maintenance with quick and easy access to the maintenance points. The gauges are suitable for hot and cold processes and QC.

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

The Wire Drawing Standard



Paramount Die is the leading designer and manufacturer of wire drawing inserts and tooling systems for the wire drawing industry. For more than 45 years we have been delivering the global wire drawing market with dies and wire drawing solutions that optimize wire drawing operations.

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Ultra heat-resistant ETFE grade for wire and cable insulation

AGC Chemicals Americas Inc has introduced Fluon® ETFE C88AXMP-HT, an ultra heat-resistant grade that maintains performance characteristics at temperatures up to 200°C. C88AXMP-HT is a suitable material for industrial and automotive wire and cable insulation, as well as under-floor heating cables.

The C88AXMP-HT grade is 20 per cent less dense than fluorinated ethylene propylene (FEP), which reduces the amount of product required for applications. In addition, the grade's high melt flow rate provides fast, highly efficient processing line speeds. One product grade is suitable for all wire size cross sections (0.3mm²-10mm²).

"This new material expands design possibilities because it is so lightweight and remains stable at very high temperatures," said Gary Eckrote, business director of AGC FluoroCompounds Group. "Manufacturers can now produce cables and wires with a much thinner insulation layer, which is important for vehicles and aircraft that require fuel efficiency and a low carbon footprint."



▲ Fluon® ETFE C88AXMP-HT, an ultra heat-resistant grade

Additional performance benefits of Fluon ETFE C88AXMP-HT include:

- Improved crack and abrasion resistance
- Enhanced mechanical strength
- Full range of compatible colour masterbatches
- Tested to German automotive LV112 class F
- Meets automotive FLUR specifications

AGC Chemicals Americas Inc – USA
Website: www.fluorocompounds.com

Precision wire EDM

Makino's HEAT U3 features a split precision V-guide wire system, and four-sided work table, and is said to have the lowest wire consumption in the industry.

Like the Makino U3, the U3 HEAT (High Energy Applied Technology) has five programmable axes.

"This machine is fast, reliable and requires very little maintenance," said technical equipment president Lou Olson. "It was designed to be user friendly."

The U3 and U3 HEAT feature a new cutting technology called HyperCut, designed for superior part accuracy and surface finish.

HyperCut is capable of producing a 3umRz surface finish with three-pass machining, and represents a 20 per cent reduction in cycle time and 14 per cent saving in wire consumption when compared to previous technologies.

Materials for steel and carbide have been developed and support both sealed and non-sealed flushing applications. The U3 HEAT also features Makino's technology for wire EDM machining speed and accuracy in parts featuring poor or difficult flushing conditions.

The U3 and U3 HEAT contain a comprehensive cutting condition library, with over 2,200 settings for many material types and flushing conditions from 0.004" to 0.012" diameter wire.

These settings include optimised conditions for standard hard brass wires, high-speed coated wires and high-taper soft wires.

The depth and versatility of the entire cutting condition library ensure that all applications can be machined at optimum productive levels.

Makino – Japan
Website: www.makino.com

From drawn dull to wire clean reflective finish in plating quality

THE PWC-S system performs wire cleaning and polishing in-line with wire drawing machine at 6 to 12m/s (1,200 to 2,400ft/min). Exceptional cleanliness permits wire direct brass coating, copper coating, galvanising and wire cleaning prior to heat treatment and coating applications including patenting, annealing, painting, plastic coating, etc.

The system incorporates new technology that enables normal cold plant water to be converted into a unique cleaning medium generating high pressure wetting/contaminants extreme pressure extrusion/hydrodynamic cavitations displace, and contaminants flush out, used to clean drawn wire at high-speed in a completely green application, providing a glossy wire finish in plating quality.

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

For decorative mirror reflective wire

Developing new guiding solutions

Collaboration with a Swedish high-tech cable manufacturer has led Subec to the development of a new multi-dimensional Precision Guide Unit (PGU). It aligns and stabilises the wire in x-y-planes before entering the extrusion head. This allows for precise centring which is especially needed for fixed position extrusion heads.



▲ Subec's new multi-dimensional Precision Guide

On the large end of the guiding range for big diameter cables and umbilicals, Subec has won several contracts with Swedish and Norwegian HVC plants. A constant high quality of guide rollers made of polyurethane coated steel make sure cables are not damaged during transport to the waterfronts at the Baltic Sea and Norwegian Sea.

Subec AB – Sweden
Website: www.subec.se

applications, the system can be used with an emulsion including a new rust preventive additive diluted at 3-5 per cent concentration. The PWC-S unit is compact and can be easily installed on the finishing/last block of a wire drawing machine.



▲ Wire cleaning by PWC-S system

Decalub – France
Website: www.decalub.com



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New plenum cable compounds with enhanced flame and smoke performance

NEW flame retardant and smoke suppressant technologies have enhanced the performance of wire and cable compounds that were already the leading PVC-based low-flame/low-smoke products for plenum applications, according to Teknor Apex Company.

Four new grades in the Fireguard® line of plenum cable compounds exhibit oxygen indices from 49 to 51.5 per cent. Shore C hardness levels range from 80 to 90.

The new grades are Fireguard 910A-72-NL for jacketing 'hybrid' insulation in Category 5e and Category 6 unshielded plenum cables; Fireguard 910A-76-NL for jacketing 'hybrid' insulation in Category 5e and Category 6 shielded plenum cables; Fireguard 910A-79-NL for jacketing RG6 coaxial cable; and Fireguard 910A-80 UVF-NL for jacketing indoor/outdoor fibre optic distribution cables.

"In NFPA 262 flame tests, these new compounds generate lower levels of smoke and flame spread than any

generally similar compound in the marketplace," said Mike Patel, director of marketing and business development for the vinyl division of Teknor Apex. "They require no special equipment to process and can be extruded at the same high rates as standard Fireguard compounds."

Teknor Apex Company, a privately held firm founded in 1924, produces flexible and rigid vinyl, thermoplastic elastomers, nylons, colour masterbatches, speciality chemicals and hoses.

Its vinyl division manufactures compounds based on PVC, including Apex flexible and rigid vinyl, Flexalloy vinyl elastomers, Fireguard low-flame, low-smoke compounds for wire and cable, and BioVinyl™ compounds with bio-based plasticiser. The division is an international supplier to the appliance, automotive, construction, medical device, wire and cable and other industries.

Teknor Apex – USA
Website: www.teknorapex.com

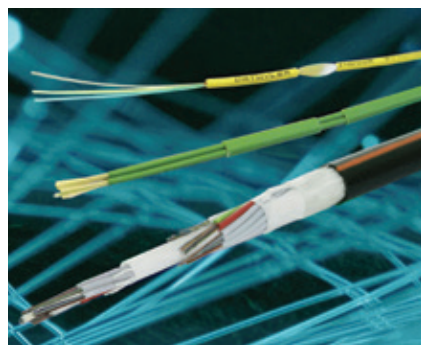
Single-mode cables with improved fibres

Smaller bending radii, improved attenuation properties and higher transmission quality: these are the significant benefits passed on to Datwyler customers, as the company switches to two new single-mode fibres: G.652.D (BLO) and ITU-T G.657.A2 fibre.

In future the FO Indoor cables previously incorporating bend-optimised single-mode ITU-T G.657.A1 fibre will be supplied as standard by Datwyler with bend-optimised G.652.D (BLO) fibre – or optionally with bend-optimised ITU-T G.657.A2 fibre. The latter has been tried and tested in FTTx networks and data centres, with users benefitting from a low bending radius of 10 to 7.5mm for added operational safety.

FO Universal and FO Outdoor cables will also no longer be offered with ITU-T G.657.A1 fibre but from now on – in addition to ITU-T G.652.D – will be available with G.652.D (BLO) fibre. BLO stands for "Bend Losses Optimised".

The convincing argument for this new fibre is not only that it has improved attenuation properties, e.g. $\leq 0,21\text{dB/km}$ @ 1,550nm (installed), but also that it incorporates the essential advantages of



▲ *Datwyler's single-mode cables with improved fibres*

the 'old' fibres, namely the comparatively large mode field diameter of G.652.D and the low bending losses of G.657.A1.

Planners and network operators of LANs, data centres, FTTx and city networks gain from using cables with the new G.652.D (BLO) fibres in that they no longer have to allow for additional attenuation losses when connecting fibres of different mode field diameters. These fibres therefore give them and the companies installing them a greater safety buffer.

Datwyler Cabling Solutions – Switzerland
Website: www.cabling.datwyler.com

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Solving the cleaning system dilemma

WHEN looking for a cleaning system for wires, cables, etc, one is often faced with a dilemma.

Which method, in general mechanical or wet-chemical, is suitable for the desired surface quality? In addition, your budget or your available space might be limited.

However, today the range of manufacturers of inline cleaning systems as well as the current market solutions are manageable.

The appropriate method is still difficult to determine at first glance. And as a result of this difficulty, there is often an attempt to construct and implement your own solution only to find that the outcome is, despite intense input of time and material, inadequate.

Where to begin the search? Basically, the definition of the cleaning target and the analysis of the surface texture should be at the beginning of the search.

Only when these points are defined, the choice of the suitable method, and if necessary a suitable cleaning agent, can be carried out.

Usually a subdivision in "mechanical cleaning" and "chemical cleaning" is made, whereby nearly all mechanical cleaning methods can be combined with the chemical cleaning.

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 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



▲ GEO-Reinigungstechnik – overcoming the cleaning system dilemma

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.

Comprehensive analysis of all parameters is necessary. Since the choice of the appropriate cleaning method is determined by many other factors, a comprehensive analysis of all parameters should be undertaken.

This is precisely the approach that GEO-Reinigungstechnik GmbH (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.

GEO offers a complete range of ultrasonic, high-pressure jet nozzle, steam and mechanical wire cleaning systems both for single wire and multi-wire applications.

GEO has completed the cleaning of welding wires after the drawing process by systems for coating with welding wire finish and subsequent quality control.

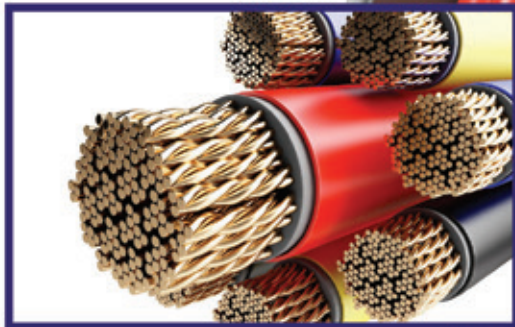
The procedures can be tested under near-production conditions at GEO's test laboratory and from the knowledge gained suitable solutions can be selected and implemented.

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

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Efficient, safe and economic cable handling

FOR almost 20 years, cable and wire harness manufacturers have been working with the Niehoff Packaging System (NPS).

It has been in continuous development since its beginnings and has proven to be a highly efficient, safe and economic handling system for primary automotive cables as well as bunched wires, strands, conductors and cables.

The NPS comprises special spoolers and collapsible multi-way spools made of ABS plastic. The spoolers are designed to operate in line with extrusion lines. Changeover from full to empty spools is carried out at full production speed, allowing non-stop operation.

The spools made in different sizes offer a secure, stable and tangle-free package both when full or partially empty, and enable highest cable pay-off speeds into downstream processes.

When empty, spools can be fully dismantled and nested into each other and returned to the cable manufacturer

where they can be easily and quickly re-assembled, reloaded and then re-used.

To protect the NPS spools from foreign spools which are not compatible with NPS, new original NPS multi-way spools are equipped with an RFID transponder.

In this way NPS users can identify if a spool belongs to the system and is compatible with it – or not. In this case considerable disturbances would be the consequence. The RFID transponder also simplifies spool labelling.

As the spool identification is stored in RFID no label is needed. The NPS packaging system allows trouble-free and tangle-free paying-off of automotive cables made of copper, copper alloys and aluminium at the highest speeds.

Even signal cables made of copper alloys with a cross-section of 0.13mm² can be processed without any problems.

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

Flexible Category 7 data cables

The new 'CU 7003 4P stranded' range of cables from Dätwyler are Category 7 S/FTP installation cables produced using stranded conductors, which makes them particularly flexible. The AWG23 cables are available in three versions – designed for office cabling, harsh industrial environments and offshore applications.

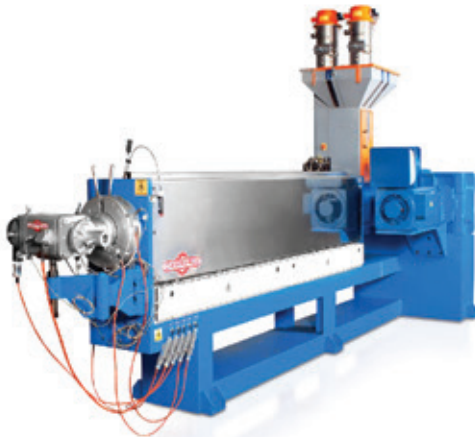
Dätwyler supplies the flexible installation cables (maximum 90m) either with a zero-halogen, flame-retardant, low-smoke outer sheath for structured in-house cabling, a polyurethane sheath for use in harsh industrial environments, or a tough, halogen-free SHF1 sheath for offshore applications (with DELTA and DNV certificates).

Dätwyler Cabling Solutions AG – Switzerland
Website: www.cabling.datwyler.com

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www.supermacindia.com



Supermac Industries established in the year 1974 is a leader in manufacturing of high end systems and process technology for the cable industries. This ISO 9001 certified company specializes in offering customized solutions, keeping in mind the specific needs of the customers.

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www.micro-weld.com



Based in USA, Micro-Weld is a pioneer in manufacturing of high performance electric-resistance butt and flash welders. Built for over 85 years, these welders are easy to operate and designed specifically to be used in wire and cable industry. There are over 50 models to choose from, for a wide range of applications and capacities.

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Brush frames for simplified cable routing applications

THE icotek range of cable entry products available from M Buttkereit Ltd has been extended with the KEL-BES range.

These products feature polyamide frames incorporating entrapped polyamide brushes, providing a quick and simple push-through entry for routing cables into network cabinets and control boxes.

The KEL-BES products are also suited to exit/entry apertures in the raised floors utilised within computer centres.

Three frame sizes are currently available, all providing exact matches for the cut-out dimensions applicable to 10-, 16- and 24-pole standard industrial connectors.

All frames feature a 10mm-thick projection above the mounting service, with a wide mix of round, flat and even pre-terminated cabling being accommodated.

The twin brush strips incorporated into each frame provide a self-sealing closure to whatever standard or mixed cabling is utilised, so limiting or preventing the ingress of all but very fine dust particles.

All frame fixing and cable routing applications can now be simplified, resulting in higher versatility and time saving.



▲ KEL-BES brush frames suitable for cabinet and control panel applications

The frames are manufactured from black polyamide with a flame class of UL94-Vo, with the same material utilised for the brushes. The products are halogen- and silicone-free and are suitable for operations within a temperature range of -20°C to +90°C.

M Buttkereit Ltd – UK
Website: www.buttkereit.co.uk

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扁方形 最薄尺寸0.10x2.0mm 專包平角銅線用
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Other main product
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Compacting or bunching dies
Others

Hexagon 六角形

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Triangle 三角形

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Ultra-fine Irregular 極細不規則形

www.weilly.com.tw weilly@ms5.hinet.net Tel: +886-3-4707155

PAI enamel in thermal class 240°C

The need to complete the IEC Regulation for the use of enamelled wires for electronic purposes has resulted in the establishment of a new standard for the production of high thermal class enamelled wires.

This new standard was necessary in response to the restrictions demanded by the REACH Regulation, which no longer allows large quantities of polyimide enamels (PI) to be imported from countries outside Europe and strongly regulates the NOx gas emissions for minor solvents content.

For this reason, in 2012, Elantas decided in agreement with the Italian corporation Comitato Elettrotecnico Italiano CT 55 to create a new standard regulating the use of enamelled wire made with polyamide-imide enamel (PAI) in thermal class 240°C.

By then, Elantas Italia had already developed a PAI enamel in thermal class 240°C that satisfied the requirements set by the only standard for high thermal index (IEC 60317-46 Aromatic polyimide enamelled round copper wire, class 240).

The product Allotherm 602 BGM was proposed as a definite alternative enamel. The application of PAI enamel helps reduce NOx emissions to 40 per cent. Allotherm 602 BGM also has a longer molecular stability than PI enamel, resulting in good usability without any particular storage problems.

The new standard publication was completed in April 2015 under the guidance of project leader Gino Paolo Piccioni, technical assistance manager, in the space of three years.

Elantas Italia – Italy
Website: www.elantas.com



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State-of-the-art control systems

WHITELEGG Machines has shipped a machine that will be used to wind body scanner coils for a Korean multinational company. This is the first machine of its type on which Whitelegg has installed state-of-the-art servo-controlled axes and a touchscreen HMI.

Whitelegg Machines has over 80 years' experience in designing, manufacturing and supplying equipment to the wire processing and electrical industries, exporting machines to customers worldwide. In general terms, the company's products fall into four groups: wire forming machinery; electric motor repair, rewinding and testing equipment; electrical safety test instruments; and coil winding machines.

Always striving to provide customers with the best product at a cost-effective price, the company continues to develop its standard machines and also supplies one-offs and special-purpose machines when requested.

Recently the company shipped the latest of its large coil winding machine, which will be used to wind body scanner coils for a Korean multinational company. Unlike previous large coil winders from



▲ Clear benefits for the end users

Whitelegg, this latest version benefits from servo-controlled axes, together with an intuitive touchscreen graphical user interface and a PLC with custom software for controlling the overall process.

For the end user, these features translate into the following benefits:

- monitor and maintain a constant tension in the material being wound
- layer wind the material very accurately
- layer control for spooling and de-spooling
- programmable winding with an onboard memory for storing winding programs
- data logging for each winding so that the number of turns, pitch and winding tension can all be recorded

Whitelegg developed and manufactured the first MRI (body scanner) winding machines in the world in 1982. This then-new technology was developed at Oxford University, which led to locally formed companies producing the first full body scanners. Eventually half a dozen companies were spawned from the initial manufacturer in and around Oxford, all of which were supplied by Whitelegg.

Oxford Magnet Technology became the first volume manufacturer and was supplied with over a dozen machines by Whitelegg. Oxford Magnet agreed to license this technology to other medical equipment manufacturers, resulting in Whitelegg receiving machine orders from GE of the USA, Siemens in Germany and Furukaiwa in Japan.

The first body scanner was built in a concrete bunker outside Oxford, as it was feared that the magnetic fields could have been harmful to humans. In the event, the results have only been beneficial.

Oxford Magnet Technology was purchased by Siemens some years ago, since when Whitelegg has designed and manufactured a special-purpose machine for winding small coils from special materials, with sophisticated tension control. All of Whitelegg's large coil winding machines are built to customers' specifications and the latest machine, pictured here, is capable of winding coils of 2,000mm maximum diameter, with lengths of up to 2,000mm, and with a maximum coil weight of 4,000kg.

An integral de-spooler is servo-controlled and operates in conjunction with the servo-driven main rotation axis and the tensioning pulley, with a load meter providing the necessary feedback for the tension control system. All of the servo motors and servo drives are Lenze products, and FMS Force Measuring Systems provided the tension control load meter (comprising a load cell and amplifier). A further servo motor controls the axial movement of the de-spooler as each turn of wire is laid down adjacent to the previous turn.

The HMI for this machine is entirely new and has been developed by Whitelegg specifically for the manufacture of body scanner coils. The graphical touchscreen interface prompts the user to enter parameters such as the number of layers, the number of turns, the traverse position and, of course, the wire tension. The HMI is mounted on an arm that traverses the length of the machine as winding progresses in order that the operator always has the best possible view of the winding process.

Additional push buttons are installed on the HMI housing to control the de-spooler, and a joystick provides for manual fine control of the de-spooler traverse. Another set of push buttons on the reverse of the machine, where the de-spooler is mounted, allow for easier set-ups.

The use of state-of-the-art servos and a specially developed HMI and control program offers clear benefits for end users.

Whitelegg Machines says it can upgrade existing large coil winding machines – whether from Whitelegg or another manufacturer – so that the benefits can be enjoyed more widely by end users seeking better process control for coil winding. In some cases this work would be carried out at Whitelegg's factory in Surrey, UK, but other machines may be suitable for the upgrade to be retrofitted at the customer's premises.

Whitelegg Machines Ltd – UK
Website: www.whitelegg.com

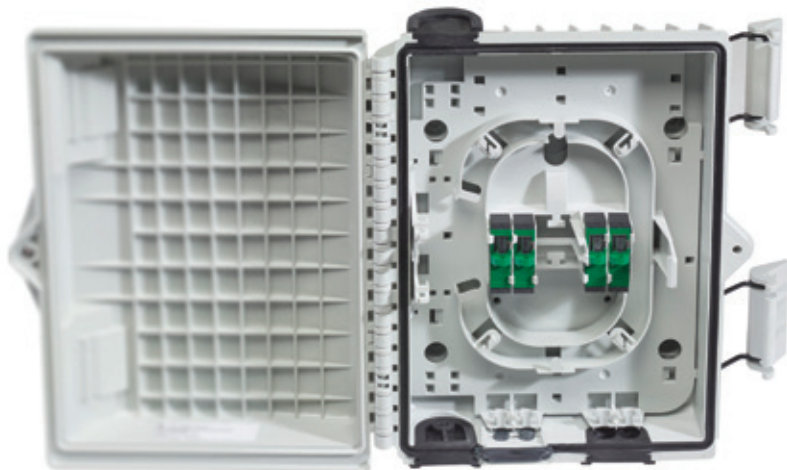


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Enhanced fibre wall box portfolio



▲ The optical wall box from CommScope

COMMSCOPE is introducing its enhanced fibre wall box portfolio designed to simplify installation and reduce the cost of taking fibre deeper into both multi-dwelling unit (MDU) and single-family dwelling unit (SFU) environments.

As part of the recently acquired Broadband Network Solutions (BNS) business from TE Connectivity, the fibre wall boxes:

- are available in multiple sizes and configurations for splice, connectorised and indoor/outdoor applications
- provide an end-to-end solution for in-building construction
- address the need for targeted installation budgets

"CommScope recognises the unique challenges of bringing fibre into the MDU and SFU. Service providers have targeted budgets and timelines to work with. We can help by offering products with the flexibility to adapt to a variety of building types and environments," said Jaxon Lang, general manager and vice president, BNS, CommScope.

"With the expansion of our fibre wall box portfolio, we give our customers more choices for bringing fibre deeper into the home or business without exceeding their budget or having to sacrifice anything in network performance and reliability."

CommScope's mini Rapid Fiber™ distribution terminal (RDT), previously only available for indoor MDU applications, is now available for outdoor use. Using CommScope's RapidReel™ cable spool, the mini RDT can deploy several hundred feet of 3.6mm indoor/outdoor cable.

The far end of the cable terminates to a 12-fibre multi-fibre push-on (MPO) or hardened multi-fibre optical connector (HMFOC), which ensures faster cable routing and equipment terminations by the technician. The RapidReel cable spool, multi-fibre cable and connector technologies help reduce site survey inspections, streamline cable inventory requirements and speed overall MDU installations.

To support cascaded MDU architectures, the mini RDT – indoor model is now available with a 1x4 or 1x8 integrated splitter option. A single optical fibre cable feeds the mini RDT, which splits the signal up to eight available SC plug-and-play adapter ports.

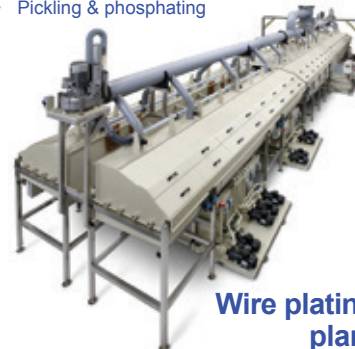
To turn up service, installers use preconnectorised drops to quickly feed up to eight living units per floor. All-front access to customer terminations ensures easy maintenance, changes and additions for technicians.

The optical wall box (OWB-S) is an outdoor fibre termination solution for connecting fibre-to-the-home (FTTH) devices, but it can also be used in other outdoor above-ground applications. Built for mechanical and environmental protection, the OWB-S offers flexible options for fibre storage, splicing, patching and passive component integration in a small footprint. The OWB-S offers multiple cable access points for indoor/outdoor applications. A simple hinge and latch design ensures quick and easy technician access. For security applications, the OWB-S includes an optional padlock.

