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The International Magazine for the Wire & Cable Industries

15th Anniversary

ISSN 1463-2438

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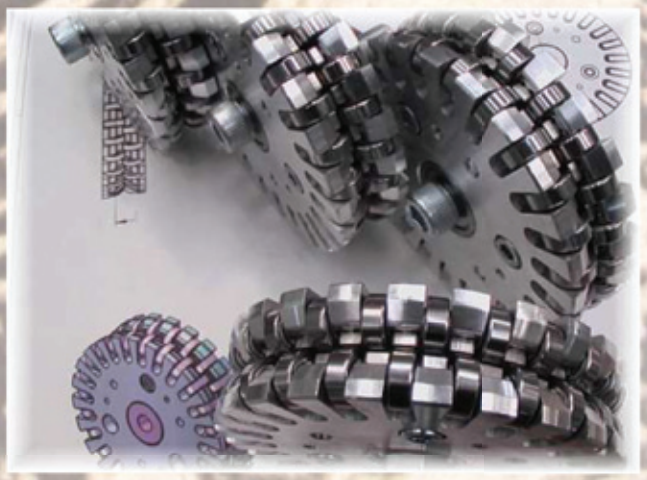

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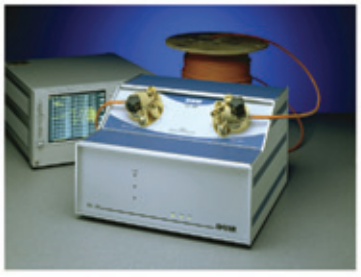

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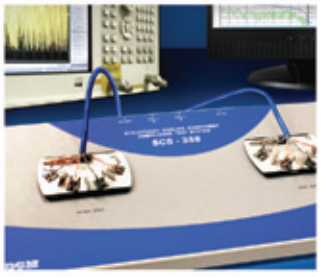

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See page 96 for further details

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A hectic month for all our magazines

WE have good reason to celebrate this month. *EuroWire* is in its 15th year of publication, sister publication *Wire & Cable ASIA* turns 21 and it has been a year since the launch of ezine, *wiredInUSA*, in just a few short weeks' time.

But what really matters is that it is you, readers, subscribers and advertisers, who have all played your roles in allowing us to succeed over the years.

It is with no small amount of pride that we have a special section on our anniversary, which starts on page 46.

Special mention must also be made to Fibercore Ltd, a UK-based designer and manufacturer of speciality optical fibres who are also celebrating their 30th anniversary. A story on their success can be found on page 10.

There's also an enlightening report this month into the boom time ahead for the Eastern European market. On page 14 you can find out how Integer Research expect the region's cable output to reach around US$7 billion in 2012.

And a little closer to home, Scotland's Rautomead played host to that country's Finance Secretary, John Swinney, when he paid a visit to the company's Dundee site. See page 16 for the full story.

A report from the British Approvals Service for Cables (BASEC) explains the testing and safety procedures for cables at the start of our technology section on page 26.

In Transatlantic Cable, our features editor reveals some startling facts about General Motors' alternative fuel car, the Chevrolet Volt. That all starts on page 20.

On page 22 you can also read how US companies are showing signs of loosening the purse strings.

David Bell
Editor

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- Wire & Cable India 2012
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Getting Technical

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wire/Tube China 2012

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2012

September 2012

25–28: **wire/Tube China** – trade exhibition – Shanghai, China
Organisers:
Messe Düsseldorf China Ltd
Fax: +86 216 169 8301
Email: www.shanghai@mdc.com.cn
Website: www.mdc.com.cn

October 2012

30–1 Nov: **wire and Cable India/ Tube India** – trade exhibition – Mumbai, India
Organisers: Messe Düsseldorf India
Fax: +91 112 697 1746
Email: info@md-india.com
Website: www.md-india.com

November 2012

11-14 Nov: **IWCS** – Technical conference & trade exhibition – Providence, RI, USA
Organisers:
IWCS Inc
Fax: +1 732 389 0991
Email: phudak@iwcs.org
Website: www.iwcs.org

2013

April 2013

23-25 April: **Interwire 2013** – trade exhibition – Atlanta, USA
Organisers: WAI
Fax: +1 203 453 2777
Email: info@wirenet.org
Website: www.wirenet.org

May 2013

TBA: **wire/Tube Russia** – Technical conference & trade exhibition – Moscow, Russia
Organisers:
Messe Düsseldorf GmbH
Fax: +49 211 456 07740
Email: info@messe-duesseldorf.de
Website: www.wire-russia.com

▲ *€50m offshore wind farm contract for Nexans*

Nexans cables to connect at Northwind offshore wind farm

NEXANS has won a contract worth more than €50m to supply a total of 57km of high-voltage subsea power export cables to Northwind NV in the North Sea.

The project comprises 14km of cable to connect Belwind Phase 2 to the Northwind wind farm (formerly known as Eldepasco), together with a further 43km of cable that will transfer a total of 381MW produced by both wind farms to the onshore grid connection at Zeebrugge, Belgium.

In addition to the design, type-testing and supply of the XLPE subsea cables, Nexans will also supply mechanical and electrical accessories.

This includes the onshore transition joints to connect the subsea cables to the land cables, the accessories for the two platforms, comprising hang-off and GIS (gas insulated switchgear) terminations, and four repair joints.

The Northwind wind farm will comprise 72 wind turbines, summing up to a total of 216MW installed capacity. The power will be delivered to the Belgian electricity network at the ELIA HV connection station in Zeebrugge.

The 14km section of 245kV cable connecting Belwind Phase 2 to Northwind will consist of three copper cores, each with a cross-section of 400mm^2.

The majority of the 43km, 245kV connection from Northwind to Zeebrugge will comprise three 1,000mm^2 copper cores. However, there is a length of the route where the cable has to traverse a sea channel subjected to regular dredging, requiring it to be buried down to 9 metres in the seabed for protection.

In order to maintain the electrical performance of the cable along this channel, the copper cross-section will be increased to 1,200mm^2 on a 4km section.

This section of cable will have an outer diameter of 265mm and will weigh 130kg per metre.

The subsea cables will be manufactured at Nexans' specialised facility in Halden, Norway. They will also include two FO48 fibre optic elements, manufactured in the Nexans Rognan plant, to enable data communications, control and monitoring for the power transmission system.

Nexans – France
Website: www.nexans.com

New cable drying systems improve efficiency and maintenance

THE new blower-powered 'LINE-Dry' system from Air Control Industries has been installed at the Prysmian Group's Aberdare facility, offering enhanced drying yet lower operating costs. Additionally the system offers greater production efficiency, reduced maintenance and the elimination of health and safety hazards.

Previously, compressed air based systems were used at the Aberdare facility but these were failing to remove the excess carry-over water adhering to the wire after leaving the cooling troughs. This resulted in slippage causing the length/speed monitoring encoder to give incorrect readings that impacted upon line speeds, and water dripping/spraying on the line and surrounding equipment. The random water dispersal had the effect of causing corrosion, increasing maintenance requirements and shortening equipment life.

Water droplets on cables also interfered with quality control procedures. Laser equipment designed to detect cable imperfections could be 'fooled' by droplets to undermine production goals.

Another result of the water carry-over was water dripping on the ground around the tensioning sheave to form puddles and creating potential health and safety issues, such as personnel slipping.

With these issues in mind, project engineer Sam Donnelly sought a means of eradicating them. He approached ACI about the LINE-Dry and the company agreed to loan a machine on a free six-month trial. That machine was installed in July 2011 and it proved to be very successful resulting in the purchase of a further two systems, which were installed in March 2012.

"The ACI LINE-Dry proved its ability to meet all our needs, as shown by the fact we have installed two more units," said Sam Donnelly. "It dries cables up to 35mm efficiently at speeds up to 400m/min and has eliminated all the problems associated with water carry-over helping to reduce running and maintenance costs."

▲ *The LINE-Dry system from Air Control Industries*

Since the installation of the first LINE-Dry operating cost figures show that the ACI blower-powered unit has lower running costs than the previous compressed air system.

In addition, cable drying is more efficient because the air is from a dedicated source whereas previously variations of load-demand upon the compressed air compressor impacted upon both the drying line and packing operations.

ACI's LINE-Dry comprises a drying station and a free-standing blower housed in an ABS enclosure. The drying function is performed inside an enclosure housing adjustable, spring-loaded opposing plenums.

On both sides of the plenums are rubber baffles that serve to entrap the removed water to be ducted away from the underside of the enclosure. To ensure maximum drying efficiency the gap between the drying heads can be adjusted manually to suit different products whilst viewed through a hinged inspection hatch.

The blower enclosure houses an ACI Multi-Stage unit controlled complete with a speed controller to give flexibility to adjust air delivery to accommodate different products and line speeds. Air is delivered at up to 2.8psi (80in SWG) at speeds of 8,800m/min (28,900ft/min) at 80°C.

Prysmian – UK
Website: www.prysmian.co.uk

Two die in plant fire

Two Evonik employees died after a blaze at the company's CDT plant on the grounds of the Marl Chemicals Park on Saturday, 31st March.

Evonik has been supporting the authorities investigating the cause of the fire and has held its own examination through an independent expert. A spokesman for the company said: "We are deeply sorry that two members of our workforce lost their lives in the blaze."

Evonik Industries – Germany **Website**: www.evonik.com

Superconducting fault limiter passes test

BRUKER Energy & Supercon Technologies (BEST) and Schneider Electric Sachsenwerk GmbH have announced the successful completion of another step in the development of a shielded, inductive superconducting fault current limiter (iSFCL), which is to begin field test operations in the Stadtwerke Augsburg (Germany) grid in 2013.

Testing of a subscale device under expected operating conditions was performed at the Institute for High-Voltage Engineering and Electrical Energy Systems of the University of Braunschweig, a leading German research institute in the field of high voltage and power systems engineering.

This device implements the concept to be used in the full-size iSFCL system and utilises BEST's 40mm-wide second generation (2G) high temperature superconductors (HTS), specifically designed for application in fault current limiters.

During the tests in Braunschweig, the device functioned as predicted in more than 100 triggered short-circuits.

Due to the novel design of the superconducting modules, the system withstood fault durations of up to 500 milliseconds, believed to be the longest withstand time reported worldwide with HTS coated conductors.

The results validated the performance parameters predicted by computer models, thus enabling extrapolation to other grid topologies and requirements.

Bruker Energy – Germany
Website: www.bruker-est.com

CTC contract for HVDC project

CTC Marine Projects, part of DeepOcean Group Holding AS, has been awarded a contract for Dolwin 1, a high-voltage cabling project off the German coast to link offshore wind projects to the grid. The contract for EMAS AMC, will include the trenching of 62.34km of bundled HVDC power cable from a 14m water depth and trenching of a power cable.

CTC Marine Projects – Norway
Website: www.deepocean.no

Speciality fibre firm reflects on three decades of success

▲ *The Fibercore team*

FIBERCORE Ltd, a leading UK-based company in the design and manufacture of speciality optical fibres is celebrating 30 years of innovation and excellence within the highly specialised sector.

The company continues to embody the spirit of innovation; technical excellence and quality which has seen it flourish through three decades of monumental changes in both technology and its effects on society as a whole.

Established in 1982, Fibercore was formed as a business venture spin-out from the Optical Fibre Group of the University of Southampton, to offer the speciality optical fibres, developed at the university, commercially.

Managing director Dr Chris Emslie said: "The company was born from a foundation of professional research, excellence and expertise, so three decades on we are proud that Fibercore is still a byword for quality, innovation and unrivalled technical support."

Its divestiture from the Cisco group in February 2011 means Fibercore starts its third decade as an independent company.

This new-found freedom is enabling the company to drive forward the boundaries of the technologies that truly benefit its customers in key areas such as aerospace, metrology, telecoms components, sensors, defence and fundamental research.

Fibrecore products are used in an incredibly broad range of applications spread throughout more than 50 countries including fibre optic gyroscopes (FOGs), fibre optic hydrophones, fibre lasers, fibre amplifiers (EDFAs), embedded sensors, specialist medical, government and corporate research agencies and telecommunications components.

With the move to the company's purpose-designed R&D and manufacturing facility, Fibercore House, in 2003, it was able to increase its manufacturing capabilities ten-fold and enabled the company to introduce 'world-class manufacturing' philosophies to what was traditionally viewed as a scaled-up laboratory process.

The total shipments of fibre from Fibercore House now average more than 1,300,000m per month – a figure believed to be higher than that of any other 'speciality' fibre manufacturer anywhere in the world and providing Fibercore with unmatched experience in the volume manufacture of highly-specified 'speciality' fibre.

Fibercore Ltd – UK
Website: www.fibercore.com

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More choice, technology and support

HUESTIS Industrial in a cooperative agreement purchased Wyrepak Industries in March 2012.

This acquisition will provide customers with more choice of equipment for the wire and cable industry, while benefiting from technology and support from Huestis Industrial.

The synergy between Wyrepak Industries and Huestis Industrial will take customer service and support to another level while providing rugged machinery and real time solutions to meet the demands of modern manufacturing.

Wyrepak Industries has a great reputation and has been established as a long time supplier of high quality machines for the wire and cable industry.

"I have the greatest confidence that this company will continue to grow and compliment the Huestis Industrial product lines, while giving the customers more choice," said Howard Fancher.

▲ *Dave Monighetti and Ray Browne, of Wyrepak, and Howard Fancher of Huestis Machine Corp*

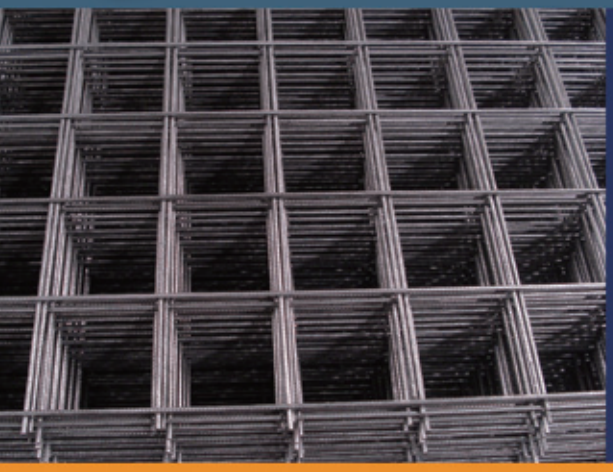
Wyrepak Industries will remain as a stand-alone company and continue to sell products under the Wyrepak brand name.

Huestis Industrial – USA
Website: www.huestis.com

STIRRUP BENDER **WG-12D**

STIRRUP BENDER **WG-12B-2**

WIRE STRAIGHTENING AND CUTTING MACHINE **GT5-12**



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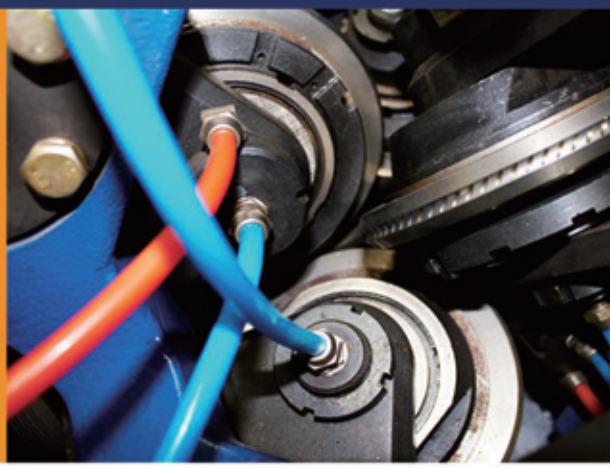

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Boom time ahead for eastern Europe . . .

THE eastern Europe cable industry saw impressive growth rates from 2000-2008, before being hit hard by the global financial crisis. Since then the cable industry has bounced back to become one of the fastest growing markets globally.

According to Integer Research's latest study, cable output in the region will top US$7 billion in 2012, and demand will reach US$6.5 billion.

"There is significant investment in the region, from existing companies and new entrants. The main players look entirely different now compared to ten years ago, when Siemens sold off many of its operations in the region," said Integer Research director Philip Radbourne.

"Tele-fonika is still by far the largest cable manufacturer in this region. It cemented its position with the acquisition of the leading Serbian cablemaker FKZ. It has been exporting cable products from Poland into Western Europe, but more recently has focused on significant investments in EHV power cable and a new submarine power cable operation in Szczecin (Stettin) on the Baltic coast."

The only global and regional producers with operations in more than one country are Prysmian Group (Hungary, Slovakia and Romania, and its subsidiary Draka Kabely in the Czech Republic), NKT (Poland and the Czech Republic), and Wilms Group (Czech Republic, Romania).

"Increasingly the leading economies such as Poland, the Czech Republic, Hungary and Slovakia, and more recently Romania have become intertwined with key western European economies. This increase in investment and shifts in production into Eastern Europe has seen demand for cable increase sharply over the last decade," said Stephen Duck, analyst at Integer.

Integer Research – UK
Website: www.integer-research.com

New chief executive

Lars Fagerholm, was appointed CEO of the Maillefer group, as of 12th April this year.

Mr Fagerholm has a broad international experience from several management positions, specifically from his extensive career with Albany International, the leading global supplier of technical paper machine clothing products to the pulp and paper industry.

Maillefer International Oy – Finland
Website: www.mailleferextrusion.net

New company for distribution

Joe Snee has announced the formation of Joe Snee Associates, Inc of Seekonk, Massachusetts. The company will serve as the exclusive North American distributor for the Pressure Welding Machine (PWM) line of cold pressure welders, dies and spares.

In use throughout the world the PWM line offers a variety of models to handle a range of sizes from fine wire as small as 40AWG (0.0031") to 1.181" diameter rod. These machines will also weld strip and other profiles including segment wire.

Mr Snee has nearly 20 years' experience in the wire and cable industry and has sold cold welding products since 1992. He has been affiliated with PWM in various capacities since October 2000.

Joe Snee Associates – USA
Website: www.coldpressurewelding.com

▲ *Joe Snee*

Worldwide experts

FREUDENBERG Nonwovens is a global partner with a reputation for market and customer specific solutions, excellent service and a wealth of expertise in the field of nonwovens.

Freudenberg has 22 manufacturing and processing sites in 13 countries.

The equipment of power and data-transmitting cables belongs to the classic field of application for Freudenberg Nonwovens. In this case, nonwovens are being used not only as a separating or fixing layer, but also and above all as a protection against penetration of water into cables.

The nonwovens protect cables not only against the penetration of humidity, but the conductive tape versions also ensure that a permanent electrical contact is maintained between the shield and the outer semi-conductive layer on power cables.

They also make sure that shield wires are firmly seated, thanks to their outstanding bedding characteristics, while avoiding any damage to the outer semi-conductive layer.

In submarine cable applications, Freudenberg Nonwovens act not only as protection against the penetration of seawater, but also assume further crucial functions inside the multi-layer protective jacket enclosing the cable core. Ocean cables are sheathed with special sheets of metal that are fixed, in turn, by stable and tear-resistant Freudenberg Nonwovens.

Freudenberg Vliesstoffe KG – Germany
Website: www.freudenberg-nw.com

ABB to expand base in India

Power and automation technology group ABB is investing $50m to build new facilities to manufacture power products and transformers in Gujarat, India.

The facilities will produce high-voltage gas-insulated switchgear and plug and switch system hybrid switchgear, as well as dry-type and oil immersed distribution transformers.

ABB's plug and switch system is a hybrid switchgear solution that combines air and gas-insulated technologies. The new oil immersed transformer factory will extend the distribution transformer range by up to 10 megavolt amperes.

The facilities are to be established by the end of 2012.

ABB – UK
Website: www.abb.co.uk

Prospective orders for Windak

More than 100 visitors from 40 different countries paid a visit to the Windak stand at wire 2012 – with five prospective orders lined up from the exhibition.

The company displayed the AR24-D – the latest dual head automatic reeler which was developed for the automatic packaging of cable and wire products on spools and reels between 300mm and 600mm in overall diameter.

Windak – Estonia
Website: www.windakusa.com

▲ *The Windak team at wire 2012*

The secret of Scottish enterprise

▲ *From left: Brian Frame, managing director Rautomead; John Swinney, Scottish Government Finance Secretary and Sir Michael Nairn, chairman Rautomead*

SCOTTISH Government Finance Secretary John Swinney recently visited continuous casting technology specialist Rautomead Ltd in Dundee, Scotland, to learn more about its growth ambitions.

During Mr Swinney's visit, accompanied by representatives of Scottish Enterprise, he heard about the company's business scope, international trade successes, and strategic ambitions from Rautomead's managing director, Brian Frame, and chairman, Sir Michael Nairn.

Established in 1978, Rautomead designs and manufactures continuous casting equipment for the wire and cable industry, the foundry industry and precious metals. The company works closely with the government-funded business support organisation Scottish Enterprise, who most recently provided research and development support and international development assistance.

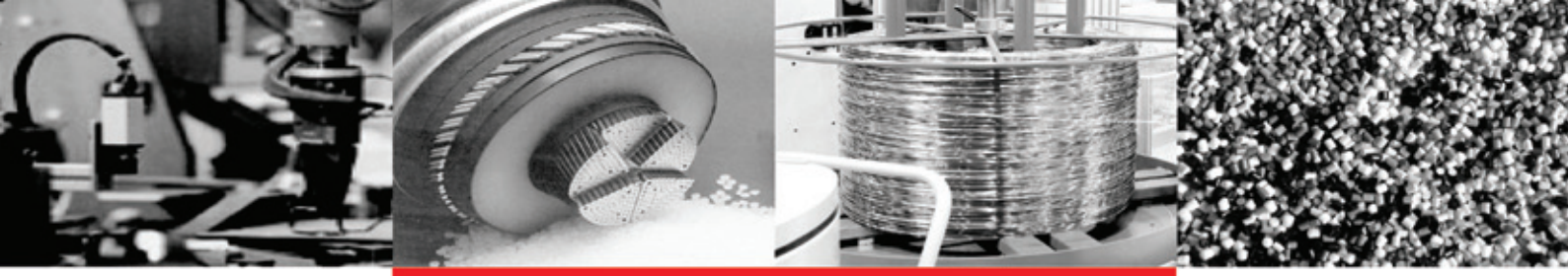
Rautomead has a worldwide marketing presence, with customer installations in 43 countries. The most important regional markets are presently in China, Japan, Thailand, Germany, USA and Brazil. In 2010 the company increased staffing levels from 36 to 50 employees, an increase of almost 40 per cent.

Sir Michael said that the timing of the minister's visit coincided with confirmation of a new seven-figure order for a copper rod-casting machine from Brazil. Mr Swinney showed keen interest in Rautomead's research and development work.

The directors stressed the importance of continuous technical innovation as absolutely essential to keep the company's technology ahead of international competition. Brian Frame emphasised the advantages of close working relationships with universities and colleges and the pressing need for them to develop appropriate courses for the young engineers and technicians for the future.

Mr Swinney was also shown two large completed copper rod-casting machines undergoing final testing in the company's assembly shop.

Rautomead Ltd – UK
Website: www.rautomead.com



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Jiangsu Xinji Machinery Co., Ltd.
Kabelmaschinen - Hersteller
Kolon Industries Inc.
Kos Limited
Kunshan City Hongtai Machinery & Electric Equipment Co., Ltd
Kunshan Sanchi Engineering & Machinery Co., Ltd.
Landgraf S.r.l.
Lee & Lee
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Maschinenfabrik Niehoff GmbH & Co. KG
Max Springs Machinery Manufacturing Co., Ltd.
MIYAZAKI Machinery Systems Co., Ltd
Pan Pioneer Co., Ltd
Polyone Corporation
SAMP S.p.A.
Shanghai Hamana Machinery Co., Ltd.
Shanghai HOSN (HOLD) Machinery Technology Co., Ltd
Shanghai Kechen Wire & Cable Machinery Co., Ltd.
Shanghai Kingstone Cable & Equipment Co., Ltd.
Sheng Chyean Enterprise Co., Ltd.
Sicme Italia Impianti srl
Solvay (Shanghai) Co., Ltd.
Suzuki Garphyttan Wire (Suzhou) Co., Ltd
Teijin Aramid Asia Co. Ltd.
TJK Machinery Co., Ltd
Totoku Toryo Group
Troester GmbH & Co KG
VDKM - Verband der Draht- und Kabelmaschinenhersteller
VÖDKM / AWCMA - Verband Österreichischer Draht- und
WAFIOS AG
WCISA - Wire and Cable Industry Suppliers Association
WKÖ - Wirtschaftskammer Österreich
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Organizers

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Tube CHINA

Concurrent Event: Tube China 2012

Extending the range of solutions

PRYSMIAN Group is extending its range of Reelex packaged Draka cabling solutions across all categories of UC cables from Cat.5e up to Cat.7A (including Coax 10 AD S AL) to cover all of its European markets.

This extended packaging solution is intended to reply to increasing customer concerns about controlling TCO (Total Cost of Operations) as installation complexity and density increases in networking installations across Europe.

Reelex packaging replies to the current need for cable handling convenience and increased installation efficiency. This Reelex time and labour-saving packaging alternative can include more than 300m of Draka UC900 SS23 Cat.7 cable per box and results in easier storage, handling and less wastage during the cable laying process.

The Reelex packing format is a good match for Draka cabling because of the robustness of the patented foil design in the latest Draka Cat.5e to Cat.7A range. Draka UC900 SS23 Cat.7 cable meets IEEE 802.3 requirements for up to 10Gbase-T data applications as well as all other network services over Class EA channels.

▲ *Part of the range of Reelex packaged Draka cabling solutions from Prysmian*

The four 0.56mm twisted pair copper wire conductors are individually screened with Draka patented, high performance, aluminium laminated plastic foil which provides excellent return loss and attenuation characteristics over a 500MHz frequency range.

"We have tried and tested the Reelex packaging configuration over the last two years and have found that with Draka brand cables it provides a highly effective combination for project installations," says Carsten Fehr, EMEA marketing manager Prysmian Group multi-media solutions (MMS).

"We are pleased to present an extensive range of conveniently packaged, high tech cabling solutions that provide full Class EA capability together with robustness to contribute to a quick and easy installation process."

Prysmian Group – UK
Website: www.prysmian.co.uk

Speeding up European distribution

Alpha Wire International has partnered with XpressConnect, a product distribution specialist that supports wholesalers and distributors throughout EMEA, to increase supply chain speed through European stocking.

Initially, the new agreement will mainly focus on Alpha Wire's range of FIT® heat-shrink tubing and cable management ranges. Moving forward, the partnership will also see the inclusion of "C" and "D" Class products, which means that the entire Alpha Wire inventory will be available directly from Europe.

"Alpha Wire represents an important addition to our comprehensive portfolio," said Johan Slot, vice president of sales for XpressConnect.

"Alpha Wire and XpressConnect Supply believe that availability, solution expertise, and courteous and helpful service are core values to our customers. This agreement is therefore a perfect fit for both our companies. I look forward to working with the professional team at Alpha Wire and to developing the partnership in the future."

FIT heat-shrink tubing offers a reliable way to protect and seal terminations or add additional mechanical ruggedness. FIT preferred heat-shrink products are made from premium compounds under the tightest manufacturing controls.

"This means FIT will consistently display excellent physical characteristics such as low longitudinal shrinkage and wide temperature ranges while providing an elegant appearance when used alone or on OEM equipment.

"I am excited about the opportunities this agreement with XpressConnect represents," said Harry Quinn, European director for Alpha Wire.

"The migration to a third-party logistics business model means that we can deliver real value to distributors and wholesalers throughout Europe with 24/7 local support and international reach. I look forward to working with the team at XpressConnect to continue the development of this agreement."

Alpha Wire International – UK
Website: www.alphawire.com

It's a bright new look for Metalube

High-performance lubricant specialist Metalube has unveiled a new fresh corporate look with the launch of a streamlined logo, new barrels and brochures as well as a modern, well-designed website.

The new website – www.metalube.co.uk – is both stylish and contemporary but more importantly is highly functional and easy to use. It will provide Metalube's customers with seamless access to the company's products and services, as well as giving them the technical details required to run at peak efficiency. It is available in both Chinese and English.

David Lee, managing director, said: "Our re-branding is not a revolution but part of our evolution.

"The new corporate identity and marketing tools reflect the company as it is today with science at the core of what we do. I think our 'global specialists in high-performance lubricants' promise is now well projected in the image that we portray."

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

▶ *The new look website from Metalube*

Showtime for new look AEI

AEI Compounds launched its new look at wire 2012 in Düsseldorf, Germany, at the end of March.

Since being bought by Saco Polymers last year, AEI has undergone an image change with a new logo and literature, and this was on show to the public for the first time.

It was also the first chance for the company to present the well-respected Pexidan range from Saco Polymers to customers outside the US market.

Key compounds presented at the show were those with:

- Oil resistance for rail cable and ship wiring
- Char forming properties for fire survival and CPD rated cable
- Crack resistance for use on armoured cable for hot climates
- Flexibility for appliance wiring and cords

Visitors were welcomed on the stand from over 30 different countries with strong contingents from Europe, Africa, India, Middle East, USA and South America.

During the five days AEI was pleased to welcome a large number of their existing customers as well as making the acquaintance of a number of important new contacts.

Colleagues from the USA also joined AEI, giving their support and taking the opportunity to meet many of these customers for the first time. In September AEI will be present for the first time at the wire China 2012 show in Shanghai.

AEI Compounds – UK
Website: www.aeicompounds.co.uk

Transatlantic Cable

Automotive

At twice the price, is an alternative-fuel General Motors car that much more virtuous than an 'ordinary' GM model?

In the new metric of electric miles, the 2011 Chevrolet Volt has provided its maker with some striking statistics. According to General Motors records, Chevy Volt owners have driven their $40,000 cars the equivalent of many trips around the world and not a few to the moon and back.

Collectively, the company says, they have saved a supertanker's worth of gas since the extended-range plug-in went on sale in the US in December 2010.

On the basis of the Volt owners having driven more than 40 million miles on electricity alone, they would have saved about 2.1 million gallons of fuel.

Automotive reporter Fred Meier of *USA Today* accepts that "GM should know," since it monitors the operation of all Volts through its GPS (global positioning system) feature OnStar. The Volt can go about 35 miles on the plug-in charge before the gas engine kicks in. ("GM Says Volt Owners Saved Supertanker of Gas," 17th May).

The OnStar monitoring indicates that Volts are being driven about 60 per cent of their miles electric-only, so they have also gone about 27 million miles on gasoline. Volt marketing director Cristi Landy interpets that this way: "With each click of the odometer, Chevrolet Volt owners are measuring their contribution to reducing America's dependence on foreign oil and to preserving the environment."

Ms Landy added that the Volt people saved about $8 million at the pump, minus the cost of the electricity. Therein, to Mr Meier, lies both the virtues of the car and the rub, "at least for folks of average means."

His reasoning: The $8 million will offset the (approximate) $535 million the owners spent to buy 13,374 Volts from roll-out through April of this year, plus the cost of chargers in their garages.

But those owners would have spent half that amount if they had bought the Chevy Cruze Eco, a comparable car with a sticker price of around $20,000.

Even considering the tax writeoffs (call them government subsidies) available to buyers of the Volt, Mr Meier points out that an Eco owner would still be money ahead for years.

Nor do the Volt's lower fuel costs wipe out the advantage, since the Eco is no gas hog, either. It delivers 28 miles per gallon in city driving; 42 mpg motorway; 33 mpg combined.

Mr Meier said that this is not to knock the high-tech, innovative Volt – just to question the economics of ownership. He wrote that, unless the price premium for plug-in electric vehicles – notably the $10,000-$15,000 current cost of a battery with kilowatt-hours enough for an electric car – is narrowed, EVs will "remain halo cars for car makers and ecologically virtuous, well-to-do buyers."

Doing the arithmetic for such prospective buyers, General Motors construed these equivalents for the 40 million electric miles clocked by the Volt owners:

- 16,373 cross-country trips (2,443 miles New York-Los Angeles)
- 1,606 trips around the world (24,901 miles each)
- 167 moon trips (238,657 miles each)

As to fuel savings, 2,130,000 gallons of gasoline not burnt equal:

- 50,714 barrels (42 gallons per barrel)
- 387 semi-truck tankers (5,500 gallons each)
- One supertanker of fuel (2 million gallons)

Early respondents to the online version of "GM Claims" demonstrated the highly charged tone of discussions of US automotive ecology:

- Love my Volt and happy to be saving oil
- Love my Volt too. It might use fossil fuel for the electricity but at least it's American fossil fuel and much cleaner than gasoline

You may love your Volt because you like being green and American, not because you are saving money. Maybe some things are more important than money. Like being green and American?

Elsewhere in automotive . . .

- Ford Motor has chosen China for its largest factory expansion programme in a half-century. The news, on the eve of the Beijing auto show in April, of a $760 million Ford assembly plant to be built in Hangzhou was the second such announcement within two weeks.

The US company had already said it would be building another, $600 million, assembly plant in Chongqing, only weeks after having completed an assembly plant there.

Until early this year, Ford had a manufacturing capacity in China of 450,000 cars per year, in what has become the world's largest market. But it plans to have an annual Chinese capacity of 1.2 million cars by 2015.

Ford's expansion in China comes as a long list of American, European, and Japanese automakers are building factories there – and facing competition from fast-growing, low-cost Chinese manufacturers in a market contracting after a decade of double-digit annual growth.

Steel

Steel demand in the US is set to rise 5.7 per cent this year

Slackening growth in China, the world's biggest consumer of steel, has prompted the World Steel Association to cut its forecasts for global use of the commodity by nearly two percentage points for the year ahead.

The WSA said on 26th April that it expects global demand to rise 3.6 per cent in 2012 to 1.42 billion metric tons. Its previous forecast of a 5.4 per cent rise was adjusted downward as the Chinese growth slowed.

