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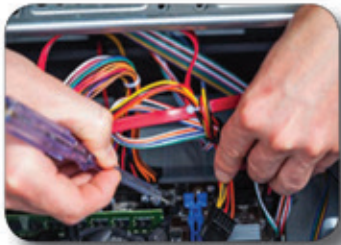


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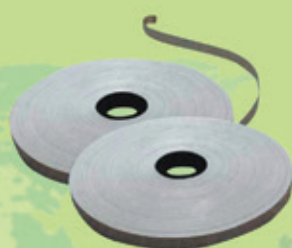


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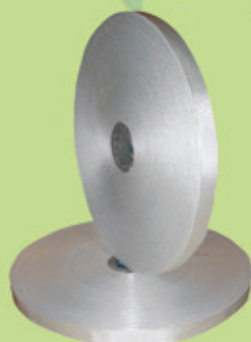
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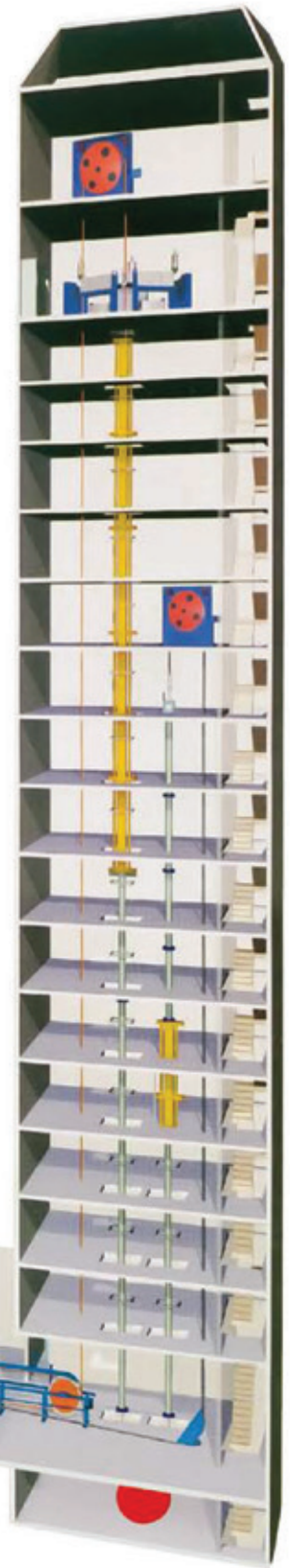
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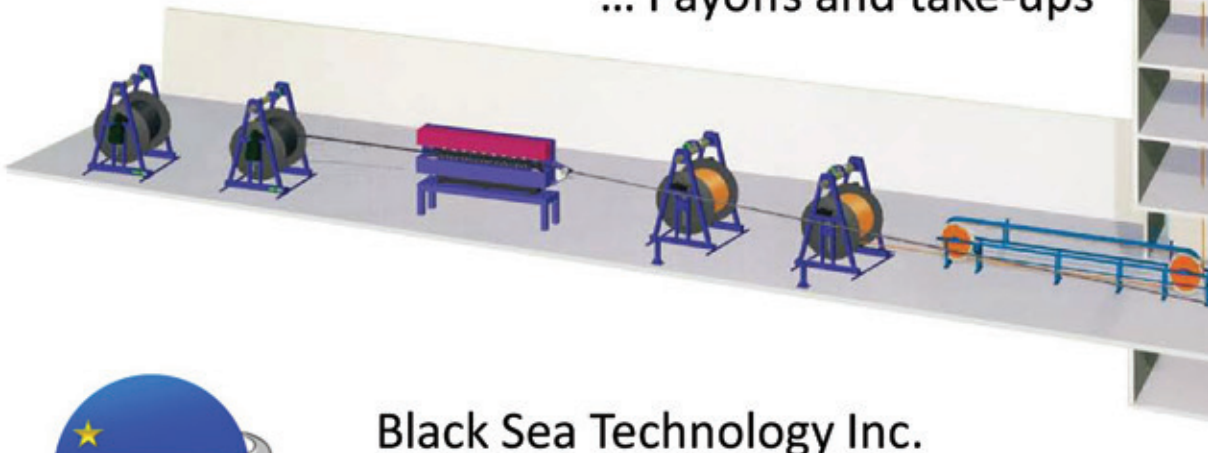
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Keeping eyes fixed on our surroundings

Our surroundings is something that all of us should take into consideration, but imagine being charged with taking the Internet to four million people in one of the most fragile environments on Earth – the Amazon Rainforest.

That is something that Nexans has been tasked to do, with 7,700km of cables being laid on or beneath riverbeds that will ensure 52 municipal areas have Internet connections.

The company has supplied cables that will not release harmful substances into the delicate ecosystem, and that have no negative impact on the environment. You can read the full story on page 12.

Continuing along the same environmental theme, Prysmian has launched new breakthrough cable technology for the development of power transmission grids.

This will ensure better environmental sustainability, higher electrical performance and lower costs. The group has already completed the development and testing of its new cable system. More details are on page 41.

Reels, spool makers and suppliers are featured in this issue, starting on page 42. These are only too aware of their importance in the industry in dealing with something that is the most workaday equipment to be found in any wire mill.

In this issue we also take a look back at this year's wire 2016 in Düsseldorf, Germany, hailed by some exhibitors as 'the best yet'.

There is feedback from organisers Messe Düsseldorf, and comments from a number of the industry heavyweights, heaping praise on this year's exhibition. You can read the review, starting on page 46.



David Bell
 Editor



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Getting Technical:
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Wire & Cable India 2016

IWCS 2016

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dates for your diary ...

2016

October

2–5 October:
IWCS – technical symposium –
Rhode Island, USA
Tel: +1 717 993 9500
Email: phudak@iwcs.org
Website: www.iwcs.org

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

2017

March

23–25 March:
TEL – trade exhibition –
Istanbul, Turkey
Organisers:
Voli Fuar Hizmetleri
Fax: +90 212 604 5051
Email: info@voli.com.tr
Website: http://tel-fair.com

May

9–11 May:
Interwire – trade exhibition –
Atlanta, Georgia, USA
Organisers:
Wire Association International
Fax: +1 203 453 8384
Email: sales@wirenet.org
Website: www.wirenet.org

June

5–8 June:
wire Russia – trade exhibition –
Moscow, Russia
Organisers:
Messe Düsseldorf and VNIKP
Fax: +7 499 246 9277
Email: info@wire-russia.com
Website: www.wire-russia.com

wire China

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



▲ Shielded cabins for testing from Highvolt Prüftechnik

Maximum reliability and efficiency

EXACT and reproducible high-voltage tests with partial discharge measurements on plastic-insulated cables require test systems with very low background noise level. Furthermore, the cable industry wishes the high-voltage tests to be integrated seamlessly into the production process.

To this end, Highvolt Prüftechnik Dresden has developed shielded rooms that provide optimum conditions and high shielding effectiveness.

Highvolt offers shielded cabins for both routine and type tests with test voltages of more than 700kV as standard. The shielding effectiveness is optimised for a frequency range between 30kHz and 1MHz. This corresponds to the measuring range of broadband partial discharge measuring devices in accordance with

the IEC standard. Where necessary, the shielded rooms are designed and manufactured in customised dimensions or adapted to existing installations.

The walls and main steel construction of the shielded rooms are preassembled by Highvolt such that they can be installed on the customer's premises both quickly and with minimum outlay.

Drilling work that could otherwise damage the zinc anti-corrosion coating is not necessary. The results include good shielding properties over the whole service life and a background noise level less than 1 picocoulomb. In addition, the measuring room is maintenance-free.

To be able to achieve a high throughput of test objects, the shielded rooms are

fitted with sectional doors that can be opened and closed quickly thanks to a motor drive.

The shielded rooms, including the doors, are suitable for the use of air cushions, and the cables to be tested can thus be transported quickly and easily. Transport by way of fork lifts or rail vehicles, or the installation of turntable facilities, are further variants for access.

Multi-stage construction of the floor ensures reliable separation between the earthing of the building and the earthing of the test bay, while at the same time providing a high mechanical load-bearing capacity.

Highvolt Prüftechnik Dresden GmbH – Germany
Website: www.highvolt.de

Groundbreaking impulses at Niehoff

THE latest issue of the Niehoff Magazine, the customer journal of the Niehoff Group, was published shortly before the wire 2016 trade fair in Düsseldorf, Germany, in April.

Under the title "Groundbreaking impulses for the wire and cable industry", the Niehoff exhibits are described along with technical data: A rod breakdown machine type MSM 86, a rotary braiding machine type BMV 16 Z + BZ 380, an inductive inline annealer type RI 120, a data cable stranding line type ARD 630 D + ALB 600 + DSI 631 and a bunching line type D 562 + ARP 630. Also the Niehoff Original+ After Sales service with its offerings is introduced, as well as the exhibits of Niehoff's partner company HFSAB (components of its latest horizontal lead extruder).

In an interview entitled "They only speak of Düsseldorf", Friedrich-Georg Kehrer, project director at organisers Messe Düsseldorf, talks about special features of this event. The situation of Europe's wire and cable industry and some trends are subject of the article "Imagine life without our products".

A further focus of this issue is the in-house exhibition which took place in the new Niehoff factory in Schwabach immediately after the wire trade fair. There were shown a completely new multi-wire line type MMH 112 + RM 202 + S 632, which embodies a new machine generation, a double-twist bunching machine type D 632 for the manufacture of strands of copper alloys for automotive wires, a barrel coiler type WF 651 with new patented locking system, the rotary braiding machines type BMV 16 and BMV 124, the new generation of the NPS double spooler type SV 402 D and more.

An article under the heading "All specialists under one roof" describes details of the buildings, its equipment and measures to achieve a high level of energy efficiency. In the company portrait Norbert Kordes Kabel und Leitungen GmbH u Co KG, Uslar, one of the biggest copper cable manufacturers in Germany, is introduced.

Biannually the Niehoff Magazine informs about company news and developments, trade shows and events and other interesting topics. The magazine, published in English and German with summaries in Chinese and Russian, can be obtained from Niehoff headquarters in Germany or any Niehoff subsidiary and service office all over the world. It is also available at the Niehoff website.

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

Closer relationship

Prüftechnik and MGS, the distributors of Prüftechnik's alignment and condition monitoring systems in Brazil, are forging a closer partnership.

Prüftechnik SL, based in São Paulo, and MGS, headquartered in Minas Gerais, will merge activities in order to offer their common customers a unified range of products and services.

Prüftechnik Dieter Busch AG – Germany
Website: www.pruftechnik.com

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

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Controlling design and manufacture of cables

APRIL witnessed the launch of what has been described as 'the cable manufacturer's dream' – a single comprehensive set of tools to control the design and manufacture of cables in one place.

The product is called CableSuite and is the result of a partnership between UK-based Cimteq and InnoVites, of the Netherlands. The two companies selected the wire exhibition in Düsseldorf, Germany, to unveil their project.

CableSuite is a complete and fully integrated enterprise software solution that supports all business functions of cable manufacturers and distributors, combining CableBuilder, CablePlan, CableERP and CableMES.

CableSuite enables a cable manufacturer or distributor to significantly optimise and accelerate its business processes through its combination of tools.

Ali Shehab, of Cimteq, said: "CableSuite is a natural progression for both ourselves and InnoVites in the way in which we can assist our customers by helping them



▲ The Cimteq and InnoVites team at wire 2016 in Düsseldorf, Germany

to become more efficient through the use of our products. By packaging the core elements of our flagship systems together in the form of CableSuite we can truly deliver a one-stop-shop solution to allow cable manufacturers to design and manufacture cable more efficiently and profitably. We are excited

to witness the transformation our clients' experience upon adopting the system."

Cimteq Ltd – UK

Website: www.cimteq.co.uk

InnoVites BV – The Netherlands

Website: www.innovites.com



Guy Strand

According to ASTM A475, class A coating.
9/16"(14.29mm) 7×4.78mm(-0.05,+0.05mm)
Breaking load: ≥155.644kn(EHS grade)
Lay direction: left"S", lay length≤16 times
Coil weight: 70m/coil(-0,+2%) Surface no greased
Zn coating: ≥305g/m2



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Taking cables to the Amazon

Brazil's Connected Amazonia Program will include Nexans submarine fibre optic cables. The project aims to bring the Internet to four million people in the Amazon Rainforest. The project comprises 7,700km of cables to connect 52 municipal areas through five separate cable routes on and beneath riverbeds in the Amazon.

For Brazil's Connected Amazonia Program, one of largest submarine fibre projects in the world, 275km of Nexans cables will be installed in riverbeds between Coari and Tefé. The entire network will be made up of five data highways: Upper Negro river, Upper Solimões, Madeira, Purus and Juruá.

For this project, Nexans recommended using high performance cables that have a minimal environmental impact. This allows the project to serve the needs of local communities while preserving the fragile Amazon Rainforest ecosystem.

Nexans has supplied cables that will not release harmful substances into the delicate river ecosystem and have no negative impact on the environment. The fibre optic cables from the URC-1 family of cables meet all international standards for submarine cables. To handle the strong currents in the river that occur throughout the year, a flat-bottomed barge will be used as the cable-laying vessel.

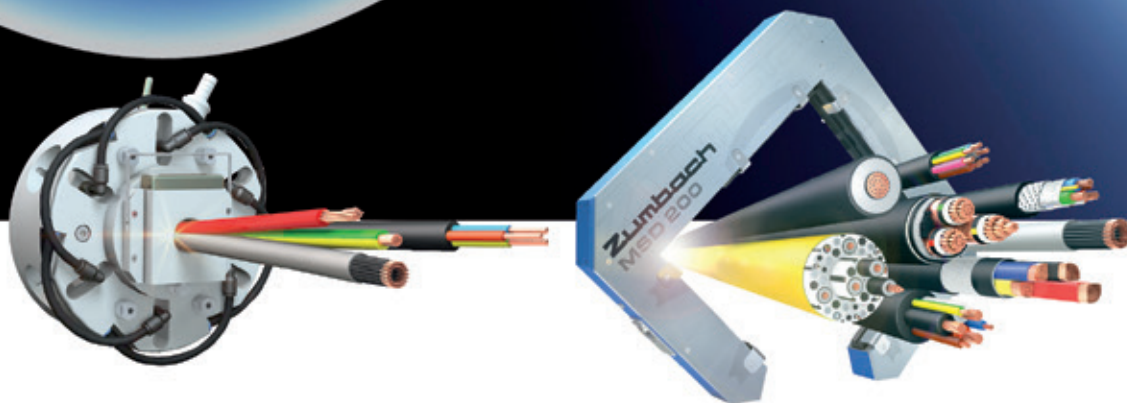
The Connected Amazonia Program aims to bring a high quality Internet connection to the State of Amazonas, not only to connect residents to the Internet, but also to enable telemedicine, distance learning and greater interconnection between health, security and traffic services.

Nexans – France

Website: www.nexans.com

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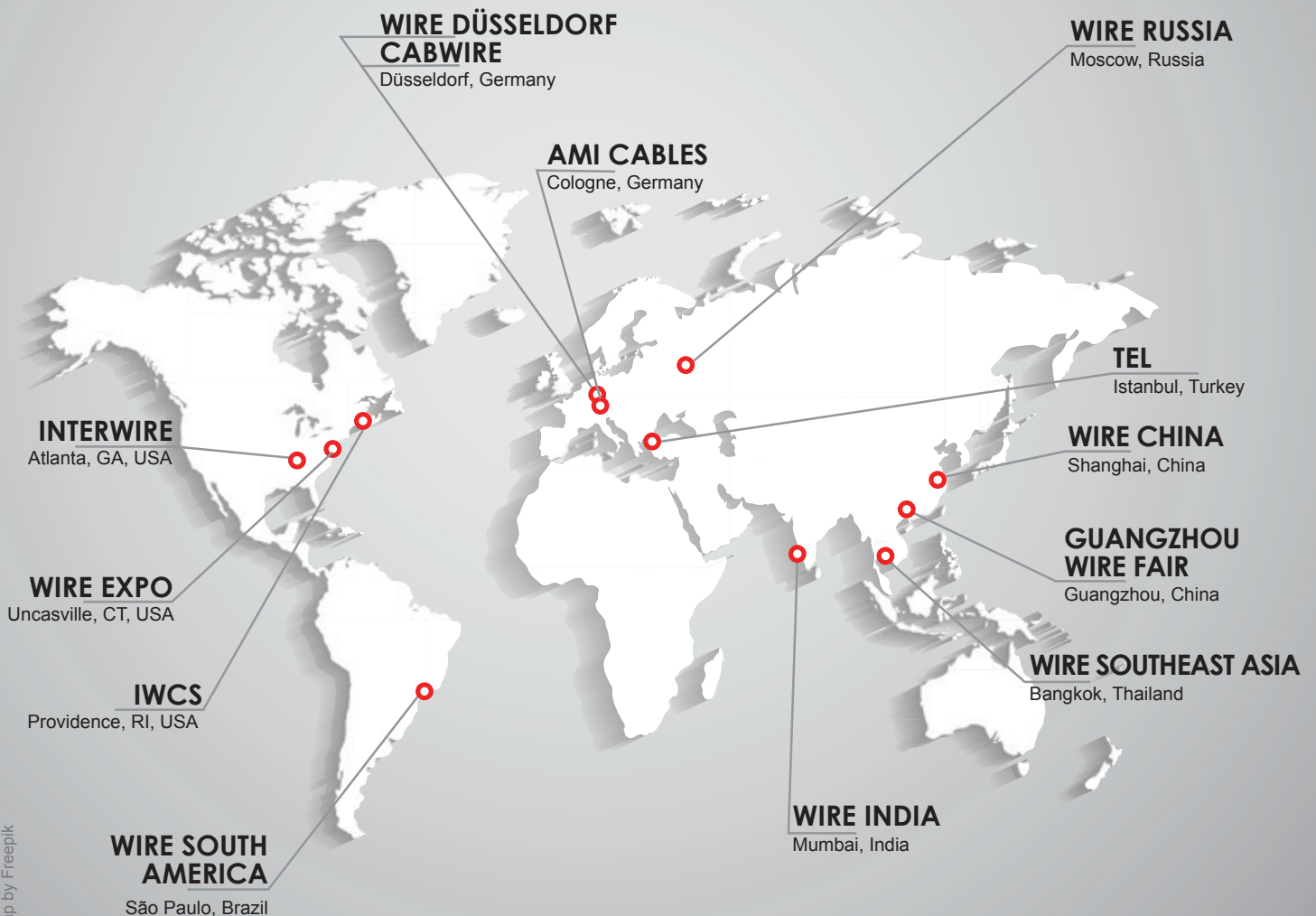


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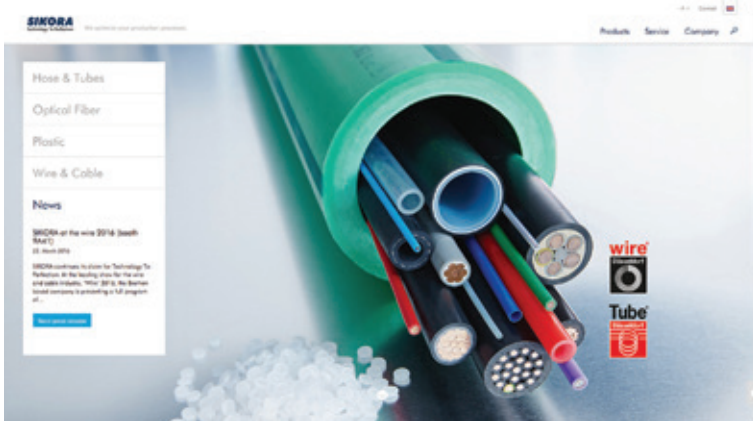
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▲ The new Sikora website

New website for Sikora

WITH the relaunch of the company website, Sikora has presented its new corporate design with a clear, intuitive structure, pictures and the brand colours of blue and white.

Using easy navigation, the new web presence guides the visitor to the desired pages. The changing topics with large pictures on the homepage inform about industries and news about the company.

Via the menu item 'Service' the visitor finds an overview of all Sikora services and is directly navigated to the new support and spare part request form.

The section 'Company' offers customers, candidates and media representatives important and clearly structured information on the company.

Its social media channels, providing a direct connection to social networks such as Twitter, are also integrated.

A further highlight of the new web presence is the flexible layout. Whether PC, tablet or smartphone, the website is responsive and adjusts automatically to every terminal and every display.

Therefore, the functionality of the website remains in any situation, and all information is fast, easy and user-friendly retrievable.

"With the relaunch of our website we present ourselves in a new design and at the same time modern, intuitive and emotional," said Harry Prunk, member of the board. "Our users find their way around our page, independently of the device they are using."

Sikora AG – Germany
Website: www.sikora.net

Hatebur's deal for Calvi

The Swiss forming machinery specialist, Hatebur Umformmaschinen AG, has agreed to buy Carlo Salvi SpA, a cold forming machine builder in Garlate, Italy.

Hatebur specialises in designing and building hot and cold forming machines, with offices in Switzerland, China, Japan and Germany. Carlo Salvi develops and manufactures cold forming machines. It has 92 employees, operating from facilities in Italy, China, the USA and UK.

Hatebur Metalforming Equipment Ltd – Switzerland
Website: www.hatebur.com

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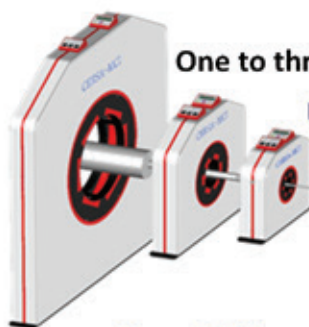
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Production throughput up to 20 per cent

KABTEK has improved its weekly production throughput up to 20 per cent by using CablePlan Plannica.

InnoVites, a provider of enterprise software for wire and cable manufacturers and distributors, distributes CablePlan around the globe in the wire and cable market.

Kabtek is a global manufacturer of cable, offering industrial products including silicon cables, rubber-based command control, power and mid-voltage cables, and exports more than 80 per cent of total production to the leading western European countries.

Abdurrahman Güngör, COO at Kabtek, said: "CablePlan Plannica is helping Kabtek to improve the production throughput rate up to 20 per cent through weekly planning of its new 21,000m² dedicated indoor facility producing approximately 700-1,000 tons per month, reduce the master planning cycle from days to minutes, and provide Kabtek with an opportunity to revise its master plans multiple times throughout the week, and generate a master plan that conforms 100 per cent to a variety of customer- and cable-specific constraints.

"Kabtek has expanded the scope of its involvement with CablePlan and is currently implementing CablePlan Chronica to minimise the setup times and improve overall OEE (operational equipment efficiency) across its entire facility, and integrating

CablePlan Promica to provide optimal quotations to its customers."

Albert Groothedde, CEO at InnoVites, added: "We are excited about the results cable manufacturers can achieve with CablePlan. The results at Kabtek are a strong proof how production planning software can significantly improve production efficiency and therefore positively influence the bottom line of a cable manufacturer."

InnoVites BV – Netherlands
Website: www.innovites.com

It's all in a name!

DS Brookes Ltd, Davis-Standard's subsidiary in the West Midlands, UK, will now be called Davis-Standard Limited. The modification is in name only, better reflecting Davis-Standard's global market position and current activities.

Davis-Standard Ltd will continue supplying screws and barrels associated with the DS Brookes brand, and will remain Davis-Standard's key supplier of extrusion systems for the EMEA (Europe, Middle East, Africa) region.

Davis-Standard LLC – USA
Website: www.davis-standard.com

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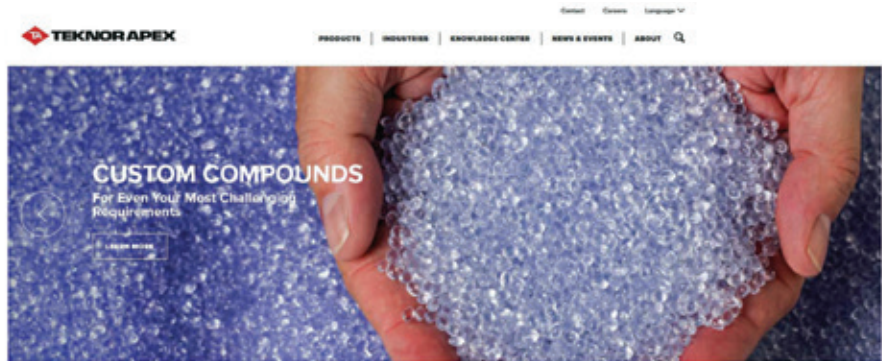
CUSTOM compound company Teknor Apex has launched a new website to make it easy for plastic products manufacturers to discover the company's capabilities for solving problems and creating new product opportunities.

The site at www.teknorapex.com puts site designers and processors around the world in touch with a company known for technological depth and customer service.

Site visitors have access to extensive information on the company's flexible and rigid PVC, thermoplastic elastomer (TPE), nylon, and flame retardant compounds, as well as colour concentrates.

The user-friendly website provides visitors with:

- A direct line to technical experts
- Access to technical data sheets
- Downloadable processing guides
- White papers, webinars, and product selection tools
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▲ The home page of the Teknor Apex website

- Teknor Apex innovations
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Also available is information on every Teknor Apex location around the world, including ISO certifications.

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Teknor Apex Company – USA
Website: www.teknorapex.com



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▲ Leading edge solutions from Eurolls

Complex systems provide solutions

EUROLLS continues to develop leading edge solutions, for both industrial and construction wire sectors.

In particular, it is now talking of wire diameters in the range 16-28mm. In the industrial wire sector, Eurolls has

developed and sold a complex wire system for Ø26mm high carbon wires with dual rotary payoffs, a double accumulator to guarantee non-stop wire feeding to the processing lines, an electronically guided shear to cut-to-measure and a dual take-up system. Each section of the system is characterised by innovative solutions.

For the construction wire sector, Eurolls has sold a stretching and spooling line for Ø25mm ribbed wire, complete with dual automatic spooler capable of winding eight-ton spools.

The system is complete with a total spool management system with automatic spool assembly/disassembly, strapping/weighing, and spool loading/unloading with conveyor lines.

These are in addition to the other successful worldwide installations of various multi-wire static and rotating payoff and take-up systems for spools and coils for non-stop operation in conjunction with annealing, patening, galvanising, copper coating, bead wire, etc.

Eurolls now comprises Team Meccanica and Teurema for cold drawing and rolling wire production, and wire processing lines under the Vitari brand, which allows the company to develop and apply leading edge solutions, along with in-house wire tooling design and production.

Eurolls Spa – Italy
Website: www.eurolls.com



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Schuler takes over die construction specialist

SCHULER AG is to take over the die construction specialist AWEBA and greatly expand its activities in this business field. Based in Aue, Germany, the AWEBA Group is a full-service provider of dies and fixtures. Under the terms of the purchase agreement, Schuler will acquire a 100 per cent stake in AWEBA Werkzeugbau GmbH Aue.

The transaction is still subject to the approval of the relevant anti-trust authorities. AWEBA Werkzeugbau GmbH was previously held by private and institutional investors. The parties have agreed not to disclose any details about the purchase agreement.

AWEBA was founded in 1882 as Bernhard Hiltmann Spezialfabrik für Schnitt und Stanzwerkzeug. The company today supplies international customers in the automotive and electrical industries, as well as machine and plant manufacturers. The product portfolio includes forming, cutting, hydroforming, and die-casting dies, as well as fixtures and a comprehensive range of services.

In fiscal year 2015, the AWEBA Group generated sales revenue of around €60 million.

Schuler CEO Stefan Klebert said: "We are delighted to add a successfully managed company like AWEBA to our group. With its high level of expertise in research and development and excellent engineering know-how, the company is a perfect fit for Schuler. The acquisition is part of our growth strategy. AWEBA complements our product portfolio in forming technology in line with market requirements and will expand and strengthen our existing activities in die construction."

The AWEBA Group employs around 600 people, including almost 200 highly skilled engineers and toolmakers. The company owns 40 valuable patents in the field of die manufacturing.

The AWEBA takeover is Schuler's second major acquisition in the last 12 months. Last year, the company acquired a majority stake in the Chinese press manufacturer Yadon, with annual sales of around €110 million.

Schuler AG – Germany
Website: www.schulergroup.com



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Expanding sales and service in China

SCHMOLZ + Bickenbach is expanding its sales and services network in China. In January the company began operating a new warehouse for special steel with a first focus on tool steel in Chongqing.

The 2,000m² facility is equipped with sawing technologies and high-tech milling machines. Customers benefit from shorter delivery times and tailor-made cutting services for the tool steels from the group's own production.

The product portfolio includes cold-work and high-speed steel grades, steel for plastic moulding and hot work steel from the Schmolz + Bickenbach companies Deutsche Edelstahlwerke and Finkl Steel.

With expanded sales and service capacities, Schmolz + Bickenbach International is now also able to meet the needs of local companies in the automotive and plastic moulding industries from a central location in China.

The Chongqing-Chengdu area represents between 10 and 15 per cent of the total Chinese tool steel demand. Jack Huan, former sales manager of the



▲ With the new warehouse for special steel in Chongqing, China, the company is able to meet the needs of local manufacturers of automotive components and plastic moulds

Ninghai (Zhejiang) warehouse, has been appointed manager of the new warehouse. He has many years of experience in senior management in the Chinese tool steel business and with his team will provide local customers with the necessary technical support to benefit from the group's product quality.

Other warehousing and commercial

platforms of Schmolz + Bickenbach International in China are located in Dongguan (Guangdong), in Taicang (Jiangsu), in Ninghai (Zhejiang) and in Shanghai.

Schmolz + Bickenbach International GmbH – Switzerland

Website:

www.schmolz-bickenbach.com

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Highest fibre count cable installed in Australia

PRYSMIAN has marked the launch of local manufacture of its new Flextube® cable technology with another world first – the installation of its highest fibre count cable to date.

TPG, one of Australia’s leading telcos, required the highest fibre count cable possible, in an ultra-dense single cable solution for a particular application. Using its innovative Flextube technology, Prysmian responded, manufacturing a cable with a capacity of 2,112 fibres.

“It is not only the highest fibre count cable ever manufactured by Prysmian but it also exhibits the world’s highest fibre density. The 2,112 fibres are contained within a single sheath 24mm in diameter, making it the highest density optical cable solution in the world, with a record breaking 4.7 fibres/mm².

“The cable was designed to be slim enough to fit inside a 32mm subduct (with an internal diameter of just 28mm), fully maximising the available space,” said Jack Clements, technical sales manager at Prysmian Australia.

Prysmian has partnered with TPG Telecom for many years and TPG was one of the first companies in Australia to trial the Flextube product. Flextube is a revolutionary cable, designed to be extremely compact, lightweight and flexible and also much faster to install. Using Flextube, Prysmian states that it continues to lead the way in ultra-dense cable solutions and this new record-breaking cable sees the company add to its already extensive Flextube range.

A 1.8km section of the 2,112F cable was deployed in Melbourne CBD and installed within a subduct of 28mm internal diameter. The cable was spliced at both ends using Prysmian’s latest high capacity joint enclosures. The joints are able to store up to 2,688 fibre splices and are modular in design, able to be scaled up and down depending on the customer’s requirements.