CommScope – USA
Website: www.commscope.com

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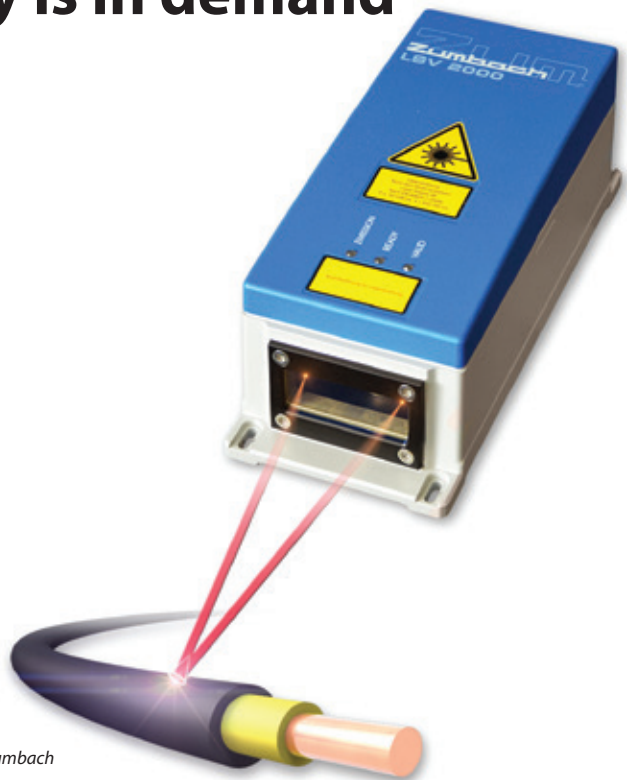
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Quality is in demand



▲ The LSV2000 from Zumbach

PRECISE knowledge of length and current speed is a key cost and process optimisation factor in the production of sheet goods and cables. Wear and slip push material costs up, but companies today can no longer afford to produce rejects.

The LSV 1000/2000 velocimeters from Zumbach support manufacturers when monitoring quality in steel, cable, wire and tubing production.

They exceed the performance of conventional contact-based measuring methods, at the same time offering maximum robustness with minimised maintenance requirements and costs.

The compact device provides length and velocity data quickly and reliably for both process control and cut-to-length applications. Precise detection of very small movements is possible because the measuring accuracy is not dependent on the speed.

With the LSV 1000/2000, you can:

- Rapidly adjust the desired measuring field. The device is a compact all-in-one system and can be easily integrated into production processes. The visible lasers simplify alignment in the measuring field.
- Measure immediately – with mobile or remote monitoring. Recalibration is superfluous. Its low weight of just

4.3kg and the supplied mobility kit allow rapid mobile deployment as well as connection to a laptop. The sensors are immediately ready for use and feature a universal power supply and a LAN connection.

- Optimise production processes – irrespective of the surfaces, materials and temperatures. The LSV length and speed sensors can be used in a huge array of environments. They are robust enough to supply reliable results even in adverse conditions: the LSV 1000/2000 measure reliably on virtually any surface, eg steel, shiny aluminium, oily sheets, wire and cable. Certified for protection classes IP 66 and IP 67 (in acc. with EN 60529), the robust sensor technology ensures reliable operation even under harsh conditions.
- Communicate effectively. The rapid, state-of-the-art signal processor is equipped with a powerful command system for efficient system communication via serial or Ethernet interface. The new system allows Zumbach to support the objective of optimising continuous production processes to obtain significant material cost savings. In the light of this performance and the low operating and maintenance costs, the ROI is attractive.

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

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Wire drawing lubricants

TRAXIT International supplies lubricants for the international wire drawing industry. The company provides a complete range of products and innovative solutions to suit all needs and applications of its demanding customers.

Founded 1881 in Schwelm, Germany, Traxit has grown into a major player in its industry, and claims to be the only global supplier that maintains drawing lubricants and compounds as its sole business.

Its products are distributed by proprietary companies, agents and representatives in more than 150 countries, in order to provide clients with technical solutions and necessary know-how. With a committed team of experts and more than 200 different formulations, Traxit can help find the lubricant for any task required.



▲ Traxit supplies a wide range of lubricants for wire drawing

The eco-conscious company uses its experience to look ahead and remain at the cutting edge of wire drawing technology.

For instance, it has already switched all lubricants to borax-free versions, with better performance in most cases, and has started to produce dry lubricants with total usage to reduce disposal costs.

Traxit is also developing lubricants with constant viscosity at high temperature, to reduce the friction temperature inside the die, and is working on special lubricants for high drawing performance with anti-friction for extended die life and higher productivity.

The company offers sodium soaps with a large and special shape of grain size to reduce dust contamination around the drawing line, as well as lubricants for pressure dies (hydrodynamic lubrication).

Further details can be found when the company exhibits at wire 2016 in Düsseldorf, Germany, in April.

Traxit International GmbH – Germany
Website: www.traxit.com

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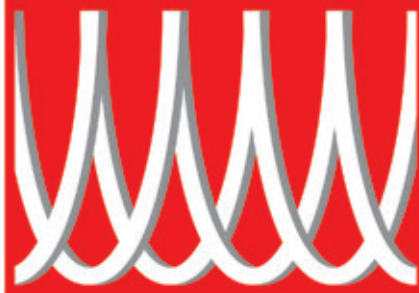
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▲ Responsible dry drawing lubricants from Condat

SINCE the end of 2010 and the classification of Borax as SVHC, French company Condat has discontinued the production of high Borax dry lubricants and surface coatings at its European site. This first step ensures that its surface coating and dry lubricants are not labelled reprotoxic and ensures a safer workplace for operators.

Keeping in mind that the future of Borax in Europe is jeopardised by its inscription on the SVHC list, Condat's research and development team has worked relentlessly to provide its customers with high performance solutions. Vicafil Santale 6, a wire drawing soap, satisfies the more demanding operations such as the production of steel cord allowing continuous quality improvement of the final product.

Lubricants containing titanium dioxide are often used where a heavy duty, high coating weight is required. Keeping ahead of the potential evolution in regulations, Condat has started to diminish the percentage of titanium dioxide in its lubricants and develop alternatives that are titanium dioxide free.

Vicafil Decal 440 is the perfect example. Its use has been validated on processes where lubricants containing titanium dioxide were usually used. This switch has been done without impact on productivity and provides improvements such as lower maintenance of acid cleaning baths or better compatibility with in line fluidised bed ovens.

Another example is where Condat has discontinued the use of short and

medium chain lengths of chlorinated paraffins. Short chain lengths are banned and medium chain lengths contribute to the classification of industrial sites (ex: European Seveso regulation).

Chlorinated oils are commonly used in high duty metal forming operations. Condat has reformulated its range of drawing oils and greases so that they are not labelled under the GHS regulations. Condat products, for example Vicafil TFG 4295 or Vicafil TFH 1672 oils, can be used safely by operators, with minimal impact on the environment, and do not contribute to Seveso classification for end users. They also result in cost savings in terms of waste disposal and site equipment.

With the same philosophy, Condat tries to reduce its environmental and transportation impact through local storage facilities. With three production sites worldwide and an international sales presence, Condat is able to promptly deliver products of identical quality to any location.

Condat's sense of responsibility is also obvious in the way it accompanies its customers. Not only does it guarantee its customers a reliable, consistent and high level of quality, but a team of experts, dedicated to the metal forming market, also provide a full range of services to help clients improve their production processes and productivity; lubricant use audit on-site, and specific training on its technologies for plant management and operators.

Condat - France
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wire Düsseldorf preview 2016

Wire manufacturing and finishing machinery; materials, special wire and cables; measuring and control technology; and test engineering are just some of the sectors catered for when wire 2016 opens in April.

The countdown is well underway and it is now just three months before the biggest and best exhibition for the wire and cable industry swings into action from 4th to 8th April in Düsseldorf, Germany.

Two years ago more than 38,000 visitors toured the show site at the Fairgrounds, all eager to visit over 1,300 exhibitors showing off the latest technology and machinery in the industry's premier exhibition.

Visitors are drawn from around the globe from the wire and cable industry, automotive supply industry, iron, steel and non-ferrous metal world, the electrical industry, as well as construction, chemical, trade, technical and specialist retail trades.

A list of exhibiting companies starts on the next page. Tube 2016 will also be running alongside wire 2016 in 17 halls at the site on the outskirts of the city.

Show dates:
Monday 4th April - Friday 8th April 2016

Show opening hours:
9am-6pm Monday to Thursday
9am-4.30pm Friday

Messe Düsseldorf GmbH – Germany
Tel: +49 211 456 001
Fax: +49 211 456 087 7793
Email: wire@messe-duesseldorf.de
Website: www.wire.de

Listings are correct at the time of going to press, December 2015. Stand descriptions are being taken now for the March issue and should be sent to david@intras.co.uk



4-8 April

Alphabetical list of Exhibitors

Listing correct at time of going to press, December 2015

Exhibitor	Hall/Stand		
3View.Com Inc.....	15 G48	Alecosa Aleados del Cobre SA09 A11	
A Appiani Srl	11 G32	Alfred Wertli AG	11 J60
A Schulman GmbH Thermoplastische Kunststoffe	16 F33	Alloy Wire International Ltd	11 E26
Aachener Maschinenbau GmbH	15 C36	Almetha GmbH.....	11 J68
AB Elektrokoppar / Liljedahl Bare Wire	12 A43	ALMT Corp	15 J12
Acciai Speciali Zorzetto Srl	12 D59	Alok Ingots (Mumbai) Pvt Ltd	17 E10
Acciaierie Bertoli Safau SpA	17 C04	Alpha Converting Equipment Ltd	12 D23
Acciaierie Valbruna SpA	12 C60	Alroc SAS	12 A51
Acciaierie Venete SpA	12 C40	Altec Srl	11 B25
Acenta Steel Ltd.....	12 E43	Altman Technologies Inc	09 D16-5
ACIMAF Italian Wire Machinery Manufacturers Association....	11 A52	Altrimex Packaging Equipment BV	15 F14
ACM A/B	09 F40	Ambica Stainless Steel Limited	17 E37
ADC SARL	09 C02	Ambica Steels Limited	17 E27
Adelys EURL	16 H04	Ambrell BV (Ambrell Group).....	11 H31
Advaris Informationssysteme GmbH	09 B54	Amic SARL	10 H22
Aeroel Srl.....	09 B53	AMPAC International Inc	11 A02
Aesa SA Aesa Cortailod	10 A38	Ampere Deutschland GmbH	11 J49
Aferpi Acciaierie e Ferriere di Piombino SpA	11 J33	Analyticon Instruments GmbH	06 G34
AFH-Antriebstechnik GmbH.....	12 A50	Anand Arc Ltd	11 D49
AGC Chemicals Europe Ltd	17 B11	Anbao Qinhuangdao International Corp	16 E48
Agibi Progetti Srl	16 G21	Anglia Metal Limited	12 A37
Agir Technologies SAS (Mouto – Rivom)	10 G56	Ann-Chain Enterprise Co Ltd	16 G68
Agro Steel Wire GmbH	10 C31	Anordica AB	12 E25
AGST Draht- & Biegetechnik GmbH	10 A32	Anu Extrusions Pvt Ltd	15 D39
Aichelin Holding GmbH	15 F56	Aperam Alloys Imphy SAS	12 A32
AIM Inc	11 A21	Ara Makina Imalat Sanayi ve Ticaret Limited Sirketi	11 D74
Ajex & Turner Wire Dies Co	11 C03	ArcelorMittal Commercial Bars and Rods SA	12 D34
Akcelik Demir Celik Sanayi ve Ticaret AS	17 B09	ArcelorMittal WireSolutions SA	12 D34
Akdeniz Civi Tel Nakliyat San ve Tic Ltd Sti	15 J36	Area Sistemi Srl	11 D30
Aksh Optifibre Limited	09 E55	Arma-Plus SAS.....	16 A09
		Artofil BV	11 B02
		ASA-RT Srl	09 F74

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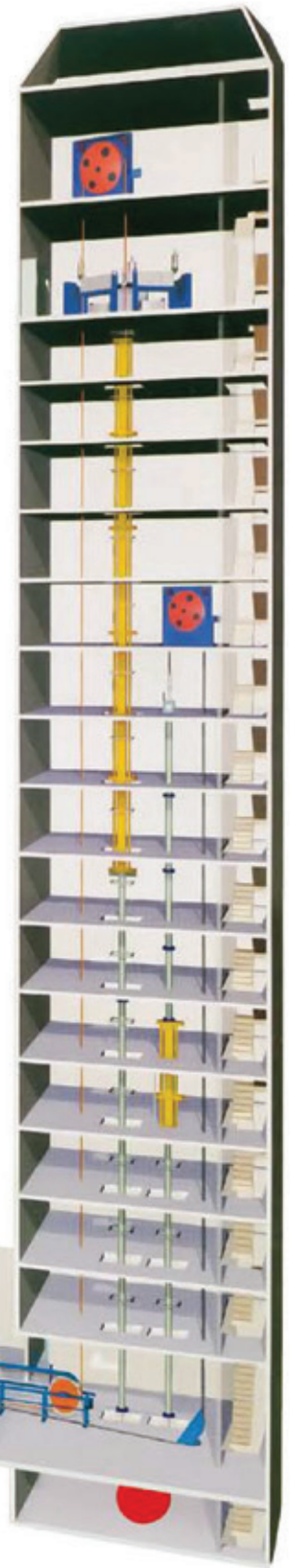
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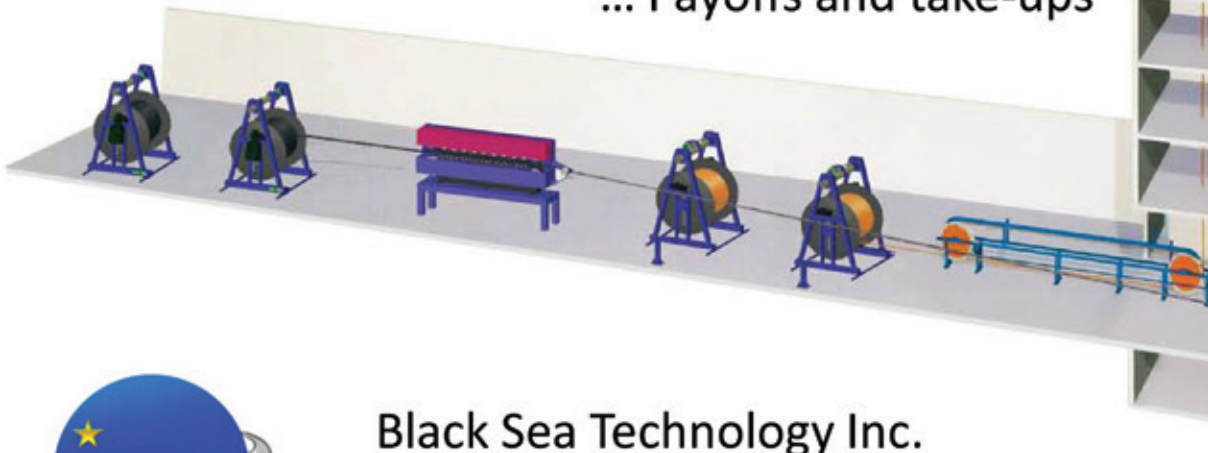


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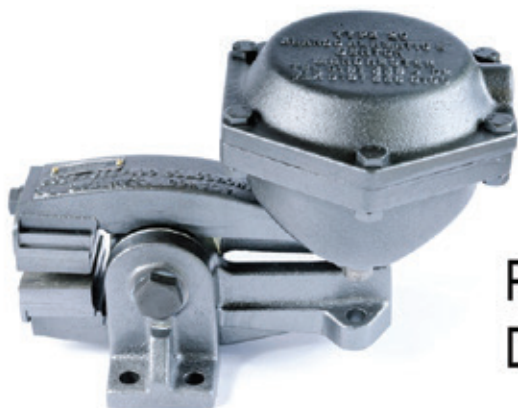
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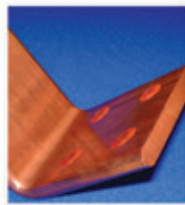
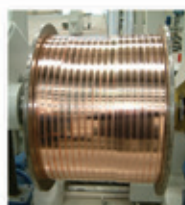
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Technique for precise concentricity measurement of a conductor in the insulation and relevant parameters of cables and wires

By Harald Sikora and Katja Giersch, Sikora, Germany

Introduction

Wire and cable manufacturers of automotive and control wires as well as coax and communication cables are using measuring and control technologies in their extrusion lines to maintain specified cable parameters. This is important for process optimisation and quality assurance but is also demanded when products are assembled automatically. In these cases, assembly failure rates are recorded statistically, registered and assigned to the manufacturer. For this reason, cable plants are aiming to supply cables with reliable high quality standards.

Challenges in cable extrusion

A challenge in the cable extrusion process is maintaining measurement values with tight tolerances of the conductor concentricity in the insulation, the conductor diameter, the outer diameter of the cable and the ovality of the outer diameter. During the extrusion process deviations of the measuring values can occur, which would remain undetected without special equipment for visualisation.

Lumps, neckdowns, faults or bare spots in the cable can lead to malfunctions during assembly.

Early in the assembly process, the cable or wire is cut to lengths and stripped at the ends in order to be subsequently fitted with plugs. The pull-off forces used for the stripping are exactly defined. Deviations of the pull-off forces within the conductor insulation can cause interferences during the stripping. The use of innovative measuring and control technology allow the cables to meet the high demand requirements and also identify potentials for process optimisation of the extrusion line.

Rotating/oscillating conductor

The requirements for measuring and control technologies in cable extrusion lines are very precise where tolerances within a few micrometres have to be maintained. While the mean value of the diameter or the wall thickness of the insulation is sufficient for controlling the extrusion line, the reliable recording and visualisation of short-term variations, especially of the eccentricity values, is additionally necessary under the aspect of the minimum wall thickness. Slight oscillations of the conductor directly before the crosshead can lead to significant deviations of the concentricity, especially if the conductor is oscillating in one plane or rotating. Such eccentricities cannot be shown with a conventional graphical visualisation. A fast rotating

vector of a constant eccentricity value can only be displayed to the operator by a visualisation beyond the standard display.

Angle position of a conductor

During the extrusion process it is possible that a cable, with or without guide rollers, has a slightly angled position when running through the measuring plane. Eccentricity measuring systems have to be able to generate accurate measuring values even when such a position occurs (see *Picture 6*).

A sag or bend of the conductor

Even on the assumption that the conductor is stretched when running through an extrusion line, it may still show some bends, which have to be detected when entering the gauge head of an eccentricity system. Without any special measures, even invisible curve radii in the range of 5 to 20 metres can lead to eccentricity errors of up to 40 micrometres. Only in an ideal case, guide rollers can compensate this imperfect stretching of the conductor, or vice versa, even increase the error. Therefore, the aim should be to eliminate guide rollers completely.

Measuring the concentricity of a conductor in the insulation ensures a high quality cable will be produced. During manufacturing of the cable, the measuring system should compensate completely the influence of production related variables that can affect the measuring result, such as angled cable positions and curve radii of the conductor.

Concentricity systems, in combination with an integrated or external processor system, visualise short-term variations of the eccentricity in the form of a scatter plot. The system lays the foundation for the production of high quality cables, and ensures a reliable, flawless cable during the assembly process. Subsequently, it contributes to process reliability and additionally to cost effectiveness.

Measuring system for concentricity measurement

The measuring system (*Picture 1*) is based on an optical and inductive measuring technique. With the inductive measuring system, which is positioned between two optical measuring planes, the exact position of the conductor is determined. With the optical system, the position of the cable is measured. An eccentricity value occurs when both positions differ from each other. Simultaneously, the optical system captures precisely the diameter and the ovality of the cable.

All necessary calculations and analysis are carried out in the measuring system. The measuring values are available from different interfaces for transferring data to a display and control unit or to a line computer.

▼ **Picture 1:** Devices for the concentricity measuring of a conductor in the insulation



Inductive measuring circuit

The cable passes through a toroidal transformer, which generates an alternating current of a few milliamps into the conductor. The alternating current creates a magnetic field, which ideally surrounds the conductor in a circular manner and the intensity decreases, exponentially, with the square of the distance. In the measuring system inductive sensors are placed at a determined distance, radially around the conductor. With the help of these sensors, the exact position of the conductor is calculated with high precision from the distribution of the intensity of the magnetic field strength.

Due to the combination of multiple optical sensors and the special design of the inductive sensors, an angled position or a bend in the cable is detected and automatically compensated for. This ensures a precise eccentricity measurement.

Due to the automatic centring of the gauge head to the cable position, the measuring system is able to provide precise measuring values at all times, even when the pulling forces in the cable vary. Guide rollers are unnecessary with automatic adjusting heads.

The arrangement of the inductive measuring system for the determination of the conductor position in the centre of the gauge head, in combination with ferro-magnetic shielding, prevents environmental variables from having an influence on the eccentricity measuring value. For that reason, even a passing forklift, a moved cooling trough or changing grounding conditions have no influence on the measuring result.

Optical measuring circuit

The optical measurement is based on the principle of the diffraction analysis combined with pulse-driven laser diodes, the light beam from the diodes projects a shadow of the cable onto the CCD-line sensor in each measuring axis with an exposure time of 0.25 microseconds. The systems measure at four axes (at eight points) the position and the width of the shadow. From the position of the shadow in relation to the determined position of the conductor, signal processors calculate the exact value of the eccentricity and from the widths of the four shadows the outer diameter and the ovality are calculated.

The measuring values of the outer diameter, if required in combination with the conductor diameter (the wall thickness), are suitable to amend the output capacity of the extruder or the haul-off speed of the cable in such a way that the measuring values are set to the respective nominal value. Moreover, measuring values with tight tolerances are of significant importance for the assembly. Each of these values influence the wave impedance (eg twisted LAN-cables) and consequently the value for the Structural Return Loss (SRL) of a data transfer cable, especially when deviations of these values occur periodically.

With the help of the Fast Fourier-Transformation (FFT), the high scan rate of 2,500 measurements/second is suitable for creating a forecast for the SRL in dependence of the transmission frequency even at line speeds of 3,000 metres/minute for both current and future CAT-specifications. If a specification is given concerning the minimum wall thickness for the cable insulation, then any eccentricity leads inevitably to an increased consumption of insulation material. Therefore, eccentricities should be reduced for economic reasons.

Recording of oscillating eccentricity values

With a scan rate of 2,500 measurements per second, the measuring system records oscillating eccentricity values with high single value precision. These are visualised in form of a scatter plot (*Pictures 3, 4 and 5*).

The scatter plot provides an additional way to visualise the ongoing measurement at processor-based display and control devices, and with its help, the distribution of short-term variations of the eccentricity can be shown graphically. Each dot represents a single value of the eccentricity concerning value and direction. The overall distribution of the scatter plot highlights the standard deviation of the eccentricity. It is often sufficient to amend the guiding of the conductor close to the crosshead in order to avoid these oscillations, which usually occur within a certain speed range and/or certain filling degrees of the coiler or decoiler, respectively.

The standard way of representing eccentricity using a cross-section of the cable (*Picture 2*) is additionally helpful for the operator when centring the crosshead. *Picture 3* shows a random type distribution of the single values of the eccentricity, while *Picture 4* shows a ring type distribution of the eccentricity values, which is often the result of a rotating



▲ **Picture 2:** Standard presentation of eccentricity



▲ **Picture 3:** Random type distribution of the single values of the eccentricity



▲ **Picture 4:** Ring type distribution of the single values of the eccentricity



▲ **Picture 5:** Ellipse type distribution of the single values of the eccentricity

(oscillating) conductor prior to the extruder crosshead. *Picture 5* shows an ellipse type distribution of the scatter plot, which can happen, for example, when the conductor is oscillating or vibrating in one direction directly before entering the crosshead and which therefore additionally causes eccentricity variations.

This permanent rotation eccentricity would also not be visible with a standard presentation of eccentricity (as shown in *Picture 2*).

In order to ensure a high measuring accuracy of the conductor within the insulation, the optical measurement axes

should be positioned at the same level as the inductive sensors. In this positioning, the optical paths are shaded by the inductive sensors. For that reason, the optical measuring planes are divided.

One optical measuring plane is arranged before and one after the inductive sensor plane. As a consequence, only an absolute straight and horizontal conductor can generate accurate measuring results.

In practice, however, slightly angled positions or bends in the conductor typically have to be expected. This means that the measuring device has to be able to record precise measuring values even under these conditions.

Measurement of a sloping position of the cable

Picture 6 shows a cable running in reference to a straight line. The cable, however, is running in an inclined position to the actual intended production line.