Steel demand in the US is projected to grow 5.7 per cent this year and 5.6 per cent next year, bringing US consumption of steel to 99.5 million metric tons by the end of 2013. Demand is forecast to grow almost 7 per cent this year in South America and in India.

The WSA said that steel demand in emerging economies will be 45 per cent above 2007 levels, while demand in developed economies overall will be 14 per cent below those levels.

That disparity between developing and developed economies will grow further, the WSA said, with emerging economies expected to account for 73 per cent of global steel demand in 2013, up from 61 per cent in 2007.

Doing as the Belgians do rejuvenates ArcelorMittal's Burns Harbor steel plant in the American Midwest

"Robots are in. Pencils are out."

John W Miller of the *Wall Street Journal* was referring to an experiment at the Burns Harbor steel mill in Burns Harbor, Indiana, which has resulted in a second life for the nearly 50-year-old facility on the shores of Lake Michigan. In 2008, the plant – owned by Luxembourg-based ArcelorMittal – was "twinned" with a hyper-modern mill in Ghent, Belgium. Over 100 Burns Harbor engineers and managers were flown to Europe with instructions to observe the Belgians at work – and then to implement those methods on their own side of the Atlantic.

After studying the practices followed in Ghent, the Burns Harbor managers installed a new computer system, run by software developed in Belgium, that sharpens the timing of the steelmaking process.

This has generated an increase in the number of heats – 298-ton cauldrons of steel – from 42 to 50 per day. In 2011, according to company spokesman Bill Steers, Burns Harbor achieved record output of 4.8 million tons of steel slabs, ready for cutting into strip, coil, plate, and other basic semi-finished products. ("Indiana Steel Mill Revived With Lessons From Abroad," 21st May).

Smaller changes include such refinements as the adjustment of hose nozzles and trimming less steel off the side of coils, and productivity is now at almost 900 tons per employee per year.

This stellar showing is attributed largely to the twinning with the Ghent mill, which apparently cuts both ways: the Belgian plant has brought its equivalent measure close to 950.

Some $150 million has gone toward capital upgrades at the Burns Harbor mill, on a 3,300-acre site some 50 miles southeast of Chicago.

The plant, with its two blast furnaces, was built by Bethlehem Steel in 1964 as a supplier for Detroit's booming car industry. It is now one of ArcelorMittal's largest facilities in the US and still primarily serves the automotive industry.

As to the Belgian "twin," the Ghent facility is also centred on the automotive industry. Established by ArcelorMittal in 2001, it produces both shaped (pressed) steel blanks and tailored welded blanks for a customer base that includes Volkswagen, Renault-Nissan, Daimler, Audi, and Ford.

- A photo-montage at wsj.com of the Burns Harbor plant concluded with a timely caption: "Steel is not a shrinking industry. Last year, 1.5 billion tons were produced in the world, an all-time record."

Elsewhere in steel . . .

- In other news of ArcelorMittal, the world's biggest steelmaker has agreed to sell Skyline Steel LLC (Parsippany, New Jersey) to Nucor Corp for about $605 million, enabling Nucor to add speciality steel distribution in North America and the Caribbean.

  The acquisition gives the largest US mini-mill operator control of a company that has distributed its steel plate and sheet products for more than two decades, Nucor said. In a separate statement on 17th May, ArcelorMittal said that Skyline had sales of $873 million last year.

  With the Skyline purchase, Nucor (Charlotte, North Carolina) gains 21 sales offices as well as fabrication and distribution facilities. Luxembourg-based ArcelorMittal, which is to retain control of Skyline's Latin American operations, said the sale was in line with its strategy of selling non-core assets and reducing debt.

  Skyline will retain exclusive rights to sell ArcelorMittal's piling and foundation products in North America and the Caribbean.

Transatlantic cable

Business spending

After years of hoarding cash, American companies show signs of loosening the purse-strings

Matthew Philips, an associate editor for *Bloomberg Businessweek*, noted one of the many ironies of the last few years in the United States: the Federal Reserve lowered interest rates in order to (among other things) compel businesses to spend their cash rather than save it.

And yet, Mr Philips wrote: "The pile of corporate cash has grown astronomically in the face of interest rates kept near zero. According to Moody's [ratings agency], US corporations were sitting on $1.24 trillion of cash at the end of 2011. That's more than 8 per cent of the entire US economy."

Accounting for nearly a quarter of the giant stash are just five companies – Apple, Microsoft, Cisco, Google, and Pfizer (pharmaceuticals) – with a combined $276 billion in cash and cash equivalents.

While some firms have been putting some cash to work, more than half of the grand total has been driven overseas by the 39 per cent US corporate tax rate, the world's highest. And much of the outlay at home has gone toward such items as dividend hikes and stock buybacks, with scant stimulating effect on the economy.

But according to Mr Philips some recent data suggest that change is in the air ("Companies May Finally Be Starting to Spend That Cash," 4th April).

Businessweek cited three hopeful indicators:

- The latest survey of small firms by the National Federation of Independent Business shows that 57 per cent of firms have made a capital expenditure over the six months through 31st March, the largest percentage since March 2008. Much of that appears to be going toward big-ticket items.

  A combined 63 per cent of firms report spending on new equipment and vehicles. Nineteen per cent of firms reported having spent $10,000 to $49,000 over the six months, while 11 per cent said they spent $100,000 or more.

- A survey by American City Business Journals of 2,200 executives of companies with up to 499 employees found that they expect to increase spending by 5.9 per cent this year – and that may be low. Last year's study of the same respondents prompted the estimate of a 4.7 per cent rise, when in fact spending increased 15.3 per cent.

- In a 30th March report, Citigroup's chief US equity strategist Tobias Levkovich pointed to a "clear acceleration" in the capital spending intentions of the 735 non-financial public companies covered by Citi's equity research analysts. "[It is] very clear that business has stepped up, even from levels considered in early January," he wrote. "Indeed, capital spending intentions are now up almost 11 per cent for 2012 versus 2011, as compared with the previously planned 6 per cent increase."

  Mr Levkovich summed up in a phone interview with *Businessweek*: "Despite a fair amount of uncertainly related to China and Europe, there is a willingness among businesses to invest when it makes sense to do so, which is quite encouraging."

  For his part, Mr Philips pointed out that the increase in capital expenditure should also bode well for the employment picture in the US, since increases in capital spending tend to be accompanied by hiring.

  He wrote: "After all, if you're going to buy a new piece of equipment you're probably going to need someone to operate it."

As the world's economic outlook brightens, IT spending is expected to accelerate this year

Although it dropped its forecast for IT spending growth in 2012 from 3.7 per cent to 2.5 per cent, the information technology research and advisory company Gartner Inc (Stamford, Connecticut) says the outlook for global IT spending is improving.

The lowered growth rate estimate was said to reflect economics – in particular the continued strengthening of the US dollar versus other currencies – rather than a drop in real IT spending.

When the Gartner analysts looked at worldwide IT spending in constant US dollars, the true rate was 5.2 per cent for the year, up from a previous forecast of 4.6 per cent.

"The euro zone crisis has abated somewhat, fears about the Chinese real estate bubble have waned, and the HDD [hard-disk drive] shortage, while serious, has not caused significant disruption to hardware system spending," Richard Gordon, research vice president at Gartner, said in a 5th April post on the firm's blog.

In his view, the somewhat brighter outlook is prompting consumers and enterprises to spend on IT products and services.

As noted by Jeffrey Burt at eWeek, the massive flooding last year in Thailand, while severe, did not impact the hardware market as badly as feared at first. He pointed to numbers released 3rd April by market research firm IDC (Framingham, Massachusetts), showing that HDD unit shipments worldwide fell only 4.5 per cent in 2011.

Efforts to stabilise the industry in Thailand and in tsunami-ravaged Japan will likely succeed in returning production of HDDs and related components to pre-disaster levels in the second half, IDC said.

While Gartner is expecting US government IT spending to be flat in 2012, other areas should see strong growth. The small and mid-size business (SMB) market – which Gartner analysts said accounts for about 25 per cent of all enterprise IT spending, should hit $874 billion this year, and grow to $1 trillion by 2016. The SMB space will outperform other markets over the next few years, thanks to demand for enterprise software, the analysts said.

Transatlantic cable

According to Gartner the global telecom equipment market will grow 6.9 per cent in 2012, to $472 billion. The continued explosion of the mobile device space will fuel much of the growth for telecom equipment vendors.

There is also growing demand for enterprise networking equipment, particularly in the areas of application acceleration, network security, wireless LAN, and Ethernet switches, Gartner said.

A survey of small businesses in Ohio uncovers a phenomenon: half of them do without a website

When business reporter Marcia Pledger of the *Cleveland Plain Dealer* visited a local family-run tool-and-die business, she was not surprised to see the owner's son cutting an 8,000-pound cast iron clutch with a computer-driven machine.

Something else did deliver a surprise: after nearly five decades in existence, the company still does not have a website.

Even more startling is that the business is in good company. According to a survey by Google and the global market research firm Ipsos, while 97 per cent of Americans look online for products and services, 58 per cent of the small businesses in the US have no website.

In Ohio, the holdouts make up half of all small enterprises. ("Is Your Business Online? About Half of Small Companies in Ohio Don't Have Websites," 19th May).

Ms Pledger reported that, according to Google's research, small American companies (250 employees or fewer) do not bother with websites primarily because they think setting them up is too hard, too costly, and too time-consuming. While none of that is true, something else is.

The reality, the *Plain Dealer* was told by Rebecca Ginsberg, a Google representative in New York, is that "mall businesses are the backbone of this country, but a lot of them are missing out on opportunities by not being online."

Google is trying to nudge small businesses into the Internet age. The search engine giant has teamed up with Intuit Inc, a payroll services company, in a year-long project to encourage more businesses to go online.

Intuit is offering free, easy-to-build websites, then charging a $6.99 monthly hosting fee for a year. So far, about 100,000 small businesses have taken advantage of the project, including thousands in Ohio.

The Google/Ipsos survey disclosed that 54 per cent of Ohio businesses, of whatever size, do not have websites, thus putting the state close to the national average.

The percentage of businesses without websites in New York is 53 per cent. In Kentucky, it is 71 per cent.

Transatlantic cable

Donna Dabbs, director of the Cleveland Small Business Development Centre, said she would have expected the total nationwide to be closer to 25 per cent.

Finding the survey results bracing, Ms Dabbs said she plans to offer free forums on website development to help more businesses get online.

- Ms Pledger observed that many Ohio businesses have put off developing a website, not because they are opposed to having one but because they just have not made it a priority. On this point, Mary Kaye Denning, president of the Cleveland marketing firm Manufacturing Mart, had some input.

  After putting on a downtown expo in February that attracted 137 attendees, she believes that local industry has awakened to the importance of an online presence.

  "The mindset for many manufacturers is that when you do something really well, people know you do it," Ms Denning told the *Plain Dealer*. "It wasn't until China came on the scene pitching on price that a lot of small manufacturers had to change their ways of meeting new customers."

Telecom

With a plan to share Wi-Fi hot spots, US cable operators seek to curb customer drift to wireless providers

At a cable industry conference held in Boston in May, five of the biggest cable operators in the US announced an agreement to cooperate in providing their combined customer pool with Wi-Fi service in public places.

The addition of Cox Communications and Bright House Networks builds on an existing collaboration among Comcast, Time Warner Cable and Cablevision.

Over the last two years, in parts of the Northeast, customers of any of the three companies have had free use of the Wi-Fi hot spots of the others.

Brian Stelter, "Media Decoder" blogger for the *New York Times* (21st May), observed that the hot spots (more than 50,000 nationwide in places like malls, arenas, and parks) are being marketed as a benefit for cable customers, giving them a reason not to switch providers.

He wrote: "They also position broadband-via-cable as an alternative, or at least a supplement, to the services of wireless companies like AT&T and Verizon, which are more closely associated with wireless phone and data subscriptions."

Mr Stelter noted that, with little to show for the effort, cable companies have been trying for years to come up with a wireless strategy to blunt the growing influence of AT&T and Verizon.

Cox mounted a direct challenge to the two companies by trying to sell its own wireless phone and data service.

But it abandoned the venture in November, citing, among other factors, "the lack of wireless scale necessary to compete in the marketplace."

Weeks later, Comcast, Time Warner Cable, and Bright House made a joint announcement. Rather than build out networks of their own, they would sell their wireless spectrum to Verizon and thereafter market Verizon's service. Cox subsequently adopted a similar plan.

Cablevision has many more Wi-Fi hot spots than other cable companies – more than 35,000 – and a company statement summed up its subtly different thinking about the new agreement: "We believe that Wi-Fi is a superior approach to mobile data, and that cable providers are best positioned to build the highest-capacity national network."

Of related interest . . .

- According to a report released 17th May by Insight Research, the US telecommunications industry continues to expand as business spending for wireless services fuels industry revenue growth.

  The New Jersey-based market research firm estimates that all US businesses will spend $154 billion for telecommunications services in 2012. Business spending on wired and wireless calling will grow to $184 billion by the end of 2016, indicating a CAGR (compound annual growth rate) of 4.8 per cent over the period. "Telecom Services in Vertical Markets 2011-2016" finds that business spending for cellular and other wireless services is creating all of this growth.

  While US business spending for wireline services is essentially flat over the five years 2011-2016, wireless expenditures are expected to grow at a compound rate of 9.4 per cent. "As US business activity recovers, employment and network traffic increase," said Insight research director Fran Caulfield. "In parallel, business applications shift to the cloud and end users shift to wireless access, driving higher network and wireless revenues for service providers."

Dorothy Fabian – USA Editor

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How much time does cable have in an emergency?

TO ensure safe evacuation of a building in the event of a fire, there are a combination of active fire systems such as emergency lighting, smoke control and extraction, gaseous fire extinguishing and firefighter support systems that need to be factored in.

Many of these systems require electrical power supplies and control circuitry to remain fully functional throughout a potentially serious fire lasting many hours. An example would be in a high rise building where it is vital that power supplies for fire-fighting lifts, smoke extract systems and emergency lighting remain intact for a prolonged period to ensure safe evacuation and effective fire fighting.

There are two different types of cable on the market. Those that, when subjected to fire, have low smoke emissions and are flame retardant, and those that are fire resistant, which will continue to operate for a certain period of time.

Normal armoured power distribution cables such as BS5467 or BS6724 have limited performance against a sustained fire attack. Cables which need to remain operational throughout the fire need to be robust not only to fire, but also to 'shock' damage from falling items of building structure and resistant to the effects of water spray from sprinklers or from fire fighting activities.

Some well-established cable types, such as mineral insulated cables to BSEN 60702-1, remain very effective under such circumstances and are usually smaller in diameter than the equivalent armoured cable.

A new cable fire test, BS8491, has been developed to provide assessment of cables larger than 20mm diameter. The test incorporates direct fire attack, mechanical attack and water spray, over a variable time up to two hours. The enhanced performance categories are classified as F30, F60 or F120, reflecting the length of time in minutes of the BS8491 fire test. BASEC recommends that specifiers choose BS7846 F120 to ensure such cable has been tested to withstand up to two hours of fire.

Gaining BASEC product approval for a fire performance cable is a prestigious mark of quality for a cable manufacturer. BASEC approval includes all the tests specified for a cable type and its constituent materials, not just a single fire test.

▲ *Testing cables to keep you safe*

A cable may be seen to pass a single fire test, but if its construction is incorrect or its materials do not last very long this would be a poor value product.

BASEC conducts a full range of tests on each cable type, including electrical, mechanical, materials, chemical and fire tests as specified in the cable standard and in all the subsidiary standards referred to.

BASEC – UK
Website: www.basec.org.uk

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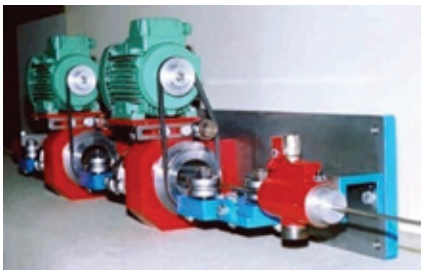
Rod dry cleaning by micro-abrading at 2.2 to 3.4 tonne per hour

DEVELOPMENT of wire rod Smooth-Brush (SB) system by ultra-fine brushing replaces the most costly operations in wire drawing process, including acid and wet pre-coating chemicals, providing substantial cost savings, environmental benefits and improvements in productivity.

In rod cleaning applications, the SB incorporates revolutionary new technology which continuously uses liberated rod scale converted into a unique micro-abrading pressure pads to effectively remove residual solid contaminants from base material.

For wire cleaning, the SB incorporates high density ultra-fine brush bristles that finely impact wire surface separating lubricant residue from base material, evacuating dispersed contaminants by moving wire, exiting the unit clean of white-metal appearance.

The SB system features in-line smooth



▲ *Rod/wire cleaning by SB brushing system*

ultra-fine brushing at no speed limitation providing an extra-clean rod or wire of white metal appearance, providing:

(a) rod surface specific finish by micro-abrasion, adjustable at will, which is ideal for in-line dry coating/lubrication and direct drawing of mechanically descaled H/C and L/C rod (including 0.90%C), and

(b) drawn wire cleaning/polishing for metallic and plastic coating applications.

The system provides an extra-clean product by transversal high-speed ultra-fine brushing all around the rod or wire circumference with automatically controlled brush pressure, adjustable at will, and ensures unchanged rod/wire physical properties with no residual stress induced, operating virtually at zero consumables cost (one set of brush inserts cleans 100-120 tonnes of wire rod) and zero energy consumption.

The SB system is recommended for use where the surface finish is of great importance. The system offers consistency and can benefit demanding applications including plating wire, cold-heading wire and H/C wire where the ductility is a prime focus, particularly in production of spring wire, bead wire, PC strand wire, etc.

Decalub – France
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Email: info@decalub.com
Website: www.decalub.com

November 13-16, 2012

Halls 69, 75, The All-Russia Exhibition Center, Moscow

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▲ *The new 3S-PCX from DCM*

New broadband telecom cable test

DCM Industries, a leading worldwide producer of cable test and measurement solutions and now part of Beta LaserMike, has released its new 3S-PCX broadband telecom cable test system and new CATS-3000 shielding effectiveness test system.

Utilising DCM's solid-state-switching platform, the company introduces a new generation of test systems for telecom cables. The new Model 3S-PCX covers the complete range of applications for telecom cables, from 100 kHz to 100 MHz applications.

Traditional as well as new international telecom cable standards for xDSL and other broadband applications (including ASTM, IEC, ANSI-TIA) can be quickly and automatically tested.

The feature-rich 3S-PCX includes 26-pair/52-pair/104-pair test fixture options, dual impedance features, and updated test reporting.

The new Model CATS-3000 from DCM provides a tri-axial test fixture and test automation software enabling the testing of all three of the standard shielding effectiveness test parameters required for data cables.

Utilising the CATS-3000 test solution, combined with a suitable vector network analyser, cable producers and test laboratories can quickly and efficiently perform shielding effectiveness tests.

In addition to the 3S-PCX and CATS-3000 systems, DCM representatives will be available during the show to discuss the following solutions for cable production applications:

- 3SXLD – comprehensive LAN cable testing solution for Cat 5e, Cat 6, Cat 6a, and Cat 7 cables
- ES-2G – efficient compliance testing of high-performance, individually shielded, twisted-pair (Cat 7 ISTP, S/STP) cables
- SCS-350B – cost-effective compliance testing of high-performance LAN cable and cable assemblies (patch cords)
- RF/COAX – fully integrated test system for high-performance coaxial cables
- LF-2000 – twisted pair cable testing solution for analysing capacitance and resistance LCR
- TCL/TCTL – LAN cable testing solution to test Transverse Conversion Loss (CAT 6a)

DCM Industries – USA
Website: www.dcmindustries.com

New welder for rods up to 26mm diameter

GERMANY'S August Strecker presented its most recent development at wire 2012 – a welder with vertical orientation of the wire axis for wire rods up to 26mm diameter. An enlarged range up to 30mm diameter is planned by the end of this year.

Not only is the "SS 120" machine able to join the ends of hanging wire coils in the radius, eg without straightening the ends prior to welding, but it incorporates an automatic deburring process which produces welds of identical cross-section compared to the original material.

Reworking through manual flash removal is unnecessary which is an enormous step forward considering that earlier, using conventional welding machines, the welding flash had to be removed through time-intensive manual work.

Automatic flash removal means not only enormous time savings, but also simplification of the operator's work. Additionally, there is no risk of wire breaks due to excessive deburring, ie reduction of the cross section at the welded joint.

▲ *The new SS 120 from August Strecker*

Equipped with dual upset technique, the machine produces welds of excellent quality. Nearly all the heated and therefore molten material is pressed out of the joint so a weld with extremely high tensile strength is created.

It is also the first time Strecker has offered a so-called "handling unit" to relieve the operator from physical strains of gripping the wire rod and pulling it into the welder – a job almost impossible to achieve for wires this big by a single person.

On the new design, the operator only manipulates the joysticks to move the hydraulic arms and seize the material, bring it to an incorporated cutter which at the same time serves as a tool to centrally position the material in the welder.

Once the automatic welding and deburring cycle is finshed, the arms again help to push the material back into position, reducing the risk of accidents by a wire snatching back due to self-tension in the material.

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

Static coiler MS series from Frigeco

DESIGNED to be suitable for both copper and aluminium, Frigeco's MS series is a versatile stem-pack coiler for any application.

It can be supplied with different head diameters from 630 to 1,000mm and can suit all basket dimensions.

The MS series is supplied with an independent cabinet, to be placed in-line with existing drawing machines. A special dedicated version is a perfect take-up solution for electro-plating lines.

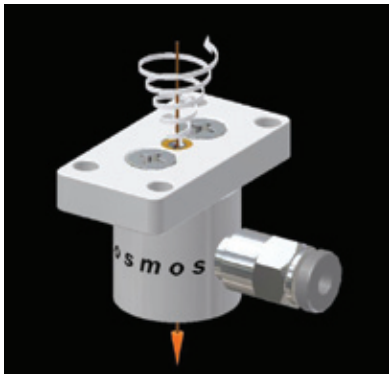
Featuring fully automatic changeover, the Frigeco MS series can be completed by motorised conveyors for both empty and full baskets, customised to customers' needs.

Great attention has been given to the operator's accessibility and space, as well as to the reduction of the set-up time.

Frigeco's machinery range, from wire drawing to extrusion and stranding, covers the whole range for the wire and cable industry.

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

▲ *The new MS series from Frigeco*



▲ *New mini-wipe from Cosmos*

A mini-wipe that cleanses bare, fine gauge wire

The new mini-wipe from Cosmos features a Vortex air stream, diamond polished wiping cylinders and exchangeable centring guides.

The machine is dedicated to cleanse bare, fine gauge wire of Ø 0.025-Ø0.71mm with air velocity within the air wipe exceeding the speed of sound while consuming only 0.1-0.2 cubic foot per minute of compressed air.

A range of exchangeable wiping cylinders and centring guides are available to realise the optimum combination of wiping cylinder and centring guide for the wire diameter customers have in mind.

Cosmos Enterprises Co Ltd – Taiwan
Website: www.cosmos-na.com

For fine and extra fine wire

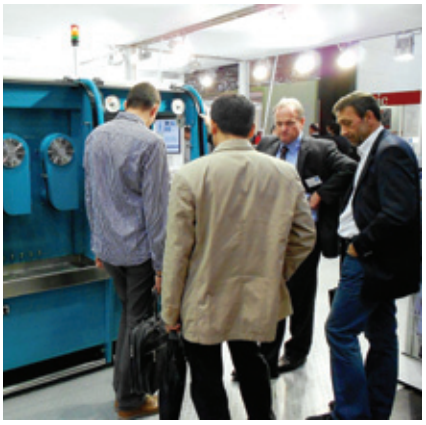
CPA Wire Technologies presented the new Linnox wet drawing machine for fine and extra fine wire at wire 2012.

The machine is the perfect addition to the high quality product lines of CPA for wire production and sets new standards in the manufacturing of premium fine and extra fine wire.

The Linnox wet drawing machine was especially developed for drawing high-strength steel wires beginning from a finished diameter of 0.06mm and operates according to the principle of a sliding wire drawing process.

State-of-the-art components and a user-friendly operating system enable an automated as well as error-free production. CPA's innovation impresses with its unique drive concept, low installation and maintenance effort, installation without foundation and low energy consumption.

Additional advantages of the system are the wire-efficient inline-wire straightening and testing unit, the straight wire behaviour, the gimbally stored final drawing dies, the guided identification of the wear of the drawing die and the highly versatile lubrication systems.



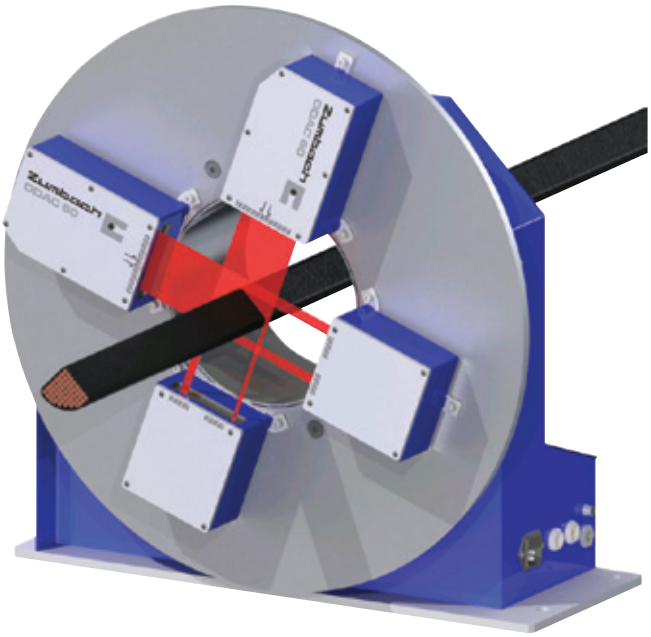
▲ *Linnox wet drawing machine for fine and extra fine wire by CPA*

The product lines of CPA Wire Technologies include continuous plating plants, heat treatment technologies and high-tech wire machinery, for example another innovation, the ROTACC PV/TV payoffs and take-ups, the system for the partly automated operation with automated guided vehicle systems.

These products are complemented by the control systems developed by CPA Computer Process Automation.

CPA Wire Technologies GmbH – Austria
Website: www.cpa.net

Accurate in-line dimension control for sector cables



▲ *Oscillating DVW 2 measurement device*

ZUMBACH Electronic has extended its well proven Jacketmaster system for sector insulations and sector cable jackets with the new oscillating DVW 2 measurement device.

Straight and pre-spiralled sectors, solid and stranded, aluminium and copper can be measured and controlled.

Width, height and insulation thickness as well as diameter, ovality and jacket thickness can be measured and calculated at accuracies within a few 1/100mm.

Two highly precise DVW 2 measurement devices capture dynamically the relevant dimensions at high rates, before and after the extrusion.

With an optional third measuring head at the cold end of the line, the hot-cold shrinkage can automatically be compensated.

The Jacketmaster processor works with sophisticated software. It displays all important data in numerical and graphical form, monitors tolerances and controls the process for optimised thickness and material consumption.

It also calculates statistics and has all necessary outputs for interfacing with external networks.

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

Quality and adaptability

Quality should be the fixed goal for any serious producer of tape machines, and the field of tape machine production is the core to more than 50 years of Palmarin Mario's activity.

Paper, polyester, PTFE, glass-mica, Kapton, Mylar, are some of the materials that have been presented over the years in the cable world. But one of the major problems for producers of tape machines and cable manufacturers is tension.

For years Palmarin has worked on the creation and completion of a new system to achieve constant tension throughout the whole process of taping.

The company has now patented the highly efficient system that ensures a constant tension of the material to be taped, thanks to the self-compensating clutch mechanism.

This self-compensation mechanism is used by both heads of the taping (unwinding) flyer.

The device is totally mechanical and needs only minimal intervention during both production and maintenance.

Another very important problem is the overlap of the tape. In this case, Palmarin has found an optimal solution thanks to the electronic system implemented in taping lines. Special, easily adjustable software, ensures a perfect overlap of the various layers of tape.

The research and development department is also developing an innovative control and manufacturing management system.

The company also prides itself on being adaptable to meet the needs of its customers.

Palmarin Mario snc – Italy
Website: www.palmarin-snc.com

Reels for all in the GMP range

GMP SLOVAKIA'S range of products includes many different items, starting from normal steel reels, take apart reels and all the equipment suitable to handle reels and coils with standard or special dimensions.

The application of these products is wide and different. There are items suitable for drawing, buncher and stranding steel, copper or aluminium wire and many of them can be used both for winding and unwinding processes.

HD-Heavy Duty type reels, for example, can be used for steel wire drawing process and also for pay off process. This reel has a machined barrel to avoid damage to the wound wire, and is dynamically balanced for high speed. It can be supplied with wire accumulator system for continuous process.

Another suggested reel for both applications is the MR-Massive Reel, which has strong construction for drawing and stranding steel wire process. The reel is normally supplied with high strength, hardened changeable bushings fixed by screws or by welding points. Many different dimensions are available, starting from 355 to 1,250mm flange.

▲ *Part of the range from GMP Slovakia*

GMP Slovakia also manufactures carries to load wire that is used for the production of annealed and galvanised wire. These carries can have a very easy structure, completely manufactured by tubes or can have a big central barrel in bent sheet.

Both types are made in welded steel structures and they can be painted or zinc galvanised. These carries can also be used for off shore cable pay off and have large dimensions, according to customers' specifications.

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

Follow us on Facebook

You can now keep right up to date with all the latest in the wire and cable industry, simply by signing up to be our friend on Facebook.

We update the site weekly, giving you the latest news of all the happenings in the industry, from the serious company buy-outs and mergers to the more light-hearted features.

Extended travel materials testing machine

THE new LS2.5 materials testing machine completes the family of single column instruments from Lloyd Instruments, which also includes the LS1 and recently launched LS5 materials testing machines.

The LS2.5 features 1,400mm crosshead travel and high speed range of 0.01-2,032mm/min, making it ideally suited for testing plastic, rubber and other high elongation materials.

From stand-alone operation via the convenient, integral control console to PC-control using Lloyd Instruments' well-respected NEXYGENPlus materials testing software, the LS2.5 is an affordable, easy to use system.

With a force capacity of 2,500N (562lbf) and using high accuracy interchangeable YLC Series loadcells for tension, compression and cycling through zero force measurements, the LS2.5 load measuring system exceeds the requirements of all recognised international standards.

Modern linear guide technology, pre-loaded ball screws and advanced software compensation means that there is no compromise on mechanical stiffness over the extended crosshead travel range.

A small tabletop footprint and large work area combine with a wide range of standard grips and fixtures, extensometers and software to establish the LS2.5 as a versatile materials testing system capable of making tensile, compression, flexural, friction, insertion/extraction, peeling, tearing and creep/relaxation tests on a vast range of material types and components.

An integral console with a membrane multi-function keypad and easy to read backlit LCD provides stand-alone control and display.

The control console displays prompts and menus as well as load and extension information, to guide the user through machine operations. The system is capable of storing up to 600 test results from a choice of ten programmable test set-ups.

Direct linking to a laptop or PC via a USB interface allows control of the LS2.5 by the powerful and flexible NEXYGENPlus material test and data analysis software.

The NEXYGENPlus User Configurable Test functionality complements a comprehensive built-in test standards library and test information can easily be exported to Microsoft products such as Word, Excel and Outlook.

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

▲ *The LS2.5 from Lloyd Instruments*

Short delivery time on whole Queins range

QUEINS' product range covers column-type, cantilever-type, bridge-type, self-traversing portal-type, heavy rotating take-ups and pay-offs for power and telecommunication cables, as well as for steel wire ropes.

Machines for reel sizes between 2,600mm (98") and 4,500mm (177") are available with short delivery time.

Standard sizes for take-ups and pay-offs are manufactured in a range from 3 to 300 tons of drum weight.

Queins Machines – Germany
Website: www.queins.com

▶ *A heavy duty traversing take-up stand for up to 300 tons load (with steel wire rope) and reel flange diameter of 6,000 mm (236")*

Teijin has it taped!

TEIJIN Aramid has a new and improved way of protecting optical fibre cables: Twaron Tape.

Optical fibre cables play an increasing, essential role in today's telecommunications, and their fragile cores need protection from various hazards and strains.

Optical fibre cables are getting smaller and smaller – and at the same time it becomes more difficult to protect the core. Twaron Tape is an aramid fibre matrix construction that enables the production of optical fibre cables with a diameter as small as 1.2mm. Simultaneously, it provides three to five times better crush resistance compared to currently used aramid fibre protection.

The production of thinner cables using Twaron Tape results in several more advantages compared to current solutions.

Teijin Aramid – Netherlands
Website: www.teijinaramid.com

Borealis and Borouge launch Borlink™ and set new standards

BOREALIS and Borouge, a leading provider of innovative, value-creating solutions for the wire and cable industry, have launched Borlink™, a technology platform offering a complete global package of power materials, experience, knowledge and support.

Borlink™ is a wire and cable industry-wide platform cross-linking the technology, products and expertise to connect networks and grids as well as people and their access to energy.

The establishment of Borlink represents another step change innovation, specifically for the wire and cable power industry. It underlines Borealis and Borouge's commitment to the industry as it provides an outstanding resource to help meet the challenges the industry faces in the future.

By establishing Borlink, Borealis and Borouge have elevated their total network of support to a new level by helping to facilitate the linking of different grids and energy sources together both regionally and globally.

Key innovations of Borlink include a tailor-made high pressure (HP) process for the production of high purity and super clean low density polyethylene (LDPE) base polymers with superior electrical properties and the introduction of a closed loop (from monomer to final packaging) which avoids contamination and ensures homogeneous and high quality clean compounds.

