

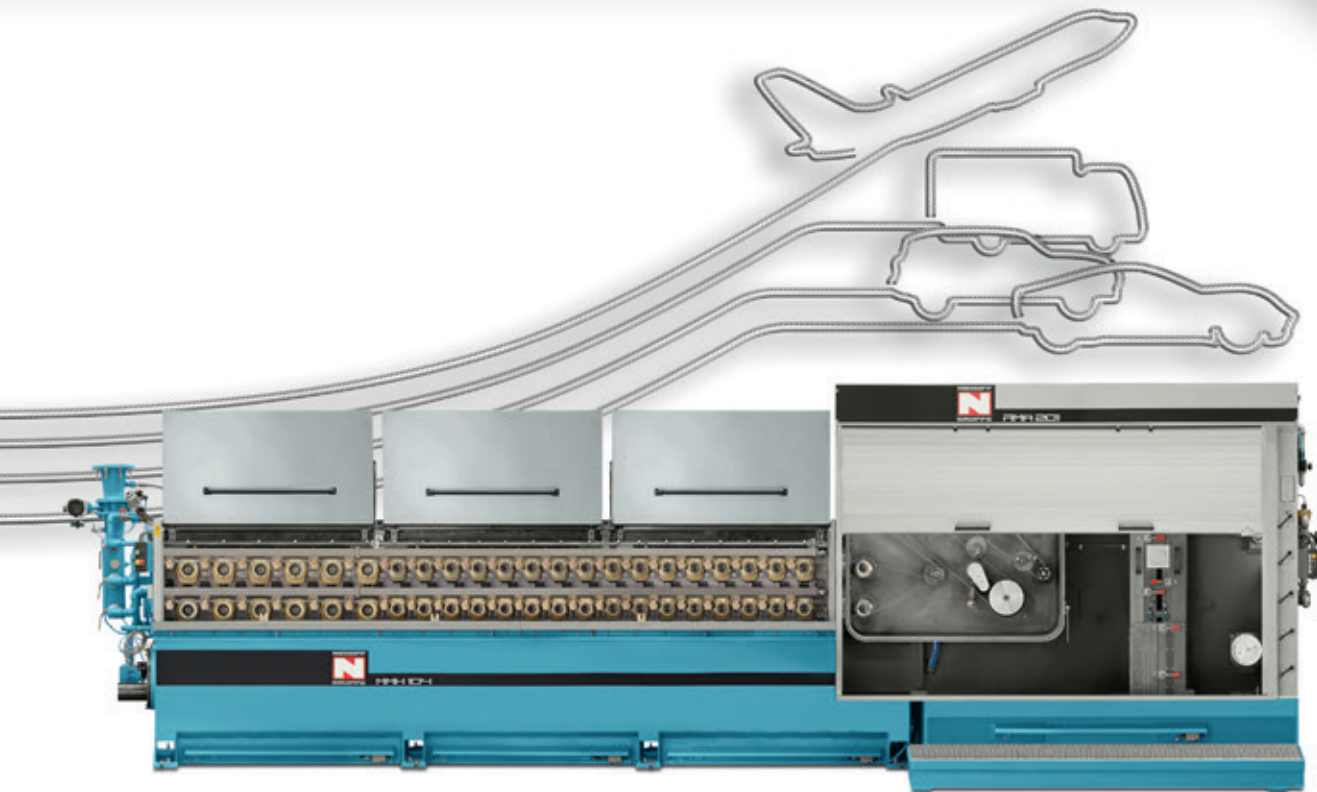
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# Wire & Cable

January 2014  
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ASIA 线缆 月刊



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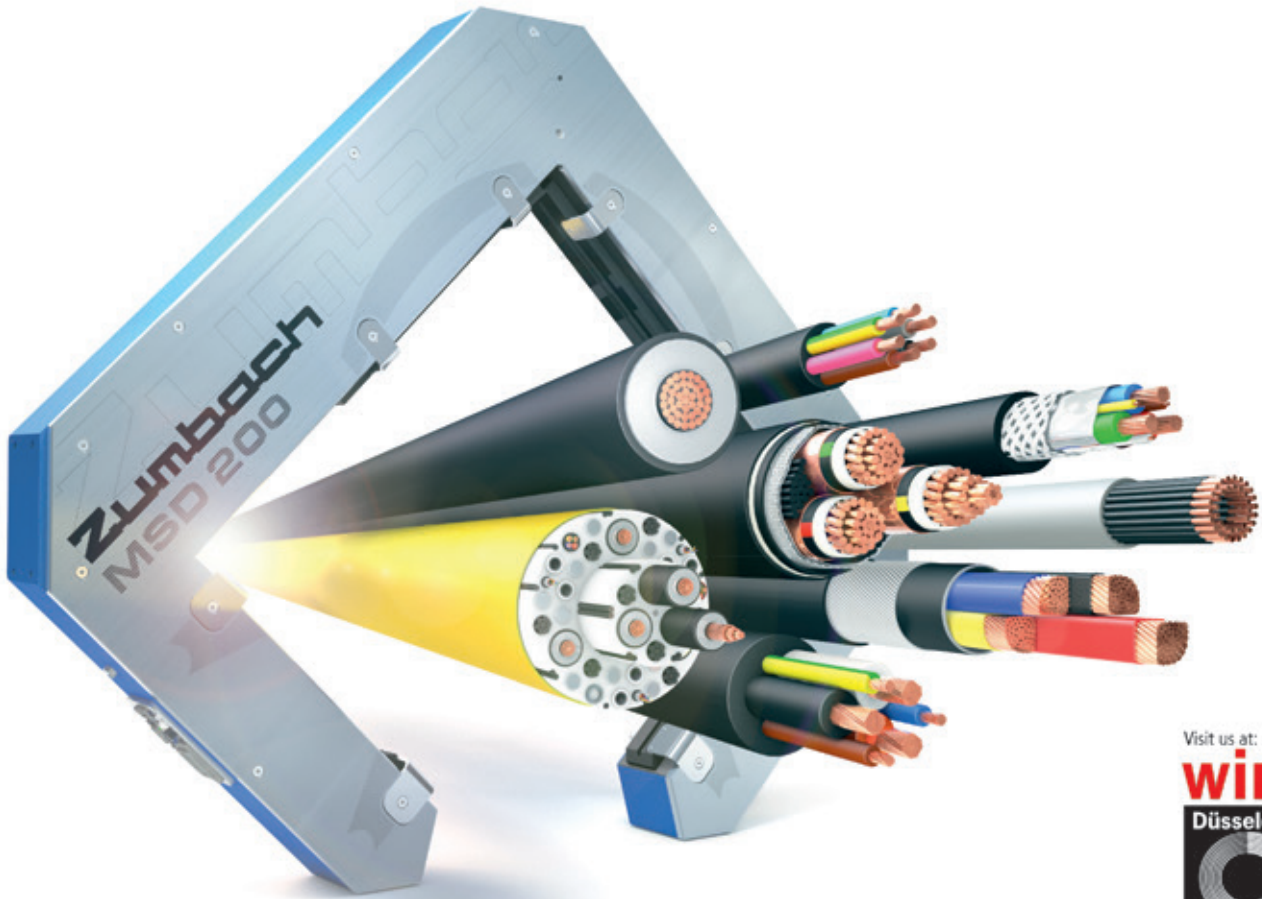


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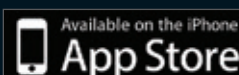
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**Editor (编辑):**..... David Bell  
**Features Editor – USA**  
**(专栏编辑 – 美国):**..... Dorothy Fabian  
**Editorial Assistant**  
**(助理文字编辑):**..... Christian Bradley  
**Design/Production (设计/制作):**..... Julie Tomlin  
**Production (制作):**..... Lisa Wright

**Translation (翻译经理):**..... Tony Zhou  
Jianye Yang  
Linda Li

**Advertising/Marketing:**..... Jason Smith  
**(广告/营销):**..... UK, ROW, USA, Canada  
Giuliana Benedetto  
Italy  
Hendrike Morris  
Germany, Austria, Switzerland  
Linda Li  
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**Advertisement Coordinator**

**(广告联络人):**..... Liz Hughes  
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**Subscriptions (订阅):**..... Liz Hughes  
**Publisher (发行人):**..... Caroline Sullens  
**Founder (创办人):**..... John C Hogg

**Europe (欧洲)**

**Advertising/Marketing & Editorial**

**(广告、营销及编辑部)**  
46 Holly Walk, Leamington Spa  
Warwickshire CV32 4HY, UK  
Tel (电话):.....+44 1926 334137  
Fax (传真):.....+44 1926 314755  
Email (电子邮箱):..... wca@intras.co.uk  
Website (网站):..... www.read-wca.com

**USA (美国)**

**Editorial (广告/营销)**

Intras USA – Doug Zirkle  
Danbury Corporate Center, 107 Mill  
Plain Road, Danbury, CT 06811, USA  
Tel (电话):.....+1 203 794 0444  
Email (电子邮箱):..... doug@intras.co.uk

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Wire & Cable ASIA is published six times a year. It is distributed throughout North and South-east Asia to registered readers in wire, cable and wire component producer and consumer industries. Annual subscriptions are available from just US\$80.

《亚洲线缆》一年出版六期，面向整个北亚、东南亚地区的电线、电缆和线材制品的生产商和用户发行。订阅一年：欧元140；英镑120；美元195。



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# Three months and counting for wire Düsseldorf 2014

A new year, a fresh start and one eye on the future.

Whilst 2014 is already here, the fresh start comes in the form of this issue of *Wire & Cable ASIA* which has undergone a make-over during the Christmas period, including a bright and bold new logo. You can also catch up with the latest news on our redesigned website at [www.read-wca.com](http://www.read-wca.com)

The future comes very much in the form of wire Düsseldorf. Just three months from now the most anticipated exhibition in the wire and cable calendar will throw open its doors in Germany.

More than 1,000 companies will be exhibiting at the Fairgrounds, and organisers Messe Düsseldorf are expecting a record number of visitors for the week-long exhibition.

Whilst we will have a more thorough look at exhibiting companies in the March issue, we have compiled a list of companies and their stand numbers for this edition, which starts on page 50.

Please also check out our sister publication, *EuroWire*, for even more details about the show. These can be found at [www.read-eurowire.com](http://www.read-eurowire.com)

David Bell  
Editor



## When and where

### March 2014

11-15 Mar:  
**METAV** – trade exhibition – Düsseldorf, Germany  
**Organisers:** VDW  
**Fax:** +49 69 756081 74  
**Email:** [metav@vdw.de](mailto:metav@vdw.de)  
**Website:** [www.metav.com](http://www.metav.com)

### April 2014

7-11 April:  
**wire Düsseldorf** – trade exhibition – Düsseldorf, Germany  
**Organisers:** Messe Düsseldorf  
**Fax:** +49 211 456 0668  
**Email:** [wire@messe-duesseldorf.de](mailto:wire@messe-duesseldorf.de)  
**Website:** [www.wire.de](http://www.wire.de)

### May 2014

6-7 May:  
**Wire Expo** – trade exhibition – Indianapolis, USA  
**Organisers:** Wire Association International  
**Fax:** +1 203 453 8384  
**Email:** [info@wirenet.org](mailto:info@wirenet.org)  
**Website:** [www.wirenet.org](http://www.wirenet.org)

### May 2014

14-17 May:  
**Lamiera** – trade exhibition – Bologna, Italy  
**Organisers:** Ceu-Centro Esposizioni Ucimu SpA  
**Fax:** +39 0226 255 894  
**Email:** [lamiera.esp@ucimu.it](mailto:lamiera.esp@ucimu.it)  
**Website:** [www.lamiera.net](http://www.lamiera.net)



○ SimpleWin from LS Cable

# LS Cable's SimpleWin – intelligent wiring

LS Cable & System has developed a next-generation intelligent integrated wiring system named SimpleWin.

This system provides integrated management of voice traffic, data transfer, security network equipment and wiring, which used to be installed and operated separately in intelligent buildings and IDCs. SimpleWin enables the checking and managing of system operation status in real-time while also offering improved network operating efficiency. In addition, management system changes, such as transfer, addition and change of circuits used as well as communication failures can be handled swiftly.

Under previous systems, lines to deliver voice, data and video information were installed independently. As a result, efficiency drops as more and more lines are installed over time. In addition, it was previously difficult to recover promptly from failures because a separate

management function was not available.

Moreover, system transfer and changes took a large amount of cost and time, and manual operation was required for a significant portion of management operations. However, SimpleWin integrates all necessary wiring and manages them using built-in intelligent software.

As a result, system administrators can identify the locations where failures occur on a real-time basis. In addition, network management through a smartphone application enables users to operate the system even more efficiently.

SimpleWin is configured with software for network management and hardware including an intelligent patch panel and an intelligent management system. Designed from the start to be an advanced integrated system, it provides the highest network

performance, and is suitable for transmitting the ever-increasing amount of data traffic.

With SimpleWin, both cross-connect, an existing subscriber wiring method, and interconnect, an equipment wiring method, have been implemented within a single system. In case of the interconnect system, stability is further improved because this method does not require additional devices to be mounted on any communication equipment.

Another advantage is that the intelligent power management system provides centralised and comprehensive power, temperature and humidity control of a communication room. According to LS Cable & System, this feature will be very useful in places consuming huge amounts of electric power, such as an IDC.

**LS Cable & System – South Korea**  
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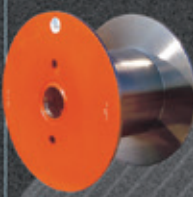





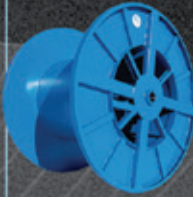




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 <p><b>TL - TILTING DEVICE.</b> FOR REELS. </p>	 <p><b>RA - REEL AUTOLIFT.</b> AUTOMATIC LIFTER FOR REELS. </p>	 <p><b>CA - COIL AUTOLIFT.</b> AUTOMATIC LIFTER FOR COILS. </p>



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## There's an app for that

SABIC has unveiled a SABIC Polypropylene (PP) app for iOS (phone and tablet) and Android (phone), titled SABIC Polypropylene Product Finder.

The app combines powerful analysis tools and product information, helping users match the right SABIC® PP solutions to their needs. In this digital age, the company wants to offer its existing and potential customers a more flexible tool to have an overview of the PP portfolio in Europe.

This app marks the company's pioneering step into mobile technology, an increasingly important platform which provides added value to its existing and potential customers.

The free-of-charge downloadable app is available in all regions, and conveniently packages SABIC PP expertise in Europe into one application, allowing converters, OEMs, designers and engineers to access comprehensive PP information quickly and easily. At first hand it contains the European offered polypropylene product portfolio.

The app has built-in technology that will allow users to search for in-depth information about PP grades within the building and construction, consumer products, flexible and rigid packaging, healthcare, mobility and transport industries and film and fibres. The app also allows users to forward information to their email account and gives them easy access to the key features of the SABIC website on their mobile or tablet device.

The app is available to download free from the Apple and Google Play Store for both iOS and Android devices.

**SABIC – Saudi Arabia** Website: [www.sabic.com](http://www.sabic.com)

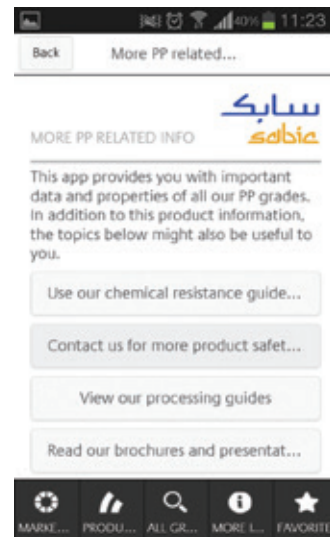
## Sumitomo in Belgian offshore

Sumitomo is entering the offshore wind sector with significant investments in two Belgian developments – the 216MW Northwind and 165MW Belwind projects.

The Japanese conglomerate has agreed to buy 33.3 per cent of Northwind, currently under construction in the North Sea and expected to open in mid-2014, and a 39 per cent stake in Belwind 1, which began operations in 2010. Sumitomo will also invest in the 165MW Belwind second phase.

The agreement is with offshore wind developer Parkwind, which is backed by Belgian supermarket group Colruyt and Korys, the holding company of the Colruyt family.

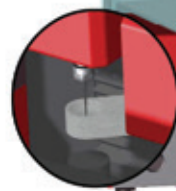
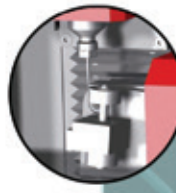
**Sumitomo – Japan** Website: [www.sumitomocorp.co.jp](http://www.sumitomocorp.co.jp)



The display on the iPhone as the app starts



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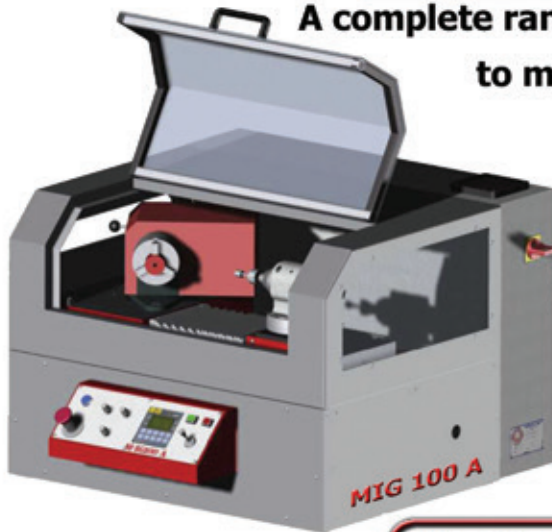


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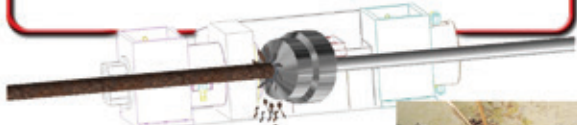
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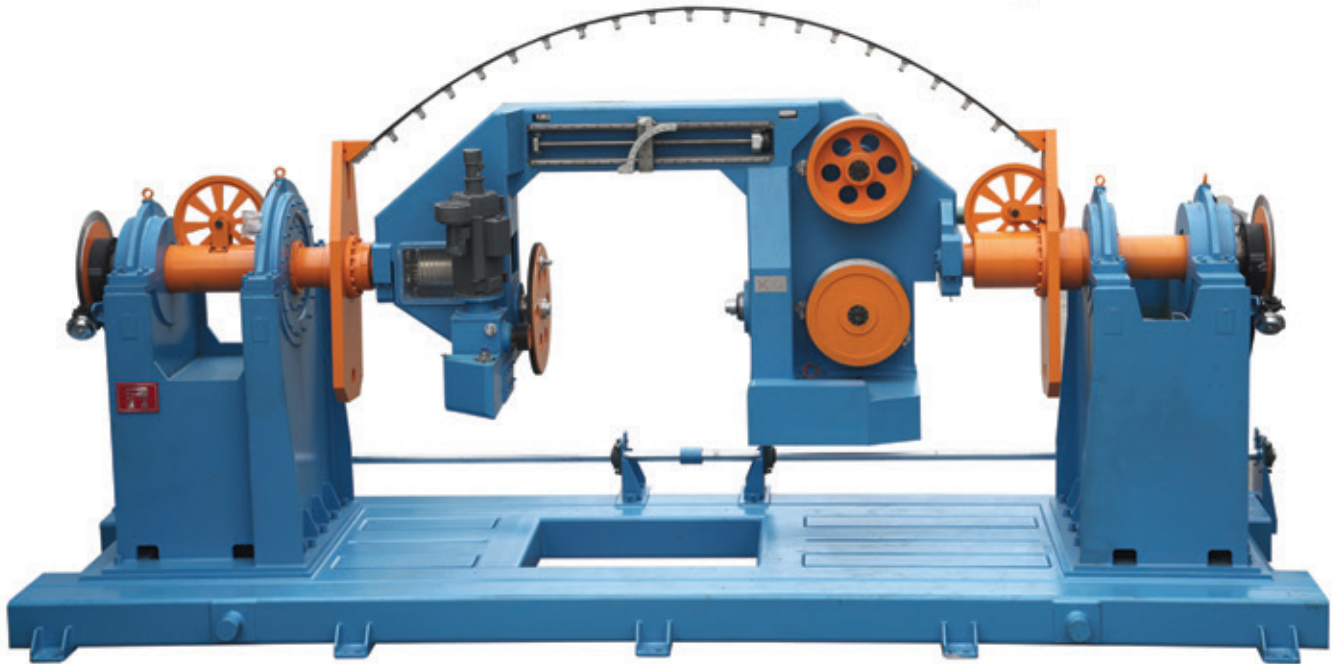
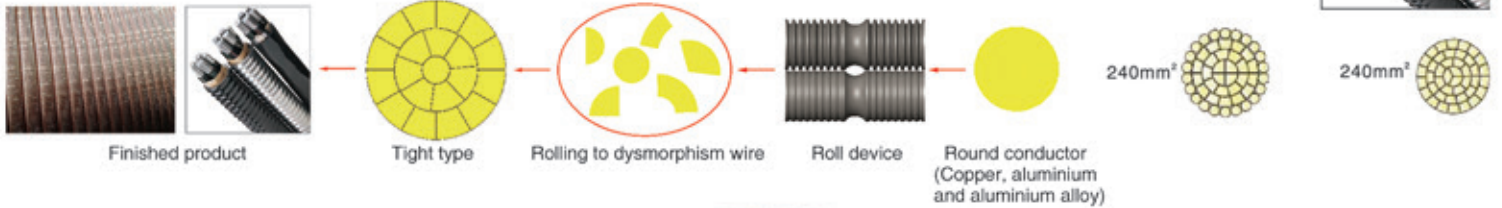
  
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Wire and cable equipment news

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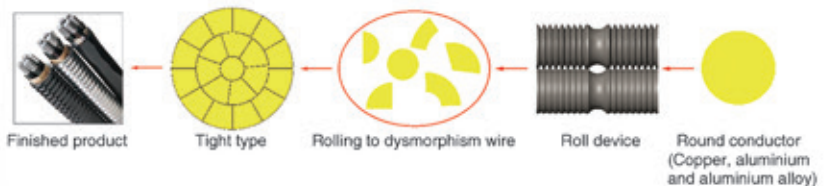
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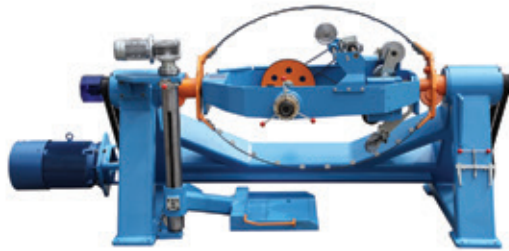
High speed rotate frame single twisting(cabling)machine



Double twist cabling machine



Ø800B High-speed copper bunching machine



Ø800E High-speed copper bunching machine



Ø250-630B High-speed copper bunching machine



1250mm double twist cabling machine



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## Laser systems specialists big in China

SPECTRUM Technologies, a UK-based specialist in the design and development of laser wire processing equipment for the aerospace industry, has had a busy few years in the Chinese market following a number of major contract awards from key aerospace manufacturers in the country. As a result the company is changing its company status to become a FICE and is moving to new larger offices in Shanghai.