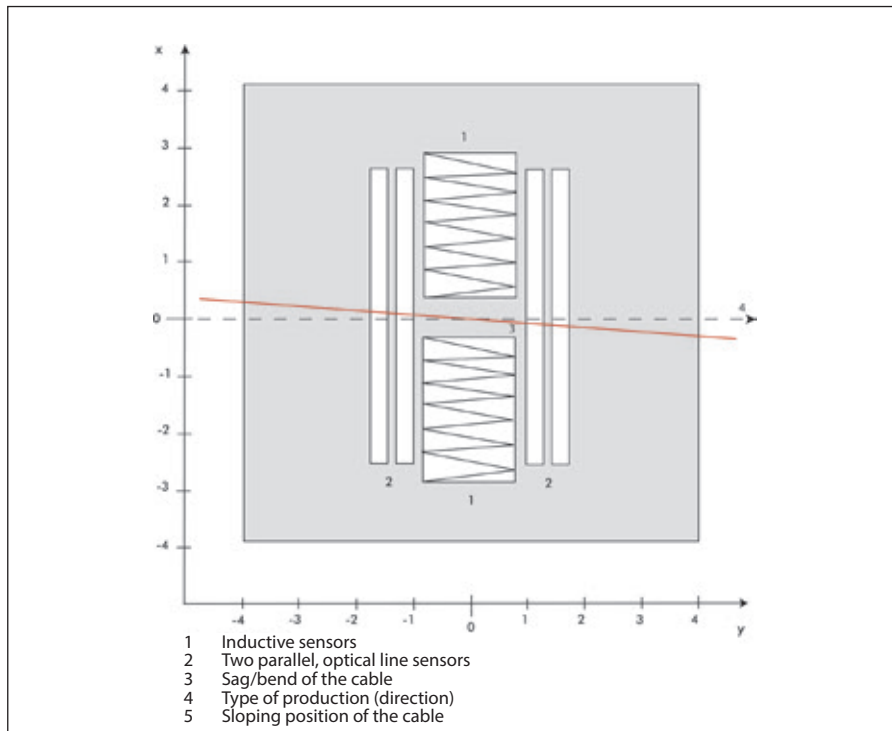
In the illustration, the inclined position of the cable is exaggerated for a better understanding. A straight or inclined line, in this case a straight conductor, is defined by two points. By means of the first and second optical measuring device, the sloping positions of the cable will be identified and its influence on the measuring results will be determined and fully compensated.

Determination and compensation of a sag or bend of the cable

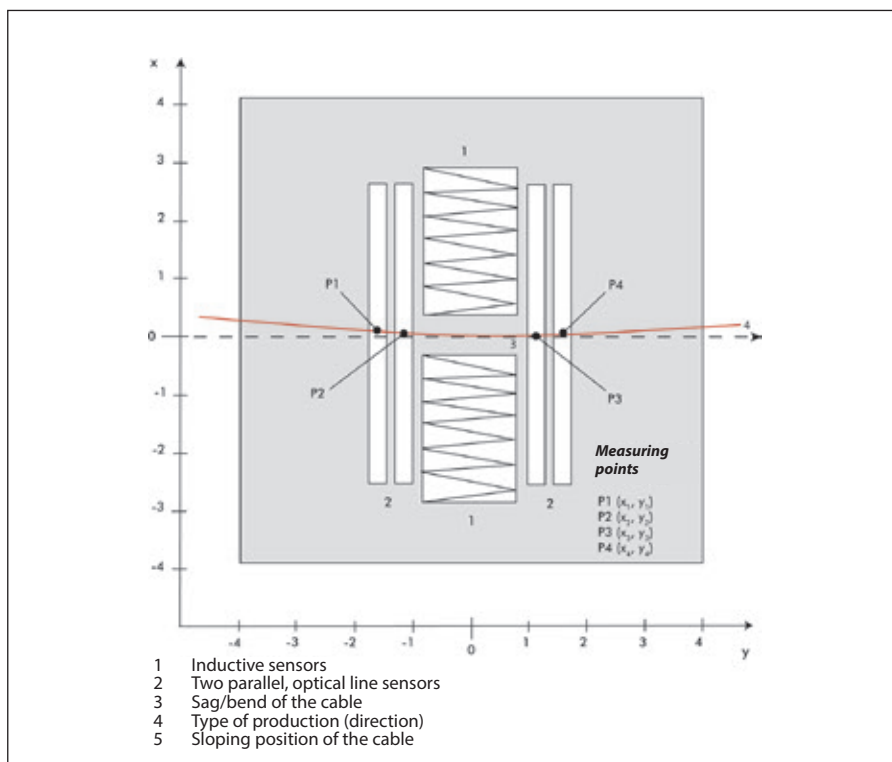
Picture 7 illustrates a cable that shows a sag or bend. For a better understanding, the illustration of the bend of the cable is extremely exaggerated and, in practice, not likely. The bend of a conductor can be described by a circle, whose position and curve radius is defined by three points.

With this information, the processor system is able to calculate the exact position of the cable in the inductive measuring plane and to fully compensate for the influence of angled position and/or bends.

As shown in the picture, the measuring system is built in a way that the position of the cable is measured at four points, shown in the illustration as P1, P2, P3 and P4. Due to this, the measuring system is able to detect even irregular deformations of the conductor.



▲ **Picture 6:** Technique to determine a sloping position of the cable



▲ **Picture 7:** Technique to determine a sag or a bend in the cable

Conclusion

With the introduced technology it is possible to precisely measure the concentricity of a conductor in the insulation as well as the product parameters, outer diameter, ovality and wall thickness. The measuring technique records rotating or in one plane oscillating eccentricity values of the conductor in

the form of a scatter plot. This scatter plot allows visualisation of the distribution of short-term variations of the eccentricity.

Per the four-axes measurement as well as eight-point eccentricity measurement, a sloping position of the cable in the measuring plane can be recognised. The measuring system compensates automatically for a sloping position of

the conductor in both horizontal as well as vertical direction, thus the measuring results are not influenced.

The measuring system also records accurate measuring values, even when the cable is running through the gauge head with a sag or curved radius.

Using the described measuring technology in extrusion lines ensures the production of high quality cables for a flawless assembly. At the same time, it contributes to process reliability and, consequently, cost effectiveness. ■

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Akademietraining bei Tratos

EINE Akademie zur Weiterentwicklung der Mitarbeiterkompetenzen des Kabelherstellers Tratos aus Knowsley, UK, wird dieses Jahr das erste seiner Trainingsmodule anbieten.

Die Idee einer Akademie entstand durch eine umfassende Umfrage bei der Belegschaft aus Merseyside - eine Übung, die großen Optimismus hinsichtlich der Zukunft des Werkes und die Ambitionen von Tratos für das gesamte Unternehmen aufzeigte. Außerdem galt dies als hilfreich, um die aktuellen Fähigkeiten und das Wissen zu beurteilen. Dabei wurden auch die Ansichten der Geschäftsleitung und des Vertriebsteams sowie der Belegschaft aus Knowsley einbezogen.

Als Bildungsansatz beschrieben, können über die Akademiestruktur überall Module durch das Unternehmen weltweit zur Verfügung gestellt werden, die sowohl langjährigen Kollegen wie auch neuen Mitarbeitern offenstehen.

Von der Geschäftsführung wurde eine Investition in der beruflichen Fortbildung ausgewählt, die als besonders wichtig gilt, und daher die Bereitstellung der Inhalte für die Akademiemodule zügig abgeschlossen.

Da sich Tratos in einer starken Wachstumsphase befindet, müssen die Schulungen entsprechend angepasst werden. Demzufolge ist das Ende letztes Jahr beschlossene Projekt bereits im Einsatz.

Fertigungsstätten von Tratos befinden sich zwar auch in Italien und die Akademieurse werden dann global angeboten, doch war das Werk von Tratos in UK das erste, in dem dieses Projekt zum Einsatz kam. Die Schulung und die Bewertungsprogramme für Tratos werden als äußerst positive Investitionen



▲ Mitarbeiter, die an dem vor kurzem stattgefundenen Trainingsmodul bei der Akademie von Tratos in Knowsley, UK, teilgenommen haben

betrachtet, insbesondere in der Produktionsstätte in Knowsley.

Langfristig betrachtet, wird eine Erweiterung der Akademie-Tätigkeiten

beabsichtigt. Die ersten Arbeitsphasen umfassen die Ausrichtung der Kompetenzen mit der Kultur und Ambition von Tratos sowie die Werte, die den italienischen Eigentümern sehr wichtig sind: Integrität, Transparenz und den Menschen im Mittelpunkt stellen.

Die vorbereitende Untersuchung prüfte die Ansichten der Mitarbeiter zur Haltung des Unternehmens hinsichtlich unethischem Verhalten (Nulltoleranz), deren Zukunftsoptimismus, gemeinschaftlichem Arbeiten, Vertrauen und Fairness, Wissen, Fachkenntnisse usw.

Die Absolventen der Tratos-Akademie werden intern Anerkennung und Qualifikationen erhalten, wobei viele die Option haben werde eine zusätzliche Ausbildung zu absolvieren.

Übernahme in Spanien

Die italienische MFL Group (Mario Frigerio/Frigecco) hat den Erwerb von Construcciones Mecánicas Caballé SA (Caballé), den spanischen Kabelmaschinenhersteller, sowie seiner weiteren Geschäftsbereiche, bestätigt.

Laut der Pressemitteilung wird die Transaktion „den Lieferumfang der Ausrüstungen im Bereich NE-Drahtzieh-, Verseil- und Extrusionsausrüstungen der MFL Group wesentlich stärken“. Der Erwerb schließt die Handelsmarken Caballé, OM Lesmo und Eurodraw Energy, inklusive der entsprechenden Urheberrechte ein.

„Diese gut etablierten Marken, gemeinsam mit der finanziellen Stärke der MFL Group, unserer 120-jährigen Industrienerfahrung und die umfangreichste Engineering- und Fertigungswissensbasis im Sektor, stärken unser Engagement noch weiter für unsere NE-Draht- und Kabelkunden,“ so die Mitteilung.

Mario Frigerio SpA – Italien
Website: www.mflgroup.com

Tratos Cavi SpA – Italien
Website: www.tratos.eu

Modulare Rotationsmesssysteme für Hochgeschwindigkeit-Dimensionsmessung

Zumbach Electronic hat in seiner Linie rotierender Messeinheiten neue modulare Ergänzungen eingeführt. Die SMR Produktlinie beansprucht erhebliche Vorteile gegenüber anderen Messeinheiten in der schnellen und genauen Erfassung der Dimensionen in Längs- und Radialrichtung.

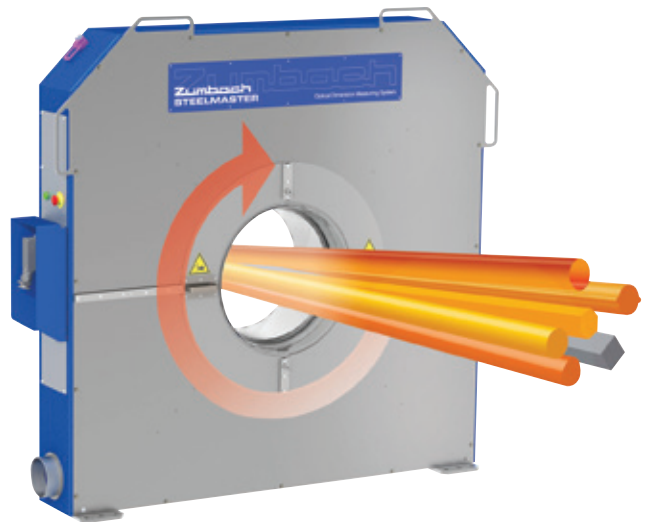
SMR-Messeinheiten drehen sich kontinuierlich mit 60 oder 100Upm. Bis zu drei ODAC®-Laserköpfe führen, voll synchronisiert, 2.000 Messungen pro Sekunde je Kopf durch. Daraus resultieren bis zu zehn vollständige Profile pro Sekunde, d.h. schneller als die vorherigen Messeinheiten.

Alternativ kann SMR im statischen, orientierbaren Modus arbeiten mit 2.000 Durchmesser-Dimensionsmessungen pro Sekunde in jede Richtung. Bei 100m/s bedeutet das ein Satz Messungen alle 50mm.

Das mechanische Konzept ist einfach und robust: keine Verschleißteile, keine Schleifringe und keine Bremsen. Die Übertragung von Energie und Signalen zu und ab den Laserköpfen erfolgt völlig berührungslos.

Standard und spezielle Softwareeigenschaften beinhalten die EPM-Funktion für eine echte Schnittdarstellung, mit polygonalen und asymmetrischen Formabweichungen; Sonderfunktionen für 3-Walzenblöcke; Berechnung des Anfangs- und Endschrotts sowie flexible, personalisierte Anzeigen.

Die Vorteile beinhalten schnelleres Anlaufen, weniger Schrott,



▲ Steelmaster SMR 400-S2 modulares Messsystem und eine Auswahl an Ausrüstungsmöglichkeiten

engere Toleranzen, Anzeige der echten Form und mühelose Wartung mit schnellem und leichtem Zugang zu den Wartungspunkten. Die Messeinheiten eignen sich für Warm- und Kaltverfahren sowie für QC.

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

Effizientes, sicheres und wirtschaftliches Kabel-Handling

SEIT fast 20 Jahren arbeiten Kabelhersteller und Kabelkonfektionäre mit dem Niehoff Paket System NPS. Das NPS wird seit seinen Anfängen ständig weiterentwickelt und hat sich als hocheffizientes, sicheres und wirtschaftliches Handling-System vor allem für Fahrzeugleitungen, aber auch für Bündellitzen, Litzen, Leiter und Kabel erwiesen.

Das NPS besteht aus speziellen Spulern und zerlegbaren Mehrwegspulern aus ABS-Kunststoff. Die Spuler sind so ausgelegt, dass sie im Inline-Verfahren mit Extrusionsanlagen arbeiten können. Der Wechsel von einer Vollspule auf eine Leerspule erfolgt bei voller Produktionsgeschwindigkeit, so dass eine Nonstop-Produktion möglich ist.

Die in verschiedenen Größen hergestellten Spulen bieten im vollen wie auch teilentleerten Zustand ein sicheres, stabiles und schlingenfrees Verpackungssystem und machen es möglich, dass das Kabel für nachfolgende



▲ Doppelspuler Typ SV 400 D für isolierte Drähte mit leeren und vollen Spulen (Niehoff-Paket-System)

Verarbeitungsgänge mit höchsten Geschwindigkeiten abgezogen werden kann.

Entleerte Spulen lassen sich komplett zerlegen und ineinander stapeln. Auf diese Weise können sie zum Kabelhersteller zurücktransportiert werden, wo sie einfach und schnell wieder zusammengesetzt, bespult und wiederverwendet werden können. Um die NPS-Spulen vor fremden Spulen zu schützen, die nicht mit dem NPS kompatibel sind, werden neue Original-NPS-Mehrwegspulen mit einem RFID-Transpondersystem versehen.

NPS-Nutzer können so erkennen, ob

eine Spule zu dem System gehört und deshalb mit ihm kompatibel ist – oder nicht. Im zweiten Fall wären beträchtliche Störungen die Folge. Mit dem RFID-Transponder vereinfacht sich außerdem die Spulen-Etikettierung.

Da die Identifikation der Spule im RFID abgelegt ist, kann das Etikett entfallen. Das NPS ist das weltweit einzige Verpackungssystem für Fahrzeugleitungen aus Kupfer, Kupferlegierungen und Aluminium, das höchste Ablaufgeschwindigkeiten störungs- und schlingenfrees zulässt.

Selbst Signalleitungen aus Kupferlegierungen mit einem Querschnitt von 0,13mm² lassen sich völlig problemlos verarbeiten. Mehr als 420 NPS-Spuler-Einheiten mit mehr als drei Mio. laufenden NPS-Spulen sind heute weltweit im Einsatz.

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

Technik für die präzise Konzentritätsmessung eines Leiters in der Isolation und entsprechende Kabel- und Drahtparameter

von Harald Sikora und Katja Giersch, Sikora, Deutschland

Einleitung

Draht- und Kabelhersteller von Automobil- und Steuerleitungen sowie Koaxial- und Kommunikationskabel setzen Mess- und Regeltechnologien in ihren Extrusionslinien ein, um spezifizierte Kabelparameter zu erhalten. Das ist wichtig für die Prozessoptimierung und Qualitätssicherung, wird aber auch verlangt, wenn Produkte automatisch zusammengesetzt werden. In diesen Fällen werden die Ausfallraten der Zusammenstellung statistisch erfasst, gespeichert und den Herstellern zugeordnet. Aus diesem Grund haben sich Kabelwerke das Ziel gesetzt, zuverlässige hochwertige Standardkabel zu liefern.

Herausforderungen in der Kabelextrusion

Eine Herausforderung im Kabelextrusionsverfahren liegt in der Einhaltung der Messwerte mit engen Toleranzen bezogen auf die Leiterkonzentrität in der Isolation, den Leiterdurchmesser, den Kabelaußendurchmesser und die Ovalität des Außendurchmessers. Während des Extrusionsverfahrens können Abweichungen der Messwerte auftreten, die ohne ein Sondergerät zur Visualisierung unentdeckt bleiben würden.

Knoten, Einschnürungen, Fehler oder Blankstellen im Kabel können zu Störungen während der Montage führen. Am Anfang des Montageprozesses wird das Kabel oder der Draht abgelängt und

an den Endteilen abisoliert, um danach mit Stecker ausgestattet zu werden. Die beim Abisolieren eingesetzten Abzugskräfte werden genau festgelegt. Abweichungen der Abzugskräfte innerhalb der Leiterisolation können Störungen während der Abisolierung verursachen. Dank des Einsatzes einer innovativen Mess- und Regeltechnologie können Kabel anspruchsvolle Anforderungen erfüllen und auch Potenziale für die Prozessoptimierung der Extrusionslinie erkennen.

Rotierender/ Oszillierender Leiter

Die Anforderungen für Mess- und Regeltechnologien in Kabelextrusionslinien sind sehr präzise wo Toleranzen im Bereich weniger Mikrometer einzuhalten sind. Während der Mittelwert des Durchmessers oder die Wanddicke der Isolation ausreicht um die Extrusionslinie zu regeln, sind die zuverlässige Erfassung und Visualisierung der Kurzzeitschwankungen, insbesondere der Exzentritätswerte, im Hinblick auf die minimale Wanddicke zusätzlich erforderlich.

Leichte Oszillationen des Leiters unmittelbar vor dem Spritzkopf können zu wesentlichen Abweichungen der Konzentrität führen, besonders wenn der Leiter in einer Ebene oszilliert oder rotiert. Diese Exzentritäten können nicht durch eine konventionelle graphische Visualisierung angezeigt werden. Dem Bediener kann ein schnell

rotierender Vektor eines konstanten Exzentritätswerts nur durch eine Visualisierung über die Standardanzeige hinaus dargestellt werden.

Winkelposition eines Leiters

Während des Extrusionsverfahrens kann es vorkommen, dass ein Kabel - egal ob mit oder ohne Führungsrollen - eine leichte Winkelposition aufweist, wenn es durch die Messebene läuft. Exzentritätsmesssysteme müssen imstande sein genaue Messwerte zu schaffen, selbst wenn eine derartige Position eintritt (siehe *Abb. 6*).

Durchhang oder Biegung des Leiters

Selbst wenn man davon ausgeht, dass der Leiter gespannt wird wenn er durch eine Extrusionslinie läuft, könnten trotzdem einige Biegungen entstehen, die detektiert werden müssen, wenn sie in den Messkopf eines Exzentritätsmesssystems eintreten. Ohne spezifische Messsysteme können sogar unsichtbare Kurvenradien im Bereich von 5 bis 20 Metern zu Exzentritätsfehlern von bis zu 40 Mikrometer führen. Führungsrollen können nur in einem Idealfall diese mangelhafte Streckung des Leiters ausgleichen, oder im Gegenteil würden sie diesen Fehler sogar steigern. Demzufolge sollte die komplette Beseitigung der Führungsrollen das Ziel sein.

Das Messen der Konzentrität eines Leiters in der Isolation sichert die Herstellung hochwertiger Kabel. Während der Kabelherstellung sollte das Messsystem den Einfluss der produktionsbezogenen Variablen, die das Messergebnis beeinflussen könnten, völlig ausgleichen, wie z. B. Winkelposition des Kabels und Kurvenradien des Leiters. Durch Konzentritätsmesssysteme, in Kombination mit einem integrierten oder externen Prozessorsystem, können die Kurzzeitschwankungen der Exzentrität in der Form einer Punktwolke visualisiert werden. Das System legt den Grundstein zur Produktion hochwertiger Kabel und garantiert ein zuverlässiges, perfektes Kabel während des Montageprozesses. Außerdem trägt es zur Prozesszuverlässigkeit und zu Kosteneinsparungen bei.

Messsystem für die Konzentritätsmessung eines Leiters in der Isolation unter Einwirkung einer Oszillation, der Winkelposition des Kabels oder einer Biegung des Kabels in der Messebene

Das Messsystem (Abb. 1) basiert auf einer optischen und induktiven Messtechnik. Mit dem induktiven Messsystem, das zwischen zwei optischen Messebenen angeordnet ist, wird die genaue Position des Leiters bestimmt.

▼ **Abb. 1:** Einrichtungen für die Konzentritätsmessung eines Leiters in der Isolation



Mit dem optischen System wird dagegen die Position des Kabels gemessen. Ein Exzentritätswert ergibt sich, wenn sich beide Positionen voneinander unterscheiden. Gleichzeitig erfasst das optische System genau den Durchmesser und die Ovalität des Kabels. Alle erforderlichen Berechnungen und Analysen werden im Messsystem durchgeführt. Die Messwerte stehen von verschiedenen Schnittstellen aus zur Verfügung, um die Daten an eine Anzeige- und Bedieneinheit oder an einen Linienrechner zu übertragen.

Induktiver Messkreis

Das Kabel läuft durch einen Ringkerntransformator, der einen Wechselstrom von einigen Milliampere im Leiter generiert. Der Wechselstrom erzeugt ein magnetisches Feld, das den Leiter optimal kreisförmig umgibt und die Intensität reduziert sich exponentiell mit dem Abstandsquadrat. Im Messsystem werden induktive Sensoren in einem bestimmten Abstand radial um den Leiter gestellt. Mit Hilfe dieser Sensoren wird aus der Verteilung der Intensität der magnetischen Feldstärke die genaue Position des Leiters mit hoher Präzision berechnet.

Dank der Kombination von mehreren optischen Sensoren und der Sonderausführung der induktiven Sensoren, wird eine Winkelposition oder eine Biegung im Kabel erfasst und automatisch ausgeglichen. Das sichert eine präzise Exzentritätsmessung. Durch die automatische Zentrierung des Messkopfs gegenüber der Kabelposition, kann das Messsystem jederzeit präzise Messwerte bieten, auch wenn die Zugkräfte im Kabel variieren. Führungsrollen sind überflüssig bei automatischen Einstellköpfen.

Die Anordnung des induktiven Messsystems für die Bestimmung der Leiterposition in der Mitte des Messkopfs, in Kombination mit der ferromagnetischen Abschirmung, vermeidet, dass Umweltvariablen einen Einfluss auf den Exzentritätswert haben. Aus diesem Grund haben nicht einmal ein passierender Gabelstapler, eine verlegte Kühlwanne oder sich verändernde Erdungsbedingungen, einen Einfluss auf das Messergebnis.

Optischer Messkreis

Die optische Messung basiert auf dem Prinzip der Beugungsanalyse, verbunden mit impuls-gesteuerten Laserdioden, der Lichtstrahl von den Dioden projiziert ein Abbild der Ader auf dem CCD-Linearsensor in jeder Messachse

mit einer Auslagerungszeit von 0,25 Mikrosekunden. Die Systeme messen über 4-Achsen (an 8-Punkten) die Position und die Breite der Schatten. Aus der Lage der Schatten in Relation zur bestimmten Position des Leiters berechnen Signalprozessoren den genauen Wert der Exzentrität und von den Breiten der vier Schatten werden der Außendurchmesser und die Ovalität berechnet.