“Prysmian continues to push the boundaries in terms of telecom solutions. We respond to market demand through innovation and currently the market is demanding higher capacity cables. It’s not just about offering new innovative cable designs but offering a complete network solution including jointing and connectivity products,” said Alice Codenotti, key account manager at Prysmian Australia.

“Being able to install over 2,000 fibres in one go brings us major advantages in terms of installation costs per fibre and utilisation of our infrastructure. It also helps us secure capacity in high demand areas, helping us to future proof our fibre network,” said

Liz Goyeneche, network design and planning manager at TPG Telecom.

“We installed Prysmian’s 1,728F cable last year and this year we’re up to 2,112F in a single cable. The technology continues to develop and at TPG we’re keen to utilise the latest cutting edge products to respond to the evolving needs of our customers,” said Reggie Naik, general manager – fibre operations at TPG Telecom.

Prysmian launched the innovative new Flextube cable line in Sydney, making it the largest telecom factory in the APAC region, enabling it to better service a growing local demand.

Prysmian Group – Italy
Website: www.prysmian.com

Newcomer at T&T

Michael Roussel has joined T&T Marketing Inc as account manager, New England. He will also have product manager responsibilities.

Mr Roussel is a graduate of the University of Massachusetts Lowell Plastics Engineering programme. He has also completed course work at the graduate level. His 24-year career has included sales, technical and managerial positions.



▲ Michael Roussel

In the wire and cable industry, he worked for AlphaGary early in his career as a sales representative and most recently as sales manager at Carris Reels. His professional memberships and affiliations include Wire Association International, ASTM International and Society of Plastics Engineers.

Mr Roussel lives in Rutland, Vermont, with his wife and two teenage sons. In his spare time, he enjoys mountain biking and fly fishing, and is an avid skier, a member of the Professional Ski Instructors of America (PSIA) and a Certified Instructor teaching skiing on weekends and holidays for the past nine years.

T&T Marketing Inc – USA
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Centenary celebrations for Ideal Industries

IDEAL Networks celebrates the 100th birthday of parent company Ideal Industries Inc, which has been designing tools and solutions that make a true difference for millions of professional tradesmen.

100 years ago, founder J Walter Becker launched the Ideal Commutator Dresser Company from his mother's kitchen with the belief that every product should be worth more than its price. Service, he said, is part of the product.

Since then, Ideal Industries has grown into an authority on electrical installation and testing. In its 100 years of business it has acquired several other companies including the LAN tester division of Acterna (formally Wavetek), and a major ATM, xDSL, SDH/Sonet, Gigabit Ethernet, and IP handheld testing equipment provider, Trend Communications.

Ideal Industries has achieved many industry firsts and was proud to launch the market's first handheld Cat 5 cable certifier (LANTech 100) in 1993. Since then it has released the first tester for Class F/FA, the first dedicated tester for Cat 6A cabling, the first tester to include a tone generator and colour screen, and the first tester to have an autotest button on the remote to save time.

Today, it continues to develop the iconic products and practical technology demanded by critical industries like data communications, aerospace, electrical, wire processing, automotive, construction and more.

There are now eight companies in the Ideal group, trading worldwide across six continents.

Many important sectors have Ideal to thank in part for their progress. For example, its wire strippers have been used on many commercial jets flying today; and its products have even been to the moon as part of the critical equipment on NASA missions.

In the past 100 years, Ideal has grown to become a major manufacturer of portable test equipment with true heritage and expertise in both LAN and WAN installation and maintenance. Through its Networks brand it now supplies data cable testers, network testers and telecom/enterprise testers all over the world.

"Innovation and quality have been central to everything Ideal Industries has done over the past century. As we reach this important milestone, Ideal Networks continues its commitment to offering both a range of unique, effective products and leading customer service," said Tim Widdershoven, global marketing manager for Ideal Networks.

"As part of the centenary celebrations we will be recognising the achievements and efforts of the Ideal team. Their work continues the values on which the company was founded in 1916 and our employees have been central to our success. We look forward to being part of the next 100 innovative years of Ideal," he added.

Ideal Industries – USA
Website: www.idealindustries.com

New managing director

AMBRELL Corporation has appointed Henk Kleef as the new managing director for its European operations. Mr Kleef will manage all aspects of Ambrell's business in Europe including the United Kingdom, the European Union and Eastern Europe.

He brings with him more than 25 years of business experience in the industrial, energy and aerospace markets. His background includes general management, sales, business development, engineering, manufacturing and operations. His most recent role was managing director of Weasler Engineering in Europe, owned by Actuant Holdings. Weasler is a manufacturer of mechanical power transmission products.

Mr Kleef also has prior experience with other Actuant businesses including positions as global business development director and global sales director. In addition, he has held management positions with IHC Merwede (shipbuilding), ENECO (energy market) and Fokker (aircraft services).

Mr Kleef will have offices in Cheltenham, UK, and in Hengelo, the Netherlands. He will report directly to Ambrell's president and CEO, Tony Mazzullo, who is located in the United States.

Mr Kleef will be a member of the global executive team and will be a representative at the company's Board of Directors quarterly meetings.

Mr Mazzullo said: "We are honoured and excited to have Henk Kleef join our team. The breadth and depth of Henk's business experience and leadership qualities will be of tremendous value to our customers."

"He will be actively involved with key end-user clients as well as distributor and OEM partnerships to help fuel Ambrell's growth trajectory. Mr Kleef will also oversee Ambrell's focus and commitment throughout Europe to deliver a superior customer experience."

Ambrell Corporation – USA
Website: www.ambrell.com

Stronger European presence for Teknor Apex

Teknor Apex has acquired Plastic-Technologie-Service (PTS), a Germany-based custom compounder of thermoplastic elastomers (TPEs) and engineering thermoplastics (ETPs). The deal, for an undisclosed amount, became final on 31st March.



▲ Jonathan Fain, chairman and CEO of Teknor Apex

PTS operates a manufacturing plant at Steinsfeld, Germany, with more than 20,000 tons of installed capacity, as well as a technical support facility. A marketing office 10km away in Tauberzell includes facilities for training, seminars and discussion with customers of possible solutions for automotive, electrical, consumer product, and other applications. The company has more than 100 employees.

The product portfolios of PTS are diverse. TPEs include block copolymers based on a number of polymer chemistries, TPVs, and polymer blends. ETPs include several types of polyamide plus PBT, polycarbonate (PC), and PC/ABS blends.

"PTS is well known for innovation and is the European leader in developing 'hard/soft' solutions that combine elastomers with rigid polymers," said Suresh Swaminathan, senior vice president in charge of the global TPE business of Teknor

Apex. "They will bring to our partnership a range of unique technologies and service capabilities."

Among proprietary specialities of PTS is a hard/soft technology for over-moulding TPEs onto polar ETP substrates, such as nylon and acetal, and producing a durable bond. Another speciality is radiation-crosslinked grades of ETPs and TPEs.

For the past year, PTS has manufactured TPE and ETP compounds for Teknor Apex under a tolling agreement. Now the PTS compounding facility at Steinsfeld becomes the second manufacturing site in Europe for Teknor Apex, which already compounds TPEs at a facility in Genk, Belgium. Teknor Apex also produces compounds at locations in the USA, Singapore, and China.

"The acquisition of PTS is a natural fit in the strategic vision of Teknor Apex to support the market with a global footprint and local presence," said Jonathan Fain, chairman and CEO. "It also brings together two companies that have shared the unique culture of being privately owned and intensively customer-centred."

Teknor Apex Company – USA
Website: www.teknorapex.com



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Strengthening North American market

MFL Group has consolidated its sales and service network in North America.

MFL has significantly increased the products portfolio of its non-ferrous division, which specialises in wire drawing, stranding and extrusion equipment. In addition to the Frigeco brand, the acquisition of CM Caballé SA has allowed the group to incorporate the long-standing OM Lesmo, Caballé and Eurodraw Energy brands.

Frigeco USA has engaged the services of Technical Marketing Systems (TMS) based in Granby, Connecticut, USA, and AITMAC Inc based in Ontario, Canada. TMS will handle specific accounts as a technical sales, service and spare parts representative for the North American market.

AITMAC Inc will serve as a spare parts distributor for customers with existing OM Lesmo and Eurodraw Energy products. In addition to coordinating the sales activity of the representatives, Frigeco USA will work directly with key accounts and multinationals that have traditionally been MFL customers.

“Our goal is to integrate OM Lesmo and Caballé rotating equipment and the Eurodraw Energy wire drawing lines into the products portfolio we currently offer in North America,” said Anthony DeRosa, general manager.

“Frigeco USA and its representatives will provide customers value-added solutions in all three production chain segments: wire drawing, cabling and extrusion. Our utmost goal is to fulfil your business needs to ensure maximum efficiency and profitability.

“We are pleased to have Technical Marketing Systems and AITMAC on board our commercial organisation. Their extensive experience in the wire and cable markets will enhance our sales and service footprint and reinforce our commitment to the North American market.”

Frigeco USA Inc – USA
Website: www.mflgroup.com

Free monthly webinars

The IWCS International Cable & Connectivity Symposium has launched a free monthly webinar series of peer-reviewed presentations on technologies and trends in wire, cable and connectivity for the communications, data, electronics, power, industrial, automotive and aerospace industries.

Held on the third Friday of every month at 10.30am Eastern USA time, the webinars run for 45 minutes and include an interactive question-and-answer period. A webinar recording is available on www.iwcs.org in the Webinar Archive about two weeks after each live presentation.

Launched in November 2015, the month following the IWCS 2015 Symposium, the IWCS Webinar Series presents technical topics of interest to those in the industry. An example of a popular recent topic from March is Development of a Totally Dry Aerial Dielectric Self Support Cable Family, which was presented by Tim Goddard of OFS.

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Transatlantic Cable

The USA economy

Optimistic economists and pessimistic voters: a strange disconnect in a presidential election year in America

"The 2016 presidential campaign has exposed worries among many voters about a US in decline. The sentiment played a particular role in boosting the candidacy of businessman Donald Trump, with [his] campaign slogan pledging to 'Make America Great Again.'"

Josh Zumbrun – a national economics correspondent for the *Wall Street Journal* in Washington, DC – went on to consider another feature of the current USA political season.

The *WSJ* monthly survey of 70 business, academic and financial economists, conducted 6th to 10th May, had posed the question whether living standards were higher today or at various points in the past. Some 80 per cent said these standards are higher today than during the 1990s and earlier.

With the 1960s as a kind of touchstone, more general sampling produces a very different response. The Pew Research Center (Washington, DC) recently polled registered voters on the question "Compared with 50 years ago, is life in America better or worse for people like you?" To 46 per cent of its respondents, life seems worse now; to 34 per cent, better.

A poll by Morning Consult (also Washington-based) asked voters whether the 1960s or the 1980s were better for them than today. In that survey, 31 per cent of respondents chose the 1960s; 37 per cent said they were better off in the 1980s.

In marked contrast, while many economists view the USA as still not fully recovered from the recession that began in 2007 or the previous recession of 2001, even so a high majority say the country is a better place today than in either the Sixties or the Eighties. In other words, in the view of the experts these are good times for Americans – in fact, the best ever.

There is no scarcity of solid supporting evidence. According to the Centers for Disease Control and Prevention, in 1960 the life expectancy of the average American was a full decade shorter than it is today.

The median personal income, after adjustment for inflation, is 55 per cent higher today than in 1960, according to the Census Bureau. These measures of overall well-being rose throughout the 1980s and 1990s. Why, then, the pervasive insistence that there has been a half-century of decline in the United States?

'Uncertain times in the labour market'

Economists consulted by Mr Zumbrun point to "a few culprits." ("Economists Disagree With Voters Who See US Worse Off Today Than in 1960s," 12th May). Among them:

- First, wages or available jobs have deteriorated for some demographic groups, particularly men without a high-school diploma and men who worked in manufacturing (two groups with some overlap)
 - Second, as noted by Joel Naroff, chief economist of Naroff Economic Advisers (Holland, Pennsylvania), Americans have just lived through the "first decade where the average worker lost ground." Incomes overall declined during the two most recent recessions – although not enough to return people to a 1960s standard of living
 - Third, "Current material standards are much higher than in 1990, but the degree of uncertainty is far higher too," said Lou Crandall, chief economist of Wrightson ICAP (Jersey City, New Jersey).
- The USA may be healthier and wealthier than in the past, but these have been more uncertain times in the labour market than many workers had anticipated
- Fourth, many voters could be thinking primarily about broad social changes that have taken place in the USA over the past 50 years
 - Finally, the election process could be undermining confidence in the economy. "Switching presidents is always an uncertain proposition," observed Mr Zumbrun. "But three-quarters [of the *WSJ* respondents in May] view this year's election as especially uncertain."

On this point the experts and the voters draw closer together, with a sizeable group of the reporting economists – about 42 per cent – believing that uncertainty about the next president is already so high as to damage the national economy.

Michael Carey, the chief economist for North America at the French banking network Credit Agricole, told the *Wall Street Journal*, "Businesses may defer investment and hiring decisions until they have a better sense of the direction of the next administration."

Mr Zumbrun concurred, noting that many economic decisions of businesses and consumers depend, at least in part, on confidence. He wrote, "This campaign season has been a long exercise in talking down that confidence."

Transatlantic cable

Energy

As to what lies ahead (ie after 8th November, when the nation chooses President Barack Obama's successor), the economists sampled by the *WSJ* shift away from their sunny hindsight.

On average, they see a 20 per cent chance that the USA will fall into recession in 2017. (It is perhaps worth noting here that the recession predicted by many economists for 2016 failed to materialise.)

They believe the pace of job growth is likely to slow. And they worry about the risk of economic fallout in the USA if China's economy continues to deteriorate.

Mr Zumbrun summed up: "The outlook is far from rosy, economists say. But going back to a 1960s standard of living wouldn't help."

- Picking up the optimism where the *WSJ* economists left it off, the respected investment firm T Rowe Price (Baltimore, Maryland) provided these "key takeaways" from its Spring 2016 report to investors:
- The probability of a USA recession remains low, with 2 per cent growth expected this year
- The link between the USA stock market and the economy is weak, with 21 of 32 major market declines since 1948 not leading to recessions
- The United States is not isolated and global headwinds are not likely to go away. But slowing growth in China and elsewhere abroad is not likely to trigger a USA recession
- Credit markets are healthy despite stress in high-yield bonds related to the energy sector; and
- The pain from falling oil prices has come quicker than its benefits, but the pain mainly has been in the oil patch

While seemingly aware of the danger, a sector especially vulnerable to cyberattack is slow to put protections in place

According to the US Department of Homeland Security, the energy sector faces more cyber attacks than any other American industry. As reported by Barbara L Vergetis Lundin in *Smart Grid News*, this conclusion is seconded by the Portland, Oregon-based software company Tripwire, which provides information technology solutions for security and compliance automation.

Ms Vergetis Lundin, of the *FierceMarkets Energy Group*, wrote that, in a survey of more than 150 IT professionals in the energy, utilities, and oil and gas industries, conducted in the USA in November 2015, Tripwire found that 77 per cent of respondents had experienced a rise in successful cyber attacks in the 12 months to that date. Some 68 per cent said the rate of successful cyber attacks had increased by more than 20 per cent in just the previous month.

More specifically, 78 per cent of respondents reported having experienced, over the same one-year period, a cyber attack from an external source; and 30 per cent knew of an attack from an inside employee. Nearly 45 per cent said they had not gathered enough information to identify the sources of the attacks. And 22 per cent acknowledged that their organisations did not have processes in place to identify and protect sensitive and confidential information.



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Transatlantic cable

In what Ms Vergetis Lundin termed “the oblivious category,” energy executives were found by Tripwire to be more than twice as likely than non-executives (43 per cent vs 17 per cent) to assume that their organisations detected every cyber attack.

Tim Erlin, director of IT security and risk strategy for Tripwire, told *Smart Grid News*, “It’s tempting to believe that this increase in attacks is horizontal across industries, but the data show that energy organisations are experiencing a disproportionately large increase when compared to other industries.” (“Oblivious in Energy: Cyber Attacks More Successful Than Ever,” 8th April)

At the same time, Mr Erlin said, energy organisations face unique challenges in protecting industrial control systems and SCADA (supervisory control and data acquisition) assets – dependent as these are on operation by way of coded signals over communication channels. He asserted that energy companies need to invest more heavily in prevention and forensic tools to decrease the rate of successful attacks and fully investigate those they cannot prevent.

➤ Tripwire also conducted a survey of 200 security professionals attending a conference hosted by the computer and network security company RSA (Bedford, Massachusetts) in February 2016 in San Francisco.

When asked if a cyber attack could cause physical damage to critical infrastructure, 83 per cent of respondents answered in the affirmative. In addition, 73 per cent said that proprietors of such facilities – definitely including power plants – are more vulnerable to ransomware attacks (in which the victims have their data encrypted until they pay) than other organisations.

Utilities hold a particular fascination for cybercriminals specialising in ransomware

In “A Brief History of Ransomware,” published on its blog about information security and IT ops, the New York-based security software company Varonis gives as the first documented example of the extortionate tactic the 1989 AIDS Trojan, also known as PS Cyborg.

Harvard-trained evolutionary biologist Joseph L Popp sent 20,000 infected diskettes labelled “AIDS Information – Introductory Diskettes” to attendees of the World Health Organization’s international AIDS conference.

The Trojan hid directories and encrypted the names of the files on the recipient’s computer. To regain access, the user had to send \$189 to PC Cyborg Corp at a post office box in Panama. Varonis recalled that Dr Popp was eventually caught but was declared unfit to stand trial: “His attorney said he began wearing a cardboard box on his head to protect himself from radiation.”

Whether latter-day ransomware attackers are as colourful as Dr Popp is not readily established, since they are at pains to conceal their identities. What can be said is that expert opinion suggests they may be making a speciality of energy utilities.

Again as reported by *Smart Grid News* (see “An especially vulnerable sector,” above), a water and electricity authority in the US Midwest needed a week to recover from a ransomware attack that hit its enterprise systems on 25th April.

The successful phishing attack forced the Lansing (Michigan) Board of Water & Light to lock down its corporate systems, including phone servers. Calling the attack a “cyber incident,” the utility emphasised that no customer data had been stolen. (“Just an Incident: Michigan Utility Downplays Cyber Attack,” 4th May)

While acknowledging that a ransomware attack is not a direct threat to critical infrastructure systems, Barbara Vergetis Lundin asserted on *smartgridnews.com* that the risk of these halt-and-release incursions is high for utilities.

And Itsik Mantin, director of security research at the cybersecurity firm Imperva (New York), took note of the trend away from individuals to enterprises as targets. Ransomware, Mr Mantin told Ms Vergetis Lundin, has evolved into a smooth and highly efficient ecosystem run by professionals “and fulfilling the hacker’s most desired void – the path from infection to money.”

Elsewhere in energy . . .

➤ The amount of solar power installed in the USA has increased 23-fold over the last seven years, from 1.2 gigawatts in 2008 to an estimated 27.4GW in 2015, with a million systems now in operation. A key challenge to further solar deployment is integrating distributed generation sources like rooftop solar panels into the national grid, striking a balance with traditional utility generation to provide reliable, cost-effective power. The US Department of Energy on 3rd May said that it would put \$25 million toward support for companies working to meet that challenge.

Through industry and utility partnerships, solutions developed by the DOE’s Grid Modernisation Initiative will be field-tested by utilities to evaluate their performance in real-world operating environments. The expectation is that the research findings and live demonstrations will provide new tools for utilities and grid operators hoping to realise the maximum benefit from solar.

Telecom

As consumers everywhere become increasingly connected, those in the developed world are already moving on from the smartphone

The Connected Consumer Index provides a single measure of how much, and on what devices, consumers in each of 78 countries and eight world regions digitally connect with digital content and with one another.

Published annually by the German market research firm *GfK* (Nuremberg), it enables businesses to compare “connectedness” in order to spot market opportunities and improve their competitive edge across a range of industries.

The *GfK Index* for 2016 finds Hong Kong and North America (USA, Canada, Mexico) holding steady as having the world’s two most fully connected populations. But the United Arab Emirates is closing in on the leaders, jumping from eighth place in 2015 to a projected third place this year. Switzerland has overtaken Denmark and Sweden to move up from tenth place to a forecast eighth place this year. (“Hong Kong, US, UAE ‘Most Connected’ Populations,” 10th May)

Other countries having made a significant leap forward, in terms of connectivity, are Chile and Jordan. Chile climbed seven places, from 27th in 2015 to 20th this year, to stand now just after Italy, Ireland and Australia. And Jordan jumped from 31st place to 23rd place – overtaking Cyprus, Oman, New Zealand and Belgium, among others.

Transatlantic cable

Kevin Walsh, the director of trends and forecasting at *GfK*, told London-based *Advanced Television* that "macro trend increases in connectivity" are observable across all countries, but with a notable difference between emerging and developed market areas.

For consumers in high-growth, emerging markets the smartphone is still the main device with which they connect to data services. But, even as price reductions over the next two to three years will likely add another billion people to the ranks of first-time personal phone users, developed markets are already seeing the next wave of consumer connectivity.

According to the *GfK Connected Consumer Index* the growth drivers in Western Europe and North America are constantly connected "wearables" (eg Google Glass, whose users check their screens an average 120 times a day) and connected cars; with smart home technology "an equally significant opportunity" although one with a slower, steadier consumer adoption curve.

▶ At the telecom-automotive interface:
a car insurance industry poised for
big gains from the Internet of Things

"IoT-centric usage-based insurance is finally coming of age and it is turning the traditional car insurance sector upside-down."

Stockholm-based Marlène Sellebråten, who covers technology for *Industrial IoT 5G*, sees Internet of Things (IoT) adoption in various markets as set to disrupt traditional industries

by introducing new business models. She cites IoT-centred usage-based insurance (UBI), which uses real-time information about the driver's ability and habits via the in-vehicle telematics system, as a prime example of the trend.

Ms Sellebråten pointed to new research by IHS Automotive showing that UBI had 12 million subscribers worldwide in 2015.

The Colorado-based provider of automotive news and intelligence expects that one per cent share of the total car insurance market to grow to ten per cent by 2023, as insurers increasingly embrace a smartphone-based model which surmounts "the hardware barrier." ("IoT-centric Usage-Based Insurance Set to Surge," 11th May)

The adoption of UBI was slowed by cost considerations, legal concerns, and torpid promotion by insurance companies. But Stacey Oh of IHS Automotive told *Industrial IoT 5G*, "In the European Union, the introduction of eCall [which, as of April 2018, will summon rapid assistance to motorists involved in a collision anywhere in the European Union] will be a major push for UBI."

Ms Oh, a manager of automotive technology with a speciality in the Korean market, noted the variety of players now joining traditional insurance companies in the UBI market, including OEMs, large data aggregators, and telecoms and telematics firms: "basically all companies that can process vast amounts of data."

The USA is the world's largest UBI market, with five million subscribers in 2015. But Italy leads in market share, with UBI accounting for ten per cent of its car insurance market.

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Transatlantic cable

The United Kingdom is the second-largest UBI market in Europe, while the model remains a niche product elsewhere on the continent.

IHS Automotive expects that in China, where in 2012 the government began granting foreign insurance carriers access to the market, around 15 insurers will launch UBI pilot programmes this year.

Automotive

It's official: the Takata airbag failures are attributable to moisture and wide temperature fluctuations over time

"This is the largest recall in American history," Mark R Rosekind, who heads the National Highway Traffic Safety Administration, told reporters on 4th May.

The occasion was the announcement by the NHTSA that it would require the Japanese automotive parts maker Takata Corp to work with automakers to recall an additional 35 million to 40 million of the company's airbags, bringing the number recalled in the United States to nearly 64 million.

The move followed on the agency's disclosure that, after three investigations and an inquiry, it had identified the cause of the defect that made the airbags rupture, sending metal fragments flying. At least 11 deaths worldwide have been linked to the defect, ten of these in the USA.

The safety regulators reported their finding that long-term exposure to environmental moisture and wide temperature fluctuations over time can degrade the propellant used to deploy the airbag, making it unstable and prone to explosion. In every such event in which an airbag made by Takata was implicated, the car was an older model.

Three investigations by the agency found flaws in the airbag's propellant, which includes the compound ammonium nitrate and is enclosed in a steel casing called an inflator.

Mr Rosekind said, "The science now clearly shows that these inflators can become unsafe over time, and faster when exposed to high humidity and high temperature fluctuations."

As reported by Hiroko Tabuchi of the *New York Times*, Takata engineers struggled for years to stabilise the ammonium nitrate, a cheap and volatile explosive that is more commonly used in large-scale applications like mining. Eventually, they hit upon the expedient of a drying agent to help stabilise the compound.

As well as the volatility of ammonium nitrate, for the NHTSA the age of the airbag emerged as an important factor.

Takata's inflators, even without the drying agent, apparently are safe when they are installed in a new vehicle, and for a few years afterward.

But, Mr Rosekind said, "After time, they pose a risk and should be replaced." ("Takata Airbag Defect Is Traced to Moisture and Temperature," 4th May)

➤ The expanded recall stipulates replacement of inflators that use ammonium nitrate and do not contain a drying agent. Takata has until the end of 2018 to recall cars that have

airbags with such inflators, and until the end of 2019 to recall faulty bags installed as part of earlier recalls.

Ms Tabuchi noted that replacing the faulty inflators poses "an enormous logistical challenge." Not only are there shortages of parts in many areas of the USA, but automakers must also deal with consumers who face the prospect of driving potentially deadly cars while they await the repair. In some cases, she wrote, automakers have made loaner cars available.

➤ Earlier, Mr Rosekind himself had touched on this aspect of the recalls. On 16th March he told the *Times* that his wife's car required a fix to a faulty Takata airbag but that parts were not available.

The chief American auto safety regulator said the experience had helped him know what people go through in an extensive recall.

To that point, 14 automakers in the USA had recalled 24 million vehicles with Takata airbags, and about 7.1 million of the devices had been replaced.

Volkswagen ignores the slowdown in China's car market, sticks to its plan to invest \$4.49 billion there this year

A spokesman for the German carmaker Volkswagen AG said on 10th May in Beijing that VW and a joint venture partner – the state-owned China FAW Group Corp – would begin construction in Tianjin the following week for a plant with capacity to turn out 300,000 cars annually.

The plant is due to be completed by 2018, *Reuters* was told. The spokesman declined to put a value on the project, but *China Daily* cited an FAW-VW joint venture official saying the investment was worth just under \$3 billion.

VW had previously announced that it planned to build a factory in the northern port city that would start production by 2018, but provided no details.

According to the May disclosure the company is aiming for annual production capacity of five million units by 2020. VW said last year it would hit that mark by 2019.

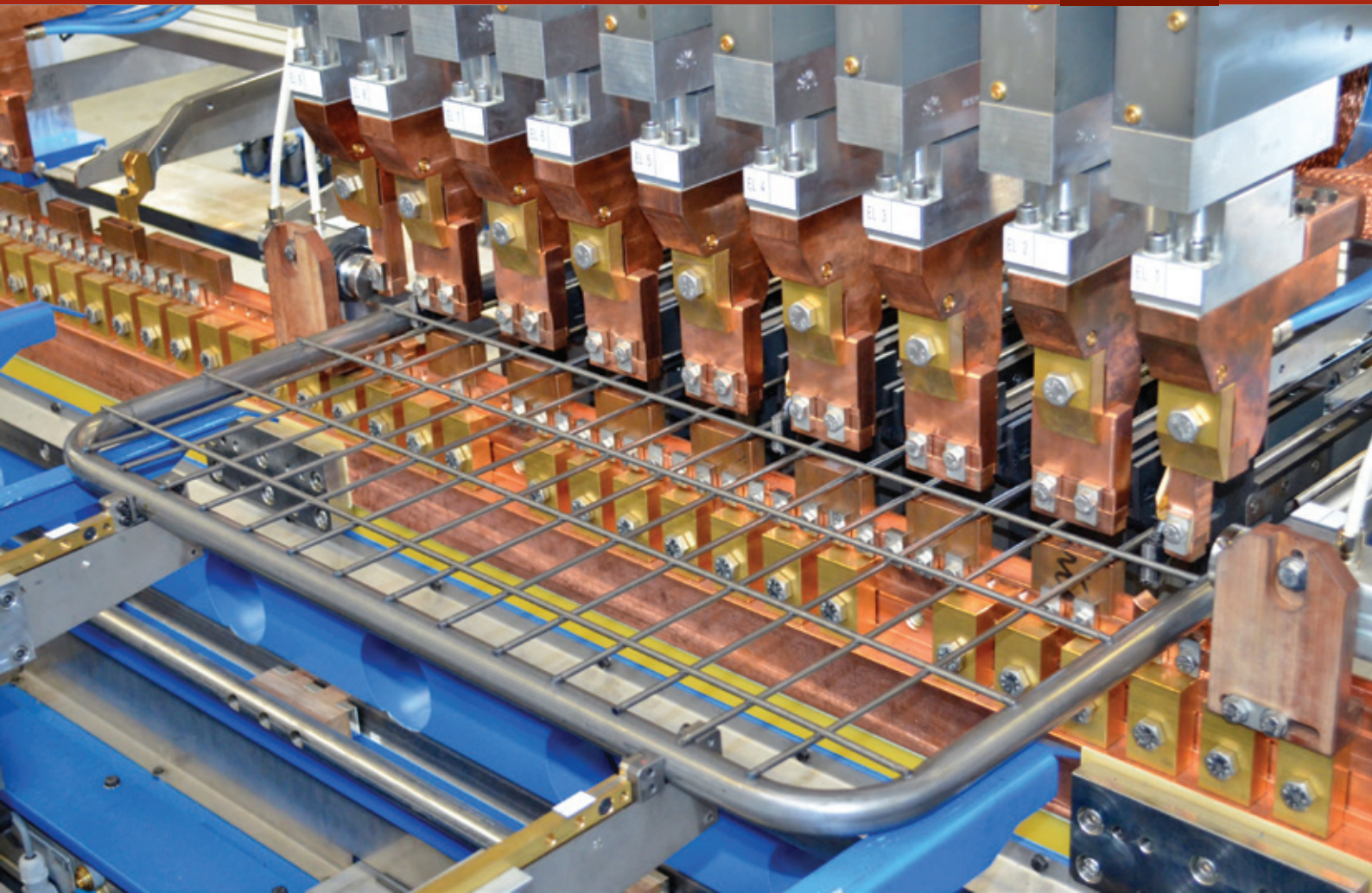
Reuters reporters Jake Spring and Brenda Goh noted that the German automaker has broadly maintained its production in the world's largest car market; this despite sluggish sales growth as China's economy expands at its slowest rate in 25 years.

"Generally, we stay on our investment plans, with some modifications of course which is normal and which will always be done," VW China chief Jochem Heizmann had told reporters in Beijing in April. He added, "We will use these capacities and have some more flexibility to react." ("VW China Venture to Break Ground on Tianjin Plant Despite Market Slowdown," 10th May)

Mr Heizmann said ahead of the Beijing motor show in April that his company would invest \$4.49 billion with its joint venture partners in China this year.

In addition to its association with FAW-VW, the company makes passenger cars with SAIC Motor Corp Ltd, also Chinese state-owned.