It has had a presence in China since 2006 when the company opened its first Asia-Pacific office in Hong Kong with one technical sales engineer.

In 2009, Spectrum replaced the Hong Kong office with a representative office in Shanghai. The China office now employs a total of four people including a technical sales engineer and sales and marketing assistant in Shanghai, and a technical sales engineer based in Shenzhen, in addition to the Beijing-based service engineer.

During this time the company has established itself as a major supplier of wire marking equipment to the aerospace industry in China, as well as to the rest of the world.

It has won a number of significant contracts in China, including most recently the contract to supply Shanghai SAIFEI Aviation EWIS Manufacturing Co Ltd (SAIFEI) with a top-of-the-range NovaT laser wire marking system.

SAIFEI is a joint venture between Labinal, the French electrical wiring and interconnect systems (EWIS) giant and division of the Safran Group; and Shanghai Aircraft Manufacturing Co Ltd (SAMC), a subsidiary of the Commercial Aircraft Corporation of China (COMAC). SAIFEI will be the primary supplier of electrical wire harnesses for the COMAC C919 jet. This system will bring the number of Spectrum UV laser wire markers installed in China to 25, in addition to over 140 laser wire stripping products.

Spectrum counts amongst its customers in China large Western aerospace manufacturers who now have in-country facilities, as well as the majority of China's domestic aircraft manufacturers, such as Shenyang Aircraft Corporation, Changhe Aircraft Industries, Harbin Aircraft Manufacturing Corporation and Xi'an Aircraft Company.

Last year it moved to new premises in Pudong, Shanghai, under a new trading status, and from September it became a Foreign Invested Commercial Enterprise (FICE).

Spectrum's new China operation will provide a full service one-stop shop for customers, able to place and receive orders, import and export goods including spare parts that will be stocked locally for fast turnaround to local customers, and deal in local currency.

**Spectrum Technologies – UK**  
**Website:** [www.spectrumtech.com](http://www.spectrumtech.com)

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## Ground-breaking ceremony for Ekiti state cable deployment

As part of Ekiti's digital transformation programme, the Nigerian state's government has begun laying fibre optic cables in designated areas.

Governor Fayemi recently performed the ground-breaking ceremony of the first phase of the project for Ado-Ekiti, the state capital, noting that the project is the outcome of the Memorandum of Understanding (MoU) signed between the government and IPNX Nigeria Ltd in June.

He said the exercise, in line with the administration's initiative of transforming Ekiti into a digital state, is expected to enhance effective Internet connectivity.

Due to its capacity for almost limitless data speed, a broadband infrastructure in Ekiti state, based on fibre optics, is expected to transform the way Ekiti residents live and work.

The first phase will cover about 8km from the government data centre.

Essential services to be provided through the fibre cable will include high speed Internet access to home and offices at an affordable price; wi-fi hotspots; telephone services; video conferencing; cable TV on demand; city security cameras; and e-Education and e-Health services.

**Ekiti State – Nigeria**  
**Website:** [www.ekiti.com](http://www.ekiti.com)



## Big dimension reels

GMP Slovakia is a worldwide manufacturer in the production of reels and take-apart reels for the wire and cable industry. The company designs and realises different products and bespoke special projects for the handling of drums of large dimensions.



○ *Big dimension drums from GMP Slovakia*

The company has manufactured many pay-off items for offshore cables during the last year, and specialises in big drum production. The design is studied by the technical department in cooperation with private technical offices and with the customer.

GMP not only designs, but ensures that the assembly and functionality are all working at the customer's plant.

The company also supplies standard reels for steel, copper and aluminium wire and take-apart reels for coil production. The company is proud of its patented take-apart reel Easycoil Plus, the reel which can be used also as coil lifter. The internal mechanism of the reel permits the barrel expansion

during the lifting operation and takes the coil up.

Once suitable hooks are in the correct position the barrel collapses during the lifting operation and sets the coil free.

The reel can be also supplied with changeable flanges to make coils of different widths, and can be supplied with circular slots in the flanges to fit cardboard barrels. All take-apart reels and handling equipment is CE marked.

**GMP Slovakia – Slovakia**  
Website: [www.gmp-slovakia.com](http://www.gmp-slovakia.com)

## Ajaokuta looks to wire rod production

Nigeria's Ajaokuta Steel Company Ltd will commence production of wire rods, for use by major civil and construction engineering contractors, early in 2014.

Speaking in Ajaokuta, during the signing of Memorandum of Understanding (MoU) between his company, Zarubezhstrimontazh Ventures Nigeria Ltd, and Ajaokuta Steel on technical assistance for the wire rod mill, retired Lieutenant-General Salihu Ibrahim said: "We have installed an unparalleled range of quality testing assurance and research facilities at Ajaokuta, which we will use to vastly upgrade the quality of wire rods in the Nigerian market to meet highest global standards."

**Ajaokuta Steel Company Ltd – Nigeria**

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## Ultra-broadband for Saudi Arabia

ALCATEL-Lucent and Zain KSA have completed an Agile Optical Network to provide ultra-broadband access throughout Saudi Arabia.

The fibre-optic backbone network is based on converged wavelength division multiplexing/optical transport (WDM/OTN) technology, enabling Zain to provide 100 gigabits-per-second (100G) capability throughout the country's main metros.

Zain and Alcatel-Lucent are also conducting a trial of 400 Gigabit-per-second (Gbps) data transmission over an existing optical link carrying live network traffic in the major western city of Jeddah. Alcatel-Lucent's 400G optical solution, based on the 400 Gbps Photonic Service Engine (PSE) platform, supports the emergence of new high-bandwidth, high-performance.

Key facts:

- Zain has made the nationwide deployment of fibre-based mobile ultra-broadband access to support the increasing network capacity demands of 4G LTE
- Alcatel-Lucent has provided its converged WDM/OTN platform, the 1830 Photonic Service Switch (PSS), to address the booming demand for high-bandwidth data services such as high-definition video streaming, next-generation mobile broadband applications and cloud services
- 100G fibre-optic technology takes advantage of unique silicon innovations from Alcatel-Lucent's Bell Labs and supports a capacity of up to 8.8 Terabit per second – the equivalent of 1.32 million HDTV channels streamed at the same time – over a single optical fibre

Zain and Alcatel-Lucent are conducting a 400G data transmission trial in Jeddah, over an existing optical link carrying live network.

**Alcatel-Lucent – France**

**Website:** [www.alcatel-lucent.com](http://www.alcatel-lucent.com)

## Solar connected to South African grid

Norwegian solar company Scatec Solar AS has energised a 75MW PV power plant in South Africa's Northern Cape.

The \$255 million Kalkbult power plant consists of 312,000 solar panels mounted on 156km of substructure, inverters, transformers and an HV substation. The power generated by the facility will be sold to national utility Eskom through a 20-year power purchase agreement (PPA).

Last year, Scatec was awarded contracts to build two other PV power plants. It expects to complete the 75MW Dreunberg power plant in the Northern Cape and the 40MW Linde facility in the Eastern Cape in mid-2014.

**Scatec Solar AS – Norway**

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

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## Joint venture agreement for CPT

CPT (Constructions & Projects Tunisie) is now offering Al rod lines: 1.5-2.5-3.5t/h with the very highest reliability.

Formerly a subcontractor of Continuus-Propenzi for machinery components, CPT signed a joint venture agreement with the Italian company in 2013. This followed an increase in demand for second-hand Propenzi lines after many were unused because of age of being too expensive to refurbish and rebuild.

Simple, sturdy, affordable aluminium rod lines from caster to coiler (also with double automatic reels) are for cable manufacturers.

Under the technical supervision of Continuus-Propenzi, CPT is offering brand new lines with European components and proven technology both for EC, Al rod and electrical alloys



○ *The offices of Constructions and Projects Tunisie*

T4 such as 6201, where production ranges from 10,000t/h to 20,000t/h and above.

**Constructions and Projects Tunisie – Tunisia**

## China invests \$100bn

CHINA is investing around \$100 billion on 20 ultra high-voltage transmission lines to link power generation in western areas with load centres in the south and east.

The State Grid Corp of China plans to build around 12,000 miles of ultra high-voltage transmission lines by 2017. Reuters reported that some analysts have priced the transmission grid project as high as \$250 billion.

The company has already built over 2,800 miles of line, and a further 3,900 miles are currently under construction.

China's national development and reform commission has approved the remaining 5,400 miles of transmission line.

State Grid Corp of China plans to connect about 210GW of power generation capacity to load centres, to

deliver power to China's highly populated and industrialised south and east. The project demands the transmission of 1.2 trillion kWh of electric power per year.

The ultra high-voltage lines used by the company, designed to limit line losses, are capable of delivering up to five times more electricity than traditional power transmission lines, according to the company.

The power lines will help reduce demand for coal-fired power and thereby improve China's air quality through the transmission of renewable energy sources. Much of China's considerable hydropower capacity is located in the eastern part of the country.

**State Grid Corporation of China – China**  
**Website:** [www.sgcc.com.cn](http://www.sgcc.com.cn)

## Going nuclear!

Nexans has been awarded a €9m turnkey contract by China National Nuclear Corporation to supply power cables and accessories for the construction of the second phase (units 3 and 4) of the Tianwan nuclear power plant, located in Lianyungang City, Jiangsu province, China.

**Nexans – France**

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

## Trying to join the \$1bn club

SUN and Sand Industries Africa Ltd, a subsidiary of Samsung Overseas, has started production of mild steel wire rod. The company's new product line is part of its efforts to become a \$1 billion organisation by 2014.

Shweta Satija, managing director, hopes that producing the raw material for nails, wire-mesh, binding wire, furniture and utensil producing companies will also help to provide jobs for the increasing unemployed population in Nigeria.

Musa Mohammed Sada, the minister for steel development who commissioned the new factory, has commended the company for taking up the challenge of driving the industrialisation of the steel sector.

Shweta Satija added that the company is venturing into other new products, including a ferro-alloy plant, a cable and conductor manufacturing unit, and tin and gold mining in Rwanda, Uganda, Ghana and other African countries to boost the local economy and create job opportunities for Africans.

**Sun and Sand Industries Africa Ltd – Nigeria**  
**Website:**  
[www.sunandsandindustries.com](http://www.sunandsandindustries.com)

## Bengal to lay fibre network

The West Bengal government has agreed to a proposal to lay an optical fibre network connecting various panchayats in the state. Survey and cable laying work will begin after the monsoons.

West Bengal was among the last few states to sign up to the memorandum of understanding.

The state government's delay to grant right-of-way held up the implementation of a national project to make broadband Internet connectivity available in rural areas. In 2011, the department of telecommunication took up the project to improve last-mile connectivity in the country.

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## £5.5m deal for Tratos to power up Palestine

TRATOS has completed delivery of £5.5m worth of distribution equipment, transformers and poles to the Palestinian Southern Electricity Company (SELCo).

The contract for the order was signed in 2008 by the vice president of Tratos at the time, Ennio Bragagni Capaccini, and the equipment has been supplied and installed as required over the past five years.

This project is part of a more comprehensive initiative called the Electric Sector Investment Management Program (ESIMP), the primary objective of which is to deliver numerous benefits to electricity consumers in Palestine through sustainable improvements in the quality of the electricity supply.

The initiative is being jointly financed by the World Bank and the European Investment Bank (EIB).

Tratos played its part in meeting this objective by supplying high quality, advanced equipment that would provide optimum functionality for the purpose of reinforcing and renovating the power distribution system in the central and southern regions of the West Bank.

The installation of the Tratos equipment will also be complemented by institutional power sector reforms that are designed to better serve the electricity needs of the Palestinian people.

Mr Luciano Pezzotti, the Italian Consul General, expressed his appreciation to SELCo for the significant improvements the project has achieved, which is due in large part to the quality of Tratos's distribution equipment.

Tratos cables offer highly advanced

### Dolphin to land ACE in Nigeria

Dolphin Telecom, an operator of the Africa Coast to Europe (ACE) submarine cable system in West Africa, has said that it will land the \$700 million submarine cable in Nigeria at the end of this year, reports the Nigerian newspaper, *Leadership*.

technology and construction, providing flexibility, lightness and strength whilst also being low maintenance.

Tratos HV cables can be used in a wide variety of applications such as ignition systems and AC and DC power transmission. They may be any length,

with relatively short cables used in apparatus. Longer cables can be run within buildings or as buried cables in an industrial plant or for power distribution, and are often run as submarine cables under the ocean for power transmission.

**Tratos Group – Italy**  
**Website:** [www.tratos.eu](http://www.tratos.eu)

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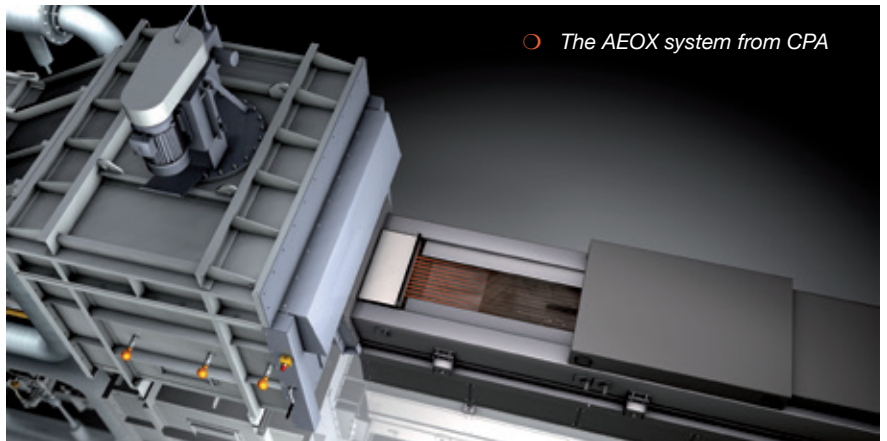
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## Gentle but efficient from CPA

AUSTRIAN high-quality wire machinery manufacturer CPA Wire Technologies uses the gentle but efficient water quenching system AEOX STS, which helps to save energy without being harmful to workers and nature.

AEOX STS is part of the elaborate AEOX Heat Treatment Technology consisting of energy-efficient recirculation convection furnaces for austenitisation and cross-flow convection furnaces for diffusion, stress relieving, soft annealing and tempering of wires and strips. With the entire AEOX heat treatment technology operators can save up to 40 per cent of energy.

Traditionally, the quenching systems used in the steel wire industry are lead baths. In a technical point of view, these systems are very well suited for achieving the desired thermal procedure, but there are major disadvantages which must not be neglected. First of all, lead is an environmental poison. Additionally, residues of lead will always adhere to the wire which might require additional chemical cleaning. Finally, heating up and controlling the temperature of tons of wire requires valuable energy.

As an alternative to lead baths, fluidised bed systems have been introduced. These systems make use of small solid particles impacting on the wire which extract heat from the product by direct contact. Compared to lead baths, these systems are environmentally compatible and have less power consumption. Still, these systems have some disadvantages. They are usually operated with sand of 100 to 200µm particle size. This is a size where dust can enter the respiratory system and

lead to irritations. Particle sizes below approximately 5µm, which may be produced during operation, can even get into the lungs and cause severe health problems. In a technical point of view, these systems only allow a very narrow dimension range of wires at the same time, since it is not possible to adjust the bed corresponding to the wires individually.

To overcome the described problems, CPA developed a water-based quenching system. The quenching fluid is a mixture of water and organic polymers. These fluids are environmentally friendly and easy to handle. Because of the polymer properties, the vapour film phase at the beginning of the quenching is very stable. The comparably long-lasting vapour film phase results in a controllable quenching process. The transformation temperature is reached before the bulk boiling phase starts.

The AEOX Structural Transformation Systems by CPA (international patent pending) is designed to run different wire dimensions at the same time. For that reason, the cooling section is divided into individually adjustable sections according to the customer's request.

The quenching section is directly connected to the soaking zone, without leading the wires through surrounding atmosphere. The soaking zone consists of two individually adjustable, electrically heated sections. In that way it is possible to introduce a temperature gradient from the entrance to the exit in order to minimise wire temperature changes during pearlite transformation.

**CPA Wire Technologies – Austria**  
Website: [www.cpa.at](http://www.cpa.at)

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# Frequent meetings and ‘nipping problems in the bud’ as university students see life HOSN-style

HOSN is a cable and wire equipment supplier, specialising in drawing and stranding machines.

As two students from the University of Nottingham, upon arrival at HOSN’s sales office, we found the workplace very energetic; the open plan office layout and the constant conversing provides a very exciting ambience to be involved in.

What really impressed us with the firm is the frequent meetings on the smallest of problems within the sales process.

The company has a philosophy of “nipping the problem in the bud” and thus prevents an escalation of any real issues.

This company recognises that growth can be both prosperous and detrimental to its development. At such a pivotal time, the company recognises the need to be flexible, in order to overcome any obstacles it may face and to ensure it expands harmoniously.

HOSN’s core value is quality; this means quality in the work force, in the products and in the levels of service in order to fully satisfy all of their clientele.

HOLD, a famous high-tech enterprise in China, is the parent company of HOSN and works closely with HOSN to ensure the core value of quality is sustained.

HOSN owns three innovative patents which has earned it certificates from the Shanghai Technology Innovation Centre.

Furthermore, it has attained a certificate from the government of China recognising its products as significant new innovations.

On top of this, HOSN boasts a large wealth of experienced and driven engineers who are highly motivated by the general manager who has devoted his whole working career to the industry and ensures consistency throughout the process.

Another key strength to the company

**James Day, from England, is studying finance, accounting and management at the University of Nottingham, UK. Pan Pan, from China, is studying for his MSc in entrepreneurship at Nottingham, having studied financial management as his undergraduate degree.**

**They chose to write about their visit to Shanghai, and their visit to the HOSN plant.**



○ Interns James and Pan from the University of Nottingham discussing HOSN’S products during the 8<sup>th</sup> China International Wire & Cable Industry Exhibition in Shanghai

is its focus on autonomy in its structure and it encourages its employees to have an active participation in realising the direction of the company in the present and future.

It is HOSN’s forward thinking that gives it the edge over its competitors within China and its ever-increasing global reach highlights a company realising its potential as a global brand.

It now distributes throughout Southeast Asia, Russian-speaking regions, Africa, Australia, South America, Europe and the Middle East and continues to branch out.