Die Messwerte des Außendurchmessers, falls erforderlich in Kombination mit dem Leiterdurchmesser (die Wanddicke), eignen sich dazu die Produktionsleistung des Extruders oder die Abzugsgeschwindigkeit des Kabels derart zu ändern, dass die Messwerte entsprechend des jeweiligen Nennwerts festgelegt werden. Darüber hinaus sind Messwerte mit engen Toleranzen von wesentlicher Bedeutung für die Montage. Jeder dieser Werte beeinflusst den Wellenwiderstand (z. B. verseilte LAN-Kabel) und demzufolge den Wert für die Rückflussdämpfung (SRL) eines Datenübertragungskabels, insbesondere wenn Abweichungen dieser Werte periodisch auftreten.

Mit Hilfe der Fast Fourier-Transformation (FFT), eignet sich die hohe Scanrate von 2.500 Messungen/Sekunde für die Erstellung einer Vorhersage für die SRL abhängig von der Übertragungsfrequenz, auch bei Liniengeschwindigkeiten von 3.000 Meter/Minute sowohl für laufende wie für zukünftige CAT-Spezifikationen. Wird eine Spezifikation über die minimale Wanddicke für die Kabelisolation geliefert, so führt jede Exzentrität unweigerlich zu einem erhöhten Verbrauch des Isolationsmaterials. Demzufolge sollten die Exzentritäten aus wirtschaftlichen Gründen reduziert werden.

Erfassung der oszillierenden Exzentritätswerte

Mit einer Scanrate von 2.500 Messungen pro Sekunde, erfasst das Messsystem oszillierende Exzentritätswerte mit höchster Einzelwertgenauigkeit. Visualisiert werden diese Werte in der Form einer Punktwolke (Abb. 3, 4 und 5).

Die Punktwolke bietet eine weitere Möglichkeit, um die laufende Messung in processor-basierten Anzeige- und Bedieneinheiten zu visualisieren, und dank dieser kann die Verteilung von Kurzzeitschwankungen der Exzentrität graphisch dargestellt werden. Jeder Punkt stellt einen Einzelwert der Exzentrität bezogen auf Wert und Richtung dar. Die gesamte Verteilung der Punktwolke hebt



▲ Abb. 2: Standarddarstellung der Exzentrizität



▲ Abb. 3: Zufällige Verteilung der Einzelwerte der Exzentrizität



▲ Abb. 4: Ringförmige Verteilung der Einzelwerte der Exzentrizität



▲ Abb. 5: Ellipsenförmige Verteilung der Einzelwerte der Exzentrizität

die Standardabweichung der Exzentrizität auf. Oft reicht es aus, die Führung des Leiters neben dem Spritzkopf zu ändern, um diese Oszillationen zu vermeiden, die in der Regel innerhalb eines gewissen Geschwindigkeitsbereiches und/oder gewisser Füllgrade des Auf- bzw.

Abwicklers auftreten. Das Standardverfahren um die Exzentrizität mit Einsatz eines Kabelquerschnitts darzustellen (Abb. 2) ist zusätzlich hilfreich für den Bediener, wenn der Spritzkopf zentriert wird. Abb. 3 zeigt eine zufällige Verteilung der Einzelwerte der Exzentrizität, während

Abb. 4 eine ringförmige Verteilung der Exzentrizitätswerte darstellt, was häufig das Ergebnis eines rotierenden (oszillierenden) Leiters ist, vor dem Extruderspritzkopf. Abb. 5 zeigt eine ellipsenförmige Verteilung der Punktwolke, die z. B. dann entsteht, wenn der Leiter unmittelbar vor dem Einlauf in den Spritzkopf in eine Ebene oszilliert oder schwingt und dadurch zusätzlich Exzentrizitätsschwankungen verursacht werden. Die dauerhafte, rotierende Exzentrizität würde nicht ersichtlich sein mit einer Standarddarstellung der Exzentrizität (wie in der Abb. 2 dargestellt). Um eine hohe Messgenauigkeit des Leiters innerhalb der Isolation zu sichern, sollten die optischen Messachsen auf der selben Ebene der induktiven Sensoren positioniert werden. Bei dieser Positionierung werden die optischen Strahlengänge durch die induktiven Sensoren beschattet. Aus diesem Grund werden die optischen Messebenen aufgeteilt. Eine optische Messebene wird vor und die andere nach der induktiven Sensorebene angeordnet. Somit kann nur ein absolut gerader und horizontaler Leiter genaue Messergebnisse erzeugen. In der Praxis sind dennoch leichte Winkelpositionen oder Biegungen im Leiter typischerweise zu erwarten. Das bedeutet, dass die Messvorrichtung auch unter diesen Bedingungen in der Lage sein soll, präzise Messwerte zu erfassen.

Messung einer Schräglage des Kabels

Abb. 6 zeigt ein Kabel, das bezogen auf eine gerade Linie läuft. Das Kabel läuft jedoch in einer geneigten Position gegenüber der tatsächlichen vorgesehenen Produktionslinie. In der Darstellung wird die geneigte Position des Kabels für ein besseres Verständnis überspitzt. Es ist bekannt, dass eine gerade oder geneigte Linie, in diesem Fall, ein gerader Leiter, durch zwei Punkte bestimmt wird. Durch die erste und die zweite optische Messvorrichtung, werden die Schräglagen des Kabels erkannt und deren Einfluss auf die Messergebnisse kann bestimmt und vollständig ausgeglichen werden.

Bestimmung und Ausgleich eines Durchhangs oder einer Biegung des Kabels

Abb. 7 zeigt ein Kabel, das einen Durchhang oder eine Biegung aufweist. Zum besseren Verständnis, ist die

Schlussfolgerung

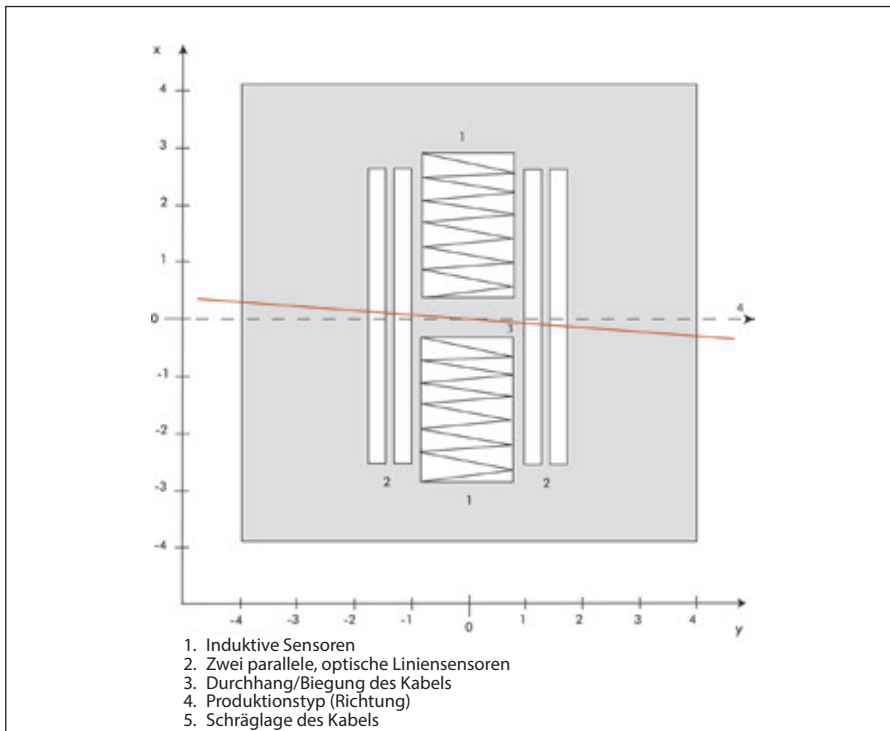
Mit der vorgestellten Technologie ist es möglich die Konzentrität eines Leiters in der Isolation genau zu messen sowie die Produktparameter, den Außendurchmesser, die Ovalität und die Wanddicke.

Die Messtechnik erfasst die rotierenden oder in einer Ebene oszillierenden Exzentrizitätswerte des Leiters in der Form einer Punktwolke. Diese Punktwolke ermöglicht die Visualisierung der Verteilung von Kurzzeitschwankungen der Exzentrizität.

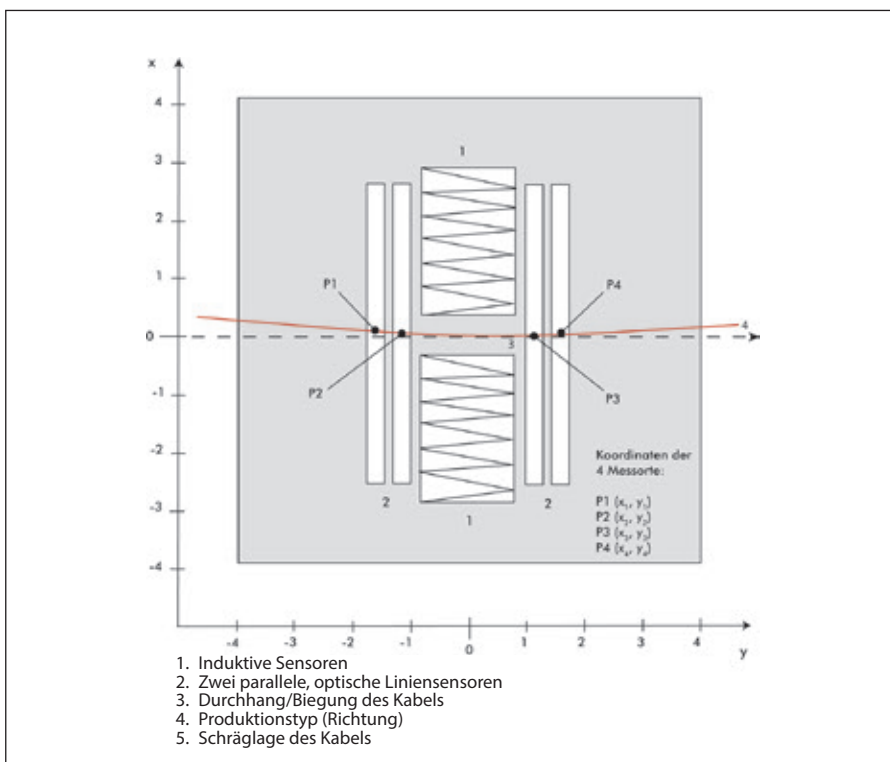
Durch die 4-Achs-Messung sowie die 8-Punkt-Exzentrizitätsmessung, kann eine Schräglage des Kabels in der Messebene erkannt werden. Das Messsystem sorgt für eine automatische Ausgleichung bezogen auf eine Schräglage des Leiters in der horizontalen sowie in der vertikalen Richtung, dadurch werden die Messergebnisse nicht beeinflusst.

Das Messsystem erfasst auch genaue Messwerte, auch wenn das Kabel durch den Messkopf mit einem Durchhang oder gebogenen Radius läuft.

Der Einsatz der beschriebenen Messtechnologie in den Extrusionslinien sichert die Produktion hochwertiger Kabel für eine einwandfreie Montage und gleichzeitig trägt es zur Prozesszuverlässigkeit und zu Kosteneinsparungen bei. ■



▲ **Abb. 6:** Technik um eine Schräglage des Kabels zu bestimmen



▲ **Abb. 7:** Technik um einen Durchhang oder eine Biegung im Kabel zu bestimmen

Darstellung der Biegung des Kabels sehr übertrieben und, in der Praxis, unwahrscheinlich.

Die Biegung eines Leiters kann durch einen Kreis beschrieben werden, dessen Position und Bogenradius durch drei Punkte bestimmt ist. Mit diesen Informationen kann das Prozessorsystem die genaue Position des Kabels in der

induktiven Messebene berechnen und völlig den Einfluss der Winkelposition und/oder Biegungen ausgleichen. Wie in der Abbildung dargestellt, ist das Messsystem so gebaut, dass die Position des Kabels in vier Stellen gemessen wird, die in der Darstellung als P1, P2, P3 und P4 angezeigt werden. Deswegen kann das Messsystem auch unregelmäßige Verformungen des Leiters erfassen.

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Обучение в академии Tratos

В академии по совершенствованию навыков в Великобритании, Ноусли сотрудники компании по производству кабеля Tratos пройдут первое обучение в этом году.

Идея о создании академии способствовала подробному исследованию кадровых ресурсов Мерсисайда, проверки, которая выявила значительный оптимизм в будущем завода и амбициях Tratos как компании в целом. Это также способствовало оценке существующих навыков и знаний, куда входило рассмотрение высшего руководства и группы по продажам, а также кадровых ресурсов Ноусли.

Указанный образовательный подход в структуре академии позволяет проводить курсы обучения во всех филиалах компании по всему миру как для коллег с большим стажем, так и для новичков.

Инвестиции в профессиональное развитие были выделены группой высшего руководства как особенно важные при оперативном завершении работы по предоставлению содержания курсов академии.

«У Tratos есть амбиции, и компания понимает, что для достижения успехов на высочайшем уровне ей необходимо оперативно развивать персонал для наличия высочайшей квалификации и полного понимания продукции, а также направления бизнеса», – заявил Генеральный директор Tratos Ltd Маурицио Браганья. Так как Tratos находится в стадии активного развития, данное обучение только поддержит

темп. Таким образом, проект, решение о проведении которого было принято в прошлом году, уже идет полным ходом.

Так как производство Tratos налажено также в Италии, курсы академии будут проходить повсюду, завод Великобритании будет первым по получению такого опыта. Программы обучения и оценки Tratos считаются высокоэффективными инвестициями, особенно на базе производства в Ноусли.

В долгосрочной перспективе планом станет увеличение объема академии. Начальными этапами работы является совмещение культуры и амбиций Tratos с ценностями, важными для итальянских владельцев – целостность, прозрачность и постановка сотрудников превыше всего.

В подготовительном опросе были изучены мнения персонала по позиции компании в части неэтичного поведения (бескомпромиссная политика), ее оптимизм на будущее, совместная работа, доверие и честность, знание, квалификация и так далее.

Маурицио Браганья добавил: Академия Tratos предоставляет возможность компании построить на основе предпринятых уже шагов обучение и развитие навыков и способностей в долгосрочной перспективе. План также отражает обязательство компании по развитию персонала и совершенствованию выполнения. «Это связано не с развитием практических и технических навыков, но также с образованием сотрудников, раскрытию их умственных способностей для



▲ Сотрудники, недавно прошедшие обучение по модулю в академии Tratos в Великобритании, Ноусли

новых возможностей и различных способов восприятия мира. Мы хотим расширить знания наших сотрудников и понимание бизнеса, чтобы они могли увидеть, что выгоду и преимущество можно получить, прикладывая усилия в обучении».

Технический директор и директор по развитию Tratos Питер Уотерворт создал содержание обучения. Он заявил: «В техническое обучение включены основы электричества в части кабелей от проводников и изоляционных покрытий до оболочек и защиты, кабелей для особых секторов рынка, воздушных линий электропередач и кранов, а также обработки материалов. Помимо этого, студенты академии Tratos узнают о различных средах, для применения в которых разрабатываются кабели.

«Высшее руководство подтвердило, что коллегам необходимо более глубокое знание продукции и лучшее понимание целей применения кабелей Tratos. С расширением производственных мощностей в Великобритании было принято решение, что данное время является самым удачным для воплощения данной инициативы и повышения концентрации внимания на росте. «Сначала обучение будет проходить в формате двух- или четырехчасовых занятий по отдельному модулю, пока не будут пройдены все модули». Выпускники академии получают внутреннюю классификацию и квалификацию, а также возможность для многих пройти дополнительное обучение.

Приобретение испанской компании

Итальянская группа компаний MFL Group (Mario Frigerio/Frigesco) подтвердила приобретение Construcciones Mecánicas Caballé SA (Caballé), испанской компании по производству кабеля и ее иных предприятий. В соответствии с информацией в прессе сделка «значительно укрепит объем поставки MFL Group волоочильной проволоки из цветных металлов, скрутки и экструзионного оборудования». Приобретение включает такие марки, как Caballé, OM Lesmo и Eurodraw Energy, а также их интеллектуальную собственность.

«Данные зарекомендовавшие себя марки совместно с финансовой силой MFL Group, нашим 120-летним опытом в отрасли, а также глубочайшим знанием инженерной и производственной базы в данном секторе еще больше укрепит нашу направленность на заказчиков проволоки из цветных металлов и кабеля», – было указано в прессе. «Благодаря использованию общей истории Caballé, OM Lesmo, Eurodraw Energy и Frigesco, мы можем гарантировать постоянное техническое совершенствование и непревзойденное обслуживание клиентов. Мы ждем с нетерпением укрепления наших связей с заказчиками и поставщиками по всему миру».

Mario Frigerio SpA – Италия
Вебсайт: www.mflgroup.com

Tratos Cavi SpA – Италия
Вебсайт: www.tratos.eu

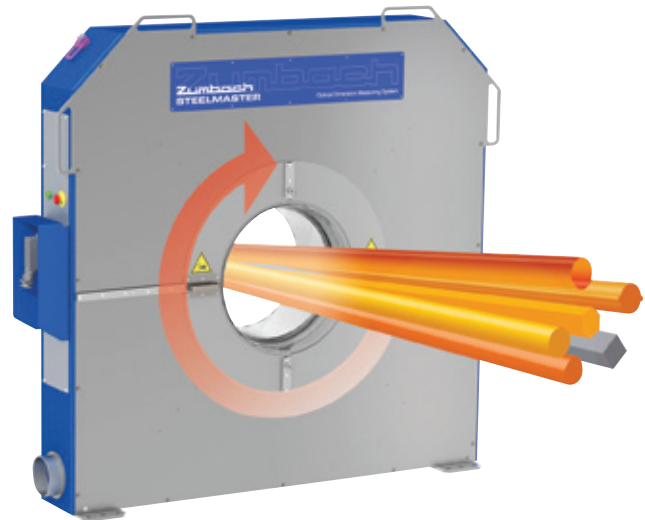
Модульные вращающиеся датчики для высокоскоростного измерения размеров

Компания Zumbach Electronic представила новые модульные дополнения к своей линейке вращающихся датчиков. Линейка продукции SMR продемонстрирует значительные преимущества над остальными датчиками при быстрой и точной фиксации размеров в продольном и радиальном направлении.

Датчики SMR постоянно вращаются со скоростью 60 или оборотов в минуту. До трех лазерных головок ODAC* выполняют 2 000 измерений в секунду каждая, полностью синхронизированных. Результатом являются до десяти полных профилей в секунду, что намного быстрее предыдущих датчиков.

В качестве альтернативы SMR может функционировать в статичном ориентированном режиме с 2 000 измерений диаметра в секунду в каждом направлении. При 100 м/сек это означает ряд измерений каждые 50 мм.

Механическая концепция проста и надежна: изнашиваемые части отсутствуют, отсутствуют коллекторные кольца и тормозные системы. Электропередача и сигналы из лазерных головок и в них полностью бесконтактные. Стандартные и особые характеристики программного обеспечения включают функцию контроля электроэнергии для реального отображения сечения с отклонениями многоугольной и асимметричной формы, особые функции для трехвалковой вальцовки, подсчет отходов с наконечника и головки; гибкие персонализированные экраны.



▲ Модульная измерительная установка Steelmaster SMR 400-S2 и ряд возможностей оснащения оборудованием

Преимущества включают более быстрый запуск, уменьшенное количество отходов, более жесткие допуски, изображение реальной формы и легкость технического обслуживания с быстрым и легким доступом к пунктам технического обслуживания. Датчики пригодны для горячей и холодной обработки и контроля качества.

Zumbach Electronic AG – Швейцария
Вебсайт: www.zumbach.com

Эффективная, безопасная и экономичная обработка кабеля

На протяжении почти 20 лет производители кабеля и кабельных жгутов работают с системой упаковки NPS от Niehoff.

Она постоянно совершенствуется с самого начала ее производства, и она зарекомендовала себя как высокоэффективная, безопасная и экономичная система для проводов первичной цепи, а также для пучков проводов, жил, проводников и кабелей.

NPS состоит из отдельных катушек и разборных трансформирующихся катушек, сделанных из АБС-пластика. Катушки разработаны для функционирования наряду с экструзионными линиями. Замена полных катушек на пустые катушки выполняется при полной скорости производства, что обеспечивает непрерывное функционирование. Катушки, выполненные в различных размерах, предлагают надежный, стабильный и не путающийся комплекс



▲ Тип двойных устройств намотки SV 400 для изолированных проводов с заполненными и пустыми катушками (система упаковки Niehoff)

При отсутствии намотки катушки можно полностью разобрать, вставить друг в друга и вернуть производителю кабеля, где их можно будет легко и быстро собрать, перезарядить и затем использовать повторно. Для защиты катушек NPS от иных катушек, несовместимых с NPS, новые оригинальные трансформирующиеся катушки NPS оборудованы транспондером РЧИД.

Таким образом пользователи NPS могут определить, принадлежит ли катушка

системе, и совместима ли она с ней или нет. В данном случае последствием будут значительные помехи. Транспондер РЧИД также упрощает маркировку катушки.

Так как идентификация катушки сохранена в РЧИД, маркировка не нужна. NPS – это единственная в мире система упаковки, позволяющая разматывать автомобильные кабели, сделанные из меди, медных сплавов и алюминия надежно без запутывания и на самых высоких скоростях.

Даже сигнальные кабели из медных сплавов с поперечным сечением 0,13мм² могут обрабатываться без проблем. По всему миру в настоящее время используются более 420 установок намотки NPS с более тремя миллионами функционирующих катушек NPS.

Maschinenfabrik Niehoff GmbH & Co KG – Германия
Вебсайт: www.niehoff.de

Техника для точного измерения эксцентриситета жилы в изоляции и соответствующих параметров кабелей и проволок

Харальд Сикора и Катя Гирш, Sikora, Германия

Введение

Производители кабеля и проволоки автомобильных кабелей и кабелей управления, а также коаксиальных кабелей и кабелей связи используют технологии контроля и измерения для своих экструзионных линий с целью соблюдения указанных кабельных параметров. Это важно для процесса оптимизации и обеспечения качества, но также это необходимо при автоматической сборке продукции. В данных случаях частота брака при сборке отмечается в статистике, регистрируется и присваивается производителю. По данной причине заводы-изготовители кабелей стремятся поставлять кабель с надежными высококачественными стандартами.

Сложные задачи при кабельной экструзии

Сложной задачей в процессе кабельной экструзии является соблюдение показателей измерения с жесткими допусками эксцентриситета жилы в изоляции, диаметра жилы, внешнего диаметра кабеля и овальности внешнего диаметра. В процессе экструзии могут возникнуть отклонения измерительного значения, которые могут остаться незамеченными без специального оборудования для визуализации.

Утолщения, сужения, брак или оголенные участки в кабеле могут привести к неполадкам при сборке. В начале процесса сборки кабель или проволока разрезаются на мерные длины и зачищаются на концах для последующего соединения с заглушками. Силы отрыва для зачистки точно определяются. Отклонения от сил отрыва в пределах жилы изоляции могут

вызвать повреждения при зачистке. Использование инновационной технологии измерения и контроля позволяют соблюдать высокие требования по кабелям, а также определить потенциалы оптимизации экструзионной линии.

Вращающаяся/колеблющаяся жила

Требования к технологиям контроля и измерения в кабельных экструзионных линиях очень точные при соблюдении допусков в пределах нескольких микрометров. В то время, как среднее значение диаметра или толщины стенки изоляции достаточно для контроля экструзионной линии, надежная запись и визуализация кратковременных колебаний, особенно значений эксцентриситета необходимы дополнительно для аспекта минимальной толщины стенки. Легкие колебания жилы прямо перед экструзионной головкой могут привести к серьезным отклонениям эксцентриситета, особенно если жила колеблющаяся в одной плоскости или вращающаяся. Такой эксцентриситет не может быть показан при помощи графической визуализации. Быстро вращающийся вектор постоянного значения эксцентриситета может быть продемонстрирован оператором при помощи визуализации за пределами стандартного дисплея.

Угловая позиция жилы

В процессе экструзии вероятно ситуация, когда кабель с направляющими роликами или без них имеет слегка

угловатую позицию при прохождении через плоскость измерения. Системы измерения эксцентриситета должны выполнять точное измерение показателей, даже при наличии такой позиции (смотрите рисунок б).

Провисание или сгиб жилы

Даже исходя из предположения, что жила растягивается при прохождении через экструзионную линию, она может все же показывать некоторые изгибы, которые должны быть обнаружены при вхождении в измерительную головку системы эксцентриситета. Без специальных измерений даже невидимый радиус кривизны в диапазоне от 5 до 20 метров может привести к эксцентрическим погрешностям до 40 микрометров. Только в идеальном случае направляющие валики могут компенсировать данное неидеальное растяжение жилы или, наоборот, увеличить погрешность. Таким образом, целью должно быть полное исключение направляющих валиков.