Dorothy Fabian
USA Editor



▲ Ideal GAM 400 Series mesh welder

New GAM 400 mesh welder

SINCE 1923 the name Ideal has stood for innovation and progress in the production of welding machines and automation. Not only standard machines, but also custom-made machine solutions according to customers' specific requirements are included in the wide range of products.

The German company manufactures mesh welding machines, coil joining of wires and stranded conductors, as well as welders for grating, fencing and the production of wire articles such as cable trays, covering, frames, rings, etc.

The company has recently launched the GAM 400 Series versatile mesh welding machine. The main advantages include:

- High flexibility by modular design
- Patented handling devices for an expedited, monitored setup
- Quick change of the welding presses without any use of tooling
- Manual loading for efficient production of small and medium-sized batches

- Automated loading for high volume production
- Possibility to feed additional wires, strips, profiles, etc
- Use of jigs for easy handling of frames
- Combination of mesh and frame welding in one run
- Double-tracking for simultaneous welding of two products in one operation
- Different welding circuits allow the parallel combination of different wire diameters

The new Ideal GAM 400 Series is ready to produce all types of mesh, but is particularly suitable for the manufacture of display articles, white goods and all articles where wire and frames are joined.

The revised, integrated Siemens control with touchscreen is a space saver as a separate PC unit is not required. The optimised user interface enables remote control via a web portal.

Ideal also had a CSR Versaweld® jig welding

machine on display at wire 2016 with a turning and pivoting table for wire and combined wire/sheet metal products in jigs. A special feature is the automatic system for changing tools thus offering easy handling of different product designs.

This flexible machine solution is made for working with various electrode forms, geometries as well as tooling, with the goal to finalise the welding job in one run without any production interruptions. The machine is also equipped with an X-welding gripper and a rotation device, which enable the handling of demanding, three-dimensional products.

A wide range of Ideal butt welders for the wire and cable industry were also shown. The revised butt welder series for T- and in-line welds with user-friendly graphical interfaces offers improved process reliability, for non-skilled operators as well.

Ideal-Werk C + E Jungeblodt GmbH + Co KG – Germany
Website: www.ideal-werk.com

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Revolutionary from Blachford

IN 2011, Blachford Corporation developed and introduced a revolutionary technical advancement with its low dust dry wire drawing lubricants.

The first generation of these low dust lubricants were sodium-based formulations that were designed to be more cohesive and adherent to the wire than standard products.

Low dust lubricants are less likely to produce nuisance dust when exiting the die (feathering) or when cooled on the wire and bent around a capstan prior to the next die box, improving housekeeping both on the machine and in the facility.

Blachford's low dust lubricants have enabled many of its customers to realise significant benefits including lower observable dust creation, lower lubricant consumption, longer die life and higher drawing speeds.

After the successful implementation of its low dust sodium lubricants, Blachford began working to develop calcium-based low dust lubricants.

Blachford introduced its newest



▲ *Low dust dry wire drawing lubricants from Blachford*

innovation – low dust calcium lubricants – at wire 2016 in Düsseldorf, Germany.

These new beaded low dust calcium lubricants are designed to reduce dust generation during handling and use through greater wire adherence and lubricant cohesion, as compared to standard wire drawing lubricant powders.

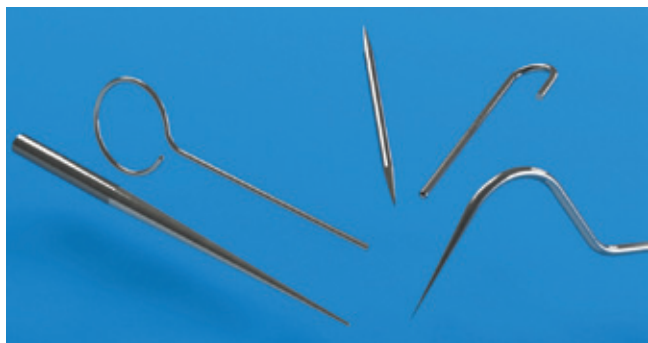
Initial testing indicates that in addition to lower dust creation, these new lubricants build a beneficial lubricant film that is sustained better than standard products, which allows for improved drawing performance over standard calcium lubricant powders.

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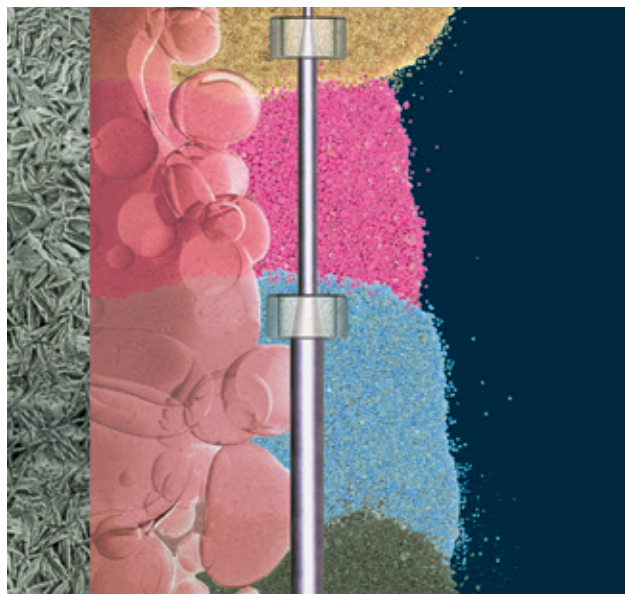


High-tech drawing lubricants

PAN Chemicals manufactures and supplies high-tech drawing lubricants and coatings to the wire industry.

The production programme includes:

- Panlube S dry drawing lubricants: A full range of calcium, sodium and combined products for low and high carbon steel and stainless steel
- Panlube L wet drawing lubricants: A complete range of oils, greases and pastes for wet drawing of low and high carbon, welding wire, stainless steel and non-ferrous wire
- Pancover lubricant carriers: Phosphates and non-reactive coatings
- Panflux flux for galvanising: Especially developed to improve the efficiency of the galvanising process by a uniform control of the reaction between the two metals, reducing operation costs and improving the quality of the zinc coating
- Panchem auxiliary products: Degreasing agents, pickling inhibitors, protective products, activated charcoal, wiping pads and more



▲ A range of chemicals from Pan

Pan Chemicals has a strong emphasis on a close technical collaboration with its customers, and is deeply focused on the research and development of new products and solutions for specific applications.

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

In addition to the chemical and auxiliary products the engineering department can offer different solutions for mechanical descaling, coating and drying units, rotating die holders and die reconditioning equipment.

The company is offering its highest quality drawing lubricants and coatings, drawing processes and solutions, long experience and specialised technical service.

Pan Chemicals SpA – Italy

Website: www.panchemical.com

Experts for plasticising oils

H&R Group has been focusing on its expertise in plasticising oils for polymer compounding, along with water blocking technology and dielectric compounds for the energy, telecommunication and fibre optic sectors.

Two areas that were of particular interest to visitors at the recent wire 2016 exhibition were plasticising oils for polymer compounding and the water blocking of XLPE cables.

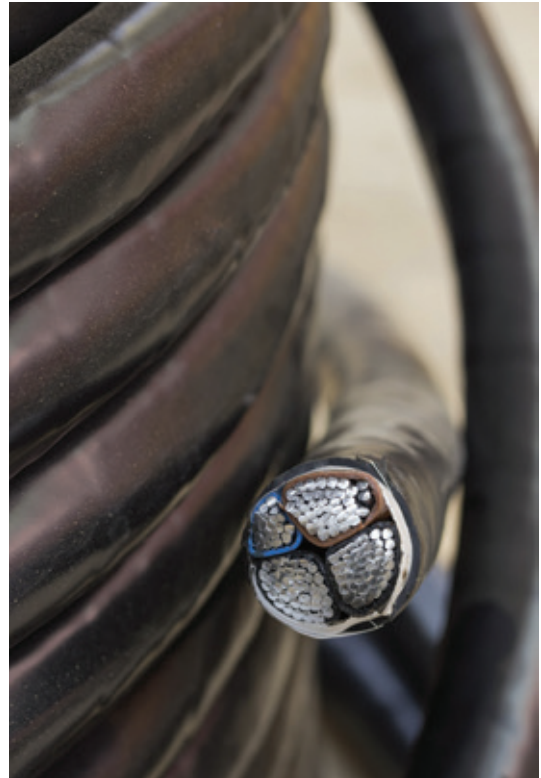
In Europe, the wire and cable sector is one of the largest users of PVC for cable sheathing and insulation.

Without plasticisers the cable sheathing and insulation would become brittle and crack, resulting in safety and down-time issues for cable networks.

H&R, with extensive experience in this area, offers a range of plasticisers with different viscosities to meet the requirements of both cable designers and polymer compounders. Its Pionier oils range is seen as an alternative to phthalates and is also suited to NBR in a number of sheathing and insulation applications.

Used since the late 1960s XLPE cables have brought cost, performance and environmental benefits to cable networks around the world. In order to maintain reliability of XLPE cables the H&R Group has developed Strandblok, specifically for the sealing of conductor strands in AC and DC XLPE cables.

Based on synthetic hydrocarbons and fillers, Strandblok offers cable designers compatibility with polymers used in cable construction, as well as exhibiting water resistance – making it suitable for offshore/subsea applications.



H&R Group – UK

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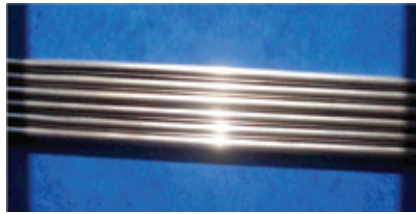
Wire green cleaning for plating and decorative bright finish

The PWC system simultaneously performs drawn wire cleaning and polishing, in-line with wire drawing machine at up to 12m/s (2,400ft/min), in a totally green application.

Exceptional cleanliness is obtained in a glossy finish and the plating quality permits wire direct brass coating, copper coating, galvanising, plating, Al and Cu cladding and wire cleaning prior to heat treatment and coating applications, including patenting, annealing, painting, plastic coating, etc.

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

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



▲ Wire cleaned for decorative finish by PWC system

contaminants extreme pressure extrusion/hydrodynamic cavitations displace/and contaminants flush out, used to clean drawn wire at high-speed in a completely green application.

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

are further smoothly polished under high pressure, generated by the unit, effectively separating lubricant residue from base material, washing away dispersed contaminants, enabling wire exiting the unit very clean of white-metal appearance with reflective finish and totally dry.

The PWC-S system provides the ultimate combination of simplicity and effectiveness: acid-free, caustic-free, without ultrasonic, without chemicals, hermetically sealed zero-emission system, no fumes, no foam. Economical and environmentally friendly, the system provides significant process savings in production of clean wire. The PWC-S unit is compact and can be easily installed on the finishing/last block of a wire dry drawing machine.

Decalub – France

Email: info@decalub.com

Website: www.decalub.com

Efficient, highly precise ODAC 14XY laser gauges

THANKS to the compact design, the ODAC® 14XY measuring heads from Zumbach can be used in virtually every manufacturing process in the wire and cable industry, the plastics and rubber industry as well as the steel and metal industry.

The technological basis considered for these measuring heads is always of the latest technology, with laser diodes as light sources combined with intelligent and powerful measured-value processors which facilitate a simple and flexible integration.

Zumbach's long-standing experience as a pioneer of in-line measuring technology, combined with high production figures result in a product with an excellent price-performance ratio.

Amongst the outstanding features are single scan calibration (CSS), with single scan monitoring and high data rate output of up to 125 data packages per second. The measuring heads can be used with all line speeds. Vibrations during production have no noticeable influence on measurements.

This is specially suited for fine and extra fine wires, enamelled wires, cables, steel cords, fibres, medical tubing, extruded plastic or rubber products.

The ODAC 14XY models are available for two measuring ranges:

- Micro version from $\varnothing 0.015$ up to 3mm (0.0006 up to 0.12"). Thanks to the use



▲ ODAC 14XY measuring head with optional local display LOC 01

- of a special laser, these versions can measure smallest diameters within the micrometre range
- Standard version from $\varnothing 0.06$ up to 16mm (0.0024 up to 0.64")

All the measuring heads of the ODAC

series have adaptive signal processing (patent DE3111356), which makes subsequent regular re-calibrations superfluous. Only in instances of component exchange or compliance to calibration regulations ISO 9000/9001 etc would re-calibration be required.

All the relevant parameters for accuracy are continuously monitored by the measuring system and automatically compensated. This is valid, in particular, for possible long-term changes of the behaviour of the scanner motor or the measuring electronics.

Flexible communication integration:

- Serial RS-232 /-422 /-485
- Ethernet TCP/IP
- Profibus DP
- Profinet IO V2.3
- J/J-M (digital, for connection to Zumbach USYS processors)

Zumbach Electronic – Switzerland

Website: www.zumbach.com

Small carrier for short unsupported applications

The small and lightweight cable carriers from the Protum series from Tsubaki Kabelschlepp are suitable for low cable weights and short unsupported applications. Compared to conventional solutions, they feature a particularly favourable ratio of usable interior space to outer dimensions.

The cable carriers from the Protum series are designed to produce a particularly low level of vibrations, ensuring very quiet running.

Tsubaki Kabelschlepp – Germany

Website: www.kabelschlepp.de

European launchpad for DIWire

PENSA Labs used wire 2016 in Düsseldorf, Germany, as the European launchpad for the smallest CNC wire bender for desktop manufacturing and rapid prototyping. Developed by Pensa, a New York, USA-based industrial design firm, the DIWire weighs in at only 10kg.

"We are excited about creating an entirely new form of desktop manufacturing. This opens up a world of new possibilities, especially when combining the DIWire technology with other desktop manufacturing machines," said Marco Perry, partner at Pensa.

"The potential is unlimited: architecture models, design prototypes, surgical implants, orthodonture, aerospace applications, lighting, stage sets, antennas, jewellery, puppetry, robotics, short run production, signage, art, furniture, small crafts, and more."



▲ The DIWire from Pensa Labs

While 3D printers can output volumes and laser cutters can slice 2D planes, converting lines into bent rods, wires or tubular forms quickly, accurately and continuously, was not possible – until now.

The DIWire bends a variety of materials – including steel, aluminium and brass – allowing for local, short-run, customised, prototype and just-in-time manufacturing.

Transportable, accessible and affordable, the DIWire fills the market gap between time-consuming hand bending and expensive large-scale, mass production CNC wire bending.

"In developing the DIWire, we focused on creating a seamless user experience, from

software interface and machine design, to accessories that help with assembly.

"Our software doesn't require speciality skills; just drag-n-drop your file and press bend," said Mark Prommel, partner at Pensa.

"Users can simply draw in 2D, with no programming or CAD skills required."

Beyond manufacturing, the DIWire is transforming STEM/STEAM education,

receiving an overwhelmingly positive response at universities and schools in the United States and Canada.

"We want to encourage creativity in students young and old. In just minutes, you can quickly go from lines on the screen to physical parts," said Kathy Larchian, partner at Pensa. "It's that simple and fast to use."

Pensa Labs – USA
Website: www.pensalabs.com



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- XLPE Compounds (36 KV)
- Semi Conducting Compounds (36 KV)
- PE Insulation & Jacketing Compounds

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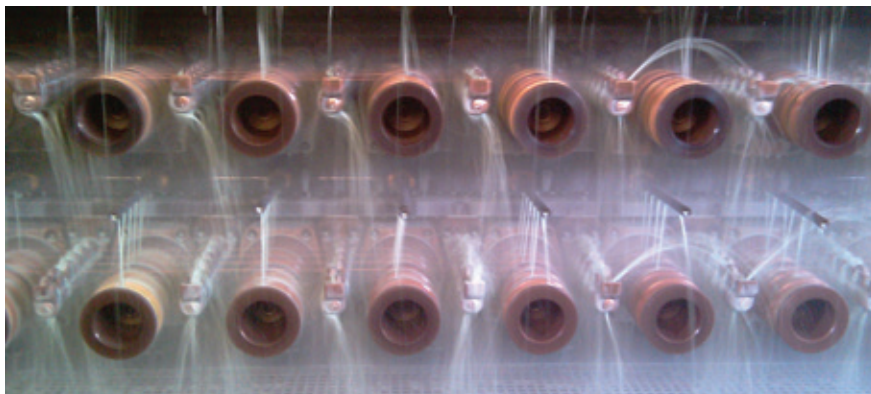


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Experience counts at Condat



▲ Lubricants for electrical wire from Condat

WITH 160 years of expertise, Condat's lubricant range is recognised in the metal forming market, especially for wire drawing processes (drawing and rolling). The Vicafil and Steelskin range gathers together a wide choice of wire-drawing soaps, surface treatment, neat and soluble oils and degreasing products.

Condat is working on a daily basis to always provide the safest products without any compromise on performance.

In the scope of being a step ahead, Condat supplies the wire drawing industry with lubricants that comply with the forthcoming environmental and health and safety legislations:

- Low dust in workshops, with the pellet technology
- On chemicals: REACH, Biocides, EPA
- Eco-friendly lubricants: free of borax, barium, sodium nitrites

For high-carbon steel, steel cord, the company offers dry wire drawing lubricants with low or zero borax. Since the classification of borax as SVHC, Condat has discontinued its production of high-borax dry lubricants and surface coatings.

This first step ensures that surface coatings and dry lubricants are not labelled reprotoxic and ensures a safer workplace. As the future of borax in Europe is jeopardised by its being on the SVHC list, Condat's research and development department has worked relentlessly to provide its customers with high performance solutions. Vicafil Santale 6 satisfies the more demanding operations such as the production of steel cord, allowing continuous quality improvement of the final product.

For low-carbon steel wire to be galvanised and CO₂ welding, the use of titanium dioxide (TD) in dry-drawing lubricants is minimised. Lubricants with TD are often used where a heavy-duty, high coating weight is required. Keeping ahead of the

potential evolution in regulations, Condat has developed TD-free alternatives. Vicafil Decal 440 is one example: its use has been validated on processes where lubricants containing TD are usually used.

For stainless steel and cold heading wire, 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 (per European Seveso regulation) or are to be banned by EPA regulations.

Condat's Vicafil TFG 4295 or Vicafil TFH 1672 oil 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.

For electrical wire applications, Vicafil™ TFA neat oils range has been designed to offer both low residues and extended operating life. Its specifically formulated additives package minimises thermal oxidation, maintaining longer lubricant performance. The bath life is increased and thus reduces maintenance costs. Thanks to their low viscosity, Vicafil TFA 1167 and Vicafil TFA 1460 reduce lubricant consumption whilst offering high lubricity. These formulations are suitable from the rod breakdown to the final wire drawing.

For high and low carbon steel grades, for such applications as rope wire, piano cord and saw wire, Condat has developed a range of high lubricating power emulsions. Formulations such as Vicafil SL 3400 and Vicafil SL 3500 allow the formation of robust and consistent lubricating films able to withstand severe drawing conditions (high speed, high tensile alloys), and are compatible with zinc, copper, brass, and phosphate-coated and bare steel.

Condat – France
Website: www.condat.fr

Eliminating defective fasteners

AS manufacturers look to lightweight materials for improved fuel economy, the associated fastening problems necessitate zero defects through 100 per cent inspection.

Manufacturers looking to reduce weight (or for cost savings) have turned to lightweight materials like aluminium, plastics, zinc and magnesium.

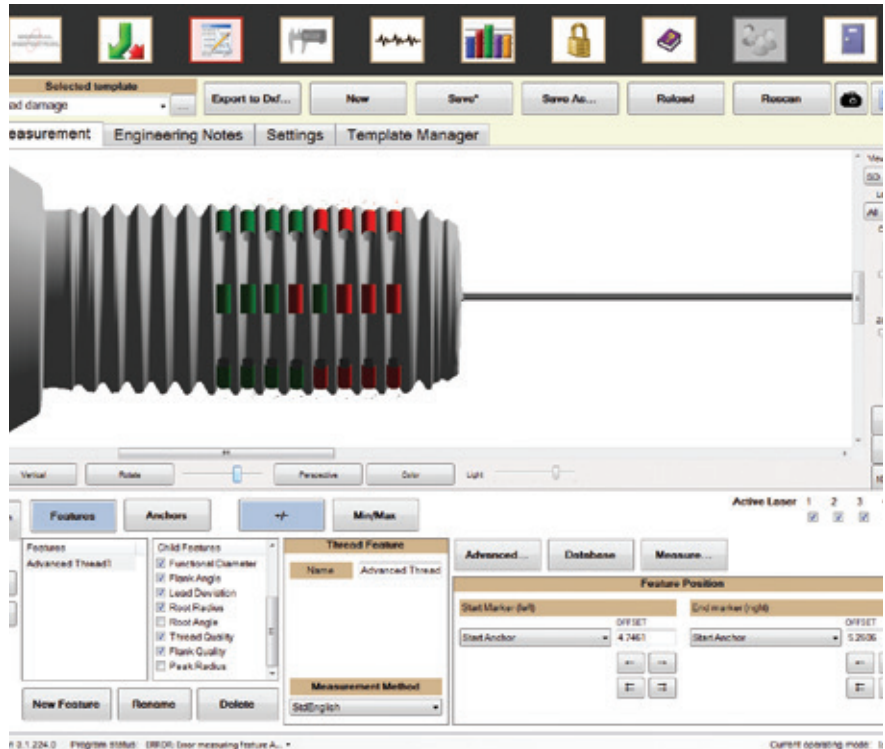
The associated fastening issues require zero defects as production speed and quality depends on them.

The fastener industry is increasingly relying on higher resolution 3D inspection of billions of fasteners. Gauging, sorting and cylindrical part inspection systems incorporating laser, vision and eddy current for dimensional measurement and determining metallurgical defects are now used for high-speed inspection of many fasteners.

The introduction of lightweight materials has made zero defects a particular challenge when the fasteners are still steel.

Quality control is critical because even small defects can cause big problems in working with lightweight materials, such as having to rework engine blocks if male threaded fasteners strip out of threaded holes.

To address these production and quality issues, the increasing use of lightweight materials is requiring high-speed 100 per cent fastener sorting as well as more



▲ Laser topography can provide a detailed 3D image of the part, detecting dents, flatness, chips and dimensional characteristics

inspection capability from fastener sorting machines.

Laser and vision-based machines can provide 100 per cent high-speed 3D fastener inspection.

General Inspection, for example, uses 3D information from multiple laser beams to detect defects that may only

be on one side of the part, such as damaged threads.

Laser topography can provide a detailed 3D image of the part, detecting dents, flatness, chips and dimensional characteristics.

General Inspection – USA

Website: www.generalinspection.com

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Technology in a beautiful form at Sikora

FOR more than 40 years Sikora, one of Germany's successful mid-size companies, has stood for quality, service and cost saving in the areas of measuring, control, inspection, analysis and sorting systems. During this time, special attention has been paid to innovation. This does not only apply for the future-orientated research and development work – also the external appearance is always one step ahead.

An example of this innovative orientation is the new advertising campaign that uniquely presents Sikora devices in use.

"Nowadays, pure product pictures are not sufficient any longer to stand out from the technically oriented environment," said Katja Giersch, head of corporate communication. This has been the challenge of the new advertising campaign, which has been placed in hose and tube as well as plastics trade magazines worldwide since the beginning of 2016.

"Therefore, we consciously combined the

technology with people, in order to offer the viewer a functional and emotional access. Presented are Sikora products in a manufacturing environment. Furthermore, each image shows a Sikora employee, who is responsible for the development, assembly or service of the corresponding device. We are demonstrating therefore, that our products are backed by a strong team," added Mrs Giersch.

The unique image style, which was specially created for this campaign, underlines the innovative orientation of the technology company. Furthermore, the colour scheme changed: instead of a minimalist black design, Sikora puts the focus on clear blue and white shades, which support the expressive large image stages.

The advertisements are completed by a communication area, on which all benefits of the displayed technology are clearly highlighted for the user.

Sikora AG – Germany
Website: www.sikora.net



▲ The Laser6000 series from Sikora

New high-speed PV ribbon line

PLASMAIT has introduced a new PV ribbon line design with an improved output, featuring a maximum speed of 210m/min. This allows the production of up to 250 tonnes of PV ribbon per annum in a typical production split between interconnect and bus bar ribbons.

Interconnect ribbons are typically 0.8 to 2mm wide and 0.1 to 0.2mm thick. They are usually coated with about 20 micron thick layer of solder. Bus bar ribbons are larger and typically range from 5 to 6mm width.

The new line can produce ribbons with yield strength down to 50MPa (Rp0.2%). These super-soft ribbons are spooled onto the integrated version of a single-head, precision take-up with accumulator. This allows copper ribbons on payoff spools to be continuously annealed, tinned and spooled onto 4kg-5kg spools, without process interruption. Some producers choose to equip the line with an automatic spool changeover unit that can be integrated with the take-up unit.

Some producers also opt for an integrated line with an inline rolling mill to produce interconnect ribbons directly from round copper wire.

The line's total output can benefit from a

double-stand rolling mill that operates at line speed. The plasma tinning line operates without chemical cleaning and fluxing whilst rolling runs without cooling agents, which makes the whole production dry and environmentally friendly.

Round wires can also be produced on the line, with mounting of appropriate wiping system for round wires.



▲ The new PV ribbon line from Plasmait

Traditional tinning lines require acid cleaning, rinsing and fluxing prior to tinning. Plasmait's line operates without flux, which avoids expensive contamination of a tin bath and thereby reduces the cost of tin waste.

High output, approximately 95 per cent up-time and a high level of automation allow PV ribbon producers to reduce labour costs and reduce scrap rates whilst improving production consistency and product quality.

Key benefits include:

- High-speed production with up-times over 95 per cent
- Production of super-soft PV ribbon
- High quality finished product and low scrap rates
- No solder waste due to flux contamination (flux-free production)
- Automated and computer-controlled production
- Limited manual involvement, ie low labour cost per ton of production
- Low maintenance cost and low energy consumption

Additional original manufacturer services:

- Commissioning, startup and full operator training
- Advanced operator and production manager training

Plasmait GmbH – Austria
Website: www.plasmait.com



▲ Better environmental stability because of the new technology

Prysmian reaches technology milestone in the field of power transmission grids

PRYSMIAN Group is launching a new breakthrough cable technology for the development of power transmission grids that will ensure better environmental sustainability, higher electrical performance and lower costs. The group has completed the successful development and testing of its new P-Laser 525kV cable system for high voltage direct current (HVDC) applications.

"This is a significant and important new technology that shapes the progress of HVDC in the cable industry and reconfirms once again our undisputed leadership in driving technological innovation within the sector," said Massimo Battaini, senior vice president energy projects at Prysmian Group.

"We are proud to offer this advanced technology to our customers engaged in developing, extending and upgrading their power grids, while seeking to reduce environmental impacts with solutions that provide them with superior system performance and cost benefit," he added.

P-Laser is the name given to the advanced and innovative technology that permits a more efficient cable production with lower environmental impact than traditional XLPE (cross-linked polyethylene).

Manufacture is performed in a single and continuous process and does not require chemical reactions to achieve

the properties required for the long-term electrical integrity of HVDC insulation systems. This feature gives the benefit of shorter production times and results in both reduced energy consumption and lower greenhouse gas emissions. P-Laser is particularly suitable for HVDC applications; moreover, it is the first HVDC cable that can be fully recycled at system end-of-life.

P-Laser technology is fully compatible with existing cable and accessory technologies, and provides better electrical performance and a higher material integrity for HVDC in comparison to traditional XLPE-insulated cables. From an efficiency perspective, P-Laser technology has higher thermal performance properties, which increase the power transmission capability of the cable system for a given conductor size, thereby enabling average overall cost reductions of approximately ten per cent per transmitted MW.

P-Laser application to HVDC underground and submarine systems marks a world first in the cable industry. This milestone achievement follows the group's recent announcement of the successful testing of the XLPE extruded cable solution at the same voltage level (525kV DC) in December 2015 and is further recognition of the clear commitment and leading role Prysmian has towards innovation in cable technology.

Prysmian Group – Italy
Website: www.prysmian.com

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Feature

Reels and Spools



Patterned on the most elegant form in industrial practice – the wheel – spools and reels are also the most workaday equipment to be found in any wire mill.

The two aspects, as distinct but complementary as payload and workload, are entirely appropriate to this basic equipment tasked with receiving and moving a valuable product.

The products and services reviewed in this section reflect a keen understanding on the part of their suppliers of the importance of that responsibility.

A 'Reel' alternative

Manufacturers of flexible products ranging from 3D printing filament to fibre optics can utilise a tangle and twist-free packaging solution that eliminates internal packaging structures altogether.

As the standard packaging method in the structured cabling industry for over 30 years, Reelex® is a patented method of winding any flexible filamentary material into a figure-eight coil.

This unique coil dispenses from the inside-out without twists, tangles, snags or overruns. Because the coil does not rotate during payout, there is no inertia, and thus no need for stands or brakes. And since the coil does not require any moving parts as a means of dispensing the product, it may be packaged in a wide variety of package shapes and materials, or simply placed in a cardboard box.

The product dispenses through a range of payout tube sizes which are inserted into a hole woven into the wall of the coil by a specialised Reelex coiling machine.

While Reelex has become the standard package for deploying "last mile" lengths of communications, data, telephony, security and other low-voltage products, the coiling method has applications for a wide variety of products.



▲ SlingPack packaging system featuring stretch wrapped Reelex® coil

"We encourage manufacturers of everything from fibre optics to welding wire to consider Reelex as a superior packaging method," said Timothy Copp, vice president of business development.

Mr Copp added, "Because the Reelex coil can be packaged in a variety of container shapes, sizes and materials, the coil allows manufacturers to leverage their own creativity and innovation to create a unique delivery platform for their product."



▲ SlingPack packaging system

The standard package is a cardboard box, but coils can be packaged in anything from simple stretch wrap, to the heat-shrink ProFlex Packaging System® or innovative SlingPack packages.



▲ Cat-6 cable in a ProFlex package

Reelex Packaging Solutions – USA
Website: www.reelex.com



Inosym Reels



Inosym Limited
P +64 21 353 634
inosym@inosym.com
www.inosym.com

Supplying reels to over 65 countries

Inosym has been supplying reels to the cable and wire industry in over 65 countries for 16 years.

Specialising in steel and plastic reels that are manufactured to European and USA standards, Inosym can offer reels to meet all varying needs of modern manufacturing plants.

The company is committed to providing its customers with high quality reels and bobbins at competitive prices. Inosym reels were developed to provide cable and wire manufacturers with a product that was realistically priced and of high quality.