**HOSN – China**  
**Website:** [www.hosnglobe.com](http://www.hosnglobe.com)



○ James and Pan visit HOSN’s workshop



○ LS电缆的SimpleWin系统

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LS Cable & System开发了下一代智能化综合布线系统，命名为SimpleWin。

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SimpleWin使得系统运行状态能够实时进行检查和管理，同时提高网络运行效率。

此外，管理系统的改变，如变化、添加和电路变更以及通信故障都能够迅速处理。

在以前的系统中，提供语音、数据和视频信息的线路独立安装。结果，越来越多的线路随着时间的推移需要安装，导

致效率下降。此外，之前也很难从障碍中恢复，因为无法实现独立的管理功能。

除此之外，系统的转换与变更需要花费很高的成本和时间，而且重要部分的管理操作需要手动进行。然而，SimpleWin集成了所有必要的布线，并利用内置智能软件进行管理。

因此，系统管理员能够实时识别哪些地方发生了故障。另外，网络管理通过智能手机应用，使用户能够更有效地操作系统。

SimpleWin包括网络管理软件、智能配线架和智能管理系统。从一开始，系统的设计理念即为先进的集成系统，提供

迄今为止最高的网络性能，适用于发送不断增加的数据流量。

SimpleWin，无论是交叉连接，即现有用户的接线方法，还是互连，即设备的接线方法，都能够在单一的系统内实现。在互连系统情况下，稳定性将进一步提高，因为这种方法不需要在任何通信设备上安装额外装置。

系统的优势还在于，智能电源管理系统为通信机房提供集中和全面的电源、温度和湿度控制。据LS Cable & System公司介绍，此功能对于电力消耗量非常大的场所如IDC机房，非常实用。

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## CPT签署合资协议

CPT (Constructions & Projects Tunisie)提供铝棒线: 1.5-2.5-3.5t/h, 并具有非常高的可靠性。CPT原为Continuus-Properzi机械部件的分包商, 今年与意大利公司签署了一项合资协议。由于很多机器使用时间较长, 翻新和重建的成本又太高, 签署合资协议正是为了满足二手Properzi 生产线需求不断增加。简单、坚固、实惠的铝棒生产线, 从连铸机到卷取机(带有双自动卷轴)都能够满足电缆生产的需求。

在Continuus-Properzi技术监督下, CPT提供具有欧洲部件和成熟技术的全新生产线, 适用于EC、铝棒和电工合金T4, 诸如6201, 生产范围从10,000t/h到20,000t/h及以上。

Constructions and Projects Tunisie – 突尼斯



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公司很荣幸, 可拆卸卷轴Easycoil Plus获得专利, 卷轴能够作为线圈升降器使用。

卷轴的内部机制允许在起重作业过程中筒体扩张和将线圈提起。

一旦合适的钩处于正确的位置, 筒体在起重作业过程中就会崩塌释放线圈。

供应的卷轴法兰也可以变化, 使得线圈具有不同的宽度, 法兰上也可以用圆形槽, 以适应纸板桶的应用需求。

所有可拆卸的卷轴和处理设备都具有CE标志。斯洛伐克GMP通过了ISO DNV 9001:2008质量体系的认证。

GMP Slovakia – 斯洛伐克  
网址: [www.gmp-slovakia.com](http://www.gmp-slovakia.com)

## 中国市场上不断壮大的激光系统专家

英国Spectrum Technologies公司专业为航空工业设计与开发激光束加工设备, 这今年在中国市场异常活跃, 持续接到一系列中国主要航空航天企业的大宗订单。

因此, 公司在当地市场的地位得到提升, 成为FICE, 最近将搬迁到上海新的大型办公室。

Spectrum于2006年在中国香港开设了第一家只配备了一位销售工程师的亚太地区办公室, 至此, 在中国市场已经存在了6年。Spectrum随后在北京聘用了一位现场服务工程师, 以支持该地区日益增长的客户群。

2009年, Spectrum在上海设立了代表处, 取代了香港办事处。中国办事处的员工增加到4位, 包括上海的一位技术销售工程师和一位销售与营销助理, 一

位深圳的技术销售工程师, 以及北京的一位服务工程师。

在此期间, 公司奠定了作为中国及世界其它地区航空航天工业线材打标设备主要供应商的地位。

公司在中国赢得了许多重要合同, 包括最近为上海赛飞航空线缆制造有限公司(赛飞)提供顶级的NovaT激光线打标系统。赛飞是法国赛峰集团旗下拉比纳公司和中国商飞公司所属上海飞机制造有限公司共同投资组建而成。赛飞将是COMAC C919喷气机电线束的主要供应商。因此, Spectrum紫外激光打标机在中国的安装数量将达到25台, 除此之外, 还有140多台激光剥线机。

Spectrum中国客户包括西部地区拥有国内设施的大型飞机制造商, 以及大多数

中国本土的飞机制造商, 比如沈阳飞机制造公司、昌河飞机工业公司、哈尔滨飞机制造公司和西安飞机公司。去年, 公司迁至新址上海浦东新区, 在新的交易环境下, 从9月份开始, 成为外商投资商业企业(FICE)。

Spectrum新的中国运营处将为客户提供一站式服务, 能够发出和接收订单, 进口和出口货物, 包括备件等, 就地储存, 为当地客户提供快速周转, 以本地货币进行交易。

销售和市场营销总监John Meahan先生说: “交易和办公环境的改变是公司迈出的重要一步; 这也表明Spectrum致力于在该地区开展业务, 为当地的客户建立有效的技术与商业支持。”

Spectrum Technologies – 英国  
网址: [www.spectrumtech.com](http://www.spectrumtech.com)

## 埃基蒂州开始部署电缆

作为埃基蒂州数字转型计划的一部分，州政府开始在指定区域铺设光纤电缆。Fayemi省长最近举行了Ado-Ekiti项目第一阶段的奠基仪式，国有资本，指出该项目是政府与IPNX尼日利亚公司6月签署谅解备忘录(MoU)的结果。他说，此举应政府倡议，将埃基蒂转化成数字状态，将进一步增强有效的互联网连接。由于其容量几乎是无限数据传输速度，埃基蒂州的宽带基础设施基于光纤，预计能够改善该州居民的生活和工作方式。第一阶段涵盖从政府数据中心开始的8公里。通过光纤电缆提供的必要服务包括，高速互联网以实惠的价格接入家庭和办公室；wi-fi热点；电话服务；视频会议；有线电视；城市安全摄像机；电子教育和电子健康服务。

**Ekiti State – 尼日利亚**  
网址: [www.ekiti.com](http://www.ekiti.com)

## SABIC推出App应用软件

SABIC为手持设备操作系统(手机和平板电脑)和安卓(手机)推出应用软件SABIC Polypropylene (PP) app, 称为SABIC Polypropylene Product Finder。

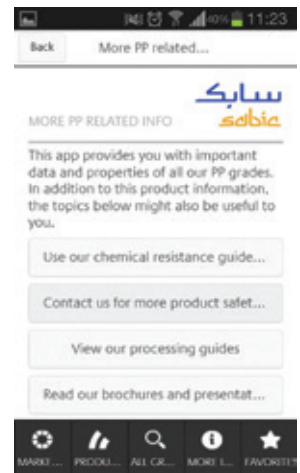
软件app结合了强大的分析工具和产品信息，帮助用户匹配合适的SABIC® PP解决方案。在这个数字时代，公司旨在为现有和潜在客户提供更灵活的工具，拥有全面的欧洲PP信息。

应用软件app的推出，标志着公司向移动技术领域迈出了开创性的一步，这是一个日益重要的平台，能够为现有和潜在的客户带来附加值。所有地区都可以免费下载app，方便将在欧洲对SABIC PP专业知识进行打包，从而允许转换器、OEMs、设计者和工程师方便快捷地访问综合的PP信息。第一手资料包含欧洲提供的聚丙烯产品组合。

App有内置技术，用户因此能够搜索建筑和建设、消费类产品、柔性及刚性包装、医疗保健、物流与交通运输，以及薄膜和纤维等领域内关于PP的深度信息。App还允许用户转发信息给他们的电子邮件帐户，在其手机或平板电脑上便捷地访问SABIC网站的各个板块。

苹果与谷歌播放商店的手持设备操作系统和安卓都可以免费下载app。

**SABIC – 沙特阿拉伯**  
网址: [www.sabic.com](http://www.sabic.com)



○ 在苹果iPhone手机上展示启动app

### Shanghai Shenchen Wire and Cable Equipment Co.Ltd.

## 上海申辰线缆设备有限公司

— The Kingdom of Cold Welding Machines



**HD-2**



**ZJ-420 SGZ-170**



**SD-10 SD-II SD-1D J1-A J1-B J3-D J4-A**



**AC1510 AC3525**



**AC705-BM**

Shanghai Shenchen Wire & Cable Equipment Co., Ltd is a company specializing in producing cold welding machines and dies. For many years, we have devoted ourselves to cold welder design, manufacture and sales. Now our company has become an international professional enterprise.

The welding copper wire ranges from  $\phi$  0.05 mm -  $\phi$  25 mm and aluminium  $\phi$  0.06mm -  $\phi$  35mm, the flat cable largest width is 33mm and smallest thickness is 0.40mm. Our enterprise has one of the largest welding range in the whole industry. Our cold welder series products rigorously comply with enterprise standard Q/YQJT1-2004 to produce quality and consistency.

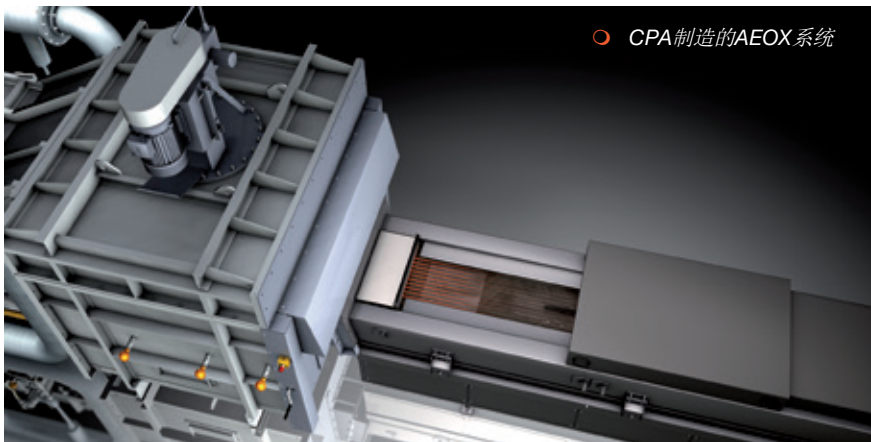
Our company has accumulated a wealth of production experience though continuous innovation, constantly filling the domestic gap. Recently our company has launched a Multi-stand cluster welding machine, which ranges from 0.5mm<sup>2</sup>- 630mm<sup>2</sup>. We are always leading the industry.

<http://www.sch.chinacable.com.cn> Email: [schsc8@aliyun.com](mailto:schsc8@aliyun.com)




Shanghai Shenchen Wire & Cable Equipment Co.Ltd.(head office、foreign trade office)  
Address: Rm.1804, Bldg.No.1(Guoke Mansion), Lane 1029, Kongjiang Road, Yangpu District, Shanghai, China.  
Tel: 0086-21-65199437 0086-21-65199438 Fax: 0086-21-65199430

## 温和而高效



○ CPA制造的AEOX系统

奥地利高质线材机械制造商CPA Wire Technologies使用温和但高效的水淬系统AEOX STS,在对工人和自然环境没有伤害的前提下帮助节约能源。

AEOX STS是AEOX复杂热处理技术的组成部分, AEOX包括用于奥氏体化的高效节能循环对流炉和用于扩散、压力缓解、软性退火与回火线材与带钢的横流对流扩散炉。使用完整的AEOX热处理技术,您可以节省高达40%的能源。

传统上,钢丝行业使用的淬火系统系铅浴。从技术角度来看,这些系统非常适合于实现所需的热过程。但也有不容忽视的主要缺点。首先,铅是一种环境毒物。此外,残留的铅将始终附着在线材上,这可能需要额外的化学品来清洗。最后,加热和控制上吨重的电线的温度需要宝贵的能源。

作为铅浴的替代方案,引入了流化床系统。这些系统利用小固体颗粒撞击在电线上,通过产品的直接接触提取热量。与铅浴相比,这些系统与环境兼容,功耗也更低。然而,这些系统仍然存在一些缺陷。它们通常伴随着100到200微米的颗粒一起运作。这为灰尘进入呼吸系统提供了可乘之机,并引起过敏。在操作过程中,可能产生约5微米以下的颗粒,甚至可以进入肺,导致严重的健康

隐患。从技术的角度来看,这些系统只允许在同一时间运行很窄尺寸范围内的电线,因为它不可能单独根据线材调整床。为了克服上述问题,CPA开发了基于水的淬火系统。淬火液是水与有机聚合物的混合物。这些液体环保,且易于处理。由于聚合物的性能,蒸汽膜在淬火的起始阶段是非常稳定的。相对持久的蒸汽膜阶段导致可控的淬火过程。在沸腾阶段开始之前达到转变温度。

CPA制造的“AEOX结构转型系统”(国际专利申请)设计用于同时运作不同尺寸的线材。出于这个原因,冷却部根据客户需求分成单独可调节的部分。调整从池的外部进行,不需要操作任何运行线或在淬火中。

淬火部分直接与均热区连接,不会导致电缆穿过周围大气。浸泡区包括两个独立可调的电加热部分。在这种方式下,有可能从入口到出口引入温度梯度,以便在珠光体转变过程中尽量降低线材温度。

AEOX STS淬火系统可以与CPA高效节能的奥氏体化炉相结合,能够节约高达40%的能源,可调节部分负荷量从名义炉负荷量的30%开始。

CPA Wire Technologies – 奥地利  
网址: [www.cpa.at](http://www.cpa.at)

## 新型线材生产线

Sun and Sand Industries Africa Ltd是三星海外附属公司,开始生产低碳钢线材。新的生产线是公司目标在2014年打造10亿美元组织的一部分。总经理Shweta Satija希望为钉、丝网、捆绑线、家具和器具生产行业提供原材料,此举也将有助于为尼日利亚失业人口创造更多的就业机会。

钢铁发展部部长Musa Mohammed Sada,试运行了新工厂,高度评价了公司积极迎接挑战,推动钢铁行业的产业化。Shweta Satija补充说,公司正在开发新产品,包括一家铁合金厂、电缆与导线制造装置、在卢旺达、乌干达、加纳和其他非洲国家进行锡与黄金开采,以刺激地方经济并为非洲创造更多就业机会。

Sun and Sand Industries  
Africa Ltd – 尼日利亚  
网址:  
[www.sunandsandindustries.com](http://www.sunandsandindustries.com)

## 中国电力连接

中国正投资约1000亿美元用于20个超高压输电线路,将西部地区发电和东南部负荷中心连接起来。中国国家电网公司计划到2017年建设大约12,000英里超高压输电线路。据路透社报道,一些分析师给输电项目的定价高达2500亿美元。

公司已建成超过2,800英里的输电线,除此之外的3,900英里目前正在建设中。中国国家发展与改革委员会已经批准了余下的5,400英里的输电线路。

中国国家电网公司计划将210GW的发电能力连接到负荷中心,为中国人口密集和工业化的东南部提供电力支持。该项目要求每年1.2万亿千瓦小时的电力传输。

公司使用的超高压线路旨在限制线损耗,据说,与传统电力传输线路相比,超高压线能够提供高达5倍以上的电力。

电力线路有助于减少燃煤发电的需求,通过可再生能源的传输,来改善中国的空气质量。中国相当大的水电装机容量位于该国的东部地区。

State Grid Corporation of China – 中国  
网址: [www.sgcc.com.cn](http://www.sgcc.com.cn)

## Ajaokuta Steel公司开始生产线材

尼日利亚Ajaokuta Steel Company Ltd公司将于2014年初开始生产线材,主要用于土木和建筑工程。Zarubezhstrimontazh Ventures Nigeria Ltd和Ajaokuta Steel之间就线材轧机技术支持签署了谅解备忘录(MoU)。提起Ajaokuta,退役中将Salihu Ibrahim表示:“我们在Ajaokuta配备了一系列性能卓越的质量检测与研究设备,致力于显著提升尼日利亚市场线材的品质,满足全球最高标准的需求。”

Ajaokuta Steel Company Ltd – 尼日利亚

## 沙特阿拉伯采用超宽带接入

阿尔卡特-朗讯和Zain KSA已完成智能光网络，至此，沙特阿拉伯普及了超宽带接入。光纤骨干网基于会聚波分复用/光传输技术(WDM/OTN)，Zain因此能够为全国的主要地铁网络提供100千兆比特每秒(100G)的容量。

Zain和阿尔卡特-朗讯还将对400千兆每秒(Gbps)数据传输进行试验，在吉达西部的主要城市对现有的光链路网络流量进行测试。阿尔卡特-朗讯400G光网络解决方案，基于400 Gbps光电处理引擎(PSE)平台，支持新的高带宽和高性能。

主要事实：

- Zain公司在全国范围内部署基于光纤的超宽带移动接入，支持4G LTE不断上涨的网络容量需求。
- 阿尔卡特-朗讯提供了融合WDM/OTN平台和1830光子业务交换机(PSS)，来满足高带宽数据服务，如高清视频流、下一代移动宽带应用和云服务的旺盛需求。
- 100G光纤技术充分利用阿尔卡特-朗讯贝尔实验室独特的硅创新技术，能够支持8.8比特每秒的容量 - 相当于132万高清电视频道流量同时涌出 - 通过单一光纤。

Zain和阿尔卡特-朗讯在吉达进行400G数据传输试验，通过现有的光纤链路承载网络直播。

Alcatel-Lucent - 法国  
网址: [www.alcatel-lucent.com](http://www.alcatel-lucent.com)

## Dolphin公司ACE电缆系统登陆尼日利亚

Dolphin Telecom系非洲海岸到欧洲(ACE)海底电缆系统在西非的运营商，据称今年年底价值7亿美元的海底电缆将登陆尼日利亚，尼日利亚报纸Leadership报道。ACE电缆，由法国Télécom-Orange发起，16家运营商共同管理，连接欧洲到非洲的西海岸。Dolphin Telecom在ACE海底电缆的总体投资超过7000万美元，电缆在阿克拉、达喀尔、拉各斯、冈比亚和塞内加尔拥有完全落地权。ACE将通过英国、法国、葡萄牙、加那利群岛，并在21个非洲国家有接触点。Dolphin Telecom总经理Abdel Mageid Elzain说：“凭借我们在全球的广泛网络和强大的可靠性，Dolphin Telecom目标成为西非商界的驱动力，在扩大全球影响力、提供高品质连接和创造无与伦比的可靠性与正常运行时间等方面发挥催化剂的作用。”Dolphin Telecom首席商务官Francis Okoh表示，ACE海底电缆将为非洲带来大量带宽的无缝连接，确保廉价的互联网接入到陆地。Dolphin Telecom是ACE海底电缆系统第二大投资商，只限在批发市场经营。



中国·山西天祥机械有限公司 China, Shanxi Tianxiang Machinery Co., Ltd.

Our company produces GP series polished shaft rolling ring traverse drives and has a thirty-year history. It is the largest company in this area. Our products are high quality and price is competitive. Our company also produces equipments for wire and cable. Welcome to our company!



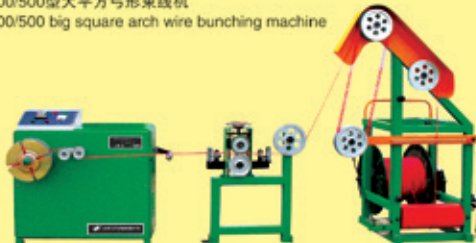
GP系列光纤排线器  
GP Series Polished  
Shaft Rolling Ring  
Traverse Drives



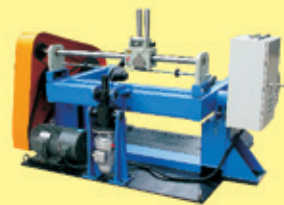
JSF400/500型大平方弓形束线机  
JSF400/500 big square arch wire bunching machine



CQK550/700/850型主动放线成圈系统  
CQK550/700/850 active pay-off/coiling systems



GS II 系列工字轮收线机  
GS II series H-shaped wheel take-up machine



GZC320高速自动电缆成圈机组  
GZC320 high-speed automatic wire coiling set



地址: 山西省新绛县店头大街1号 网址: [www.pxq.cn](http://www.pxq.cn) E-mail: [bxj7650158@163.com](mailto:bxj7650158@163.com) [xdpxq@163.com](mailto:xdpqx@163.com)  
联系人: 武荣文 电话: +86 15296788565 Contacts: Wu Rongwen Mobile phone: +86-15296788565  
Add: No.1 Diantou Main street, Xinjiang County, Shanxi PR 043100 China Tel: +86-359-7650868/7650158  
Fax: +86-359-7650288 Website: [www.pxq.cn](http://www.pxq.cn) E-mail: [bxj7650158@163.com](mailto:bxj7650158@163.com) [wurongwen-444@163.com](mailto:wurongwen-444@163.com)



○ Single welding groups from Schlatter

## New industrial mesh-welding machine

THE new MG950 system is a mesh-welding machine developed by Schlatter Industries AG, which is designed primarily for the production of industrial mesh. The aim was to broaden the product portfolio with a welding machine that is flexible in relation to various mesh geometries, achieves high production speeds and exhibits the highest quality right from the first mesh.

More and more additional functions, for example plug-in connectors for the connection of meshes, are integrated into the welded mesh during the production of wire meshes. As a result, the manufacture of such meshes also becomes increasingly complex and there are growing demands on accuracy. The graduation tolerances of the functional wires, in particular, are very demanding. The newly developed industrial mesh-welding machine MG950 provides line wire feeds for this purpose, which are rigid and quickly adjustable.

Two different power levels are available on the new MG950 at the same time, which facilitates the economical production of complex meshes. This means that different wire diameters can be welded at once. Even if differences in the narrowness of gradations mean that varying numbers of line wires must be welded per welding press, these can be welded at the same time.

Lot sizes continue to shrink and manufacturers of wire products can no longer afford to generate waste. This occurs during the production of the first few meshes – caused only by the need to optimise the settings. The measuring system of the new MG950 remedies this situation.

When using this measuring system, the line wire feeds can be precisely positioned according to the mesh that has been programmed. It is therefore possible to produce the desired quality right from the first mesh, by using the

built-in welding assistant. As a result, productivity is significantly higher for small lot sizes when using the newly developed welding machine MG950 compared to traditional industrial mesh welding machines.

For recurring products, a new computer system is available for the line wire feeds. This offers the advantage that only those line wire magazines that are in a different position must be moved in case of similar products.

Many products are trimmed along the cross wire, for example oven racks, cable trays, meshes used in shop fitting and so on. For the first time, the trimming heads can be mounted directly behind the welding machine. This means that an additional trimming station with integrated linear pull-out is no longer required.