Измерение эксцентриситета жилы изоляции обеспечивает высокое качество производимого кабеля. В процессе производства кабеля система измерения должна полностью компенсировать влияние отклонений, связанных с производством, которые могут повлиять на результат измерения, таких, как угловатые позиции кабеля и радиус кривизны жилы. Системы эксцентриситета в сочетании со встроенной или внешней системой процессора визуализируют кратковременные колебания эксцентриситета в форме диаграммы разброса. Система создает основу для производства высококачественных

кабелей и обеспечивает надежность и отсутствие брака кабеля в процессе сборки. Впоследствии это вносит вклад в надежность технологии и дополнительно в экономическую целесообразность.

Система измерения для измерения эксцентриситета жилы в изоляции под влиянием колебания, угловой позиции кабеля или изгиба кабеля в плоскости измерения

Система измерения (рисунок 1) основана на оптической и индукционной системе измерения. При помощи индукционной системы измерения, которая располагается между двумя оптическими плоскостями измерения, определяется точное положение жилы. При помощи оптической системы измеряется положение кабеля. Значение эксцентриситета возникает, когда оба положения отличаются друг от друга. Одновременно оптическая система точно фиксирует диаметр и овальность кабеля. Все необходимые расчеты и анализ выполняются системой измерения. Значения измерения доступны с разных интерфейсов для передачи данных на дисплей и блок управления или на линейный компьютер.

Индукционный измерительный контур

Кабель проходит через тороидальный трансформатор, который является источником переменного тока в несколько миллиампер в жиле. Переменный ток создает магнитное поле, которое идеально окружает жилу, и напряженность уменьшается, в геометрической прогрессии, с квадратом расстояния. В системе измерения индукционные сенсоры расположены на определенном расстоянии по радиусу жилы. С помощью данных сенсоров четкое положение жилы рассчитывается с высокой точностью от распространения напряженности силы магнитного поля.

В связи с сочетанием множественных оптических сенсоров и специальным проектированием индукционных

сенсоров угловая позиция или изгиб кабеля определяется и автоматически исправляется. Это обеспечивает точное измерение эксцентриситета.

В связи с автоматической центровкой измерительной головки по отношению к положению кабеля система измерения способна предоставить точные показатели измерения в любое время даже при различии тянущих усилий кабеля. Направляющие валики не являются необходимыми с регулируемыми головками.

Устройство индукционной измерительной системы для определения положения жилы в центре головки измерителя в сочетании с ферромагнитным экранированием предотвращает влияние факторов внешней среды на показатель измерения эксцентриситета. По данной причине даже проходящий вильчатый погрузчик, сдвинутый охлаждающий желоб или изменяющиеся условия на площадке не влияют на результат измерения.

Оптический измерительный контур

Оптическое измерение основано на принципе структурного анализа в сочетании импульсными лазерными диодами, световой луч из диодов проецирует тень кабеля на сенсор линии схемы расположения кабеля на каждой измерительной оси с продолжительностью экспонирования 0,25 микросекунд. Измерение систем на четырех осях (в восьми точках) положения и ширины тени. От положения тени относительно определенного положения жилы сигнальные процессоры рассчитывают точное значение эксцентриситета и от ширины четырех теней рассчитываются внешний диаметр и овальность.

Измеряющиеся значения внешнего диаметра при необходимости в сочетании с диаметром жилы (толщиной стенки) подходят для изменения выходной мощности экструдера или скорости отвода кабеля таким образом, чтобы измеряющиеся значения были установлены на соответствующем номинальном значении. Кроме того, измеряющиеся значения с жесткими допусками имеют значительную важность для сборки. Каждое из данных значений влияет на волновое сопротивление (например, кабели локальной сети со скрученными жилами) и, впоследствии, на показатель структурных потерь на отражение кабеля передачи данных,

особенно когда отклонения от данных показателей возникают периодически. С помощью анализатора на основе быстрого преобразования Фурье высокая скорость сканирования 2 500 измерений/секунду подходит для создания приблизительной оценки показателя структурных потерь в зависимости от частоты передачи даже при линейных скоростях 3 000 метров/минуту для обоих, фактической и будущей спецификаций CAT. При наличии спецификации для минимальной толщины стенки кабельной изоляции любой эксцентриситет непременно ведет к увеличенному потреблению материала изоляции. Следовательно, эксцентриситет должен быть уменьшен по экономическим причинам.

Регистрация колеблющихся показателей эксцентриситета

Со скоростью сканирования в 2 500 измерений в секунду система измерения регистрирует колеблющиеся значения эксцентриситета с точностью до одного значения. Данное визуализируется в форме диаграммы разброса (рисунки 3, 4 и 5).

Диаграмма разброса предоставляет дополнительный способ визуализации осуществляемого измерения на дисплее, работающем от процессора и устройствах управления, а с данной помощью распространение кратковременных отклонений эксцентриситета может быть показано графически.

▼ Рисунок 1. Устройства для измерения эксцентриситета жилы в изоляции





▲ Рисунок 2. Стандартная презентация эксцентриситета



▲ Рисунок 3. Произвольный тип распределения единичных показателей эксцентриситета



▲ Рисунок 4. Кольцевой тип распределения единичных показателей эксцентриситета

Каждая точка представляет единичное значение эксцентриситета в части показателя и направления. Общее распространение диаграммы разброса демонстрирует стандартное отклонение эксцентриситета. Часто достаточно исправить направление жилы, находящейся близко к экструзионной головке, чтобы избежать данных колебаний, которые обычно возникают в рамках определенного скоростного диапазона и/или определенной степени заполнения намоточного устройства или устройства для разматывания, соответственно.

Стандартный способ представления эксцентриситета при использовании сечения кабеля (рисунок 2) также помогает оператору при центровке сечения. На рисунке 3 показан произвольный тип распределения единичных показателей эксцентриситета, в то время как на рисунке 4 показан кольцевой тип распределения значений эксцентриситета, что зачастую является результатом вращения (колебания) жилы до распределительной головки экструдера. На рисунке 5 изображен эллиптический тип распределения диаграммы разброса, который может возникнуть, к примеру, когда жила колеблется или вибрирует в одном направлении прямо перед вхождением в распределительную головку, и что, таким образом, вызывает дополнительные колебания эксцентриситета. Данный

постоянный эксцентриситет вращения также не был бы виден со стандартной презентацией эксцентриситета (как показано на рисунке 2).

Для обеспечения высокой точности измерения жилы в пределах изоляции оси оптического измерения должны быть расположены на одном уровне с индукционными сенсорами. При данном расположении оптические траектории затенены индукционными сенсорами. По данной причине оптические плоскости измерения разделены. Одна оптическая плоскость измерения расположена до, а одна после плоскости индукционного сенсора. В результате только абсолютно прямая и горизонтальная жила может предоставить точные результаты измерения. На практике, однако, можно ожидать слегка угловатые позиции или изгибы жилы. Это означает, что прибор измерения должен быть способен регистрировать точное значение измерения даже при вышеуказанных условиях.

Измерение наклонного положения кабеля

На рисунке 6 показан кабель, расположенный относительно прямой линии. Кабель, однако, расположен в



▲ Рисунок 5. Эллиптический тип распределения единичных показателей эксцентриситета

наклонной позиции по отношению к фактической планируемой линии производства. На иллюстрации наклонная позиция кабеля преувеличена для лучшего понимания. Это понимается как прямая или наклонная линия. В

данном случае прямая жила определена двумя точками. При помощи первого и второго оптического измерительного кабеля, и их влияние на результаты измерения будет определено и полностью компенсировано.

Определение и компенсация провисания или изгиба кабеля

На рисунке 7 показан кабель с провисанием или изгибом. Для лучшего понимания иллюстрация изгиба кабеля сильно преувеличена, что на практике не встречается. Изгиб жилы может быть описан по кругу, положение и радиус изгиба которого определяется по трем точкам.

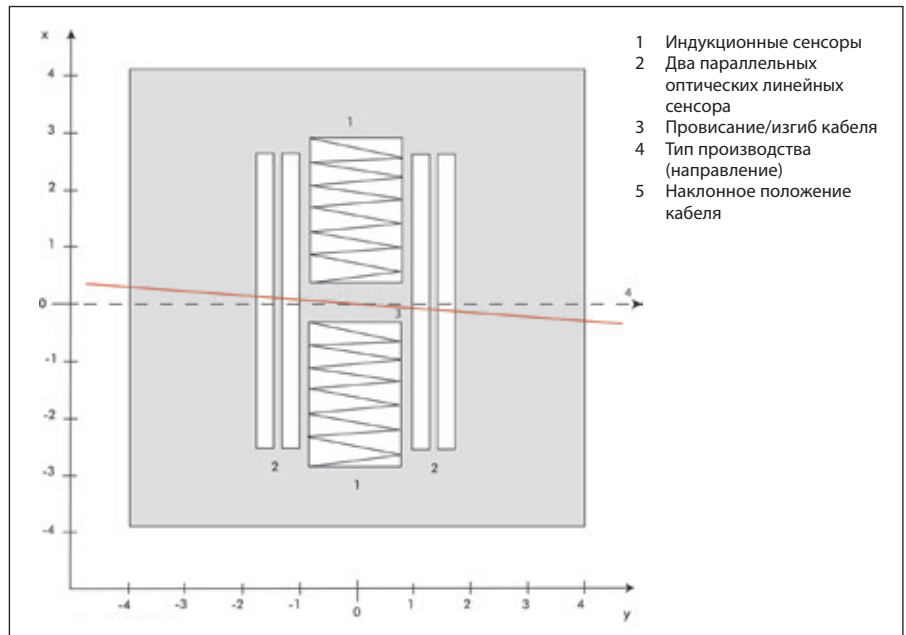
Имея данную информацию система процессора способна рассчитать точное положение кабеля в плоскости индукционного измерения и полностью компенсировать влияние углового положения кабеля и/или изгибов. Как показано на рисунке система измерения построена способом, при котором положение кабеля измеряется в четырех точках, что показано на иллюстрации как P1, P2, P3 и P4. В связи с этим система измерения способна обнаружить даже несимметричные деформации жилы.

Заключение

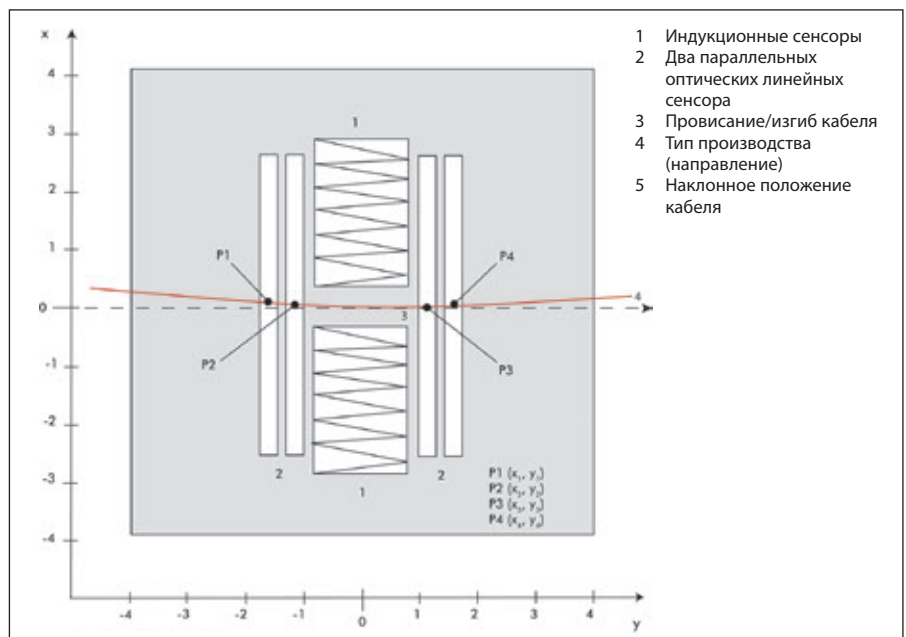
При помощи представленной технологии возможно точно измерять эксцентриситет жилы в изоляции, а также параметры продукции, внешний диаметр, овальность и толщину стенки. Техника измерения регистрирует вращающиеся или колеблющиеся в одной плоскости значения эксцентриситета жилы в форме диаграммы разброса. Данная диаграмма разброса предусматривает визуализацию распределения кратковременных отклонений эксцентриситета.

По измерению по четырем осям, а также по измерению эксцентриситета в восьми точках может быть распознано наклонное положение кабеля в плоскости измерения.

Система измерения автоматически компенсирует наклонное положение жилы в обоих направлениях, горизонтальном и вертикальном, таким образом, результаты измерения не подвергаются воздействию. Система измерения также регистрирует точные



▲ Рисунок 6. Техника определения наклонного положения кабеля



▲ Рисунок 7. Техника для определения провисания или изгиба кабеля

значения измерения, даже если кабель проходит через измерительную головку с провисанием или искривленным радиусом.

Использование описанной технологии измерения в экструзионных линиях обеспечивает производство высококачественных кабелей с идеальной сборкой. В то же время, это способствует надежности технологии, а, следовательно, экономичности. ■

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Académie de formation chez Tratos

UNE Académie créée pour développer davantage les compétences des employés du fabricant de câbles Tratos dans son établissement de Knowsley, Royaume-Uni, offrira le premier de ses modules de formation cette année.

L'idée de l'Académie a suggéré une enquête approfondie de la main-d'œuvre de Merseyside, un travail qui a révélé un optimisme remarquable concernant l'avenir de l'usine et les ambitions de Tratos pour la société dans son ensemble. Elle a également permis d'évaluer les compétences et les connaissances actuelles en tenant compte des points de vue de la haute direction, de l'équipe de vente ainsi que de la main-d'œuvre de Knowsley.

La structure de l'Académie, qui aura une approche instructive, permettra d'effectuer la livraison des modules à travers la société de par le monde, et sera ouverte aux collègues de longue date ainsi qu'aux nouveaux employés.

L'investissement dans le développement professionnel a été jugé par l'équipe de la haute direction comme particulièrement important, et pour cette raison les contenus des modules de l'Académie ont été rapidement complétés pour leur distribution.

Tratos se trouvant dans une phase de forte croissance, sa formation doit suivre le rythme. En conséquence, le projet qui a été décidé l'année dernière est déjà en place et en cours.

Bien que Tratos fabrique également en Italie et que les cours de l'Académie



▲ Employés qui ont fréquenté le récent module de formation à l'Académie de Tratos à Knowsley, Royaume-Uni

seront fournis à un niveau global, c'est l'établissement du Royaume-Uni qui a été le premier à le voir en action. Les programmes de formation et d'évaluation pour Tratos sont considérés comme des investissements très positifs, en particulier

au siège de production de Knowsley. À plus long terme, le plan consistera à élargir le champ des activités de l'Académie.

Les premières étapes du travail entraînent l'alignement des compétences avec la culture et les ambitions de Tratos, et avec les valeurs si importantes pour ses propriétaires italiens, c'est-à-dire l'intégrité, la transparence et placer les personnes au premier plan.

L'enquête préparatoire a examiné les points de vue du personnel quant à la position de l'entreprise concernant le comportement contraire à l'éthique (tolérance zéro), son optimisme pour l'avenir, le travail basé sur la collaboration, la confiance et l'équité, les connaissances, l'expertise et plus.

Les diplômés de l'Académie Tratos recevront la reconnaissance et les qualifications internes, avec la possibilité pour de nombreux étudiants de suivre une formation supplémentaire.

Acquisitions espagnoles

Le Groupe italien MFL (Mario Frigerio/Frigeco) a confirmé l'acquisition de Construcciones Mecánicas Caballé SA (Caballé), un fabricant de machines de câble espagnol, et de ses autres activités.

D'après le communiqué de presse, la transaction "renforcera considérablement l'étendue de la fourniture du Groupe MFL en ce qui concerne les équipements de tréfilage de fil non ferreux, de toronnage et d'extrusion". L'acquisition comprend les marques Caballé, OM Lesmo et Eurodraw Energy, ainsi que leur propriété intellectuelle.

"Ces marques bien implantées, avec les moyens financiers du Groupe MFL, nos 120 ans d'expérience dans l'industrie et la plus vaste connaissance de l'ingénierie et de la fabrication dans le secteur, renforcent davantage notre engagement envers nos clients de fils et de câbles non-ferreux," précise le communiqué.

"En exploitant l'histoire combinée de Caballé, OM Lesmo, Eurodraw Energy et Frigeco, nous sommes en mesure de garantir un perfectionnement technique continu et un service à la clientèle sans égal. Nous sommes heureux de renforcer notre relation d'affaires avec nos clients et nos fournisseurs à travers le monde."

Mario Frigerio SpA – Italie
Website: www.mflgroup.com

Tratos Cavi SpA – Italie
Website: www.tratos.eu

Unités de mesure rotatives modulaires pour la mesure des dimensions à haute vitesse

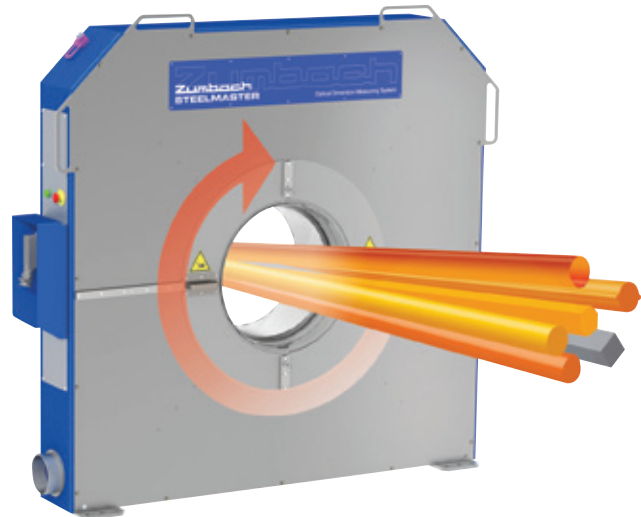
Zumbach Electronic a introduit de nouveaux composants modulaires dans sa gamme d'unités de mesure rotatives. L'on estime que la ligne de produits SMR offre des avantages significatifs par rapport aux autres unités de mesure en ce qui concerne la saisie rapide et précise des dimensions dans le sens longitudinal et radial.

Les unités de mesure SMR tournent en continu à 60 ou à 100 tours par minute. Le système comprend jusqu'à trois têtes laser ODAC® qui effectuent 2 000 mesures par seconde chacune, entièrement synchronisées. Il en résulte jusqu'à dix profils complets par seconde, c'est-à-dire à une vitesse supérieure à celle des unités de mesure précédentes.

Alternativement, le système SMR peut fonctionner en mode statique orientable avec 2 000 mesures des dimensions du diamètre par seconde dans chaque direction. À 100m/s, cela signifie qu'on effectue une série de mesures tous les 50mm.

Le concept mécanique est simple et robuste: pas de pièces d'usure, pas de bagues collectrices et pas de freins. La transmission de puissance et de signaux vers et depuis les têtes laser s'effectue entièrement sans contact.

Les fonctions standard et spécifiques du logiciel comprennent la fonction EPM pour l'affichage effectif de la section, avec des écarts de forme polygonale et asymétrique; des fonctions spécifiques pour le laminoir à trois cylindres; le calcul des chutes de tête et de queue ainsi que des écrans flexibles personnalisés.



▲ Unité de mesure modulaire Steelmaster SMR 400-S2 et une gamme de possibilités d'équipements

Les avantages comprennent un démarrage plus rapide, moins de déchets, des tolérances plus strictes, l'affichage de la forme effective et un entretien sans problèmes ainsi qu'un accès rapide et facile aux points d'entretien. Les unités de mesure sont indiquées pour les processus à chaud et à froid et pour le contrôle de qualité.

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

Manutention efficace, sûre et économique de câbles

DEPUIS près de 20 ans, les fabricants de câbles et de câblages travaillent avec le système Niehoff Packaging NPS. Le système est constamment en évolution depuis ses débuts et il a démontré qu'il est très efficace, sûr et économique surtout pour les câbles automobiles et pour les faisceaux de fils, les torons, les conducteurs et les câbles.

Le système NPS comprend des enrouleurs spécifiques et des bobines démontables et réutilisables réalisées en plastique ABS. Les enrouleurs sont conçus pour fonctionner en ligne avec les lignes d'extrusion. Le changement de la bobine pleine à la bobine vide est effectué à la vitesse maximale de production tout en permettant un fonctionnement continu. Les bobines réalisées dans différentes tailles offrent un système d'emballage sûr, stable et sans enchevêtrements lorsqu'elles sont pleines ou partiellement vides tout en permettant des vitesses de déroulement du câble plus élevées dans les processus en aval. Une fois vides, les bobines peuvent être entièrement démontées et empilées les



▲ Double enrouleur du type SV 400 D pour fils isolés avec bobines pleines et vides (système d'emballage Niehoff)

unes sur les autres et être ensuite restituées au fabricant de câbles où elles peuvent être facilement et rapidement réassemblées, rechargées et ensuite réutilisées. Pour protéger les bobines NPS des autres bobines qui ne sont pas compatibles avec le système NPS, les nouvelles bobines NPS originelles réutilisables sont équipées d'un transpondeur RFID (technologie d'identification par radiofréquence).

De cette façon, les utilisateurs du système NPS peuvent identifier l'appartenance éventuelle d'une bobine au système et donc la compatibilité éventuelle avec ce dernier. Dans ce cas, des perturbations

considérables seraient la conséquence. En outre, le transpondeur RFID simplifie l'étiquetage de la bobine et puisque son identification est mémorisée dans la technologie RFID, aucune étiquette n'est nécessaire.

Le NPS est le seul système d'emballage au monde qui permet d'effectuer le déroulement de câbles automobiles en cuivre, en alliages de cuivre et en aluminium aux vitesses les plus élevées sans entraîner aucun problème ni enchevêtrement.

Même les câbles de signal en alliages de cuivre avec une section transversale de 0,13mm² peuvent être traités sans aucun problème. Plus de 420 unités d'enroulement NPS sont actuellement utilisées de par le monde avec plus de trois millions de bobines NPS en fonction.

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

Technique pour la mesure précise de la concentricité d'un conducteur quant à l'isolation et aux paramètres des câbles et des fils correspondants

Par Harald Sikora et Katja Giersch, Sikora, Allemagne

Introduction

Les fabricants de fils pour l'industrie automobile et les câbles de commande, les câbles coaxiaux et de communication utilisent actuellement des technologies de mesures et de contrôle dans leurs lignes d'extrusions afin de maintenir des paramètres spécifiques dans les câbles. Cela est important pour l'optimisation des processus et pour le contrôle de la qualité, mais il s'agit d'une exigence lorsque les produits sont assemblés automatiquement. Dans ces cas, les taux d'échec dans l'assemblage sont enregistrés statistiquement, relevés et affectés au producteur. Pour cette raison, les usines de production de câbles ont pour but de fournir des câbles offrant des standards de qualité élevés et fiables.

Défis dans le secteur de l'extrusion de câble

Un défi dans le procédé d'extrusion du câble consiste à maintenir les valeurs de mesure avec des tolérances serrées en ce qui concerne la concentricité du conducteur quant à l'isolation, le diamètre du conducteur, le diamètre extérieur du câble et l'ovalité du diamètre extérieur. Pendant le processus d'extrusion des déviations des valeurs de mesure pourraient se vérifier, et elles ne seraient pas identifiées sans des équipements spéciaux de visualisation.

Les nœuds, les étranglements, les défauts ou les zones nues dans le câble peuvent entraîner des dysfonctionnements lors de l'assemblage. Au début du processus d'assemblage, le câble ou le fil est coupé sur mesure et dénudé aux extrémités pour être ensuite équipé de fiches. Les forces de traction utilisées pour le dénudage sont définies avec précision. Les écarts des forces de traction au sein de l'isolation du conducteur peuvent causer des interférences lors du dénudage. L'utilisation d'une technologie de mesure et de contrôle innovante permet de répondre aux exigences élevées requises pour les câbles et d'identifier les potentialités d'optimisation des processus de la ligne d'extrusion.