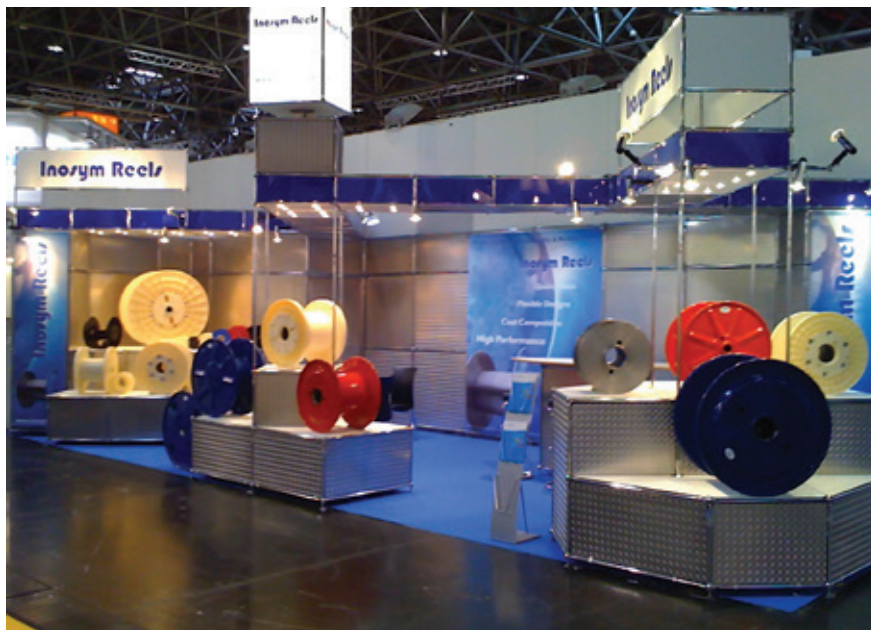
Product examples include:

- ABS plastic reels from 250mm to 1,000mm for insulating, group twinners, stranding, bunching and jacketing
- MF (Metal Flange) pressed metal process reels in sizes from 100 to 1,250mm, made from high-quality steel plate and tube. Applications include universal take-up and payoff reels, bunching, stranding, insulating and jacketing
- SM (Semi Machined) double-wall high-speed reels in sizes from 315 to 1,250mm, made of high-quality steel plate and tube. Applications include drawing, bunching, stranding and insulating
- FM (Fully Machined) steel high-speed reels in sizes ranging from 100 to 1,000mm and manufactured from high-quality steel plate and tube. Applications include high-speed single wire drawing, high-speed multi-wire drawing, bunching and enamelled wire coating
- SD (Steel Drum Reels) are large steel process and shipping drums available in sizes ranging from 800 to 4,500mm. Options include flat sided flanges, corrugated flange and break-down reels. Applications include drum twisting, stranding, insulating and jacketing

With more than 40,000m² of production space, Inosym can provide its customers with rapid delivery of both large and small reel orders.

Inosym Reels – New Zealand

Website: www.inosym.com



▲ The Inosym Reels stand at the recent wire 2016 in Düsseldorf, Germany



Proven track record stretching 40 years

Pittsfield Plastics Engineering is an ISO 9001-2008 certified plastics processor specialising in injection moulding with a proven track record of nearly 40 years.

PPE specialises in manufacturing plastic spools and reels for the wire and cable industry.

The company recently expanded its product offering with three new premium fine wire spools that include a Din 100, Din 125, and a 6x3.5.

These new products meet the demanding requirements of the wire and cable industry. The spools feature a one-piece construction, and domestic availability helps reduce cost.

The one-piece spools eliminate seams and are precision crafted. They are available in high impact polystyrene or ABS with a wide range of colours.

◀ Pittsfield Plastics – specialist in injection moulding

Pittsburgh Plastics Engineering – USA

Website: www.pittsplas.com

Range of reels from GMP



▲ A selection of the reels on offer from GMP Slovakia

GMP Slovakia produces steel reels, take-apart reels and handling equipment for the wire and cable industry.

The company has had the certification ISO 9001:2008 for quality management system since 2009 and is now also certified ISO 14001:2004 for the environmental management system and BS OHSAS 18001:2007 for the occupational health and safety management system.

The take-apart reels and special equipment (tilters, lifters, and rolling systems) are CE marked. All the products are high quality and manufactured for long-term durability.

GMP Slovakia's range of products includes not only reels and drums for wire and cable, but also different models of tilters and lifters. The tilting unit type TU/M can carry reels or coils up to five tons. It works by transmitting the movement from the motor to the tilting unit by a chain.

It is provided with safety barriers (hardware and optical) and with all the documentation required by law. The equipment must be placed in the ground according to GMP Slovakia's technical team's instruction.

It is possible to supply a rolling system, where the operator can place the reel in horizontal axis position for the strapping operation. For smaller reels the TL model is available: the operator expands the jaws of the tilter by the handles and tilts the reel 90°. This device is suitable for reels up to 800mm flange weighing one ton.

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

High level of praise for Madem

In the first quarter of 2016 Madem Brazil conducted a customer satisfaction survey with 96 wire and cable manufacturing customers from 21 countries.

Madem received 76 (79 per cent) responses from customers polled in three categories: bad, regular, and good/very good, with 91.05 per cent of responses falling into good and very good categories.



▲ High level of satisfaction from Madem Reels

The company polled the following services: claim response, quantities shipped X received, documentation, deliveries, quality inspections, performance and packing. "We are very proud of our product continuity, considering that we supply products to several countries, each with their own special requirements. We are again pleased with the results of the survey, and will continue to work towards 100 per cent customer satisfaction for all our global customers," said Leandro Mazzocato, corporate director of sales and marketing.

The next customer satisfaction survey in the Brazil plant will be conducted in January 2017.

Madem Reels SA – Brazil
Website: www.mademreels.com

Qunye
QUNYE ELECTRICAL CO., LTD.
Qunye Spool Expert
Comparable Trustable ISO9001:2008

Jiangsu Qunye Electrical co., Ltd. is a specialized spools manufacturer. We have highlevel workshops and office , first class equipment line and complete inspection facilities, advanced management and quality control system to fulfill all cutomers' requirements. We manufacture all kinds of metal and plastic spools and win a good market both at home and abroad. Looking forward to seeing you at wire China 2016.

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wire Düsseldorf can look back on a 30-year success story. It premiered in 1986 with 488 exhibitors from 23 countries.

Even 30 years ago, when approximately 21,000 trade visitors attended the first wire in Düsseldorf, some 45 per cent of trade fair guests already hailed from abroad.

High internationality and professional competence once again distinguished the visitors at the exhibition stands in 2016.

Exhibitors were delighted with the customer contacts and deals they made.



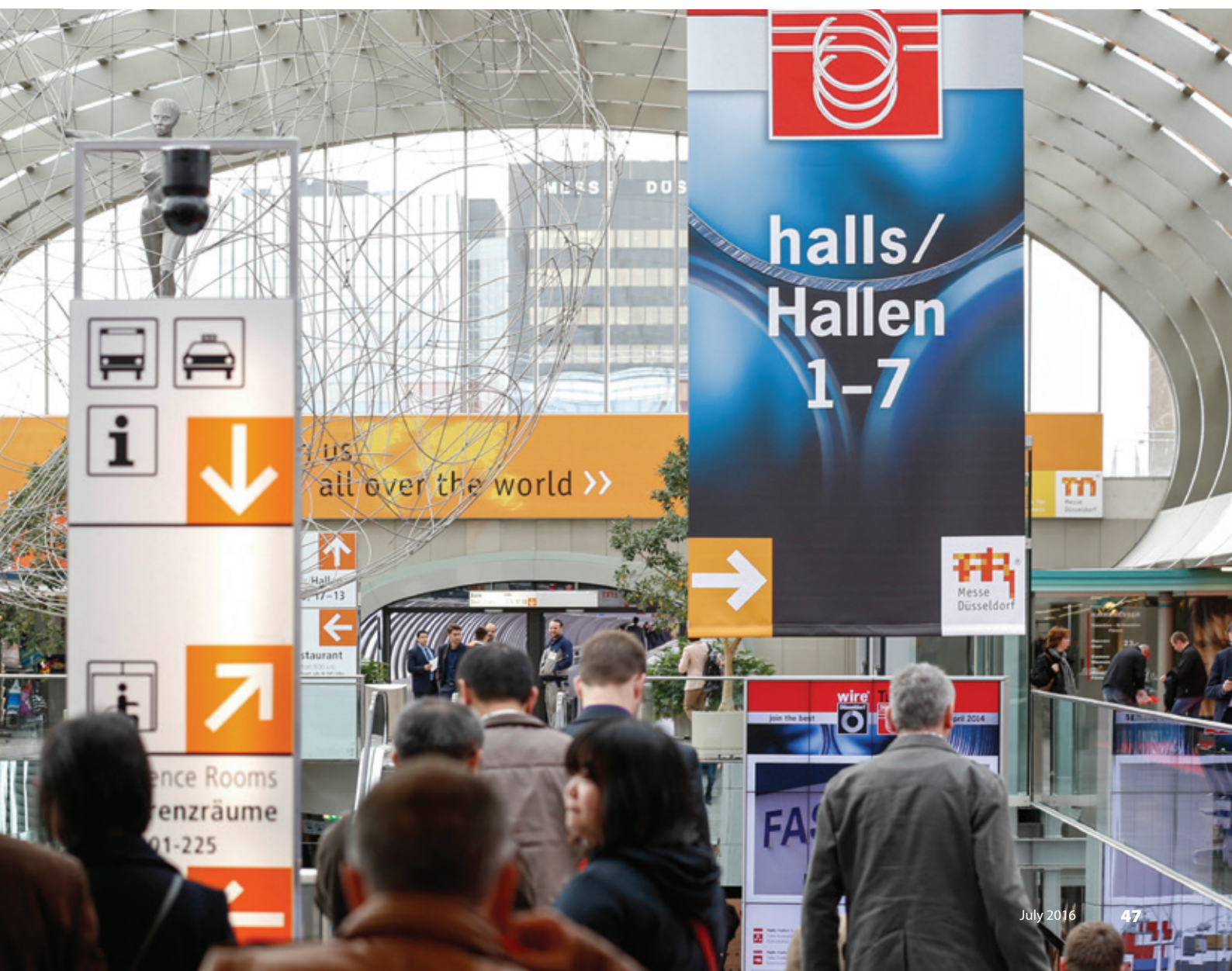
▲ Sales and marketing executive Linda Li, right, on the EuroWire and Wire & Cable ASIA stand with assistant Flavia Loreto



wire 2016

Trade Exposition Review

Industry heavyweights heap praise on wire 2016





join the best



halls/
Hallen
9-12
15-17



join the best



halls/
Hallen
1-7



with u
a
the world >>

wire

Tube Düsseldorf

halls/
Hallen
9-12
15-17

halls/
Hallen
1-7

Messe Düsseldorf



'Really powerful and highly energised wire 2016' – a comment from one of the exhibitors – summed up wire 2016.

The exhibition could easily be described as a benchmark show as both quality and quantity came together to make it a bustling week for the wire and cable professionals from around the world who descended on Düsseldorf – the German city long synonymous with wire and cable. A shade under 70,000 visitors pounded the floors of the halls over the five days and if those numbers weren't impressive enough, the quality of the visitors left a number of companies wishing that the week would not end.



▲ Joachim Schäfer, managing director of Messe Düsseldorf

Comments like the 'best ever', 'a must' and 'by far the best show we attend' were commonplace at the 30th anniversary of the industry's largest exhibition.

"The fact that as many exhibitors as ever nailed 'their colours to the mast' in Düsseldorf proves that the wire, cable and tube industries loyally stand by their leading trade fairs wire and Tube in Düsseldorf, even in tough economic times," beamed Joachim Schäfer, managing director at organisers Messe Düsseldorf GmbH.

And that it was set against global economic upheaval, a worldwide steel crisis, new climate regulations spanning the globe, and a classic industry on its journey into the new Industry 4.0 digital age is testament to the planning and organisation not only of the organisers, but the exhibiting companies and visitors alike. A total net exhibition area of 110,900m² was occupied across 16 exhibition halls – a new record value posted in Düsseldorf's long success story of wire and Tube. Fitting as well on this, the 30th anniversary.

"Major deals are made in Düsseldorf; wire and Tube serve as the global communication and business platform for industry heavyweights, SMEs and international associations alike," said Friedrich-Georg Kehrer, global portfolio director for metals and flow technologies.

A combined total of about 69,500 trade visitors from more than 130 countries attended the two events.



▲ Friedrich-Georg Kehrer, global portfolio director for metals and flow technologies at Messe Düsseldorf

"Lots of traffic again at our stand at wire, which once again underscored the event's aspiration as the world's leading trade fair," said a thrilled Dr Christoph Müller-Mederer, sales and marketing director of **WAFIOS AG Reutlingen**.

"A very international, highly competent audience from Europe and North America. Particularly pleasing was the high number of concrete projects," he added.

"The great response to the introduction of smartfactory 4.0 products, services and ideas is WAFIOS's answer to the Industry 4.0 challenge."

With 1,337 exhibitors from 53 countries on a net exhibition area of 59,700 square metres, wire showcased wire manufacturing and finishing machinery, process engineering tools and auxiliary materials as well as materials, special wires and cables. Also presented were innovations from measurement, control and test engineering as well as other specialised areas.

wire – the international trade fair for wire and cable – featured the segments wire, cable and fibre optic machinery, and wire and cable products and trade in Halls 9 to 13, 16 and 17. Innovations in forming technology were on display

in Hall 15. Hall 16 was home to mesh welding machinery and spring making technology. "We'd like to congratulate Messe Düsseldorf GmbH on the occasion of the 30th anniversary of wire Düsseldorf and wish them all the best for another 30 successful years," said Stefan Szkudlapski, spokesman and networking manager of **netzwerkdraht**, an association of small and medium-sized wire companies from South Westphalia, Germany.

"It was another well-executed event, and the expectations of our members were fully met." The South Westphalian wire experts are planning another group stand for wire 2018 in Düsseldorf.

As is tradition, companies from Italy, Belgium, France, Spain, Austria, the Netherlands, Switzerland, Turkey, the UK, Sweden and Germany were strongly represented again. Sizable overseas contingents hailed from the USA, South Korea, Taiwan, India, Japan and China.

The majority of visitors were from Germany, Italy, Turkey, France, Poland and the Netherlands, with the share of international trade fair guests staying very high at 65 per cent, with about a third travelling from overseas.

German and international trade fair visitors at each of the two trade fairs handed out top marks for what was offered at both events. Some 75 per cent of trade fair visitors were executives with decision-making authority.

Altogether, the willingness to invest at the two leading industry events – wire and Tube – continued to increase. What's more, 60 per cent of trade fair visitors said they had found new suppliers.

With one eye firmly on the future, **Rosendahl Nextrom** branded the show as "a really powerful and highly energised wire 2016."

"Industry 4.0 – 'Smart Factory' as we like to call it – is becoming reality and opening new doors both for us as suppliers and for you as manufacturers. It is an industrial revolution which eases information management," the company said.



▲ The Rosendahl Nextrom team at this year's wire trade fair

"The main benefit is concerned with predictive maintenance, backtracking of processes and online monitoring. We at Rosendahl Nextrom take this revolution seriously and are proud that we could present the opportunities with our technology."

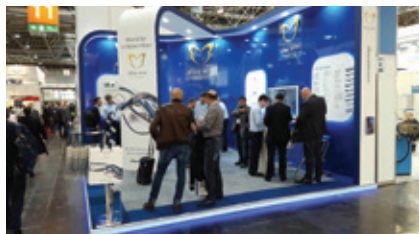
Managers at UK manufacturer of round, flat, shaped profile and electrical resistance wire **Alloy Wire International** hailed the exhibition as "the best yet."

The company saw more than 250 serious enquiries during the five-day show, with interest for its extending range of exotic nickel alloys coming from all corners of the globe, including Australia, Japan, the USA and Europe, in the automotive, aerospace, defence, medical and nuclear

sectors, with oil and gas the only sector showing small signs of depression.

Mark Venables, managing director, said: "wire 2016 was definitely the biggest and the best yet in terms of getting so many quality suppliers, customers and agents together in one venue. This is our premier show of the year and this is reflected in the level of investment we have put into creating a high profile presence and the fact we have many of our international agents here to build relationships and talk to visitors."

He continued: "Enquiries came from all over the world and having a vast array of our colleagues on hand was great to help interpret and translate conversations. The exchange of thoughts and ideas flowed freely and I'm sure will lead to orders."



▲ Visitors quickly arrived at the Alloy Wire stand in Hall 11

Like many other companies, Alloy Wire – which is celebrating its 70th anniversary this year – used the show to launch its new technical brochure and its largest ever range of exotic nickel alloys, which offer high corrosion resistance properties and high temperature performance.

Over 50 different alloys – including the recently added Nitronic 50[®] (0.025 to 5.5mm) and Super Duplex (0.025 to 6.5mm) – were on display at the Brierley Hill firm's new stand, which caused a lot of interest.

Another business launching a new product was UK company **Cimteq** and its partner, **InnoVites** from the Netherlands. The latest joint venture – CableSuite – has been described as a cable manufacturer's dream, providing a single comprehensive set of tools in one place.

CableSuite is a complete and fully integrated enterprise software solution that supports all business functions of cable manufacturers and distributors, combining CableBuilder, CablePlan, CableERP and CableMES. CableSuite enables a cable manufacturer or distributor to significantly optimise and accelerate its business processes. As anticipated the interest in the product

was extensive and the exhibition was considered to be an extremely successful showcase by both Cimteq and InnoVites.

Steve Mepsted, managing director of **PWM Ltd**, said: "We enjoyed an excellent show with steady visitor traffic to the stand from Monday through to Thursday; Friday was quieter. Visitor quality was also really good with more visitors from India and Scandinavia than in previous years.



▲ PWM seemed to have little trouble in attracting visitors to its stand

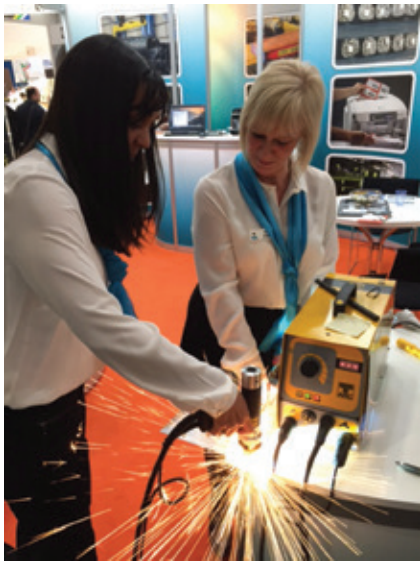
"Our innovative ST40 air/hydraulic cold welder specifically designed for joining strip and tape was a big attraction, and we are now testing materials for customers interested in this new machine. Our large, energy-efficient P1500 and EP500 welders proved popular with visitors looking for a cost-effective way of welding non-ferrous rod, including aluminium to copper, up to 30mm (1.181") diameter. All in all, a very positive show."

French lubricant manufacturer **Condat** was delighted with the response at its stand. Communications manager Nathalie Vidal said: "Whereas Messe Düsseldorf has announced a three per cent decrease in visitors this year, Condat's booth has experienced great recognition and increased its leads. We have welcomed visitors from 60 countries.



▲ Visitors gather at Condat's stand. The French lubricant manufacturer praised the show, with an increase in leads

"There was a great interest in Condat's new offers for lubricants dedicated to electrical wire and cable and HSE-friendly solutions. This was also a good occasion to communicate on Condat's new image and dynamic: simple, modern and efficient."



▲ Jenni Murray, left, and Sue Elwis of IML try their hands at stud welding at the exhibition

The ability to identify and track products is becoming essential to the smooth trading of steel across the globe, and many visitors showed interest in Sheffield, UK-based **IML's** high performance labels and tags.

The company, which described the show as an "excellent return on investment" received more than 150 enquiries and leads relating to a broad range of products, including its durable rip-proof tags, Thermo-tag (600) high temperature tags and its complete in-house label printing systems.

Sales director Neil Dunn said: "Tube and wire is by far the best exhibition we attend across the sectors we currently work within, the quality of leads was top level and the decision makers were there to make improvements to the operational side of their business. It was a long week for the staff involved but the initial results are very encouraging."

Shanghai HOSN demonstrated its confidence and strength with the launch of new machinery and a presentation on its stand on the opening morning of the exhibition, with invited special

▼ Special guests at the Shanghai HOSN stand on the opening morning of the show



guests and members of the trade media. Representatives of the guests made speeches and listened as the company outlined its plans for its globalisation strategy during 2016.

Such was the importance of the show for the company, a number of new contracts were signed during the exhibition and a high number of positive orders of intent were discussed, including conversations involving more than 40 new customers.

AIM – which received about 20 per cent more enquiries than two years ago, 40 per cent of which were new customers – presented the patented Synchro CNC wire bending machine. The hybrid forming technology provides the user with the competitiveness needed in today's ever-changing marketplace. The AIM Synchro line has the ability to form tube off coil and make complex 2D and 3D profiles.



▲ An increase in enquiries and new customers on the AIM stand

Large, generating arcs and hard bends are made easy, with three different cutting techniques depending on the complexity of the profile, chamfering, external saw cut and traditional tube cutters. Each configuration is modular and can be integrated in the field with relative ease.

German company **Woywod Kunststoffmaschinen** introduced its new "easy-to-operate" PDC-control, as well as the IPC based touchscreen control for mixing stations, and a major subject for many clients was the incorporation of existing equipment into new and more precise mixing station systems.

▼ Woywod's impressive stand at wire 2016



The company also used the opportunity to strengthen already close contacts with clients from India, Southeast Asia, America and Europe.

Heinze & Streng described the show as "a must," having received a large number of enquiries following five days of "interesting conversations" which have led to an increase in prospective business. The company also described its "complete satisfaction" over the show.



▲ Bringing a little art to the proceedings on the Heinze & Streng stand

"Competence that Counts" was **Maillefer's** core theme for this year, reflecting on its proven experience in cable manufacturing processes and extrusion technology. The company is not only an equipment supplier but also a customer-oriented process expert with more than 100 years driving its customer-driven research and development.



▲ Maillefer raise a glass to wire 2016

It also introduced at the show several new innovations, including the Round Value Package Premium for high and extra high voltage cable production. In addition to improved cable roundness and increased productivity, it leads to significant insulation material savings.

wire and Tube 2018 is being held 16th to 20th April 2018. Further details are available at www.wire.de or www.tube.de

Design Analysis of a Large Planetary Strander using CAE tools

By Giorgio Pirovano, MFL Group, and Fabiano Maggio, EnginSoft SpA

Introduction

The design of a stranding and closing planetary machine with back-twist is not a simple project, due to the “planetary” rotation of the parts: that introduces dynamic effects that are difficult to estimate; in particular if the performance is extreme due to large spool mass, load configurations and rotation speed.

In order to avoid any possible risk and to obtain the most precise design input, MFL involves EnginSoft and its simulation capabilities as reliable partner in this project.

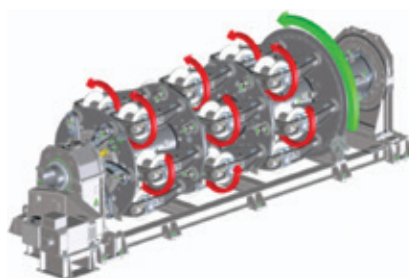
For this specific project, EnginSoft is in charge of carrying out the whole dynamical assessment of the planetary machine. In order to achieve reliable and precise results, it is necessary to use a powerful and versatile multi-body software: RecurDyn®.

On the other hand, MFL has to complete the design of all parts in order to meet structural requirement in terms of strength and lifetime.

Methods and problem definition

This colossal planetary machine will be used to produce cable with different diameters and strand combinations, so that the spools loaded on the machine can be different in size and position on the main rotor. In addition, the spools are naturally unbalanced due to winding errors.

This results in various load scenarios to be analysed. The goal is the identification of the worst case in terms of power required to the motors and stress on parts.



▲ **Figure 1:** Rotations on a planetary stranding machine

EnginSoft's engineers are in charge of finding out such worst conditions through dynamic simulation.

The approach starts with a single cage, and an analysis defines the worst configuration. After that, together with MFL, finite load scenarios are defined.

The next step is the dynamic simulation of the different load scenarios by applying the worst cage condition previously defined. At the end it is possible to obtain the worst working condition of the whole machine.

In other words, this activity is the scientific and precise application of the design of experiment (DOE).

Rigid body dynamics model

A rigid body dynamic analysis is performed; internal loads and motor power torques mainly depend on acceleration and inertias of moving parts, so that there is not a clear need of introducing flexibilities into the model (which would significantly increase the computational effort).

Starting from the MFL 3D CAD geometry of the machine, the dynamic model is

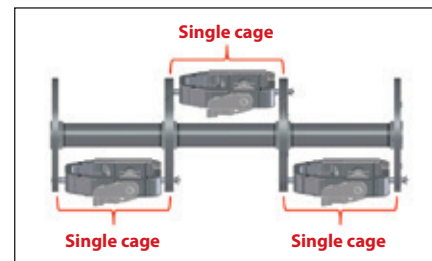
defined in the RecurDyn® environment. The result is an accurate model with more than 100 bodies.

Most of the inertial proprieties are derived automatically from CAD, but several bodies are parametrised inside the multi-body software.

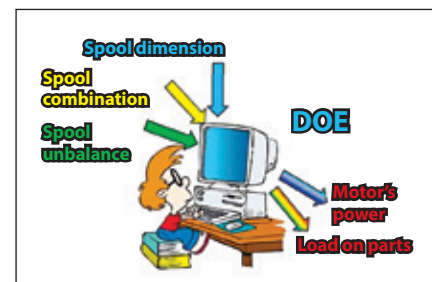
Obviously, the connection between the different bodies perfectly simulates the real kinematic link (gear, shafts, and so on) in order to obtain a model which is the closest as possible to the real machine in terms of degrees of freedom.

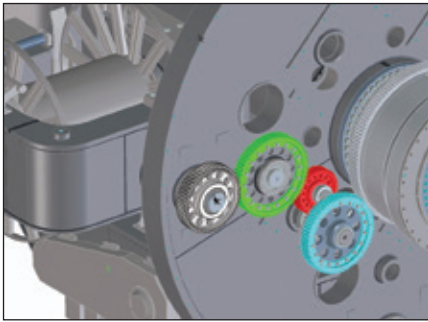
Gear elements are special features of the RecurDyn® library, designed to simulate both kinematics (transmission ratio) and dynamics (reciprocal loading) occurring at any gear couple. *Figure 4* shows the gears back-twist system. It is easy to see that the “gear feature” of RecurDyn® has been massively used due to the conformation of the transmission chain.

▼ **Figure 2:** Single cage of planetary machine



▼ **Figure 3:** Method and DOE approach





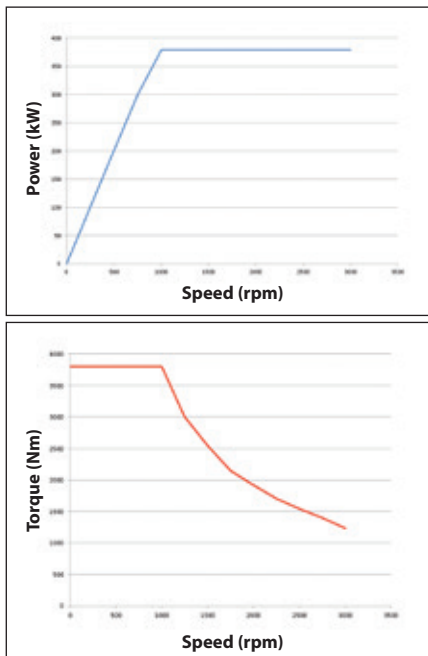
▲ **Figure 4:** Planetary back-twist

When each simulation runs, all loads are automatically combined together along the transmission chains, leading to a precise estimation of the power demand at all motor shafts.

As active parts of the machine, the electric motors, are modelled taking into account the real inertia of the rotating parts and using the real constructive curves (torque and speed) of modern induction motors.

Otherwise by using ideal motors (very easy and simple in RecurDyn®) there would be the risk to obtain an imprecise answer. In fact, such an approach would generate unrealistic torque peaks in the simulated signals; motors with unlimited torque simply do not exist.

Figure 5 shows an example of motor laws.



▲ **Figure 5:** Induction motor power and torque curves

Dynamic simulation and results

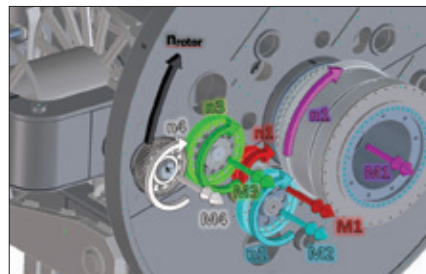
A lot of dynamic simulations are run, and more than 60 cases are analysed, based on the possible different load cases preliminarily defined.

Each dynamic simulation is composed of three phases: acceleration (from zero to the maximum speed), a steady state condition at the maximum speed, and the emergency braking (deceleration from maximum speed to zero in a few seconds).

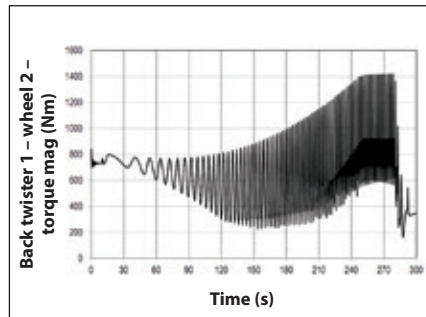
From the large volume of data collected it is possible to define all the information necessary for the design; in particular the maximum power required to the motors and the maximum torque and speed on each part.

This data is fundamental for the right choice of motors and for a good structural design of the parts (rotor, cradles, joints, and so on).

Figure 6 shows the results in terms of rotation speed and torque on each part of the transmission chain.



▲ **Figure 6:** Speed and torque on each back-twist shaft



▲ **Figure 7:** Torque curve on a gear

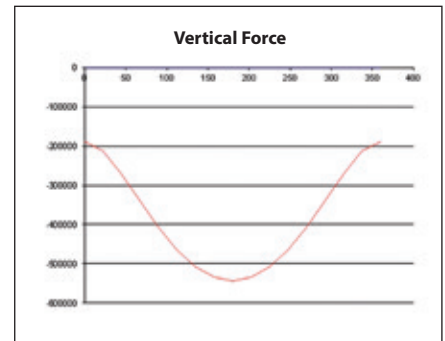
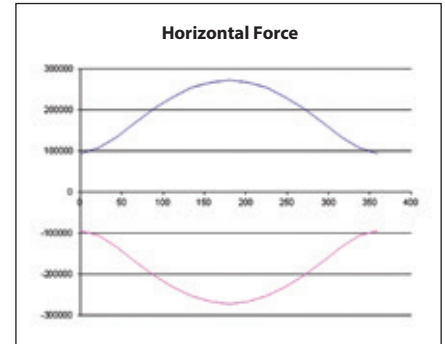
Figure 7 shows a typical torque output on a gear. The peaks, clearly visible in the curve, are due to spools unbalance.

Dynamic results as structural input

As previously explained, the results obtained from the dynamic simulation are the input of the structural simulation.

By using the CAE structural software ANSYS Workbench®, that is directly linked with RecurDyn®, MFL performs the simulation of the mechanical behaviour of the most important parts of the planetary machine.