**Schlatter Industries AG – Switzerland**  
**Website:** [www.schlattergroup.com](http://www.schlattergroup.com)

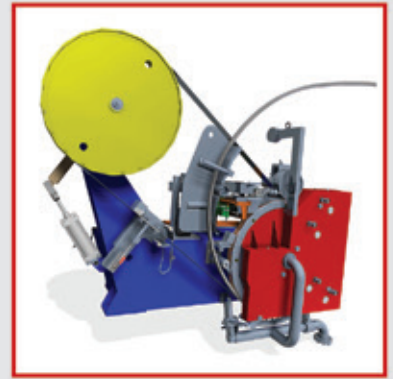




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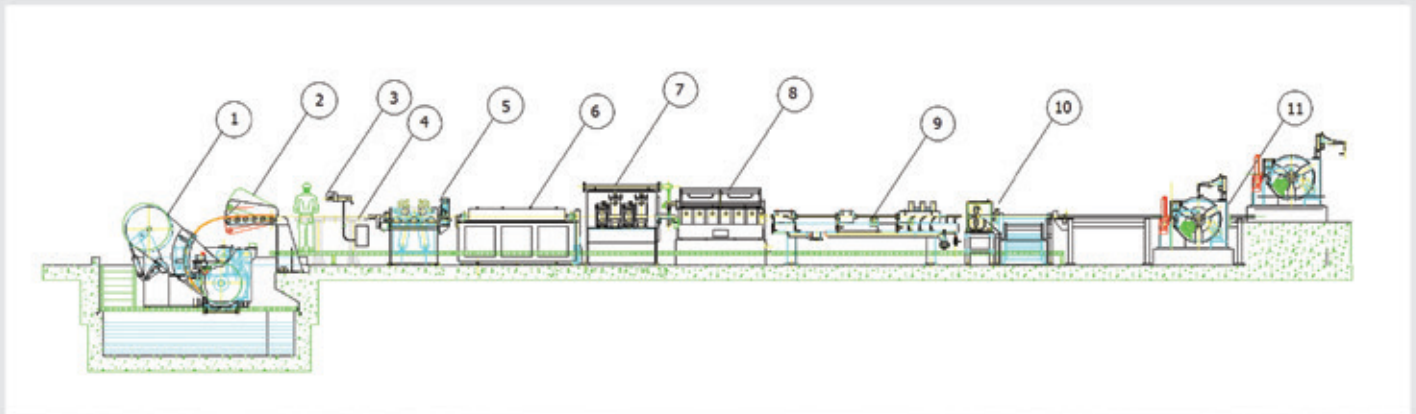
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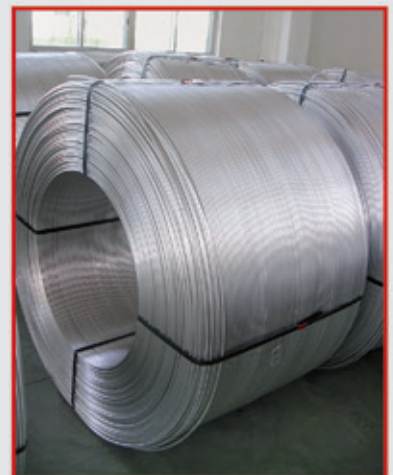
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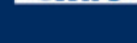
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## New MTM simplifies efficient taping

RIDGWAY Machines has launched a new MTM Mobile Coil Taping Machine with a unique mobile carriage mounted taping head. The carriage seats the operator and travels along the machine length to simplify the application of insulation tapes to larger size electrical coils or bars, whilst ensuring that the highest levels of quality and productivity are achieved.

The MTM is specifically designed for handling larger size coils and bars, up to 4,000mm straight length, using a combination of retractable pneumatic coil supports, adjustable rear clamp stands and coil eye supports.

The robust taping head travels in both directions – as the carriage approaches the coil supports, the clamps open automatically and the

support arm moves away to the rear of the machine.

Downtime is eliminated as the machine can be operated continuously in both directions to apply multiple tape layers. The taping head rotates around the

coil, applying a pair of tapes simultaneously with tension being settable between 0.5 and 7kg direct pull. Feeding angle is automatic as the correct angle is always found either side of the centre line.

The MTM uses twin variable speed motors to provide and synchronise the taping head drive and carriage traverse functions. These are controlled by a foot pedal mounted on the taping head carriage, with reversing selection by joystick control located on the panel in front of the operator. Additional controls provide safety guard/bump strip reset, and factory pre-set acceleration and deceleration ramps ensure gentle start and stop operations.



○ New mobile/travelling head coil taping machine from Ridgway

**Ridgway Machines – UK**  
Website: [www.ridgwayeng.com](http://www.ridgwayeng.com)

### Exceeds rating

comCables has released its new Cat 5e2 plenum cable. From the design of the “Easy-Feed” box down to the engineering of the twisted pairs, the 100 MHz plenum cable is installer-friendly and its performance exceeds its 100 MHz rating. The rigid, thin design prevents bending and twisting, making for an easy installation.

The new outer jacket design is durable and tough yet easy to remove when needed, and there is no rip cord to delay installation time. Made in the USA of solid 24 AWG copper, it features sequential footage marking and is ETL listed and performance verified. The 5e2 plenum cable is now available at comCables authorised distributors.

comCables manufactures complete end-to-end solutions of copper and fibre-structured cabling products. Its products range from residential to enterprise systems while focusing on standards-based performance.

**comCables – USA**  
Website: [www.comcables.com](http://www.comcables.com)

## AllWave launch

Tratos has launched the AllWave® FLEX and the AllWave FLEX+ bend-optimised single-mode fibre range, developed alongside cutting-edge fibre optic network solutions manufacturer OFS in order to offer customers a brand new solution for any application that requires exceptionally small bend diameters.

Featuring a 200-micron coating, AllWave Fibres occupy 46 per cent less area than conventional 250-micron coated fibres, enabling them to be used in cables with higher fibre counts per tube and in microcables where cable diameters must be minimised.

The bend-optimised design enables tight, low loss bends and the coating meets dynamic fatigue characteristics without risking fibre strength, resulting in long-term reliability and ultimate peace of mind for the customer.

Mirko Gori, area sales manager for Tratos, said: “The 200-micron Allwave FLEX+ fibres offer enhanced bend performance and low diameter, as well as full compatibility and compliance with the installed base of conventional G.652.D single-mode fibres. This makes them an excellent choice for higher density cables for our

customers’ access networks, enterprise networks and high-density Fibre-to-the-Home applications.”

AllWave FLEX is an ITU-T G.657.A1 bend-optimised single-mode fibre, providing outstanding macrobend and microbend performance. Bending loss is extremely low across the full usable spectrum of wavelengths from 1,260 to 1,625 nm and these fibres can be coiled into a loop with less than 0.5 dB incurred loss at 1,625 nm and less than 0.2 dB incurred loss at 1,550nm – five times better than the bending performance of conventional single-mode and leading ‘low water peak’ fibres. AllWave FLEX is suitable for indoor applications and Outside Plant (OSP) that requires bend radii as low as 10mm.

AllWave FLEX+ fibre offers many of the same benefits and is the first Zero Water Peak (ZWP) that actually exceeds both ITU-T G.657.A2 and G.652.D specifications. The range is suitable for many applications in which small bend diameters may be required, including central office buildings, backbone cabling in multi dwelling units (MDUs) and enterprise networks.

**Tratos – Italy**  
Website: [www.tratos.eu](http://www.tratos.eu)

## Precision, speed and length measurement

Precision speed and length measurements are critical for optimisation of continuous or quasi-continuous production processes. Proper utilisation of these measurements can lead to lower production costs and higher product quality.

The ideal sensor must exceed traditional contact encoder performance, increasing reliability and accuracy while minimising maintenance requirements and material yield.

The LSV Laser Surface Velocimeters have been designed as the ideal next generation sensors for non-contact length and speed measurement. They provide precise length and velocity data quickly and reliably for both process control and cut-to-length applications.



○ LSV 2000 Velocimeter

The LSV 1000/2000 measure reliably on almost any solid surface, whether controlling processes utilising carbon steel, shiny aluminium or oily sheets, producing round wire and cable, or manufacturing paper, cardboard or tissue.

Benefits, advantages and main features:

- Zero speed, direction detection (model LSV 2000 only)
- Reduced operating and maintenance costs
- Attractive ROI, fast payback
- All-in-one system, easy integration into production processes and control environments
- Easy to operate and no re-calibration required
- Visible laser for easy alignment in the field
- Robust sensor technology for reliable operation even under harsh conditions, protection classes IP 66 and IP 67
- Fast, state-of-the-art signal processor with powerful command set for efficient system communication via serial or Ethernet interface
- Includes two trigger inputs for additional light barriers or optical switches for high precision edge detection and offset length compensation
- Hardware status signals for remote diagnostic functions available
- User-selectable full quadrature pulse output and interfacing as LAN and RS 422/232

Zumbach Electronic AG – Switzerland

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

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## On the way to Cat 8

TO anticipate the demand of high category LAN cable used in data centres, Setic is now on the way to Cat 8.

Setic – part of the Gauder Group – has worked in cooperation with top LAN cable makers to provide a viable production solution able to successfully run Cat 8 (in addition to the current Cat 7a 1,200 MHz).

Cat 8 is used for 40 Gigabit per second (Gbps) Ethernet channel and is specified in the international (draft) standards IEC 46C/976/NP and ISO/IEC TR 11801-99-1. This transmission capacity is now possible using a copper twisted pair cable and familiar RJ45 connector.

This improvement is achieved without cable construction modification (identical to Cat 7A). Enhancement of the manufacturing processes is the key point to reach this level of performance through a wider bandwidth. Accuracy, consistency and control have been tightened on all Setic twinners, cablers and group twinners.

“We consider this development highlights Setic’s commitment to provide production solutions designed for future generation of LAN copper cable. We believe it is the best way to strengthen our current technical and commercial leadership in that field,” said a spokesman.

Setic sas – France

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



○ The Setic AST 1000R

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## Composite clad metal wire replaces pure platinum, gold and silver

Composite clad metal wire that can be formulated to improve the performance characteristics of precious metal solid wire at a small fraction of the cost is available from Anomet Products Inc of Shrewsbury, Massachusetts, USA.

Anomet precious metal clad wire can be formulated to accentuate specific performance characteristics such as strength, radiopacity and corrosion, contact, or temperature resistance.

Featuring a precious metal which is metallurgically bonded to a core material such as copper, Kovar®, nickel-iron, molybdenum, stainless steel, tantalum or titanium, this composite clad wire is functionally equivalent to solid wire at one-tenth the cost.

Replacing solid platinum, silver, gold and gold alloy wires, the wire typically incorporates two per cent or more cladding thickness and is more ductile and formable than filled or plated products, claims the firm.

Offered in 0.05mm to 3.2mm OD sizes, typical applications include aerospace, electronics and medical connectors, implantable devices, and sensors.

**Anomet Products Inc – USA**  
Website: [www.anometproducts.com](http://www.anometproducts.com)



○ An example of precious metal clad wire from Anomet

## New version from Dynamex

Dynamex Corporation is now offering a new version of the high-speed taping payoff with auto-splicing, designed specifically for the European and international markets. It uses Siemens PLC, drives, and other components these markets prefer at full line speed for taping at the extruder, longitudinal auto-splice taping.

This small footprint patented (USA, Canada, EU) payoff enables taping continuously in the extrusion line with unattended automatic splices. These tape payoffs are fully driven, and the tape always runs at constant tension, including at the instant of crossover. Low tape tensions are attainable at high line speeds, and tension is readily adjustable.

The tape payoff runs and splices automatically at speeds up to 1,500 FPM (460m/min) and can operate with tissue, paper, water-swellable, mylar, PE and aluminised tape. Models are available for tape width up to 3" (76 mm) or wider. The payoff is installed off-line at an angle to the line so it can be easily added to existing installations. A tape-redirection unit delivers the tape parallel to the core into the tape-former. Optional retractable wheels make it a portable unit.



○ The new payoff TPX-HMI-EU-3

A new version is now offered that can handle both flat pads and traversed pads. These machines are useful for jacketing operations that use longitudinal taping, but they can also be used for other continuous processes.

Another type of constant tension payoff is designed to work specifically on Dynamex or other single-twist cabler lines. Offered with this takeup is a "dial-in-angle" tape-redirection unit. This unit delivers the tape to the cable at the correct helical angle without trial-and-error.

This payoff has two positions to speed up tape changeover, or to perform an easy manual on-the-fly splicing, and is also suitable for low speed jacketing lines, where non-automatic on-the-fly splices are acceptable. Another model of this payoff is designed for feeding in two tapes simultaneously to the cabler line, when the cable construction requires two tapes with or without a drain wire.

**Dynamex Corporation – USA** Website: [www.dynamexcorp.com](http://www.dynamexcorp.com)

## Improving performance Facing tough conditions

Nexans' newest product, Energex® Extra, uses Dow Endurance™ HFDC-4202 tree-retardant cross-linked polyethylene (TR-XLPE) insulation.

The advantages of Energex Extra using Dow Endurance HFDC-4202 are said to include improved resistance to water tree growth, higher retained dielectric strength after ICEA 360-day accelerated water treeing test (AWTT) and reduced cost of ownership through longer cable life.

**Nexans – France**  
Website: [www.nexans.com](http://www.nexans.com)

Cable manufacturer and supplier Tratos Ltd has launched a series of cables especially designed to supply electricity to machines operating in tough drilling and underground environments across the world.

Manufactured to withstand the kind of extreme conditions common in mining applications, the MTO® cables are resistant to extreme temperatures, sunlight, water, chemicals, oil and abrasion and are available in voltages ranging from 600V to 35KV.

**Tratos – Italy**  
Website: [www.tratos.eu](http://www.tratos.eu)

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○ Ridgway生产的新型移动/行进头线圈绑带机

## 新型MTM简化高效捆绑 大型定子线圈与棒材

Ridgway Machines推出新型MTM移动线圈绑带机，该机配有独特的移动马车式绑带头。

操作员坐在台车上，沿机长移动，简化大尺寸电线圈或棒上绝缘带的应用，同时确保最高水平的质量和生产率得以实现。

MTM使用气动伸缩线圈、可调后来紧站和线圈眼支持组合，专门设计用于处理大尺寸的线圈和棒，直线长达4,000毫米。

坚固的绑带头在两个方向上行进 - 台车接近线圈支持，夹具自动打开，支持臂移到机器的后部。

由于机器连续在两个方向上运行，运用多个带层，因此没有停机时间。

绑带头围绕线圈旋转，采用一对带，同时拉力可设置在0.5到7.0kg直接拉动。送料角度是自动的，因为正确的角度总是位于中心线的两侧。

MTM采用双变速电机，为绑带头驱动和台车提供穿越功能。这些通过绑带头台车上的脚踏板来控制，倒车通过操作员前面的面板上的操纵杆来控制。

其它控件提供安全防护/凹凸带复位、工厂预设定加速和减速斜坡，确保柔和启动与停止操作。

**Ridgway Machines - 英国**  
网址: [www.ridgwayeng.com](http://www.ridgwayeng.com)



## 来自蒂纳米克的新版本

蒂纳米克公司 (Dynamex Corporation) 目前推出了一款专门为欧洲和全球市场设计的有自动剪接功能的新版本高速包带放线装置。它采用了西门子可编程逻辑控制器 (PLC)、驱动器以及这些市场偏好的全线速挤出机包带和纵向自动拼接包带的其他零件。这种占地面积小、拥有专利 (美国、加拿大、欧盟) 的放线装置可实现挤出生产线上持续打包带, 无须人工看管拼接。这些包带释放完全由驱动器带动, 即使在交叉的瞬间, 包带也能一直以恒定的张力运行。生产线高速运转时包带张力却可以达到很低, 而且张力很容易调节。

包带释放装置以 1,500 FPM (460 米/分) 的速度运行和拼接, 能够处理绵纸、纸、水溶性材料、聚酯薄膜、PE 和镀铝带。该机型可用于宽度为 3" (76 毫米) 或更宽的包带。释放装置安装在生产线外与生产线构成一个角度的位置, 这样它就能很容易地添加到现有设备上。一台包带重新定向设备平行地将包带运送到包带前端的中心位置。选配的可伸缩轮子使它成为一个便携式装置。

目前提供的这种新版本既可以处理平垫, 也可以处理 Z 型垫。这些机器对使用纵向打包带的护套操作非常有用, 另外它们也可以用于其他连续进程。另一种持续张力释放装置是专门为蒂纳米克或者其他单捻缆绳生产线设计的。该企业提供这种收回装置的同时也提供一种“拨号角 (dial-in-angle)”包带重新定向单元。该单元无须试错即能沿着螺旋升角将包带传送到电缆。这种释放装置有两种定位, 目的是加速包带转换或进行简易的人工快速拼接, 也适用于可接受非自动动态拼接的低速护套生产线。这种释放装置的另一种模式是为需要两条包带 (有/无排流线) 的电缆施工时, 同时供应两个包带缆机线而设计的。

**Dynamex Corporation – 美国**  
网址: [www.dynamexcorp.com](http://www.dynamexcorp.com)

○ 新型释放装置 TPX-HMI-EU-3



## 精度、速度和长度测量

精准的速度和长度测量对连续或准连续生产工艺的优化至关重要。正确利用这些测量结果可降低生产成本和提升产品质量。理想的传感器必须超越传统的接触式编码器的性能, 在最大限度地减少维护成本和材料损耗的同时, 增强可靠性和准确性。

LSV 激光测速仪设计成理想的新一代传感器, 用于非接触式长度与速度的测量。仪器能够提供精准的长度与速度数据, 用于快速可靠的过程控制和切割长度应用。



○ LSV 2000 型测速仪

LSV 1000/2000 可以在任何固体表面上测量, 控制过程的表面可为碳钢、光泽铝或油性薄板, 或者用于圆电线电缆、造纸和纸板纸巾的生产过程控制。

优势、优点和主要特点:

- 零速度, 方向检测 (只限于 LSV 2000 型)
- 降低运营和维护成本
- 有吸引力的投资回报率, 快速回报
- 功能集成系统, 易于整合到生产过程和控制环境
- 便于操作, 不需要重新校准
- 可见激光, 便于现场对齐
- 强大的传感器技术, 即便在恶劣的条件下, 确保运行可靠, 保护等级为 IP 66 和 IP 67
- 快速、先进的信号处理器具有强大的命令功能, 通过串口或以太网接口进行有效的系统通信
- 两个触发输入用于额外光栅, 光纤交换机用于高精度边缘检测和偏移长度补偿
- 硬件状态信号用于远程诊断
- 用于可选择完整的正交脉冲输出和接口作为 LAN 和 RS 422/232。

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

## 复合包覆金属丝代替纯铂金、黄金和白银

美国马萨诸塞州 Anomet Products Inc of Shrewsbury 提供的复合包覆金属丝经过加工可改善贵金属固体线的性能特点, 而且金属丝的加工成本只占很小的一部分。

Anomet 贵金属包覆线可增强产品的性能特点, 比如强度、射线不透性和耐腐蚀性、接触或耐温性。贵金属与以下芯材, 如铜、Kovar®、镍-铁、钼、不锈钢、钽和钛等冶金结合, 复合包覆线在功能上与固体线等效, 但成本只有十分之一。

公司声称, 替代固铂、银、黄金和黄金合金丝, 电线通常采用 2% 或以上的包层厚度, 更具有韧性, 比填充或镀产品更易成型。外径尺寸 0.05-3.2 毫米, 典型的应用包括航空航天、电子和医疗连接器、可植入设备和传感器。

**Anomet Products Inc – 美国**  
网址: [www.anometproducts.com](http://www.anometproducts.com)



○ Anomet 贵金属包覆线

# India Insight

## Hydroelectric project delayed by objectors

ASSAM'S chief minister, Tarun Gogoi, has said that the National Hydroelectric Power Corporation (NHPC) has agreed to a modification of the design of its 2,000MW Lower Subansari hydroelectric project. The work has faced stiff opposition from anti-dam groups, and construction has been placed on hold for some time.

The chief minister said: "As per the recommendation of Thatte committee, an independent dam design review panel was formed. It has proposed some additional safety measures in the construction of the dam. Now, NHPC has been asked to modify the design of the dam."

Mr Gogoi added that recommendations from the panel followed the examination of issues such as foundation competency, seismic aspect, dam design and existing ground conditions. A joint steering committee was formed by NHPC in 2011 to suggest feasible and practical remedial measures in downstream areas with reference to the expert group's recommendations along with flood, bank erosion and sediment control issues.

The chief minister added that the power situation in Assam will improve dramatically with the anticipated 240MW from the Palatana power project in Tripura.



○ Work underway at the Lower Subansari project. Photograph courtesy of [www.information-of-assam.blogspot.co.uk](http://www.information-of-assam.blogspot.co.uk)

"Immediately we are going to get 90MW of power from [the] Palatana project, but from next year we are going to receive 240MW of power from the project," he said, adding that he was also keen to initiate talks with Bhutan for power to meet the growing power demand in Assam.

**National Hydroelectric Power Corporation – India**  
**Website:** [www.nhpcindia.com](http://www.nhpcindia.com)

## Plant improvements

A new coke oven battery has begun trials at the Sail Authority of India's Burnpur IISCO steel plant, as part of a plan to increase capacity from 0.4 to 2.9 million tonnes of hot metal. The new facilities will include a universal section mill, and a wire rod and bar mill.

The wire rod mill has also commenced trial production. Having an annual production capacity of 0.5 tonnes, the mill will produce cold-headed steel for fasteners, critical wire rope applications and special quality electrodes. The product portfolio will offer sizes from 5.5mm to 22mm diameter in low, medium and high carbon steel.

**Steel Authority of India Ltd – India**  
Website: [www.sail.co.in](http://www.sail.co.in)

## Power to Manipur

The supply of power in Manipur may shortly be improved, officials of the state electricity department have announced, following the news that work on a 400kV transmission line from Assam is making good progress.