Applying these technologies enables Borealis and Borouge to deliver a wide range of material solutions such as their unique Supercure™ cross-linked polyethylene (XLPE) for high productivity, as well as the first globally available solutions for high voltage direct current (HVDC) cable applications.

The value of these innovations was underlined by Frost & Sullivan, who awarded their 2011 Europe Product Leadership Award in the HVDC Insulation Market to Borealis.

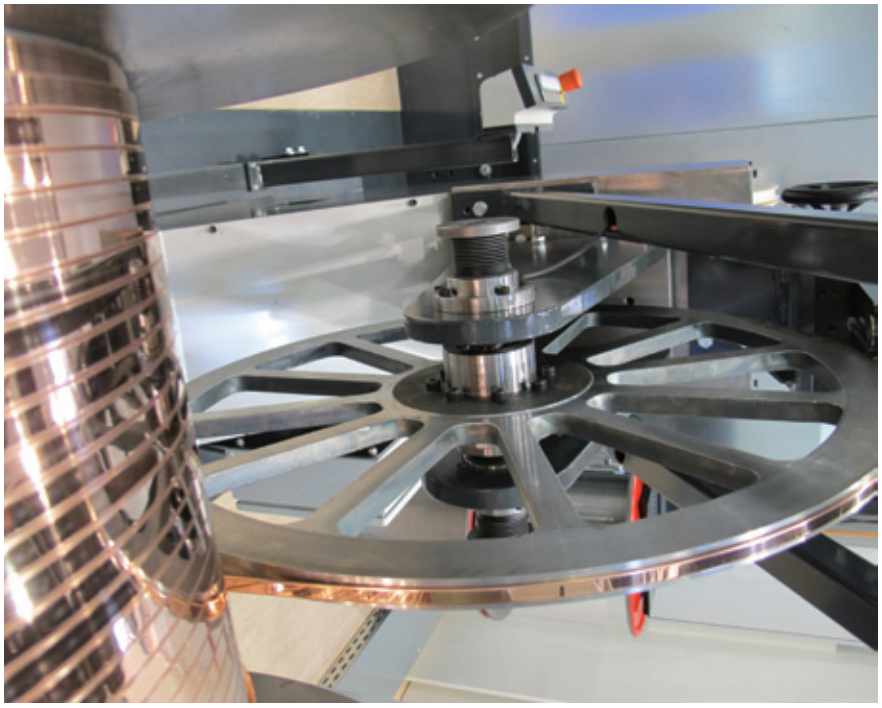
By successfully applying their well-known proprietary Borstar® and their new Borlink technologies, Borealis and Borouge have delivered a step change innovation for the plastics industry. Moreover, in 2010, Borealis completed a major investment of nearly €400 million at its plant in Stenungsund, Sweden, to enhance its capability to provide advanced Borlink materials for the entire wire and cable market.

Benefiting from Borlink technology, cables in use for more than 30 years still perform to today's exacting standards and prove the reliability of Borealis and Borouge's solutions. Additionally, at the end of their useful life these cables can be fully recycled in combination with standard polyethylene (PE) for a fully sustainable multi-generation life cycle.

"Borlink will ensure the credentials we have built as a reputable and innovative partner to the industry are properly positioned to continue to deliver results in the future," said Marc Hubert, Borealis' vice president wire and cable.

"We are anticipating the step changes that will take place in the power and communications grid world. Borlink encompasses all aspects of our business, expertise and service capabilities into one central and coordinated technology powerhouse that will connect with the emerging wire and cable value chain."

Borealis AG – Austria **Website**: www.borealisgroup.com
Borouge – Abu Dhabi **Website**: www.borouge.com



▲ *Fuhr – a long tradition in designing and building layer winding machines*

Two guiding systems

PRODUCERS of flat and shaped wires usually supply their products on reels. When it comes to delivery, the customer's first impression is the optical appearance of the winding quality.

A perfect layer-wise winding is associated with a perfect product. Therefore, in today's wire production the winding quality has gained a high level of importance.

But not only these facts are important: A low quality of layer winding can indeed be of major impact on the product quality. When wires are confusedly wound on reels, it does also have a bad influence on quality aspects such as straightness, torsion and surface.

Moreover, a tangled winding can result in difficulties or even wire breakage when customers unwind the material from the reels.

As a producer of wire rolling mills, the Germany-based company Fuhr also has a long tradition in designing and building layer winding machines.

Fuhr offers a wide range of spoolers in cantilever and pintle design for gross weights from 200kg to 10 tons. The machines are prepared to either be used with reels made of plastic, wood and steel or to create coreless coils by the means of collapsible reels.

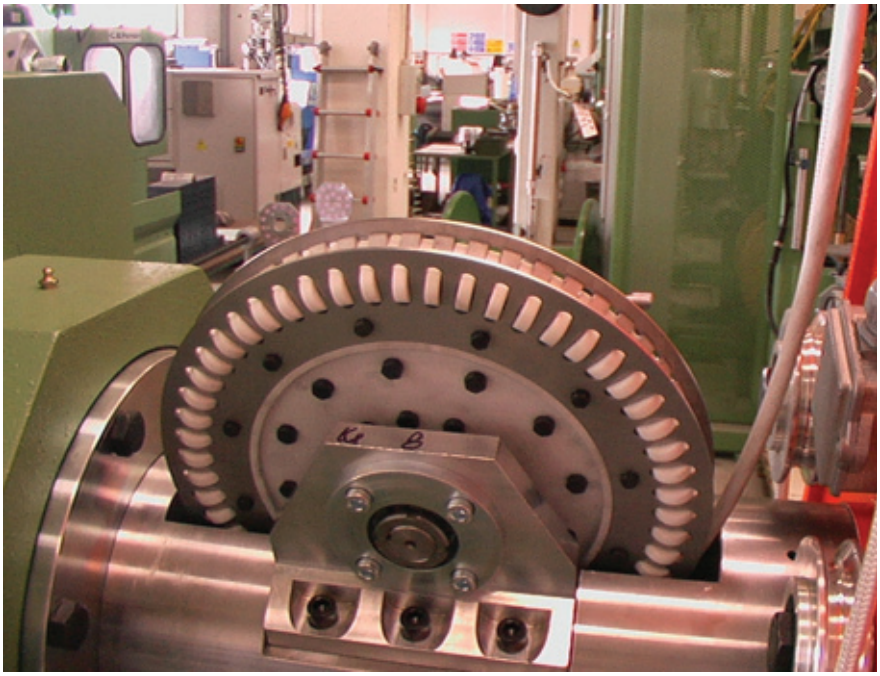
The common design base of these spoolers is the concept of a traversing spool and a fixed wire line. The traversing is computer controlled.

The software provides special features to optimise the laying especially in the reversing points such as edge stop, angle offset and spike. For standard applications the software is self-optimising.

The software controls the spool with highest precision, but it needs a precise wire guiding in addition.

Fuhr has developed two guiding systems to cover the wide range of wires – one for strips and one for rectangular and special shapes. The total package is the clue to prime quality.

Karl Fuhr GmbH & Co KG – Germany
Website: www.karl-fuhr.com



▲ *The patented 'free pulley' from Macchine Speciali*

Boosting cable production

ITALIAN company Macchine Speciali has developed a series of plant and equipment tailored to the optimisation of cable production.

Machines and equipment have been developed for rotating machines, double twist and single twist, and in the field of cold extrusion of materials such as PTFE and silicone.

In the continuous technological evolution Macchine Speciali has designed, perfected, built and patented a device that is a pulley with multiple degrees of freedom simply called 'Free Pulley'. This pulley leaves the cable free to accept the twists imposed and allows cables to perform with variable back twist even in the presence of deviation of the product with deflection angles of 180°.

This application allows the customer to take advantage of working in stranding with back twist and this gives a much better production performance. Under identical conditions, the multiplication factor is tested five times the traditional method.

Macchine Speciali – Italy
Website: www.macchinespeciali.it

New coiler from Bongard

Bongard has launched its new coiler – CU C 480.

This model has several design features that sets this coiler apart. It is made for copper wire from AWG 27 (0.35mm) to AWG 16 (1.2mm diameter), soft to hard, with a maximum coiling speed of 118 fps (36m/s).

The new features include a modular design that makes the set up much easier as well an upgrade of more user-friendly features. Wear on the deflection pulley has also been reduced to a minimum.

The fingers that press the wire onto the capstan are easy adjustable, and wear is reduced more than three times.

Because of work on the accumulations system, there is no disturbance and a tangle free barrel change is guaranteed, while there is also a continuously adjustable rosette laying device.

Bongard – Germany **Website**: www.bongard.de

Roblon introduces anti-rodent glass yarns

IN response to the increasing demand for all-dielectric rodent resistant OFC, Roblon has introduced a new glass strength member named Anti-rodent Glass.

▲ *The Anti-rodent Glass yarn from Roblon*

Roblon Anti-rodent Glass has been developed in close cooperation with suppliers and customers and tested at a test institute in India. The Roblon Anti-rodent Glass is a glass strength member coated with a non-toxic, non-hazardous rodent aversive coating.

Tests show that Roblon Anti-rodent Glass changes rodent behaviour over time and attack rate decreases after one week. The change in behaviour indicates that the rodents learn that OFC with Roblon Anti-rodent Glass tastes bad and therefore they avoid these OFCs. In fact the Indian test institute went as far as to conclude:

"Thus it can be concluded that the repellent effect of the test compounds may dominate gradually and lead to a gradual elimination of the rodent attack over a period longer than the period of exposure used in the current study."

Roblon Anti-rodent Glass is a strength member and rodent protection in one and should be applied as peripheral strength member. Furthermore, Roblon Anti-rodent Glass offers high wear resistance, thus eliminating possible issues with dust or filaments during production.

Five species of rodents were used to test the efficiency of Roblon Anti-rodent Glass compared to other glass strength members.

These five species of rodents are widely distributed and can be considered to represent a wide range of rodents – from the most ferocious to the most docile – that can cause damage to commercial communication cables.

Roblon A/S – Denmark **Website**: www.roblon.com

Research and testing pays off for SAMP

THE new SAMP extruders are the result of many months of continuous research and testing. The project aims at maximising productivity while at the same time ensuring maximum flexibility, efficiency and reliability during the extrusion process.

Productivity has been significantly increased thanks to the new extrusion screw and cylinder profile that allows a high material drag flow (litres/min/screw rpm), without altering the physical product characteristics. The process is continuously monitored by the innovative SAMP single and dual-loop thermoregulation system that controls the compound thermal and pressure stability through the whole manufacturing process.

New dedicated software has been developed to ensure the process thermal stability and the extruder linearity also during the start-up and set-up phase, as well as during acceleration and deceleration ramps. The system automatically adjusts the screw rpms and the line speed during both the start-up phase and the manufacturing process.

In addition, the software automatically detects the need for using the screw thermoregulation and employs it only when necessary. These speed variations are managed so accurately that they can be rightly considered as cable production phases. In this way the start-up phase and ramp times have been considerably decreased, with a consequent increase in the capacity and reduction of the scrap rate.

▲ *Part of the new SAMP extruders*

Thanks to the numerous sensors placed in the feeding area, the system knows the positions of all its hoppers and the exact quantities of the remaining material in the feed throat. All this data is the result of an elevated automation system of the feeding area and of an accurate material measurement during the feeding of the pellets. As a consequence, a large amount of material can be saved (both in terms of raw thermoplastic material and of additives and colourants).

The automation of the hopper area is also a great advantage for the machine operator. Moreover, it drastically reduces the number of people needed to operate it. A single operator can manage the whole extrusion line.

Access to the machine is much easier now because of the low hopper height. Neither burdensome platforms are needed for the feeding, nor are ladders or special equipment for the hopper cleaning.

For this reason all machine processes are monitored and managed through the line operating panel, including the ones that have been mentioned above.

Statistical and graphical analysis is also possible. The extruder stability and linearity can be monitored in real time both during the manufacturing process and during fast acceleration ramps.

All SAMP machines have been designed and developed as plug-and-play solutions for a fast and easy installation. Ordinary maintenance operations have been further simplified and speeded up to ensure the efficiency and reliability of the cable manufacturing lines at any time.

SAMP SpA – Italy
Website: www.sampspa.com

Finished power cables by merging Power SZ with sheathing

GETTING from single insulated conductors to a finished power cable offers a lot of advantages for the manufacturer.

The development of technologies and the improvement processes led to the merger of the Power SZ stranding and the sheathing process in one line. The equipment is the solution for low voltage cable up to 1kV with a cross section up to 240mm^2 of each single conductor. The perfect result of the finished power cable can be observed on the take-up reel.

Thanks to the SZ technology, where no heavy mass is in rotation, the working principle is the same as of conventional helical stranding systems. The pay-offs and take-ups stands in the line are stationary reelers that need no special foundation. The non-rotating reeler also helps to improve the line efficiency due to a very fast and simple reel loading and unloading cycle.

As the reel does not need to be transferred between the stranding and the sheathing process, time and space saving is guaranteed. There is also no limitation for the size of take-up that helps to get a long product length on bigger take-up reels.

The advantage of non-rotating machinery allows a very safe working area for the operators and reduces the maintenance efforts.

A perfect combination for optimised manufacturing conditions: low investment and reduced operating costs and efficient production of power cables.

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

Niehoff has got it covered

❍ *SV 410 D type NPS double spooler*

The wire and cable machinery developed by Maschinenfabrik Niehoff covers nearly all operations that are necessary for the production of non-ferrous wires and special cables.

The product range includes pay-off and take-up systems like the WF type barrel coilers and TW static coilers for non-stop operation inline with wire production lines, the Bongard STN coilers for inline operation behind a galvanic plant, suitable for tin, silver and nickel plated copper wires, and the compact S type spoolers which are suitable as take-up systems for multi-wire drawing lines.

Another example is the Niehoff Package System (NPS), an efficient, safe and economical handling system for primary automotive cables as well as bunched wires, strands, conductors and cables.

It comprises the SV type spoolers which use a patented wire-laying algorithm and collapsible multi-way ABS plastic spools made in various sizes which offer a secure, stable and tangle free package both when full or partially empty and enable highest cable pay-off speeds into downstream processes.

The SV 410 D type double spooler is designed for the non-stop production of NPS packages and when installed behind an extrusion line is capable of spooling automotive primary cable at a speed of up to 1,500m/min (4,920fpm).

This spooler is capable of accommodating all NPS 400 multi-way spools with a traverse width of 100 to 400mm without the need of exchanging pintles or spool take-up parts, reducing set-up and changeover times.

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

Breakthrough in micro extrusion

B&H Tool Company has introduced the industry's lowest volume microcrosshead. The BH25A MicroCrosshead with spiral deflector delivers breakthrough micro extrusion performance for applications including microbore tubing, fibre optics and insulated fine wire.

Major medical device manufacturers that documented major improvements in process capability and stability tested it.

The BH25A can extrude PEEK tubing with a product ID of 0.010" and OD of 0.015". It will extrude FEP insulated fine wire with an OD of 0.00471" and core OD of 0.00157". Tolerances are heavily dependent on the process and material, but are generally in the range of +0.0005".

Customers who tested the BH25A MicroCrosshead with spiral deflector achieved exceptional ID/OD control, superior melt flow, highly uniform material distribution, and short residence time. This resulted in extraordinary concentricity and finished surface quality. Customers using this innovative tooling say these features provide a significant competitive advantage.

The BH25A is manufactured in two versions, both appropriate for biomedical and other FDA applications. A 420 stainless steel model provides optimum performance for thermoplastics, and a Hastelloy head is specified for use with fluoropolymers.

B&H Tool Company Inc – USA
Website: www.bhtool.com

▲ *The industry's lowest volume microcrosshead from B&H Tool*

SIEBE Colour Match

THE difference of colours between two cables can be safety relevant. For controlling purposes, visual inspection with colour cards is used to check the acceptance limit of the specified colours. Visual assessments are subject to subjective impression arising from factors such as illumination, angle of vision and colour sensitivity of the observer.

SIEBE Colour Match (SCM) is an automatic system to get objective, reproducible and comparable results. A white light source avoids measurement errors with inappropriate illuminants. Cable colours are often specified with RAL colour system or with Munsell colour model. A comparison of the measurement with these systems is possible. This data is stored in a database and serves as reference for productions with the same colour requirement.

For the classification in RAL or Munsell colours choose 'best fit scan' and you will get the code of the colour shade, that is the most similar to the measured colour. In mode 'scan with dE', the measured colour is only accepted within a given tolerance interval around the reference colour.

Using the teach-in function, new colours can be added to the database enabling customers' own specification or other colour reference systems. The minimal visual width of stripes is approx. 0.5mm. Cable diameter can be 1-10mm (optional bigger sizes with extended optics).

The inline version can be integrated into a control system via ethernet without having its own display. Provided with an optional touch screen the device can also be operated stand-alone. An extended version is designed for operation in the quality control or laboratory with mechanics to ensure inspection of short samples.

The usage of SCM is not only inline production control. Harnessing the adherence of defined colour values can also be controlled. The database with all relevant product colours can easily be copied as a file from one device to another. This ensures a colour compliance regarding production of same cables in different facilities.

SIEBE Engineering GmbH – Germany
Website: www.siebe.de

New spark tester with integrated self-test

DURING the extrusion of cables the insulation is inspected by spark testers – high-voltage spark testers – and possible insulation faults are detected and documented.

The quality management system assures that only faultless cables are delivered. Sikora offers high frequency (HF), direct current (DC) and alternating current (AC) spark testers for diverse applications. For the testing, the dry cable runs through the sturdy electrode of the spark tester that is installed after the cooling section.

Here the cable insulation is exposed to the selected test voltage and faults in the insulation are reliably detected. The test voltage is continuously adjustable. All spark testers conform to approved test standards (AS, BS, CS, CENELEC, EN, UL, VDE) and safety regulations (as demanded by DIN/VDE 0800, IEC 479-1).

The new Spark 6030 HF is a high-frequency high-voltage spark tester, designed for the detection of faults in the insulation of cables from 0.5 to 30mm. In addition, the system reliably detects bare patches. Its sturdy electrode and the electronic box form one integral unit. Optionally integrated in the device is a display, which visualises the number of high-voltage breakdowns. The display is combined with a control panel for entering the test voltage.

According to European standards, openly operated measuring and testing equipment has to be checked regularly. Accordingly, spark testers are tested with regard to high-voltage, short-circuit current and function (sensitivity). While in the past cable manufacturers had to use an external testing device, the Spark 6030 HF integrates a complete three-step self-test and calibration system.

Integrated high-voltage test: The spark tester tests the displayed high-voltage of the device for correctness. The high-voltage has to be within a tolerance of 5%.

Integrated short-circuit current test: In addition to the high-voltage test, the spark tester automatically checks the maximum short-circuit current, which at human body model should not exceed 10mA when operating the device (according to EN61010-1:2010).

Integrated function (sensitivity) test: The spark tester automatically performs a function test (sensitivity test). Therefore, 20 artificial faults (breakdowns) are initiated that are detected and reported.

The Spark 6030 HF has common interfaces as well as a W-LAN interface and can be directly connected to a smart phone or laptop.

Sikora offers a free app for diagnosis and quality control on smart phones. The operator can easily log in via the W-LAN interface and receives production data such as number of breakdowns or the high-voltage immediately. It is also possible to control the high-voltage and to start the self-test via the app.

Sikora AG – Germany **Website**: www.sikora.net

▲ *The Spark 6030 HF with integrated display*

euro Wire

▲ *An advertisement from Pave featured in the first issue of EuroWire. The company can also be found a little further on in our anniversary section*

THERE have been a lot of changes during the last 15 years in the wire and cable industry.

One thing though has firmly remained. The fact that EuroWire has been bringing you – our readers and advertisers – news and information globally from this rapidly evolving industry.

We are now in our 15th year and we are justifiably proud of our achievements since our first issue.

EuroWire was borne of Transfil Europe, published by S T Diffusion from Paris, France, which served its international audience in four separate language editions every quarter.

Since then EuroWire has been turned into a six language magazine produced every two months with English, German, Russian, French, Italian and Spanish sections within the magazine.

That first magazine also carried booth descriptions for wire Düsseldorf 1998 in some 63 pages. In comparison that more than doubled for the latest wire 2012 edition in March this year, a reflection in the growth of the industry and the importance of wire Düsseldorf during this period.

Many of the companies mentioned in that first magazine remain today and, indeed, are valued as readers, advertisers and friends. And some of those companies follow on the next few pages in helping us to celebrate our milestone.

Whilst there have been changes in the industry as a whole, the publishing world has taken huge steps forward with the introduction of full-page make-up, full colour printing (which we went to in 2007) and the birth and global spread of the Internet. EuroWire's first website was lauched in 2001 and its social networking sites – Twitter and Facebook – along with RSS feeds were launched in 2010.

Without doubt there will be greater developments over the next 15 years determining how you get your news from one of the leading magazines in the sector, but we look forward to remaining the most important source of information in the wire and cable industry.

15th Anniversary

Always reporting the latest international wire & cable industry news, Eurowire also covers technological innovations concerning the production and processing of wire, cable, fibre optics, springs, fasteners and precision parts, as well as worldwide trade show reports, and in-depth technical articles on topical subjects.

World class, precision measurement and control systems

▲ Beta LaserMike's head office in Dayton, Ohio, USA

BETA LaserMike has a long history of providing high-precision, non-contact measurement and control solutions to the world's leading wire and cable manufacturers. Its origins trace back to two main companies: Beta Instruments and LaserMike.

Beta Instruments pioneered the measurement and control technologies for the wire and cable industry in the mid-sixties. LaserMike invented the first laser-scanning micrometer in the early seventies to accurately measure part dimensions.

These companies merged in 1997 under the now parent company "the Spectris Group" to form Beta LaserMike. In 2003, Beta LaserMike purchased a key non-contact length and speed measurement technology from TSI Instruments – the recognisable brand LaserSpeed®.

In February 2012, the company acquired DCM Industries – a leading global provider of cable testing solutions.

Since its inception, Beta LaserMike's solutions have helped customers drive profitability by increasing productivity. The company has over 35 patents worldwide and continues to innovate.

Beta LaserMike's portfolio of measurement and control solutions include laser, ultrasonic, infrared, and process control technology for a wide range of in-process wire and cable applications. These solutions seamlessly integrate with an organisation's production processes to effectively reduce scrap, minimise material usage, increase capacity, and ensure product quality.

Beta LaserMike's highly recognisable brands include:

- AccuScan – laser scanning diameter measurement
- CenterScan – eccentricity measurement
- CapScan – capacitance measurement
- LayScan – lay length measurement
- LaserSpeed – non-contact length and speed measurement
- LN Detector and Spark Testers – on-line fault detection of lumps and neckdowns, voids and pinholes
- BenchMike – off-line sample inspection
- UltraScan – ultrasonic wall and eccentricity measurement
- SRL Pro – structural return loss prediction
- DataPro – process control and data management
- DCM Cable Testing Solutions – LAN, coaxial, telecom, marine, and aerospace


▲ Some of the range from Beta LaserMike

Beta LaserMike is headquartered in Dayton, Ohio, USA. The company has a global sales and service presence with offices in the Americas, Europe, and Asia.

An extensive partner network extends the company's solutions delivery to reach the various markets in all regions.

Beta LaserMike – USA
8001 Technology Blvd
Dayton, OH 45424 USA
Tel: +1 937 233 9935
Fax: +1 937 233 7284
Toll Free: +1 800 886 9935
Email: sales@betalasermike.com
Website: www.betalasermike.com

They're the true specialists

▲ A drum twister from Caballe

CM Caballé sa is specialised in manufacturing and designing rotating machinery for the wire and cable industry.

Caballé started as a project in 1944 and since then has consolidated its leadership worldwide through technology, quality, honesty and professionalism.

Its extensive range of machinery and systems means they can offer the most efficient and reliable solutions for the cable industry. Over 1,000 installations worldwide are a guarantee of the company's performance.

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

Caballé distinguishes itself by flexibility, always adapting to the market and a customer's particular demands. The company's sales team is made up of expert professionals who interpret the market requests and provide personalised and innovative solutions.

Caballé has invested in approaching sales functions to prospective markets and after-sales service to customers.

New service centres have been opened worldwide as part of a large mid-term programme. Sales organisation and communication between headquarters and service centres is achieved by expert staff and by applying the most advanced software and tools.

Markets served include wire and cable manufacturers of:

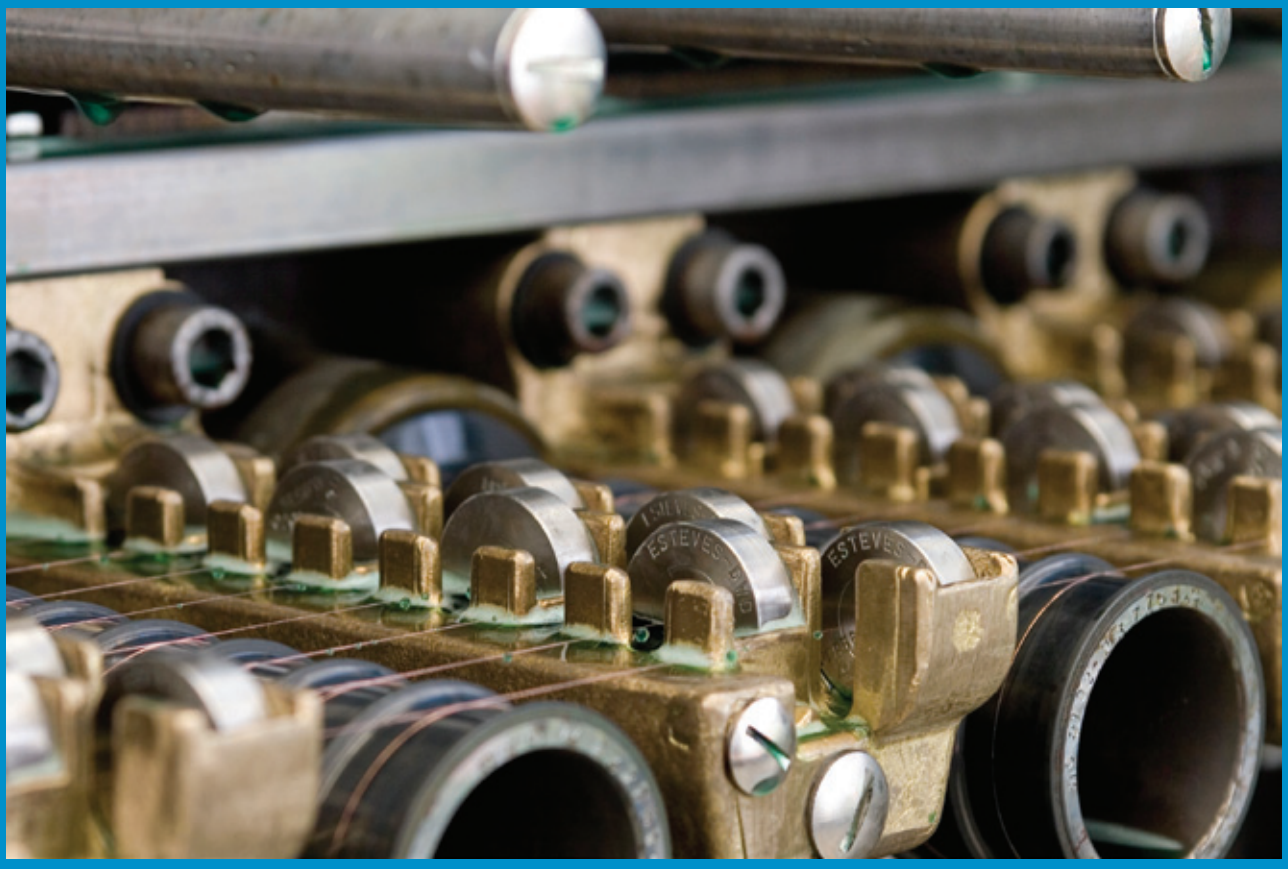
- Power cables
- Control cables
- Telecom and LAN cables (metallic and fibre optics)
- Steel ropes

Products include a complete range of bunching, stranding and cabling machinery:

- Double twist stranders
- Rigid stranders
- Drum twisters
- Single twist stranders
- Bow skip stranders
- Tubular stranders
- Planetary stranders
- SZ stranders
- Twinners and quadding machines
- Shielding and Jelly Filling

CM Caballe SA – Spain
C/ Progrés 293-299
08918 Badalona
Tel:+34 93 460 14 13
Fax: +34 93 399 09 08
Email: caballe@cmcaballe.es
Website: www.cmcaballe.com

▲ One of the rigid strander range from Caballe



▲ *High precision dies from Esteves*

▶ *The complete range on offer from the company*

One of the world's top die manufacturing companies

MORE then 100 years' experience has brought Esteves Group the knowledge to become one of the largest wire die manufacturing groups in the world.

The company has a complete range of wire manufacturing tools and produces high precision drawing, stranding, bunching, split and shaped dies, extrusion tips and dies, and machines for die reconditioning and refurbishing.

Esteves' products are used by companies worldwide and the group has developed proprietary equipment and manufacturing methods to meet the requirements of the most demanding companies in the wire industries, and will continue to invest in their valuable customers, partnering together to improve and develop new products.

On the Esteves website you can find the main products and services, available in five different languages. There is also the Drawing Die Wizard, the first die design software made for the industry, allowing customers easy access and to design their own die profiles.

Additionally there is the eWizard, a wire drawing handbook which contains information about materials to be drawn, profiles of wire dies, useful formulas, tables and many other resources. This is on top of the improved customer area section. And if you have an online account, you can update your company and personal contact information.

Esteves has been built on integrity and loyalty, and works to efficiently offer the best services to customers in building an enjoyable, friendly and successful partnership.

Esteves Group – Spain
Malvasía,
2-4, 08758,
Cervelló,
Barcelona
Tel: +34 93 660 00 50
Fax: +34 93 684 10 80
Email: sales@estevesgroup.com
Website: www.estevesgroup.com

Gauder Group – known throughout the world

▲ *A drum twister line from Pourtier*

A WORLD-RENOWNED supplier of rotating machines, Gauder Group leads from the front with its Pourtier and Setic brand names.

Both companies provide high quality bunchers, stranders and cablers which are made in Europe to the highest standards in design and manufacturing.

Pourtier develops comprehensive solutions to produce all types of high voltage and extra-high voltage power cable: from overhead cable (including ACCC™, ACSS-TW and ACSR-TW) to insulated cable, AC type (using high quality Milliken conductor) or DC type (using large round compacted conductor or trapezoidal wires). The company is also deeply involved in the submarine and umbilical cable markets.

Tel: +33 164 218 400
Fax: +33 164 266 110
Email: pourtier@gaudergroup.com

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

The company is the owner of the Triple Twist patent.

Tel: +33 477 232 555
Fax: +33 477 711 085
Email: setic@gaudergroup.com

'Gauder Group Customer Services' implements the most recent developments to maintain and improve production capacity of all brands' existing machinery: upgrades, predictive maintenance, genuine Setic and Pourtier spare parts, rebuilding, start-up and training.

Tel: +33 164 218 400
Fax: +33 164 266 110
Email: aftersales.pourtier@gaudergroup.com
Tel: +33 4 77 23 25 55
Fax: +33 4 77 71 10 85
Email: aftersales.setic@gaudergroup.com

Bow Technology offers a global service from conception to production to reach enhanced performances. More than 500 designs are available for all brands of double twist machines as well as the innovative and patented GreenBow, which enables energy savings.

Tel: +33 477 232 555
Fax: +33 477 711 085
Email: bowtechnology@gaudergroup.com
Website: www.bowtechnology.com

As a member of the Gauder Group, Daloo benefits from a long background in the cable industry manufacturing for the international market low cost machinery such as rigid cage stranders, taping lines, rewinding lines, pay-offs and take-ups as well as pulling caterpillars.

The design is based on European experience; the manufacturing is done in China following strict criteria.

Tel: +86 519 854 805 53
Fax: +86 519 854 835 57
Email: sales@daloo-machines.com
Website: www.daloo-machines.com

▲ *The TC630i double twist buncher from Setic*

Gauder Group – France
POURTIER
3 rue Gustave Eiffel
77506 Chelles - France
SETIC - Gauder Group
126 rue de Matel
42300 Roanne - France
Email: info@gaudergroup.com
Website: www.gaudergroup.com

▲ *Pave staff at wire 2012 in Düsseldorf*

▶ *The GR8 is the latest addition to the Pave portfolio*

Pave adds to portfolio as wire bending success continues

PAVE'S success story continues with a fruitful wire 2012 in Düsseldorf.

As expected the stand was visited by customers old and new from the four corners of the wire bending world helping secure Pave's position in the market place as a leading manufacturer of CNC wire bending equipment.

The GR8 is the latest edition to the Pave portfolio. The GR8 is a low cost solution to CNC wire bending for a world economy that is still on the road to recovery. The GR8 symbolises the Pave philosophy of short-term payback equipment to aid end user growth.

Born from Pave's heavy emphasis on development the GR8 is a product of today's market needs, offering the complexity of computer controlled machinery in a simplistic, easy to use and affordable form.

With animated icon programming, video links, innovative software and touch screen, the GR8 is crammed with technology way above its price tag.