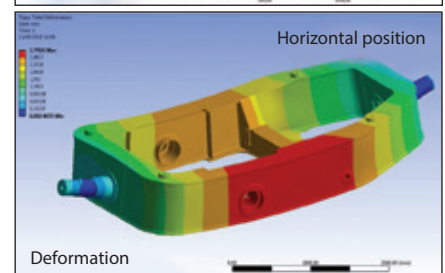
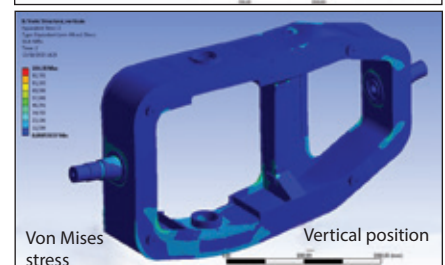
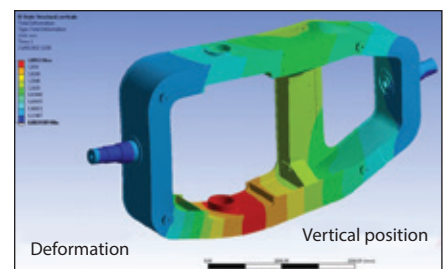
The goal is to verify that all parts meet the strength and deformability specifications.

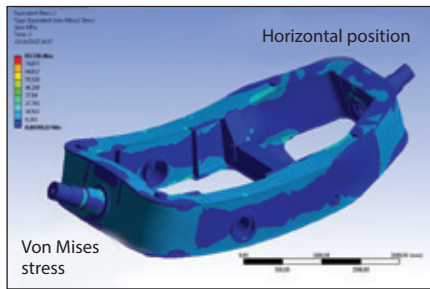


▲ **Figure 8:** Load on cradles

On a planetary machine, all parts are under fatigue (Figure 8 shows the load on the main frame of a cradle during a rotation around its axle); so that the engineers use specific methods for the verification of welded structure under fatigue as hot spot, Radaj methods and so on.

Figure 9 shows deformation and equivalent Von Mises stress on a cradle in two positions.





▲ **Figure 9:** Cradle equivalent deformation and Von Mises stress

Finally, a check of the eigen-frequencies of all parts of the machine was done to avoid any risk of resonance.

Conclusion

Thanks to EnginSoft's expertise in dynamic simulation it was possible to obtain an accurate simulation of a huge planetary stranding machine in a short time.

The results of these simulations support Mario Frigerio's mechanical designers for the dimensioning of the machine. On this large machine no mistake is acceptable.

Virtualisation allows saving time in the development process and is an alternative to the classical approach, in particular when historical data, from similar applications, is not available.

This collaboration between companies made it possible to optimise the design of this challenging project and preserve the high quality level and performance of Mario Frigerio's products. ■

This article contains references to the following products, which are trademarks or registered trademarks of their respective owners: ANSYS Workbench; RecurDyn.

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Europäische Startplattform für DIWire

PENSA Labs nutzte die wire 2016 in Düsseldorf, Deutschland, als europäische Startplattform für den kleinsten CNC-Drahtbieger zur Desktop-Fertigung und zum schnellen Prototypenbau. Das vom New Yorker Designerstudio Pensa entwickelte DIWire wiegt nur 10kg.

“Wir freuen uns darüber eine komplett neue Form der Desktop-Fertigung geschaffen zu haben. Das erschließt eine Welt neuer Möglichkeiten, insbesondere wenn die DIWire-Technik mit anderen Maschinen der Desktop-Fertigung kombiniert wird.“ so Marco Perry, Partner von Pensa.

“Das Potential ist unbegrenzt: Architekturmodelle, Designprototypen, chirurgische Implantate, kieferorthopädische Anwendungen, Raumfahrtanwendungen, Beleuchtung, Bühnenbilder, Antennen, Schmuck, Marionettentheater, Robotertechnik, Kleinserienfertigung, Ausschilderung, Kunst, Möbel, Kleinhandwerk und noch vieles mehr.“

Während 3D-Drucker dreidimensionale Modelle erstellen und Laserschneider 2D-Ebenen schneiden können, war es nicht möglich Linien schnell, genau und



▲ Das DIWire von Pensa Labs

kontinuierlich in gebogene Stangen, Drähte oder Schlauchformen zu verwandeln - zumindest bis heute nicht.

DIWire biegt eine Auswahl an Materialien – einschließlich Stahl, Aluminium und Messing – und ermöglicht somit örtliche, Kleinserien-, kundenspezifische, Prototyp- und Just-in-Time-Fertigungen. Transportierbar, zugänglich und erschwinglich, füllt DIWire die Lücke im Markt zwischen zeitaufwendigem, handlichem Biegen und der kostenaufwändigen, großangelegten Massenproduktion CNC-Drahtbiegung.

“Bei der Entwicklung des DIWire, haben wir uns auf die Schaffung einer nahtlosen Benutzer-Erfahrung fokussiert, von der Softwareschnittstelle und dem Maschinendesign bis hin zu der bei der Montage unterstützenden Zubehör. Unsere Software fordert kein Sonderfachwissen; einfach mit Drag-and-Drop die eigene Datei ziehen und ablegen und auf Biegung drücken,“ so Mark Prommel, Partner bei Pensa.

“Die Benutzer können leicht in 2D zeichnen. Dabei ist kein Programmierungs- oder CAD-Fachwissen erforderlich.“

Neben der Fertigung, verändert derzeit das DIWire die STEM-/STEAM-Bildung, indem man auf eine überwältigende positive Resonanz bei den Universitäten und Schulen in den USA und Kanada gestoßen ist. “Wir wollen die Kreativität bei jüngeren und älteren Studenten fördern. In wenigen Minuten kann man schnell von Linien auf dem Bildschirm auf physikalische Teile übergehen,“ meinte Kathy Larchian, Partner bei Pensa. “So einfach und schnell ist der Gebrauch.“

Pensa Labs – USA
Website: www.pensalabs.com

Stärkung des nordamerikanischen Marktes

MFL Group hat sein Vertriebs- und Dienstleistungsnetz in Nordamerika konsolidiert.

MFL hat die Produktpalette seiner in Drahtziehen, Verseil- und Extrusionsausrüstungen spezialisierten NE-Sparte wesentlich erweitert. Neben dem Frigeco-Markenzeichen, konnte die Gruppe dank dem Erwerb von CM Caballé SA die langjährig eingeführten Marken OM Lesmo, Caballé und Eurodraw Energy integrieren.

Frigeco USA hat die Technical Marketing Systems (TMS) mit Sitz in Granby, Connecticut, und AITMAC Inc ansässig in Ontario, Kanada, engagiert. TMS wird bestimmte Kunden als technischer Vertreter des Bereichs des Vertriebs, der Dienstleistung und der Ersatzteile für den nordamerikanischen Markt betreuen.

AITMAC Inc wird für die Kunden als Vertriebspartner für Ersatzteile mit den bestehenden Produkten von OM Lesmo und Eurodraw Energy fungieren. Neben der Koordinierung der Verkaufstätigkeiten der Vertreter, wird Frigeco USA auch direkt mit Großkunden und multinationalen Unternehmen zusammenarbeiten, die bisher Kunden von MFL waren.

“Unser Ziel ist es die rotierenden Ausrüstungen von OM Lesmo und Caballé sowie die Drahtziehlinien von Eurodraw Energy in die Produktpalette zu integrieren, die wir derzeit in Nordamerika anbieten,“ so Anthony DeRosa, Generaldirektor.

“Frigeco USA und seine Vertreter werden den Kunden hochwertige Lösungen in allen drei Produktionskettensegmenten bieten, wie Drahtziehen, Verkabelung und Extrusion.

“Unser oberstes Ziel ist es die Geschäftsbedürfnisse unserer Kunden zu erfüllen, um höchste Effizienz und Rentabilität zu sichern.

“Wir freuen uns, dass sich Technical Marketing Systems und AITMAC unserer Handelsorganisation anschließen. Deren umfangreiche Erfahrung im Draht- und Kabelmarkt wird unsere Vertriebs- und Servicepräsenz steigern sowie unser Engagement am nordamerikanischen Markt stärken.“

Frigeco USA Inc – USA
Website: www.mflgroup.com

Effiziente, hochpräzise ODAC 14XY Lasermessgeräte

Dank der kompakten Bauart können die ODAC®-14XY-Messköpfe von Zumbach in praktisch jedem Fertigungsprozess in der Draht- und Kabelindustrie, Kunststoff- und Gummiindustrie sowie Stahl- und Metallindustrie eingesetzt werden.

Die technologische Grundlage dieser Messköpfe bildet immer modernste Lasertechnologie mit Laserdioden als Lichtquellen, kombiniert mit intelligenten, leistungsstarken Messwertprozessoren, welche eine einfache und flexible Anbindung ermöglichen.

Zumbachs langjährige Erfahrung als Pionier der In-line Messtechnik, kombiniert mit hohen Produktionszahlen, bietet ein Produkt mit einem ausgezeichneten Preis-Leistungs-Verhältnis.

Herausragende Merkmale sind u.a. die Einzelscan-Kalibration (CSS), Einzelscan-Überwachung und die hohe Datenratenausgabe von bis zu 125 Datenpakete pro Sekunde. Die Messköpfe können bei allen Liniengeschwindigkeiten eingesetzt werden. Produktvibrationen haben keinen merkbaren Einfluss auf die Messung.



▲ ODAC 14XY Messkopf mit optionaler Lokalanzeige LOC 01

Das eignet sich speziell für Fein- und Feinstdrähte, Lackdrähte, Kabel, Steelcord, Fasern, Medizinalschläuche, Produkte aus extrudiertem Kunststoff und aus Gummi.

Die ODAC 14XY-Modelle sind in zwei Messbereichen erhältlich:

- Mikroversion von \varnothing 0,015 bis 3mm (0,0006 bis 0,12"). Dank der Verwendung eines speziellen Lasers, können mit diesen Versionen kleinste Durchmesser

im Mikrometerbereich gemessen werden

- Standardversion von \varnothing 0,06 bis 16mm (0,0024 bis 0,64")

Alle Messköpfe der ODAC®-Reihe beinhalten eine adaptive Signalverarbeitung (Patent DE3111356), welche eine regelmäßige Neukalibrierung überflüssig macht, außer wenn es durch den Austausch von Komponenten oder durch das Erfüllen von Kalibrierungsvorschriften ISO 9000/9001 usw. notwendig wird.

Sämtliche relevante Parameter für die Genauigkeit werden durch das Messsystem kontinuierlich überwacht und laufend automatisch auskompensiert. Dies gilt speziell auch für eventuelle Langzeitänderungen des Verhaltens des Scannermotors oder der Messelektronik.

Flexible Kommunikationsintegration:

- Serielle RS-232 /-422 /-485
- Ethernet TCP/IP
- Profibus DP
- Profinet IO V2.3
- J/J-M (digital, zum Anschluss an Zumbach USYS Prozessoren)

Zumbach Electronic – Schweiz
Website: www.zumbach.com

Kabelinstallation im Amazonas-Regenwald

DAS brasilianische Programm "Amazônia Conectada" wird unterseeische Glasfaserkabel von Nexans einschließen. Das Projekt hat das Ziel, das Internet für vier Millionen Menschen in den Amazonas-Regenwald zu bringen und umfasst 7.700km Kabel, die über fünf gesonderte Routen entlang von bzw. in Flussbetten 52 Ballungsräume im Amazonas verbinden werden.

Im Rahmen des brasilianischen Programms Amazônia Conectada, einem der weltweit bedeutendsten Projekte mit unterseeischen Glasfaserkabeln, werden 275 km Nexans-Kabel in Flussbetten zwischen Coari und Tefé installiert. Das gesamte Netz wird fünf Datenautobahnen umfassen: das obere Flussbecken des Rio Negro, das obere Flussbecken des Rio Solimões, Rio Madeira, Rio Purus und Rio Juruá.

Für dieses Projekt empfahl Nexans den Einsatz von Hochleistungskabeln mit minimalen Umweltauswirkungen. Auf diese Weise wird das Projekt den lokalen Anforderungen der Gemeinden gerecht und das fragile Ökosystem des Amazonas-Regenwalds wird erhalten.

Nexans hat Kabel geliefert, über die keine schädlichen Substanzen in das empfindliche Flussökosystem diffundieren

können und die daher keine negativen Auswirkungen auf die Umwelt haben werden. Die Glasfaserkabel von der URC-1-Kabelfamilie entsprechen den internationalen Normen für unterseeische Kabel.

Als Kabelverlegeschiff wird ein Schlepper dienen, der für die Verlegung während der ganzjährig bestehenden starken Strömung im Fluss geeignet ist. Um die Sicherheit noch weiter zu erhöhen, werden zum Kabelverlegeschiff unterstützend fünf weitere Schiffe eingesetzt. Um die Wartung der Kabel kümmern sich in Zukunft lokale Teams mit Spezialinstrumenten.

Mit dem Programm „Amazônia Conectada“ soll eine leistungsfähige Internetverbindung im Bundesstaat Amazonas eingerichtet werden, nicht allein um die Einwohner mit dem Internet zu verbinden, sondern auch Telemedizin, Fernunterricht und die umfangreichere Vernetzung zwischen Einrichtungen in den Bereichen Gesundheitswesen, Sicherheit und Transport zu ermöglichen. Ein weiteres Ziel des Programms besteht darin, die Umwelt bei der Installation möglichst wenig zu belasten.

Nexans – Frankreich
Website: www.nexans.com

Konstruktionsanalyse einer großen Korbverseilmaschine mit Rückdrehung bei Einsatz von CAE-Werkzeugen

Von Giorgio Pirovano, MFL Group, und Fabiano Maggio, EnginSoft SpA

Einleitung

Die Konstruktion einer Korbverseilmaschine mit Rückdrehung ist kein einfaches Projekt wegen der „planetaren“ Drehung der Elemente, denn diese beinhalten dynamische Effekte, die schwer abzuschätzen sind; insbesondere wenn die Leistung, wegen der großen Spulenmasse, der Lastkonfigurationen und der Drehgeschwindigkeit extrem ist.

Um alle möglichen Gefahren auszuschließen und die genauesten Konstruktionsvorgaben zu erfüllen, wird - als zuverlässiger Partner für dieses Projekt - EnginSoft und seine Simulationsfähigkeiten von MFL mit einbezogen.

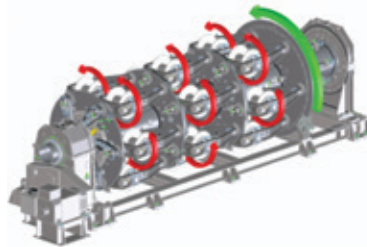
Für dieses spezifische Projekt trägt EnginSoft die Verantwortung, die gesamte dynamische Bewertung der Korbverseilmaschine mit Rückdrehung durchzuführen.

Um zuverlässige und präzise Ergebnisse zu erreichen ist der Einsatz einer leistungsstarken und universell verwendbaren Mehrkörpersoftware erforderlich: RecurDyn®.

Andererseits hat MFL für die Vervollständigung der Konstruktion aller Elemente zu sorgen, um die strukturellen Anforderungen an Festigkeit und Lebensdauer zu erfüllen.

Methoden und Problemstellung

Diese riesige Korbverseilmaschine mit Rückdrehung wird eingesetzt, um Kabel mit verschiedenen Querschnitten und Verseilkombinationen zu fertigen, so



▲ **Abb. 1:** Drehungen bei einer Korbverseilmaschine mit Rückdrehung

dass die auf der Maschine geladenen Spulen unterschiedliche Größen und Positionen am Hauptrotor aufweisen können. Darüber hinaus sind die Spulen von Natur aus unsymmetrisch wegen der Wickelfehler, was verschiedene zu analysierende Beladenszenarien festlegt.

Das Ziel ist die Bestimmung des Worst-Case, bezogen auf die benötigte Leistung für Motoren und der Beanspruchung der Elemente.

Die Ingenieure bei EnginSoft sind dazu beauftragt diese ungünstigsten Bedingungen durch die dynamische Simulation zu finden.

Der Ansatz startet mit einem Einzelkäfig, eine Analyse definiert die ungünstigste Konfiguration. Danach werden gemeinsam mit MFL, Finite-Ladenszenarien definiert. Der nächste Schritt ist die dynamische Simulation der verschiedenen Ladenszenarien, indem man die ungünstigste zuvor festgelegte Käfigbedingung verwendet.

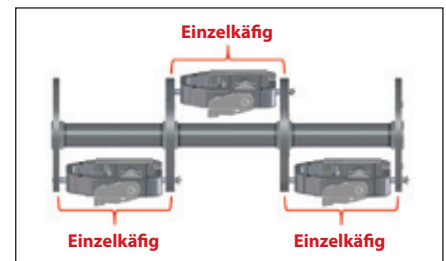
Zum Schluss wird es ermöglicht, die schlechtesten Betriebsbedingungen der ganzen Maschinen zu erreichen. Anders gesagt besteht diese Tätigkeit aus der wissenschaftlichen und präzisen Anwendung der Versuchsplanung (DOE).

Modell der Festkörperdynamik

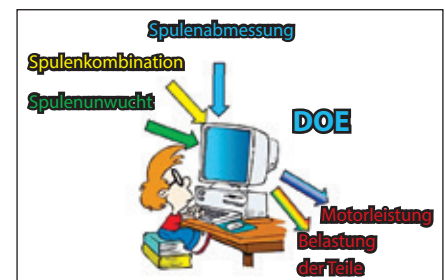
Eine Analyse der Festkörperdynamik wird durchgeführt. Die inneren Lasten und die Leistung/Drehmomente der Motoren hängen vor allem von der Beschleunigung und der Trägheit beweglicher Teile ab, so dass kein klares Erfordernis besteht, dass das Modell Flexibilitäten beinhaltet (was einen signifikant erhöhten Rechenaufwand bedeuten würde).

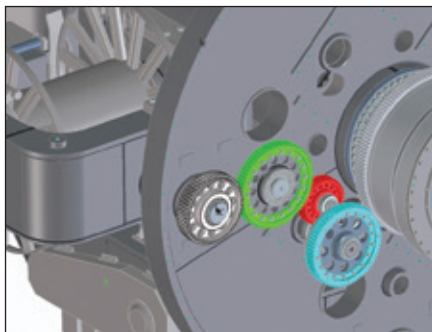
Von der MFL 3D CAD-Geometrie der Maschine ausgehend, wird das Dynamikmodell in der RecurDyn®-Umgebung bestimmt. Das Ergebnis ist ein präzises Model mit über 100 Körpern. Die meisten Inertialeigenschaften werden automatisch vom CAD abgeleitet, jedoch werden verschiedene Körper

▼ **Abb. 2:** Einzelkäfig der Korbverseilmaschine mit Rückdrehung



▼ **Abb. 3:** Methode und DOE-Ansatz





▲ **Abb. 4:** Rückdrehung mit planetarer Bewegung

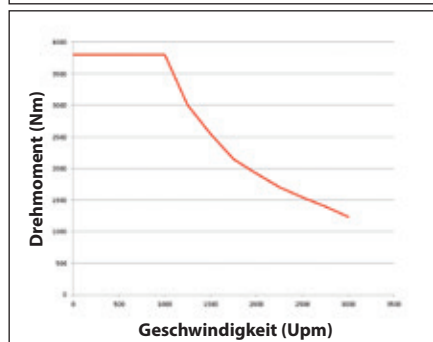
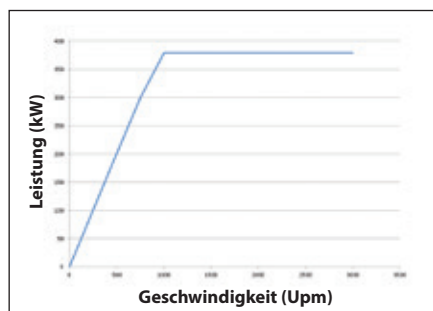
im Innenteil der Mehrkörpersoftware parametrisiert. Offenbar simuliert die Verbindung zwischen den verschiedenen Körpern genau die tatsächliche kinematische Verbindung (Getriebe, Wellen usw.) damit ein Modell entsteht, das der realen Maschine, bezogen auf die Freiheitsgrade, an nächsten liegt.

Getriebe sind besondere Elemente der RecurDyn®-Bibliothek, die entworfen wurden um Kinematik (Übersetzungsverhältnis) sowie Dynamik (gegenseitiges Beladen) zu simulieren, die bei allen Getriebepaaren auftreten.

Abb. 4 zeigt das Rückdrehungssystem der Getriebe. Es ist somit leicht ersichtlich, dass die „Funktion Getriebe“ von RecurDyn® massiv eingesetzt wurde aufgrund der Gestaltung der Übertragungskette.

Wenn jeweils eine Simulation durchgeführt wird, werden jegliche Lasten automatisch miteinander entlang der Übertragungsketten kombiniert, was zu einer genauen Einschätzung des Strombedarfs bei allen Motorwellen führt.

▼ **Abb. 5:** Leistungs- und Drehmomentkurven in einem Induktionsmotor



Als aktive Elemente der Maschine werden die Elektromotoren modelliert, unter Berücksichtigung der tatsächlichen Trägheit der drehenden Teile und mit Einsatz der tatsächlichen konstruktiven Kurven (Drehmoment und Geschwindigkeit) moderner Induktionsmotoren.

Anderenfalls bestünde durch den Einsatz idealer Motoren (sehr einfach und leicht in RecurDyn®) das Risiko eine ungenaue Antwort zu erhalten.

In der Tat, würde ein derartiger Ansatz unrealistische Drehmomentspitzen in den simulierten Signalen schaffen - Motoren mit unbegrenztem Drehmoment existieren nicht.

Abb. 5 zeigt ein Beispiel der Gesetze über die Motoren.

Dynamische Simulation und Ergebnisse

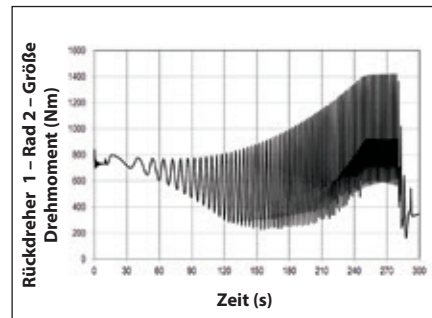
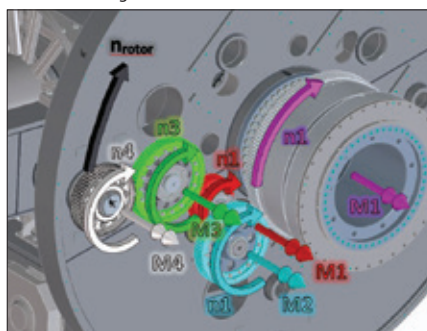
Eine Menge dynamische Simulationen werden durchgeführt, über 60 Fälle werden analysiert, basierend auf die möglichen unterschiedlichen vorläufig festgelegten Lastfälle.

Jede dynamische Simulation besteht aus drei Phasen: Beschleunigung (von 0 zur Höchstgeschwindigkeit), ein stationärer Zustand bei der Höchstgeschwindigkeit und die Notbremsung (Verzögerung von der Höchstgeschwindigkeit bis zu Null in wenigen Sekunden).

Durch der gesammelten großen Datenmenge können alle Informationen bestimmt werden, die für die Konstruktion erforderlich sind; insbesondere die für die Motoren geforderte Höchstleistung sowie der maximale Drehmoment und die Höchstgeschwindigkeit je Element.

Diese Daten sind von fundamentaler Bedeutung bei der richtigen Wahl der Motoren und für einen geeigneten strukturellen Entwurf der Teile (Rotor, Wiege, Verbindungen usw.).

▼ **Abb. 6:** Geschwindigkeit und Drehmoment bei jeder Rückschlagwelle



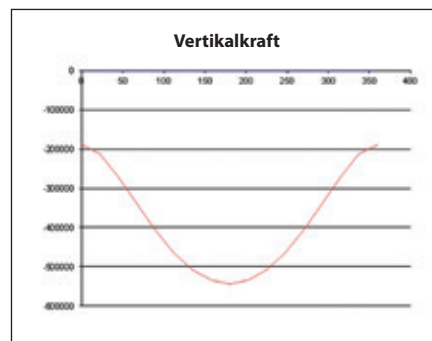
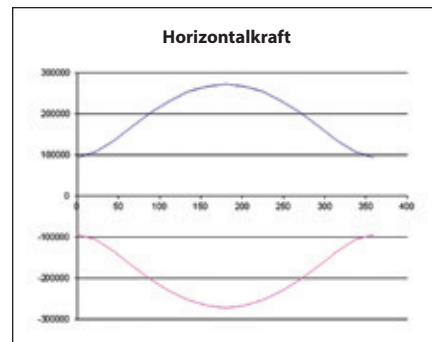
▲ **Abb. 7:** Drehmomentkurve an einem Getriebe

Abb. 6 zeigt die Ergebnisse in Hinblick auf Drehgeschwindigkeit und Drehmoment an jedem Teil der Übertragungskette.

Abb. 7 zeigt die Größe eines typischen Drehmoments an einem Getriebe. Die in der Kurve klar ersichtlichen Spitzenergebnisse ergeben sich aus der Unwucht der Spulen.

Dynamische Ergebnisse als strukturelle Dateneingaben

Wie zuvor erläutert, sind die erzielten Ergebnisse aus der dynamischen Simulation, die Dateneingaben der strukturellen Simulation.

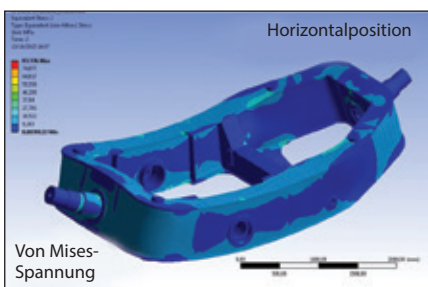
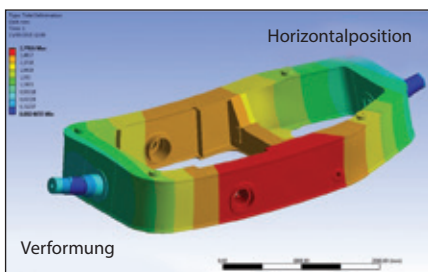
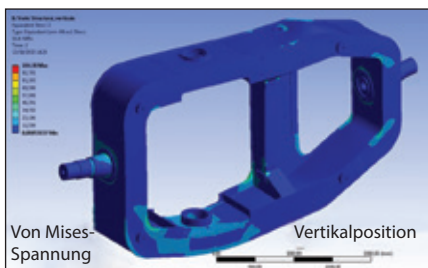
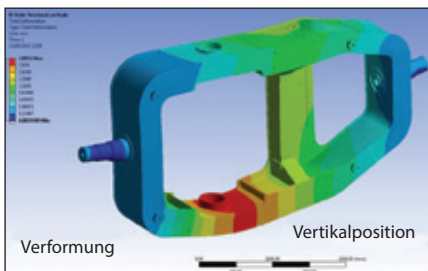


▲ **Abb. 8:** Belastung bei Spulenträger

Mit Einsatz der CAE strukturellen Software ANSYS Workbench®, die direkt mit RecurDyn® vernetzt ist, führt MFL die Simulation des mechanischen Verhaltens der wichtigen Teile der Korbverseilmaschine mit Rückdrehung durch.

Die Zielsetzung liegt darin zu prüfen, dass alle Teile die Festigkeits- sowie die Verformbarkeitsspezifikationen erfüllen.

In einer Korbverseilmachine mit Rückdrehung sind alle Teile unter Ermüdungsbelastung (Abb. 8 zeigt die Last am Hauptrahmen einer Wiege während der Drehung um dessen Achse), somit setzen die Ingenieure spezielle Methoden für die Überprüfung geschweißter Konstruktionen unter Ermüdungsbelastung als Methoden nach Hot-Spot, nach Radaj usw. ein.



▲ **Abb. 9:** Wiege entsprechende Verformung und Von Mises-Spannung

Abb. 9 zeigt die Verformung und die gleichwertige Von Mises-Spannung in einer Wiege in zwei Positionen.

Schließlich wurde eine Prüfung der Eigenfrequenzen aller Maschinenteile durchgeführt, um jedes Resonanzrisiko zu vermeiden.

Schlussfolgerung

Dank der Fachkenntnis von EnginSoft im Bereich der dynamischen Simulation wurde es ermöglicht, eine präzise Simulation der riesigen Korbverseilmachine mit Rückdrehung in kürzester Zeit darzustellen.

Die Ergebnisse dieser Simulationen unterstützen die mechanischen Designer bei der Bemessung der Maschine von Mario Frigerio. Bei dieser großen Maschine ist kein Fehler akzeptabel.

Die Virtualisierung ermöglicht Zeiteinsparungen im Entwicklungsverfahren und ist eine Alternative zum klassischen Ansatz, insbesondere wenn historische Daten, aus ähnlichen Applikationen, nicht zur Verfügung stehen.

Mit dieser Zusammenarbeit zwischen den beiden Unternehmen konnte der Entwurf dieses anspruchsvollen Projekts optimiert sowie das hohe Qualitäts- und Leistungsniveau der Produkte von Mario Frigerio erhalten werden. ■

Dieser Artikel enthält Verweise auf nachfolgende Produkte, dessen Warenzeichen bzw. eingetragene Warenzeichen die jeweiligen Inhaber sind: ANSYS Workbench; RecurDyn.

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Европейская стартовая площадка для DIWire

Pensa Labs использовали проволоку в 2016 году в Дюссельдорфе, Германии, в качестве европейской стартовой площадки для оборудования гибки проводов ЧПУ для изготовления рабочих панелей и быстрого макетирования. Разработанная Pensa, промышленной компанией по проектированию в Нью-Йорке, США DIWire весит всего 10 кг.

«Мы очень рады, созданию совершенно новой формы изготовления рабочих панелей. Это открывает целый мир новых возможностей, особенно при объединении технологии DI проволоки с другими рабочими панелями», - сказал Марко Перри, партнер в Pensa.

«Потенциал неограничен: модели архитектуры, дизайн прототипы, хирургические имплантаты, ортодонтия, аэрокосмическая промышленность, освещение, декорации, антенны, ювелирные изделия, куклы, робототехника, мелкосерийное производство, вывески, искусство, мебель, малые корабли, и многое другое».

В то время как 3D-принтеры могут иметь объемы производства и лазерные резакки могут разрезать 2D плоскости,



▲ DIWire от Pensa Labs

преобразование линий в изогнутые стержни, проволоки, или трубчатые формы быстро, точно и непрерывно не представлялось возможным - до сих пор. DIWire позволяет гнуть различные материалы - в том числе стали, алюминий и латунь, предоставляя местный, мелкосерийный, заказной, прототип и точно в срок изготовления. Переносная, доступная и приемлемая по цене, DI проволока заполняет зазор между рыночной трудоемкой стороной изгиба и дорогим крупномасштабным массовым производством гибки проволоки с ЧПУ.

«При разработке DIWire, мы сосредоточились на создании бесперебойного пользовательский опыт, из интерфейса программного обеспечения и дизайна машины, аксессуаров, которые помогают с сборкой. Наше программное обеспечение не требует специальных навыков; необходимо просто перетащить и вставить ваш файл и нажать изгиб», - сказал Марк Проммель, партнер Pensa.

«Пользователи могут просто рисовать в 2D, не требуется никаких навыков программирования или САПР навыков».

Помимо обрабатывающей промышленности, DIWire трансформирует STEM / STEAM образование, получая положительный отклик в университетах и школах в Соединенных Штатах и Канаде. «Мы хотим стимулировать творчество у учащихся, молодых и старых. В считанные минуты, вы можете быстро перейти от линий на экране до физических частей», - говорит Кэти Ларчиан, партнер Pensa. «Это так просто и быстро использовать».