Conducteur tournant/oscillant

Les exigences en matière de technologies de mesure et de contrôle dans les lignes d'extrusion de câbles sont très précises là où il faut maintenir les tolérances dans quelques micromètres. Alors que la valeur moyenne du diamètre ou l'épaisseur de la paroi de l'isolement est suffisante pour commander la ligne d'extrusion, l'enregistrement fiable et l'affichage des variations à court terme, en particulier des valeurs d'excentricité, sont en outre nécessaires sous l'aspect de l'épaisseur minimum de la paroi. De faibles oscillations du conducteur directement devant la tête d'extrusion peuvent

déterminer des écarts significatifs de la concentricité, surtout si le conducteur oscille sur un plan ou s'il est en rotation. Ces excentricités ne peuvent pas être affichées avec une visualisation graphique classique. Un vecteur de rotation rapide avec une valeur d'excentricité constante ne peut être affiché à l'opérateur qu'au moyen d'un affichage supérieur à l'affichage standard.

Position angulaire d'un conducteur

Au cours du processus d'extrusion, il est possible qu'un câble, avec ou sans rouleaux de guidage, occupe une position légèrement inclinée pendant son passage à travers le plan de mesure. Les systèmes de mesure de l'excentricité doivent être capable de générer des valeurs de mesure précises, même dans le cas d'une telle position (voir Figure 6).

Flèche ou courbure du conducteur

Même en supposant que le conducteur soit tendu lors de son passage à travers une ligne d'extrusion, il peut encore présenter quelques courbures, qui doivent être détectées lors de l'entrée dans la tête de mesure d'un système de mesure de l'excentricité.

Sans un système de mesure spécifique, même les rayons de courbure imperceptibles sur des tronçons allant de 5 à 20 mètres peuvent causer des erreurs d'excentricité jusqu'à 40 micromètres. Seulement dans un cas idéal, les rouleaux de guidage peuvent compenser cette tension imparfaite du conducteur, ou vice versa, même augmenter l'erreur. Par conséquent, l'objectif devrait consister à éliminer complètement les rouleaux de guidage.

La mesure de la concentricité d'un conducteur dans l'isolement assure la production de câbles de haute qualité. Lors de la fabrication du câble, le système de mesure devrait compenser complètement l'influence des variables liées à la production pouvant affecter le résultat de la mesure, tel que les positions du câble en angle et les rayons de courbure du conducteur. Les systèmes de mesure de la concentricité, en combinaison avec un système à processeur intégré ou externe, permettent d'afficher les variations à court terme de l'excentricité sous la forme d'un diagramme de dispersion. Le système pose les bases pour la production de câbles de haute qualité, et assure un câble fiable, sans défauts pendant le processus d'assemblage. Par la suite, il garantit la fiabilité du processus et offre un rapport coût-efficacité avantageux.

Système de mesure pour le mesurage de la concentricité d'un conducteur dans l'isolement sous l'effet d'une oscillation, de la position angulaire du câble ou d'une courbure du câble sur le plan de mesurage

Le système de mesure (Figure 1) est basé sur une méthode de mesure optique et inductive. Le système de mesure inductif, qui est positionné entre deux plans de mesure optique, permet de déterminer la position exacte du conducteur, alors que le système optique permet de mesurer la position du câble. Une valeur d'excentricité est relevé lorsque les deux positions se distinguent l'une de l'autre. En même temps, le système optique relève avec précision le diamètre et l'ovalité du câble. Les calculs et les analyses nécessaires sont effectués dans le système de mesure. Les valeurs de mesure sont obtenus au moyen de différentes interfaces pour transférer



▲ Figure 1: Dispositifs pour la mesure de la concentricité d'un conducteur dans l'isolement

des données à une unité d'affichage et de commande ou à un ordinateur en ligne.

Circuit de mesure inductif

Le câble passe à travers un transformateur toroïdal, qui génère un courant alternatif de quelques milliampères dans le conducteur. Le courant alternatif crée un champ magnétique qui entoure le conducteur idéalement d'une manière circulaire et l'intensité diminue de façon exponentielle, en fonction du carré de la distance. Dans le système de mesure des capteurs inductifs sont placés à une distance déterminée, de façon radiale autour du conducteur. Grâce à ces capteurs, la position exacte du conducteur est calculée avec une précision élevée à partir de la distribution de l'intensité de la force du champ magnétique.

Grâce à la combinaison de plusieurs capteurs optiques et à la conception spécifique des capteurs inductifs, il est possible de détecter et de compenser automatiquement une position angulaire ou une courbure dans le câble, ce qui assure une mesure précise de l'excentricité. En raison du centrage automatique de la tête de mesure de la position du câble, le système de mesure est conçu pour fournir des valeurs de mesure précises à tout moment, même en cas de variation des forces de traction. Les rouleaux de guidage sont superflus avec des têtes de réglage automatique.

L'agencement du système de mesure inductif pour la détermination de la position du conducteur au centre de la tête de mesure, en combinaison avec un blindage ferromagnétique, empêche que des variables environnementales éventuelles aient une influence sur la valeur de mesure de l'excentricité.

Pour cette raison, même un chariot élévateur de passage, une goulotte de refroidissement déplacée ou des conditions de mise à la terre variables n'ont aucune influence sur le résultat de mesure.

Circuit de mesure optique

La mesure optique est basée sur le principe de l'analyse de diffraction combinée avec des diodes laser à impulsions, le faisceau de lumière des diodes projette une ombre du câble sur le capteur linéaire CCD sur chaque axe de mesure avec un temps d'exposition de 0,25 microsecondes. Les systèmes effectuent le mesurage sur quatre axes (sur huit points), de la position et de la largeur de l'ombre. De la position de l'ombre par rapport à la position déterminée du conducteur, des processeurs de signaux calculent la valeur exacte de l'excentricité alors que des largeurs des quatre ombres on calcule le diamètre extérieur et l'ovalité.

Les valeurs de mesure du diamètre extérieur, le cas échéant en combinaison avec le diamètre du conducteur (l'épaisseur de la paroi), sont utilisées pour modifier la capacité productive de l'extrudeuse ou la vitesse de tirage du câble de telle manière que les valeurs de mesure soient affichées en fonction de la valeur nominale correspondante. En outre, les valeurs de mesure avec des tolérances serrées revêtent une importance non négligeable pour l'assemblage. Chacune de ces valeurs influence l'impédance d'onde (par exemple, les câbles LAN torsadés) et par conséquent la valeur de la perte par retour structurel (SRL) d'un câble de transfert de données, en particulier lorsque des écarts de ces valeurs se produisent périodiquement. Grâce à Transformation de Fourier Rapide (FFT), le taux élevé de balayage de 2 500 mesures/seconde permet de générer une prévision pour le SRL en fonction de la fréquence de transmission, même à des vitesses de ligne de 3 000 mètres/minute pour des spécifications CAT actuelles et futures. Si on donne une spécification concernant l'épaisseur minimum de la paroi pour l'isolement du câble, alors toute excentricité conduit inévitablement à une augmentation de la consommation de matériau d'isolement. Par conséquent, les excentricités devraient être réduites pour des raisons économiques.

Enregistrement des valeurs oscillantes d'excentricité

Avec une vitesse de balayage de 2 500 mesures par seconde, le système de mesure enregistre d'excentricité avec une grande précision pour chaque valeur. Ces valeurs sont affichées sous forme d'un nuage les valeurs oscillantes de points (Figures 3, 4 et 5).



▲ Figure 2: Présentation standard de l'excentricité



▲ Figure 3: Distribution de type aléatoire de chaque valeur d'excentricité



▲ Figure 4: Distribution de type à anneau de chaque valeur d'excentricité



▲ Figure 5: Distribution de type à ellipse de chaque valeur d'excentricité

Le nuage de points fournit un moyen supplémentaire pour afficher la mesure courante sur des dispositifs d'affichage et de commande basés sur le processeur, tout en permettant la représentation graphique de la distribution des variations à court terme de l'excentricité. Chaque point représente une valeur unique de

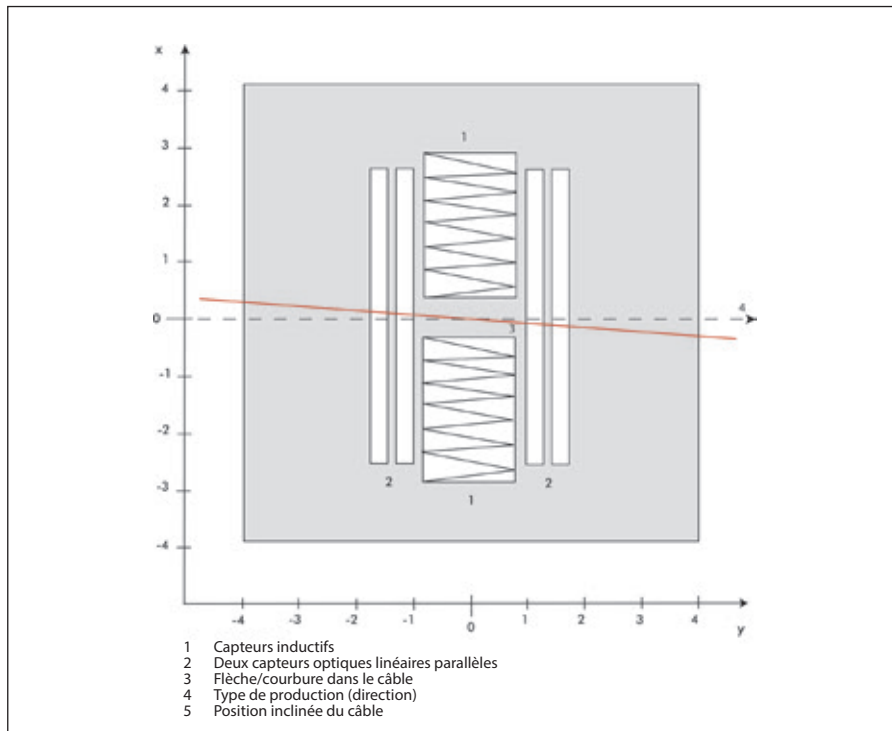
l'excentricité en fonction de la valeur et de la direction. La distribution globale du diagramme de dispersion met en évidence l'écart type de l'excentricité. Il suffit souvent de modifier le guidage du conducteur à proximité de la tête d'extrusion afin d'éviter ces oscillations, qui se produisent généralement au sein

d'une certaine gamme de vitesse et/ou de certains degrés de remplissage de la bobineuse ou du dérouleur, respectivement. La méthode standard de représenter l'excentricité moyennant une section transversale du câble (Figure 2) est en outre utile pour l'opérateur lorsqu'il est nécessaire de centrer la tête d'extrusion. La Figure 3 montre une distribution de type aléatoire de chaque valeur de l'excentricité, alors que la Figure 4 montre une distribution de type à anneau des valeurs d'excentricité, ce qui est souvent le résultat d'un conducteur qui tourne (oscille) devant la tête d'extrusion de l'extrudeuse. La Figure 5 montre une distribution du nuage de points du type à ellipse, pouvant se produire, par exemple, lorsque le conducteur oscille ou vibre sur un plan immédiatement avant d'entrer dans la tête d'extrusion et qui cause donc des variations de l'excentricité supplémentaires. En outre, cette excentricité rotative permanente ne serait pas aussi visible avec une présentation standard de l'excentricité (comme illustré à la Figure 2).

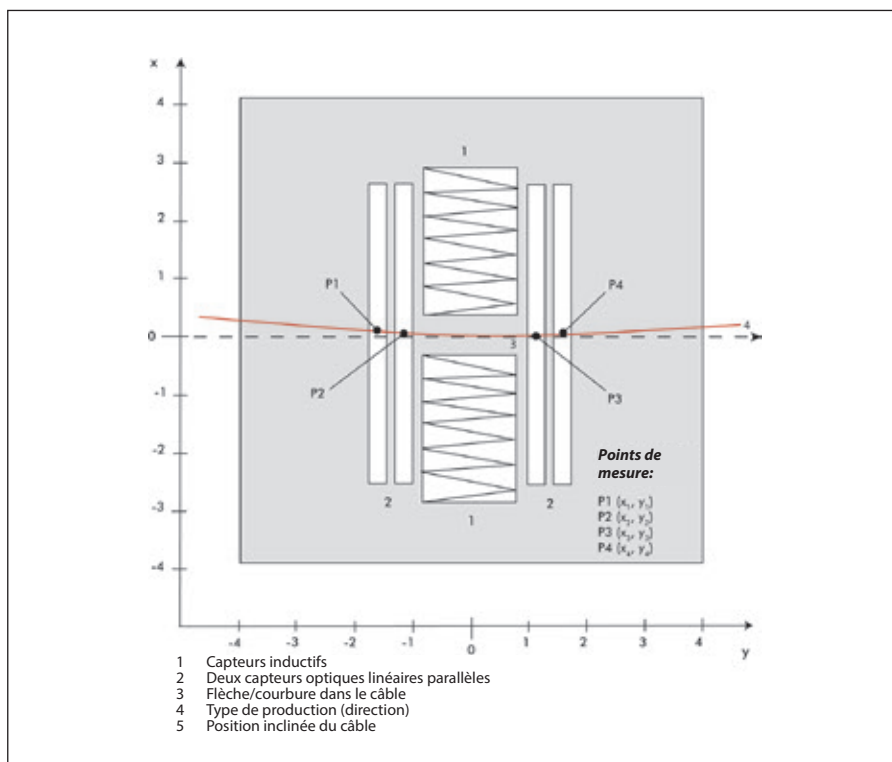
Afin d'assurer une précision de mesure élevée du conducteur à l'intérieur de l'isolement, les axes de mesure optique doivent être placés au même niveau que les capteurs inductifs. Dans cette position, les chemins optiques sont obscurcis par les capteurs inductifs. Pour cette raison, les plans de mesure optique sont partagés. Un plan de mesure optique est disposé avant et un après le plan du capteur inductif. En conséquence, seul un conducteur absolument droit et horizontal peut générer des résultats de mesure précis. En pratique, cependant, les positions légèrement angulaires ou les courbures dans le conducteur doivent généralement être prévues. Cela signifie que le dispositif de mesure doit être en mesure d'enregistrer des valeurs de mesure précises même dans ces conditions.

Mesure d'une position inclinée du câble

La Figure 6 montre un câble en train de se déplacer par rapport à une ligne droite. Toutefois, le câble se déplace de la position inclinée à la ligne de production effectivement prévue. Sur l'illustration, la position inclinée du câble est exagérée pour une meilleure compréhension. On sait qu'une ligne droite ou inclinée, dans ce cas un conducteur rectiligne, est définie par deux points. Au moyen du premier et du deuxième dispositif de mesure optique, les positions inclinées du câble seront identifiées ainsi que leur influence sur les résultats de mesure sera déterminée et entièrement compensée.



▲ Figure 6: Technique pour relever une position inclinée du câble



▲ Figure 7: Technique pour déterminer une flèche ou une courbure du câble

Détermination et compensation d'une flèche ou d'une courbure du câble

La Figure 7 illustre un câble qui montre une flèche ou une courbure. Pour une meilleure compréhension, l'illustration

de la courbure du câble est extrêmement exagérée et, dans la pratique, peu probable. La courbure d'un conducteur peut être décrite comme un cercle, dont la position et le rayon de courbure sont définies par trois points.

Avec ces informations, le système à processeur est en mesure de calculer la position exacte du câble sur le plan

de mesure inductif et de compenser totalement l'influence de la position angulaire et/ou des courbures. Comme illustré à la figure, le système de mesure est réalisé de manière à ce que la position du câble soit mesurée en quatre points, indiqués sur la figure comme P1, P2, P3 et P4. Pour cette raison, le système de mesure est conçu pour détecter même des déformations irrégulières du conducteur.

Conclusions

Avec la technologie présentée, il est possible de mesurer avec précision la concentricité d'un conducteur dans l'isolement, ainsi que les paramètres du produit, le diamètre extérieur, l'ovalité et l'épaisseur de la paroi. La méthode de mesure permet d'enregistrer les valeurs d'excentricité du conducteur dans le cas de rotation ou d'oscillation sur un plan sous forme d'un nuage de points. Ce nuage de points permet d'afficher la distribution des variations à court terme de l'excentricité.

Grâce à la mesure à quatre axes ainsi qu'à la mesure de l'excentricité à huit points, il est possible d'identifier une position inclinée du câble sur le plan de mesure.

Le système de mesure compense automatiquement la position inclinée du conducteur, aussi bien horizontale que verticale, et par conséquent les résultats des mesures ne sont pas influencés. Le système de mesure enregistre également des valeurs de mesure précises, même lorsque le câble passe à travers la tête de mesure avec une flèche ou un rayon de courbure.

L'utilisation de la technologie de mesure décrite dans les lignes d'extrusion assure la production de câbles de haute qualité pour un assemblage sans défauts, tout en contribuant à la fiabilité du processus et, par conséquent, à une meilleure rentabilité. ■

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Accademia di formazione presso Tratos

UN'ACCADEMIA creata per sviluppare ulteriormente le abilità dei dipendenti del produttore di cavi Tratos della sede di Knowsley, Regno Unito, offrirà quest'anno il primo dei propri moduli di formazione.

L'idea dell'accademia ha suggerito un'indagine approfondita del personale di Merseyside, un lavoro che ha rivelato un ottimismo significativo circa il futuro dello stabilimento e le ambizioni di Tratos per l'azienda nel suo complesso. Ha inoltre contribuito a valutare le competenze e le conoscenze attuali tenendo in considerazione i punti di vista della direzione, del team di vendita e del personale di Knowsley.

La struttura dell'accademia, alla quale sarà conferito un approccio istruttivo permetterà di impartire i moduli nelle sedi della società in tutto il mondo, e sarà aperta ai colleghi di vecchia data così come ai nuovi dipendenti.

Gli investimenti nello sviluppo professionale sono stati giudicati particolarmente importanti dalla dirigenza, e per tale ragione i contenuti dei moduli dell'accademia sono stati rapidamente completati per essere impartiti.

Siccome Tratos è in una fase di massima crescita, la sua formazione deve tenere il passo. Di conseguenza, il progetto che è stato deciso alla fine dello scorso anno è già avviato e in corso.

Benché Tratos produca anche in Italia e i corsi dell'Accademia saranno estesi



▲ Dipendenti che hanno frequentato il recente modulo di formazione presso l'Accademia di Tratos a Knowsley, Regno Unito

a livello globale, è stato lo stabilimento del Regno Unito a vederne per primo

l'applicazione. I programmi di formazione e valutazione per Tratos sono considerati investimenti molto positivi, in particolare presso la sede di produzione di Knowsley.

Acquisizioni spagnole

Il Gruppo italiano MFL (Mario Frigerio/Frigeco) ha confermato l'acquisizione di Construcciones Mecánicas Caballé SA (Caballé), il produttore spagnolo di macchinari per cavo, e le sue ulteriori attività. Secondo il comunicato stampa, la transazione, "rafforzerà notevolmente la capacità di fornitura del Gruppo MFL per quanto riguarda gli equipaggiamenti di trafilatura di filo non ferroso, di trefolatura e di estrusione". L'acquisizione comprende i marchi Caballé, OM Lesmo e Eurodraw Energy, e le corrispondenti proprietà intellettuali.

"Questi marchi affermati, unitamente ai mezzi finanziari del gruppo MFL, i nostri 120 anni di esperienza nel settore, e la più ampia base di conoscenze della progettazione e della fabbricazione nel settore, rafforzano ulteriormente il nostro impegno verso i nostri clienti di fili non ferrosi e cavi," si legge nel comunicato stampa.

"Sfruttando la storia combinata di Caballé, OM Lesmo, Eurodraw Energy e Frigeco, possiamo garantire un continuo miglioramento tecnico e un servizio clienti senza pari. Siamo lieti di rafforzare i nostri rapporti commerciali con i nostri clienti e fornitori in tutto il mondo."

A più lungo termine, il piano consisterà nell'aumentare le attività dell'Accademia. Le fasi iniziali del lavoro comportano l'allineamento delle competenze con la cultura e le ambizioni di Tratos, e con i valori così importanti per i suoi proprietari italiani, cioè l'integrità, la trasparenza e mettere al primo posto le persone.

Durante l'indagine preparatoria sono state esaminate le opinioni del personale circa la posizione della società riguardo al comportamento non etico (tolleranza zero), il suo ottimismo per il futuro, la collaborazione nel lavoro, la fiducia e la correttezza, la conoscenza, le competenze e altro.

Misuratori rotanti modulari per la misurazione delle dimensioni ad alta velocità

Zumbach Electronic ha introdotto nuovi componenti modulari nella sua linea di misuratori rotanti. Si ritiene che la linea di prodotti SMR offra vantaggi significativi rispetto ad altri misuratori per quanto riguarda l'acquisizione rapida e accurata di dimensioni in senso longitudinale e radiale.

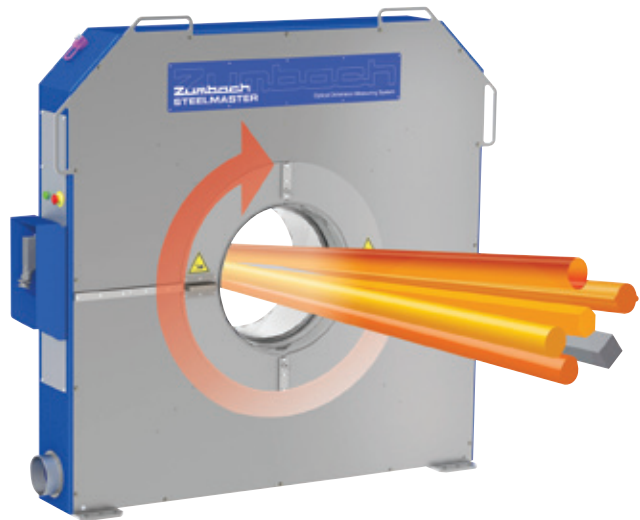
I misuratori SMR ruotano in continuo a 60 o a 100 giri al min. Il sistema comprende fino a tre testine laser ODAC® che effettuano 2.000 misurazioni al secondo ciascuna e sono completamente sincronizzate.

Ciò presuppone fino a dieci profili completi al secondo, cioè con una velocità superiore a quella dei misuratori precedenti.

In alternativa, il sistema SMR può funzionare in modo orientabile statico con 2.000 misurazioni delle dimensioni del diametro al secondo in ciascuna direzione. A 100m/s ciò significa che viene effettuata una serie di misurazioni ogni 50mm.

Il concetto meccanico è semplice e robusto: non ci sono parti di usura, anelli collettori né freni. La trasmissione di energia e segnali verso e dalle teste laser avviene completamente senza contatto.

Le caratteristiche standard e specifiche del software includono funzionalità EPM per la visualizzazione della sezione effettiva, con deviazioni di forma poligonale e asimmetriche; funzioni speciali per laminatoio a trio; il calcolo delle spuntature di testa e di coda e schermi flessibili personalizzati.



▲ Unità di misura modulare Steelmaster SMR 400-S2 e una gamma di possibilità di equipaggiamenti

I vantaggi comprendono un avviamento più veloce, meno scarti, tolleranze più strette, la visualizzazione della forma effettiva e una manutenzione senza problemi nonché un rapido e facile accesso ai punti di manutenzione. I misuratori sono adatti per i processi a caldo e a freddo e per il controllo di qualità.

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

Movimentazione di cavi efficiente, sicura ed economica

DA quasi 20 anni, i produttori di cavi e cablaggi lavorano con il sistema Niehoff Packaging NPS. Il sistema è in continua evoluzione sin dal suo inizio e ha dimostrato di essere un sistema di movimentazione altamente efficiente, sicuro ed economico soprattutto per i cavi destinati al settore automobilistico i fasci di fili, i trefoli, i conduttori e i cavi.

Il sistema NPS comprende avvolgitori speciali e bobine smontabili e riutilizzabili realizzate in plastica ABS. Gli avvolgitori sono progettati per operare in linea con le linee di estrusione. Il cambio dalla bobina completa alla bobina vuota avviene alla massima velocità di produzione consentendo un funzionamento continuo. Le bobine realizzate in diverse dimensioni offrono un sistema di imballaggio sicuro, stabile e privo di grovigli sia quando sono piene sia quando sono parzialmente vuote e consentono velocità di svolgimento del cavo più elevate nei processi a valle.



▲ Doppio avvolgitore tipo SV 400 D per fili isolati con bobine piene e vuote (sistema d'imballaggio Niehoff)

Quando sono vuote, le bobine possono essere completamente smontate e impilate le une dentro le altre e restituite al produttore dei cavi dove possono essere facilmente e rapidamente riassemblate, ricaricate e quindi riutilizzate. Per proteggere le bobine NPS da bobine estranee che non sono compatibili con il sistema NPS, le bobine nuove originali NPS riutilizzabili sono dotate di un transponder RFID (tecnologia per l'identificazione mediante radiofrequenza).