PAVE
PROVEN WIRE FORMING SOLUTIONS

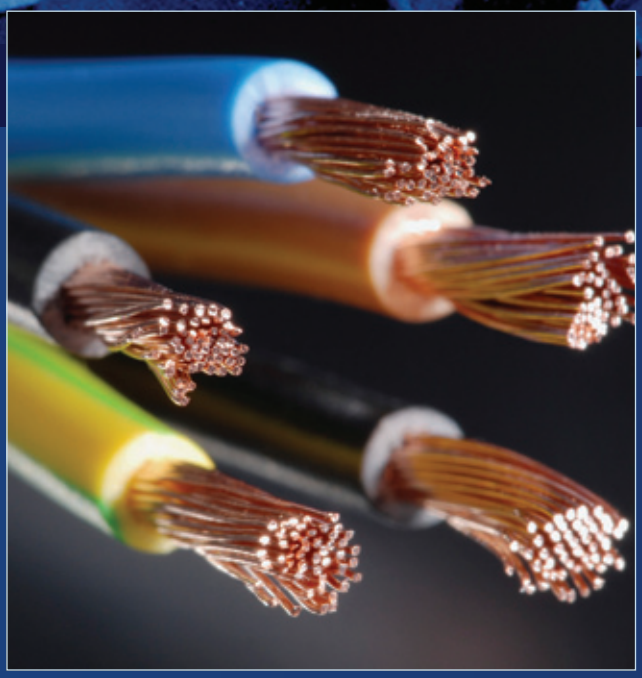
Looking forward Pave will be exhibiting across the world at various wire expos to continue to build on the long term success that the range of equipment has brought.

Pave Automation Ltd – UK
Padholme Road,
Peterborough,
UK. PE1 5XL.
Tel: +44 1733 342519
Fax: +44 1733 563500
Email: pave@enterprise.net
Website: www.pave-wire.com

Focus on Turkey

Turkey – a true delight on the edge of Europe . . .

Also bordering Asia this incredible country is home to a buoyant wire and cable industry



Istanbul welcomes cable and wire industry leaders

CNR Holding, a leading fair organiser in Turkey, recently acquired the Cable & Wire Fair from Mediaforce.

Cable & Wire Fair (cable accessories, cable realignment, electrical insulation materials, equipment and machinery) is now ready to welcome the industry leaders for the fifth time at the largest fairground in the country, CNR Expo Center, in Istanbul, Turkey, from 15th to 18th November 2012.

The Cable & Wire Fair will present new machines, products and

◀ *Cable and wire industry experts will gather in Istanbul in November*

Photo: bigstockphoto.com – 'Blue Mosque, Istanbul, in Winter' by Sadik Demiroe

systems from wire, cable and tube industries at the 10,000m² exhibition grounds. Around 300 local and international companies are expected to participate at the fair, introducing their new technology and product developments.

Manufacturers of process engineering tools, companies producing machines for the production and refining of wire, materials manufacturers and companies offering wire and cable from China, Germany, Italy, France, Spain, Japan, Taiwan, USA and Turkey will be the main exhibitors at the fair.

Focusing on the expectations of visitors, mostly expected to participate from UK, Iraq, Germany, France, CIS and Middle East countries, the exhibitors will display machinery and systems for wire production and processing, materials, and speciality wire and cables, as well as tubes and accessories, tube production and processing machines.

CNR Holding – Turkey
Website: www.cnrexpo.com

Foil, film and tape products

GURFIL started serving the electrical and cable industry in 1981, providing customers with foil, film and tape products.

In addition, Gurfil started producing wire and cable machinery several years ago, and has become a main supplier for cable manufacturers in most parts of Europe, the Middle East and Africa.

In order to give the best service and products, Gurfil has been managed by an ISO 9001:2008 quality management system, and all Gurfil products are supplied with a RoHS certificate.

The company's products are divided into three main groups: foil, film and tape products; wire products; and machinery.

Foil, film and tape products include Alu+PET, Alu+PET+Alu, Alu+PET+Sy, Alu+PET+PVC, Cu+PET, Cu+Sy, polyester film (PET film), fibre glass tape, and mica tape.

Wire products include three-layer physical foamed conductors (skin-foam-skin); aluminium wire; copper clad aluminium wire (CCA); and copper clad steel wire (CCS).

Gurfil's range of machinery consists of high-speed vertical braiding machines; high-speed horizontal braiding machines; mica taping machines; pre-heaters; diameter measuring units; spark testers; and twisting machines.

The company reports that 2011 was a very efficient year. Parallel to the growth of the cable market in Turkey, there was a high increase in the domestic market. Nevertheless, the company's level of export has a tendency to increase.

Its exports to Europe, the Middle East and Africa have been growing rapidly, and in recent years Gurfil has been developing its sales area in Europe by assigning sales agents in some countries.

Gurfil AS – Turkey
Website: www.gurfil.com

▲ *Gurfil manufactures tape and wire products*

From domestic to export markets

SURTEL Kablo was founded in Istanbul in 1964. Initially the company manufactured only for the domestic market, but since 2001 has become an exporter to international markets, and presently exports 95% of its overall production. Having exported to more than 30 countries in Europe, the Middle East and the Arabian Peninsula, the company reorganised its production facilities to be able to produce in accordance with the standards of respective countries.

The company holds many quality system certificates and licenses, including KEMA, GOST, ISO 14001:2004, ISO 14000, ISO 9000, BASEC and TSE (Turkish Standards İnstitution).

Surtel Kablo's range of products includes PVC and XLPE insulated low voltage cables, sector shape cables, steel wire armoured cables, traffic signal, N2XRY, NYFGY, NYRY, N2XY, NYY, NYM, H05VV-F, H05V-R, H07V-U, H05V-K, halogen free cables and stranded round copper. It also produces tailor-made cables that are specifically designed according to customers' needs. The company's laboratory is able to test cables according international standards.

Surtel has an annual copper rod drawing capacity of 10,000 tons, and also produces its own PVC granule.

Since 1997 Surtel has consistently been in the list of the second 500 top industrial companies as announced by the Istanbul Chamber of Industry, by sales volume. It has also been in the list of the top 1,000 exporters as announced by the Turkish Exporters Assembly (TIM), after turning its sales direction to the international markets.

Surtel Kablo Sanayii AŞ – Turkey
Website: www.surtel.com.tr

▼ *Products from Surtel Kablo's range*

AYMAK MAKİNE
MÜHENDİSLİK HİZMETLERİ SAN. ve TİC. LTD. ŞTİ.

DOUBLE AND SINGLE TWIST STRANDERS

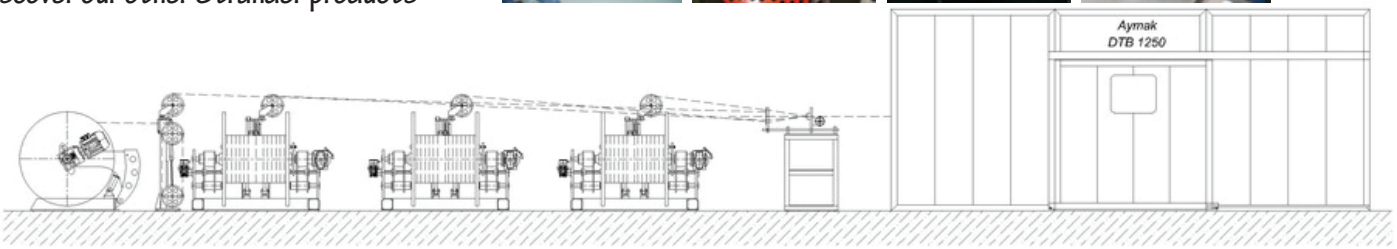
Double Twist Buncher
- DTB 560
- DTB 630
- DTB 1000
- DTB 1250
- DTB 1600

Single Twist Buncher
- SNB 630
- SNB 1000
- SNB 1250
- SNB 1600

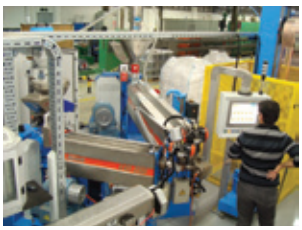
Technical Specifications
- Stranding 7, 19 wire
- Stranding Copper, Aluminium, Cabling of insulated conductors
- Aerodynamic, Ergonomic Single Bow System

Technical Specifications
- Armouring and Screening (wire/tape)
- Power and Control Cables
- LAN, Signal, Telecommunication Cables
- Flexible and Ultraflexible

- ❊ More than 20 years experience
- ❊ Reliability
- ❊ High-efficiency lines
- ❊ Appropriate solutions to your requests
- ❊ Discover our other Strander products



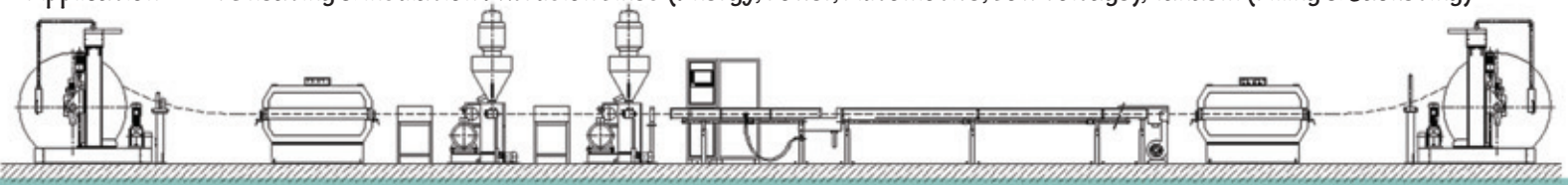
EXTRUSION LINES



E35, E45, E60, E75, E90, E100, E120, E150 EXTRUDERS

- PVC/PE/PP/HFFR/XLPE
- Extruders for PVC, PE, Halogen Free, XLPE from 35 mm up to 150 mm screw

Line Speed	: up to 1200 m/min
Capacity	: up to 1000 kg/h
Screw-barrel	: Made from nitrade steel 1. 8550 (34CrAlNi7)
Motor	: DC motor/AC square motor
Application	: Sheating & Insulation Extrusion Lines (Energy, Power, Automotive, Low Voltage), Tandem (Filling & Jacketing)



AYMAK MAKINE MÜHENDISLIK HIZMETLERI SAN. ve TIC. LTD. ŞTI.
Emek Mahallesi Mevlana Caddesi No 42, 34785 Sancaktepe/ ISTANBUL/ TÜRKIYE
Tel : +90 216 622 32 81 (Pbx) Fax: +90 216 620 97 86
www.aymakmakine.com info@aymakmakine.com

123RF – 'Istanbul Sunset ' by Sosnitskiy Evgen

Films, foils and tapes

BESEL Group is a producer and converter of flexible materials for technical applications. The company processes 800 tons of films, foils and tapes every month.

The company has 10,000m^2 of production and stock space equipped with the latest designs of converting technology, located on 42,000m^2 of land.

It produces insulating, semi-conductive and conductive films, tapes and foils for the cable industry, using an ISO 9001 certified quality system.

Besel Group – Turkey
Website: www.beselfoil.com

Copper rod and wire

HAK Copper Wire Industry is a manufacturer of copper rod and wire, and is has been a major supplier in this area since 1997.

The company's production facilities are in Gebze, Kocaeli, about 70km from the centre of Istanbul.

The plant area is 20,000m^2, and production is carried out using state-of-the-art machinery in an upcast copper rod production system with 20 lines. Equipment includes two rod breakdown machines, four multi-wire drawing machines, four intermediate wire drawing machines, 11 fine wire drawing machines, 15 double twist bunchers, and one fully automatic electro-tinning line.

Monthly production is 1,700 tons. Products meet international standards and are in accordance with the ISO 9001-2008 quality system.

Hak Copper Wire Industry Co Inc – Turkey
Website: www.hak.com.tr

Cold drawn wire

GÜNEŞ Tel Çekme Ve Transmisyon produces cold drawn wire (low and high carbon content), straightened and cut to length wire, flat and profiled wire, spring wire, wire for screws and bolts, annealed wire, zinc, copper coated wire, and electro-galvanised bailing wire.

The company also performs CNC wire bending and shaping, wire and tube grinding and polishing, welded wire mesh, chamfering, thread cutting, welding for mat and production of rivets, screws and U bolts, V bolts, threaded rods and shaped wire (form) springs.

Güneş Tel Çekme Ve Transmisyon Sanayi Ve Ticaret Ltd Şti – Turkey
Website: www.gunestel.com

Cable manufacturing

FREKANS Makina provides sales of automation, control and system engineering services.

Frekans is registered in accordance with ISO 9001-2008 and aims to improve the level of quality standards with TS EN ISO 9001:2000. The company is working on adding to its six patented products.

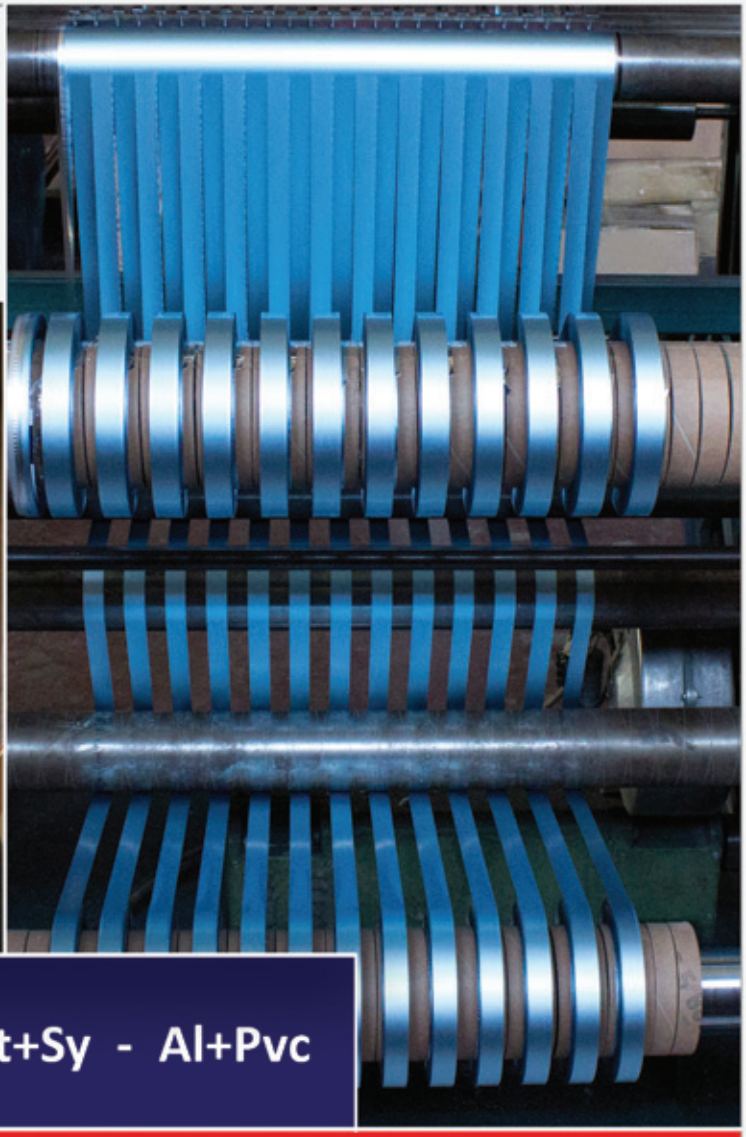
The multi-functional Multi Strander 10 can strand copper and aluminium, and armour with steel wire, with 500 rpm rotation speed and 60-120m/min line speed, up to 1000mm^2.

Frekans' range consists of extrusion (insulation-sheathing) lines; assembling and armouring machines; central stranding and armouring machines; rewinding machines; and mica taping machines.

Frekans Makina San Tic AŞ – Turkey
Website: www.frekansmakina.com.tr

Turkey

GÜR FİL



Al+Pet - Al+Pet+Al - Al+Pet+Sy - Al+Pvc

Cu+Pet - Cu+Sy / Pet Film / Mica Tape / Fiberglass Tape

RoHS

www.gurfil.com | info@gurfil.com

ISO 9001:2008 REGISTERED

Double head cable packing line for plywood spools

DOMEKS, a provider of many different solutions for cable packing technology, has developed a new double head automatic spooling line for cable rewinding on plywood spools, under the brand name Reelmatik 600 D.

The Reelmatik 600 D consists of a 1,600 or 2,000mm motorised payoff; empty spool feeding conveyors with capacity up to 20 spools; accumulator; double head spooling and stretching unit; automatic palletising unit; and pallet stretch wrapping unit. It also features a spark test and lump detector, user-friendly control panel, and strong and reliable design.

Available spool sizes include 400-600mm outside diameter, 100-250mm inner diameter, widths from 300 to 450mm, with a maximum weight of 200kg.

Cable sizes are: for flexible cables 4-14mm, up to 4x6mm^2 cable cross section; for solid cables 4-12mm, up to 4x4mm^2 cable cross section; and for flat cables up to 15mm cable width.

Line speed is up to 400m/min, and 40 spools per hour for 500m spool lengths.

Domeks Makine Ltd Sirketi – Turkey
Website: www.domeksmakine.com

Aluminium wire

SINCE 1998 Telmaksan has specialised in producing aluminium and aluminium alloy drawn wires for mechanical and electrical applications. The company supplies aluminium wire in a full size range from 0.12 to 9.5mm from raw materials that meet international standards. Telmaksan has also developed production of aluminium and aluminium alloy multiwire.

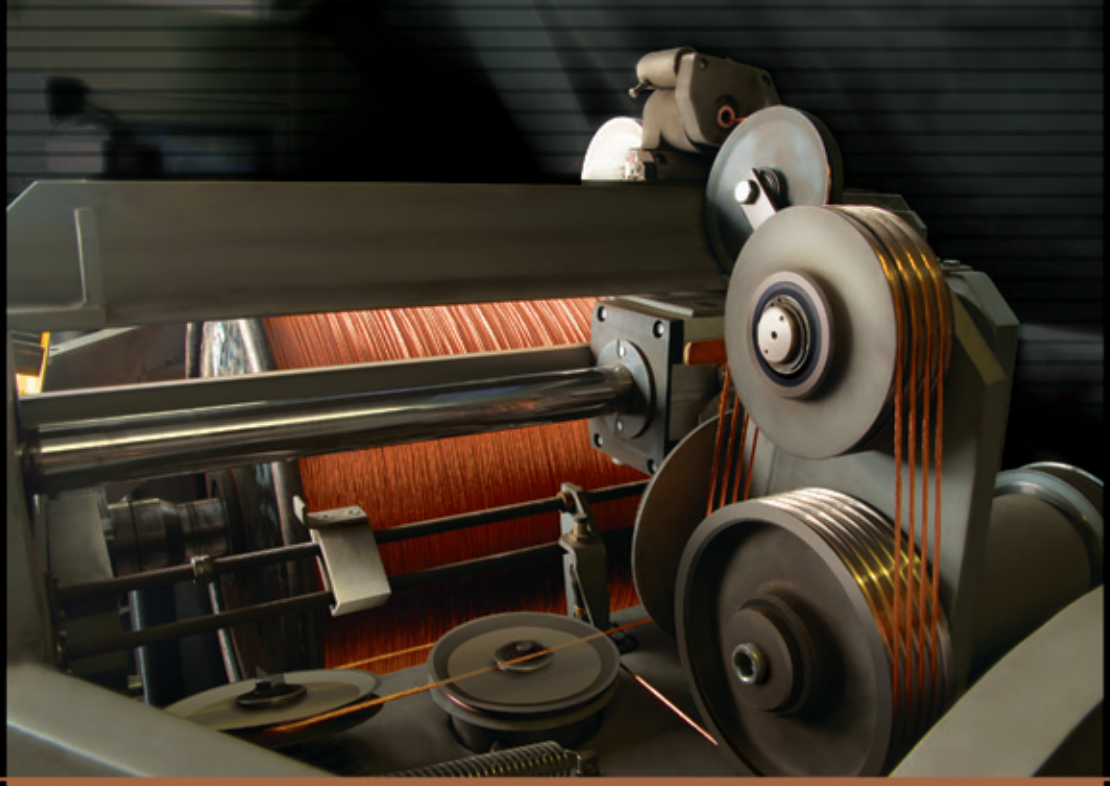
Lightness, flexibility and low production costs increase demand for aluminium wire for a wide range of applications, such as clip wires, tea bag wire for food industry, fine wires, weaving wires, cold heading wire for rivets screws, nails, vaporisation wires for packaging industry, etc.

Aluminium and aluminium alloys are progressively replacing copper in electrical cables. As far as electrical cables are concerned, aluminium is interesting not only for its lightness but also its high conductivity. For this reason aluminium and aluminium alloy wires are now in widespread use in armour and shielding for coaxial cables, overhead lines and energy cables.

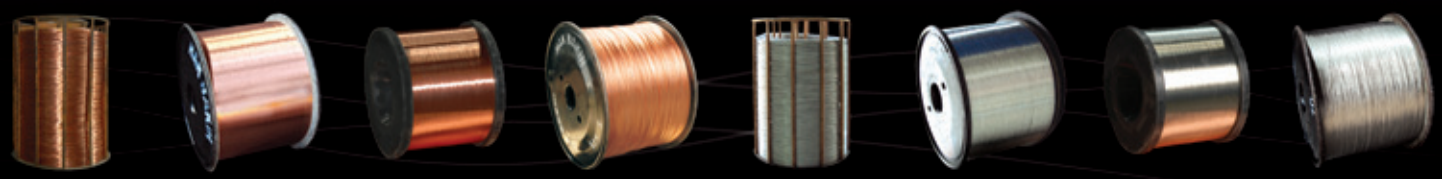
Alloys 6101 (AlMgSi), 1310 Aluflex (AlFeMg) and Aluminium 1370 are mostly used in electrical applications. Telmaksan supplies these alloys in monowire as well as in multiwire.

Telmaksan Ltd Şti – Turkey
Website: www.telmaksan.com

Photo: bigstockphoto.com – 'Blue Mosque Interior' by Artur Bogack



HAK COPPER WIRE INDUSTRY CO. INC.



www.hak.com.tr

HAK COPPER WIRE INDUSTRY CO. INC is a manufacturer within the Copper Rod and Wire Production Industry. It is one of the major suppliers in this industry since 1997. The production facilities are based in Gebze/KOCAELİ Turkey which is about 70 kilometers from Istanbul City Centre. The plant area is 20,000 square meters, with an output of 1,700 tons per month. This level of production is achieved through state-of-the-art Upcast Copper Rod Production Systems with 20 lines. The Wire Mill consists of:- Rod Breakdown Machines; Medium, Fine & Multiwire Drawing Machines; Double Twist Bunchers; and, Fully Automatic Electro-tinning Line.

The senior leadership team at Hakbakır aim to continue investing in new machinery and to become a first class global manufacturing and product developer in this field. Hakbakir expects to better serve its customers and expanding business in the coming years. All products meet International Standards and are in accordance with ISO 9001-2008 quality systems.

Hak Copper Wire Industry Co.INC.
Tel:00-90-262-643 20 92 Fax:00-90-262-642 77 86 - email: admin@hak.com.tr

ISO 9001 Registered

Cable production machinery

AYMAK Makine, founded in Istanbul in 2003, offers solutions to customers in the field of cable machinery, bringing technology, knowledge accumulation and expert staff together.

The company's production programme includes extrusion lines, rigid strander lines, bunching twister lines, drum twister lines, planetary strander lines, coiling lines, rewinding lines, armouring lines, payoffs and take-ups, crossheads, taping machines, accumulators and dancers.

Aymak Makina Mühendislik Hizmetleri San Ve Tic Ltd Şti – Turkey
Website: www.aymakmakine.com

Aluminium energy cables

FOR over 40 years Sahra Kablo has been supplying electric utilities, engineering, procurement and construction firms with high quality aluminium energy cables. The company offers solid and sector underground and overhead aluminium power cables for distribution applications and also conductors for transmission applications.

The lightweight cables have high electrical conductivity and good resistance to corrosion, and aluminium is an economical way to deliver electrical power.

Sahra Kablo – Turkey
Email: export@sahrakablo.com

▼ *A display of cables from Sahra Kablo*

▲ *Elki has facilities is Istanbul and Manisa*

Cables to meet international standards

ELKI Cable, founded in 1983, produces cables in accordance with international quality standards.

Since 1986 the company has been producing cables under the Irmak Kablo brand name.

The company focuses on quality and timeliness of delivery.

Various cables used in appliances, consumer electronics products, PCs and energy transmission are produced in accordance with the ISO 9001:2000 quality system.

All of the ranges of cables have TSE (Institute of Turkish Standards) and HAR certificates, enabling the company to export 30% of its production to countries that include The Netherlands, UK, Germany, Austria, Bulgaria, Romania, Ukraine, Georgia, Iraq, Lebanon and Guinea.

Elki has 12,000m^2 of covered production space in Istanbul and Manisa, with 120 employees.

PVC used in cables is also produced in-house, while copper is supplied from local vendors.

Elki Cable – Turkey
Website: www.elkicable.com

Rapid, reliable production of foil and film

YILDIRIM Folyo produces foils for the cable and duct industry, with an experience of more than 40 years.

The company is capable of laminating up to five layers, using aluminium foil, polyester film, copper foil, polyethylene film, polypropylene film, PVC film and Surlyn film. It can apply five-colour rotogravure printing, colouring, and can make lubrication on foils.

Yildirim Folyo can produce tape and spool rewound rolls of foils, and supplies cost free and easy packaging to customers. It can slit foils, with a slitting width of 5 to 900mm, and thickness from 6 to 150 microns.

Having sufficient amount of raw materials in stock, the company is always a good source of foils and rapid service to the industry.

Yildirim Folyo has very demanding targets for 2012. While its current agents in Italy and Egypt are a successful on-going business, the company is planning at least five new representative agents throughout the world.

A qualified Italian spool rewinding machine added to Yildirim Folyo's plant in 2011 will give the company the opportunity to develop its product range and better serve the industry with ten times longer rolls of foils.

Yildirim Folyo Ambalaj San Tic Ltd Sti – Turkey
Website: www.yildirimfolyo.com

www.facebook.com/cnrexpoistanbul
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www.cnrcablewire.com

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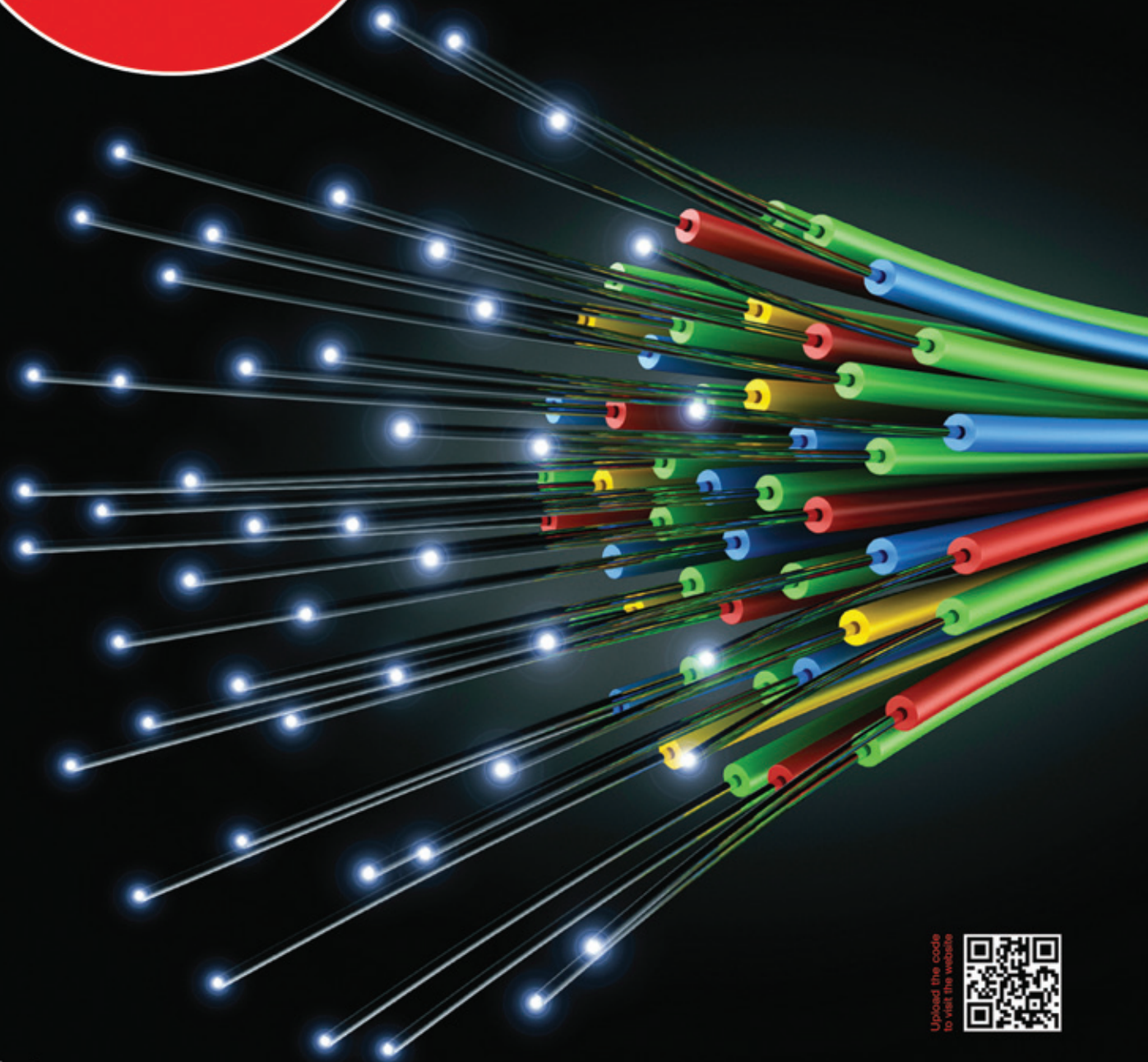

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▲ *Platex planetary extruders from Istanbul*

Extrusion technology

TAKIMSAN'S Platex range offers plastification, homogenisation and dispersion technology for soft PVC, rigid PVC, wood-plastic composites, and PE+calcite granulates.

Planetary roller screws ensure perfect mixing and compounding. Other main advantages of the Platex extruders are optimum degassing in special vacuum chamber; high production capacity (600, 900, 1,200 or 2,000kg/hr); substantial electric power savings; self-cleaning screws; short formula change times; and maximum filler (eg $CaCO_3$) plastification capacity.

Takimsan Ltd – Turkey
Website: www.takimsan.com

Electrostatic equipment

MIKRON Machine Electrostatic Powder Application Co (Mikronix) is known principally for its electrostatic equipment production line.

The company also produces electrostatic powdering machines, and with more than 200 machines manufactured to date is one of the leaders in its sector in Turkey, Azerbaijan, Algeria, Ethiopia and Jordan.

Mikronix – Turkey
Website: www.mikronixcable.com

▼ *Powder coating technology from Mikronix*

▲ *Cable production at Meksan Kablo*

LV cables

MEKSAN Kablo manufactures building installation wires and low voltage energy cables according to international standards, including products under the 'mexancab' registered trademark.

The company was founded in 2005 and after improving production, built its own plant in the Silivri İndustrial Area, Istanbul, with 13,500m^2 open and 10,000m^2 closed building areas.

Meksan operates an ISO 9001:2008 quality management system together with a high-tech quality control test laboratory to check everything according to global standards.

The company is continuously improving its product range, for example by adding halogen free insulated wires and cables, and enlarging the range by adding aluminium conductor low voltage energy cables.

The company also has TSE and HAR licences, and ISO 14001 Environmental Management System Certificate.

Meksan Kablo – Turkey
Website: www.meksankablo.com

Tungsten carbide wire drawing dies

OMERLER Ltd has been established as an engineering, consultancy and sales representation company for the Turkish wire industry since 1989.

After gaining adequate experience in this field Omerler expanded its activities to cover the production and re-cutting of tungsten carbide wire drawing dies in 1995. Since then, the company has continued to supply quality dies conforming to international standards to the wire industry.

All Omerler dies are produced on state-of-the-art machinery within the required tolerances, allowing the company to warrant a consistent quality and repeatable results with its products. Omerler uses machinery and technology from US company Die Quip Corp, which it also represents in Turkey.

Omerler supplies major wire mills in Turkey, and its dies have also been exported to countries that include Portugal, Italy, The Netherlands, Egypt, Syria, Iran, Zimbabwe and the Ivory Coast.

▲ *Dies from Omerler*

Being aware that the prerequisite for a quality product is to begin with a quality raw material, Omerler procures its raw material from the same well-known suppliers.

Omerler is not only a die maker but also a problem solver. The company discusses the details of the wire production process and the aims of its customers in order to determine the best die profile suited to the process, and all dies are customised to the requirements of the customer.

Omerler Ltd – Turkey
Website: www.omerler.com.tr

Cable Print Verification system

By Craig Girdwood, Taymer International Inc, and Brian Franklin, Commscope

Abstract

The use of the Print Verification (PV) system in detecting print defects greatly improves quality assurance of wire and cable. Defects on the jacket are continuously detected by a machine vision system at production line speed. Images of the defects are processed and saved. This technology improves the print quality of the cable produced and by greatly reducing defective products from reaching the customer.

1 Introduction

Print defects are generally the biggest single source of defects in power cable and fibre optic cable manufacturing facilities.

Wrong messages, print smudging and faded prints are print defects that should not be on good quality products. The defects are not only cosmetic problems, but the wrong message can lead to misuse of the cable when it reaches the end-user. By being able to detect the defects, corrective actions can be taken at the production level and defective pieces can be reprinted or discarded.

The PV system uses machine vision technology to analyse, isolate, and identify print defects. The system runs inline and saves the all defect image data including length and defect size in a database. The camera is generally positioned close to the printer to simplify print legend identification and print location. Images of the print legend are created and processed through high-speed image processing algorithms and character verification techniques. Any illegible or incorrect print legends are detected by the software, alerting the operator to take corrective action. The images are stored together with length information providing further analysis or report generation.

The alert provides operators with instant feedback on current printing conditions resulting in not only corrective actions, but more importantly allows the operator to identify and reduce the root causes of the print defect. This reduces the print defects before they actually happen; improving print quality, reducing rework cost, wasted consumables, and defective products.