To expedite the ongoing work on the power transmission line from Silchar to Imphal via Jiribam, the Manipur government has formed a dedicated committee to monitor the project.

The 400kV transmission line is thought to be Manipur's only hope of improving the power situation in the state, where inhabitants have access to electricity for barely five hours a day. Existing transmission lines in Manipur are incapable of drawing the full volume of power allocated to the state from central sponsored and joint venture power plants.

Once completed, Manipur is hoping that the 400kV power line will carry supply from power plants in Tripura.

**Manipur Government – India**  
Website: [www.manipur.gov.in](http://www.manipur.gov.in)

## India's first ultra mega transmission project

Sterlite Grid has commissioned a 231km, 400kV double-circuit quad transmission line to connect Purnia and Bihar Sharif substations in the state of Bihar, India. The move marks the completion of India's first ultra mega transmission project (UMTP).

Capable of offering critical connectivity for power transmission from the hydro power plants in the north eastern region, the new line will power over a million homes in north east Bihar and northern India.

Sterlite Technologies director Pravin Agarwal said: "We are building several critical lines which are crucial for evacuation

of power, and are hopeful that with continued support from the state and central government, we will be able to deliver these as per our commitments."

As part of the Purnia-Bihar Sharif transmission line, the company has installed a transmission line in the East North Interconnection (ENICL) transmission project, linking Assam with West Bengal and Bihar.


In 2010, Sterlite was awarded a contract worth \$158.2m to build transmission lines to transport 1,000MW of power from hydropower projects, in the northeast, to over one million homes in northern and eastern India. The project was awarded on a BOOM basis (build, own, operate and maintain) which would offer annuity revenues for Sterlite Grid for about 25 years.

**Sterlite Technologies – India**  
Website: [www.sterlitetechnologies.com](http://www.sterlitetechnologies.com)

## KEC's 400kV contracts

KEC International Ltd (KEC) has recently secured large new orders in India and the Americas for its transmission cables, telecom and power systems businesses.



Projects include two  New large orders for KEC consisting of the supply and erection of 400kV transmission lines between the proposed Anikadavu-Thappagundu and the Anikadavu-Rasipalayam 400kV substations on a turnkey basis. The orders were placed by the Tamil Nadu Transmission Corporation Ltd.

In Andhra Pradesh, KEC will undertake the supply and erection of the 400kV transmission line between Kamavarapukota-Chinnakorukondi substations, again on a turnkey basis. The order was secured from the Transmission Corporation of Andhra Pradesh Ltd (APTransco).

**KEC International Ltd – India**  
Website: [www.kecprg.com](http://www.kecprg.com)

## Going underground?

Cyclone Phailin, which battered the Odisha coast, has left the power distribution infrastructure in a shambles, said National Disaster Management Authority vice-chairman Marri Sasidhar Reddy, anticipating that it would be 15 days before normal service could be resumed in the area.

He is urging governments to install underground power cables in coastal areas to minimise the damage. Such projects can be taken up under the World Bank-funded National Cyclone Risk Mitigation project.

**National Disaster Management Authority – India**  
Website: [www.ndma.gov.in](http://www.ndma.gov.in)

## ITU: Broadband speed – key to growth and prosperity for nations and households – is on the rise worldwide

According to the 2013 State of Broadband Report from the International Telecommunications Union (ITU), last year the nation with the highest percentage of people using the Internet was Iceland, with a 97 per cent usage rate. The top 10 countries all had usage rates above 88 per cent and all but two – New Zealand and Qatar – were in Europe. With its 81 per cent rate the US ranked 24<sup>th</sup> worldwide in the percentage of residents who use the Internet, the ITU said. As noted by Joan Engebretson of *Telecompetitor* (22<sup>nd</sup> September), the ITU “got a lot of attention” with its report for 2012 of twice as many mobile broadband subscriptions as fixed broadband subscriptions worldwide. A year later, it was projecting more than three times as many mobile subscriptions as fixed subscriptions globally by the end of 2013.

The new ITU research, presented on 22<sup>nd</sup> September in New York at a meeting of its Broadband Commission for Digital Development, identified five countries with mobile broadband penetration rates above 100 per cent, indicating that people in substantial numbers have more than one mobile broadband connection. Singapore, topping the list with a mobile broadband penetration rate of 123.3 per cent, was followed by Japan, Finland, the Republic of Korea and Sweden. The US ranked ninth worldwide in mobile broadband penetration, behind several Asian and European countries and Australia. Just under three-quarters (74.7 per cent) of American citizens use mobile broadband, the ITU said. Writing that the report “contains some interesting data to illustrate the positive economic and societal impact that broadband can have,” Ms Engebretson cited these highlights of that data:

- A 2013 study from the mobile operators’ association GSMA found that mobile health (patient-oriented health-care apps) could save developed countries \$400 billion in 2017
- Small and medium-size enterprises that spend more than 30 per cent of their budget on web technologies grow their revenue nine times as fast as SMEs that spend less than 10 per cent, according to 2012 research from the global management consulting firm McKinsey
- According to research conducted by Arthur D Little and Chalmers University of Technology for Sweden’s Ericsson, a doubling of broadband speed can increase GDP (gross domestic product) growth by 0.3 per cent on average in member-countries of the Organisation for Economic Cooperation and Development. The OECD includes the world’s most developed nations
- The Little and Chalmers research found an average rise in household income from an upgrade of 4-8 Mbps in broadband speed of US\$120 per month in OECD countries. The research also indicated that, in OECD countries, the greatest increase in income may be expected in households that go from being without broadband to having 4 Mbps. Such households gain \$182 per month, the researchers said. The threshold to higher earnings is a broadband access speed of between 0.5 Mbps and 2 Mbps.

### Ericsson’s high-level vision of making networks more relevant is being moved, cautiously, into demonstration mode

“After nearly a year since he introduced the term ‘Service Provider Software-Defined Networking,’ Ericsson

CTO Ulf Ewaldsson is ready to provide an update on the Swedish vendor’s vision of the programmable wide area network (WAN) and what it will mean for OSS platforms.”

Contributing editor Michelle Donegan of *Light Reading* was reporting on her interview with Mr Ewaldsson on the sidelines of the recent GigaOM Structure Europe

conference in London, in which he asserted that Ericsson had moved beyond vision into demonstration: of service chaining and a variety of opportunities with customers who “can be unleashed by being able to programme the network.” What remains to be done, he said, is “to connect into real big clouds with this kind of technology.”

That blending of carrier and cloud network functionality is still some way from being realised, Ericsson’s chief technical officer acknowledged. The aim of Service Provider SDN – to provide opportunities for networks inside the cloud to be connected to the WAN while letting the WAN be controlled from applications in the cloud – is “something that is totally impossible today,” according to Mr Ewaldsson. (“Ericsson CTO Bangs SDN Drum,” 16<sup>th</sup> October).

At the heart of Service Provider SDN is software and a major transformation of the OSS layer, which would morph in its role to include control over the network in addition to operations and maintenance. Ericsson envisions the evolution of the OSS into a control plane for the entire network.

Mr Ewaldsson urged that this not be misinterpreted as a centralised control point. Rather, he told Ms Donegan, the OSS software will be distributed across all the elements in the network – as in radio base stations, routers, or datacentre equipment. The network elements would house software that is part of the OSS system, he explained, while there would also be a more centralised management capability. “That’s different from a datacentre, where someone says ‘I’ll sell you an SDN controller,’ and what happens is a piece of hardware sits somewhere in the datacentre,” he said. “That’s not the vision that we have of how this will be realised.”

➤ Ericsson is not, of course, the sole telecom equipment vendor with this kind of vision for SDN in carrier networks, notes Caroline Chappell, a senior analyst at Heavy Reading. In her new report “Managing the Virtualised Network: How SDN & NFV Will Change OSS,” she puts Ericsson – along with Alcatel-Lucent, Cisco Systems, Inc, and Nokia Solutions and Networks in the

category of “big picture SDN and NFV management vendors.” For her part, Ms Donegan noted that Ericsson is not necessarily leading that vendor pack. She quoted Ms Chappell: “Ericsson is being very cautious about this. They’re saying, ‘We’ve got to get this right.’”

### Elsewhere in telecom . . .

- The Russian telecom MegaFon has launched an all-terrestrial fibre optic cable system stretching from Germany to China. The entire cable system has a potential maximum capacity of 8 Tbps. At first, it is offering access to 10-Gbps DWDM (dense wavelength division multiplexing) channels.

Built with partners Kazakhtelecom and London-based Interoute, the Diverse Route for European and Asian Markets (DREAM) stretches 5,400 miles from Frankfurt, Germany, to the Kazakhstan-China border. It passes through Austria, Russia, Slovakia and Ukraine. As reported by Nick Wood in *Total Telecom* (17<sup>th</sup> October), the route was laid out in part for its low seismic activity.

- América Móvil SAB on 16<sup>th</sup> October backed out of its planned takeover of the Dutch carrier Royal KPN NV, after failing to persuade KPN’s management to accept a \$9.7 billion tender offer. The Mexico City-based wireless operator, owned by Mexican billionaire Carlos Slim, has a financial stake of about 30 per cent in KPN. Even if Mr Slim’s company retains its holding in KPN, Dutch law prevents him from making a new takeover bid for six months. A move elsewhere in Europe, such as an increase in his stake in Telekom Austria AG, would also help advance his goal of expanding América Móvil beyond Latin America.

“We probably expect them to increase their stake in another European operator, and the natural option would be Telekom Austria,” Carlos de Legarreta, an analyst at Corporativo GBM SAB in Mexico City, told *Bloomberg News* (17<sup>th</sup> October). “Europe is

an attractive market, even if it’s being pressured by the slowing macro-economy. They are mature markets with a good return.”

- A report from the Media Department of the London School of Economics and Political Science (LSE) contradicts widespread claims about the decline of creative industries as a result of copyright infringement. Copyright & Creation – a Case for Promoting Inclusive Online Sharing – indicates that the publishing, film and gaming industries are growing and new business models emerging as a result of digital sharing. For some in the creative industries, copyright infringement may actually be helping boost their revenues, the report finds.

As noted by Colin Mann on *advanced-television.com* (4<sup>th</sup> October), industry data shows that, while the global music industry has stagnated somewhat in the last four years, since 1998 it has experienced overall growth; Internet-based revenues have been a significant component since 2004. In Britain, online sales now exceed CDs or vinyl as a percentage of total revenue for recorded music.

- Effective 1<sup>st</sup> December, Canada’s telecom regulator, CRTC, requires wireless providers to suspend a subscriber’s roaming charges in excess of \$100 in a single month’s bill. The CRTC also issued a request to Canadian wireless companies to explain their roaming pricing, information previously unavailable to the public.

Writing in the *Toronto Star* (8<sup>th</sup> October), consumer issues reporter Ellen Roseman noted that “bill shock” is a common experience for Canadians travelling with a smartphone or tablet. She cited the example of a family of four visiting the US for a long weekend. Each member uses a cellphone “modestly” (for email and texting; no streaming video or uploading multiple photos). In a previous *Star* column, University of Ottawa professor Michael Geist said such a family’s roaming costs would range from \$500 to \$1,000 for the trip.

Looking into the hot-button consumer issue of data roaming costs, Ms Roseman found “a big difference” between the services available from some smaller Canadian providers and those offered by the majors. She wrote: “I’m glad to see the CRTC putting pressure on big telecoms to reveal what goes into their pricing and look for ways to reduce the cost.”

- On the vexed subject of roaming charges, London-based TelecomTV took note of some “asymmetric behaviour” on the part of Deutsche Telekom, whose US subsidiary T-Mobile has eliminated those charges to its American customers travelling overseas. Included in the operator’s standard plan “Simple Choice,” the dispensation took effect 1<sup>st</sup> November and covers 100 of the most popular destination countries including Britain, France, China and Australia. The company also announced a reduction in charges for international calls made from within the US. Meanwhile, wrote I D Scales, “The German T-Mobile [Telekom] manages to maintain some of the highest mobile prices in Europe.” (“T-Mobile Scraps Roaming for the US,” 10<sup>th</sup> October).

TelecomTV pointed out that T-Mobile is very much the challenger operator in the US pack, and this marks the third phase of its “uncarrier” strategy to put distance between itself and incumbents Verizon and AT&T. In the first phase it got rid of handset subsidies and reworked the tariff structure to separate service and phone payments. Phase two featured a new handset upgrade programme.

- Huawei is not planning any large takeovers, according to its current CEO. On 11<sup>th</sup> October, *Welt am Sonntag* reported that Guo Ping said, however, that it would be open to cooperation with another handset company. *Welt am Sonntag* reported that he also rejected allegations by the US Congress that technology from Huawei might be used to spy on its users, and discounted European Commission concerns about the dumping of goods onto the market in Europe.

## 国际电信联盟 (ITU): 宽带速度——国家与家庭繁荣增长的关键——正在世界范围内上升

根据2013年国际电信联盟 (ITU) 宽带情况报告, 去年互联网使用率最高的国家是冰岛, 有97%的使用率。排名前十位国家的使用率均超过了88%——除新西兰和卡塔尔之外——都在欧洲。ITU称美国在世界范围内居民使用互联网百分率排名24位, 使用率为81%。

正如《电信竞争者》(Telecompetitor)的琼·英格布列松 (Joan Engebretson) 所评论的, ITU“非常关注”其2012年的报告, 该报告称全球范围内移动宽带服务订购数量是固定宽带订购数量的两倍。该报告预计一年之后即2013年年末全球范围内移动宽带服务订购数量是固定宽带订购数量的三倍。

新的国际电信联盟研究于9月22日在纽约, 其数字发展宽带委员会 (Broadband Commission for Digital Development) 会议上发布, 认定了5个国家拥有移动宽带渗透率超过了100%, 这表明相当数量的人拥有一个以上的移动宽带连接。新加坡排名最高, 其移动宽带渗透率为123.3%, 紧随其后的是日本、芬兰、韩国以及瑞典。

美国移动宽带渗透排名世界第九, 位列几个亚洲国家和欧洲国家还有澳大利亚之后。国际电信联盟称, 只有不到四分之三 (74.7%) 的美国居民使用移动宽带。

据称该报告“包含一些有趣的数据以说明宽带能带来的积极的经济和社会影响,” 英格布列松女士就数字突出的部分作如下评论:

- 一份来源于2013年移动运营商协会 (GSMA全球移动通讯系统联盟) 的研究发现移动健康 (病患导向医疗保健应用程序) 能在2017年为发达国家节约4,000亿美元。
- 根据全球管理咨询公司麦肯锡2012年的调查: 那些在网页技术花费超过预算30%的中小企业的营业额增长速度是那些网页技术花费低于预算10%的中小企业的9倍。
- 根据理特管理顾问公司 (Arthur D Little) 和查尔摩斯工学院为瑞士爱立信公司所作的调查, 在经济合作发展组织成员国中宽带速度加倍能使得GDP (国内生产总值) 平均增长增速0.3%。经合组织包括了世界上最发达的国家。

## 爱立信的使得网络关联性更高的高端梦想正被推进, 小心翼翼的进入演示模式

“在介绍了‘服务供应商软件定义网络 (Service Provider Software-Defined Networking)’这一术语接近一年之后, 爱立信的首席技术官沃尔夫·爱华信 (Ulf Ewaldsson) 准备对这家瑞典供应商有关可编程广域网 (WAN) 的梦想进行更新, 且所有这些都用于OSS (运营支持系统) 平台。”

《休闲阅读》(Light Reading) 的特约编辑米歇尔·多纳根 (Michelle Donegan) 报导了他最近在伦敦召开的GigaOM结构欧洲会议场边对爱华信先生的采访, 采访中爱华信先生称爱立信已经超越了梦想进入了演示阶段: 服务链和与“可通过为网络编程释放”客户的各种机会。他称仍待解决的工作是“用这类技术与真正的大云相连接。”爱立信首席技术官承认那种混合载体和云网络功能被实现仍然还有一段路要走。这家软件定义网络 (SDN)

服务供应商的目标——为云内部网络被连接到广域网提供的同时让广域网被来源于云中的应用所控制——根据爱华信先生的说法“目前为止还无法实现”。(“爱立信首席技术官敲响了软件定义网络的战鼓,” 10月16日)

在服务供应商的心目中软件定义网络是一种软件且是OSS层的重大转变, 其将转变其角色除运作和维护之外还包括控制网络。爱立信梦想OSS转变成为整个网络的控制平台。

爱华信先生称这不能被错误的理解为中央控制点。他告诉多纳根女士, 相当于OSS软件将被遍布网络的各个元素所打扰——例如在无线电基站、路由器、或数据中心设备。爱华信先生解释称网络元素作为OSS系统的一部分将储藏软件, 同时将会有更中央话的管理能力。

“这与数据中心不同, 某些人会说‘我将卖给你一个软件定义网络控制器,’但其实是—一个数据中心某个位置的一个硬件,” 他说道, “这与我们目前尚不知如何实现梦想完全不同。”

爱立信当然不是载波网络中唯一有类似SDN梦想的电信设备供应商, 《沉闷阅读》(Heavy Reading) 的高级分析员卡罗琳·查普尔评论称。在她的新报告中“管理虚拟网络: SDN (软件定义网络) 和NFV (网络功能虚拟化) 将如何改变OSS (运营支持系统),” 她将爱立信和阿尔卡特-朗讯、思科系统公司和诺基亚解决方案与网络公司归在一起——归为那类“重要的SDN和NFV管理供应商。”

就她而言, 多纳根女士注释称爱立信并未在供应商群中领先。她引用查普尔女士的话: “爱立信对此十分谨慎。他们说, ‘我们必须把这件事做对。’”

## 电信行业其他新闻.....

俄罗斯电信 MegaFon 已经开启了一个从德国到延伸中国全地貌 (all-terrestrial) 光缆系统。整个光缆系统潜在最大容量达8 Tbps。起先, 其将要提供接入10-Gbps的DWDM (密集波分复用 dense wavelength division multiplexing) 通道。与合作伙伴哈萨克斯坦电信 (Kazakhtelecom) 和位于伦敦的Interoute公司共同建造, 这条亚欧市场多路线 (DREAM) 长达5,400英里, 从德国的法兰克福延伸到哈萨克斯坦-中国边境。经过奥地利、俄罗斯、斯洛伐克以及乌克兰。如《全部电信》(Total Telecom) (10月17日) 尼克·伍德 (Nick Wood) 报道, 路线一部分在低地震带铺设。

(América Móvil SAB) 在无法说服荷兰皇家电信的管理层接受97亿美元的要约收购之后, 于10月16日撤销收购荷兰承运商荷兰皇家电信 (Royal KPN NV) 的计划。这家总部位于墨西哥城的无线运营商由墨西哥亿万富翁卡洛斯·斯利姆 (Carlos Slim) 所拥有, 拥有荷兰皇家电信30%的金融股权。

就算斯利姆先生的公司继续保留其在KPN的股份, 荷兰法律阻止他在6个月内作新的收购竞标。欧洲其他地方的举措, 例如增加他在奥地利电信的股份 (Telekom Austria AG) 将同样能帮助他实现让América Móvil冲出拉丁美洲的目标。“我们可能预计他们在其他欧洲运营商增加他们的股份, 自然而然的选择将会是奥地利电信,” 墨西哥城的Corporativo GBM SAB分析师卡洛斯·迪·勒噶日塔 (Carlos de Legarreta) 告诉《彭博新闻》(Bloomberg News) (10月17日), “就算欧洲正在承受宏观经济放缓的压力, 仍旧是一个有吸引力的市场。他们是一个有着良好回报的成熟市场。”

## Steel

### A year later, a New Jersey coastal community ravaged by Superstorm Sandy looks to an old material for help

“Does it hurt to put a sea wall up if the beach is already artificial? Maybe not. I understand...they were never going to let that inlet stay open. (But) over time these islands are going to be more at risk, no matter what we do.”

This bleak assessment by Robert S Young, director of the Program for the Study of Developed Shorelines at Western Carolina University, was prompted by an expensive engineering project slated for the beach towns of Mantoloking and Brick in Ocean County, New Jersey, one of the states hardest-hit by Hurricane Sandy in November 2011.

At a cost of \$40 million, the Federal Highway Administration is offering New Jersey protection for the \$260 million reconstruction of Route 35, where Hurricane Sandy punched a new ocean inlet through Mantoloking and across the highway. The cost is to be split: \$32 million from Washington, \$8 million from the state.

Writing in the local newspaper, *Asbury Park Press*, Kirk Moore described plans for a vertical steel bulwark four miles long but mostly invisible under a continuous sand dune at the back of the beach. This “buried Iron Curtain” would be a last line of defence for the rebuilt stretch of roadbed.

The wall is also seen as providing protection to the thinnest, most vulnerable stretch of a barrier-beach peninsula where charts dating to the 1700s show an inlet in almost the same place as the 2012 incursion. Larry Hajna, a spokesman for the New Jersey Department of Environmental Protection, said: “You don’t want history to repeat itself.” (“\$40 Million Steel Curtain Proposed to Protect New Jersey Shore Highway,” 27<sup>th</sup> September).

#### Steel vs stone

As explained by Mr Moore, the proposed structure would be a much longer version of the steel wall installed by the Army Corps of Engineers when it was suturing Mantoloking back together last fall. The steel panels – “sheet piles” – would be driven to a depth of 32 feet below sea level, with their tops 16 feet above sea level.