Pensa Labs – США
Вебсайт: www.pensalabs.com

Укрепляя позиции на североамериканском рынке

MFL Группа объединила свои сети продаж и обслуживания в Северной Америке. MFL значительно увеличила линейку продуктов своего подразделения цветных металлов, которое специализируется на волочении проволоки, скрутке и экструзионном оборудовании. В дополнение к марке Frigeco, приобретение CM Caballé SA позволило группе включить давних партнеров, брендами которых являются OM Lesmo, Caballé и Eurodraw Energy.

Frigeco USA занимались услугами технических систем маркетинга (TMS), находящаяся в Granby, штат Коннектикут, и AITMAC Inc, находящаяся в Онтарио, Канада. TMS будет заниматься конкретными задачами, такими как технические продажи, услуги и запасные части в качестве представителя североамериканского рынка.

AITMAC Inc будет служить в качестве дистрибьютора запасных частей для клиентов с существующей продукцией OM Lesmo и Eurodraw Energy. В дополнение к координации деятельности представителей продаж, Frigeco USA также будет работать непосредственно с основными счетами и транснациональными компаниями, которые традиционно были клиентами MFL.

«Наша цель состоит в том, чтобы интегрировать вращающееся оборудование OM Lesmo and Caballé, а также линии волочения проволоки Eurodraw Energy в портфель продуктов, которые мы в настоящее время предлагаем в Северной Америке», - сказал Энтони Дероза, генеральный директор.

«Frigeco USA и его представители будут предоставлять клиентам решения с добавленной стоимостью во всех трех сегментах производственной цепочки; волочения проволоки, кабелей и экструзии. Наша цель состоит в том, чтобы предоставить все возможное для удовлетворения ваших потребностей бизнеса, чтобы обеспечить максимальную эффективность и прибыльность. «Мы рады тому, что технические системы маркетинга и AITMAC на борту нашей коммерческой организации. Их обширный опыт в проводных и кабельных рынках будет способствовать повышению продаж и качества обслуживания, а также укреплению нашей позиции на рынке Северной Америки».

Frigeco USA Inc – США
Вебсайт: www.mflgroup.com

Эффективные, высокоточные лазерные датчики ODAC 14XY

Благодаря компактной конструкции, ODAC® 14XY измерительные головки из Zumbach можно использовать практически в каждом производственном процессе: в производстве проводов и кабелей, пластмасс и резиновой промышленности, а также стальной и металлообрабатывающей промышленности. Технологическая база рассматривается для этих измерительных головок всегда по последнему слову техники, с лазерных диодов в качестве источников света в сочетании с интеллектуальными и мощными процессорами измеренных значений, которые облегчают простую и гибкую интеграцию.



▲ Измерительная головка ODAC 14XY с опциональным местным дисплеем LOC 01

Многолетний опыт Zumbach как первопроходца в оперативной измерительной технике, в сочетании с высокими производственными показателями приводит к получению продукта с отличным соотношением цены и качества. Среди выдающихся особенностей одиночные калибровки сканирования (CSS), с единой системой мониторинга сканирования и высокой выходной скоростью передачи данных до 125 пакетов данных в секунду. Измерительные головки могут быть использованы со всеми скоростями линии. Вибрации в процессе производства не оказывают заметного

влияния на результаты измерений. Это особенно подходит для тонких и тончайших проводов, эмалированных проводов, кабелей, стальных тросов, волокон, медицинских трубок, экструдированного пластика или резины.

Модели ODAC 14XY доступны для двух диапазонов измерения:

- Версия Micro от $\varnothing 0,015$ до 3 мм (0,0006 до 0,12 дюймов). Благодаря использованию специального лазера, эти версии могут измерить минимальный диаметр в диапазоне микрометров

- Стандартная версия диаметром от 0,06 до 16 мм (0,0024 до 0,64 дюймов)

Все измерительные головки ODAC серии имеют адаптивную обработку сигнала (патент DE3111356), что делает последующие регулярные повторные калибровки излишними.

Только в случаях смены компонента или соответствия правилам калибровки ISO 9000/9001 и т.д. потребуется повторная калибровка.

Все соответствующие параметры точности постоянно контролируются измерительной системой и автоматически компенсируются. Это справедливо, в частности, для возможных долгосрочных изменений поведения двигателя сканера или измерительной электроники.

Гибкая интеграция связи:

- Последовательный порт RS-232 / -422 / -485
- Ethernet TCP / IP
- Profibus DP
- PROFINET IO V2.3
- J / J-M (цифровой, для подключения к процессорам Zumbach USYS)

Zumbach Electronic – Швейцария
Вебсайт: www.zumbach.com

Прокладка кабелей в тропических лесах Амазонии

Connected Amazonia - программа Бразилии будет включать в подводные волоконно-оптические кабели Nexans. Проект нацелен на предоставление доступа в Интернет для четырех миллионов человек в тропических лесах Амазонки.

Проект включает 7 700 км кабелей для подключения 52 муниципальных районов через пять отдельных кабельных трасс на и под руслами в бассейне Амазонки. Для Connected Amazonia - программы Бразилии, одного из крупнейших проектов подводного волокна в мире, будет проложено 275 км кабелей Nexans в русел между Коари и Тефе. Вся сеть будет состоять из пяти магистралей данных: верхнее течение реки Negro, Верхняя Солимоинс, Мадейра, Пурус и Журуа.

Для этого проекта Nexans рекомендуется использовать кабели высокой производительности, которые оказывают минимальное воздействие на окружающую среду. Это позволяет проекту обслуживать потребности местных общин при сохранении хрупкой экосистемы тропических лесов Амазонки. Nexans поставяет кабели, которые не будут выделять вредные вещества в деликатную экосистему реки и не оказывает негативного влияния на окружающую среду.

Волоконно-оптические кабели из семейства URC-1 кабелей отвечают всем международным стандартам для подводных кабелей. Для того, чтобы справиться с сильным течением в реке, которое наблюдается в течение года, баржа с плоским дном будет использоваться в качестве кабельной укладки судна. Для обеспечения дополнительной безопасности, пять вспомогательных судов будут сопровождать баржу-кабелеукладчик. В будущем местные команды со специализированными инструментами могут проводить техобслуживание кабелей.

Программа Connected Amazonia стремится предоставить интернет-соединение высокого качества в штате Амазонас, а не только для подключения жителей к Интернету, но и для телемедицины, дистанционного обучения и большей взаимосвязи между службами охраны здоровья, безопасности и дорожного движения. Программа нацелена сделать это при минимизации воздействия на окружающую среду от установки.

Nexans – Франция
Вебсайт: www.nexans.com

Анализ расчета большой крутильной планетарной машины при использовании инструментов CAE

Джордио Пировано, MFL Group, Фабиано Маргио, EnginSoft SpA

Введение

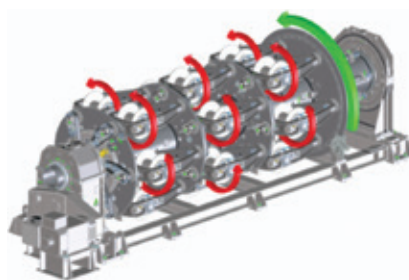
Дизайн стоящей и закрывающейся крутильной машины планетарного типа с откруткой - это не простой проект из-за «планетарного» вращения частей: это предусматривает динамические эффекты, которые трудно рассчитать; в частности, при максимальной производительности в связи с большой массой катушки, конфигурациями нагрузки и скоростью вращения.

Во избежание любого возможного риска и для получения наиболее точных исходных данных для расчета MFL привлекает компанию EnginSoft и ее возможности моделирования в качестве надежного партнера в данном проекте. Для данного конкретного проекта EnginSoft отвечает за выполнение всей динамической оценки планетарной машины.

С целью получения надежных и точных результатов необходимо использовать мощное и универсальное многомодульное программное обеспечение RecurDyn®. С другой стороны, MFL необходимо завершить дизайн всех частей для соответствия структурным требованиям в части прочности и срока службы.

Методы и определение проблемы

Данная огромная планетарная машина будет использоваться для производства



▲ Рисунок 1: Вращения на планетарной крутильной машине

кабеля с различными диаметрами и комбинациями кручения, таким образом, катушки, загружаемые на машину, могут быть различного размера и находиться в различных положениях на основном роторе. Кроме того, катушки, естественно, неустойчивы в связи с ошибками наматывания. Это приводит к различным неблагоприятным сценариям загрузки, которые необходимо проанализировать. Целью является определение худшего случая в части необходимой энергии, требуемой для двигателей и нагрузки на части.

Инженеры компании EnginSoft отвечают за обнаружение самых плохих условий посредством динамического моделирования. Данный подход начинается с одной клетки, анализ определяет самую плохую конфигурацию. После этого вместе с MFL определяются сценарии с предельной нагрузкой.

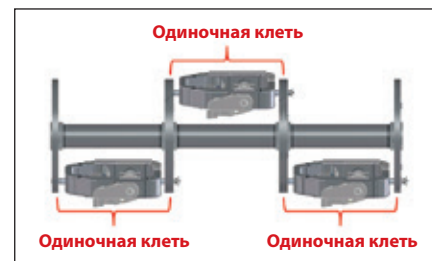
Следующим этапом динамического моделирования являются различные сценарии нагрузки при применении ранее определенного условия самой худшей клетки. В конце возможно

получить самые худшие рабочие условия всей машины.

Иными словами, данная деятельность является научным и точным применением моделирования опыта.

Модель динамики твердого тела

Выполняется анализ динамики твердого тела; внутренние нагрузки и крутящие моменты мощности двигателя в основном зависят от ускорения и инерции вращающихся частей, поэтому нет необходимости включать гибкости в



▲ Рисунок 2: Одиночная клетка на планетарной машине



▲ Рисунок 3: Метод и подход моделирования опыта

модель (что значительно увеличило бы вычислительные затраты).

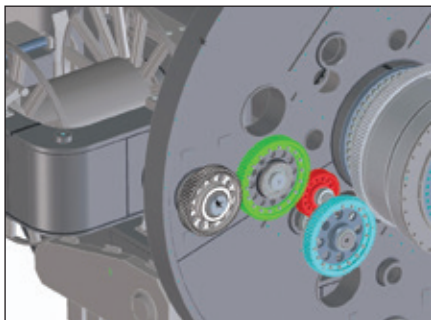
Начиная от 3D геометрических построений в САПР MFL, динамическая модель определяется в среде RecurDyn®. Результатом является точная модель с более чем 100 корпусами.

Большинство инертных характеристик получают автоматически из САПР, но параметры некоторых корпусов находятся внутри многомодульного программного обеспечения.

Очевидно, что связь между различными корпусами отлично моделирует реальную кинематическую связь (привод, валы и т.д.) для получения модели, которая будет наиболее близка к реальной машине в части степеней подвижности.

Элементы привода - это особые характеристики библиотеки RecurDyn®, рассчитанные для моделирования как кинематики (коэффициент передачи), так и динамики (обратная нагрузка), возникающих в любой зубчатой муфте. На рисунке 4 показаны приводы системы открутки.

Можно легко увидеть, что «характеристики привода» RecurDyn® часто использовались из-за соответствия приводной цепи.



▲ Рисунок 4: Планетарная открутка

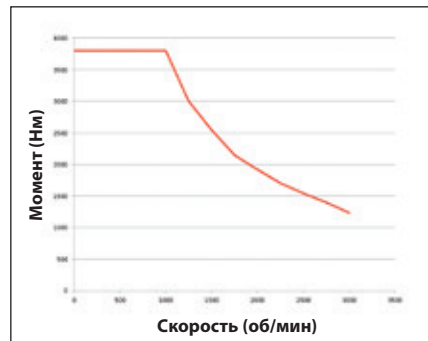
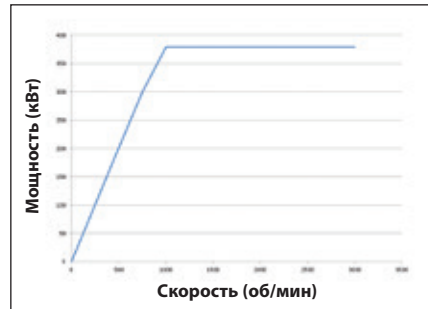
При каждом моделировании все нагрузки автоматически комбинируются вместе вдоль приводной цепи, что приводит к точному расчету необходимой мощности на всех валах двигателя.

Как и активные части машины, электродвигатели моделируются с учетом фактической инерции вращающихся частей и при использовании конструктивных кривых (момент и скорость) современных индукционных двигателей.

В противном случае при использовании идеальных двигателей (что очень легко и просто в RecurDyn®) был бы риск получения неточного ответа. Фактически, подход привел бы к получению

нереалистичных самых высоких значений момента в моделируемых сигналах; двигатели с неограниченным моментом просто не существуют.

На рисунке 5 показаны правила двигателя.



▲ Рисунок 5: Мощность индукционного двигателя и кривые момента

Динамическое моделирование и результаты

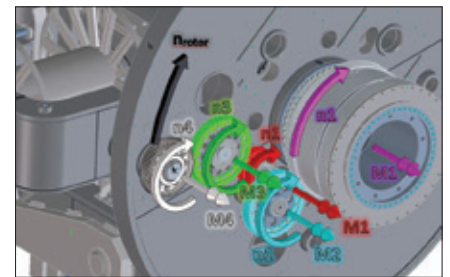
Проводится много динамических моделирований, более 60 случаев анализируются, на основе возможной нагрузки, предварительно определяются случаи.

Каждая динамическая ситуация состоит из трех этапов: ускорение (от 0 до максимальной скорости), условие стабильного состояния на максимальной скорости и аварийное торможение (замедление от максимальной скорости до нуля за несколько секунд).

Из большого объема собранных данных возможно определить всю необходимую для дизайна информацию; в частности, требуемую максимальную мощность всех двигателей и максимальный момент, а также скорость каждой части.

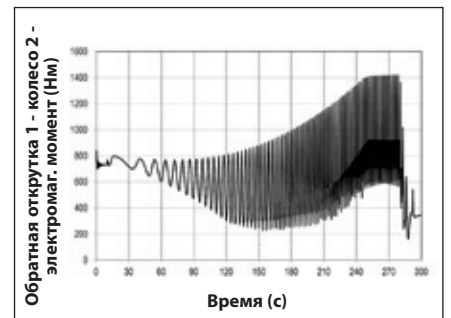
Эти данные являются фундаментальными для правильного выбора двигателей и для хорошего расчета конструкции частей (ротор, каркас, соединения и т.д.)

На рисунке 6 показаны результаты в части скорости вращения и момента каждой части приводной цепи.



▲ Рисунок 6: Скорость и момент на каждом валу открутки

На рисунке 7 показан стандартный выходной момент на приводе. Максимальные значения, четко видимые на кривой, являются результатом неустойчивости катушек.



▲ Рисунок 7: Кривая момента на приводе

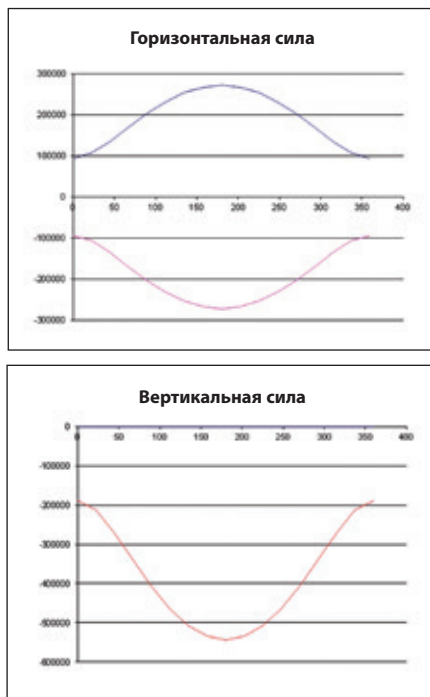
Динамические результаты как исходные данные для конструкции

Как пояснялось ранее, результаты, получаемые при динамическом моделировании, являются исходными данными структурного моделирования.

При использовании структурного программного обеспечения CAE ANSYS Workbench®, которое непосредственно связано с RecurDyn®, MFL осуществляет моделирование механического поведения самых важных частей планетарной машины.

Целью является проверка соответствия всех частей техническим требованиям прочности и деформации.

На планетарной машине все части подвержены усталости (на рисунке 8 показана нагрузка на основную раму каркаса при вращении вокруг своей оси); поэтому инженеры используют особые методы для проверки сваренных



▲ Рисунок 8: Нагрузка на каркасы

конструкций, подверженных усталости, такие как места наивысшей активности, методы Radaj и т.д.

Рисунок 9 показана деформация и эквивалент напряжения по Мизесу на каркасе в двух позициях.

В результате, была проведена проверка собственных частот всех частей машины во избежание любого риска резонанса.

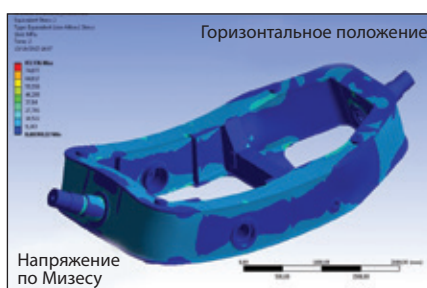
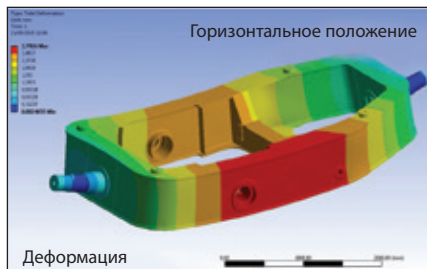
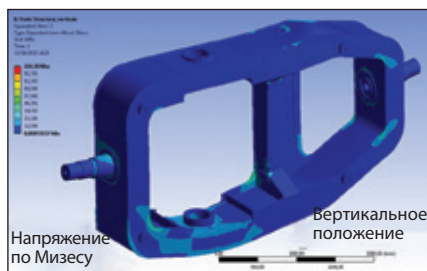
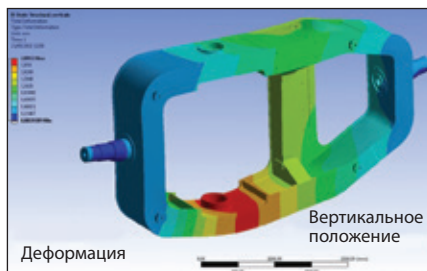
Заключение

Благодаря опыту EnginSoft в динамическом моделировании стало возможным достигать точного моделирования громадной планетарной крутильной машины за короткое время.

Результаты данных моделирований помогают инженерам-механикам Mario Frigerio при расчете габаритов машины. В машине такого большого размера ошибки неприемлемы.

Виртуализация позволяет сэкономить время на процессе разработки и является альтернативой классическому подходу, в частности, когда исторические данные от схожих применений, недоступны.

Данное сотрудничество компаний сделало возможным оптимизацию расчета данного сложного проекта и сохранение высокого качества и производительности продукции Mario Frigerio. ■



▲ Рисунок 9: Эквивалент деформации каркаса и напряжения по Мизесу

В данной статье содержатся ссылки на следующую продукцию, являющуюся торговыми марками или зарегистрированными торговыми марками соответствующих владельцев: ANSYS Workbench; RecurDyn.

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Plate-forme de lancement européenne pour DIWire

PENSA Labs a utilisé wire 2016 à Düsseldorf, en Allemagne, en tant que plate-forme de lancement européenne pour la plus petite plieuse de fil CNC pour la fabrication assistée par ordinateur et le prototypage rapide. Développé par Pensa, une firme américaine de design industriel, basée à New York, le DIWire pèse seulement 10kg.

“Nous sommes enthousiastes de la création d’une forme entièrement nouvelle de fabrication assistée par ordinateur. Cela ouvre un monde de nouvelles possibilités, en particulier lorsque l’on associe la technologie de DIWire avec d’autres machines de fabrication assistée par ordinateur”, a déclaré Marco Perry, associé chez Pensa.

“Le potentiel est illimité: modèles d’architecture, prototypes de conception, implants chirurgicaux, orthodontie, applications aérospatiales, éclairage, scénographies, antennes, bijoux, théâtre des marionnettes, robotique, production de courtes séries, signalisation, art, meubles, petits métiers, et plus encore.”

Alors que les imprimantes 3D peuvent produire des volumes de production et



▲ Le DIWire de Pensa Labs

les machines de coupe à laser peuvent trancher des plans 2D, la transformation de lignes en barres pliées, en fils ou en formes tubulaires rapidement, précisément, et de façon continue n’était pas possible – du moins jusqu’à ce jour. Le DIWire plie une variété de matériaux, y compris l’acier, l’aluminium et le laiton, tout en permettant une production locale, de courtes séries, personnalisée, de prototypes et de fabrication juste-à-temps. Transportable, accessible et abordable, le DIWire comble l’écart du

marché entre le pliage manuel exigeant beaucoup de temps et le coûteux pliage de fil CNC à grande échelle de la production de masse.

“En développant le DIWire, nous nous sommes concentrés sur la création d’une expérience utilisateur transparente, à partir de l’interface du logiciel et de la conception des machines jusqu’aux accessoires pour l’assemblage. Notre logiciel n’exige pas de compétences spécialisées; il suffit de glisser-déposer votre fichier et appuyez sur pliage”, a déclaré Mark Prommel, associé chez Pensa.

“Les utilisateurs peuvent dessiner aisément en 2D, sans exiger de programmation ou de compétences CAO.”

Au-delà de la fabrication, le DIWire est en train de transformer l’éducation STEM/STEAM, et de recevoir une réponse extrêmement positive dans les universités et dans les écoles aux États-Unis et au Canada.

Pensa Labs – États-Unis
Website: www.pensalabs.com

Le marché nord-américain se renforce

MFL Group a consolidé son réseau de ventes et de services en Amérique du Nord:

MFL a considérablement étendu le portefeuille de produits de sa division de produits non-ferreux, spécialisée dans les équipements de tréfilage, toronnage et extrusion de fil. En plus de la marque Frigeco, l’acquisition de CM Caballé SA a permis au groupe d’intégrer les marques de longue date OM Lesmo, Caballé et Eurodraw Energy.

La filiale américaine Frigeco a retenu les services de Marketing Technical Systems (TMS), basée à Granby, en Connecticut, et de la société canadienne AITMAC Inc basée en Ontario. TMS va gérer des clients spécifiques en tant que représentant technico-commercial, de l’assistance et des pièces de rechange pour le marché nord-américain.

AITMAC Inc fera office de distributeur de pièces de rechange pour les clients possédant les produits OM Lesmo et Eurodraw Energy existants déjà. En plus de coordonner l’activité de vente des représentants, Frigeco USA travaillera directement avec les clients clés et les multinationales qui ont traditionnellement été les clients de MFL.

“Notre objectif est d’intégrer les équipements rotatifs de OM Lesmo et de Caballé, ainsi que les lignes de tréfilage de Eurodraw Energy dans le portefeuille de produits que nous offrons actuellement en Amérique du Nord,” a déclaré Anthony DeRosa, directeur général.

“Frigeco USA et ses représentants fourniront aux clients des solutions à valeur ajoutée dans tous les trois segments de la chaîne de production: tréfilage, câblage et extrusion. Notre objectif principal consiste à répondre à vos exigences commerciales afin d’assurer l’efficacité et la rentabilité maximales.

“Nous sommes heureux d’accueillir Technical Marketing Systems et AITMAC au sein de notre organisation commerciale.

“Leur vaste expérience sur les marchés des fils et des câbles étendra notre présence d’un point de vue commercial et en matière d’assistance et renforcera notre engagement envers le marché nord-américain.”

Frigeco USA Inc – États-Unis
Website: www.mflgroup.com

Jauges laser ODAC 14XY efficaces et hautement précises

Grâce à la conception compacte, les têtes de mesure ODAC® 14XY de Zumbach peuvent être utilisées dans pratiquement tous les processus de fabrication dans l'industrie des fils et des câbles, de plastiques et de l'industrie du caoutchouc, ainsi que dans l'industrie de l'acier et du métal.

La base technologique envisagée pour ces têtes de mesure est toujours de la toute dernière technologie, avec des diodes laser comme sources de lumière combinées avec des processeurs à valeur mesurée intelligents et puissants facilitant une intégration simple et flexible.

L'expérience de longue date de Zumbach en tant que pionnier de la technologie de mesure en ligne, associée à des données très positives en matière de production, aboutit à un produit offrant un excellent rapport qualité-prix.

Parmi les caractéristiques remarquables figurent la technologie CSS (Calibrated Single Scan), avec un seul contrôle de balayage et un rendement à haut débit de données allant jusqu'à 125 paquets de données par seconde. Les têtes de mesure peuvent être utilisées avec toutes les vitesses de ligne. Les vibrations lors de la production n'ont aucune influence remarquable sur les mesures.



▲ Tête de mesure ODAC 14XY avec écran d'affichage local LOC 01 en option

Ceci convient particulièrement aux fils fins et extra fins, aux fils émaillés, aux câbles, aux câbles d'acier, aux fibres, aux tubes médicaux, aux produits en plastique extrudée ou en caoutchouc.

Les modèles ODAC 14XY sont disponibles pour deux plages de mesure:

- Version Micro d'un diamètre de 0,015 jusqu'à 3mm (de 0,0006 à 0,12"). Grâce à l'utilisation d'un laser spécial, ces versions peuvent mesurer les diamètres les plus petits de l'ordre du micromètre
- Version standard d'un diamètre

de 0,06 jusqu'à 16mm (de 0,0024 à 0,64")

Toutes les têtes de mesure de la série ODAC sont pourvues d'un traitement adaptatif du signal (brevet DE3111356), ce qui rend superflus les réétalonnages réguliers supplémentaires.

Le réétalonnage ne serait nécessaire qu'en cas d'échange des composants ou de conformité avec la réglementation concernant l'étalonnage ISO 9000/9001 etc.

Les paramètres concernant la précision sont constamment surveillés par le système de mesure et automatiquement compensés.

Ceci s'applique en particulier aux changements à long terme éventuels du comportement du moteur du balayeur ou de l'électronique de mesure.

Intégration flexible de la communication:

- Série RS-232 /-422 /-485
- Ethernet TCP/IP
- Profibus DP
- Profinet IO V2.3
- J/J-M (numérique, pour la connexion aux processeurs Zumbach USYS)

Zumbach Electronic – Suisse
Website: www.zumbach.com

Déploiement de câbles dans la forêt amazonienne

Nexans fournira des câbles sous-marins à fibre optique au sein du programme brésilien "Amazônia Conectada". Ce projet, qui vise à connecter 4 millions d'habitants de la forêt amazonienne à Internet, porte sur 7 700km de câbles qui relieront 52 agglomérations par cinq grandes voies situées sur et sous des lits de fleuves de l'Amazonie.

Dans le cadre dudit projet, qui est l'un des principaux projets de fibres optiques sous-marines au monde, Nexans installera 275km de câbles dans des lits de rivière entre Coari et Tefé. L'ensemble du réseau comptera 5 autoroutes de données: haut bassin du Rio Negro, haut bassin du Rio Solimões, Rio Madeira, Rio Purus et Rio Juruá.

Pour ce projet, Nexans a recommandé d'utiliser des câbles haute performance à l'impact environnemental minimal. Ainsi le projet répondra-t-il aux besoins des communautés locales tout en préservant l'écosystème de la forêt amazonienne.

Le groupe déploiera en effet des câbles qui ne diffuseront aucune

substance nocive dans cet écosystème fluvial fragile et, par conséquent, n'auront pas d'impact négatif sur l'environnement. Les câbles à fibres optiques de la génération URC-1 sont conformes aux normes internationales concernant les câbles sous-marins.

Pour résister à la force des courants lors de la pose, une barge à fond plat fera office de navire câblé. Pour renforcer la sécurité, cinq navires interviendront en renfort. Par la suite, des équipes locales équipées d'outils spécialisés se chargeront de l'entretien des câbles.

Le programme brésilien "Amazônia Conectada" a pour objectif d'offrir une connexion Internet de haute qualité à l'état d'Amazonas, non seulement pour relier ses habitants au réseau mondial, mais aussi pour faciliter la télémédecine et le téléenseignement ou pour améliorer l'interconnexion entre les services de santé, de sécurité et des transports. Telle est la mission du programme, et ce, avec un impact minimal sur l'environnement lors de l'installation.

Nexans – France
Website: www.nexans.com

Analyse de conception d'une toronneuse planétaire de grandes dimensions au moyen d'outils IAO

Par Giorgio Pirovano, MFL Group, et Fabiano Maggio, EnginSoft SpA

Introduction

La conception d'une toronneuse planétaire équipée d'un dispositif à détorsion n'est pas un projet simple, en raison de la rotation «planétaire» des parties qui introduit des effets dynamiques qui sont difficiles à estimer, en particulier si la performance est extrême à cause de la grande masse de la bobine, des configurations de charge et de la vitesse de rotation.

Afin d'éviter tout risque éventuel et pour obtenir les données de conception les plus précises, MFL a engagé EnginSoft comme partenaire fiable dans ce projet pour ses compétences en matière de simulation.

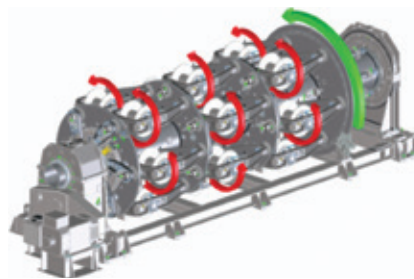
Pour ce projet spécifique, l'évaluation dynamique générale de la toronneuse planétaire a été confiée à EnginSoft.

Afin d'obtenir des résultats fiables et précis, il est nécessaire d'utiliser un logiciel multicorps puissant et versatile: RecurDyn®.

D'autre part, MFL doit compléter la conception de la totalité des parties, afin de répondre à l'exigence structurelle en termes de résistance et de longévité.

Méthodes et définition des problèmes

Cette toronneuse planétaire colossale sera utilisée pour produire des câbles avec des diamètres et des combinaisons de torons différents, de sorte que les bobines chargées sur la machine puissent avoir des dimensions et des positions différentes sur le rotor principal. En outre, les bobines sont naturellement déséquilibrées en raison d'erreurs d'enroulement, ce qui entraîne des scénarios différents quant à



▲ Figure 1: Rotations sur une toronneuse planétaire

la charge à analyser. L'objectif consiste à identifier le cas le plus extrême en termes de puissance nécessaire pour les moteurs et le stress sur les parties.

Les ingénieurs d'EnginSoft sont chargés d'identifier les pires conditions possibles grâce à la simulation dynamique. L'approche commence par une seule cage; une analyse définit la pire configuration. Ensuite, avec MFL, ils définissent les scénarios de charge finie.

L'étape suivante est la simulation dynamique de différents scénarios de charge en appliquant la pire condition de cage précédemment définie. À la fin, il est possible d'obtenir les pires conditions de travail de l'ensemble de la machine.

En d'autres termes, cette activité est l'application scientifique et précise de la planification expérimentale (DOE).