In questo modo gli utenti del sistema NPS possono individuare l'eventuale appartenenza di una bobina al

sistema e pertanto la compatibilità o meno con lo stesso. In questo caso, si avrebbero, come conseguenza, notevoli disturbi. Inoltre, il transponder RFID semplifica l'etichettatura della bobina e siccome l'identificazione della stessa è memorizzata nella tecnologia RFID, non è necessaria alcuna etichetta.

L'NPS è l'unico sistema d'imballaggio al mondo che consente le più alte velocità di svolgimento, senza problemi e senza grovigli, di cavi in rame, leghe di rame e alluminio per il settore automobilistico.

Anche i cavi di segnale in leghe di rame con una sezione trasversale di 0,13mm² possono essere trattati senza alcun problema. Oltre 420 unità di avvolgimento NPS sono attualmente in uso in tutto il mondo con più di tre milioni di bobine NPS in funzione.

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

Tecnica per la misurazione precisa della concentricità di un conduttore per quanto riguarda l'isolamento e i relativi parametri di cavi e fili

A cura di Harald Sikora e Katja Giersch, Sikora, Germania

Introduzione

Nell'ambito dei fili per l'industria automobilistica e dei fili di comando, dei cavi coassiali e dei cavi di comunicazione, i fabbricanti di fili e cavi utilizzano attualmente tecnologie di misurazione e controllo nelle loro linee di estrusione al fine di mantenere parametri specifici nei cavi. Ciò è importante per l'ottimizzazione dei processi e il controllo della qualità, ma è anche richiesto quando i prodotti sono assemblati automaticamente.

In questi casi, i tassi di difetti nell'assemblaggio vengono registrati statisticamente, memorizzati e assegnati al produttore. Per questo motivo, gli stabilimenti di produzione di cavi puntano a offrire cavi con standard qualitativi elevati e affidabili.

Sfide nel settore dell'estrusione dei cavi

Una sfida nel processo di estrusione del cavo consiste nel mantenere i valori di misurazione con tolleranze strette da un punto di vista della concentricità del conduttore per quanto riguarda l'isolamento, il diametro del conduttore, il diametro esterno del cavo e l'ovalità del diametro esterno. Durante il processo di estrusione si possono verificare deviazioni nei valori di misurazione, che non verrebbero individuate in mancanza di equipaggiamenti speciali per la visualizzazione.

Nodi, strozzature, difetti o punti nudi nel cavo possono causare malfunzionamenti in fase di montaggio. All'inizio del processo di assemblaggio, il cavo o filo

viene tagliato a misura e spellato alle estremità per essere successivamente dotato di spine. Le forze di trazione utilizzate per la spellatura sono definite con precisione. Le deviazioni delle forze di trazione all'interno dell'isolamento del conduttore possono causare interferenze durante la spellatura. L'utilizzo di una tecnologia innovativa di misurazione e controllo consente di soddisfare le elevate esigenze richieste per i cavi nonché di individuare le potenzialità per l'ottimizzazione dei processi della linea di estrusione.

Conduttore rotante/oscillante

Nelle linee di estrusione per cavi, ove è necessario mantenere le tolleranze entro pochi micrometri, i requisiti per le tecnologie di misurazione e controllo sono molto precisi. Mentre il valore medio del diametro o lo spessore della parete dell'isolamento è sufficiente per il controllo della linea di estrusione, per quanto riguarda lo spessore minimo della parete sono anche necessarie la registrazione affidabile e la visualizzazione delle variazioni a breve termine, in particolare dei valori di eccentricità.

Lievi oscillazioni del conduttore immediatamente prima della testa di estrusione possono determinare significative deviazioni della concentricità, soprattutto se il conduttore oscilla su un piano o gira. Tali eccentricità non possono essere rappresentate utilizzando una visualizzazione grafica tradizionale. Un vettore a rotazione veloce di un valore di eccentricità costante può essere visualizzato all'operatore solo con una visualizzazione superiore a quella standard.

Posizione angolare di un conduttore

Durante il processo di estrusione è possibile che un cavo, con o senza rulli di guida, presenti una posizione leggermente angolare quando passa attraverso il piano di misurazione. I sistemi di misurazione dell'eccentricità devono essere in grado di generare valori di misurazione precisi anche quando si verifica una tale posizione (si veda la *Figura 6*).

Freccia o curvatura del conduttore

Anche supponendo che il conduttore sia teso durante l'attraversamento di una linea di estrusione, possono tuttavia verificarsi delle curvature che devono essere rilevate all'ingresso nella testa di misura di un sistema di misurazione dell'eccentricità. Senza un sistema di misurazione speciale, persino i raggi di curvatura impercettibili su tratti che vanno da 5 a 20 metri possono provocare errori di eccentricità fino a 40 micrometri.

Solo in un caso ideale, i rulli di guida possono compensare questa tensione imperfetta del conduttore, o viceversa, persino aumentare l'errore. Pertanto, l'obiettivo dovrebbe essere quello di eliminare completamente i rulli di guida.

La misurazione della concentricità di un conduttore nell'isolamento garantisce la produzione di cavi di alta qualità. Durante la produzione del cavo, il sistema di misurazione dovrebbe compensare completamente l'influenza delle variabili legate alla produzione che possono influenzare il risultato della misurazione,

come ad esempio le posizioni angolari del cavo e i raggi di curvatura del conduttore. I sistemi di misurazione della concentricità, associati a un sistema a processore integrato o esterno, permettono di visualizzare le variazioni a breve termine dell'eccentricità sotto forma di un diagramma di dispersione. Il sistema pone le basi per la produzione di cavi di alta qualità, e assicura un cavo affidabile e privo di difetti durante il processo di assemblaggio. Inoltre garantisce l'affidabilità del processo e aumenta la redditività.

Sistema di misura per la misurazione della concentricità di un conduttore nell'isolamento sotto l'influenza di un'oscillazione, della posizione angolare del cavo o di una curvatura del cavo sul piano di misura

Il sistema di misurazione (Figura 1) si basa su un metodo di misurazione ottico e induttivo. Il sistema di misurazione induttivo, che è posizionato tra due piani di misurazione ottica, consente di determinare la posizione esatta del conduttore, mentre il sistema ottico consente di misurare la posizione del cavo. Si rileva un valore di eccentricità quando entrambe le posizioni differiscono l'una dall'altra.

▼ **Figura 1:** Dispositivi per la misurazione della concentricità di un conduttore nell'isolamento



Contemporaneamente, il sistema ottico rileva con precisione il diametro e l'ovalità del cavo. Tutti i calcoli e le analisi necessari vengono effettuati nel sistema di misurazione. I valori di misurazione sono ottenuti mediante diverse interfacce per il trasferimento di dati ad un'unità di visualizzazione e comando o a un computer in linea.

Circuito di misurazione induttivo

Il cavo passa attraverso un trasformatore toroidale, che genera una corrente alternata di pochi milliampere nel conduttore. La corrente alternata crea un campo magnetico che circonda idealmente il conduttore in modo circolare e l'intensità diminuisce, esponenzialmente, in funzione del quadrato della distanza. Nel sistema di misurazione, dei sensori induttivi sono posti ad una determinata distanza in modo radiale attorno al conduttore. Con l'aiuto di questi sensori, la posizione esatta del conduttore viene calcolata con elevata precisione in base alla distribuzione dell'intensità della forza del campo magnetico.

Grazie alla combinazione di molteplici sensori ottici e allo speciale design dei sensori induttivi, è possibile rilevare e compensare automaticamente una posizione angolata o una piegatura nel cavo. Questo assicura una misurazione precisa dell'eccentricità.

Con il centraggio automatico della testa di misurazione rispetto alla posizione del cavo, il sistema di misurazione è in grado di fornire valori di misurazione precisi in ogni momento, anche al variare delle forze di trazione nel cavo. I rulli di guida non sono più necessari con tali teste di regolazione automatica.

La disposizione del sistema di misurazione induttiva per la determinazione della posizione del conduttore nel centro della testa di misurazione, in combinazione con una schermatura ferromagnetica, impedisce che le variabili ambientali influenzino il valore di misurazione dell'eccentricità. Pertanto i risultati della misurazione non sono influenzati neppure da un carrello elevatore di passaggio, da una canaletta di raffreddamento spostata o dalle mutevoli condizioni di messa a terra.

Circuito di misurazione ottica

La misurazione ottica si basa sul principio dell'analisi della diffrazione combinata

con diodi a laser con funzionamento a impulsi; il fascio di luce dei diodi proietta un'ombra del cavo sul sensore lineare CCD su ciascun asse di misura con un tempo di esposizione di 0,25 microsecondi. I sistemi effettuano la misurazione su quattro assi (su otto punti) della posizione e della larghezza dell'ombra.

Dalla posizione dell'ombra rispetto alla posizione determinata del conduttore, dei processori di segnale calcolano il valore esatto dell'eccentricità mentre dalle larghezze delle quattro ombre, vengono calcolati il diametro esterno e l'ovalità.

I valori di misurazione del diametro esterno, se necessario in combinazione con il diametro del conduttore (lo spessore della parete), servono a regolare la capacità produttiva dell'estrusore o la velocità di traino del cavo in modo tale che i valori di misurazione siano impostati in funzione del rispettivo valore nominale. Inoltre, i valori di misurazione con tolleranze strette sono di notevole importanza per il montaggio.

Ciascuno di questi valori influenza l'impedenza d'onda (ad esempio, cavi LAN intrecciati) e di conseguenza il valore dell'Attenuazione di Riflessione Strutturale (SRL) di un cavo di trasferimento dati, in particolare quando le deviazioni di questi valori si verificano periodicamente.

Con l'aiuto della Trasformata Veloce di Fourier (FFT), l'alta velocità di scansione di 2.500 misurazioni/secondo permette di generare una previsione della SRL in funzione della frequenza di trasmissione, anche a velocità di linea di 3.000 metri/minuto per specifiche CAT attuali e future.

Se viene fornita una specifica riguardo allo spessore minimo della parete per l'isolamento del cavo, allora qualsiasi eccentricità determina inevitabilmente un aumento del consumo di materiale isolante. Pertanto, le eccentricità dovrebbero essere ridotte per motivi economici.

Registrazione dei valori oscillanti di eccentricità

Con una velocità di scansione di 2500 misure al secondo, il sistema di misurazione registra valori oscillanti di eccentricità con un'elevata precisione per ogni valore. Questi valori vengono visualizzati sotto forma di un diagramma di dispersione (Figura 3, 4 e 5).

Il diagramma di dispersione fornisce un ulteriore mezzo per visualizzare la misurazione corrente sui dispositivi di visualizzazione e comando basati su processore, e consente di rappresentare



▲ **Figura 2:** Presentazione standard dell'eccentricità



▲ **Figura 3:** Distribuzione di tipo casuale dei singoli valori di eccentricità



▲ **Figura 4:** Distribuzione di tipo ad anello dei singoli valori di eccentricità



▲ **Figura 5:** Distribuzione di tipo ad ellisse dei singoli valori di eccentricità

graficamente la distribuzione delle variazioni a breve termine dell'eccentricità. Ciascun punto rappresenta un singolo valore dell'eccentricità relativo al valore e alla direzione. La distribuzione complessiva del diagramma di dispersione evidenzia la deviazione standard dell'eccentricità.

Spesso è sufficiente modificare la guida del conduttore in prossimità della testa di estrusione per evitare queste oscillazioni, che di solito si verificano all'interno di un certo intervallo di velocità e/o di certi gradi di riempimento rispettivamente dell'avvolgitore o dello svolgitore. La modalità standard di rappresentazione

dell'eccentricità mediante la sezione trasversale del cavo (Figura 2) è inoltre utile per l'operatore quando è necessario centrare la testa di estrusione.

La Figura 3 illustra una distribuzione di tipo casuale dei singoli valori dell'eccentricità, mentre la Figura 4 mostra una distribuzione del tipo ad anello dei valori di eccentricità, che è spesso il risultato di un conduttore che ruota (oscilla) davanti della testa di estrusione dell'estrusore.

La Figura 5 mostra una distribuzione del tipo ad ellissi del diagramma di dispersione, che può verificarsi, ad esempio, quando il conduttore oscilla o vibra in un piano immediatamente prima dell'ingresso nella testa di estrusione e che pertanto causa ulteriori variazioni dell'eccentricità. Inoltre, questa eccentricità rotante permanente, non sarebbe visibile con una presentazione standard dell'eccentricità (come illustrato nella Figura 2).

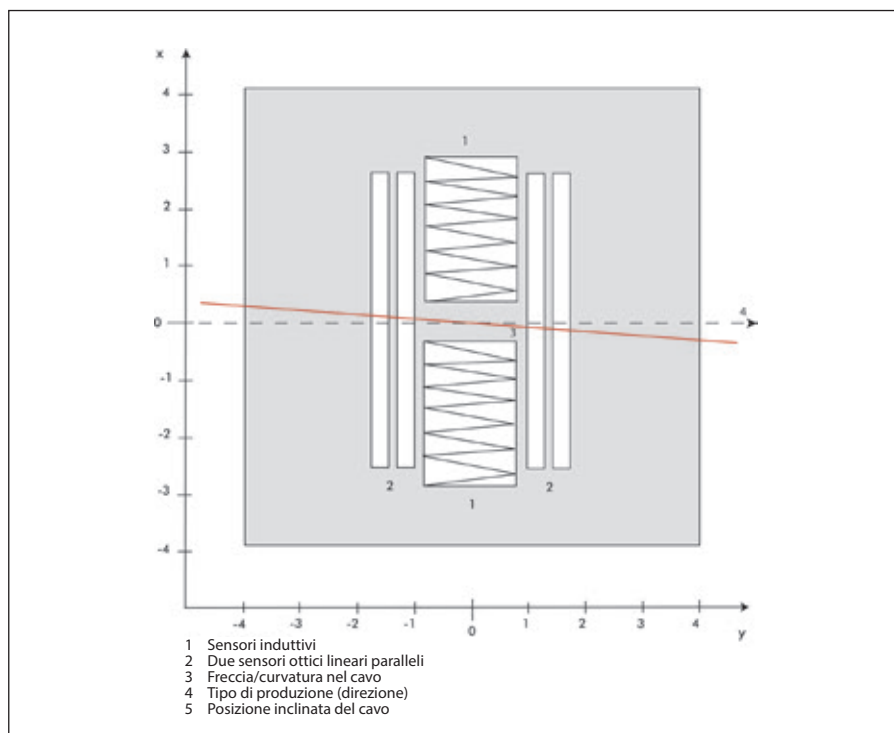
Al fine di garantire un'elevata precisione di misurazione del conduttore all'interno dell'isolamento, gli assi di misurazione ottica devono essere posizionati sullo stesso piano dei sensori induttivi.

In questa posizione, i percorsi ottici sono oscurati dai sensori induttivi. Per questo motivo, i piani di misurazione ottica sono divisi. Un piano di misura ottico è disposto prima e uno dopo il piano del sensore induttivo. Di conseguenza, solo un conduttore assolutamente rettilineo ed orizzontale può generare risultati di misurazione precisi. In pratica, tuttavia, le posizioni leggermente angolate o le curvature nel conduttore devono essere generalmente previste. Ciò significa che il dispositivo di misurazione deve essere in grado di rilevare i valori di misura precisi anche in queste condizioni.

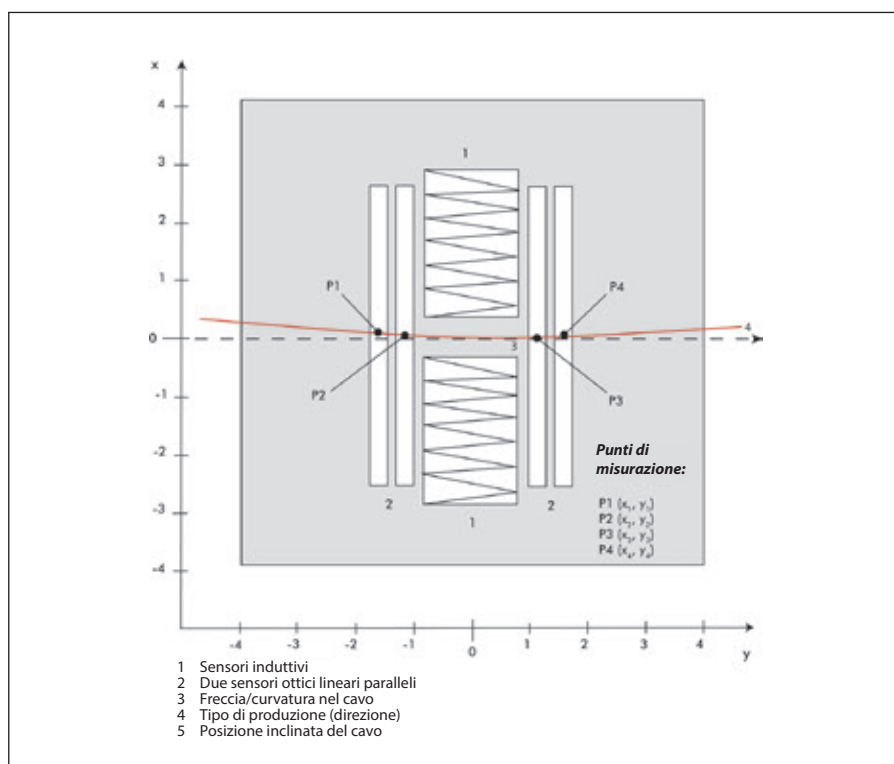
Misurazione di una posizione inclinata del cavo

La Figura 6 mostra un cavo che si sposta rispetto ad una linea retta. Il cavo, tuttavia, si sposta in posizione inclinata rispetto all'effettiva linea di produzione prevista. Nell'illustrazione, la posizione inclinata del cavo è esagerata per una migliore comprensione. È noto che una linea retta o inclinata, in questo caso un conduttore rettilineo, è definita da due punti.

Mediante il primo e il secondo dispositivo di misurazione ottico, verranno identificate le posizioni inclinate del cavo e sarà determinata e interamente compensata la relativa influenza sui risultati di misurazione.



▲ **Figura 6:** Tecnica per determinare una posizione inclinata del cavo



▲ **Figura 7:** Tecnica per determinare una freccia o una curvatura del cavo

Determinazione e compensazione di una freccia o di una curvatura del cavo

La *Figura 7* illustra un cavo che mostra una freccia o una curvatura. Per una migliore comprensione, l'illustrazione della curvatura

del cavo è estremamente esagerata e, in pratica, è improbabile. La curvatura di un conduttore può essere descritta come un cerchio, la cui posizione e raggio di curvatura sono definiti da tre punti.

Con queste informazioni, il sistema a processore è in grado di calcolare la posizione esatta del cavo sul piano di misura induttivo e di compensare

completamente l'influenza della posizione angolare e/o le curvature. Come illustrato sulla figura, il sistema di misurazione è costruito in modo tale che la posizione del cavo sia misurata in quattro punti, indicati nell'illustrazione come P1, P2, P3 e P4. Per questo motivo, il sistema di misurazione è in grado di identificare anche eventuali deformazioni irregolari del conduttore.

Conclusioni

Con la tecnologia presentata è possibile misurare con precisione la concentricità di un conduttore nell'isolamento nonché i parametri del prodotto, il diametro esterno, l'ovalità e lo spessore della parete.

La tecnica di misurazione consente di registrare i valori di eccentricità del conduttore in caso di oscillazione o rotazione su un piano sotto forma di un diagramma di dispersione. Questo diagramma di dispersione permette di visualizzare la distribuzione delle variazioni a breve termine dell'eccentricità.

Grazie alla misurazione a quattro assi e alla misurazione dell'eccentricità a otto punti, è possibile identificare una posizione inclinata del cavo sul piano di misurazione. Il sistema di misurazione compensa automaticamente la posizione inclinata del conduttore, sia orizzontale sia verticale, e pertanto i risultati di misurazione non sono influenzati. Il sistema di misurazione registra inoltre valori di misurazione precisi, anche quando il cavo passa attraverso la testa di misurazione con una freccia o un raggio di curvatura.

L'utilizzo della tecnologia di misurazione descritta nelle linee di estrusione garantisce la produzione di cavi di alta qualità per un assemblaggio privo di difetti e allo stesso tempo, contribuisce all'affidabilità del processo e conseguentemente ad una maggior redditività. ■

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Academia de capacitación en Tratos

ESTE año el primero de una serie de módulos de capacitación pensados para desarrollar aún más las habilidades de los empleados del fabricante de cables Tratos de la planta de Knowsley (Reino Unido) será impartido por una academia.

La idea de la academia dio lugar a una encuesta realizada a fondo a la mano de obra de Merseyside, una labor que reveló el clima optimista reinante sobre el futuro de la planta y las ambiciones de Tratos para toda la compañía. Ayudó también a evaluar las habilidades y conocimientos actuales e incorporó las opiniones del equipo de administración senior y del equipo de ventas, además de la de la mano de obra de Knowsley.

La estructura de la academia, a la que se dará un enfoque formativo, permitirá impartir los módulos a todas las sucursales de la empresa repartidas por el mundo, y estará abierta tanto a empleados antiguos como a nuevos.

La inversión en desarrollo profesional ha sido destacada por el equipo de administración senior como elemento de relevante importancia, motivo por el cual se ha completado e impartido rápidamente el contenido de los módulos de la academia.

Dado que Tratos se encuentra en un ciclo de alto crecimiento, tiene que mantener la capacitación de sus empleados al mismo ritmo. Por consiguiente, el proyecto, que fue decidido a finales del pasado año, ya está listo y funcionando. Aunque Tratos también tiene fábricas en Italia, y los cursos de la academia serán impartidos a escala global, la primera planta que ha visto el programa en acción ha sido la del Reino Unido.



▲ Empleados que asistieron al reciente módulo de capacitación impartido por la academia de Tratos en Knowsley (Reino Unido)

Los programas de formación y evaluación de Tratos son considerados inversiones muy positivas, especialmente en la planta de Knowsley.

A largo plazo, el plan tiene previsto extender el radio de acción de la academia. Las fases iniciales del trabajo comprenden la alineación de las habilidades con la cultura y ambición de Tratos, y con los valores que tanto importan a sus propietarios italianos (integridad, transparencia y puesta en primer plano de las personas).

La encuesta preparatoria analizó lo que pensaban los empleados sobre la actitud de la empresa frente a un comportamiento no ético (tolerancia cero), su optimismo hacia el futuro, trabajo colaborativo, confianza e imparcialidad, conocimientos, experiencia y otros temas.

Los diplomados de la Academia Tratos obtendrán reconocimiento y títulos internos y muchos de ellos podrán optar por recibir más capacitación.

Adquisiciones en España

El grupo italiano MFL (Mario Frigerio/Frigecco) ha confirmado su adquisición de Construcciones Mecánicas Caballé SA (Caballé), el fabricante de maquinaria para cables español, y sus otras operaciones. De acuerdo con el comunicado de prensa, la transacción "reforzará significativamente el alcance de suministro del grupo MFL en lo que se refiere a equipos de estirado, trenzado y extrusión de alambres". La adquisición comprende Caballé, OM Lesmo y Eurodraw Energy, además de sus correspondientes propiedades intelectuales.

"Estas consolidadas marcas, junto con el poder financiero del grupo MFL, nuestros 120 años de experiencia en el sector industrial, y la más extensa base de conocimientos de ingeniería y fabricación del sector, refuerzan aún más el compromiso contraído con nuestros clientes de productos no ferrosos y cables," decía el comunicado.

"Aprovechando la historia entrecruzada de Caballé, OM Lesmo, Eurodraw Energy y Frigecco, podemos garantizar una continua mejora técnica y un servicio de atención al cliente sin igual. Esperamos consolidar la relación empresarial con nuestros clientes y proveedores de todo el mundo."

Mario Frigerio SpA – Italia

Website: www.mflgroup.com

Tratos Cavi SpA – Italia
Website: www.tratos.eu

Medidores giratorios modulares de alta velocidad

Zumbach Electronic ha incorporado nuevos productos modulares a su línea de medidores giratorios.