At its location 500 to 600 feet east of Route 35 and in front of the houses on the oceanfront, the steel would be embedded in beach berms and dunes that are around ten feet above sea level now, said Robert Mainberger, Mantoloking’s engineer. That would leave about six feet of steel wall that Mantoloking and Brick would need to keep covered with sand, presumably until the Army Corps moves in with its planned beach replenishment: a much higher and thicker engineered beach and dune, to a height of 22 feet above sea level.

Many Mantoloking residents would have preferred an extension of a neighbouring community’s stone revetment

as a backstop to the Army Corps plan for a widened beach and continuous dune. But early estimates came in at around \$40 million – for a structure half the length of the steel wall – and the Army Corps would not pay for it.

“Those rock structures tend to be pretty expensive,” said Jon Miller, a research associate professor of ocean engineering at the Stevens Institute of Technology, in Hoboken. “Steel sheet pile is like a no-muss, no-fuss, just-drive-it-into-the-sand solution.”

Installation of the steel wall was expected to begin by the New Year, but Mr Moore noted that, until the beach-replenishment project comes in, the wall will be “only a couple hundred feet from the surf.” And coastal geologists and engineers told him that such hard structures need substantial amounts of sand in front as a shock absorber: to handle not just once-in-a-century hurricanes but also routine winter gales off the North Atlantic.

Mr Moore wrote: “If the beach erodes too fast, waves hitting sea walls will increase their rate of scour – like concrete saws, eating out the sand at the base of the wall, washing it away, and relentlessly battering the structure.” That energy then bounces back and increases the rate of erosion, said Tom Ford, director of marine operations for the Santa Monica Bay Restoration Commission in Los Angeles. According to Mr Ford that has been well documented in Southern California, an urban coast, he noted, on which “we have a lot of coastal armouring.”

Indeed, the New Jersey project has drawn many sceptics and outright detractors. “This is a situation asking for trouble,” said Mark Mauriello, New Jersey’s longtime chief of the coastal division in the Department of Environmental Protection, now in retirement. “When that beach erodes and that wall is exposed, there will be trouble.”

One of the softer voices among the commentators on the steel wall is that of Mr Young, of South Carolina, the expert on developed shorelines whose mild caution opened this piece. As he told Mr Moore: “Once you start building structures like that, you’re committed to beach replenishment – relentlessly pushing more sand in front of it.”

The *Asbury Park Press* did not allude to the painful awakening by residents of communities on both American coasts to the fact that they have much in common with people who live on the slopes of volcanoes. There was no need. Also implicit in the article was the prominence of steel – strong, corrosion-resistant, adaptable – whenever large natural disasters call for inventive responses.

### The US auto industry has Severstal’s Dearborn steel mill running flat out, but global pricing pressure erodes profits

“I think we are at our peak demand, ever,” Saikat Dey, CEO of Severstal North America, told the *Detroit Free Press*

# From the Americas

in October. The Russian steelmaker's hot-rolled steel plant in Dearborn, Michigan, was running at full capacity as it worked to keep up with rising demand from automakers.

The interview with business writer Brent Snavely marked the first public comment by Mr Dey since he took over at Severstal, in September. Previously the company's chief strategy and procurement officer, he was promoted as part of an overhaul of Severstal's North American leadership team.

The new CEO told Mr Snavely that the prior executive team was good at managing the mergers, acquisitions, and large capital investment projects that were a feature of Severstal's activities in North America over the last ten years. Now, however, the company is confronting new challenges. ("Severstal Profits [are] under Pressure from Competitor Pricing," 4<sup>th</sup> October).

Mr Dey sees the challenges in the context of a global steel industry equipped to produce between 300 million and 400 million tons more than its customers want, with slower growth in Asia the main factor in the imbalance. "Cars might be flying off the shelves here," he said 3<sup>rd</sup> October, in Dearborn. "But we have seen significantly eroded margins in pricing."

Mr Snavely noted that back in 2008, the last time automakers were performing on this scale (more than 15.5 million cars and trucks sold in 2013), a ton of hot-rolled steel was selling for more than \$1,100. When he wrote, in October, hot-rolled steel was going for about \$637 per ton for November deliveries.

OAO Severstal, the parent company of Severstal North America, has suffered accordingly. The company reported a loss of \$44 million for the three months ending 30<sup>th</sup> June 2013, compared with a profit of \$44 million in 2012.

"The gauntlet has been laid down by aluminium," Mr Dey told the *Free Press*. "Let's not ignore that fact or try to deny it." The Severstal weapon of choice in the competition with the aluminium industry will be higher-strength, lighter-weight steel.

☛ Since acquiring Rouge Steel for \$285 million in 2004, Severstal has invested between \$6 billion and \$8 billion in its North American operations. Last year the company commissioned a \$285-million hot dip line as part of its \$1.4-billion upgrade of the Dearborn plant, which has a workforce of 1,800 people.

## Elsewhere in steel . . .

☛ According to the short-range outlook of the World Steel Association, the US will likely see three per cent growth in steel demand in 2014, compared with last year's estimated 0.7 per cent growth in demand. Favouring the improvement is the pickup in the automotive, energy, and residential construction sectors.

☛ The Steel Recycling Institute said on 30<sup>th</sup> September that steel is North America's number one recycled material, with more than one billion metric tons recycled since 1988. According to Pittsburgh-based SRI, which

calculates the recycling rates for steel and major steel products, more steel is recycled in the US every year than paper, plastic, aluminium and glass combined.

In 2012 the recycling rate for the North American steel industry was 88 per cent. The almost 84 million metric tons (mmt) of steel recycled that year included 16.3mmt of automotive scrap, 2.7mmt of appliance steel, and 1.3mmt of tin plate steel. Fully 98 per cent of plates and beams from demolition projects was recycled.

The SRI, which reported that the industry's recycling effort has helped it to reduce its carbon dioxide emissions by 32 per cent, was established 25 years ago by the American Iron and Steel Institute (AISI) to create a system for recycling steel cans.

## Automotive

☛ The CEO of Chrysler Corp, Sergio Marchionne, said on 10<sup>th</sup> October that the Detroit carmaker will invest \$1.249 billion to build an assembly plant in Saltillo, a city in the northern Mexican state of Coahuila. Chrysler already has four plants in the area around Saltillo. Some 1,570 jobs will be created by the investment, Mr Marchionne said in Mexico City, where he met with Mexican President Enrique Peña Nieto.

According to President Nieto, Mexico is the world's eighth-largest automobile producer, ranking fourth as an exporter and fifth as a producer of car parts for both the domestic and international markets. Ildefonso Guajardo, the economy minister, said the auto industry accounts for 26 per cent of Mexico's total exports.

Automakers are expanding production in Mexico to capitalise on lower labour costs that bolster the profitability of vehicles sold in the American market. General Motors of the US has budgeted \$691 million to expand three existing Mexican factories. Germany's Volkswagen is investing \$1.3 billion in a new Audi plant in San Jose Chiapa with a capacity of 150,000 cars a year. Fiat, of Italy, builds a North American version of its 500 subcompact at a plant in Toluca.

☛ Edging closer to unloading its remaining shares in General Motors, the US government said in a 17<sup>th</sup> September report to Congress that it has recovered about \$36 billion of the \$51 billion invested to bail out the automaker in 2008 and 2009. The Treasury Department said it owned a 7.3 per cent stake in GM, down from 13.8 per cent as of 12<sup>th</sup> June, and that it plans to sell its last GM shares by April 2014.

Business writer Nathan Bomey of the *Detroit Free Press* noted (10<sup>th</sup> October) that, by the time it gets quit of GM, the US government is expected to have lost about \$10 billion on carmaker bailouts. But the Obama administration has declared the initiative a success because it rescued the domestic auto industry and preserved hundreds of thousands of jobs.

Claiming that that the government is recouping "significantly more than expected" on auto bailouts, the



White House said in September: “[Now] the Detroit Big Three are profitable and gaining market share for first time in 20 years.”

## Education

### An international study discloses a wide skills lag in the United States, one persisting well past school days

“Skills have become the global currency of the Twenty-first Century. What are the hot issues facing countries, companies, and individuals today?”

The Organisation for Economic Cooperation and Development poses this question on its website, and provides answers in its first OECD Skills Outlook. The results presented by the Paris-based coalition of the world’s major industrial powers are based on a new set of tests (“Survey of Adult Skills”) developed and administered in 2011 and 2012 to 5,000 individuals, aged 16 to 65, in each of 23 participating countries.

Previous international studies of the kind generally looked only at literacy, and in fewer countries. OECD looked at the key cognitive and workplace skills needed for individuals to function in society and for economies to prosper, assessing literacy, numeracy, and problem-solving in technology-rich environments. (This last category, defined as “using digital devices to find and evaluate information, communicate, and perform common tasks,” was examined in 19 of the 23 countries.)

Perhaps the most detailed of its kind to date, the survey of 166,000 people found that, in all three categories of proficiency, Japan ranked first and Finland second in respondents’ scores, with the Netherlands, Sweden and Norway near the top. The United States ranked near the middle in literacy and near the bottom in numeracy and technology skills. In number skills, just nine per cent of Americans scored in the top two of five proficiency levels, compared with an all-countries average of 12 per cent. In Finland, Japan, and Sweden, the average was 19 per cent.

As well as showing several other countries surging past the US in student test scores and college graduation rates, the OECD found that the skills gap persists well after diplomas are awarded. American young adults, in particular, fared poorly in comparison with their international counterparts, not only in maths and technology but also in literacy.

Even middle-aged Americans – ostensibly among the best-educated people of their generation anywhere in the world – scored barely above middle-of-the-pack in skills.

🌐 The American results were strikingly polarised between high achievement and low. Compared with other countries with similar averages in all three assessments, the US usually had more people at the highest proficiency levels and more in the lowest. It also showed an unusually wide gap in skills between the employed and the unemployed.

The most highly educated population of Americans – those holding graduate and professional degrees – lagged slightly behind international averages in skills. But the gap was widest at the bottom. Among those who did not finish high school, Americans had significantly poorer skills than their counterparts abroad.

Foreign-born adults in the United States were also found to have much poorer-than-average skills – but even the native-born scored slightly below international norms. White Americans scored higher than the multicountry average in literacy, but about average on maths and technology tests.

🌐 Predictably, educationists in the United States were stung by the conclusions of the OECD Skills Outlook. Arne Duncan, the US education secretary, related them to socio-economic factors. “We have a real state of crisis,” he told a panel of Education Nation Summit, a gathering on the state of education in America. “This is much bigger than education. We have to close what I call the opportunity gap. The gap between the haves and the have-nots is far too wide.”

Also predictably, perhaps, the stimulating effect of the weak showing will fade quickly. In December 2010 the OECD released the results of a previous set of tests, the “Program for International Student Assessment”. Administered in 2009, it showed 15-year-olds in Shanghai greatly outshining their American peer group in reading, maths and science.

Mr Duncan was US education secretary then, too. His response at the time: “We have to see this as a wake-up call.”

### ‘A magnet for immigrants’

With the welcome mat out for newcomers, an Ohio city is enjoying a pickup in its economy and its spirits.

“We’ve found that we can repopulate our city and we can educate the people and inspire them to employ themselves. In ten years, when the federal government figures everything out, we’ll be thriving.”

Mayor Gary Leitzell, of Dayton, Ohio, was taking a dig at Washington, DC at the height of the government shutdown for which a local lawmaker – House Speaker John A. Boehner, whose district wraps around Dayton on three sides – was receiving major blame. But the main theme of the mayor’s interview with the *New York Times* in September was much more positive: the apparent success of a novel initiative to help stem job losses and a population drop in Dayton, a former centre of heavy manufacturing ravaged by industrial decline.

In October 2011 the Dayton City Commission voted unanimously for the Welcome Dayton plan to remake the city into a magnet for immigrants, with immigrant-friendly programmes to attract newcomers and encourage those already there.

**Dorothy Fabian**  
Features Editor

# 美国展望

## 钢铁业新闻

### 一年以后，一个被超级风暴桑迪摧毁的新泽西沿海社区向往老式材料的帮助

“如果海滩已经是人工建造的，那在它上面建造海堤还会产生伤害吗？可能不会，据我了解……他们永远都不会让那个入口敞开。（但是）随着时间的推移，无论我们做什么，这些岛屿将面临更大的危险。”

西卡罗莱纳大学发达海岸线研究项目主管罗伯特·S·扬戈 (Robert S Young) 的这条冷冰冰的评论，在代价不菲的为新泽西海洋郡 (Ocean County) 海滨城镇曼陀罗金 (Mantoloking) 和布列克 (Brick) 铺设板岩的工程项目中被提及，海洋郡是新泽西州2011年11月的桑迪飓风中受灾最严重的地区。

投入4千万美元，联邦高速公路管理局2.6亿美元重建35号公路项目向新泽西提供保护，桑迪飓风在该州破坏通过曼陀罗金和横跨高速公路的新海洋入口。成本分配为：3,200万美金来自华盛顿，800万美金来自新泽西州。在当地的报纸《阿什伯公园新闻》(Asbury Park Press) 中科克·摩尔 (Kirk Moore) 写道，上述计划即一道四英里长的垂直型钢堤，其大部分隐藏在沙滩后面陆地的沙丘中。这道“被掩埋的铁帘”将是路基重建段的最后一道防线。

这堵墙也被视为是为最薄弱、最易受攻击的沿岸沙滩半岛提供保护，该地记录上看似18世纪以来就成为和2012年袭击几乎相同的入口。新泽西环境保护部门的发言人拉瑞·汉纳 (Larry Hajna) 说：“没人想看到历史不断重演。”（“4千万美元的钢帘用来保护新泽西海岸高速公路，”9月27日）。

### 钢铁对石材

摩尔先生解释说，提议的构架将会是一条由美国陆军工程兵团安装，比其于去年秋天到曼陀罗金缝合时长了许多的钢墙变体。钢板——“板桩”——将被安置在海平面32英尺以下，其顶端将高出海平面16英尺。

曼陀罗金的工程师罗伯特·梅恩伯格称：其位置距35号公路东部500至600英尺并在海滨房子的前方，钢材嵌入海滩滩肩和沙丘，目前大约比海平面高10英尺。即在曼陀罗金和布列克将有6英尺高的钢制墙需要由沙来覆盖，假设直到美国陆军工程兵团带着他们计划的海滩补给进入：设计一个更高更厚的海滩和沙丘，高度超过海平面22英尺。

很多曼陀罗金居民希望能拓展社区相邻的石头护岸作为美国陆军工程兵团为扩宽的海滩和连绵的沙丘所规划的支撑墙。但前期估价约为4,000万美元——结构为钢墙长度的一半——美国陆军工程兵团不会为之买单。

“那些石头结构会变得非常昂贵，”霍伯肯市 (Hoboken) 的史蒂文斯技术学院 (Stevens Institute of Technology) 海洋工程学研究副教授，强·米勒 (Jon Miller) 说，“钢板桩像是一种整洁、方便、只要插入沙里就能成功的解决方案。”

☞ 钢墙的安装预计将在新年开始，但是摩尔先生评论道，除非沙滩补给项目进入，否则该墙将：“仅离开海浪仅一两英尺。”同时沿海地质学家和工程师告诉他如此坚硬的结构前面需要大量的沙子作为缓冲器：不光要应对百年一遇的飓风还有每年来自北大西洋的冬季寒风。

☞ 摩尔先生写道：“如果海岸腐蚀过快，海浪冲击海墙将增加冲刷率——就像混凝土锯，侵蚀钢墙根基的沙子，将其冲走，再无情的冲击结构。”

洛杉矶圣塔莫尼卡海湾修复委员会船舶运营主管汤姆·福特 (Tom Ford) 称，能量再反弹回去增加了腐蚀的频率。根据福特先生称在南加州已经有据可查，他评论称，一个城市海岸在其之上“我们有大量的海岸防护。”

☞ 事实上，新泽西项目已经吸引了很多怀疑论者和彻底的反对者。“这根本是自找麻烦，”曾长期担任新泽西环保部海岸分部主任，现已退休的马克·马里奥 (Mark Mauriello) 称，“当海滩被侵蚀使该墙暴露于外时，将会有麻烦。”

在钢墙的诸多评论者中一个较为温和的声音来自南加州开发海岸线的专家扬格 (Young) 先生，他温和小心的展开这个问题。正如他告诉摩尔先生：“一旦你开始建造像那样的结构，你就得致力于海滩补给”——不断的将更多的沙子推到钢墙前方。

☞ 《阿什伯公园新闻》并没有提及美国两个海岸社区居民的痛苦觉醒，事实上他们与住在火山口上的人们有很多共同之处。根本没有必要。同样在文中暗示钢铁的优点——牢固、耐腐蚀、适应性强——无论巨型自然灾害何时降临都需要创造性的应对。

### 美国汽车工业使得谢韦尔集团 (Severstal) 的迪尔伯恩 (Dearborn) 钢铁厂竭尽全力，但是全球定价的压力侵蚀了利润

“我认为我们正处于前所未有的需求的巅峰状态，”谢韦尔集团北美分公司的首席执行官赛卡特·戴伊 (Saikat Dey) 于10月告诉《底特律自由新闻》(Detroit Free Press)。该俄罗斯钢铁生产商在密西根州迪尔伯恩市的热轧钢厂为了赶上汽车制造商日益增长的需求正满负荷运营。

与商业作家布伦特·斯纳夫列 (Brent Snively) 的访谈标志着德伊先生自9月接管谢韦尔集团以来的首次公开评论。这位公司前首席战略和采购官员的升职是谢韦尔北美公司领导团队大调整的一部分。

这位新任首席执行官告诉斯纳夫列先生之前的执行团队擅长管理并购、收购和大资本投资项目，在过去的10多年里成为谢韦尔集团在北美的一大特色。但是，现在公司正面临新的挑战（“谢韦尔的利润(正)承受竞争者定价的压力，”10月4日）。

德伊先生认为挑战是在全球钢铁工业生产能力超过其客户所需3亿到4亿吨钢的背景下，亚洲增长放缓是失衡的主要因素。“汽车可能从这的货架上突然起飞，”10月3日，在迪尔伯恩他称，“但是我们已经看到在定价对利润重大侵蚀。”

斯纳夫列先生评论称，最近一次汽车制造商如此的规模（2013年已销售超过1,550万辆汽车和卡车）表现可追溯到2008年，一吨热轧钢材的售价可以超过1,100美元。当他在10月写下评论时，11月出厂的热轧钢材的售价每吨大约为637美元。

谢韦尔钢铁集团 (OAO Severstal) 是谢韦尔北美公司的母公司，已经因此受到影响。公司报告截止于2013年6月30日的季度亏损为4,400万美元，而2012年同期盈利为4,400万美元。

“考验是由铝材引起的，”德伊先生告诉《自由新闻》。“让我们不要忽略该事实或试图否定它。”谢韦尔在与铝工业竞争中所选的武器将是高强度、轻重量的钢材。

☞ 自2004年以2.85亿美元收购鲁日钢铁 (RougeSteel) 以来，谢韦尔已经在其北美公司的运营中投资了60亿至80亿美元。去年公司委托建造了2.85亿美元的热镀流水线作为其14亿美元升级迪尔伯恩厂房的一部分，迪尔伯恩工厂拥有职工总数为1,800人。

## 钢铁行业其他新闻.....

- ① 根据世界钢铁协会的短期视点,美国钢材需求有可能在2014年获得3%的增长,相比去年需求增长了大约0.7%。有利于改善汽车、能源、居民建筑行业的回升。
- ② 钢铁回收协会(The Steel Recycling Institute)9月30日称钢铁成为北美第一的可循环使用材料,自1988年以来已经有超过10亿公吨的钢材被回收。

根据位于匹兹堡钢铁回收协会的观点,该协会计算钢铁与主要钢铁产品的回收率,每年在美国钢材的回收量已经超过了纸张、塑料、铝材和玻璃相加的总和。

2012年北美钢铁行业的回收率为88%。将近8,400万公吨钢材在该年被回收包括1,630万公吨汽车废弃件,和130万公吨的马口铁钢材。来自被拆除项目98%板材和横梁得到彻底的回收。

钢铁回收协会报道了钢铁行业的回收成果已经帮助减少32%的二氧化碳排放。该协会成立于25年前,由美国钢铁协会(AISI)创建,目的是建立一套回收钢铁罐的系统。

## 汽车行业新闻

- ① 克莱斯勒集团公司首席执行官,塞尔吉奥·马尔奇奥尼(Sergio Marchionne)在10月10日称该底特律汽车制造商将投资12.49亿在墨西哥北部科阿维拉州(Coahuila)的萨尔提略市(Saltillo)建造装配厂。克莱斯勒公司在萨尔提略市周边区域已经有了4家工厂。马尔奇奥尼在墨西哥城称该投资将创建1,570个工作岗位,在该地他与墨西哥总统恩里克·佩尼亚·涅托(Enrique Peña Nieto)进行了会面。

根据涅托总统的说法,墨西哥是第八大汽车生产国、第四大汽车出口国、国内及国际市场上第五大汽车零件生产国。经济部长伊尔德芬索·厄哈尔多称汽车工业占墨西哥全部出口量的26%。

汽车制造商正在墨西哥扩大生产以利用其较低廉的劳动成本使得在美国市场出售的汽车能保持盈利。美国通用汽车公司已经投入6.91亿美元的预算以扩张三个现有的墨西哥工厂。

德国的大众公司正准备在圣荷赛恰巴市(San Jose Chiapa)投资13亿美元建造一个每年生产能力达150,000辆汽车的新奥迪工厂。意大利的菲亚特公司在托卢卡(Toluca)的工厂里建造500辆微型小客车的北美版本。

- ② 离清空其剩余通用汽车公司的股份时间越来越近了,美国政府在9月17日向国会报告称在2008年和2009年帮助该汽车制造商摆脱困境的510亿美元的投资已经恢复了360亿美元。财政部称其拥有通用汽车7.3%的股份,与6月12日13.8%的股份相比有所下降,并计划在2014年4月之前出售其剩余的通用汽车股份。
- ③ 《底特律自由新闻》的商业作家南森·波曼(Nathan Bomey)评论(10月10日)称,到从通用汽车脱身之时,美国政府预期已经在这家汽车制造商紧急救助行动中损失大约100亿美金。但是奥巴马行政机构宣布初步获胜因为该救助挽救了国内汽车工业并保留了数十万的工作岗位。
- ④ 白宫宣称政府在汽车工业紧急救助中收了回“比预期要多得多”,并在9月称:“(现在)底特律三巨头是盈利的并在20年里首次获得市场份额。”

## 教育

### 国际研究发现美国技能广泛落后,眷念过去的学校生活

“在21世界,技能已经成为国际饭票了。现在国家、公司、和个人所面临的热点问题是什么?”