The PV system can also easily integrate to your lines and works well for all types of printed cables (twisted pair, jacketed, bare wires, and convoluted profiles).

The system will be able to analyse print legends done by any type of printing method such as hot foil, inkjet, emboss, indent, laser, and gravure printing.

Maintenance on the unit involves a quick wipe when the unit is dusty.

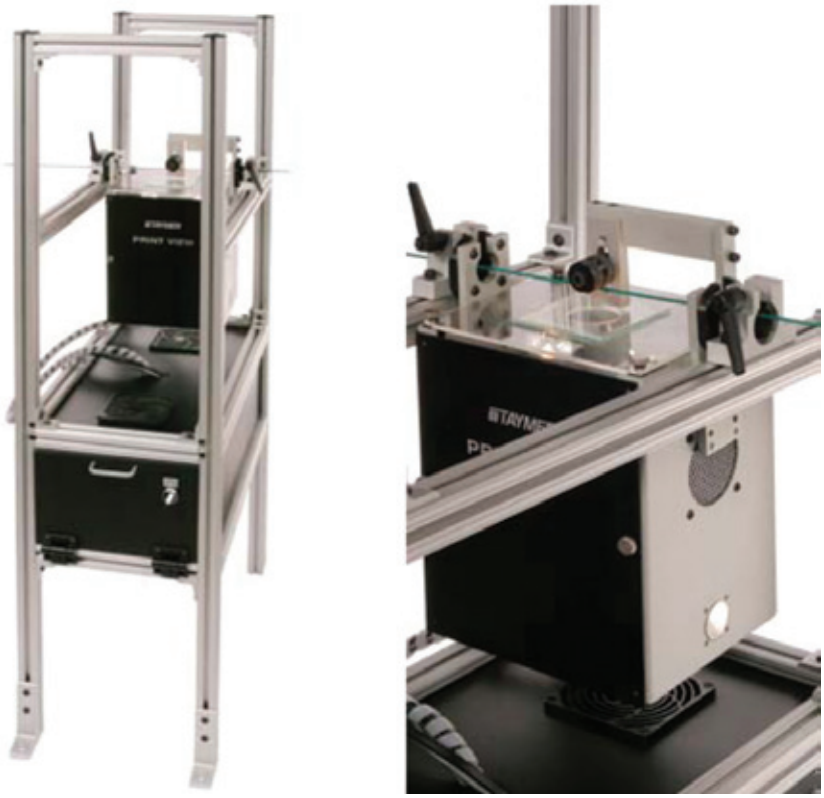
The lifetime of the lights can be over 50,000 hours of usage, and they are the only consumable part in the whole system.

2 Various Print Detection Technique Limitation

2.1 Inline Visual Inspection using Stroboscope

This type of inspection involves using a stroboscope inline. A stroboscope flashes light at the proper period to make the print legend appear to be slow moving or stationary. This gives some time for the operator to verify the existence or quality of the print. However, one limitation is that there is not enough time to carefully

▼ **Figure 1**: *Taymer Print View System*



verify lengthy print legends until the next print shows up. As well, the flashing light strobes can be a nuisance to the operator.

2.2 Offline Viewing through Magnifying Lens

One technique to detect print defects is having the operators to look through a magnifier. Although the operator can see the print defects and categorise them accordingly, there are a lot of limitations. The operator can only read the print up to a certain speed. This technique is done offline where the line speed is slower or zero. This process is very tedious and time consuming; so it is usually for customers who require this type of inspection. As print legends can be lengthy, there is a high chance of human error during the inspection. Also, the threshold of each operator is different and print quality is judged differently.

2.3 Image Capture and Sampling

This process involves a camera acquiring an image based on an encoder signal and sampling rate. The image is then shown on a display for the operator to process a sample of images to determine if there are any print defects. Some main limitations are fatigue, operator's thresholds, and slower processing speed. There is also a chance of missing some print defects depending on the sampling rate.

3 Machine Vision Inspection System

3.1 Optical Mechanical Design

The print verification system (*Figure 1*) consists of a camera and adequate lighting to capture images of print legend moving at speeds more than 1,400ft (460m) per minute.

Multi-camera systems may be needed to handle cables with several print legends. For example, wires with print legends on opposite sides require a two-camera system.

The camera and lens provide a field of view to cover the print legend (*Figure 2*). Image capture is synchronised with the printer and line speed. The image will be used for further software processing. The lighting can vary depending on the application. The factors in consideration are the reflectivity of the material, surface profile, colour, line speed, and lens aperture.

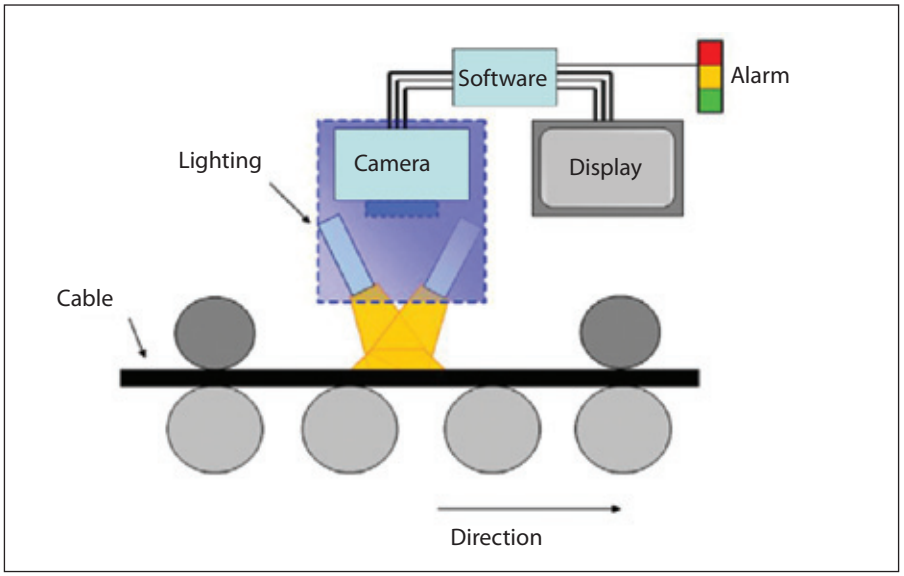
To ensure consistency in the images, the setup features an enclosure to prevent other lighting, dust particles, and other factors from affecting the results. Vibration of the cable is also minimised by wire guides to prevent images from being out of focus.

One other challenge is the location of the PV system and to ensure the print stays within the camera's field of view. The recommended location for the PV system is directly after the printer, where the print will be in the correct spot consistently. Placing the PV system further down the line will result in a high chance of the cable twist; which causes the print to be anywhere around the cable and outside the field of view.

3.2 Software

Advance algorithm is used to process the images for print defects inspection. There are a number of algorithms: print quality detection, optical character verification (OCV), and optical character recognition (OCR). Different algorithms are implemented depending on the requirements and budget.

▼ **Figure 2**: *Print View System Overview*



For print quality detection, it utilises a method called pattern matching. This method requires a template of a good print on that specific cable. The template is compared to each captured image during a run. If the two images differ beyond the desired threshold, an alarm will notify the operator and an error report is saved to the ongoing data log. The print defect will also show up on the display for operators to clarify.

OCV and OCR algorithms are more complex and are an extension to the pattern matching technique. For OCV, the software will verify each letter of the print legend. Alphabets of different fonts are stored in the database. The desired print legend is broken down into individual letters of the same font. Each captured image is also broken down into individual letters. Each letter will be compared to the desired letter. If there are differences beyond the threshold, it is a print defect. However, the software does not know what the misprinted letter is.

OCR is the most advanced. The algorithm is very similar to what an operator would be able to detect with the eyes and mind. Not only would the software find out if a letter is different from the desired print legend, but it will be able to recognise the misprinted letter(s). This helps identify exactly what the mistake is and immediate actions to fix the system can be done.

3.3 Improving Quality Assurance

Suitable for any Type of Products

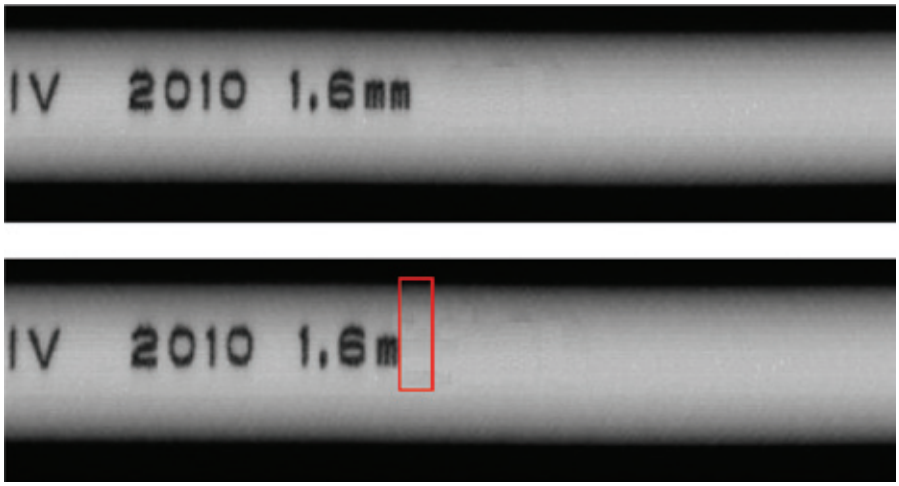
Since the PV system uses machine vision, it is able to inspect the print legend for any type of products. With proper set-up of the optical components, the system can be used on bare wire, cables, pipe, tube, tapes, flat sheets, etc.

Suitable for any Type of Printers/Fonts

The PV system uses image templates as a reference. The references fonts or print legends are predefined at the start-up. Regardless if the print legend or fonts are done by an inkjet, inkwheel, hot foil or laser printer, the software will be able to compare the print legends to the references.

Reduce Defects On-The-Fly

The PV system provides the operator with a view of the current print legend as well as the most recent print defects. This continuous stream of real time information – especially failure data – allows the operator to isolate the causes of print defects while the production line is still running. If the print quality is degrading below the threshold, the operator can immediately adjust the printer to improve the quality. Also, operators can use the PV system at the beginning of the run to set-up the printer and check to ensure



▲ **Figure 3**: *Missing print detected at 900ft/min*

▲ **Figure 4**: *Poor print quality detection at 200ft/min*

▲ **Figure 5**: *Screenshot of print quality comparison*

the print legend is correct. The PV system allows changes to be made on the fly, greatly reducing reprint of the cable post production.

Quality Assurance
The system will capture images of the printed cable at high line speeds, and save the images of the print defects to disk for use in quality reports. The PV system's display makes it easy for engineering and production supervisors to examine the defect without having to see the defect itself. Defect locations are recorded together with the image allowing for easy report generation and further analysis.

3.4 Limitations

There are a few limitations to the print verification system.

- For different types of cable surface (round/twisted profile), and fonts, the same print legend may look different. Therefore, different templates are required for different types of cables
- Lengthy print legend can also twist out of the camera view, resulting in missing characters. There is a high chance of this happening on twisted pair wires
- Since the camera is looking at the surface, water droplets/grease/dust particles would show up affecting the print legend resulting in false defects. To compensate for them, the system would need to decrease the quality threshold or an air wipe is necessary

3.5 Test Results

Taymer's Print Verification System has been tested in the industry extensively on different products, print messages, and using types of printing methods. The two authors worked closely with Commscope in Claremont to bring this QA technology to the plant.

The before and after print defect data was recorded. After one year of use, print defects were reduced by over 50%.

The reasons were as follows:

- Minor print quality issues were caught before they became an actual defect. For example the operator adjusted the printer or fixed cable alignment
- Printer maintenance was initiated before the printer actually malfunctioned because the operators received very current feedback on print quality
- Incorrect print legend was identified before the entire run was misprinted

3.6 Sample Images

Figures 3-5 are sample images or screenshots of print defects found by the PV optical system on different products.

Conclusions

With a Print Verification System, the print legends on the cable can be inspected thoroughly for defects. The system provides several benefits:

- Suitable for any type of products – wire/cable/hose/pipes/bars/plates/stranded product
- Suitable for any type of printers – inkjet, ink wheel, hot foil, laser, indent/emboss
- Ensure the customer will not get defective products, improving customer relationship and confidence
- Reduce reprinting and eliminate consumable waste resulting in material cost and labour cost
- Assist in internal improvement to production process to reduce defects ■

Acknowledgments

Special thanks also to the IWCS staff for making this template available for this year's publication.

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Potentielle Aufträge für Windak

▲ *Das Team von Windak bei der wire 2012*

Über 100 Besucher aus 40 verschiedenen Ländern haben während der wire 2012 den Stand von Windak besucht – mit fünf potentiellen Aufträgen, die während der Messe abgeschlossen wurden.

Das Unternehmen hat den AR24-D vorgestellt – den neuesten automatischen Doppelkopfwickler – der für die automatische Verpackung von Kabel- und Drahtprodukten auf Spulen und Haspeln in Gesamtdurchmessern zwischen 300 und 600mm entworfen wurde.

Windak – Estland **Website**: www.windakusa.com

Neuer Vorsitzender

LARS Fagerholm wurde am 12. April dieses Jahres zum CEO der Maillefer Gruppe ernannt.

Er tritt die Nachfolge von Peter Roos an, der bis Ende Juni 2012 in seiner Stellung blieb, um einen problemlosen Übergang zu sichern.

Während seiner vier Jahre bei Maillefer hat Roos erfolgreich mehrere wichtige Veränderungen abgeschlossen, um die Wettbewerbsfähigkeit der Gruppe für die kommenden Jahren zu garantieren.

Fagerholm verfügt über weltweite Erfahrung, die auf verschiedenen Führungsaufgaben basiert, insbesondere aufgrund seiner langen Tätigkeit bei Albany International, der weltweit führende Lieferant technischer Produkte für Papiermaschinenbespannung in der Halbstoff- und Papierindustrie.

Sein Fachwissen und die Erfahrung in internationalen Geschäftsstrukturen, im technischen Management sowie in der Fertigungswirtschaft stellen einen großen Gewinn dar, Maillefer zu unterstützen ihr Ziel zu erreichen bzw. ihre Marktführung zu stärken und ein wertvollerer Lieferant der Industrie zu werden.

Maillefer International Oy – Finnland
Website: www.mailleferextrusion.net

▲ *Neuer Vorsitzender Lars Fagerholm*

Statischer Wickler der Baureihe MS von Frigeco

ENTWORFEN, um sich sowohl für Kupfer als auch für Aluminium zu eignen, ist die Baureihe MS von Frigeco ein universell einsetzbarer Wickler mit Drahthalterkorb für jegliche Anwendung.

Dieser Wickler kann mit unterschiedlichen Kopfdurchmessern von 630 bis 1.000mm geliefert werden und passt sich den jeweiligen Korbabmessungen an.

Die MS-Baureihe wird mit einem unabhängigen Schrank ausgestattet, der Inline mit den bestehenden Ziehmaschinen anzuordnen ist. Als dedizierte Sonderversion gilt eine perfekte Aufwicklerlösung für Elektroplattierungsanlagen.

Ausgestattet mit vollautomatischer Umrüstung, kann die MS-Baureihe von Frigeco mit angetriebenen Förderern sowohl für leere wie für volle Körbe eingerichtet werden, den Kundenanforderungen entsprechend maßgeschneidert.

Eine große Aufmerksamkeit wurde auf die Zugänglichkeit für den Bediener und dem Platzbedarf sowie der Reduzierung der Einrichtzeiten gerichtet.

Die Maschinenauswahl von Frigeco vom Drahtziehen zur Extrusion und zum Verseilen, deckt die ganze Palette für die Draht- und Kabelindustrie ab.

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

▶ *Die neue Baureihe MS von Frigeco*

Teijin schützt Lichtwellenleiter mit Band

Teijin Aramid kündigt eine neue, verbesserte Möglichkeit zum Schutz von Glasfaserkabeln an: Twaronband.

Die Bedeutung von Glasfaserkabeln in der aktuellen Telekommunikationstechnologie nimmt stetig zu. Die empfindlichen Kabelkerne müssen vor unterschiedlichen Risiken und Belastungen geschützt werden.

Glasfaserkabel werden immer dünner; gleichzeitig wird es schwieriger, den Glasfaserkern zu schützen. Twaronband ist ein Aramidfaserverbundwerkstoff, mit dem sich Glasfaserkabel mit einem Durchmesser ab 1,2mm schützen lassen. Gleichzeitig zeichnet sich dieses Band im Vergleich zu derzeit genutzten Aramidfasern durch eine drei- bis fünfmal höhere Deformationsbeständigkeit aus.

Der Schutz dünner Kabel mit Twaronband bietet im Vergleich zu aktuellen Lösungen eine Reihe weiterer Vorteile. So wird beispielsweise durch Kabel mit 1,2mm Durchmesser die Kapazität für Optical Distribution Frames (gegenüber Kabeln mit 1,6 mm Durchmesser) um 30 bis 50 Prozent erhöht. Darüber hinaus müssen dünnere Kabel nicht so stark gekühlt werden; dadurch sinken an ihren Implementierungsorten die Kosten und die Emissionen.

Twaronband D2800 ist eine robuste, flexible patentierte Lösung, die dazu beiträgt, dass Kabel rascher produziert werden können. Dies spart wertvolle Zeit. Die Flexibilität des Twaronbands ermöglicht raschere und bequemere Installation und Handhabung, denn hiermit lassen sich Glasfaserkabel leichter abisolieren und mit Steckern/Steckdosen versehen.

Das Band besteht aus einem aufgespreizten Twaronfaserbündel, das imprägniert und mit einem Matrixmaterial fixiert ist. Damit lässt sich sehr viel Platz sparen und Glasfaserkabel mit einem so geringen Durchmesser produzieren. Das Band ist gleichmäßig um den Kern aus Glasfasern gewickelt und garantiert so vollständigen Schutz sowie optimale Widerstandskraft und Deformationsbeständigkeit.

Christoph Hahn, kaufmännischer Leiter bei Teijin Aramid, sagte: "Wir waren schon früh führend in Sachen Schutz für Glasfaserkabel. In dem Umfang, in dem sich dieser Markt entwickelt hat, haben wir gelernt, was der Markt verlangt.

"Wir sind stolz darauf, durch Bereitstellung unseres Know-how über hochleistungsfähige Aramidfasern für unsere Kunden in zahlreichen Ländern unseren Beitrag zum Erfolg dieser Branche zu leisten."

Teijin Aramid – Niederlande
Website: www.teijinaramid.com

Prüfsystem für die Kabelbedruckung

Craig Girdwood, Taymer International Inc, und Brian Franklin, Commscope

Zusammenfassung

Der Einsatz eines Bedruckungsprüf- (PV) Systems für die Feststellung von Bedruckungsfehlern führt zu einer wesentlichen Verbesserung der Qualitätssicherung bei Draht und Kabel. Fehler an der Umhüllung werden ständig durch ein industrielles Bildverarbeitungssystem bei Produktionsliniengeschwindigkeit erfasst.

Die Bilder der Fehler werden verarbeitet und gespeichert. Diese Technik verbessert die Bedruckungsqualität des hergestellten Kabels und reduziert wesentlich die Möglichkeit, dass der Kunde mangelhafte Produkte erhält.

1 Einleitung

Bedruckungsfehler ist in der Regel der Hauptfehler in Steuerkabel- und Lichtleitfaserkabel-Fertigungsanlagen.

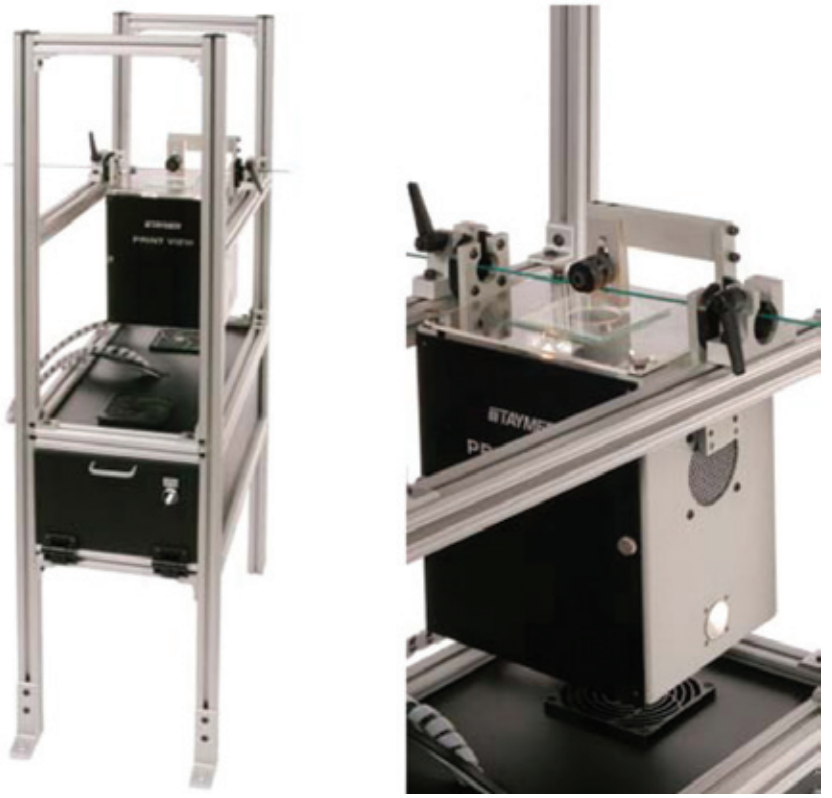
Falsche Beschriftungen, verschmutzende Bedruckung, abgefärbte Bedrucke sind Bedruckungsfehler, die bei hochwertigen Produkten nicht vorkommen sollten. Fehler sind nicht nur ästhetische Probleme, denn eine falsche Beschriftung kann zu einem Missbrauch des Kabels führen, wenn es vom Endbenutzer genutzt wird. Anhand der Möglichkeit diese Fehler zu erfassen, können Korrekturmaßnahmen am Produktionsniveau ergriffen werden und mangelhafte Teile somit von neuem bedruckt oder beseitigt werden.

Das PV-System setzt die Technik der industriellen Bildverarbeitung ein, um Bedruckungsfehler zu analysieren, isolieren und identifizieren. Das System läuft Inline und speichert die ganzen Fehlerbilddaten, einschließlich Länge und Fehlergröße, in einer Datenbank. Die Kamera wird in der Regel in der Nähe des Druckers angebracht, um die Identifizierung des Bedruckungstexts und die Bedruckungsposition zu vereinfachen. Die Bilder des Bedruckungstextes werden durch Hochgeschwindigkeits-Bildverarbeitungsalgorithmen und Techniken zur Schriftzeichenprüfung erzeugt und verarbeitet. Alle unleserlichen oder falschen Bedruckungstexte werden durch die Software erfasst und warnen den Bediener, damit er Korrekturmaßnahmen ergreifen kann.

Die Bilder werden zusammen mit den Informationen über die Länge gespeichert und bieten weitere Analysen oder die Erstellung von Berichten.

Durch die Signalisierung erhalten die Bediener ein sofortiges Feedback über die aktuellen Bedruckungsbedingungen, was nicht nur in Korrekturmaßnahmen resultiert, sondern - was umso wichtiger ist - den Bediener in die Lage versetzt, die Ursache des Bedruckungsfehlers zu identifizieren und reduzieren. Somit werden Bedruckungsfehler reduziert

▼ **Bild 1**: *Druckansicht-System von Taymer*



bevor sie tatsächlich entstehen; dadurch wird die Bedruckungsqualität erhöht und die Nachbearbeitungskosten, das verschwendete Verbrauchsmaterial und die mangelhaften Produkte werden reduziert.

Das PV-System kann außerdem leicht in die Kundenlinien hinzugefügt werden und arbeitet bei allen Typen bedruckter Kabel gleich gut (paarverseilte, umhüllte, blanke Drähte und gewellte Profile). Das System wird fähig sein den Bedruckungstext zu analysieren, die je Bedruckungsmethode durchgeführt werden, wie z. B. Warmdruck, Tintenstrahl, Stanzen, Einzug, Laser und Tiefdruck.

Zur Wartung der Einheit gehört ein schnelles Abwischen wenn die Einheit verstaubt ist. Die Lebensdauer der Lichter kann 50.000 Stunden Benutzung betragen, das sind auch die einzigen Ersatzteile im ganzen System.

2 Einschränkung der verschiedenen Techniken zur Bedruckungserfassung

2.1 Inline-Sichtprüfung mit Einsatz eines Stroboskops

Dieser Prüfungstyp schließt Inline einen Stroboskops ein. Ein Stroboskop gibt Lichtblitze in entsprechenden zeitlichen Abständen ab, damit der Bedruckungstext als langsam vorangehend oder stehend erscheint. Somit hat der Bediener etwas Zeit um die Existenz oder die Qualität der Bedruckung zu prüfen. Dennoch besteht eine Einschränkung darin, dass nicht genug Zeit vorhanden ist, um sorgfältig lange Bedruckungstexte zu prüfen, bevor die darauf folgende Bedruckung erscheint. Außerdem könnte der Bediener von dem blitzenden Licht der Stroboskopen gestört werden.

2.2 Offline-Sichtprüfung durch Vergrößerungslinse

Eine Technik um Bedruckungsfehler festzustellen besteht darin, dass der Bediener durch eine Vergrößerungslinse schaut.

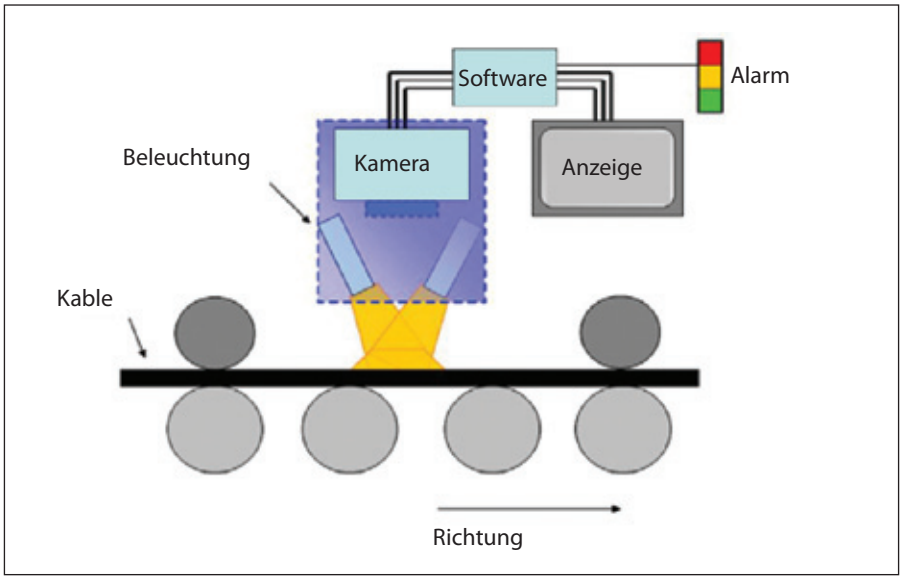
Obwohl der Bediener die Bedruckungsfehler sehen und sie entsprechend kategorisieren kann, bestehen in diesem Fall viele Einschränkungen. Der Bediener kann die Bedruckung nur bis zu einer bestimmten Geschwindigkeit lesen. Diese Technik erfolgt Offline, wo die Liniengeschwindigkeit langsamer ist oder Null entspricht. Dieses Verfahren ist sehr mühsam und zeitaufwendig; daher wird es in der Regel für Kunden vorgesehen, die genau diesen Typ von Inspektion anfordern. Da Bedruckungstexte sehr lang sein können, besteht ein hohes Risiko menschlicher Fehler während der Inspektion. Außerdem ist der Grenzwert bei jedem Bediener anders und die Bedruckungsqualität wird auf unterschiedlicher Weise beurteilt.

2.3 Erfassung und Probenahme der Bilder

Dieses Verfahren schließt eine Kamera ein, die ein Bild basierend auf einem Encodersignal und auf die Probenahmegeschwindigkeit erfasst.

Das Bild wird dann auf einer Anzeige dargestellt, damit der Bediener ein Muster von Bildern verarbeitet kann, um festzustellen ob Bedruckungsfehler vorhanden sind. Einige Haupteinschränkungen sind Ermüdung des Bedieners, Bedienerfähigkeit und langsamere Verarbeitungsgeschwindigkeit. Es besteht auch die Möglichkeit einige Bedruckungsfehler auszulassen, je nach der Probenahmegeschwindigkeit.

▼ **Bild 2**: *Übersicht des Druckansicht-Systems*



3 Industrielles Bildverarbeitungsprüfsystem

3.1 Optische mechanische Ausführung

Das Bedruckungsprüfsystem (*Bild 1)* besteht aus einer Kamera und einer geeigneten Beleuchtung, um die Bilder des Bedruckungstextes zu erfassen während dieser bei einer Geschwindigkeit von über 1.400 Fuß (460m) pro Minute läuft. Es könnte sich als erforderlich erweisen, Mehrkamerasysteme vorzusehen, um Kabel mit verschiedenen Bedruckungstexten zu handhaben.

Zum Beispiel ist bei Drähten mit Bedruckungstexten auf gegenüberliegenden Seiten ein Zwei-Kamera-System erforderlich.

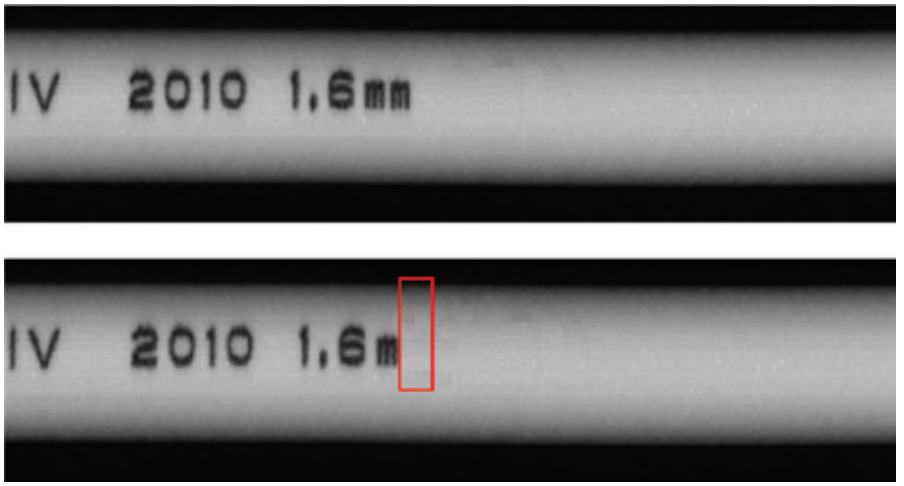
Die Kamera und die Linsen bieten ein Sichtfeld, der den Bedruckungstext einschließt (*Bild 2*). Die Bilderfassung ist mit dem Drucker und der Liniengeschwindigkeit synchronisiert.

Das Bild wird für die weiteren Softwareverarbeitungen eingesetzt. Die Beleuchtung kann abhängig von den Anwendungen variieren. Die berücksichtigten Faktoren sind das Reflexionsvermögen des Materials, das Oberflächenprofil, die Farbe, die Liniengeschwindigkeit und die Linsenöffnung.

Um die Einheitlichkeit der Bilder zu sichern, ist das Gerät abgedeckt, damit vermieden wird, dass eine andere Beleuchtung, Staubpartikeln sowie weitere Faktoren die Ergebnisse beeinträchtigen. Die Vibration des Kabels wird auch durch Drahtführungen minimiert, um zu vermeiden, dass die Bilder unscharf sind.

Eine weitere Herausforderung liegt in der Anordnung des PV-Systems und darin zu sichern, dass die Bedruckung sich innerhalb des Sichtfelds der Kamera befindet.

Die empfohlene Anordnung des PV-Systems liegt direkt nach dem Drucker, wo die Bedruckung konsequent durchgeführt wird. Wird die Anordnung des PV-Systems der Linie weiter nachgeschaltet, so entsteht eine höhere Verdrillmöglichkeit des Kabels; was



▲ **Bild 3**: *Erkennung eines fehlenden Drucks bei 900 Fuß/min*

▲ **Bild 4**: *Erkennung niedriger Druckqualität bei 200 Fuß/min*

▲ **Bild 5**: *Bildschirmabzug des Druckqualitätsvergleichs*

wiederum dazu führt, dass sich die Bedruckung überall am Kabel und außerhalb des Sichtfelds befinden könnte.

3.2 Software

Ein fortschrittlicher Algorithmus wird angewendet um die Bilder für die Inspektion der Bedruckungsfehler zu verarbeiten. Es gibt mehrere Algorithmen: Bedruckungsqualitätsdetektion, optische Schriftprüfung (optical character verification - OCV) und optische Schriftzeichenerkennung (optical character recognition - OCR). Abhängig von den Anforderungen und dem Budget, können verschiedene Algorithmen benutzt werden.

Für die Bedruckungsqualitätsdetektion wird eine Methode benutzt, die „pattern matching" (Musterübereinstimmung) genannt wird. Für diese Methode ist die Mustervorlage einer guten Bedruckung eines entsprechend speziellen Kabels erforderlich. Die Mustervorlage wird mit jedem erfassten Bild während eines Durchlaufs verglichen. Wenn sich die zwei Bilder über die erwünschte Grenze hinaus unterscheiden, wird der Bediener durch einen Alarm informiert und ein Fehlerbericht wird im laufenden Datenprotokoll gespeichert. Der Bedruckungsfehler wird auch auf der Anzeige als Klärung für die Bediener erscheinen.