Modèle de dynamique des corps rigides

Une analyse dynamique des corps rigides est réalisée; les charges internes et la puissance/le couple des moteurs dépendent principalement de l'accélération et des inerties des parties en mouvement; par conséquent il n'est pas nécessaire d'introduire la flexibilité

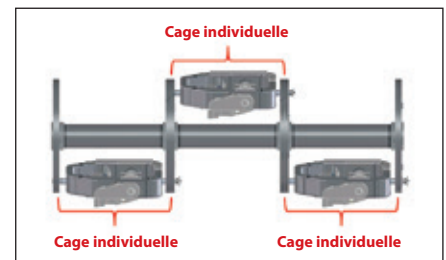
dans le modèle (ce qui augmenterait de manière significative l'effort de calcul). Le modèle dynamique est défini dans l'environnement RecurDyn® à partir de la géométrie CAO 3D de la machine de MFL. Le résultat est un modèle précis avec plus de 100 corps.

La plupart des propriétés d'inertie sont dérivées automatiquement du CAO, mais plusieurs corps sont paramétrés dans le logiciel multi-corps.

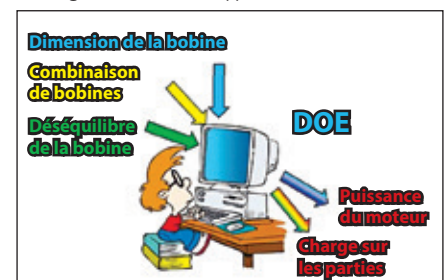
De toute évidence, la connexion entre les différents corps simule parfaitement la liaison cinématique réelle (engrenages, arbres, etc.) de manière à obtenir un modèle qui est le plus proche possible de la machine réelle en termes de degrés de liberté.

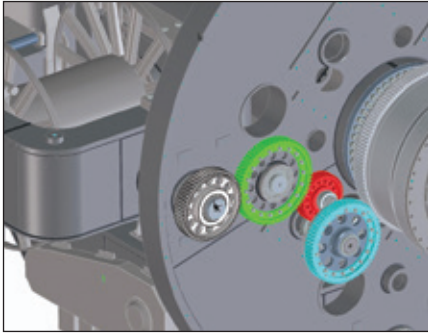
Les engrenages sont des composants spécifiques de la bibliothèque RecurDyn®, et ils sont conçus pour simuler la

▼ Figure 2: Cage individuelle de la toronneuse planétaire

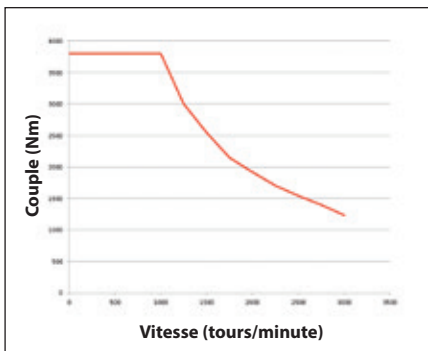
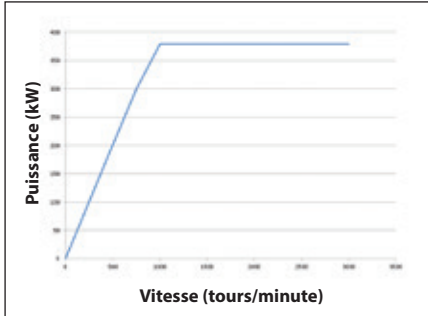


▼ Figure 3: Méthode et approche DOE





▲ **Figure 4:** Détorsion planétaire



▲ **Figure 5:** Courbes du couple et puissance dans un moteur à induction

cinématique (rapport de transmission) et la dynamique (charges réciproques) se produisant dans tout couple d'engrenages.

La *Figure 4* montre le système à détorsion des engrenages. On peut voir aisément que la «fonction engrenage» de RecurDyn® a été amplement utilisée en raison de la conformation de la chaîne de transmission.

Lorsqu'on effectue chaque simulation, les charges sont automatiquement combinées le long des chaînes de transmission, ce qui conduit à une estimation précise de la puissance requise pour la totalité des arbres moteur.

En tant que parties actives de la machine, les moteurs électriques sont modélisés en tenant compte de la réelle inertie des parties en rotation et en utilisant les courbes constructives réelles (couple et vitesse) de moteurs à induction modernes.

Autrement, en utilisant des moteurs idéaux (très facile et simple dans le cas de RecurDyn®) il y aurait le risque d'obtenir une réponse imprécise.

En fait, une telle approche pourrait générer des pics de couple irréalistes dans les signaux simulés; tout simplement il n'existe pas de moteurs à couple illimité.

La *Figure 5* montre un exemple des lois concernant les moteurs.

Simulation dynamique et résultats

Un grand nombre de simulations dynamiques sont gérées, plus de 60 cas sont analysés, sur la base des cas de charge possibles différents préalablement définis.

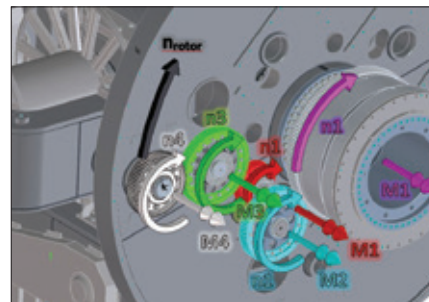
Chaque simulation dynamique consiste en trois phases: l'accélération (de 0 à la vitesse maximale), un état stable à la vitesse maximale et le freinage d'urgence (décélération de la vitesse maximale à zéro en quelques secondes).

Du grand volume de données recueillies, il est possible de définir toutes les informations nécessaires à la conception, en particulier, la puissance maximale nécessaire pour les moteurs et le couple maximal et la vitesse maximale sur chaque partie.

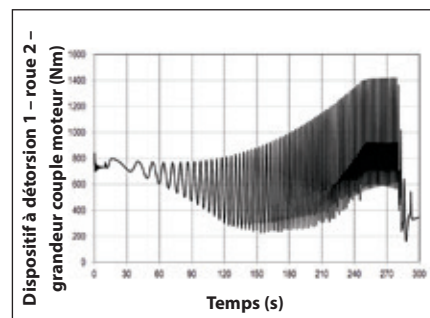
Ces données sont fondamentales pour le bon choix de moteurs et pour une bonne conception structurelle des parties (rotor, berceaux, joints, etc.).

La *Figure 6* montre les résultats en termes de vitesse de rotation et de couple de chaque partie de la chaîne de transmission.

▼ **Figure 6:** Vitesse et couple sur chaque arbre de détorsion



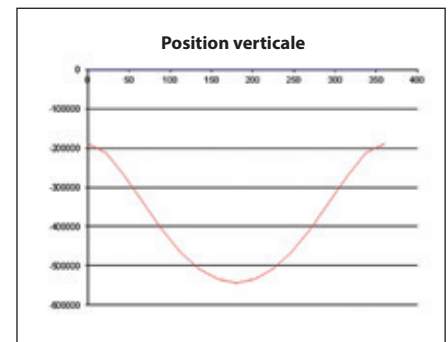
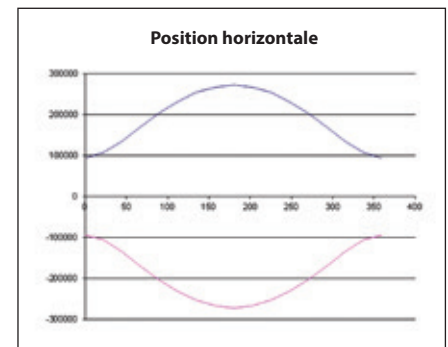
▼ **Figure 7:** Courbe de couple d'un engrenage



La *Figure 7* montre la puissance d'un couple moteur typique dans un engrenage. Les pics, clairement visibles dans la courbe, sont dus au déséquilibre des bobines.

Résultats dynamiques comme données structurelles

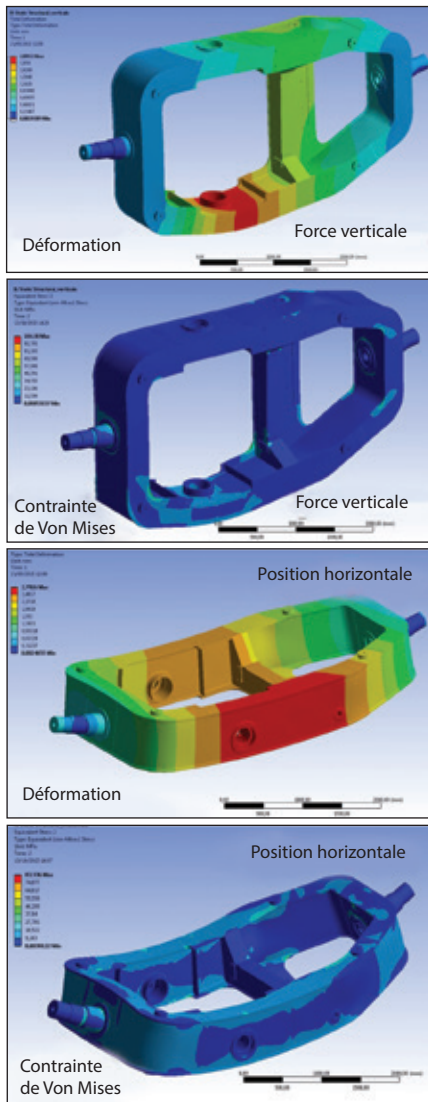
Comme expliqué précédemment, les résultats obtenus à partir de la simulation dynamique sont les données d'entrée de la simulation structurelle. En utilisant le logiciel de structure CAE ANSYS Workbench, qui est directement liée à RecurDyn®, MFL effectue la simulation du comportement mécanique des parties principales de la toronneuse planétaire.



▲ **Figure 8:** Charge sur les berceaux

Le but consiste à vérifier que la totalité des composants soient conformes aux spécifications de résistance et de déformabilité. Sur une toronneuse planétaire, toutes les parties sous chargement de fatigue (la *Figure 8* représente la charge sur le châssis principal d'un berceau au cours d'une rotation autour de son axe); il s'ensuit que les ingénieurs utilisent des méthodes spécifiques pour la vérification de la structure soudée sous fatigue telles que les méthodes "hot spot", Radaj, etc.

La *Figure 9* montre la déformation et la contrainte de Von Mises équivalente sur un berceau en deux positions. Enfin, un contrôle des fréquences Eigen de la totalité des parties de la machine a été effectué pour éviter tout risque de résonance.



▲ **Figure 9:** Déformation équivalente du berceau et contrainte de Von Mises

Conclusions

Grâce à l'expertise d'EnginSoft dans la simulation dynamique, il a été possible d'obtenir une simulation précise d'une tonneuse planétaire de dimensions énormes en peu de temps.

Les résultats de ces simulations supportent les concepteurs mécaniques de la société Mario Frigerio pour le dimensionnement de la machine.

Sur cette machine de grandes dimensions aucune erreur n'est acceptable.

La virtualisation permet d'économiser du temps dans le processus de développement et représente une alternative à l'approche classique, en particulier lorsque les données historiques, à partir d'applications similaires, ne sont pas disponibles.

Cette collaboration entre les deux entreprises a permis d'optimiser la

conception de ce projet ambitieux et de préserver le haut niveau de qualité et de performance des produits de Mario Frigerio. ■

Le présent article contient des références aux produits suivants, qui sont des marques de commerce ou des marques déposées de leurs propriétaires respectifs: ANSYS Workbench; RecurDyn.

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Piattaforma di lancio europea per DIWire

PENSA Labs ha utilizzato wire 2016 a Düsseldorf, in Germania, come piattaforma di lancio europea per la più piccola piegatrice di filo a controllo numerico computerizzato disponibile per la fabbricazione desktop (desktop manufacturing) e la rapida realizzazione di prototipi. Sviluppata dallo studio di design newyorkese Pensa, la DIWire pesa solo 10kg.

“Siamo entusiasti di creare una forma completamente nuova di fabbricazione desktop. Questo apre un mondo di nuove possibilità, soprattutto quando si combinano la tecnologia DIWire con altre macchine produttive desktop” ha dichiarato Marco Perry, partner di Pensa.

“Il potenziale è illimitato: modelli di architettura, prototipi di design, impianti chirurgici, ortodonzia, applicazioni aerospaziali, illuminazione, scenografie, antenne, gioielli, teatro delle marionette, robotica, produzione in piccoli lotti, segnaletica, arte, mobili, piccolo artigianato, e altro ancora.”

Nonostante le stampanti 3D possano realizzare modelli tridimensionali e le macchine di taglio laser possano tagliare piani bidimensionali, trasformare linee



▲ Il DIWire di Pensa Labs

in barre piegate, fili, o forme tubolari in modo rapido, preciso e continuo non era fino ad ora possibile. La DIWire può piegare vari tipi di materiali, tra cui l'acciaio, l'alluminio e l'ottone, consentendo una produzione locale, in piccoli lotti, su misura, di prototipi e just-in-time.

Trasportabile, accessibile e conveniente, la DIWire colma il gap di mercato fra la piegatura manuale che richiede tempo, e la costosa piegatura del filo CNC su vasta scala della produzione di massa.

“Nello sviluppare DIWire, ci siamo concentrati sulla creazione di un'esperienza fluida per l'utente, dall'interfaccia software e dalla progettazione della macchina, agli accessori per il montaggio. Il nostro software non richiede abilità speciali; è sufficiente utilizzare la funzione Drag & Drop e premere su piegatura”, ha dichiarato Mark Prommel, partner di Pensa.

“Gli utenti possono disegnare facilmente in 2D, senza che sia richiesta alcuna abilità nella programmazione o in CAD.”

Al di là della fabbricazione, la DIWire sta trasformando l'istruzione STEM/STEAM, ricevendo una risposta estremamente positiva nelle università e nelle scuole negli Stati Uniti e in Canada.

“Vogliamo incoraggiare la creatività negli studenti giovani e meno giovani. In pochi minuti, è possibile passare rapidamente da linee sullo schermo a componenti tangibili”, ha dichiarato Kathy Larchian, partner di Pensa. “È così semplice e veloce da utilizzare.”

Pensa Labs – Stati Uniti
Website: www.pensalabs.com

Il mercato nordamericano si rafforza

MFL Group ha consolidato la propria rete di vendite e servizi in Nord America:

Ha notevolmente aumentato il portafoglio di prodotti della divisione materiali non ferrosi, specializzata in equipaggiamenti per la trafilatura, la trefolatura e l'estrusione. Oltre al marchio Frigeco, l'acquisizione di CM Caballé SA ha consentito al gruppo di incorporare le marche di lunga data OM Lesmo, Caballé ed Eurodraw Energy.

La filiale americana di Frigeco è ricorsa ai servizi di Marketing Technical Systems (TMS) con sede a Granby in Connecticut, e di AITMAC Inc con sede in Ontario, Canada. TMS gestirà determinati clienti come rappresentante tecnico commerciale, dell'assistenza e delle parti di ricambio per il mercato nordamericano.

AITMAC Inc fungerà da distributore di parti di ricambio per i clienti che possiedono i prodotti OM Lesmo ed Eurodraw Energy esistenti.

Oltre a coordinare l'attività di vendita dei rappresentanti,

Frigeco USA lavorerà direttamente con i clienti chiave e le multinazionali che sono stati tradizionalmente clienti di MFL.

“Il nostro obiettivo è di integrare gli equipaggiamenti rotanti di OM Lesmo e di Caballé, e le linee di trafilatura di Eurodraw Energy nel portafoglio di prodotti che attualmente offriamo in Nord America,” ha dichiarato il direttore generale Tony DeRosa.

“Frigeco USA e i suoi rappresentanti potranno fornire ai clienti soluzioni a valore aggiunto in tutti e tre i segmenti della catena di produzione: trafilatura, cablaggio ed estrusione. Il nostro principale obiettivo è di soddisfare le vostre esigenze aziendali per garantire la massima efficienza e redditività.

“Siamo lieti di accogliere Technical Marketing Systems e AITMAC nella nostra organizzazione commerciale. La loro vasta esperienza nei mercati del filo e del cavo accrescerà le nostre vendite e i nostri servizi e rafforzerà il nostro impegno nei confronti del mercato nordamericano.”

Frigeco USA Inc – Stati Uniti
Website: www.mflgroup.com

Misuratori laser ODAC 14XY efficienti ed altamente precisi

Grazie al design compatto, le teste di misurazione ODAC® 14XY realizzate da Zumbach possono essere utilizzate praticamente in ogni processo di lavorazione nei settori del filo e del cavo, delle materie plastiche e della gomma, nonché dell'industria siderurgica e del metallo.

La base tecnologica considerata per queste teste di misurazione è sempre la tecnologia più recente, con diodi laser come sorgenti luminose in combinazione con i processori a valore misurato intelligenti e potenti che favoriscono un'integrazione semplice e flessibile.

L'esperienza di lunga data di Zumbach come pioniere della tecnologia della misurazione in linea, associata ai dati di un'elevata produzione si traduce in un prodotto caratterizzato da un ottimo rapporto prezzo-prestazioni.

Tra le caratteristiche principali figurano la calibrazione a scansione singola (CSS), con il controllo singolo di scansione e un rendimento ad alta velocità di trasmissione dati fino a 125 pacchetti di dati al secondo.

Le teste di misurazione possono essere utilizzate con tutte le velocità di linea. Le vibrazioni durante la produzione non



▲ Testa di misurazione ODAC 14XY con display locale LOC 01 in opzione

hanno alcuna influenza rilevante sulle misurazioni.

Ciò è particolarmente indicato per fili sottili ed extra sottili, fili smaltati, cavi, corde d'acciaio, fibre, tubi medicali, prodotti in plastica estrusa o in gomma.

I modelli ODAC 14XY sono disponibili per due gamme di misurazione:

- Versione Micro del diametro da 0,015 a 3mm (0,0006 fino a 0,12"). Grazie all'utilizzo di un laser speciale, queste versioni possono misurare i

diametri più piccoli nella gamma dei micrometri

- Versione standard del diametro da 0,06 a 16mm (0,0024 fino a 0,64")

Tutte le teste di misura della serie ODAC sono provviste di elaborazione adattativa del segnale (brevetto DE3111356), che rende superflue le regolari ricalibrizioni successive. La ricalibrazione sarebbe necessaria solo nei casi di sostituzione dei componenti o di conformità con le normative di calibrazione ISO 9000/9001, ecc.

Tutti i relativi parametri per la precisione sono continuamente monitorati dal sistema di misura e compensati automaticamente. Ciò vale, in particolare, per eventuali modifiche a lungo termine del comportamento del motore del dispositivo di scansione o dell'elettronica di misurazione.

Integrazione flessibile della comunicazione:

- Seriale RS-232 /-422 /-485
- Ethernet TCP/IP
- Profibus DP
- Profinet IO V2.3
- J/J-M (digitale, per il collegamento ai processori Zumbach USYS)

Zumbach Electronic – Svizzera
Website: www.zumbach.com

Installazione di cavi nella foresta pluviale amazzonica

NEXANS fornirà dei cavi sottomarini a fibra ottica nell'ambito del Programma brasiliano "Amazônia Conectada". Il progetto, che ha lo scopo di collegare quattro milioni di abitanti della foresta amazzonica a Internet, prevede 7.700km di cavi che collegheranno 52 aree urbane mediante cinque distinti percorsi di cavi situati lungo e nei letti dei fiumi in Amazzonia.

Nell'ambito del programma brasiliano "Amazônia Conectada", che è uno dei progetti di fibre ottiche sottomarine più importanti a livello mondiale, saranno installati 275km di cavi Nexans nei letti dei fiumi fra Coari e Tefé. La rete nel suo complesso sarà costituita da cinque autostrade di dati: il bacino superiore del Rio Negro, il bacino superiore del Rio Solimões, il Rio Madeira, il Rio Purus e il Rio Juruá.

Per questo progetto, Nexans ha raccomandato di utilizzare cavi ad alte prestazioni con minimo impatto ambientale. Ciò consentirà al progetto di soddisfare le necessità delle comunità locali preservando contemporaneamente il fragile ecosistema della foresta amazzonica.

Nexans ha fornito cavi che non rilasceranno alcuna sostanza

nociva nel delicato ecosistema fluviale e che, di conseguenza, non avranno alcun impatto negativo sull'ambiente. I cavi a fibra ottica della famiglia dei cavi URC-1 sono conformi alle norme internazionali sui cavi sottomarini.

Per resistere alle forti correnti fluviali presenti tutto l'anno, sarà utilizzata una chiatta a fondo piatto come nave posacavi. Per una maggiore sicurezza, la chiatta posacavi sarà affiancata da cinque navi di supporto. Successivamente, delle squadre locali equipaggiate di attrezzature specializzate saranno incaricate della manutenzione dei cavi.

Il programma "Amazônia Conectada" ha lo scopo di offrire una connessione Internet di alta qualità allo stato Amazonas, non solo per collegare i suoi abitanti a Internet, ma anche per facilitare la telemedicina e la teledidattica o per migliorare l'interconnessione fra i servizi della sanità, della sicurezza e dei trasporti. Il programma si prefigge questo scopo producendo un minimo impatto dell'installazione sull'ambiente.

Nexans – Francia
Website: www.nexans.com

Analisi progettuale di una trefolatrice planetaria di grandi dimensioni mediante strumenti CAE

A cura di Giorgio Pirovano, MFL Group, e Fabiano Maggio, EnginSoft SpA

Introduzione

La progettazione di una trefolatrice planetaria dotata di dispositivo di detorsione non è semplice, a causa della rotazione "planetaria" delle parti che introduce effetti dinamici difficili da valutare, in particolare se la prestazione è estrema a causa della grande massa della bobina, delle configurazioni di carico e della velocità di rotazione.

Al fine di evitare eventuali rischi e ottenere i dati di progettazione più precisi possibile, MFL ha coinvolto EnginSoft come partner affidabile in questo progetto per la sua competenza in materia di simulazione.

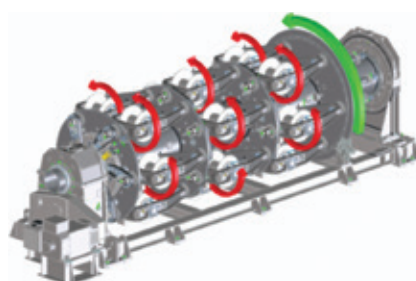
Per questo specifico progetto, la valutazione dinamica complessiva della trefolatrice planetaria è stata affidata a EnginSoft.

Al fine di ottenere risultati affidabili e precisi, è necessario utilizzare un software multibody potente e versatile: il RecurDyn®.

D'altro canto, MFL deve completare la progettazione di tutte le parti per soddisfare il requisito strutturale in termini di resistenza e durata.

Metodi e definizione dei problemi

Questa colossale trefolatrice planetaria sarà utilizzata per produrre cavi con diversi diametri e combinazioni di trefoli, in modo che le bobine caricate sulla macchina possano avere dimensioni e posizioni diverse sul rotore principale. Inoltre, le bobine sono naturalmente sbilanciate a causa di errori di avvolgimento, il che comporta degli scenari diversi per quanto riguarda il carico da analizzare.



▲ **Figura 1:** Rotazioni su una trefolatrice planetaria

L'obiettivo consiste nell'identificazione del caso peggiore in termini di potenza necessaria per i motori e di sollecitazione sui componenti.

Gli ingegneri di EnginSoft sono incaricati di identificare le peggiori condizioni possibili attraverso la simulazione dinamica. L'approccio ha inizio con una singola gabbia; un'analisi definisce la configurazione peggiore. Dopo di che, insieme a MFL, vengono definiti gli scenari di carico finito.

Il passo successivo è la simulazione dinamica dei diversi scenari di carico applicando la peggiore condizione di gabbia definita in precedenza. Alla fine, è possibile ottenere le peggiori condizioni di funzionamento dell'intera macchina.

In altre parole, questa attività consiste nell'applicazione scientifica e precisa della progettazione sperimentale (DOE).

Modello di dinamica dei corpi rigidi

Viene eseguita un'analisi della dinamica dei corpi rigidi; i carichi interni e la potenza/coppia dei motori dipendono principalmente dall'accelerazione e dalle inerzie delle parti in movimento, pertanto non c'è la necessità di

introdurre la flessibilità nel modello (che comporterebbe un aumento significativo dello sforzo computazionale).

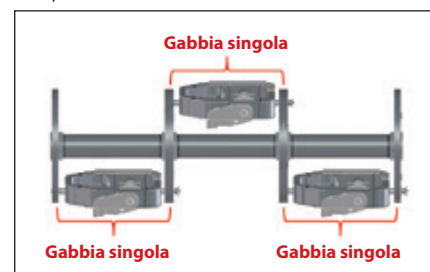
Partendo dalla geometria CAD 3D della macchina di MFL, il modello dinamico viene definito nell'ambiente RecurDyn®. Il risultato è un modello accurato con più di 100 corpi.

La maggior parte delle proprietà inerziali è derivata automaticamente dal CAD, ma numerosi corpi sono parametrizzati all'interno del software multibody.

Ovviamente, il collegamento fra i diversi corpi simula perfettamente il reale collegamento cinematico (ingranaggi, alberi, ecc.) in modo da ottenere un modello che è il più vicino possibile alla macchina reale in termini di gradi di libertà.

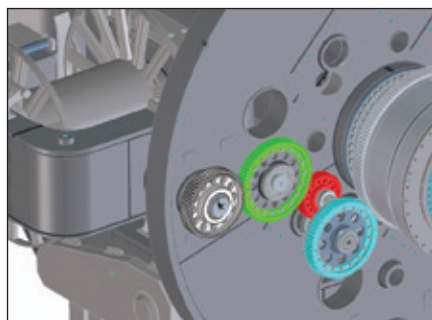
Gli ingranaggi sono componenti speciali della libreria RecurDyn® e sono progettati

▼ **Figura 2:** Gabbia singola della trefolatrice planetaria



▼ **Figura 3:** Metodo e approccio DOE





▲ **Figura 4:** Detorsione planetaria

per simulare sia la cinematica (rapporto di trasmissione) sia la dinamica (carichi reciproci) che si verificano in qualsiasi coppia di ingranaggi.

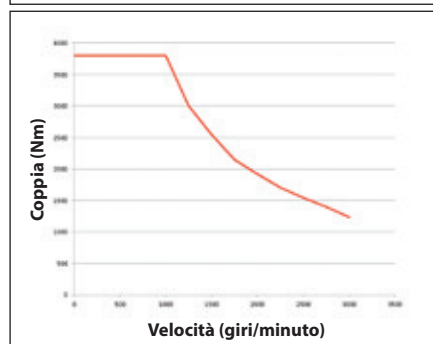
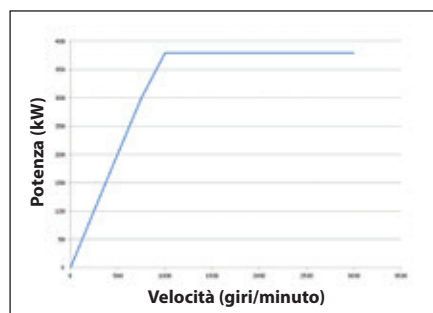
La **Figura 4** illustra il sistema a detorsione degli ingranaggi. Si può vedere facilmente che la "funzione ingranaggio" di RecurDyn® è stata ampiamente utilizzata data la conformazione della catena di trasmissione.

Quando si esegue ciascuna simulazione, tutti i carichi vengono automaticamente combinati lungo le catene di trasmissione, determinando una stima precisa della potenza richiesta per tutti gli alberi motore.

Come parti attive della macchina, i motori elettrici sono modellati tenendo in considerazione l'inerzia effettiva delle parti rotanti e utilizzando le reali curve costruttive (coppia e velocità) di motori a induzione moderni.

Altrimenti, utilizzando motori ideali (molto facile e semplice in RecurDyn®) si rischierebbe di ottenere una risposta imprecisa.

▼ **Figura 5:** Curve della coppia e potenza in un motore a induzione



In realtà, un simile approccio potrebbe generare picchi di coppia irrealistici nei segnali simulati; semplicemente non esistono motori con coppia illimitata.

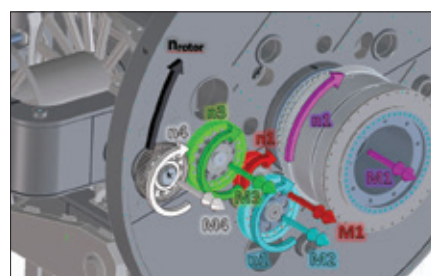
La **Figura 5** mostra un esempio delle leggi relative ai motori.

Simulazione dinamica e risultati

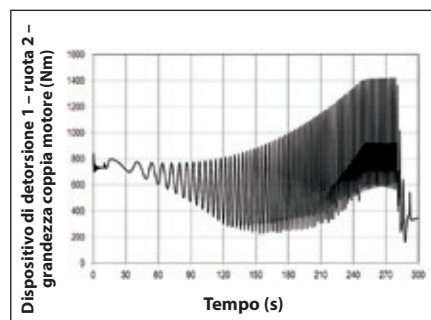
Vengono eseguite numerose simulazioni dinamiche e vengono analizzati più di 60 casi, sulla base dei diversi casi di carico possibili definiti preliminarmente.

Ciascuna simulazione dinamica è composta da tre fasi: l'accelerazione (da 0 alla velocità massima), una condizione di stato stazionario alla velocità massima e la frenatura di emergenza (decelerazione dalla velocità massima a zero in pochi secondi).

Dal grande volume di dati raccolti è possibile definire tutte le informazioni necessarie per la progettazione; in particolare la potenza massima richiesta per i motori e la coppia e velocità massime su ciascuna parte.



▲ **Figura 6:** Velocità e coppia su ciascun albero di detorsione



▲ **Figura 7:** Curva della coppia di un ingranaggio

Questi dati sono fondamentali per la corretta scelta dei motori e per una buona progettazione strutturale dei componenti (rotore, culle, giunti, ecc.).

La **Figura 6** illustra i risultati in termini di velocità di rotazione e coppia per ciascuna parte della catena di trasmissione.

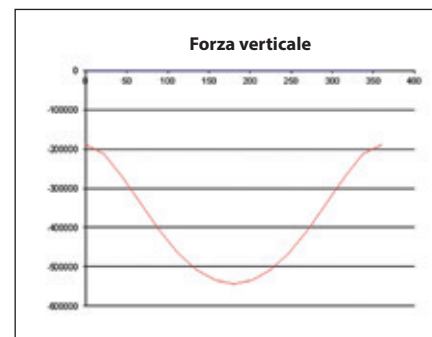
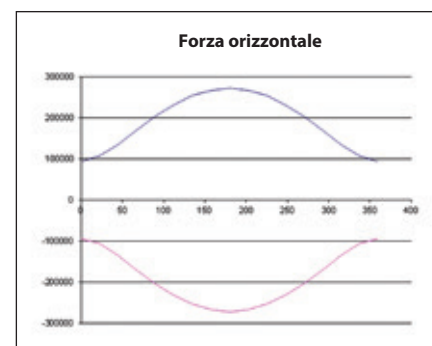
La **Figura 7** mostra la potenza di una coppia di motore tipica in un ingranaggio.

I picchi, chiaramente visibili nella curva, sono dovuti allo sbilanciamento delle bobine.

Risultati dinamici come dati strutturali

Come spiegato in precedenza, i risultati ottenuti dalla simulazione dinamica costituiscono i dati di partenza utilizzati per la simulazione strutturale.