经济合作与发展组织(Organisation for Economic Cooperation and Development)在其网站上指出这个问题,并在其首次编撰的《经合组织技能纵览》中提供了答案。这家位于巴黎的世界主要工业强国联盟所显示的结果是基于一套新的测试(“成人技能调查”),该测试于2011年和2012年开展和进行,对象是23个成员国,每个成员国的5000个年龄为16至65岁的个人。之前类似的国际调查只是简单的在几个国家浏览一下阅读能力。经合组织(OECD)关注个人在社会功能方面和经济成功方面的关键认知和工作技巧,评估阅读能力,计算能力,和在技术复杂环境下的问题解决能力。(这最后一类,定义为“使用数字设备并评估信息、沟通和执行常见任务,”在23个成员国中的19个国家测试。)

可能是迄今为止该类测试中最详细的,该166,000人的调查发现,所有三项技能熟练度,答题者得分日本排在首位,芬兰获得第二,荷兰、瑞丹和挪威都紧随其后。美国在阅读能力排名接近中等,在计算能力和技术技能上排名垫底。在计算能力上,仅有9%的美国人得分在5个熟练等级前两级之上,相比所有国家的平均12%得分在前两等级之上,而芬兰、日本、和瑞典平均19%。

在显示多个其他国家在学生测试成绩和大学毕业率远超美国的同时,经合组织发现在授予学位后技能落后也相应存在。特别是美国年轻的成年人,不仅在数学和技术方面与国际对手相比相当差,在阅读能力方面也一样。设置中年美国人——在世界任何地方中他们这一代人貌似接受最好教育的人——在技能上很少得分能超过中间值。

- ① 美国的测试结果惊人的在获得高分与低分中两极分化。与其他国家在所有三项测试平均分都相似相比,美国通常更多的人在熟练度以及更多人在最低熟练度。结果还显示在就业与失业人员之间技能差距非同寻常的大。

美国受教育程度最高人群——那些获得毕业证书和技术资格——在技能上稍稍落后与国际平均水平。但是差距在底部最大。在那些为完成中学教育的人中,美国人与海外的对手相比技能差距极大。

美国海外出生的成年人同样被发现远低于平均值的技能——但是甚至土生土长的成绩也略低于国际标准。美国白人在阅读能力上优于多国籍人员,但在数学和技能测试上几乎相同。

- ② 可预料到得是,美国教育被经合组织技能纵览的结论所刺痛。美国教育部长阿恩·邓肯(Arne Duncan)将它们与社会经济因素联系起来。“我们正身处危机,”他告诉国家教育峰会即美国教育状况聚会的专家们,“这比教育本身严重得多。我们必须消除这些我称之为机会差距的事物。穷人与富人之间的差距太大了。”

同样可预料的是,可能,针对表现疲软而做的刺激效力会很快消逝。在2010年12月经合组织发布之前一套测试的结果,“国际学生评估计划”。2009年执行,显示了在上海的15岁学生在阅读、数学和科技上使得他们美国同龄人群大大地相形见绌。

那时,邓肯先生也同样是美国的教育部长。他在当时的回应是:“我们必须将其视为敲响的警钟。”

专栏编辑: Dorothy Fabian



Photo credit: Messe Düsseldorf/Reine Tillman & Partner

# Countdown to wire 2014

Over 58,000m<sup>2</sup> – more than the total space in 2012 - has already been booked for exhibitors at wire Düsseldorf, which opens its doors on 7<sup>th</sup> April.

And organisers Messe Düsseldorf are expecting a record number of visitors to the largest and most influential wire exhibition in the world.

For the first time, all exhibitors in the area of mesh welding machines are consolidated together in hall 16. Around 20 companies will be presenting their latest products on roughly 2,000m<sup>2</sup>.

One third of the visitors have direct responsibility for purchasing, while 57 per cent act in a contributory or advisory role when purchasing.

Technology also plays a large part during the five-day show. Many companies choose to debut their new innovations on the biggest marketplace of all, with main

product groups including wire manufacturing and finishing machinery; process technology tools; auxiliary process technology materials; special wires and cables; measuring and control technology; and test engineering.

**Show dates:**

Monday 7<sup>th</sup> April - Friday 11<sup>th</sup> April 2014

**Show opening hours:**

9am-6pm Monday to Thursday

9am-5pm Friday

**Messe Düsseldorf GmbH – Germany**

**Fax:** +49 211 45 6087 7793

**Email:** [wire@messe-duesseldorf.de](mailto:wire@messe-duesseldorf.de)

**Website:** [www.wire.de](http://www.wire.de)



A list of exhibiting companies starts on the next page. Listings correct as at 28<sup>th</sup> November 2013.



## Alphabetical list of Exhibitors

<b>Exhibitor</b> .....	<b>Hall/Stand</b>		
2 M-Tech Thomas Mallinger BSc.....	<b>10 A40</b>	ArcelorMittal WireSolutions.....	<b>12 D41</b>
3View Com Inc.....	<b>15 H08</b>	Area Sistemi Srl.....	<b>11 D69</b>
A Appiani Srl.....	<b>11 G32</b>	Arkema France.....	<b>16 G52</b>
AMPERE Deutschland GmbH.....	<b>11 J53</b>	Arma-Plus SAS.....	<b>16 A09</b>
ATR SpA.....	<b>17 C16</b>	Artofil BV.....	<b>11 J03</b>
AWM SpA Automatic Wire Machines.....	<b>16 C20</b>	ASA-RT Srl.....	<b>09 F74</b>
Aachener Maschinenbau GmbH.....	<b>15 C36</b>	Asahi Sunac Corporation.....	<b>15 A53</b>
Acciai Speciali Zorzetto Srl.....	<b>12 D66</b>	AseA Wire & Cable Machinerie Spare Parts Pvt Ltd.....	<b>09 B60</b>
Acciaierie Bertoli Safau SpA.....	<b>17 C04</b>	Asel.....	<b>16 E40</b>
Acciaierie Valbruna SpA.....	<b>12 C67</b>	Asil Celik Deutschland GmbH.....	<b>12 E63</b>
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Accuision Technology Inc.....	<b>15 B14</b>	Aslanli Tel Sanayi.....	<b>16 E29</b>
Acenta Steel Ltd.....	<b>12 D47</b>	Asmag - Anlagenplanung und Sondermaschinenbau GmbH.....	<b>09 C06</b>
ACIMAF Italian Wire Machinery Manufacturers Association.....	<b>11 A58</b>	Aspe SAS.....	<b>15 D24</b>
ACM A/B.....	<b>09 E40</b>	Assembling Srl.....	<b>16 E52</b>
Acuity Products Limited.....	<b>09 B37</b>	Associated Engineers & Industrials Ltd.....	<b>11 E11</b>
ADC SARL.....	<b>09 C02</b>	Assomac Machines Ltd.....	<b>11 D22</b>
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Advantage Austria Wirtschaftskammer Österreich.....	<b>10 A56</b>	AstroPlast Kunststofftechnik GmbH & Co KG.....	<b>11 J76</b>
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AEI Compounds Ltd.....	<b>11 D46</b>	ATE Applicazioni Termo Elettroniche Srl.....	<b>11 C77</b>
Aeroel Srl.....	<b>09 B55</b>	Atech Co Ltd.....	<b>16 G27</b>
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Aichelin Holding GmbH.....	<b>15 C51</b>	Aymak Makine Mühendislik Hiz San ve Tic Ltd Sti.....	<b>16 D58</b>
AIM Inc.....	<b>11 A25</b>	Aztech Lubricants LLC.....	<b>09 F18</b>
Ajex & Turner Wire Dies Co.....	<b>11 F02</b>	B + B Eisen- und Stahlhandel GmbH.....	<b>12 C07</b>
AJT Equipment Ltd.....	<b>16 B58</b>	BS Shakti Steel Pvt Ltd.....	<b>16 F55</b>
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	ViDiMa Srl.....	<b>16 F30</b>	Zamak Mercator Sp zoo .....	<b>17 C50</b>
	Vikas Spool Private Limited .....	<b>17 A12</b>	Zami 1950 Srl .....	<b>09 C03</b>
	Vinco - Vizcaina de Industria y Comercio.....	<b>16 G37</b>	ZDB Dratovna as.....	<b>09 C59</b>
	Viraj Profiles Limited.....	<b>17 C34</b>	Zeller+Gmelin GmbH & Co KG.....	<b>09 E31</b>
	Vision Engineering Ltd .....	<b>15 A51</b>	Zenkoh Co Ltd .....	<b>17 C22</b>
	Vitari SpA - Eurolls Group .....	<b>11 D40</b>	Zeus Techno Inc .....	<b>15 A18</b>
	Vivirad SA .....	<b>17 A08</b>	Zhangjiagang Free Trade Zone Drow New Material Science & Technology Co Ltd .....	<b>17 A43</b>
	Vladimir Plant of Precision Alloys Vladimir Plant of Metal Hoses .....	<b>16 H52</b>	Zhejiang Minmetals Sanhe I/E Co Ltd.....	<b>17 B38</b>
	VÖDKM / AWCMA Verband Österreichischer Draht- und Kabelmaschinen-Hersteller .....	<b>10 A40</b>	Zhejiang Tenglong Stainless Steel Products Co Ltd.....	<b>16 F50</b>
	VÖDKM / AWCMA Verband Österreichischer Draht- und Kabelmaschinen-Hersteller .....	<b>11 A05</b>	Zhejiang Tsingshan Steel Pipe Co Ltd.....	<b>12 E26</b>
	Voestalpine Austria Draht GmbH .....	<b>10 A40</b>	Zhejiang Zhijiang Machinery Co Ltd.....	<b>16 H50</b>
	Volme-Draht GmbH.....	<b>12 E70</b>	ZhengZhou VIC Water Blocking Materials of Cable Co Ltd .....	<b>17 C05</b>
	Vom Hagen & Funke GmbH.....	<b>10 E40</b>	Zink KÖRNER GmbH.....	<b>09 F51</b>
	Von Roll Schweiz AG.....	<b>12 A48</b>	Zollern GmbH & Co KG .....	<b>12 C76</b>
	VSM Vereinigte Schmirgel- und Maschinen-Fabriken AG.....	<b>17 D63</b>	ZT Srl .....	<b>16 G51</b>
	WNJ Europe sc Jakub Gorczynski - Dariusz Oczko .....	<b>16 H10</b>	Zumbach Electronic AG .....	<b>11 D43</b>
	WTM Srl.....	<b>11 E77</b>	Zwez Chemie GmbH .....	<b>15 C41</b>
			Zwick GmbH & Co KG.....	<b>16 H44</b>

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# PV ribbon: Overview of product specifications and comparison of production processes

By Igor Rogelj, Peter Ziger and Primoz Eiselt, Plasmait GmbH, Lebring, Austria

## Abstract

PV ribbon is an essential component in every mainstream solar panel and is used to interconnect solar cells and provide connection to the junction box. PV ribbon is tinned copper ribbon between 1mm-6mm wide and 0.08mm-0.5mm thick, with a 10 micron-30 micron thick solder coat. The quality of PV ribbon and its soldering to the solar cells is essential to ensure panel efficiency and durability.

This article scans the market dynamics of PV ribbon manufacturing and outlines PV ribbon product specifications commonly required by the panel manufacturers. These include properties such as material compositions, dimension ranges, straightness, solder coat thickness, mechanical characteristics and others.

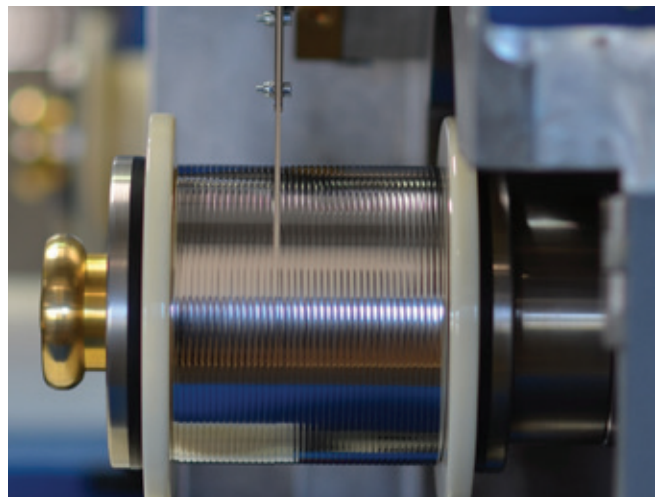
The traditional tinning process is compared to the new chemical-free plasma assisted tinning process, which has been widely adopted in the West and increasingly in Asia as well. The two production processes are compared in terms of output, productivity, efficiency, process control and environmental impact.

## PV ribbon

PV ribbon is a hot dip tinned copper conductor used in photovoltaic solar panels. There are two types of PV ribbon: The interconnect or tabbing ribbon and PV bus bar, both needed in a typical silicon solar cell. Thin film panels usually require only bus bar.

The interconnect ribbon is soldered directly onto silicon crystal to interconnect solar cells in a solar panel. The interconnect ribbon carries the current generated in solar cells to the PV bus bar.

PV bus bar is a hot dip tinned copper conductor installed around the perimeter of the solar panels. PV bus bar connects interconnect ribbons to the junction box.



○ **Figure 1:** Interconnect ribbon produced on the PlasmaPREPLATE Tinning line and wound on the spool as a finished product ready for stringing

## PV ribbon market dynamics

PV ribbon manufacturing is a growing, dynamic and fragmented part of the PV industry. There are many different types of solar panels and solar cells, which require different types of PV ribbons. Solar panel and cell designs are constantly changing driven by rapid innovation in the PV industry. This results in ever changing PV ribbon specifications. PV ribbon suppliers are also under constant price pressure, which is led by fast declines in solar panel prices.

PV ribbon is a key component in the solar panel and is an important factor driving panel efficiency and durability. High efficiency and durability of the solar panel can only be achieved with a good quality PV ribbon that has been properly installed into the solar panel. Good quality PV ribbon can also improve panel production efficiency and reduces associated scrap rates.



○ **Figure 2:** Solar panel with interconnect ribbons soldered onto cells and bus bar around the panel perimeter

To ensure high productivity of the stringing process a good quality, straight, soft and properly soldered ribbon has to be used. Accurate laying of the PV ribbon also has to be ensured during the stringing, tabbing process. Good quality interconnect ribbon will inevitably reduce stringer downtime and its scrap rate. Today's high-speed stringers require ever more demanding ribbon specifications.

The three key trends in PV ribbon specifications include:

- Ever tighter tolerances of solder thickness and ribbon straightness are driven by new generation fully automated, high-output stringers
- Lower ribbon yield strengths (Rp0.2%) are required for increasingly thin solar cells
- New panel designs utilise three interconnect ribbons per cell instead of two, reflected in a growing demand for smaller (narrower and thicker) ribbons. This in turn drives capacity expansion of precision tinning lines for small interconnect ribbons

## PV ribbon specifications and requirements

The conductor or base material in the PV ribbon is high-conductivity, high-purity copper. Copper used in PV ribbons is typically ETP, DIP form copper or oxygen-free copper (OFC: CD-110, CD-101, CD-102).

Copper wire is rolled in a rolling mill to produce copper ribbons, which are subsequently tinned/soldered in a tinning line to produce PV ribbon. Some producers use an alternative process of copper strip slitting to produce copper ribbons, which are generally of lower quality.

The size range of bare copper ribbons (inlet material for tinning line) is as follows:

- PV bus bar: width [3mm-6mm] x thickness [0.2mm-0.5mm]
- Interconnect ribbon: width [1mm-3mm] x thickness [0.08mm-0.2mm]

Copper ribbon tolerances vary among producers. They depend mainly on the type of rolling mills deployed, the quality of input material and the know-how of the manufacturer. Typical tolerances for producers with good rolling capabilities are:

- Width tolerance:  $\pm 8$  micron- $\pm 15$  micron
- Thickness tolerance:  $\pm 8$  micron- $\pm 13$  micron

The mechanical properties of PV ribbon that are commonly sought by panel manufacturers are:

- Tensile strength: <250 MPa
- Elongation: >20%
- Camber: <0.5% [5mm on 1m long sample]
- Yield strength (Rp0.2%)
- Hard/semi hard >120 MPa
- Soft <80 MPa
- Super soft <65 MPa

PV ribbon straightness, also known as camber, is measured in terms of millimetres off a straight line on one metre long ribbon sample.

Maximum level of camber is determined by the stringing process and typically ranges between <8mm/metre and <5mm/metre.

There are different types of solder compositions used in PV ribbon. They depend on the stringing/soldering technique deployed by the panel manufacturer and the local health and safety standards related to panel manufacturing.

Common solder compositions are as follows:

- Lead-free solder: Sn 100
- Lead containing solder: SnPb 60/40
- Silver containing solder: SnAg 96.5/3.5; SnAgCu 96.5/3.0/0.5
- Lead and silver containing solder: SnPbAg 62/36/2
- Low temperature solder: BiSn 57/43; BiSnAg 57.7/42/0.3

Solder coat thickness ranges from 10 micron to 40 micron, with tolerances between  $\pm 10\%$  and  $\pm 30\%$ . The most common solder coat thickness is 20 micron  $\pm 4$  micron. There are three types of solder coat thickness measurement technique:

- X-Ray: off-line measurement used for one-side thickness measurement
- Manual micrometer: off-line measurement used for measuring the total thickness of two sides of the coat
- Laser: in-line measurement that can be deployed on the tinning line and is used for measuring the total thickness of two sides of the coat during PV ribbon production

PV ribbon is also inspected visually or with a microscope to examine coating quality, which should be without defects such as stains, debris, burrs, dents, discolouration, bare copper visible through solder coating, small pinholes and other kinds of mechanical defects. Most of the above specifications and corresponding measurement techniques are defined in the standards for PV ribbon that were introduced in August 2011.

○ **Figure 3:** Cross-section of a typical hot-dip tinned copper ribbon



They are available at [www.semi.org](http://www.semi.org) and include:

- SEMI PV18-0811: Guide for Specifying a Photovoltaic Connector Ribbon
- SEMI PV19-0811: Guide for Testing Photovoltaic Connector Ribbon Characteristics

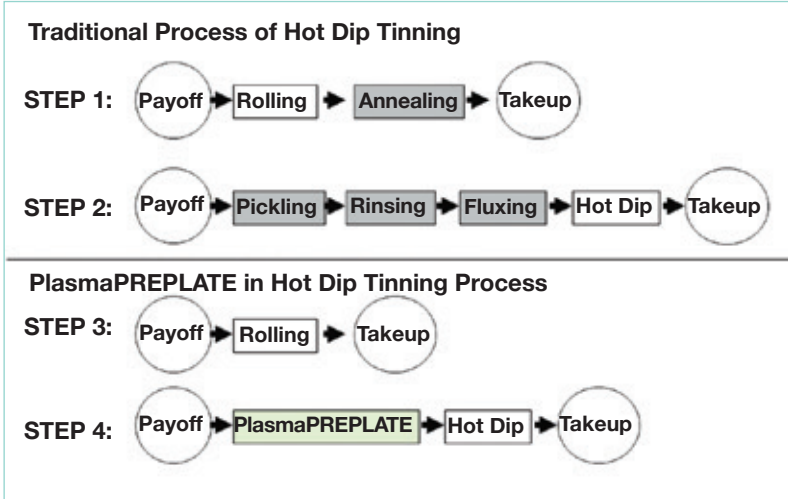
Finished PV ribbon products are packed on spools/reels or discs/pancakes. The most common spools used for PV ribbon in Europe are DIN K125, K160, K200 and K250 and in Asia also P4 and P10.

### Critical quality parameters for PV ribbon

All of the above PV ribbon specifications are important in their own way. Type of copper and its purity determines material conductivity and the maximum level of softness achievable for the ribbon. Solder composition, its coat thickness and coating composition influence the quality of solder joint and panel durability.

High elongation of PV ribbon is important to prevent failure of solder joints between the bus bar and interconnect ribbon, which may occur due to stretching/tension due to temperature oscillations during the panel operation.

Continuous daily, sometimes extreme temperature fluctuations during the lifetime of the solar panel, put



○ **Figure 4:** Production steps in the traditional and PlasmaPREPLATE tinning process for PV ribbon production

solder joints to the test for the duration of the panel lifespan, which is on average 25 years.

The two parameters that have been critical for most PV ribbon manufacturers are camber and yield strength. Many PV ribbon manufacturers find it difficult to achieve high level of ribbon softness whilst ensuring its straightness.

Achieving sufficient softness and low camber could mean the difference between winning and losing a supply contract.