OCV- und OCR-Algorithmen sind komplexer und stellen eine Erweiterung der Technik der Musterübereinstimmung dar. Für OCV, wird die Software jede Drucktype des Bedruckungstexts prüfen. Die Alphabete unterschiedlicher Schriften sind in der Datenbank gespeichert. Der gewünschte Bedruckungstext wird in einzelnen Buchstaben derselben Schrift aufgeteilt. Jedes erfasste Bild wird ebenfalls in einzelnen Buchstaben aufgeteilt. Jeder Buchstabe wird mit dem gewünschten Buchstaben verglichen. Falls sich Unterschiede über die Grenze hinaus zeigen, bedeutet es, dass ein Bedruckungsfehler vorhanden ist. Die Software erkennt jedoch nicht welcher Buchstabe falsch ist.

Das OCR-System ist das fortgeschrittenste System. Der Algorithmus ist dem was ein Bediener mit Augen und Verstand feststellen könnte, sehr ähnlich. Die Software findet nicht nur heraus, ob ein Buchstabe sich vom gewünschten Bedruckungstext unterscheidet, sondern kann auch den falschen Buchstabe/die falschen Buchstaben erkennen.

Das bietet eine Unterstützung bei der genauen Identifizierung der Fehler und damit können sofortige Maßnahmen erfasst werden, um das Problem zu lösen.

3.3 Verbesserte Qualitätssicherung

Für jeden Produkttyp geeignet

Da das PV-System die industrielle Bildverarbeitung benutzt, kann es den Bedruckungstext für jeden Produkttyp prüfen. Mit einer geeigneten Einstellung der optischen Komponenten, kann das System bei Blankdraht, Kabeln, Schläuchen, Rohren, Bändern, Flachblechen usw. eingesetzt werden.

Für jeden Drucker-/Schrifttyp geeignet

Das PV-System setzt Bildermustervorlagen als Bezug ein. Die Bezugsschriften oder -bedruckungstexte werden beim Anlaufen voreingestellt. Unabhängig davon, ob die Bedruckungstexte oder -schriften durch Tintenstrahl-, Tintenrad-, Heißfolien- oder Laserdrucker erfolgen, wird die Software imstande sein, den Bedruckungstext mit den entsprechenden Bezug zu vergleichen.

Reduzierte Mängel in Ist-Zeit

Das PV-System bietet dem Bediener eine Ansicht des laufenden Bedruckungstextes sowie der neuesten Bedruckungsfehler. Dank diesem kontinuierlichen Fluss von Ist-Zeit-Informationen – insbesondere Fehlerdaten – kann der Bediener die Ursachen der Bedruckungsfehler isolieren während die Produktionslinie weiterhin läuft.

Wenn die Bedruckungsqualität unter den Grenzwert gerät, kann der Bediener sofort den Drucker regeln um die Qualität zu verbessern. Außerdem können die Bediener am Anfang des Arbeitsgangs das PV-System benutzen um den Drucker einzustellen und zu prüfen, damit sichergestellt wird, dass der Bedruckungstext richtig ist. Anhand des PV-Systems können Änderungen in Ist-Zeit durchgeführt werden. Dies führt zu einer wesentlichen Reduzierung von Neubedruckungen der Kabel nach der Produktion.

Qualitätssicherung
Das System wird Bilder des bedruckten Kabels bei hohen Liniengeschwindigkeiten erfassen und die Bilder der Bedruckungsfehler auf der Diskette für den Gebrauch bei Qualitätsberichten speichern.

Durch die Anzeige am PV-System wird den Engineering- und Produktionsleitern die Prüfung des Fehlers erleichtert, ohne dass sie direkt den Fehler sehen müssen.

Die Plätze der Fehler werden zusammen mit dem Bild aufgezeichnet. Dies ermöglicht eine einfache Erstellung der Berichte und weitere Analysen.

3.4 Einschränkungen

Es gibt einige Einschränkungen beim Bedruckungsprüfsystem:

- Für verschiedene Typen von Kabeloberflächen (runde/gedrillte Profile) und Schriften, könnte der Bedruckungstext unterschiedlich aussehen. Daher sind verschiedene Mustervorlagen für unterschiedliche Kabeltypen erforderlich.
- Ein langer Bedruckungstext kann sich auch außerhalb des Kamerasichtfelds befinden. Das ergibt fehlende Schriftzeichen. Bei paarverseilten Drähten kann dies öfter vorkommen
- Da die Kamera auf die Oberfläche gerichtet wird, können Wassertropfen/ Fett/Staubpartikel erfasst werden, die den Bedruckungstext beeinflussen, was zu falschen Fehleranzeigen führen kann. Um dies auszugleichen, sollte entweder das System die Qualitätsgrenze vermindern oder ein Luftabweiser erforderlich sein

3.5 Testergebnisse

Das Bedruckungsprüfsystem von Taymer wurde für verschiedene Produkte, Bedruckungsbeschriftungen und mit Einsatz von Typen von Bedruckungsmethoden im Industriebereich verbreitet geprüft.

Die zwei Autoren haben eng mit Commscope in Claremont zusammengearbeitet, um diese Qualitätssicherungstechnik im Werk herzustellen.

Die Angaben der Bedruckungsfehler wurden davor und danach aufgezeichnet. Nach einem Jahr Einsatz wurden die Bedruckungsfehler um über 50 Prozent reduziert.

Die Gründe dazu waren:

- Probleme wegen einer niedrigeren Bedruckungsqualität wurden festgestellt bevor sich diese in tatsächliche Fehler umwandelten. Zum Beispiel regelte der Bediener den Drucker oder legte die Kabelorientierung fest
- Die Wartung des Druckers wurde initiiert bevor der Drucker eigentlich versagte, weil der Bediener ein sofortiges Feedback über die Bedruckungsqualität erhielt
- Ein unrichtiger Bedruckungstext wurde identifiziert bevor der ganze Arbeitslauf fehlerhaft druckte

3.6 Musterbilder

Nachfolgend sind Musterbilder oder Bildschirmabzüge (*Bild 3-5*) von Bedruckungsfehlern angegeben, die vom optischen PV-System bei unterschiedlichen Produkten erfasst wurden.

Schlussfolgerungen

Mit einem Bedruckungsprüfsystem können Bedruckungstexte am Kabel sorgfältig hinsichtlich der Fehler geprüft werden. Das System bietet verschiedene Vorteile:

- Für alle Produkttypen geeignet – Draht/ Kabel/ Schläuche/ Rohre/ Stangen/ Bleche/ gezogene Produkte
- Für alle Druckertypen geeignet – Tintenstrahl, Tintenrad, Warmdruck, Laser, Einzug/Stanzen
- Sichert, dass der Kunde keine mangelhaften Produkte erhält, was wiederum die Kundenbeziehung sowie das Vertrauen verbessert
- Reduzierte Neubedruckung und Beseitigung verschwendeten Verbrauchsmaterials, was sich in Material- und Arbeitskraftkosten auswirkt
- Unterstützung bei werksinternen Verbesserungen des Produktionsverfahrens, um Fehler zu reduzieren ■

Danksagungen

Ein spezieller Dank geht auch an das Team von IWCS, das es ermöglichte diese Mustervorlage für die diesjährige Veröffentlichung zur Verfügung zu stellen.

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Потенциальные заказы «Уиндак»

▲ *Представители компании «Уиндак» на выставке wire 2012*

Более 100 гостей из 40 стран мира посетили стенд компании «Уиндак» (Windak) на выставке wire 2012, по окончании которой образовалась очередь из пяти потенциальных заказчиков.

Компания представила AR24-D – последнюю модель двухшпиндельного автоматического намоточного станка, которая была разработана для автоматизированной упаковки кабельно-проводниковой продукции с намоткой на катушки и бобины общим диаметром от 300 до 600 мм.

Windak (Эстония) **Web-страница**: www.windakusa.com

Новый главный исполнительный директор

С 12 апреля текущего года главным исполнительным директором группы компаний «Мэйллефер» (Maillefer) назначен Ларс Фагерхольм (Lars Fagerholm). Он сменил Питера Рооса (Peter Roos), который был оставлен на этом посту до конца июня 2012 года для обеспечения плавного перехода к новому руководству. В течение четырех лет своего пребывания в «Мэйллефер» г-н Роос с успехом провел ряд существенных преобразований, имеющих целью обеспечить конкурентоспособность группы компаний на ближайшие годы.

Г-н Фагерхольм обладает большим международным опытом, который он приобрел, занимая руководящие посты в нескольких компаниях, и, в частности, за время длительной работы в компании «Элбани интернэшнл» (Albany International) – ведущего мирового поставщика одежды бумагоделательных машин для целлюлозно-бумажной промышленности. Его деловая квалификация и навыки, приобретенные в международных коммерческих структурах, а также опыт технического руководства и управления производством представляют большую ценность для продвижения «Мэйллефер» по пути к достижению ее цели по укреплению лидерства на рынке и упрочнению положения отраслевого поставщика продуктов и услуг.

Maillefer International Oy (Финляндия)
Web-страница: www.mailleferextrusion.net

▲ *Ларс Фагерхольм, новый главный исполнительный директор*

Статические бухтовочные станки серии MS от компании «Фриджеко»

Станки серии MS производства компании «Фриджеко» (Frigeco), рассчитанные для работы как с медными, так и с алюминиевыми проводами, представляют собой универсальные бухтовщики контейнерного типа, которые могут использоваться в различных областях.

Станки могут поставляться со шпинделями различного диаметра (от 630 до 1000 мм) и подходят для корзин всех размеров.

Станки серии MS поставляются с отдельной кабиной для размещения на поточной линии вместе с существующими волочильными станками.

Предлагается специализированная модель, которая является идеальным намоточным устройством для гальванических линий.

Станки серии MS производства компании «Фриджеко», в которых предлагается функция полностью автоматизированной переналадки, могут комплектоваться конвейерами с электроприводом как для пустых, так и для заполненных корзин в зависимости от потребностей заказчика.

Большое внимание уделено удобству доступа и осмотра для оператора, размерам его рабочего места, а также сокращению времени наладки станка.

Номенклатура продукции, выпускаемой компанией «Фриджеко», охватывает полный спектр оборудования для проволочно-кабельной промышленности, включая проволочно-волочильные станы, экструдеры и кабелескруточные станки.

Mario Frigerio SpA (Италия)
Web-страница: www.mflgroup.com

▲ *Новый станок серии MS от компании «Фриджеко»*

«Тейдзин»: оборачиваем все лентой!

Компания «Тейдзин арамид» (Teijin Aramid) предлагает новый, усовершенствованный способ защиты волоконно-оптических кабелей: ленту «тварон» (Twaron Tape).

В сегодняшних сетях связи волоконно-оптические кабели играют все более значимую роль, однако хрупкие сердечники таких кабелей нуждаются в защите от влияния различных неблагоприятных факторов и деформационных нагрузок.

Все большая миниатюризация волоконно-оптических кабелей усложняет задачу по обеспечению защиты их сердечников. Конструкционно лента «тварон» состоит из арамидного волокна и связующего, что позволяет производить волоконно-оптические кабели с минимальным диаметром до 1,2 мм. Одновременно этот продукт обеспечивает усиление сопротивления сдавливанию в 3-5 раз по сравнению с предлагаемыми в настоящее время вариантами арамидного армирования.

В сравнении с существующими решениями использование ленты «тварон» для производства кабелей меньшего диаметра дает ряд других преимуществ. В частности, производство кабелей диаметром 1,2 мм обеспечивает увеличение плотности кроссовых соединений на 30-50 % (по сравнению с кабелями диаметром 1,6 мм). Кроме того, кабели меньшего диаметра требуют меньше энергозатрат на охлаждение, что позволяет снизить издержки и уровень электромагнитного излучения в распределительных центрах.

Лента «тварон» D2800 – это надежное и гибкое запатентованное решение, которое позволяет увеличить скорость производства кабеля и обеспечивает экономию времени. Гибкость ленты «тварон» ускоряет и упрощает монтаж и обслуживание волоконно-оптических кабелей за счет удобства их зачистки и оконцевания.

Лента состоит из единственной площеной нити «тварон», которая пропитана и зафиксирована связующим материалом. В результате значительно экономится пространство, и становится возможным столь существенное уменьшение диаметра оптического кабеля. Для обеспечения полного покрытия кабеля и оптимального уровня стойкости к нагрузкам и сдавливанию лента равномерно наматывается вокруг оптоволоконного сердечника.

Кристоф Хан (Christoph Hahn), коммерческий директор «Тейдзин арамид», говорит: «Наша компания одной из первых стала применять технологию армирования волоконно-оптических кабелей, и по мере развития этого рынка мы приобрели глубокое понимание его требований. Мы горды тем, что теперь можем внести свой вклад в развитие этой отрасли, предоставляя партнерам по всему миру наш опыт в применении высокофункционального арамидного волокна».

Teijin Aramid (Нидерланды)
Web-страница: www.teijinaramid.com

Система проверки печати на кабельной продукции

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Аннотация

Использование системы проверки печати для обнаружения дефектов качества печати значительно улучшает контроль качества проволочно-кабельных изделий. Непрерывный контроль дефектов на кабельной оболочке осуществляется системой машинного зрения со скоростью перемещения изделий в поточной линии. Изображения дефектов обрабатываются и сохраняются. Данная технология позволяет повысить качество печати кабельной маркировки, существенно снижая количество некачественной продукции, поступающей заказчикам.

1 Введение

На предприятиях, выпускающих силовые и волоконно-оптические кабели, наибольший процент выбраковки продукции приходится на некондиционную печать.

Ошибки в маркировке, размытый и нечеткий шрифт – это те дефекты качества печати, которых не должно быть в продукции высокого качества. Указанные дефекты не только ухудшают внешний вид – ведь ошибки в маркировке могут привести к тому, что после его доставки конечному потребителю кабель будет использоваться не по назначению. Благодаря возможности обнаружения дефектов корректирующие действия могут предприниматься уже на производственной площадке, с повторным нанесением печати или отбраковкой некачественной продукции.

Система проверки печати использует технологию машинного зрения для локализации, анализа и идентификации дефектов качества печати. Система работает в составе производственной линии и сохраняет все видеоданные о дефектах, включая длину кабеля, а также размеры дефектов, в базе данных. В большинстве случаев камера устанавливается рядом с печатающим устройством для упрощения идентификации печатной маркировки и определения размещения текстового объекта. Изображения печатной маркировки формируются и обрабатываются с помощью быстродействующих алгоритмов обработки изображений, а также средствами верификации символов. Любая неразборчивая или ошибочная печатная маркировка обнаруживается программным обеспечением, которое предупреждает оператора о необходимости принятия корректирующих мер. Изображения хранятся вместе с данными о длине кабеля для их последующего анализа или формирования отчета.

Система оповещения немедленно передает оператору по каналу обратной связи данные о текущих параметрах печати, что не только обеспечивает возможность ввода поправок, но, что гораздо более важно, позволяет оператору установить и минимизировать основные причины возникновения дефектов качества печати. Таким образом, число дефектов качества печати уменьшается еще до их появления, что повышает качество печати, снижает затраты на исправление брака, сокращает непроизводительное использование расходных материалов и брак продукции.

Система проверки печати также легко агрегатируется с производственными линиями заказчиков и хорошо работает со всеми типами кабельных изделий с нанесенной маркировкой (витой парой, изолированными и неизолированными проводниками, кабелями в гофрированной оболочке). Система способна анализировать печатную маркировку, выполненную любым способом печати, включая горячее тиснение фольгой, чернильную печать, конгревное тиснение, блинтовое тиснение, лазерную и глубокую печать.

Техническое обслуживание устройства сводится к легкой протирке для удаления с него пыли. Срок службы световых приборов может превышать 50 тыс. часов работы, при этом они являются единственными расходными деталями в конструкции системы.

2 Различные ограничения по способам определения качества печати

2.1 Линейный визуальный контроль с использованием стробоскопа

Данный вид визуального контроля предполагает использование линейного стробоскопа. Стробоскоп с определенной частотой излучает вспышки света, в которых печатная маркировка кажется медленно двигающейся или неподвижной. Это дает оператору некоторое время для проверки наличия тестового объекта или качества печати. Однако здесь существует одно ограничение, а именно: времени для тщательной проверки печатной маркировки, содержащей длинный ряд символов, до появления следующей маркировки недостаточно. Кроме того, стробоскопические вспышки света могут доставлять неудобство оператору.

2.2 Автономный визуальный контроль с помощью лупы

Одним из способов определения дефектов качества печати является осмотр изделия оператором с помощью увеличительной лупы. Несмотря на то что оператор может рассмотреть дефекты качества печати и соответствующим образом их классифицировать, существует целый ряд ограничительных условий. Оператор может читать маркировку только со скоростью, не превышающей определенного

максимума. Данный способ применяется в автономном режиме, когда скорость работы линии замедляется или равна нулю. Процедура очень утомительная и отнимает много времени, поэтому визуальный контроль этого типа обычно проводится по требованию самого заказчика. Поскольку печатная маркировка может содержать длинный ряд символов, при визуальном контроле велика вероятность ошибки со стороны оператора. К тому же пороговые уровни производительности у каждого оператора разные, и качество печати оценивается по-разному.

2.3 Регистрация и выборка изображений

Данная технологическая операция предполагает получение изображения при помощью камеры с учетом скорости передачи сигнала датчика положения и частоты выборки. Далее изображение выводится на дисплей для того, чтобы оператор мог обработать образец изображения и определить наличие каких-либо дефектов качества печати. Среди основных ограничений – усталость, пороговый уровень производительности оператора и более низкая скорость обработки данных. Существует также вероятность пропуска отдельных дефектов качества печати в зависимости от частоты выборки.

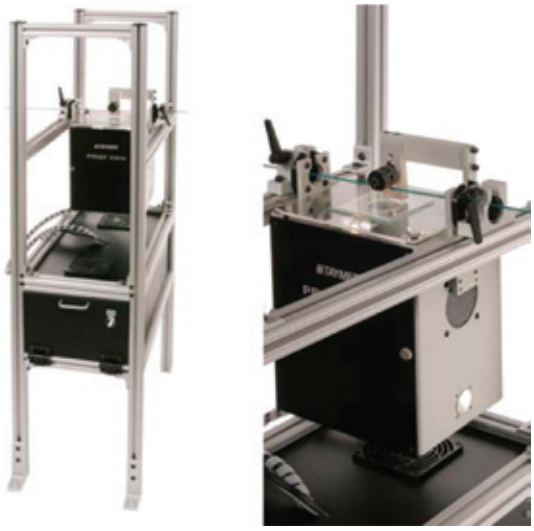
3 Система визуального контроля с использованием технологии машинного зрения

3.1 Оптико-механическая часть

Система проверки печати (см. рис. 1) состоит из камеры и соответствующих осветительных приборов для записи изображений печатной маркировки при движении изделий со скоростями более 1400 фут. (460 м) в минуту. Для работы с кабелями, на которых нанесено несколько печатных маркировок, могут понадобиться многокамерные системы. Например, для проводников с печатной маркировкой, нанесенной с двух противоположных сторон, требуется двухкамерная система.

Камера с объективом обеспечивают поле обзора, которое охватывает всю печатную маркировку (см. рис. 2). Запись изображения синхронизируется с печатающим устройством и со скоростью работы линии. Изображение используется в программно реализуемом процессе последующей обработки. Освещение может меняться в зависимости от конкретного применения. При этом учитываются такие факторы, как отражающая способность поверхности материала, контур поверхности, цвет, линейная скорость и апертура объектива.

Для обеспечения стабильности качества изображений в состав системы входит защитный экран, предотвращающий влияние света от других источников, частиц пыли, а также иных факторов на данные обработки. Кроме того, с помощью направляющих для подачи проводников уменьшается вибрация кабеля, что позволяет предупредить расфокусирование изображения.



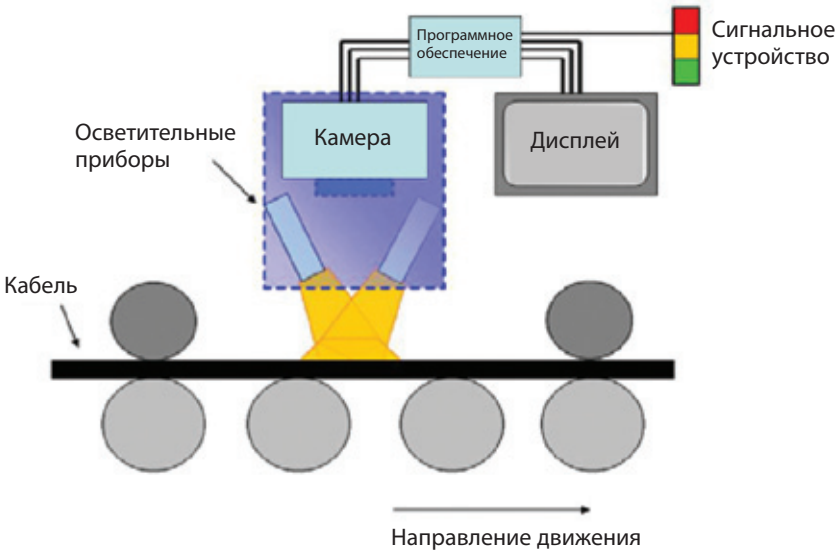
▲ **Рис. 1.** *Система визуального контроля качества печати компании «Тэймер»*

Еще одной сложной задачей является размещение системы проверки печати и обеспечение расположения маркировки в поле обзора камеры. Рекомендуется размещать систему проверки печати непосредственно за печатающим устройством, так как в этом случае маркировка всегда будет располагаться в нужном месте. Размещение системы проверки печати на последующих участках линии приведет к высокой вероятности перекручивания кабеля, в результате чего маркировка сместится в любую сторону относительно оси кабеля и окажется вне поля обзора.

3.2 Программное обеспечение

Для обработки изображений при визуальном контроле дефектов качества печати используется усовершенствованный алгоритм. Существует целый ряд алгоритмов: алгоритм определения качества печати, алгоритм оптической верификации символов (ОВС) и алгоритм оптического распознавания символов (ОРС). В зависимости от предъявляемых требований и объема бюджета применяются разные алгоритмы. Для определения качества печати используется методика, называемая «сопоставлением шаблонов». Для этой методики требуется качественный шаблон для печати на конкретном кабеле. Во время прогона шаблон сопоставляется с каждым записанным изображением. Если разница между двумя изображениями превышает заданный пороговый уровень, сигнальное устройство предупреждает оператора, а сообщение об ошибках сохраняется в файле текущей

▼ **Рис. 2.** *Общий вид системы визуального контроля качества печати*

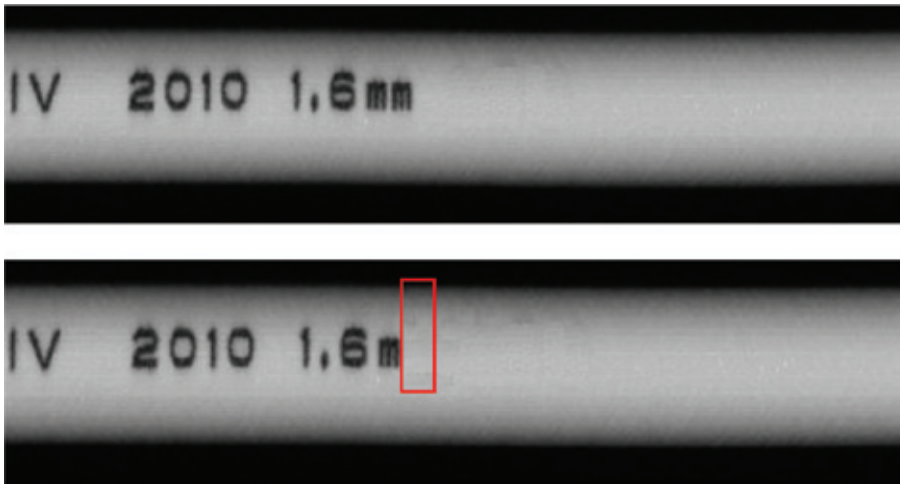


регистрации данных. Дефект качества печати также отображается на дисплее для подробного изучения оператором.

Алгоритмы OBC и OPC носят более сложный характер, представляя собой расширительные компоненты технологии сопоставления шаблонов. В случае OBC программное обеспечение проверяет каждый символ печатной маркировки. В базе данных хранятся наборы символов разных шрифтов. Необходимая печатная маркировка разбивается на отдельные символы одного и того же шрифта. Каждое записанное изображение также разбивается на отдельные символы. Каждый символ сопоставляется с требуемым символом. Превышение заданного порогового уровня различий является дефектом качества печати. Однако программное обеспечение не распознает ошибки в написании символов.

Наиболее совершенной является технология OPC. Работа алгоритма очень сходна с тем, что мог бы обнаружить оператор, руководствуясь органами зрения и мышления. Программное обеспечение не только обязательно определяет, отличается ли тот или иной символ от того, который должен быть на требуемой печатной маркировке, но и может распознать ошибку в написании символа. Это позволяет точно установить, в чем заключается ошибка, и определить, какие безотлагательные меры могут быть предприняты для устранения неполадок в системе.

▼ **Рис. 3.** *Обнаруженный пропуск печатного символа на скорости 900 фут./мин*



▼ **Рис. 4.** *Низкое качество печати, выявленное на скорости 200 фут./мин*

▼ **Рис. 5.** *Снимок сравнительных образцов качества печати, сделанный с экрана монитора*

3.3 Оптимизация контроля качества

Пригодность для продукции любого типа

Поскольку система проверки печати использует технологию машинного зрения, она может контролировать состояние печатной маркировки на продукции любого типа. При надлежащей настройке оптических компонентов система может использоваться для работы с неизолированными проводами, кабелями, трубными изделиями, лентами, плоскими гладкими листами и т. д.

Пригодность для любых типов печатающих устройств и комплектов шрифтов

В качестве образцов система проверки печати использует шаблоны изображений. Контрольные шрифты или печатные маркировки заранее определяются при пусконаладочных работах.

Вне зависимости от того, каким печатающим устройством нанесены печатные маркировки или шрифтовые знаки – струйным, лепестковым принтером, принтером для горячего тиснения фольгой или лазерным принтером, – программное обеспечение может сопоставить печатные маркировки с контрольными образцами.

Снижение числа дефектов в процессе работы

Система проверки печати обеспечивает для оператора визуализацию текущей печатной маркировки, а также последних дефектов качества печати. Непрерывный поток информации в реальном масштабе времени, в особенности данные о неисправностях, позволяет оператору выявить причины возникновения дефектов качества печати непосредственно во время работы производственной линии. Для повышения качества печати в случае его ухудшения ниже порогового уровня оператор может незамедлительно произвести регулировку печатающего устройства.

Кроме того, оператор может использовать систему проверки печати в начале прогона для настройки печатающего устройства и проверки правильности печатной маркировки. Система проверки печати позволяет вносить изменения «на лету», существенным образом снижая процент повторной печати на этапе серийного производства кабельной продукции.

Обеспечение качества

Система осуществляет запись изображения нанесенной на кабель маркировки при высокой линейной скорости и сохраняет изображения

дефектов качества печати на жесткий диск для последующего использования в отчетах о качестве продукции.

Предусмотренный в системе проверки печати дисплей облегчает мастерам технического и производственного участков задачу изучения дефектов без необходимости их физического осмотра.

Данные о месте возникновения дефекта записываются вместе с изображением для упрощения формирования отчета и последующего анализа.

3.4 Ограничения

Применительно к системе проверки печати существует ряд ограничений.

- Для различных типов поверхности кабельной продукции (круглого или крученого профиля) и комплектов шрифтов одна и та же печатная маркировка может выглядеть по-разному. Поэтому для различных типов кабеля требуются разные шаблоны.

- Печатная маркировка с длинным рядом символов также может перекрутиться и оказаться вне поля обзора камеры, что приведет к пропуску символов. Велика вероятность того, что это может иметь место на витой паре.

- Поскольку камера направлена на поверхность изделия, наличие на ней капель воды, смазки, частиц пыли, скорее всего, скажется на печатной маркировке, в результате чего будут зарегистрированы ложные дефекты. Для введения соответствующей поправки на них потребовалось бы снизить пороговый уровень качества в системе. В противном случае необходимо провести пневмоочистку.

3.5 Результаты испытаний

Система проверки печати компании «Тэймер» прошла комплексные испытания на отраслевых предприятиях с использованием различных изделий, текстовых объектов и методов печати.

Оба автора работали в тесном сотрудничестве с компанией «Коммскоуп» в г. Клермонте для переноса на существующее производство данной технологии обеспечения качества.

Были зафиксированы данные о дефектах качества печати до и после проведения испытаний. Спустя год эксплуатации количество дефектов качества печати сократилось более чем на 50 %.

Это было обусловлено следующими причинами:

- незначительные проблемы с качеством печати выявлялись и устранялись до того, как они перерастали в реальные дефекты. К примеру, оператор проводил корректировку настроек печатающего устройства или регулировал центровку кабеля;

- техническое обслуживание печатающего устройства выполнялось до фактического нарушения его нормальной работы, так как оператор получал по каналу обратной связи самые последние данные о качестве печати;

- неправильная печатная маркировка идентифицировалась до выбраковки печати на всей длине кабеля.

3.6 Образцы изображений

Ниже приведены образцы изображений или сделанные с экрана монитора снимки (см. рис. 3-5) дефектов качества печати, обнаруженных оптической системой проверки печати на различных изделиях.

Выводы

С помощью системы проверки печати можно проводить тщательную проверку печатной маркировки кабельной продукции на отсутствие дефектов. Система обеспечивает ряд преимуществ:

- пригодность для продукции любого типа: проволоки, кабелей, гибких рукавов, труб, сортового и листового металлопроката, прядевой арматуры;

- пригодность для любых типов печатающих устройств: струйных, лепестковых принтеров, принтеров для горячего тиснения фольгой, лазерных принтеров, устройств для блинтового и конгревного тиснения;

- позволяет не допустить поставки заказчикам некачественной продукции, что укрепляет взаимоотношения с заказчиками и повышает уровень доверия с их стороны;

- сокращение количества случаев повторной печати и устранение случаев непроизводительного использования расходных материалов, приводящих к росту материальных и трудовых затрат;

- служит вспомогательным средством во внутреннем совершенствовании производственного процесса для сокращения количества дефектов. ■

Выражение признательности

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Commandes potentielles pour Windak

▲ *Le groupe Windak à wire 2012*

Plus de 100 visiteurs provenant de 40 pays différents ont visité le stand de Windak à wire 2012 qui a enregistré cinq commandes potentielles pendant le salon.

La société a exposé son tout-dernier enrouleur automatique à deux têtes AR24-D, conçu pour l'emballage automatique de câbles et fils sur bobines et sur dévidoirs d'un diamètre total allant de 300mm à 600mm.

Windak – Estonie **Website**: www.windakusa.com

Nouveau Directeur général

LARS Fagerholm a été nommé Directeur général du groupe Maillefer le 12 avril dernier. Il succède à Peter Roos qui a occupé cette charge jusqu'à la fin de juin 2012 pour assurer une transition douce.

Durant ses 4 ans avec Maillefer, Roos a complété avec succès une série de changements importants pour garantir la compétitivité dans les années à venir. M. Fagerholm possède une vaste expérience à un niveau international acquise comme cadre au cours de sa carrière professionnelle, en particulier chez Albany International, leader global dans la fourniture de tissus techniques pour la fabrication de papier pour l'industrie papetière.

Sa formation et son expérience en ce qui concerne la gestion de la fabrication, de la technique et de structures d'entreprises internationales représenteront une grande ressource pour la gestion de Maillefer, qui permettra à la société d'atteindre son objectif: guider un marché consolidé et se transformer en un fournisseur de valeur majeure pour l'industrie.

Maillefer International Oy – Finlande
Website: www.mailleferextrusion.net

▲ *Le nouveau Directeur général Lars Fagerholm*

Enrouleur statique série MS de Frigeco

L'ENROULEUR MS de Frigeco, conçu pour enrouler le fil de cuivre et d'aluminium, est une machine versatile équipé de berceau porte-fil conçue pour tout type d'application.

Il peut être fourni avec des têtes de diamètres différents, allant de 630mm à 1000mm, et permet d'utiliser des berceaux de toutes dimensions.

L'enrouleur de la série MS est fourni avec une armoire indépendante, à installer sur la ligne avec les tréfileuses existant déjà. Il existe une version spécifique dédiée qui représente la solution d'enroulement idéale pour les lignes de dépôt électrolytique.

L'enrouleur MS de Frigeco est équipé d'un dispositif de changement entièrement automatique et peut être équipé de convoyeurs motorisés pour berceaux vides et pleins, personnalisés en fonction des exigences des clients.

Une attention particulière a été accordée à l'espace et à l'accessibilité de l'opérateur ainsi qu'à la réduction du temps de réglage de la machine.

La gamme des machines Frigeco, comprenant des tréfileuses, des extrudeuses et des toronneuses, couvre la totalité de la gamme de câbles et de fils du secteur industriel.

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

▲ *Le nouvel enrouleur de la série MS de Frigeco*

Teijin protège la fibre optique avec une bande!

Teijin Aramid offre une nouvelle méthode perfectionnée pour protéger la fibre optique: la bande en Twaron.

Les câbles à fibres optiques jouent un rôle de plus en plus important dans les télécommunications d'aujourd'hui et leurs noyaux fragiles exigent d'être protégés contre différents types de risques et de déformations.

Les câbles à fibres optiques sont en train de devenir de plus en plus minces et en même temps il est toujours plus difficile de protéger le noyau. La bande en Twaron est un produit avec une matrice de fibre en aramide permettant de produire des câbles à fibre optique à partir de 1,2mm de diamètre.

En outre, cette bande est caractérisée par une résistance à l'écrasement de trois à cinq fois meilleure par rapport à la protection de fibre en aramide utilisée actuellement.