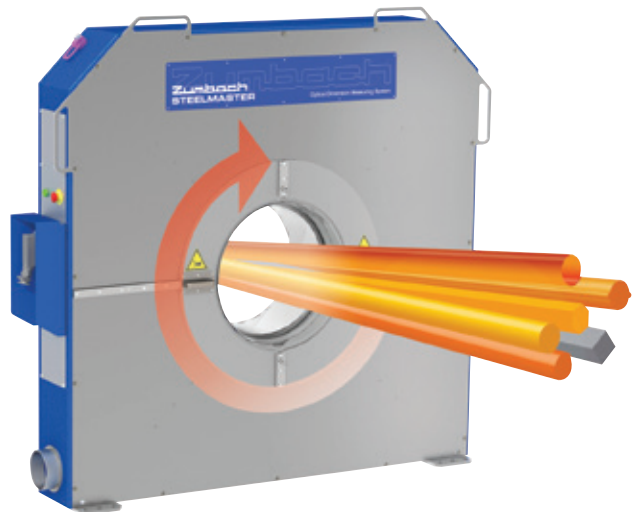
La línea de productos SMR ofrece importantes ventajas respecto a otros medidores en lo que se refiere a rapidez y precisión de captura dimensional en sentido longitudinal y radial.

Los medidores SMR giran a 60 ó 100rpm de manera continua. Están equipados con hasta 3 cabezales láser ODAC®, totalmente sincronizados, que realizan 2.000 medidas por segundo cada uno. Ello supone hasta diez perfiles completos por segundo, es decir, más rápido que los medidores anteriores.

Si se desea, el SMR puede funcionar en modo estático orientable haciendo 2.000 medidas de diámetro por segundo en cada dirección. A 100m/s significa una serie de medidas cada 50mm.

El diseño mecánico es simple y sólido. No lleva piezas que se desgasten, ni anillos colectores, ni frenos. La transmisión de potencia y señales hacia y desde los cabezales láser se hace totalmente sin contacto.

Las funciones estándares y especiales del software comprenden la función EPM para visualización de la sección real, con desviaciones de forma poligonales y asimétricas, funciones especiales para plantas de laminación de tres rodillos, cálculo del despunte de cabeza y cola, además de pantallas personalizadas flexibles.



▲ Medidor modular SMR 400-S2 Steelmaster y una variedad de posibilidades de equipos

Entre las ventajas se pueden citar un arranque más rápido, menor producción de desechos, tolerancias más restringidas, visualización de la forma real, además de mantenimiento facilitado con acceso rápido y fácil a las partes donde intervenir. Los medidores son indicados para procesos en caliente y en frío y control de calidad.

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

Manejo de cables económico, seguro y eficiente

Los fabricantes de mazos de cables llevan casi 20 años utilizando el sistema NPS de Niehoff para preparar sus bobinas.

Desde que se inventó, el sistema ha seguido mejorándose continuamente y se ha revelado un sistema de manejo barato, seguro y de alta eficiencia sobre todo para los cables del sector automovilístico, así como para alambres, trenzas, conductores y cables agrupados.

El sistema NPS comprende bobinadoras especiales y bobinas multiuso desmontables de plástico ABS.

Las bobinadoras están diseñadas para funcionar en línea con líneas extrusoras. El cambio de bobina llena a bobina vacía es realizado a la máxima velocidad de producción, lo que evita tener que parar la línea.

Las bobinas, disponibles en distintos tamaños, representan un sistema de almacenamiento seguro, estable y sin enredos, ya sea llenas ya sea medio vacías, y permiten aplicar las máximas



▲ Doble bobinadora SV 400 D para alambres aislados con bobinas llenas y vacías (sistema de preparación de bobinas NPS)

velocidades de desenrollado del cables en los procesos sucesivos.

Cuando están vacías, las bobinas pueden ser desmontadas y encajadas unas en otras para devolverlas al fabricante de cables, donde pueden ser montadas de nuevo fácil y rápidamente, rellenas y reutilizadas.

Para proteger las bobinas NPS contra otras bobinas incompatibles con el sistema NPS, las nuevas bobinas multiuso NPS originales están equipadas con un transpondedor RFID.

De este modo, los usuarios de bobinas NPS pueden identificar si una bobina

pertenece a su sistema y si es compatible o no con él. Si no lo fueran, darían problemas considerables.

El transpondedor RFID simplifica además el etiquetado de la bobina.

Como la bobina es identificada mediante RFID, no se requiere etiqueta. El NPS es el único sistema de preparación de bobinas del mundo que permite desenrollar sin problemas ni enredos cables de cobre, de aleaciones de cobre y de aluminio para el sector automovilístico a las velocidades más elevadas.

El sistema permite procesar sin problemas incluso cables de señales de aleaciones de cobre y de 0,13mm² de sección.

Actualmente, hay más de 420 bobinadoras NPS en función en todo el mundo utilizando más de tres millones de bobinas NPS.

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

Técnica para medir con precisión la concentricidad de un conductor en su aislamiento y parámetros correspondientes para cables y alambres

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Introducción

Los fabricantes de alambre y cable que producen alambres de control y para vehículos, así como cables coaxiales y de comunicación, usan tecnologías de medición y control en sus líneas de extrusión para mantener específicos parámetros de cables. Esto es importante para la optimización del proceso y el control de calidad, pero es necesario también cuando se ensamblan los productos automáticamente. En estos casos, la frecuencia de defectos de ensamblaje es registrada estadísticamente, guardada y asignada al fabricante. Por esta razón, el objetivo de las plantas de producción de cables es suministrar cables con estándares de calidad altos y fiables.

Retos en la extrusión de cables

Uno de los retos en el proceso de extrusión de cables es mantener tolerancias estrechas en los valores de medición de la concentricidad del conductor en su aislamiento, del diámetro del conductor, del diámetro externo del cable y de la ovalidad del diámetro externo. Durante el proceso de extrusión, pueden ocurrir desviaciones de los valores de medición sin que sean detectadas si no se dispone de un equipo especial para visualizarlas.

Durante el ensamblaje, la presencia de bultos, estrechamientos, defectos o zonas descubiertas del cable pueden ocasionar mal funcionamiento.

Al principio del proceso de ensamblaje, el cable o el alambre es cortado en trozos y pelado en las extremidades para ser equipado con clavijas. Las fuerzas de tiro que se usan para el pelado son determinadas con precisión. Las desviaciones de las fuerzas de tiro dentro del aislamiento del conductor pueden causar interferencias durante el pelado. El uso de tecnología de medición y control innovadora permite cumplir los exigentes requisitos de los cables y descubrir el potencial de optimización del proceso en la línea de extrusión.

Conductor que gira/oscila

En las líneas de extrusión de cables, donde se deben respetar tolerancias de pocas micras, los requisitos para las tecnologías de medición y control son muy específicos. El valor medio del diámetro o del espesor de la pared del aislamiento es suficiente para controlar la línea de extrusión. Sin embargo, para controlar el espesor mínimo de la pared, también es necesario visualizar y registrar de manera fiable las variaciones a corto plazo, especialmente las de los valores de excentricidad.

Oscilaciones pequeñas del conductor justo delante del cabezal de la extrusora pueden causar desviaciones significativas de la concentricidad, especialmente si el conductor oscila en un plano o gira. Dichas excentricidades no pueden ser apreciadas con una visualización gráfica convencional. Un vector de rotación rápida de un valor

de excentricidad constante puede ser visualizado por el operador sólo con una visualización superior a la estándar.

Posición angular de un conductor

Durante el proceso de extrusión es posible que un cable, con o sin rodillos de guía, tenga una posición un poco angulada cuando se mueve a través del plano de medición. Los sistemas de medición de excentricidad deben poder obtener medidas de precisión incluso en dicha posición (ver la *Figura 6*).

Pandeo o curvatura del conductor

Incluso suponiendo que el conductor es estirado cuando pasa a través de la línea de extrusión, puede conservar algunas curvaturas, que deben ser detectadas cuando entra en la cabeza medidora de un sistema de medición de excentricidad.

Sin un sistema de medición especial, incluso radios de curvatura imperceptibles a lo largo de 5 a 20 metros pueden llevar a errores de excentricidad de hasta 40 micras. Sólo en una situación ideal los rodillos de guía pueden compensar este estirado imperfecto del conductor. Sin embargo, puede ocurrir lo contrario, que incluso aumenten el error. Por lo tanto, el objetivo es eliminar los rodillos de guía completamente.

La medición de la concentricidad de un conductor en su aislamiento asegura la producción de un cable de alta calidad. Durante la fabricación del cable, el sistema de medición debería compensar completamente la influencia de las variables relacionadas con la producción que pueden afectar al resultado de la medición, como posiciones anguladas del cable o radios de curvatura del conductor.

Los sistemas de medición de concentricidad, en combinación con un sistema con procesador integrado o externo, permiten visualizar las variaciones de excentricidad a corto plazo en forma de diagrama de dispersión. Este sistema sienta las bases para la producción de cables de alta calidad y asegura un cable fiable y sin defectos durante el proceso de ensamblado. Además, garantiza la fiabilidad del proceso y aumenta su rentabilidad.

Sistema para la medición de la concentricidad de un conductor en su aislamiento sujeta a oscilación, posición angulada o curvatura del cable en el plano de medición

El sistema de medición (*Figura 1*) se basa en una técnica de medición óptica e inductiva. Con el sistema de medición inductivo, situado entre dos planos de medición óptica, se determina la posición exacta del conductor.

▼ **Figura 1:** Dispositivos para la medición de la concentricidad de un conductor en su aislamiento



Con el sistema óptico se determina la posición del cable. Se detecta una cierta excentricidad cuando ambas posiciones difieren una de la otra. Al mismo tiempo, el sistema óptico detecta con precisión el diámetro y la ovalidad del cable. Todos los cálculos y análisis necesarios son realizados por el sistema de medición.

Las medidas son obtenidas mediante varias interfaces que transfieren datos a una unidad de visualización y control o a un ordenador en línea.

Circuito de medición inductivo

El cable pasa a través de un transformador toroidal que genera una corriente alterna de pocos miliamperios en el conductor.

La corriente alterna crea un campo magnético que, idealmente, rodea el conductor de manera circular y cuya intensidad disminuye exponencialmente en función del cuadrado de la distancia.

El sistema de medición está equipado con sensores inductivos puestos a una distancia determinada, radialmente alrededor del conductor. Con la ayuda de estos sensores se puede calcular con alta precisión la posición exacta del conductor en base a la distribución de la intensidad de la fuerza del campo magnético.

Gracias a la combinación de múltiples sensores ópticos y al diseño especial de los sensores inductivos, se puede detectar una posición angulada o una curvatura del cable y compensarlas automáticamente. Esto asegura una medición de la excentricidad precisa.

Con el centrado automático de la cabeza medidora respecto a la posición del cable, el sistema de medición permite obtener en todo momento valores de medición precisos, incluso cuando las fuerzas de tiro en el cable varían.

Los rodillos de guía ya no son necesarios con dichas cabezas de ajuste automático.

La disposición del sistema de medición inductivo para la determinación de la posición del conductor en el centro de la cabeza medidora junto con la pantalla ferromagnética, permite evitar que las variables ambientales afecten a la medida de excentricidad.

Por lo tanto, los resultados de la medición no son influenciados ni siquiera por el paso de una carretilla elevadora, por el movimiento de un canal de enfriamiento o por el cambio de las condiciones de puesta a tierra.

Circuito de medición óptico

La medición óptica se basa en el principio del análisis de la difracción combinada con diodos láseres pulsados. El haz de luz de los diodos proyecta la sombra del cable en el sensor lineal CCD en cada eje de medición con un tiempo de exposición de 0,25 microsegundos.

Los sistemas miden la posición y la anchura de la sombra en los cuatro ejes (en ocho puntos). Desde la posición de la sombra respecto a la posición determinada del conductor, los procesadores de señales calculan el valor exacto de la excentricidad, mientras que de las anchuras de las cuatro sombras se calculan el diámetro externo y la ovalidad.

Las medidas del diámetro externo, si son necesarias además de las del diámetro del conductor (el espesor de la pared), sirven para corregir la capacidad productiva del extrusor o la velocidad de tiro del cable para de ajustar las medidas al valor nominal correspondiente. Además, las medidas con tolerancias estrechas son muy importantes para el ensamblaje.

Cada una de dichas medidas influye la impedancia de onda (ej. cables LAN trenzados) y, por consiguiente, el valor de la pérdida de retorno estructural (SRL) de un cable de transmisión de datos, especialmente cuando las desviaciones de estos valores se producen periódicamente.

Con la ayuda de la transformada rápida de Fourier (FFT), la alta velocidad de barrido de 2.500 mediciones/segundos permite generar una previsión de la SRL en base a la frecuencia de transmisión incluso a velocidades de línea de 3.000 metros/minuto para especificaciones CAT corrientes y futuras.

Si hay una especificación para el espesor mínimo de pared del aislamiento del cable, entonces cualquier excentricidad genera inevitablemente un consumo de material aislante mayor. Por lo tanto, se deberían reducir las excentricidades por razones económicas.

Registro de valores oscilantes de excentricidad

Con una velocidad de barrido de 2.500 mediciones por segundo, el sistema de medición registra valores oscilantes de excentricidad con alta precisión de cada valor. Dichos valores son visualizados en un diagrama de dispersión (*Figuras 3, 4 y 5*).



▲ **Figura 2:** Presentación estándar de la excentricidad



▲ **Figura 3:** Distribución aleatoria de los valores de excentricidad



▲ **Figura 4:** Distribución en anillo de los valores de excentricidad



▲ **Figura 5:** Distribución en elipse de los valores de excentricidad

El diagrama de dispersión representa otro modo de ver la medición corriente en los dispositivos de visualización y control basados en procesador; con su ayuda, la distribución de las variaciones de excentricidad a corto plazo puede ser visualizada gráficamente. Cada punto representa un valor y dirección de

excentricidad. La distribución general del diagrama de dispersión destaca la desviación estándar de la excentricidad.

A menudo es suficiente corregir la guía del conductor cerca del cabezal para evitar estas oscilaciones, que normalmente se producen en un cierto campo de

velocidades o en ciertos grados de llenado respectivamente del enrollador o del desenrollador. El modo estándar de representar la excentricidad usando la sección transversal de un cable (Figura 2) también es útil para el operador a la hora de centrar el cabezal.

La Figura 3 muestra una distribución de tipo aleatorio de los valores de excentricidad, mientras que la Figura 4 muestra una distribución en anillo de los valores de excentricidad, que a menudo es el resultado de un conductor que gira (oscila) delante del cabezal de la extrusora.

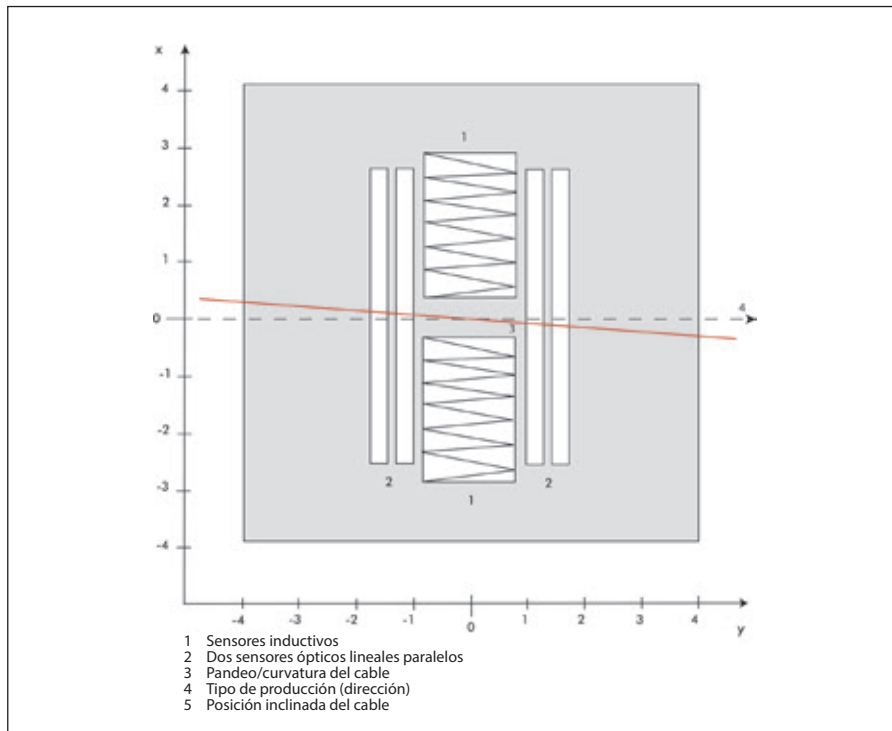
La Figura 5 muestra una distribución en elipse del diagrama de dispersión, que puede ocurrir, por ejemplo, cuando el conductor oscila o vibra en un plano justo antes de entrar en el cabezal y que, por lo tanto, causa variaciones de excentricidad adicionales. Esta excentricidad de rotación permanente tampoco sería visible con una presentación estándar de la excentricidad (como se muestra en la Figura 2).

Para asegurar alta precisión a la medición del conductor en su aislamiento, los ejes de medición óptica deberían estar situados en el mismo plano que los sensores inductivos. En esta posición, los recorridos ópticos son sombreados por los sensores inductivos. Por esta razón, los planos de medición óptica son divididos. Hay un plano de medición óptica antes y otro después del plano del sensor inductivo. Por consiguiente, sólo un conductor absolutamente recto y horizontal puede generar resultados de medición precisos.

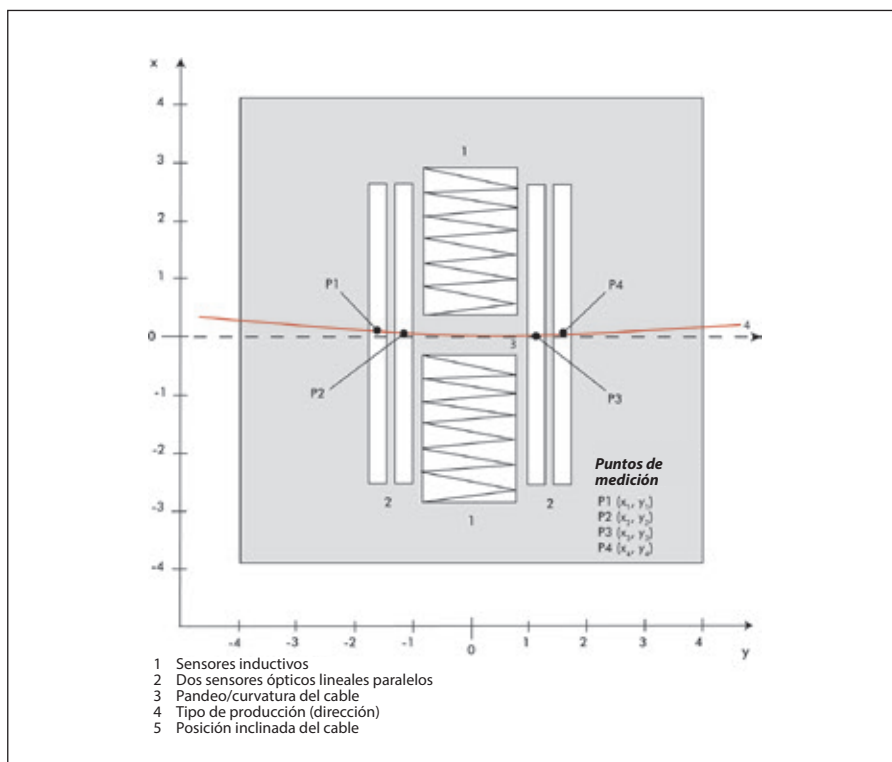
En práctica, sin embargo, el conductor presenta normalmente posiciones un poco anguladas o curvaturas. Esto significa que el dispositivo de medición debe ser capaz de registrar valores de medición precisos incluso en dichas condiciones.

Medición de una posición inclinada del cable

La Figura 6 muestra un cable que se desliza respecto a una línea recta. Sin embargo, el cable se mueve en posición inclinada respecto a la línea de producción realmente deseada. En la ilustración, se ha exagerado la posición inclinada del cable para una mejor comprensión. Se sabe que una línea recta o inclinada, en este caso un conductor recto, está determinada por dos puntos. Por medio del primero y del segundo dispositivo de medición óptica, las posiciones inclinadas del cable serán detectadas y su influencia en los resultados de medición será determinada y compensada completamente.



▲ **Figura 6:** Técnica para determinar una posición inclinada del cable



▲ **Figura 7:** Técnica para determinar un pandeo o una curvatura en el cable

Determinación y compensación de un pandeo o curvatura de un cable

La Figura 7 muestra un cable que presenta pandeo o curvatura. Para una mejor comprensión, la ilustración de la curvatura del

cable es extremadamente exagerada y, en práctica, es improbable. La curvatura de un conductor puede ser descrita con un círculo, cuya posición y radio de curvatura se determinan con tres puntos.

Con esta información, el sistema de procesador puede calcular la posición exacta del cable en el plano de medición inductivo y compensar completamente la influencia de la posición angulada o de

las curvaturas. Como se ilustra en la figura, el sistema de medición está construido para poder medir la posición del cable en cuatro puntos, indicados en la figura como P1, P2, P3 y P4. Por lo tanto, el sistema de medición puede detectar también deformaciones irregulares del conductor.

Conclusión

Con la tecnología presentada es posible medir con precisión la concentricidad de un conductor en el aislamiento, así como los parámetros de producción, el diámetro externo, la ovalidad y el espesor de la pared.

La técnica de medición permite registrar los valores de excentricidad del conductor en caso de rotación u oscilación en un plano, en forma de diagrama de dispersión. Este diagrama de dispersión permite visualizar la distribución de las variaciones de excentricidad a corto plazo.

Con la medición de la excentricidad en cuatro ejes y ocho puntos, se puede reconocer una posición inclinada del cable en el plano de medición. El sistema de medición compensa automáticamente la posición inclinada del conductor ya sea en dirección horizontal ya sea vertical y, por lo tanto, los resultados de medición no son afectados. El sistema de medición registra también los valores de medición de manera precisa, incluso cuando el cable pasa a través de la cabeza del medidor con un determinado radio de pandeo o curvatura.

El uso de la tecnología de medición descrita en las líneas de extrusión asegura la producción de cables de alta calidad para un ensamblado sin defectos. Al mismo tiempo, contribuye a la fiabilidad del proceso, y por consiguiente, a su rentabilidad. ■

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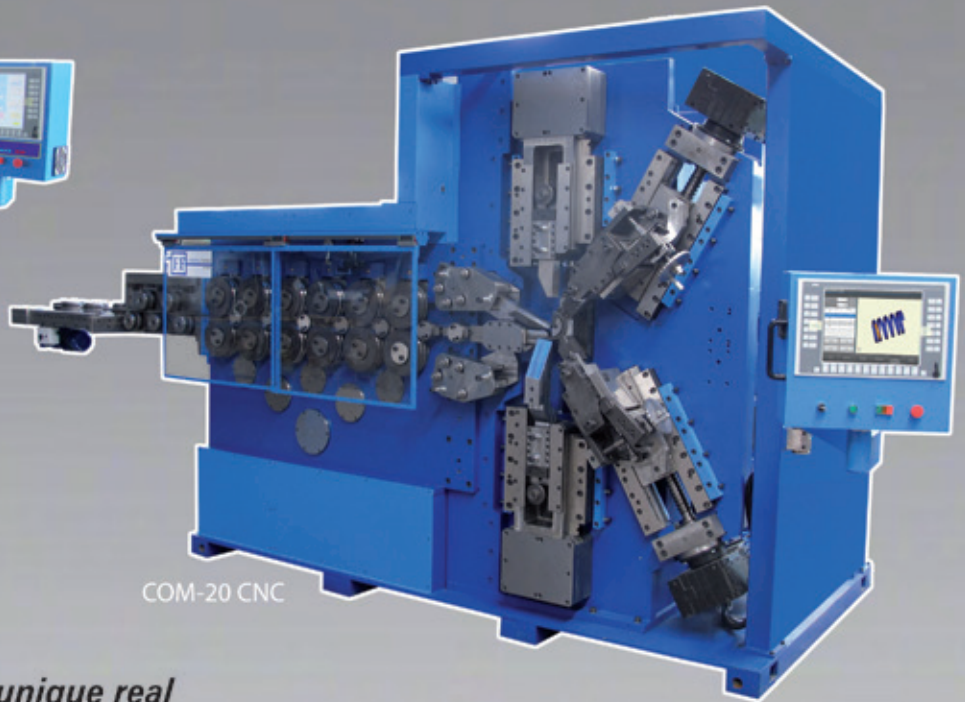
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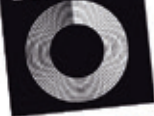
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