Utilizzando il software strutturale CAE ANSYS Workbench®, che è direttamente collegato con RecurDyn®, MFL esegue la simulazione del comportamento meccanico dei componenti principali della trefolatrice planetaria.



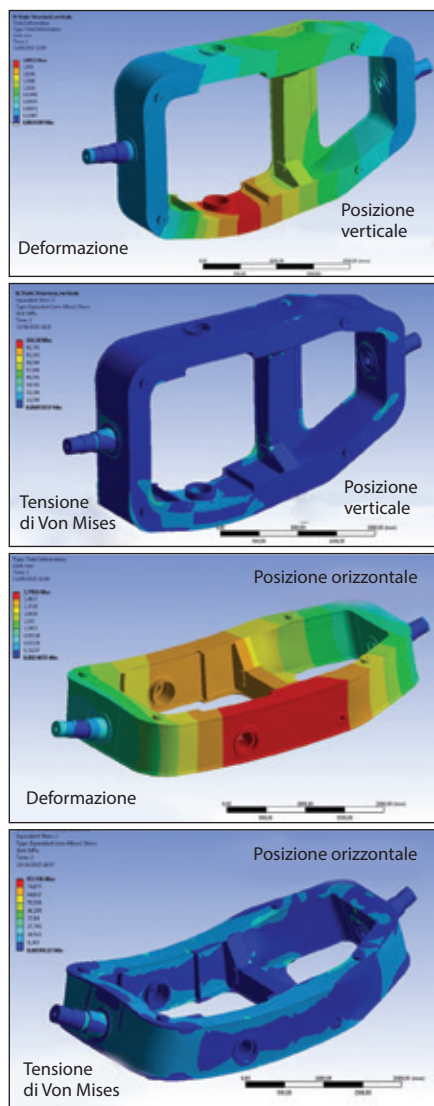
▲ **Figura 8:** Carico sulle culle

L'obiettivo è di verificare che tutti i componenti siano conformi alle specifiche di resistenza e deformabilità.

Su una trefolatrice planetaria, tutti i componenti sono sottoposti a fatica (la **Figura 8** mostra il carico sul telaio principale di una culla in rotazione attorno al proprio asse) cosicché i tecnici utilizzano metodi specifici per la verifica della struttura saldata sottoposta a fatica come i metodi "hot spot", Radaj, ecc.

La **Figura 9** mostra la deformazione e la tensione Von Mises equivalente su una culla in due posizioni.

Infine, è stato effettuato un controllo delle frequenze Eigen di tutte le parti della macchina per evitare qualsiasi rischio di risonanza.



▲ **Figura 9:** Deformazione equivalente della culla e tensione di Von Mises

Conclusioni

Grazie alla competenza di EnginSoft nella simulazione dinamica, è stato possibile ottenere una simulazione accurata di una trefolatrice planetaria di dimensioni enormi in breve tempo.

I risultati di queste simulazioni supportano i progettisti meccanici di Mario Frigerio per il dimensionamento della macchina. Su una macchina di tali dimensioni non può essere accettato alcun errore.

La virtualizzazione consente di risparmiare tempo nel processo di sviluppo e costituisce un'alternativa all'approccio classico, in particolare quando non sono disponibili dati storici da applicazioni simili.

La collaborazione tra le due aziende ha permesso di ottimizzare l'elaborazione di questo ambizioso progetto e di preservare l'elevato livello di qualità e prestazioni dei prodotti di Mario Frigerio. ■

Il presente articolo contiene riferimenti ai prodotti indicati di seguito, che sono marchi commerciali o marchi registrati dei rispettivi proprietari: ANSYS Workbench; RecurDyn.

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Plataforma de lanzamiento europea para la dobladora DIWire

PENSA Labs aprovechó la feria wire 2016, celebrada en la ciudad alemana de Düsseldorf, como plataforma de lanzamiento europea para su dobladora de alambre CNC, la más pequeña existente para la fabricación personal (desktop manufacturing) y la creación rápida de prototipos.

La dobladora DIWire, desarrollada por Pensa, empresa americana de diseño industrial de Nueva York, pesa solo 10 kilos.

“Estamos entusiasmados con la idea de crear una forma totalmente nueva de fabricación personal. Abre todo un abanico de nuevas posibilidades, sobre todo cuando se combina tecnología DIWire con otras máquinas productivas de sobremesa,” comentó Marco Perry, socio de Pensa.

“El potencial es ilimitado: maquetas, prototipos de diseño, implantes quirúrgicos, ortodoncia, aplicaciones aeroespaciales, iluminación, decorados, antenas, joyería, títeres, robótica, producción de lotes pequeños, señalética, arte, muebles, pequeñas embarcaciones, y más.”

Aunque las impresoras 3D pueden realizar modelos tridimensionales y las cortadoras láser pueden cortar planos 2D, convertir



▲ *Dobladora DIWire de Pensa Labs*

líneas trazadas en barras dobladas, alambres o formas tubulares de manera rápida, precisa y continua no era posible, hasta ahora.

La dobladora DIWire dobla toda una gama de materiales (acero, aluminio y latón, incluidos) y permite la creación de prototipos personalizados, en lotes pequeños y a nivel local, y la fabricación justo a tiempo.

La dobladora DIWire, transportable, accesible y asequible, colma el vacío comercial existente entre el lento doblado

a mano y el oneroso doblado de alambre CNC a gran escala para la producción en masa.

“Para el desarrollo de la DIWire, hemos intentado ofrecer un servicio para el usuario perfecto, desde la interfaz software y el diseño de la máquina, hasta los accesorios que ayudan en el montaje. Nuestro software no requiere habilidades especiales. Solo hay que arrastrar y soltar el fichero, y pulsar Doblar,” explicó Mark Prommel, socio de Pensa.

“Los usuarios pueden simplemente dibujar en 2D, sin conocimientos de programación ni CAD.”

Además de la fabricación, la DIWire está modificando también el modo de enseñar las asignaturas científico-tecnológicas y artísticas (STEM/STEAM), por lo que está recibiendo una enorme aceptación en universidades y escuelas de Estados Unidos y Canadá. “Queremos promover la creatividad de los alumnos, jóvenes y menos jóvenes. En tan solo unos minutos, se puede pasar rápidamente de líneas en la pantalla a piezas tangibles,” dijo Kathy Larchian, socio de Pensa. “Es así de simple y rápido de usar.”

Pensa Labs – Estados Unidos
Website: www.pensalabs.com

Consolidando el mercado norteamericano

MFL Group ha consolidado su red de ventas y servicios en Norteamérica.

MFL ha ampliado significativamente la cartera de productos de su división de productos no ferrosos, especializada en equipos de trefilado de alambre, trenzado y extrusión.

Además de la marca comercial Frigeco, la adquisición de CM Caballé S.A. le ha permitido al grupo incorporar marcas tan conocidas como OM Lesmo, Caballé y Eurodraw Energy.

Frigeco USA ha contratado los servicios de Technical Marketing Systems (TMS), de Granby (Connecticut), y AITMAC Inc. Ontario (Canadá). TMS se ocupará de determinadas tareas como las ventas técnicas y la asistencia al cliente, y será representante de repuestos para el mercado norteamericano.

AITMAC Inc será distribuidor de repuestos para los clientes que utilizan productos OM Lesmo y Eurodraw Energy. Además de coordinar las ventas de los representantes, Frigeco USA también trabajará directamente con clientes clave y multinacionales que han sido siempre clientes de MFL.

“Nuestro objetivo es incorporar los equipos giratorios de OM Lesmo y Caballé, y las líneas de trefilado de alambre de Eurodraw Energy a la cartera de productos que estamos ofreciendo ahora en Norteamérica,” dijo Anthony DeRosa, director general.

“Frigeco USA y sus representantes proveerán soluciones de valor añadido a sus clientes en los tres sectores de la cadena productiva: trefilado de alambre, cableado y extrusión.

“Nuestro principal objetivo es responder a las necesidades del mercado para garantizar la máxima eficiencia y rentabilidad.

“Nos complace tener en nuestra organización a Technical Marketing Systems y a AITMAC.

“Su vasta experiencia en los sectores del alambre y del cable potenciará nuestras ventas y servicios y reforzará nuestro compromiso con el mercado norteamericano.”

Frigeco USA Inc – Estados Unidos
Website: www.mflgroup.com

Medidores láser ODAC 14XY eficientes y de alta precisión

Gracias a su diseño compacto, las cabezas medidoras ODAC® 14XY de Zumbach pueden ser utilizadas prácticamente en cualquier proceso de fabricación de alambre y cable, de plásticos y goma, además de acero y metales.

La base tecnológica utilizada para estas cabezas medidoras también es de última tecnología, con diodos láser como fuentes luminosas combinados con procesadores de valor medido potentes e inteligentes que facilitan su integración con facilidad y flexibilidad.

La larga experiencia de Zumbach como pionero en tecnología de medida en línea, combinada con altas cifras de producción da como resultado un producto con una excelente relación precio-rendimiento.

Entre las notables funciones se pueden citar el calibrado de un solo barrido (CSS), con monitorización del barrido y alta velocidad de los datos de hasta 125 paquetes de datos por segundo. Las cabezas medidoras pueden ser utilizadas con cualquier velocidad de línea. Las vibraciones son prácticamente imperceptibles durante la producción y no afectan a las medidas.



▲ Cabeza medidora ODAC 14XY con pantalla local LOC 01 opcional

Los medidores son indicados especialmente para alambres finos y extra finos, alambres esmaltados, cables, cuerdas de acero, fibras, tubos médicos, productos extruidos de plástico o de goma.

Los modelos ODAC 14XY están disponibles para dos gamas de medida:

- Versión micro de $\varnothing 0,015$ a 3mm (0,0006 a 0,12"). Gracias al uso de un láser especial, estas versiones pueden medir los diámetros más

- pequeños, del orden de micras
- Versión estándar de $\varnothing 0,06$ a 16mm (0,0024 a 0,64")

Todas las cabezas medidoras de la serie ODAC disponen de procesamiento de señales adaptable (patente DE3111356), con lo cual los normales recalibrados sucesivos resultan innecesarios. Solo en casos de intercambio de componentes o de cumplimiento de las normas de calibrado ISO 9000/9001, etc. sería necesario un recalibrado.

Todos los parámetros pertinentes para la precisión son monitorizados por el sistema de medida y compensados automáticamente. Esto vale, en particular, para posibles cambios a largo plazo del comportamiento del motor del escáner o de la electrónica del sistema de medida.

Integración flexible con el sistema de comunicación:

- RS-232 /-422 /-485 serie
- Ethernet TCP/IP
- Profibus DP
- Profinet IO V2.3
- J/J-M (digital, para conexión con procesadores Zumbach USYS)

Zumbach Electronic – Suiza
Website: www.zumbach.com

Llevando conectividad a la selva amazónica

El programa "Amazonia Conectada" de Brasil utilizará fibra óptica submarina de Nexans. El proyecto tiene como objetivo proveer Internet a cuatro millones de personas de la selva amazónica. El proyecto comprende 7.700 Km de cables que conectarán 52 términos municipales a través de cinco rutas de cables distintas por encima y por debajo de cauces fluviales del Amazonas.

Para llevar a cabo el programa brasileño "Amazonia Conectada", que es uno de los proyectos de fibra submarina de mayor envergadura del mundo, se instalarán 275 Km de cables Nexans en cauces fluviales entre Coari y Tefé. Toda la red estará constituida por cinco autopistas de datos: el alto río Negro, el alto Solimões, el Madeira, el Purus y el Juruá.

Para este proyecto, Nexans recomendó que se usaran cables de alto rendimiento, que tienen un impacto ambiental mínimo. De este modo, el proyecto responde a las necesidades de las comunidades locales y preserva al mismo tiempo el frágil ecosistema de la selva amazónica.

Nexans ha suministrado cables que no liberarán sustancias nocivas en el delicado ecosistema fluvial y no tendrán un impacto negativo en el ambiente. La fibra óptica de la familia de cables URC-1 cumplen todas las normas internacionales para cables submarinos.

Para hacer frente a las fuertes corrientes de agua que se generan en el río durante el año, se usará una gabarra de suelo plano para el tendido de cables. Para más seguridad, cinco barcos de apoyo acompañarán a la gabarra de tendido de cables. Más adelante, el mantenimiento de los cables puede ser realizado por equipos locales con herramientas especiales.

El Programa "Amazonia Conectada" se propone ofrecer conexión Internet de alta calidad al estado de Amazonas, no solo para conectar a Internet a los residentes, sino también para ofrecer servicios de medicina a distancia, enseñanza a distancia y mejor interconexión entre los servicios de sanidad, seguridad y tráfico. El programa pretende hacer todo esto acarreado con la instalación el mínimo impacto ambiental posible al ecosistema.

Brasil es el cuarto país del mundo por número de usuarios que usan Internet y esa cifra está destinada a aumentar ya solo con este proyecto.

Con el fin de ofrecer un servicio de alta calidad, los cables se fabricaron en Nexans Noruega, una planta especializada en soluciones Ethernet de alto rendimiento, y se enviaron luego a Brasil para su instalación.

Nexans – Francia

Website: www.nexans.com

Análisis de diseño de una cableadora planetaria de grandes dimensiones usando herramientas CAE

Por Giorgio Pirovano, MFL Group, y Fabiano Maggio, de EnginSoft SpA

Introducción

El diseño de una cableadora planetaria con destorsión no es un proyecto simple debido a la rotación “planetaria” de las partes: ésta produce efectos dinámicos que son difíciles de estimar, en particular, en caso de prestaciones extremas debido a la masa elevada de las bobinas, las configuraciones de las cargas y la velocidad de rotación.

Para evitar cualquier riesgo y obtener datos de diseño lo más preciso posible, MFL se ha dirigido a EnginSoft y sus capacidades de simulación, como partner fiable para este proyecto.

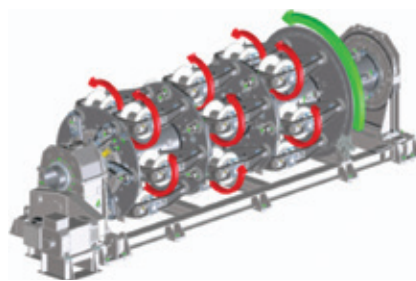
En este proyecto específico, EnginSoft tiene que realizar la evaluación dinámica total de la máquina planetaria.

Para obtener resultados precisos y fiables, es necesario usar un software de simulación multicuerpo potente y versátil: RecurDyn®.

Por otro lado, MFL debe completar el diseño de las partes para cumplir los requisitos estructurales en términos de resistencia y duración.

Métodos y definición de los problemas

Esta máquina planetaria colosal será usada para producir cable con distintos diámetros y combinaciones de cableado; por lo tanto, las bobinas cargadas en la máquina pueden tener diferentes tamaños y posiciones en el rotor principal. Además, las bobinas son desequilibradas naturalmente debido a errores de enrollado. Esto produce varios escenarios de carga por analizar. El objetivo es determinar el peor caso



▲ **Figura 1:** Rotaciones en una cableadora planetaria en términos de potencia requerida por los motores y esfuerzo en las partes. Los ingenieros de EnginSoft deben descubrir dichas condiciones mediante simulación dinámica. Se inicia analizando una sola caja para determinar la peor configuración. Luego, junto con MFL, se determinan escenarios de carga finita.

El paso sucesivo es la simulación dinámica de los distintos escenarios aplicando la condición de carga peor determinada anteriormente para la caja analizada. Al final se obtienen las condiciones de trabajo peores de la máquina entera.

En otras palabras, esta actividad es la aplicación científica y precisa del diseño de experimentos (DOE).

Modelo de la dinámica de los cuerpos rígidos

Se realiza un análisis de la dinámica de los cuerpos rígidos. Las cargas internas y la potencia/pares de los motores dependen principalmente de la aceleración y de las inercias de las partes en movimiento. Por lo tanto, no es necesario introducir la flexibilidad en el modelo (que aumentaría significativamente el esfuerzo de cálculo).

Partiendo de la geometría CAD 3D de la máquina de MFL, se determina el modelo

dinámico con el software RecurDyn®. El resultado es un modelo preciso con más de 100 cuerpos.

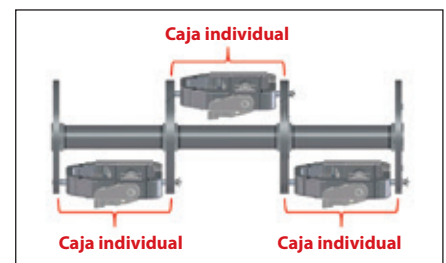
La mayoría de las propiedades inerciales son calculadas automáticamente por CAD, pero muchos cuerpos son parametrizados por el mismo software multicuerpo.

Obviamente, la conexión entre los distintos cuerpos simula perfectamente el enlace cinético real (engranajes, ejes y demás) para obtener un modelo que es el más cercano posible a la máquina real en términos de grados de libertad.

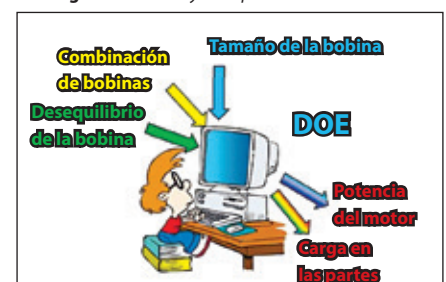
Los engranajes son elementos especiales de la librería RecurDyn®, diseñados para simular ya sea la cinética (relación de transmisión) ya sea la dinámica (cargas recíprocas) de cada par de engranajes.

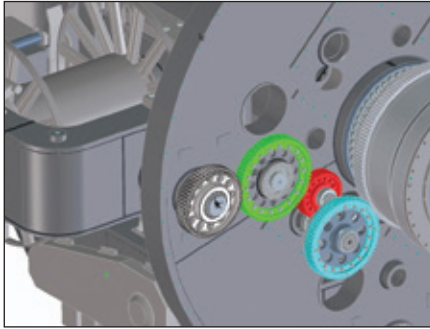
La Figura 4 muestra el sistema de destorsión de los engranajes. Se puede ver fácilmente que se ha usado masivamente

▼ **Figura 2:** Caja individual de la máquina planetaria



▼ **Figura 3:** Método y enfoque DOE





▲ **Figura 4:** Destorsión planetaria

la "función engranajes" de RecurDyn® debido a la conformación de la cadena de transmisión.

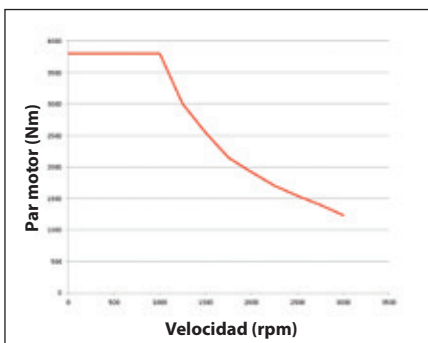
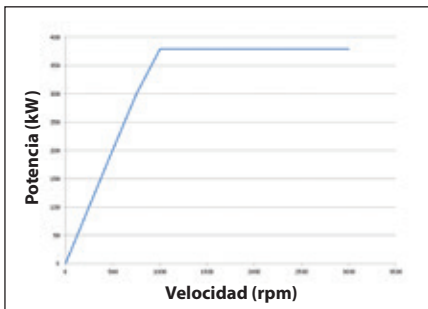
En cada simulación, todas las cargas son combinadas automáticamente a lo largo de las cadenas de transmisión, lo que permite calcular con precisión la demanda de potencia de todos los ejes de los motores.

Dado que son partes activas de la máquina, los motores eléctricos se modelan tomando en consideración la inercia real de las partes giratorias y usando las curvas constructivas reales (par motor y velocidad) de los motores de inducción modernos.

De lo contrario, usando motores ideales (muy fácil y simple con RecurDyn®) existe el riesgo de obtener una respuesta imprecisa. En efecto, se generarían picos de par motor poco realistas en las señales simuladas; los motores con par ilimitado simplemente no existen.

La *Figura 5* muestra un ejemplo de las leyes de los motores.

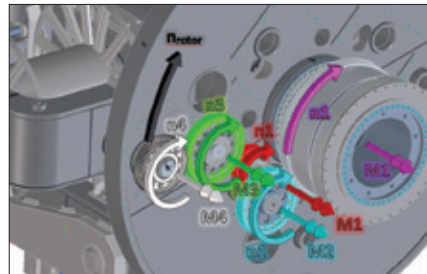
▼ **Figura 5:** Curvas de par y potencia de un motor de inducción



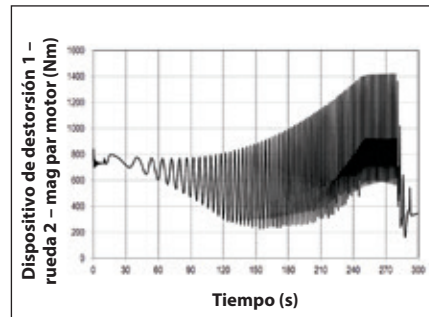
Simulación dinámica y resultados

Se ejecutan muchas simulaciones dinámicas y se analizan más de 60 casos en base a los distintos casos de cargas posibles determinados anteriormente. Cada simulación dinámica se compone de tres fases: la aceleración (de 0 a la velocidad máxima), una condición de régimen permanente a la velocidad máxima y el frenado de emergencia (deceleración de la velocidad máxima a cero en pocos segundos).

Del gran volumen de datos recogidos es posible determinar toda la información necesaria para el diseño; en particular la potencia máxima requerida por los motores, y el par motor máximo y velocidad de cada parte.



▲ **Figura 6:** Velocidad y par de cada eje de destorsión



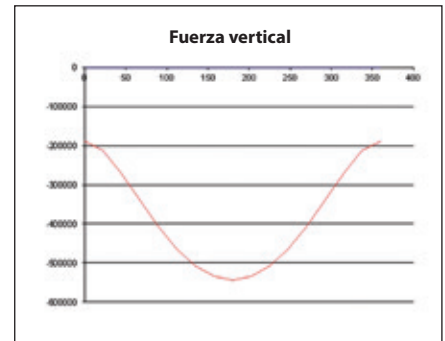
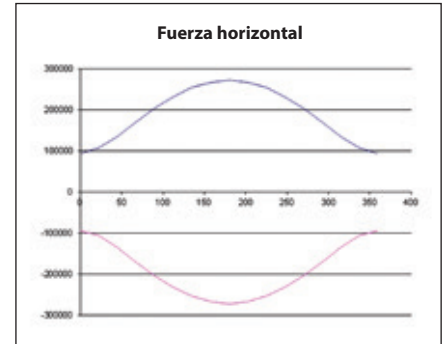
▲ **Figura 7:** Curva de par de un engranaje

Estos datos son fundamentales para escoger los motores más adecuados y un buen diseño estructural de las partes (rotor, cunas, juntas y demás).

La *Figura 6* muestra los resultados en términos de velocidad de rotación y par en cada parte de la cadena de transmisión. La *Figura 7* muestra la magnitud de un par motor típico en un engranaje. Los picos, claramente visibles en la curva, son debidos al desequilibrio de las bobinas.

Resultados dinámicos como datos estructurales

Como se ha explicado antes, los resultados obtenidos con la simulación



▲ **Figura 8:** Carga en las cunas

dinámica son los datos usados para la simulación estructural. Usando el software estructural CAE ANSYS Workbench®, que está vinculado directamente con RecurDyn®, MFL efectúa la simulación del comportamiento mecánico de las partes más importantes de la máquina planetaria.

El objetivo es verificar que todas las partes cumplan con las especificaciones de resistencia y deformabilidad.

En la máquina planetaria, todas las partes están sometidas a fatiga (la *Figura 8* muestra la carga en el armazón principal de una cuna durante una rotación alrededor de su eje).

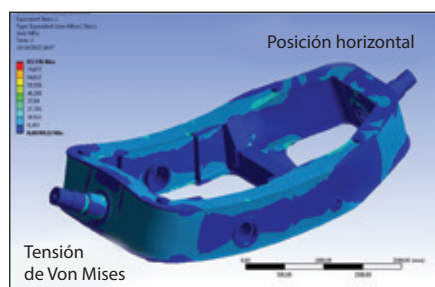
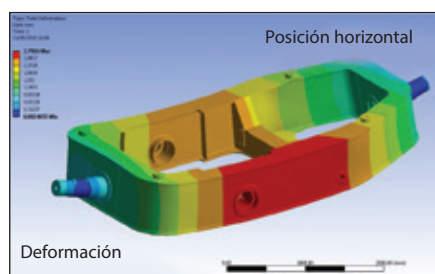
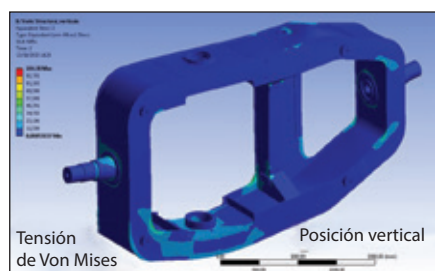
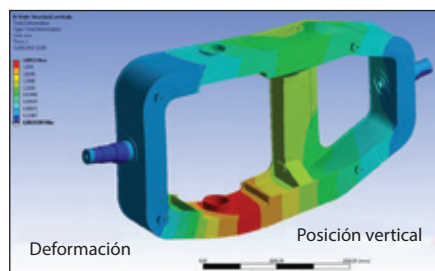
Por lo tanto, los ingenieros usan métodos específicos para la verificación de la estructura soldada bajo fatiga, como los métodos de punto caliente, Radaj y demás.

Figure 9 muestra la deformación y la tensión de Von Mises equivalente en una cuna en dos posiciones.

Por último, se ha realizado un control de las frecuencias Eigen de todas las partes de la máquina para evitar cualquier riesgo de resonancia.

Conclusión

Gracias a la experiencia de EnginSoft en la simulación dinámica, fue posible obtener una simulación precisa de una enorme cableadora planetaria en breve tiempo.



▲ **Figura 9:** Deformación equivalente de la cuna y tensión de Von Mises

Los diseñadores de Mario Frigerio se basan en los resultados de estas simulaciones para el dimensionamiento de la máquina. En una máquina tan grande cualquier error es inaceptable.

La virtualización permite ahorrar tiempo en el proceso de desarrollo y es una alternativa al método clásico, en particular, cuando los datos históricos de aplicaciones similares no están disponibles.

Esta colaboración entre compañías ha hecho posible optimizar el diseño de este proyecto desafiante y conservar el alto nivel de calidad y rendimiento de los productos de Mario Frigerio. ■

Este artículo contiene referencias a los productos siguientes que son marcas o marcas registradas de sus respectivos propietarios: ANSYS Workbench; RecurDyn.

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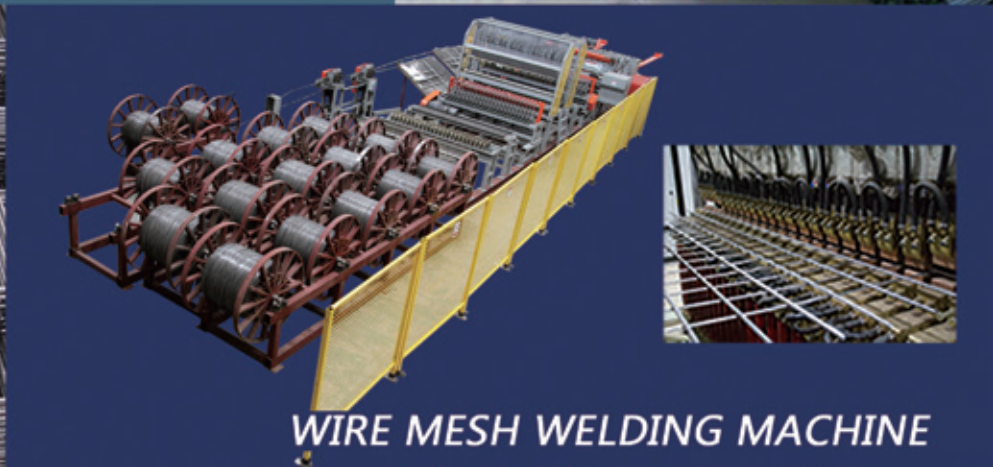
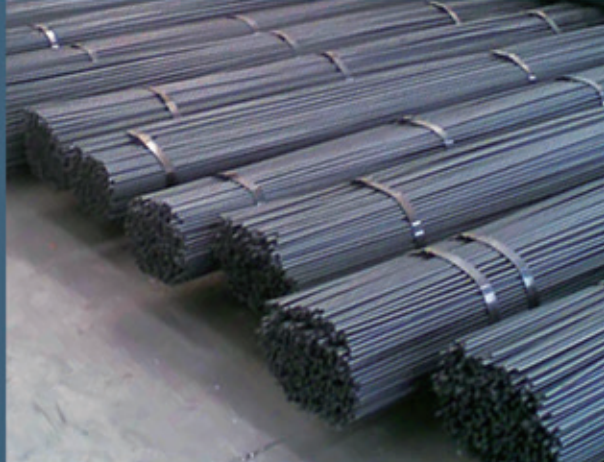
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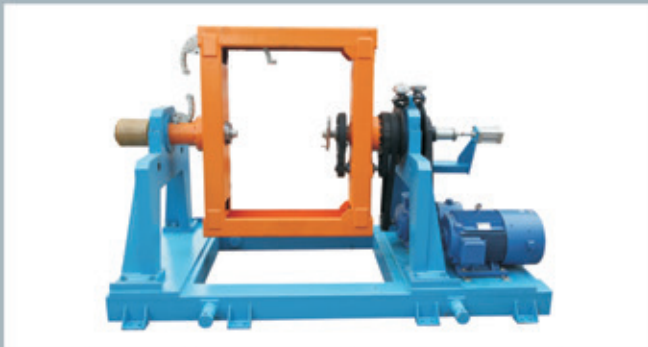
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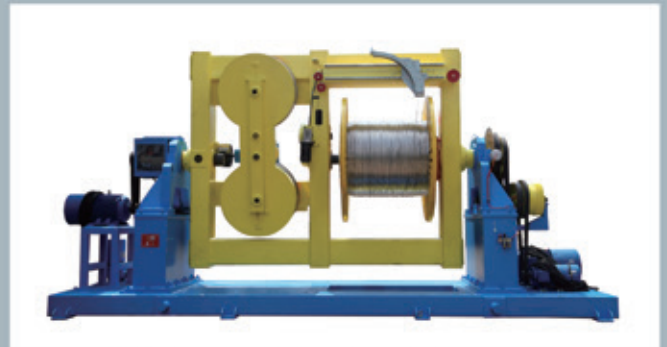
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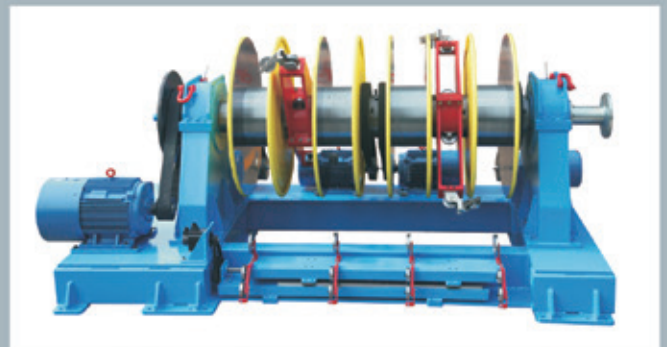
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