La production de câbles plus minces en utilisant la bande en Twaron offre beaucoup plus d'avantages par rapport aux solutions courantes. Par exemple, la production de câbles de 1,2mm de diamètre se traduit par une augmentation de la capacité de 30-50% pour les baies de distribution optique par rapport aux câbles de 1,6mm. En outre, les câbles plus minces exigent une mineure puissance frigorifique d'où une réduction des coûts et des émissions dans les centres de distribution.

La bande en Twaron D2800 est une solution brevetée solide et flexible qui contribue à augmenter la vitesse de production des câbles en permettant d'économiser du temps précieux. La flexibilité de la bande en Twaron permet une installation et une manipulation plus rapide et facile grâce à l'utilisation de câbles à fibre optique plus faciles à dénuder et à connectoriser.

La bande est composée d'un seul fil en Twaron étendu, imprégné et fixé avec du matériau matrice, qui entraîne une économie significative tout en permettant d'utiliser des câbles à fibres optiques très minces.

Pour offrir une couverture totale et une résistance optimale à l'écrasement, la bande est enveloppée de façon égale autour du noyau du câble à fibre optique.

Christoph Hahn, directeur commercial de Teijin Aramid, a déclaré: "Nous sommes parmi les premiers pionniers dans la technologie des câbles à fibres optiques et au fur et à mesure que ce secteur s'est développé, nous avons acquis une connaissance approfondie des exigences du marché.

"Nous sommes fiers de donner notre contribution dans ce secteur en offrant à nos partenaires du monde entier nos connaissances concernant les fibres optiques d'aramide hautes performances".

Teijin Aramid – Pays Bas
Website: www.teijinaramid.com

Système de contrôle du marquage des câbles

Craig Girdwood, Taymer International Inc, et Brian Franklin, Commscope

Résumé

L'utilisation du système de contrôle du marquage pour la détection des défauts d'impression améliore considérablement le contrôle de qualité des fils et des câbles. Les défauts de revêtement sont constamment relevés par un système de vision artificielle à la vitesse de la ligne de production. Les images des défauts sont élaborées et sauvées. Cette technologie améliore la qualité de l'impression du câble produit et réduit considérablement le nombre de produits défectueux livrés au client.

1 Introduction

En général, le défaut principal relevé dans les installations de production des câbles d'alimentation électrique et en fibre optique est un défaut d'impression.

Des messages incorrects, le maculage et les impressions passées sont des défauts qu'on ne devrait pas rencontrer sur les produits de bonne qualité. Ces défauts ne sont pas seulement des problèmes esthétiques: un message incorrect peut entraîner un mauvais emploi du câble de la part de l'utilisateur final.

La capacité de relever les défauts permet d'effectuer des corrections durant la production et d'éliminer ou réimprimer les parties défectueuses.

Le système de contrôle du marquage utilise la technologie de vision artificielle pour analyser, isoler et identifier les défauts d'impression.

Le système fonctionne en ligne et effectue la sauvegarde de la totalité des données images des défauts dans une base de données, y compris la longueur et les défauts de dimension.

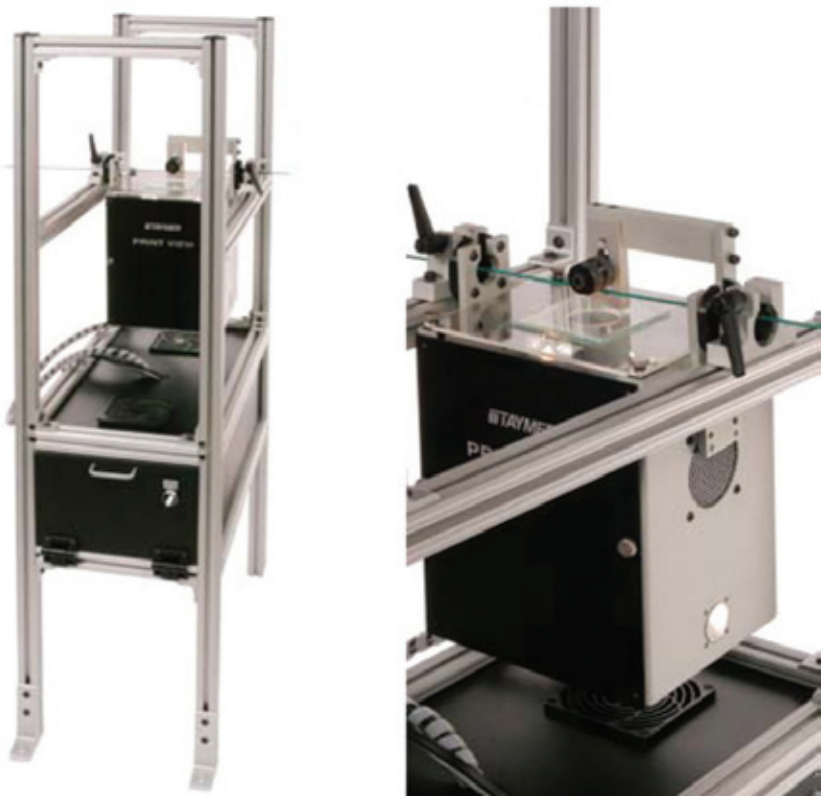
La caméra est généralement située à proximité de l'imprimante pour simplifier l'identification de la légende imprimée et sa position.

Les images de la légende imprimée sont créées et élaborées au moyen d'algorithmes de traitement d'image à haute vitesse et de techniques de contrôle du caractère. Les légendes imprimées illisibles ou incorrectes sont relevées par le logiciel, qui prévient l'opérateur d'effectuer les corrections nécessaires.

Les images sont stockées avec les informations concernant la longueur, en permettant ainsi d'effectuer d'autres analyses ou de générer des rapports.

L'alarme fournit aux opérateurs une rétroaction instantanée concernant les conditions d'impression courantes, ce qui entraîne non seulement l'adoption d'actions correctives, mais surtout permet à l'opérateur d'identifier et de réduire les causes à l'origine du défaut d'impression. De cette façon, il est possible de réduire les défauts d'impression avant qu'ils ne se produisent effectivement, en améliorant la qualité d'impression et en réduisant les coûts de réélaboration, les gaspillages et les produits défectueux.

▼ **Figure 1**: *Système d'inspection visuelle pour le marquage de Taymer*



Le système de contrôle du marquage peut être aisément intégré dans les lignes de production du client et être adapté pour tout type de câbles marqués (câbles à paires torsadées, câbles gainés, câbles nus et profils ondulés).

Le système est conçu pour analyser des légendes imprimées avec toute méthode d'impression telle que l'estampage à chaud, le jet d'encre, le gaufrage, l'indentation, l'impression au laser et l'impression en creux.

Pour l'entretien de l'unité un simple coup de chiffon suffit lorsque l'équipement est poussiéreux.

Les lumières peuvent présenter une longévité supérieure à 50 000 heures de fonctionnement et sont la seule partie consommable du système.

2 Limites des différentes techniques de détection d'impression

2.1 Examen visuel en ligne au moyen de stroboscope

Ce type d'inspection entraîne l'utilisation d'un stroboscope en ligne. Le stroboscope émet une lumière intermittente à la fréquence appropriée de manière à ce que la légende imprimée semble avoir un mouvement lent ou immobile. Cela donne du temps à l'opérateur pour vérifier l'existence ou la qualité de l'impression.

Toutefois, le fait que le temps pour une vérification soignée des légendes longues imprimées avant l'affichage de la légende suivante est insuffisant représente une limite de cette technique. En outre, la lumière stroboscopique intermittente peut résulter agaçante pour l'opérateur.

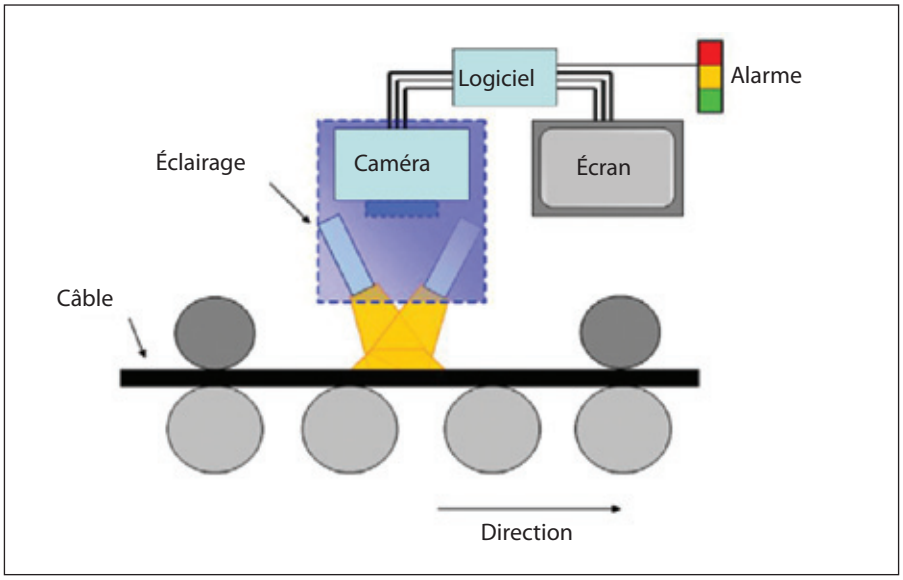
2.2 Inspection hors ligne au moyen d'une loupe

Une autre technique pour la détection des défauts d'impression consiste en l'utilisation d'une loupe. Bien que l'opérateur puisse voir les défauts d'impression et donc les classer selon le cas, cette technique présente plusieurs limites. L'opérateur ne peut lire l'impression que jusqu'à une certaine vitesse. Cette technique est utilisée hors ligne où la vitesse est inférieure ou nulle. Ce processus est très fatigant est exige beaucoup de temps. Par conséquent, il est généralement utilisé pour les clients qui demandent ce type d'inspection. Étant donné que les légendes imprimées peuvent être longues, il y a une haute probabilité d'erreur humaine durant l'inspection. En outre, la capacité de chaque opérateur avec cette technique est différente et la qualité d'impression peut être évaluée de façon différente par chacun.

2.3 La capture et l'échantillonnage d'images

Ce processus utilise une caméra conçue pour acquérir une image basée sur un signal d'encodeur et sur la vitesse d'échantillonnage. Ensuite, l'image est affichée à l'opérateur sur un écran pour élaborer un échantillon d'images et déterminer la présence éventuelle de défauts d'impression. Les principales limites de ce processus sont la fatigue, la capacité de l'opérateur et une vitesse de processus inférieure. Il existe également une possibilité de rater certains défauts d'impression selon la vitesse d'échantillonnage.

▼ **Figure 2**: *Vue d'ensemble du système d'inspection visuelle pour le marquage*



3 Système d'inspection par vision artificielle

3.1 Conception optomécanique

Le système de contrôle du marquage (*Figure 1*) consiste en une caméra et en un système d'éclairage approprié pour la capture d'images et de légendes imprimées en mouvement à des vitesses supérieures à 1 400 pieds (460m) par minute. Les câbles qui présentent plusieurs légendes imprimées peuvent exiger l'utilisation de systèmes multi caméras. Par exemple, les fils avec des légendes imprimées sur les deux côtés exigent un système à deux caméras.

La caméra et la lentille offrent un champ de vision pour couvrir la légende imprimée (*Figure 2*). La capture d'images est synchronisée avec l'imprimante et avec la vitesse de la ligne. L'image est utilisée pour le traitement par logiciel supplémentaire. L'éclairage peut varier en fonction de l'application. Les facteurs à considérer sont la réflectivité du matériau, le profil de la surface, la couleur, la vitesse de la ligne et l'ouverture de l'objectif.

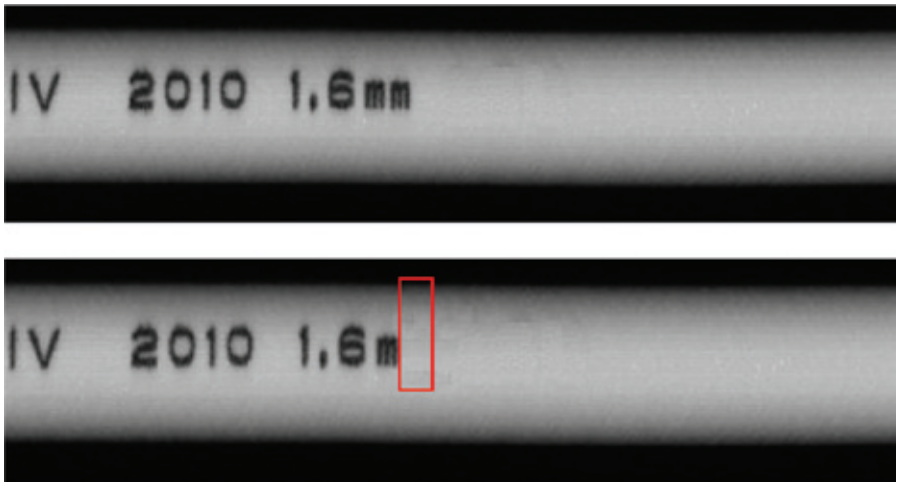
Afin d'assurer l'uniformité des images, le dispositif est équipé d'une protection pour éviter que d'autres sources lumineuses, des particules de poudre ou d'autres facteurs influencent les résultats. En outre, la vibration du câble est minimisée grâce à l'utilisation de guides pour éviter des images floues.

Un défi important est posé par la position du système de contrôle du marquage qui doit assurer que ce dernier est dans le champ de vision de la caméra. La position recommandée pour le système de contrôle du marquage est immédiatement après l'imprimante, où l'impression s'effectue régulièrement. Le positionnement du système d'inspection visuelle pour le marquage vers la fin de la ligne peut entraîner un risque élevé de torsion du câble et la possibilité pour le marquage d'être effectué dans un point quelconque du câble et hors du champ de vision.

3.2 Logiciel

Pour le traitement des images et la détection des défauts d'impression on utilise des algorithmes avancés. Il existe plusieurs algorithmes: la détection de la qualité d'impression, la vérification optique de caractères (OCV), la reconnaissance optique de caractères (OCR). Différents algorithmes sont réalisés en fonction des exigences et du budget disponible.

Pour le contrôle de la qualité d'impression, on utilise une méthode appelée appariement de formes.



▲ **Figure 3**: *Absence de marquage détectée à 900pies/min*

▲ **Figure 4**: *Mauvaise qualité de marquage détectée à 200pies/min*

▲ **Figure 5**: *Capture d'écran de la comparaison de la qualité du marquage*

Cette méthode exige un gabarit d'une impression correcte du câble à contrôler. Le gabarit est comparé à chaque image capturée durant un lot de production.

Si la différence entre les deux images dépasse la limite désirée, le système génère une alarme pour informer l'opérateur et un relevé d'erreur est sauvé sur le registre de données courant. Le défaut d'impression est affiché également sur l'écran de l'opérateur pour une majeure clarté.

Les algorithmes OCV et OCR sont plus complets et sont une extension de la technique d'appariement des formes. Pour le OCV, le logiciel vérifie chaque caractère de la légende imprimée. La base de données contient les alphabets de différentes polices de caractères. La légende imprimée désirée est subdivisée en caractères séparés de la même police de caractères.

Chaque image capturée est également décomposée en caractères individuels.

Chaque caractère est comparé au caractère désiré. Si les différences dépassent le seuil, il s'agit d'un défaut d'impression. Toutefois, le logiciel ne reconnaît pas le caractère défectueux.

L'OCR est le plus moderne. Cet algorithme est plus similaire à ce qu'un opérateur serait capable de relever de ses yeux et avec son intelligence.

Le logiciel non seulement découvre si un caractère est différent de la légende imprimée désirée, mais il est également en mesure de reconnaître les caractères défectueux.

Cette fonction aide à identifier exactement le type d'erreur et permet d'adopter immédiatement l'action corrective pour résoudre le problème.

3.3 Amélioration du contrôle de qualité

Approprié à tout type de produits

Étant donné que le système de contrôle du marquage utilise la vision artificielle, il peut également vérifier la légende imprimée de tout type de produit.

Avec une configuration appropriée des composants optiques, le système peut être utilisé pour le fil nu, les tuyaux flexibles, les tubes, les rubans, les tôles plates, etc.

Approprié pour tout type d'imprimantes/ polices de caractères

Le système de détection du marquage utilise des gabarits comme références. Les polices de caractères ou les légendes de références sont préétablies avant de mettre en marche le système.

Indépendamment du fait que le marquage de la légende ou des polices de caractères a été effectué avec un jet d'encre, à roue d'encre, avec le gaufrage à chaud ou avec une imprimante à laser, le logiciel sera en mesure de comparer les légendes imprimées aux références.

Réduction des défauts en temps réel

Le système de contrôle du marquage présente à l'opérateur une image de la légende imprimée courante ainsi que les défauts d'impression les plus récents.

Cette source d'informations continuelle en temps réel, surtout les données concernant les défauts, permet à l'opérateur d'isoler les causes des défauts d'impression alors que la ligne est encore en fonction.

Si la qualité d'impression descend au-dessous d'un seuil préétabli, l'opérateur peut immédiatement régler l'imprimante pour améliorer la qualité. En outre, les opérateurs peuvent utiliser le système de contrôle du marquage au début de la production pour configurer l'imprimante et s'assurer que la légende imprimée est correcte.

Le système de contrôle du marquage permet d'effectuer des changements à l'instant en réduisant considérablement la nécessité d'imprimer de nouveau le câble après la production.

Assurance de la qualité

Le système capture les images du câble marqué à des vitesses de la ligne élevées et enregistre les images des défauts d'impression sur le disque pour générer des rapports de qualité.

L'écran d'affichage du système de contrôle du marquage permet aux superviseurs de l'ingénierie et de la production d'examiner le défaut sans nécessité d'observer directement le défaut.

Les positions du défaut sont enregistrées avec l'image pour faciliter la génération de rapports et des analyses supplémentaires.

3.4 Limites

Il existe quelques limites du système de vérification du marquage.

- Pour différents types de surfaces de câble (profil rond/torsadé) et polices de caractère, la même légende imprimée peut apparaître différente. Par conséquent, différents gabarits sont requis pour différents types de câbles
- Les légendes imprimées longues peuvent également rester hors du champ de vision de la caméra, et par conséquent des caractères peuvent manquer. Il est fortement probable que cet événement se produise sur les câbles à paires torsadées
- Étant donné que la caméra est orientée vers la surface, le système pourrait détecter des gouttes d'eau/graisse/particules de poudre sur la légende imprimée et signaler de façon erronée des défauts qui n'en sont pas. Pour compenser ce risque, il est nécessaire de diminuer le seuil de qualité ou de nettoyer le système avec de l'air

3.5 Résultats de l'essai

Le système de contrôle du marquage de Taymer a été essayé à fond dans le secteur industriel sur différents produits, sur les messages imprimés, et en utilisant différentes méthodes d'impression. Les deux auteurs ont travaillé en collaboration étroite avec Commscope à Claremont pour réaliser cette technologie de contrôle de qualité sur l'installation.

Les données concernant les défauts d'impression ont été enregistrées avant et après. Après un an d'utilisation, les défauts d'impression furent réduits de plus de 50%.

Les raisons sont les suivantes:

- Des problèmes d'impression mineurs ont été constatés avant de se transformer en défauts effectifs. Par exemple, l'opérateur réglait l'imprimante ou l'alignement du câble
- L'entretien de l'imprimante était effectué avant son dysfonctionnement effectif, parce que les opérateurs recevaient une réponse immédiate concernant la qualité de l'impression
- La légende imprimée incorrecte était détectée avant d'imprimer incorrectement le lot entier

3.6 Images d'échantillon

Des images échantillon ou des captures d'écran (*Figure 3-5*) des défauts d'impression détectés par le système optique de contrôle du marquage de différents produits sont fournies ci-dessous.

Conclusions

Avec un système de contrôle du marquage, les légendes imprimées sur le câble peuvent être vérifiées de manière approfondie pour identifier d'éventuels défauts. Le système présente plusieurs avantages.

- Il est indiqué pour tout type de produits – fil/câble/tuyaux flexibles/tubes/barres/plaques/produits toronnés
- Il est indiqué pour tout type d'imprimantes – jet d'encre, roue d'encre, estampage à chaud, laser, indentation/gaufrage
- Il garantit que le client ne reçoit pas de produits défectueux, en améliorant ainsi la relation et la confiance du client
- Il réduit la nécessité d'imprimer de nouveau les câbles et élimine les rejets des consommables qui entraînent des coûts de matériaux et de main d'œuvre
- Il contribue à améliorer le processus de production interne pour réduire les défauts ■

Remerciements

Nos remerciements spéciaux également à l'équipe de IWCS pour avoir mis à disposition l'échantillon pour la publication de l'année en cours.

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Potenziali ordini per Windak

▲ *Il gruppo Windak a wire 2012*

Oltre 100 visitatori provenienti da 40 paesi diversi hanno visitato lo stand di Windak in occasione di wire 2012 che ha riportato cinque potenziali ordini durante l'esibizione.

La società ha esposto il suo più recente bobinatore automatico a due teste AR24-D, progettato per l'imballaggio automatico di cavi e fili su bobine e rocchetti del diametro complessivo da 300mm a 600mm.

Windak – Estonia **Website**: www.windakusa.com

Nuovo direttore generale

LARS Fagerholm è stato nominato presidente e direttore generale del gruppo Maillefer il 12 aprile di quest'anno.

Egli succede a Peter Roos che ha occupato tale carica fino alla fine di giugno 2012 per agevolare la transizione.

Durante i suoi 4 anni con Maillefer, Roos ha completato con successo una serie di cambiamenti importanti per garantire la competitività del gruppo negli anni a venire.

Fagerholm possiede una vasta esperienza a livello internazionale acquisita con diversi incarichi direzionali, in particolare nel corso della sua lunga carriera in Albany International, leader globale nella fornitura di tessuti tecnici per la fabbricazione di carta per l'industria della carta e della pasta di legno.

La sua formazione e la sua esperienza nella gestione della fabbricazione, nella tecnica e nelle strutture di imprese internazionali rappresenteranno una risorsa preziosa per la gestione di Maillefer, che consentirà alla società di raggiungere il suo obiettivo di guidare un mercato consolidato e di trasformarsi in un fornitore di maggiore valore per l'industria.

Maillefer International Oy – Finlandia
Website: www.mailleferextrusion.net

▲ *Il nuovo direttore generale Lars Fagerholm*

Avvolgitore statico serie MS di Frigeco

L'AVVOLGITORE MS di Frigeco, progettato per avvolgere filo di rame e alluminio, è una macchina versatile dotata di cesta portafilo per qualsiasi tipo di applicazione.

È disponibile con teste di diametri diversi, da 630mm a 1000mm, e consente di utilizzare ceste di qualsiasi dimensione.

L'avvolgitore della serie MS viene fornito con un armadietto indipendente, da installare sulla linea assieme alle macchine di trafilatura esistenti. Esiste una versione speciale dedicata che costituisce la soluzione di avvolgimento ideale per le linee di elettroplaccatura.

L'avvolgitore MS di Frigeco è dotato di un cambio completamente automatico e può essere equipaggiato con trasportatori motorizzati per ceste vuote e piene, personalizzati secondo le esigenze del cliente.

È stata prestata particolare attenzione allo spazio e all'accessibilità dell'operatore nonché alla riduzione del tempo di preparazione della macchina.

La gamma di macchine Frigeco, che comprende trafilatrici, estrusori e trefolatrici, copre tutta la gamma di cavi e fili del settore industriale.

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

▲ *Il nuovo avvolgitore della serie MS di Frigeco*

Teijin protegge la fibra ottica con un nastro!

Teijin Aramid offre un nuovo metodo perfezionato per proteggere la fibra ottica: il nastro in Twaron.

I cavi a fibre ottiche rivestono un ruolo sempre più importante nelle telecomunicazioni di oggi e il loro fragile nucleo necessita di essere protetto contro diversi tipi di pericoli e deformazioni.

I cavi a fibre ottiche stanno diventando sempre più sottili e al tempo stesso diventa sempre più difficile proteggere il nucleo. Il nastro in Twaron è un prodotto con una matrice di fibra di aramide che consente di produrre cavi a fibra ottica a partire da 1,2mm di diametro.

Inoltre, presenta una resistenza allo schiacciamento da tre a cinque volte migliore rispetto alla protezione di fibra di aramide utilizzata attualmente.

La produzione di cavi più sottili con l'utilizzo del nastro in Twaron offre molti più vantaggi rispetto alle soluzioni esistenti. Ad esempio, la produzione di cavi di 1,2mm di diametro si traduce in un aumento di capacità del 30-50% per le cornici di distribuzione ottica rispetto ai cavi di 1,6mm.

Inoltre, cavi più sottili richiedono una minore potenza refrigerante con conseguente riduzione dei costi e delle emissioni nei centri di distribuzione.

Il nastro in Twaron D2800 è una soluzione brevettata solida e flessibile che contribuisce ad aumentare la velocità di produzione dei cavi consentendo un prezioso risparmio di tempo.

La flessibilità del nastro in Twaron permette una più rapida e facile installazione e manipolazione grazie all'utilizzo di cavi a fibre ottiche più facili da spelare e connettorizzare.

Il nastro è composto da un solo fascio in fibra di Twaron spiegato, impregnato e fissato con materiale matrice, che comporta un notevole risparmio di spazio consentendo di utilizzare cavi a fibre ottiche molto sottili. Per offrire una copertura totale ed una resistenza ottimale allo schiacciamento, il nastro viene avvolto uniformemente attorno al nucleo del cavo a fibra ottica.

Teijin Aramid – Olanda
Website: www.teijinaramid.com

Sistema di controllo della marcatura dei cavi

Craig Girdwood, Taymer International Inc, e Brian Franklin, Commscope

Riassunto

L'utilizzo del sistema di controllo della marcatura per individuare i difetti di stampa, migliora notevolmente il controllo qualità dei fili e dei cavi. I difetti di rivestimento vengono rilevati in modo continuo da un sistema di visione artificiale alla velocità della linea di produzione.

Le immagini dei difetti vengono elaborate e salvate. Questa tecnologia migliora la qualità di marcatura del cavo prodotto e riduce notevolmente il numero di prodotti difettosi che possono essere consegnati al cliente.

1 Introduzione

Generalmente, il principale difetto rilevato negli impianti di produzione di cavi di alimentazione e cavi a fibre ottiche è un difetto di marcatura. Messaggi errati, macchie di stampa e stampa scolorita sono difetti che non si dovrebbero incontrare in prodotti di buona qualità.

Questi difetti non sono solo problemi estetici: un messaggio errato può dare luogo ad un uso scorretto del cavo da parte dell'utente finale. La capacità di rilevare i difetti in linea consente di apportare delle correzioni durante la produzione e di eliminare o ristampare le parti difettose.

Il sistema di controllo della marcatura utilizza la tecnologia di visione artificiale per analizzare, isolare e identificare i difetti di stampa. Il sistema funziona in linea e salva tutti i dati delle immagini dei difetti in una banca dati, inclusi la lunghezza e i difetti di dimensione. Generalmente, la telecamera è posizionata presso la stampante per semplificare l'identificazione della legenda stampata e la relativa posizione. Le immagini della legenda stampata sono create ed elaborate attraverso degli algoritmi di elaborazione di immagini ad alta velocità e tecniche di verifica dei caratteri.

Le legende stampate illeggibili o errate vengono identificate dal software, che informa l'operatore affinché effettui le correzioni necessarie.

Le immagini sono memorizzate assieme alle informazioni relative alla lunghezza, consentendo ulteriori analisi o la generazione di rapporti.

La segnalazione offre agli operatori un feedback immediato sulle condizioni di stampa correnti.

Ciò non solo permette all'operatore di adottare azioni correttive, ma soprattutto di riconoscere e limitare le cause che sono all'origine del difetto di stampa.

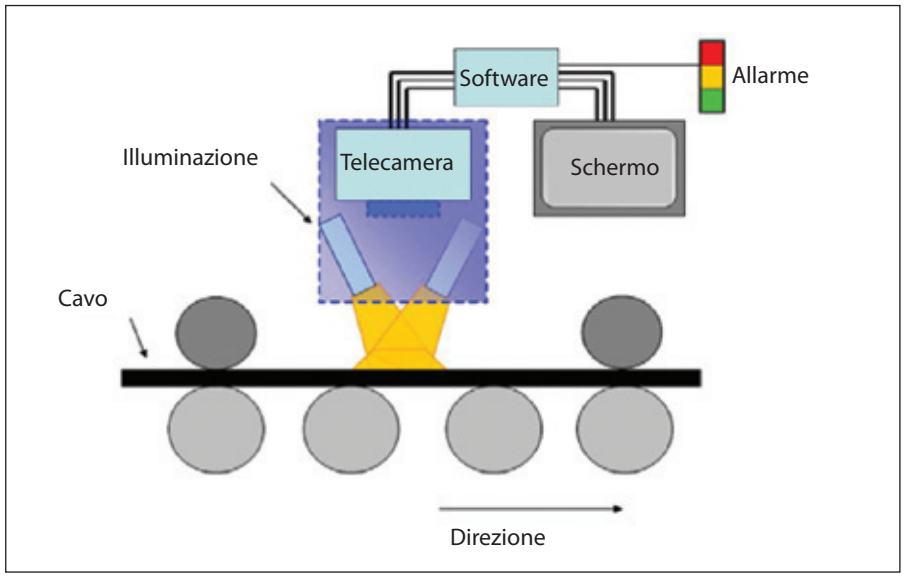
In questo modo si possono ridurre i difetti di stampa prima che si producano effettivamente, migliorando la qualità della stampa e riducendo i costi di rielaborazione, le perdite sui materiali di consumo e i prodotti difettosi. Il sistema di controllo della marcatura dei cavi può

▼ **Figura 1**: *Sistema di controllo della marcatura di Taymer*

essere facilmente integrato nelle linee di produzione del cliente ed è indicato per qualsiasi tipo di cavi marcati (a doppini intrecciati, rivestiti, a conduttori nudi e profili ondulati.

Il sistema può analizzare legende stampate realizzate da qualsiasi metodo di stampa come la stampa a caldo, a getto d'inchiostro, in rilievo, con indentazione, a laser e eliografica.

Per la manutenzione dell'unità è sufficiente una rapida passata con lo straccio quando c'è polvere. Le luci possono avere una vita media di oltre 50.000 ore di funzionamento e sono l'unica parte di consumo dell'intero sistema.



▲ **Figura 2**: *Veduta generale del sistema di controllo della marcatura*

2 Limitazioni delle diverse tecniche di rilevamento della marcatura

2.1 Ispezione visiva in linea mediante stroboscopio

Questo tipo di ispezione utilizza uno stroboscopio in linea. Lo stroboscopio emette una luce intermittente alla frequenza adeguata affinché la legenda stampata appaia come se si muovesse lentamente o restasse immobile.

Ciò dà tempo all'operatore per verificare l'esistenza o la qualità della marcatura. Tuttavia, il fatto che il tempo per una verifica accurata delle legende stampate lunghe prima che venga visualizzata la stampa successiva è insufficiente costituisce un limite di questa tecnica. Inoltre, la luce stroboscopica intermittente può arrecare disturbo all'operatore.

2.2 Ispezione visiva fuori linea mediante lente di ingrandimento

Un'altra tecnica per rilevare difetti di stampa consiste nell'utilizzare una lente di ingrandimento.

Sebbene l'operatore possa vedere i difetti di stampa e classificarli secondo il caso, questa tecnica presenta numerosi limiti. L'operatore può solo leggere la stampa fino ad una certa velocità.

Questa tecnica si utilizza fuori linea dove la velocità è molto bassa o nulla. Questo processo è molto noioso e richiede molto tempo; pertanto è normalmente indicato per clienti che richiedono questo tipo di ispezione.

Siccome le legende stampate possono essere lunghe, vi è un'alta probabilità di errore umano durante l'ispezione. Inoltre, la capacità di ciascun operatore con questa tecnica è diversa e la qualità di stampa può essere valutata in modo diverso per ciascuno.

2.3 Cattura e campionamento delle immagini

Questo processo utilizza una telecamera che acquisisce un'immagine basata su un segnale di encoder e sulla velocità di campionamento. Quindi l'immagine viene presentata all'operatore su uno schermo affinché possa elaborare un campione di immagini per determinare se vi sono difetti di stampa.

I principali limiti di questo processo sono la stanchezza dell'operatore, la capacità dell'operatore e una velocità di processo più bassa. Inoltre, e possibile che alcuni difetti di stampa siano saltati secondo la velocità di campionamento.

3 Sistema di visione artificiale

3.1 Progettazione optomeccanica

Il sistema di controllo della marcatura (*Figura 1*) consiste in una telecamera e in un sistema di illuminazione adeguato per catturare immagini di legende stampate che si muovono a velocità superiori a 1400 piedi (460m) il minuto.

Nel caso di cavi con diverse legende stampate, possono essere necessari vari sistemi multicamera. Ad esempio, i fili con legende stampate su entrambi i lati richiedono un sistema di due telecamere.

La telecamera e la lente offrono un campo visivo che copre la legenda stampata (*Figura 2*).

La cattura delle immagini è sincronizzata con la stampante e la velocità della linea. L'immagine sarà utilizzata per l'elaborazione del software. L'illuminazione può variare secondo l'applicazione. I fattori da considerare sono la riflettanza del materiale, il profilo della superficie, il colore, la velocità della linea e l'apertura della lente.

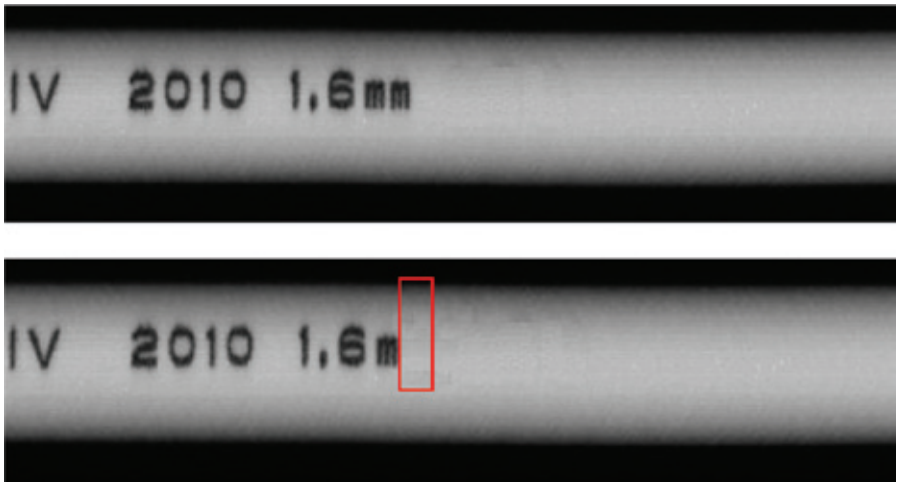
Per assicurare la coerenza delle immagini, l'equipaggiamento è dotato di una protezione per evitare che altre fonti luminose, particelle di polvere o altri fattori influenzino i risultati. Inoltre, la vibrazione del cavo è minimizzata grazie all'utilizzo di guide per evitare immagini sfocate.

Una sfida importante è costituita dalla posizione del sistema di marcatura, che deve assicurare che la marcatura si trovi all'interno del campo visivo della telecamera.

La posizione raccomandata per il sistema di controllo della marcatura è immediatamente dopo la stampante, dove si effettua regolarmente la marcatura. Se si posiziona il sistema di controllo della marcatura più in basso della linea, vi è un'elevata possibilità che il cavo subisca una torsione e che la marcatura avvenga in qualsiasi punto attorno al cavo e fuori dal campo visivo.

3.2 Software

Per l'elaborazione delle immagini e per il rilevamento dei difetti di stampa vengono utilizzati algoritmi avanzati. Esistono vari algoritmi: il rilevamento della qualità di stampa, la verifica ottica dei caratteri (OCV), il riconoscimento ottico dei caratteri (OCR).



▲ **Figura 3**: *Rilevamento marcatura mancata a 900piedi/min*

▲ **Figura 4**: *Scarsa qualità di marcatura rilevata a 200piedi/min*

▲ **Figura 5**: *Cattura di immagine dallo schermo della comparazione di qualità della marcatura*

Diversi sono gli algoritmi applicati in base ai requisiti e al budget disponibile. Per il rilevamento della qualità di stampa si utilizza il metodo chiamato "*pattern matching*".

Questo metodo richiede un formato di una marcatura corretta del cavo da verificare. Il formato viene comparato con ciascuna immagine catturata durante un lotto di produzione.

Se le due immagini differiscono oltre una certa soglia, il sistema genera un allarme per informare l'operatore e salva un rapporto di errore nel registro di dati corrente. Per una maggiore chiarezza, il difetto di stampa viene anche visualizzato sullo schermo dell'operatore.

Gli algoritmi OCV e OCR sono più complessi e rappresentano una estensione della tecnica del "*pattern matching*". Per quanto riguarda l'OCV, il software verificherà ciascun carattere della legenda stampata. La banca dati contiene gli alfabeti di vari font.

La legenda stampata viene suddivisa in lettere separate dello stesso font. Ciascuna immagine catturata viene inoltre scomposta in caratteri singoli.

Ciascun carattere viene comparato con il carattere desiderato. Se le differenze superano la soglia, si riconosce un difetto di stampa. Tuttavia, il software non riconosce quale sia il carattere difettoso.

Il sistema OCR è il più avanzato. Questo algoritmo è molto simile a quello che un operatore sarebbe in grado di rilevare con i propri occhi e con la mente.

Il software non solo rileva se un carattere è diverso dalla legenda stampata desiderata, ma è anche in grado di riconoscere i caratteri difettosi. Ciò contribuisce al riconoscimento esatto del tipo di errore e consente di adottare immediatamente l'azione correttiva per risolvere il problema.

3.3 Miglioramento del controllo di qualità

Indicato per qualsiasi tipo di prodotto
Poiché il sistema di verifica di marcatura utilizza la visione artificiale, può controllare la legenda stampata di qualsiasi tipo di prodotto.

Con una configurazione adeguata dei componenti ottici, il sistema può essere utilizzato per filo nudo, cavi, tubi flessibili/tubi, nastri, lamiere, ecc.

Indicato per qualsiasi tipo di stampante/font
Il sistema di rilevamento della marcatura utilizza sagome di immagini come riferimento. I font o le legende stampate di riferimento sono predeterminati prima di mettere in funzione il sistema. Indipendentemente dal fatto che la marcatura o i font siano eseguiti con stampante a getto d'inchiostro, a ruota d'inchiostro, a lamina calda o a laser, il software sarà in ogni caso capace di effettuare una comparazione fra le legende stampante e i riferimenti.

Riduzione dei difetti in tempo reale
Il sistema di controllo della marcatura presenta all'operatore un'immagine della legenda stampata corrente assieme ai difetti di stampa più recenti. Questa continua fonte di informazioni in tempo reale, specialmente dati di errore, consente all'operatore di isolare le cause dei difetti di stampa mentre la linea di produzione è ancora in funzione.

Se la qualità di stampa scende al di sotto della soglia prestabilita, l'operatore può regolare immediatamente la stampante per migliorare la qualità.

Inoltre, gli operatori possono utilizzare il sistema di controllo della marcatura all'inizio della produzione per configurare la stampante e controllare che la legenda sia corretta. Il sistema di controllo della marcatura consente di effettuare dei cambiamenti in tempo reale, riducendo notevolmente la necessità di ristampare il cavo dopo la produzione.

Garanzia di qualità
Il sistema cattura le immagini del cavo marcato a velocità della linea elevate e salva le immagini dei difetti di stampa sul disco per generare rapporti sulla qualità.

Lo schermo del sistema di controllo della marcatura permette ai supervisori dell'ingegneria e della produzione di esaminare il difetto senza la necessità

di osservare direttamente il difetto. Le posizioni del difetto sono registrate assieme all'immagine per facilitare la generazione di informazioni e l'esecuzione di ulteriori analisi.

3.4 Limitazioni

Il sistema di controllo della marcatura presenta alcune limitazioni:

- Per diversi tipi di superficie di cavo (profilo tondo/attorcigliato) e font, la stessa legenda stampata può apparire diversa. Pertanto, sono necessari campioni diversi per diversi tipi di cavo
- Le legende stampate lunghe possono fuoriuscire dal campo visivo della telecamera, e pertanto possono risultare caratteri mancanti. Esiste un'alta probabilità che questo evento si produca nei fili con doppini intrecciati
- Siccome la telecamera è orientata verso la superficie, il sistema potrebbe rilevare gocce d'acqua/grasso/particelle di polvere sopra la legenda stampata e segnalare erroneamente difetti che non esistono. Per compensare questo rischio, è necessario abbassare la soglia di qualità o prevedere un deflettore dell'aria

3.5 Risultati della prova

Il sistema di controllo della marcatura di Taymer è stato ampiamente collaudato nel settore industriale su vari prodotti, messaggi di stampa e utilizzando vari metodi di stampa. I due autori hanno lavorato in stretta collaborazione con Commscope nel Claremont per realizzare questa tecnologia di controllo di qualità nello stabilimento.

I dati relativi ai difetti di stampa sono stati registrati prima e dopo. Dopo un anno di utilizzo, i difetti di stampa furono ridotti oltre il 50%.

Le ragioni sono le seguenti:

- Sono stati riscontrati problemi di qualità di stampa minori prima di trasformarsi in difetti effettivi. Ad esempio, l'operatore regolava la stampante o l'allineamento del cavo
- La manutenzione della stampante veniva effettuata prima dell'effettivo malfunzionamento, poiché gli operatori ricevevano un feedback immediato sulla qualità della stampa
- La legenda stampata errata veniva rilevata prima di stampare erroneamente l'intero lotto di produzione

3.6 Immagini di campioni

Di seguito si illustrano immagini di campioni o catture di immagini (*Figura 3-5*) di difetti di stampa rilevati dal sistema ottico di controllo della marcatura di vari prodotti.

Conclusioni

Con un sistema di verifica della marcatura, le legende stampate sul cavo possono essere controllate accuratamente per individuare eventuali difetti. Il sistema presenta diversi vantaggi.

- È indicato per qualsiasi tipo di prodotto – filo/ cavo/tubo flessibile/ tubi/barre/piastre/prodotti trefolati
- È indicato per qualsiasi tipo di stampante – a getto d'inchiostro, ruota d'inchiostro, lamina calda, laser, indentazione/rilievo
- Garantisce che il cliente non riceva prodotti difettosi, migliorando le relazioni e la fiducia del cliente
- Riduce la necessità di stampare nuovamente i cavi ed elimina gli scarti dei materiali di consumo che comportano costi di materiale e di manodopera
- Contribuisce a migliorare il processo di produzione interni per ridurre i difetti ■

Ringraziamenti

Si ringrazia in particolare anche lo staff di IWCS per aver reso disponibili i campioni per la pubblicazione di quest'anno.

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Pedidos a la vista para Windak

▲ *El equipo Windak expuesto en wire 2012*

Más de 100 visitantes procedentes de 40 países visitaron el stand de Windak en wire 2012, de donde volvió con prácticamente cinco pedidos en el bolsillo.

La empresa expuso en la feria su última bobinadora automática de doble cabezal AR24-D, diseñada para embalar automáticamente cable y alambre en carretes y bobinas de entre 300mm y 600mm de diámetro.

Windak – Estonia **Website**: www.windakusa.com

Nuevo director ejecutivo

LARS Fagerholm fue nombrado director ejecutivo del grupo Maillefer el 12 de abril de este año en sustitución de Peter Roos, quien ocupó dicho cargo hasta finales de junio de 2012 para facilitar el cambio en la dirección.

En los cuatro años que ha ocupado el cargo, el Sr. Roos ha llevado a cabo con éxito una serie de cambios importantes en Maillefer para garantizar la competitividad del grupo en los años futuros.

Fagerholm posee una vasta experiencia internacional adquirida en distintos puestos directivos, concretamente fruto de su larga carrera en Albany International, líder global en el suministro de telas para fabricación de papel altamente tecnológicas para el sector del procesado de pulpa y fabricación de papel.

Su formación y experiencia profesional en la gestión de manufactura, técnica y estructuras de empresas internacionales supondrán un aporte de gran valor para Maillefer, que permitirá a la empresa alcanzar su objetivo de liderazgo en un mercado fortalecido y convertirse en un proveedor de mayor valor para la industria.

Maillefer International Oy – Finlandia
Website: www.mailleferextrusion.net

▲ *Lars Fagerholm, nuevo director ejecutivo*

Encestadora estática MS de Frigeco

LA encestadora MS de Frigeco, diseñada para enrollar hilo de cobre y aluminio en cestas, es una máquina versátil para todo tipo de aplicaciones.

Está disponible con cabezales de distintos diámetros, de 630mm a 1000mm, y permite usar cestas de cualquier tamaño.

La encestadora MS lleva un armario independiente que debe ser instalado en la línea junto con las máquinas de estirado existentes. Existe una versión especial dedicada que es la solución de enrollado ideal para las líneas de chapado electrolítico.

La encestadora MS dispone de un cambio totalmente automático, por lo que puede ser equipada con transportadores motorizados para cestas vacías o llenas, personalizados según las exigencias del cliente.

En el diseño se ha prestado especial atención al espacio y a la accesibilidad del operador. A estas ventajas se añade, además, la reducción del tiempo de preparación de la máquina.

La gama de máquinas Frigeco, que comprende desde máquinas de estirado hasta extrusoras y trenzadoras, cubre toda la gama de cables y alambre del sector industrial.

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

▲ *La nueva bobinadora de la serie MS de Frigeco*

Teijin encinta la fibra óptica

Teijin Aramid ofrece un nuevo método mejorado para proteger la fibra óptica denominado Twaron Tape.

La fibra óptica juega un papel cada vez más importante en las telecomunicaciones de hoy en día y su frágil núcleo necesita ser protegido contra distintos tipos de peligros y deformaciones.

La fibra óptica se hace más pequeña cada día y, por ello, resulta más difícil proteger el núcleo. Twaron Tape es un producto con una base de fibra de aramida que permite producir fibra óptica de hasta 1,2mm de diámetro. Además, es de tres a cinco veces más resistente que la protección de fibra de aramida utilizada actualmente.

La producción de fibra óptica más fina usando Twaron Tape ofrece varias ventajas más comparada con las soluciones existentes. Por ejemplo, la producción de fibra óptica de 1,2mm de diámetro supone un aumento de capacidad del 30-50% para los bastidores de distribución óptica, en comparación con la fibra de 1,6mm. Además, una fibra más fina requiere menos potencia refrigerante, lo que se traduce también en una reducción de costes, y emisiones, en los centros de distribución.

Twaron Tape D2800 es una solución patentada sólida y flexible que contribuye a aumentar la velocidad de producción de fibra óptica y, por tanto, a ahorrar tiempo. La flexibilidad de la cinta Twaron agiliza y facilita el manejo y la instalación gracias al uso de fibra óptica más fácil de encintar y conectorizar.

La cinta está compuesta por un solo hilo Twaron desplegado, impregnado y fijado con material matriz, lo que supone un importante ahorro de espacio y permite tener fibra óptica de diámetro muy pequeño. Para ofrecer total cobertura y buena resistencia al aplastamiento y otras fuerzas, es incluso enrollado alrededor del núcleo de la fibra óptica.

Christoph Hahn, director comercial de Teijin Aramid, dijo: "Somos uno de los primeros pioneros en la tecnología de refuerzo de la fibra óptica, y a medida que se ha ido desarrollando el mercado, hemos ido conociendo a fondo las exigencias del mercado. Estamos orgullosos de contribuir en el sector ofreciendo a nuestros socios de todo el mundo nuestros conocimientos sobre fibras de aramida de alto rendimiento."

Teijin Aramid – Holanda
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BASEC tiene sede propia

El Consejo Directivo del Servicio Británico de Certificación de Cables (BASEC) ha anunciado que ha finalizado las obras de construcción de un nuevo laboratorio de ensayo de cables de talla mundial que ocupa unos 1.670m^2 (18.000pies^2). Las instalaciones de vanguardia, que se han convertido también en la nueva oficina central de BASEC, es el laboratorio de ensayo de cables dedicado más grande de todo el Reino Unido.

BASEC – Reino Unido **Website**: www.basec.org.uk

Sistema de verificación del marcado de cables

Craig Girdwood, Taymer International Inc y Brian Franklin, Commscope

Resumen

El uso del sistema de verificación del marcado de cables para detectar defectos de impresión mejora considerablemente el control de calidad de alambres y cables. Los defectos del revestimiento son detectados de modo continuo por un sistema de visión artificial a la velocidad de la línea de producción.

Las imágenes de los defectos son elaboradas y guardadas. Esta tecnología mejora la calidad de impresión del cable producido y reduce considerablemente el número de productos defectuosos entregados al cliente.

1 Introducción

Generalmente, el principal defecto detectado en las plantas de producción de cables de suministro eléctrico y fibra óptica son los defectos de impresión.

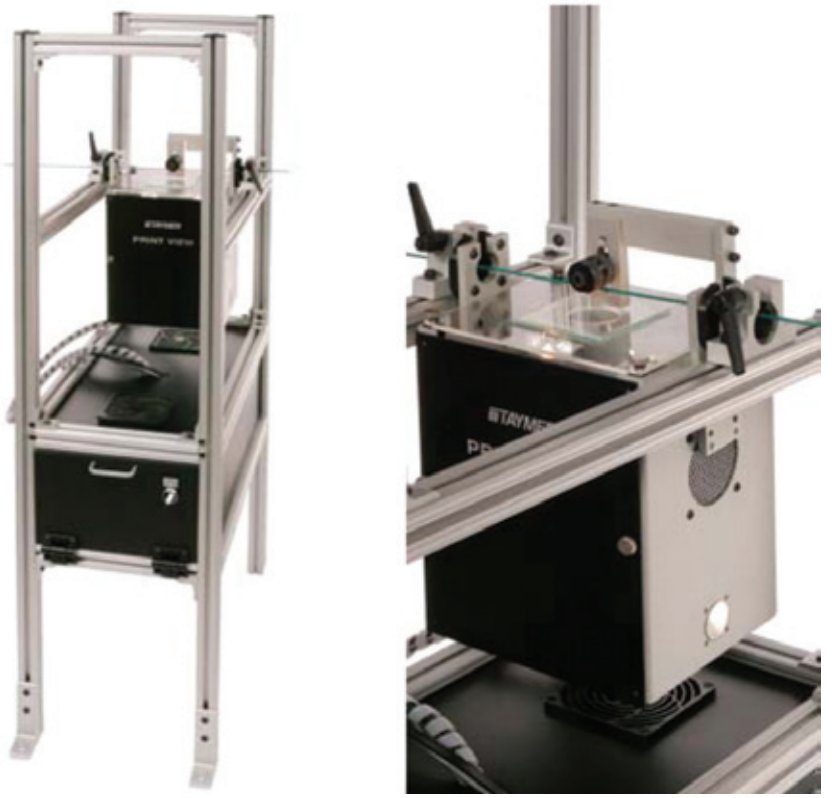
Mensajes incorrectos, manchas de impresión e impresión descolorida son defectos que no deberían encontrarse en productos de buena calidad. Estos defectos no sólo son problemas estéticos. Un mensaje incorrecto puede dar lugar a un uso incorrecto del cable por parte del usuario final. La capacidad de detectar los defectos en línea permite efectuar correcciones durante la producción y eliminar o volver a imprimir las partes defectuosas.

El sistema de verificación del marcado usa la tecnología de visión artificial para analizar, aislar y reconocer los defectos de impresión. El sistema funciona en línea y guarda todos los datos de imagen de los defectos en una base de datos, incluidos la longitud y los defectos de tamaño. La cámara está posicionada generalmente cerca de la impresora para simplificar el reconocimiento de la leyenda impresa y su posición. Las imágenes de la leyenda impresa son creadas y elaboradas a través de algoritmos de elaboración de imágenes a alta velocidad y técnicas de verificación de caracteres. Las leyendas impresas ilegibles o incorrectas son detectadas por el software, que avisa al operador para que efectúe las correcciones necesarias. Las imágenes son almacenadas junto con la información sobre la longitud, permitiendo otros análisis o la generación de informes.

El aviso supone para los operadores una retroalimentación instantánea sobre las condiciones de impresión corrientes. Esto no sólo permite adoptar acciones correctivas, sino también permite al operador reconocer y limitar las causas que originan el defecto de impresión.

De esta manera, se pueden reducir los defectos de impresión antes de que ocurran efectivamente, mejorar la calidad de impresión y reducir los costes de reelaboración, los desperdicios y los productos defectuosos.

▼ **Figura 1**: *Sistema de visión del marcado de Taymer*



El sistema de verificación del marcado puede ser integrado fácilmente en las líneas de producción y es adecuado para todo tipo de cables marcados (pares trenzados, cables revestidos, cables desnudos y perfiles en espiras.

El sistema puede analizar leyendas impresas realizadas con cualquier método de impresión, como la estampación en caliente, el chorro de tinta, la estampación en relieve, el sangrado, la impresión por láser y por huecograbado.

El mantenimiento de la unidad se realiza con una rápida limpieza cuando el equipo tiene polvo. Las luces pueden tener una duración de más de 50.000 horas de funcionamiento y son la única parte desechable de todo el sistema.

2 Limitación de varias técnicas de detección de marcado

2.1 Inspección visual en línea mediante estroboscopio

Este tipo de inspección utiliza un estroboscopio en línea. El estroboscopio emite luz intermitente a la frecuencia adecuada para que la leyenda impresa aparezca como si estuviera inmóvil o moviéndose lentamente. Esto da tiempo al operador para verificar la existencia o la calidad del marcado.

Sin embargo, la desventaja es que no hay tiempo suficiente para verificar detenidamente leyendas impresas largas antes de que aparezca la impresión sucesiva.

Además, la luz estroboscópica intermitente puede resultarle molesta al operador.

2.2 Inspección fuera de línea mediante lupa

Otra técnica para detectar defectos de impresión es el uso de una lupa. Aunque el operador pueda ver los defectos de impresión y clasificarlos según el caso, hay muchas limitaciones.

El operador puede leer la impresión solamente hasta una cierta velocidad. Esta técnica se usa fuera de línea donde la velocidad es más baja o nula. Este proceso es muy largo y aburrido, por lo tanto, se realiza normalmente para clientes que requieren este tipo de inspección.

Dado que las leyendas impresas pueden ser largas, hay una alta probabilidad de error humano durante la inspección.

Además, la capacidad de cada operador con esta técnica es diferente y la calidad de impresión puede ser evaluada de modo diferente por cada uno.

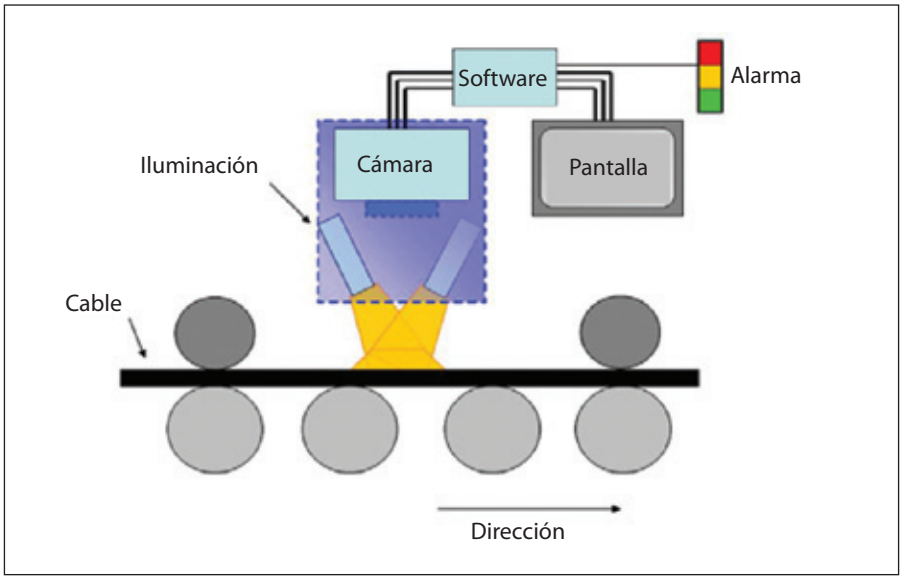
2.3 Captura y muestreo de imágenes

Este proceso utiliza una cámara que adquiere una imagen basada en una señal de codificador y en la velocidad de muestreo.

Luego, la imagen es presentada al operador en una pantalla para que pueda elaborar una muestra de imágenes y determinar si hay defectos de impresión.

Las limitaciones principales son el cansancio del operador, la capacidad del operador y una velocidad de procesado más baja. También es posible saltarse algunos defectos de impresión debido a la velocidad de muestreo.

▼ **Figura 2**: *Vista general del sistema de visión del marcado*



3 Sistema de inspección visual artificial

3.1 Diseño optomecánico

El sistema de verificación del marcado (*Figura 1*) consiste en una cámara y un sistema de iluminación adecuado para capturar imágenes de leyendas impresas que se mueven a velocidades de más de 1400 pies (460m) por minuto.

En caso de cables con varias leyendas impresas se pueden necesitar sistemas multicámara. Por ejemplo, los alambres con leyendas impresas en ambos lados requieren un sistema de dos cámaras.

La cámara y la lente ofrecen un campo visual que cubre la leyenda impresa (*Figura 2*). La captura de imagen es sincronizada con la impresora y la velocidad de la línea. La imagen es usada para procesamiento por software. La iluminación puede variar de acuerdo con la aplicación.

Los factores a considerar son la reflectancia del material, el perfil de la superficie, el color, la velocidad de la línea y la apertura de la lente.

Para asegurar la coherencia de las imágenes, el equipo está dotado de una protección para evitar que otras fuentes luminosas, partículas de polvo u otros factores afecten a los resultados. Además, la vibración del cable es minimizada gracias al uso de guías para evitar imágenes desenfocadas.

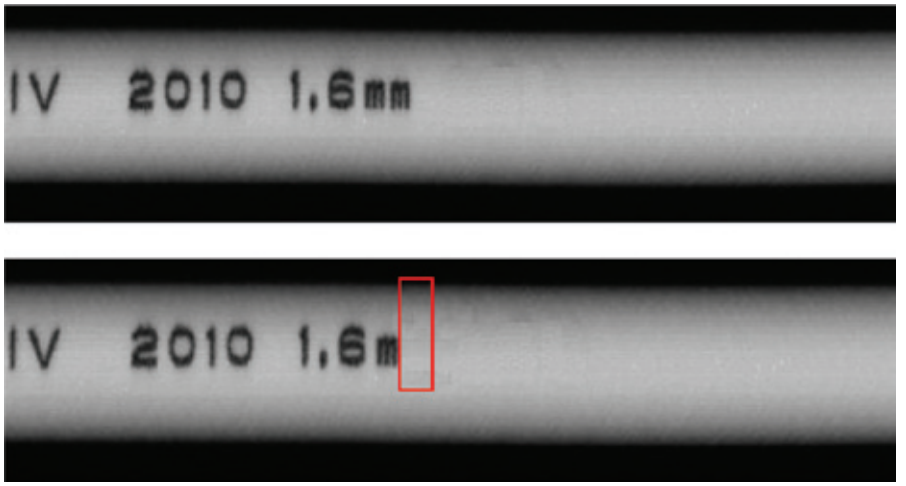
Un factor importante es la posición del sistema de verificación del marcado, que debe asegurar que el marcado esté dentro del campo visual de la cámara.

La posición recomendada para el sistema de verificación del marcado es inmediatamente después de la impresora, que es donde se realiza regularmente el marcado. Si se posiciona el sistema de verificación del marcado más abajo en la línea, hay grandes posibilidades de que el cable se tuerza y el marcado podría realizarse en cualquier punto alrededor del cable y fuera del campo visual.

3.2 Software

Para procesar las imágenes y detectar los defectos de impresión se usan algoritmos avanzados. Hay una serie de algoritmos: la detección de la calidad de impresión, la verificación óptica de caracteres (OCV), el reconocimiento óptico de caracteres (OCR).

Según los requisitos y el presupuesto disponible, se implementan distintos algoritmos.



▲ **Figura 3**: *Falta de marcado detectado a 900pies/min*

▲ **Figura 4**: *Baja calidad de marcado detectada a 200pies/min*

▲ **Figura 5**: *Captura de pantalla de la comparación de calidad de marcado*

Para la detección de la calidad de impresión se utiliza el método llamado emparejamiento de patrones. Este método requiere el patrón de un marcado correcto del cable a verificar. El patrón es comparado con cada imagen capturada durante un lote de producción.

Si las dos imágenes difieren por encima de un determinado umbral, el sistema genera una alarma para avisar al operador y guarda un informe del error en el registro de datos corriente. El defecto de impresión es visualizado también en la pantalla del operador para mayor claridad.

Los algoritmos OCV y OCR son más complejos y son una extensión de la técnica de emparejamiento de patrones. Para el OCV, el software verificará cada letra de la leyenda impresa.

La base de datos contiene los alfabetos de varias fuentes.

La leyenda impresa deseada es dividida en letras separadas de la misma fuente. Cada imagen capturada es separada también en letras. Cada letra es comparada con la letra deseada. Si las diferencias superan el umbral, se reconoce un defecto de impresión. Sin embargo, el software no reconoce cuál es la letra defectuosa.

El OCR es el más avanzado. Este algoritmo es muy similar a lo que un operador sería capaz de detectar con sus ojos y mente. El software no sólo detecta si una letra es diferente de la leyenda impresa deseada, sino que además también puede reconocer las letras defectuosas. Esto ayuda a reconocer exactamente el tipo de error y permite adoptar inmediatamente la acción correctiva para resolver el problema.

3.3 Mejora del control de calidad

Adecuado para todo tipo de productos

Dado que el sistema de verificación del marcado usa la visión artificial, puede inspeccionar la leyenda impresa de todo tipo de productos. Con una configuración adecuada de los componentes ópticos, el sistema puede ser usado para alambre desnudo, tubos, cintas, chapas llanas, etc.

Adecuado para todo tipo de impresoras/ fuentes

El sistema de detección del marcado usa patrones de imágenes como referencia. Las fuentes o las leyendas impresas de referencia son predeterminadas antes de poner en marcha el sistema. Que se haya realizado el marcado de la leyenda o de las fuentes con impresora de chorro de tinta, o de rueda de tinta, o de lámina en caliente o láser, el software será capaz de todos modos de comparar las leyendas impresas con las de referencia.

Reduce los defectos en tiempo real

El sistema de verificación del marcado presenta al operador una imagen de la leyenda impresa corriente junto con los defectos de impresión más recientes.

Esta fuente de información continua en tiempo real, principalmente datos sobre fallos, permite al operador aislar las causas de los defectos de impresión mientras la línea está todavía en fase de producción.

Si la calidad de impresión desciende por debajo del umbral determinado, el operador puede ajustar inmediatamente la impresora para mejorar la calidad. Además, los operadores pueden usar el sistema de verificación del marcado al inicio de la producción para configurar la impresora y controlar que la leyenda impresa sea correcta. El sistema de verificación del marcado permite efectuar cambios en tiempo real, reduciendo considerablemente la necesidad de imprimir de nuevo el cable después de la producción.

Control de calidad

El sistema captura las imágenes del cable marcado a velocidades de línea elevadas y guarda las imágenes de los defectos de impresión en el disco para generar informes de calidad. El display del sistema de verificación del marcado permite a los supervisores de ingeniería y producción examinar el defecto sin tener que observar directamente el defecto. Las posiciones del defecto son registradas junto con la imagen para facilitar la generación de informes y la realización de análisis.

3.4 Limitaciones

Hay pocas limitaciones del sistema de verificación del marcado:

- En distintos tipos de superficie de cables (perfil redondo/trenzado) y fuentes, la misma leyenda impresa puede aparecer diferente. Por lo tanto, se requieren patrones diferentes para tipos de cables distintos

- Las leyendas impresas largas pueden quedar fuera del campo visual de la cámara y, por lo tanto, pueden faltar algunos caracteres. Hay una alta probabilidad de que esto pueda ocurrir en pares trenzados
- Dado que la cámara apunta a la superficie, el sistema podría detectar gotas de agua/grasa/partículas de polvo sobre la leyenda impresa y podría dar reconocer falsos defectos. Para compensarlos, es necesario disminuir el umbral de calidad o limpiar con aire el sistema

3.5 Resultados de prueba

El sistema de verificación del marcado de Taymer fue probado ampliamente en el sector industrial en varios productos, mensajes impresos y usando varios métodos de impresión.

Los dos autores colaboraron estrechamente con Commscope en Claremont para implementar esta tecnología de control de calidad en la planta. Se registraron los defectos de impresión antes y después. Después de un año de uso, los defectos de impresión fueron reducidos más del 50%.

Las razones son las siguientes:

- Se encontraron menos problemas de control de calidad antes de transformarse en defecto efectivo. Por ejemplo el operador ajustaba la impresora o la alineación del cable
- El mantenimiento de la impresora era efectuado antes de su efectivo malfuncionamiento, porque los operadores recibían una retroalimentación inmediata sobre la calidad de impresión
- La leyenda impresa incorrecta era detectada antes de imprimir el lote entero con erratas

3.6 Imágenes de muestra

Abajo se ilustran imágenes de muestra o capturas de pantalla (*Figuras 3-5*) de defectos de impresión detectados por el sistema óptico de verificación del marcado de varios productos.

Conclusiones

Con un sistema de verificación del marcado las leyendas impresas en el cable pueden ser inspeccionadas detenidamente para localizar defectos. El sistema presenta varias ventajas:

- Es adecuado para todo tipo de productos – alambre/cable/manguera/tubos/barras/placas/productos trenzados
- Es adecuado para todo tipo de impresoras – chorro de tinta, rueda de tinta, lámina en caliente, láser, sangrado/estampado
- Asegura que el cliente no reciba productos defectuosos, mejorando la relación y confianza del cliente
- Reduce la necesidad de imprimir de nuevo los cables y elimina los derroches de consumibles que suponen costes de material y mano de obra
- Ayuda a mejorar el proceso de producción interno para reducir los defectos ■

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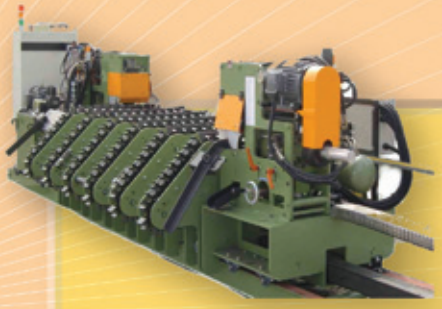

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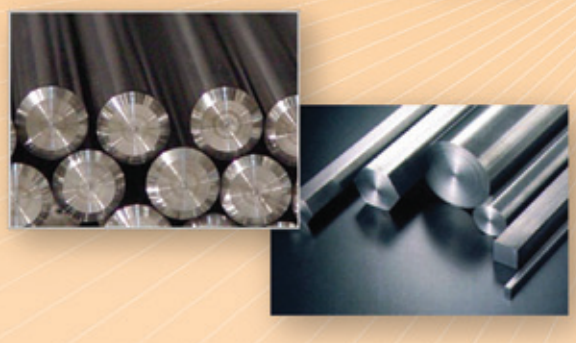

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