○ **Table 1:** Typical production parameters for traditional PlasmaPREPLATE tinning in PV ribbon production

	<b>Traditional Tinning</b>	<b>PlasmaPREPLATE</b>
<b>Process type</b>	<b>Multi-line tinning process</b> with wet chemical surface preparation	<b>Single line high-speed tinning,</b> Dry surface treatment without fluxing
<b>Production speed</b>	<b>5-60m/min</b> , subject to ribbon softness	<b>150m/min</b> – super soft ribbon
<b>No of lines/output</b>	<b>4-25</b> , subject to quality, ribbon softness	<b>1</b> – super soft high-quality ribbon
<b>Annealing type</b>	furnace/resistive/induction (off-line)	Plasma (inline with tinning)
<b>Surface preparation for tinning</b>	<b>Acid, rinsing, fluxing prior to tinning</b> Expensive and harmful to operator	<b>Dry, chemical-free plasma treatment</b> Low cost and operator friendly
<b>Production cost</b>	<b>High</b> – labour, chemicals, energy	<b>Low</b>
<b>Production continuity</b>	More frequent changeover – <b>50kg spools</b>	Less changing over – <b>500kg spools</b>
<b>Scrap rate</b>	<b>High</b> – wet processes difficult to control operator experience and skills are key	<b>Low</b> Inline PLC-based quality control
<b>Solder wastage</b>	<b>High</b> – flux contamination in tin bath	<b>Low</b> – flux-free production
<b>Production control</b>	Limited PLC with manual assistance – complex multi-line production/line-to-line reference	Fully PLC controlled production – inline PLC quality control and alarm system
<b>Capital investment</b>	<b>Low</b>	<b>High</b>
<b>Production line footprint</b>	<b>Large</b>	<b>Compact</b>

Manufacturers are therefore forced to continuously improve their rolling, annealing, tinning and material handling techniques to meet ever more demanding product specifications.

**Critical parameter: yield strength**

The thermal expansion coefficient of copper is different to the thermal expansion coefficient of silicon. Interconnect ribbon is soldered onto the silicon cell at temperatures around 200°C.

Cooling down after stringing results in warpage. This could lead to silicon crystal breakage. Interconnect ribbons with low yield strength reduce the stress on silicon cells after stringing and with it the scrap rate.

The use of ever-thinner solar cells drives demand for ribbons with ever-lower yield strength (Rp0.2%). Only a few years ago solar 300-micron thick cells were commonly in use. They are able to sustain the stress from ribbons with yield strength of <120MPa.

Today, 160 micron-180 micron thick cells became a common practice with it the ribbons of yield strength <70MPa-<80MPa. The average cell thickness is likely to continue its downward path putting further pressure on ribbon manufacturers to reduce yield strength below 65MPa.

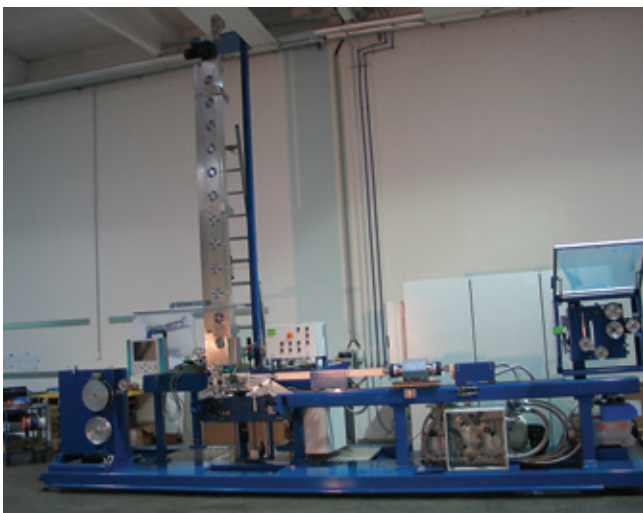
To reduce yield strength of PV ribbon the manufacturers should look into the following areas of improvement:

- Select appropriate input copper material
- Choose the right annealing and rolling techniques
- Ensure precision handling of soft ribbon through the transport system on the tinning line
- Ensure good payoff and precision winding on the takeup in the tinning line

The panel manufacturers, who want to reduce the stress on the cell after stringing, should examine their payoff system on the stringer to avoid hardening of the ribbon and creation of camber during paying off.

Some panel manufacturers have adopted an alternative panel design with three or even four smaller ribbons per cell (instead of two), which further reduces the stress on the cells after stringing.

○ **Figure 5:** PlasmaPREPLATE tinning line for PV ribbon production



**Critical parameter: camber**

Low camber is important for ensuring straight laying of interconnect ribbon during stringing. Production of solar panels has become fully automated with increasing stringing speeds. High-output fully-automated stringers can suffer from unnecessary down-time due to excessive camber of processed interconnect ribbon.

Ribbon with excessive camber can even cause weak solder joint or an increase in scrap rate on the stringer. Commonly pursued target camber today is <5mm/metre. There has been a trend of ever-tighter camber requirements which require detailed assessments of PV ribbon production process as well as payoff on the stringer during panel manufacturing.

To minimise camber, PV ribbon manufacturers have to look into the following areas of improvement:

- Accuracy of layer winding on the spooler, which requires precision mechanics and accurate process control
- Consistent ribbon quality, especially low tolerance of coating thickness
- Select appropriate size of spool

Manufacturers are well aware of the limitations to the minimum possible camber on the edge of the spool, where the ribbon changes direction during laying. Minimum possible camber on spool depends on the size of ribbon and barrel diameter of the spool. However, panel manufacturers or stringer suppliers themselves can examine possible improvements of the payoff system on the stringer in order to improve ribbon laying before soldering.

Increasing the size of spool can also help in reducing the camber that is created on the edge of the spool.

**PV ribbon production: PlasmaPREPLATE tinning vs. traditional tinning**

Tin-plating of copper wire is traditionally performed by running the wire through a bath of molten tin/solder followed by wiping and cooling of the coated wire vertically in the cooling tower.

○ **Figure 6:** HMI with a touch-screen, user-friendly interface on PlasmaPREPLATE tinning line





The inter-metallic bond can be achieved only if the wire surface is clean and appropriately activated. Acid cleaning or pickling has traditionally been used to clean the wire surface prior to surface activation, which is achieved with fluxing. Fluxing is a dirty and environmentally compromising process that can also be harmful to the operators.

Figure 4 compares the process steps of the traditional hot dip tinning to the process steps of the PlasmaPREPLATE tinning.

PlasmaPREPLATE process anneals, cleans and activates the surface of copper ribbon before it enters the tin bath to allow tin adhesion without the need for fluxing. Flux-free tinning accelerates the creation of intermetallic layer, which in turn results in a considerably higher tinning speed when compared to the tinning speed of the traditional process. PlasmaPREPLATE process can be tuned to anneal the copper ribbon to any required softness.

Complete recrystallisation with yield strengths down to 50MPa and small grain size can be achieved. Performing annealing in-line with tinning reduces the amount of soft material manipulation.

Less stress and mechanical deformation reduces the potential for yield strength and camber build up on the rolling line takeup and tinning line payoff. It is important to recognise the need for precision handling and accurate winding in case of super soft ribbon.

Precision transport system for handling of super soft ribbon can be an expensive investment, which is required on every tinning line. Faster tinning lines can therefore reduce the capital investment in transport systems per unit of production output.

The traditional tinning lines require acid cleaning, rinsing and fluxing prior to tinning. These wet processes are not only environmentally questionable, they are also hazardous and unpleasant for the operator. Flux contamination of tin bath leads to high cost of solder waste. The use of wet processes adds to the number of production parameters that must be closely controlled.

Production of expensive, precision products with tight tolerances such as interconnect ribbon requires tight control of the production conditions to avoid excessive scrap rates. This is often difficult to achieve when wet processes are involved. The differences between the two processes can be divided into the differences related to production efficiency and the differences in finished product quality.

Despite higher capital investment, PlasmaPREPLATE tinning process offers a number of benefits that translate into considerable long-term savings:

- Production speed of up to 150m/min compared to 5m/min-60m/min in a traditional process means fewer tinning lines, smaller machinery footprint and less manpower
- Process stability, increased production uptime and less frequent spool changeovers means less material manipulation and less operator involvement in PlasmaPREPLATE tinning line
- Dry surface preparation with plasma replaces acid cleaning, rinsing, drying, fluxing, waste disposal, and water treatment used in the traditional process

- Less tin waste due to flux-free production
- Quick changeover between different products and specifications
- Lower cost of production in terms of power, manpower, cost of chemicals and their manipulation as well as maintenance
- In-line quality control in the PlasmaPREPLATE tinning process translates into consistent product quality, less scrap and fewer returns

The key production parameters in the traditional tinning are compared to the production parameters of PlasmaPREPLATE tinning in Table 1.

In addition to production efficiency plasma process offers a number of product quality advantages when compared to the traditional tinning process:

- Superior and consistent product quality is reflected in:
- Super soft wire with yield strength down to 60 MPa on spool and elongation over 30%
- Smooth consistent and shiny coating with tighter thickness tolerance
- Dry, flux-free and chemical-free tinning simplifies process control, which translates into more consistent product quality
- In-line laser coating thickness measurement system can be justified on a high-speed plasma line
- Computer enabled, in-line product quality control with alarm and surface fault database simplifies quality control activities
- Computer assisted Production Recipe Database is an essential tool for the operator and product manager and an integral part of production know-how management

It is the stability of PlasmaPREPLATE process, consistency of product quality, low cost of operation as well as low scrap rates and tin waste that have won the confidence of many PV ribbon manufacturers since 2007 when PlasmaPREPLATE tinning process was first introduced to PV ribbon production.

**Plasmait GmbH**  
Philipsstraße 27 / C3, 8403  
Lebring  
Austria  
**Tel:** +43 3182 52 4751  
**Email:** info@plasmait.com  
**Website:** www.plasmait.com

# 光伏导电带: 产品规格概述与生产过程比较

作者: 奥地利Plasmait GmbH Lebring Igor Rogelj, Peter Ziger和Primoz Eiselt

## 摘要

光伏导电带是每个主流太阳能面板必不可少的元件之一,用于太阳能电池的互连和到接线盒的连接。光伏导电带是一种宽度在1至6毫米之间、厚度在0.08至0.5毫米之间、焊料涂层厚度在10微米到30微米的镀锡铜带。光伏导电带的质量及其在太阳能面板上的焊接对于保证面板的效率和耐久性至关重要。

本文考查了光伏导电带生产的市场动态,并概括了面板生产商通常要求的光伏导电带产品规范。这些规范包括诸如材料成分、尺寸范围、直度、焊料涂层厚度、机械特性和其他特性。

我们将传统镀锡工艺与新型无化学品等离子体辅助镀锡工艺进行了对比,这种新工艺在西方国家广泛采用,亚洲也有越来越多的地区采用。我们从产量、生产率、效率、工艺控制及对环境的影响这些方面对比了这两种生产工艺。

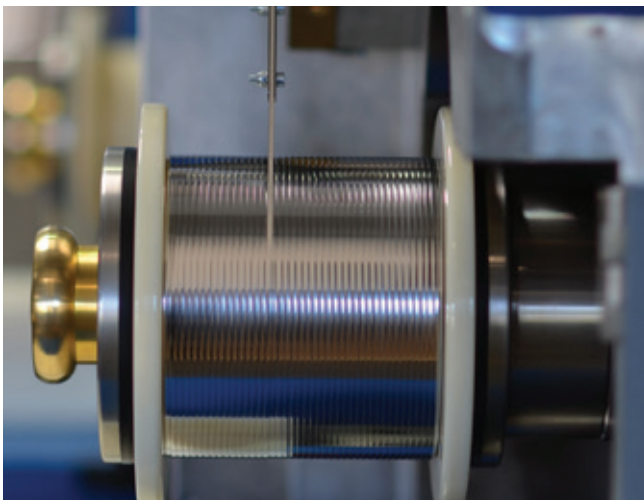
## 光伏导电带

光伏导电带是光伏太阳能电池板使用的一种热浸镀锡铜。现在有两种类型的光伏导电带: 互联或跳格导电带和光伏汇流条,这两种导电带都是典型的硅太阳能电池所必需的。薄膜面板一般只需要汇流条。

互联导电带是直接焊接到硅晶体上的,作用是连接太阳能电池中的太阳能电池板。互联导电带将太阳能电池中产生的电流输送到光伏汇流条上。

光伏汇流条是一种安装在太阳能电池板周围的热浸镀锡铜导线。光伏汇流条将焊带连接到接线盒上。

○ 图1: 由等离子预制板镀锡线生产的、缠绕在卷轴上等待穿线的互联焊带



○ 图2: 电池上焊有互联焊带且面板周边焊有汇流条的太阳能面板

## 光伏导电带市场动态

光伏导电带生产是光伏产业中正在成长的、动态的和零散的一部分。现有多种不同类型的太阳能面板和太阳能电池,它们需要不同类型的光伏导电带。太阳能面板和电池设计在光伏产业快速创新的驱动下不断变化,导致光伏导电带规格也在不停地变化。光伏导电带提供商也时常面临着太阳能面板价格快速下降引致的价格压力。

光伏导电带是太阳能面板的一种关键零件,也是决定面板效率和耐久性能的一项重要因素。只有妥当地安装在太阳能面板上的高质量的光伏导电带才能生产出高效和耐性好的太阳能面板。高质量的光伏焊带也能改善面板生产的效率,降低与之相关的废品率。

为了保证穿线过程的高效率,必须使用质量好、笔直、柔软且经过正确焊接的色带。穿线和跳格过程中也必须保证光伏导电带的精确安装。高质量的互联焊带必将减少机器停机时间和废品率。今天的高速穿线机对色带规格的要求日益严格。

光伏导电带规格的三种主要趋势包括:

- 在新一代全自动、高产量穿线机的驱动下,对焊料厚度和色带直线的公差要求越来越严格。
- 随着太阳能电池越来越薄,对色带的屈服强度要求也更高(屈服点为0.2%)。
- 新型面板设计的每块电池充分利用了三种而不是两种互联色带,反映出对更小型(更窄更厚)焊带日益增长的需求。这反过来促进了生产小型互联焊带的精密镀锡生产线的产能扩张。

## 光伏导电带的规格和要求

光伏导电带的导线或基材应为高导电性、高纯度的铜。光伏焊带使用的铜通常为ETP、DIP型铜或无氧铜(OFC: CD-110、CD-101、CD-102)。



图3: 典型的热浸镀锡铜焊带的横截面

轧机将铜线轧制生产成铜焊带，然后沿镀锡生产线镀锡/焊接形成光伏导电带。一些生产商使用铜带分切的替代工艺来制造铜导电带，产品质量通常较低。

裸铜色带（镀锡线进样口材料）的规格范围描述如下：  
 光伏汇流条：宽度[3至6毫米] x厚度[0.2至0.5毫米]  
 互联导电带：宽度[1至3毫米] x厚度[0.08至0.2毫米]

铜色带公差因生产厂商而异。它们主要由使用的轧机类型、原材料的质量和生产商的专业知识决定。轧制能力较强的生产商的典型公差为：

- 宽度公差：±8微米至±15微米
- 厚度公差：±8微米至±13微米

面板生产商通常追求的光伏导电带的机械特性有：

- 拉伸强度：<250兆帕
- 伸长率：>20%
- 曲弧度：<0.5% [1米长的样品弧形不超过5毫米]
- 屈服强度(屈服点0.2%)：
- 硬/半硬>120兆帕
- 柔韧度<80兆帕
- 超软度 <65兆帕

光伏导电带的直度，也称为曲弧度，用拉直后一米长色带样品曲翘的毫米数来表示。曲弧度的最大水平由穿线过程决定，通常在<8毫米/米至<5毫米/米之间。

光伏导电带使用的焊锡成分有多种不同的种类。它们取决于面板生产商采用的穿线/焊接技术以及当地与面板生产商有关的健康和安全标准。常用的焊锡成分如下：

- 无铅焊料：锡 100
- 含铅焊料：锡铅 60/40
- 含银焊料：锡银 96.5/3.5；锡银铜 96.5/3.0/0.5
- 含铅含银焊料：锡铅银 62/36/2
- 低温焊料：铋锡 57/43；铋锡银57.7/42/0.3

焊料涂层厚度为10至40微米，公差在±10%至±30%之间。最常见的焊料涂层厚度为20微米±4微米。

测量焊料涂层厚度的方法有三种：

- X光：用于单面厚度测量的离线测量方法
- 手动千分尺：用于测量涂层两侧总厚度的离线测量方法
- 激光：可以应用于镀锡线的在线测量方法，可用于光伏焊带生产过程中两侧涂层总厚度的测量

也可以通过目视或显微镜检查光伏导电带的涂层质量，涂层应该没有污渍、杂物、毛刺、压痕、变色、裸铜线通过焊料涂层可见、小针孔和其他类型的机械缺陷。

2011年8月推出的光伏导电带标准对上述大部分规格和相应的测量方法作了界定。

可以从www.semi.org上获取，包括：

- SEMI PV18-0811：光伏连接器色带规格指南
- SEMI PV19-0811：光伏连接器色带特性测试指南

光伏导电带完工产品用卷轴或圆盘包装。欧洲最常见的光伏导电带卷轴有DIN K125、K160、K200和K250，亚洲也使用P4和P10。

## 光伏导电带的关键质量参数

上述所有光伏导电带规格都有其各自的重要性。铜类型及其纯度决定了材料的导电性能和色带可以达到的最大柔韧度。焊料成分、涂层厚度和涂层构成影响焊点的质量和面板的耐久性。

光伏导电带的高伸长率对于防止母线和互联带之间的焊点失效起着至关重要的作用，焊点失效可能由于面板操作过程中的温度振荡导致的拉伸/张力发生。

在太阳能电池板使用期间内，连续每天或有时极端的温度波动都会通过焊点测试面板寿命的长短，其平均寿命为25年。

对大部分光伏导电带生产商而言，曲弧度和屈服强度是最关键的两项参数。许多光伏导电带生产商发现很难在保证焊带直度的同时获得高柔韧度。

达到足够的柔韧度和低曲弧度可能决定着供货合同的成功与失败。因此生产企业被迫持续改进他们的轧制、退火、镀锡和材料处理技术，以满足越来越严苛的产品规格要求。

### 关键参数：屈服强度

铜的热膨胀系数与硅的热膨胀系数不同。互联色带在约200摄氏度条件下焊接到硅电池上。穿线后降温的后果是翘曲。这可能导致硅晶体破裂。穿线后，屈服强度低的互联色带施加在硅电池上的压力较小，从而降低了废品率。

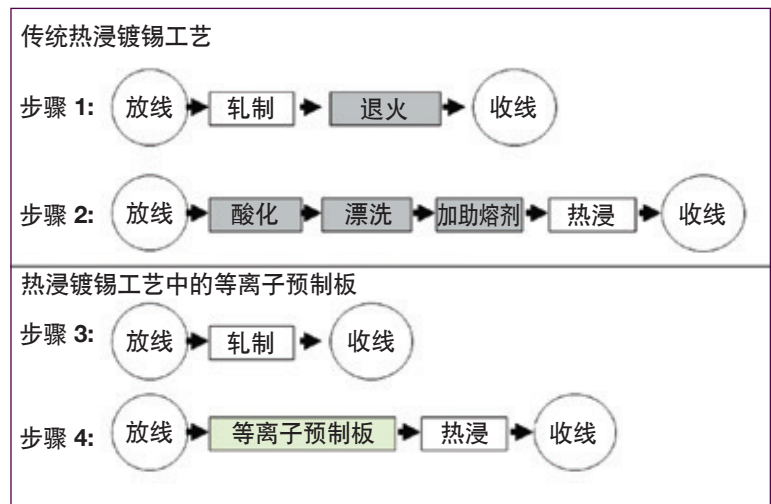
越来越薄的太阳能电池的使用驱动着对屈服强度越来越低(屈服点0.2%)的焊带的需求。仅仅在几年前，300微米厚的太阳能电池还很常见。如今，160至180微米厚的电池已经很普遍，其焊带的屈服强度为<70兆帕至<80兆帕。压缩电池平均厚度的趋势很可能将持续，焊带生产商面临着将屈服强度降至65兆帕以下的巨大压力。

为了降低光伏导电带的屈服强度，生产商应该寻求以下几个方面的改进：

- 选择合适的铜原材料
- 选择适当的退火和轧制技术
- 确保运用镀锡线上的传输系统对柔软焊带进行精确操作
- 确保镀锡生产线中的良好放线以及在卷轴上的精确缠绕。

面板生产企业如果想要降低穿线后施加在电池上的压力，就应该检查他们穿线机上的放线系统，避免色带硬化或放线时产生翘曲。一些面板生产商已经采用了每个电池有三个甚至四个更小的焊带（而不是两个）的替代面板设计，进一步降低了穿线后施加在电池上的压力。

图4: 传统和等离子预制板镀锡工艺生产光伏焊带的步骤



	传统镀锡	等离子预制板
工艺类型	湿化学表面处理的多线镀锡工艺	单线高速镀锡， 无需助焊剂的干燥表面处理
生产速度	5-60米/分钟，根据焊带柔韧度的不同	150米/分钟 - 超级柔软焊带
生产线数量/产出	4-25, 根据焊带质量和柔韧度不同	1 - 超级柔软高质量焊带
退火类型	加热炉/电阻/感应（离线）	等离子（与镀锡同步）
镀锡的表面准备	镀锡之前进行酸化、漂洗、加助焊剂 昂贵且对操作员不利	干燥、免化学品等离子处理 低成本且对操作员友好
生产成本	高消耗——劳动力、化学品和能量	低
生产的连续性	更频繁切换——50公斤卷轴	较少切换——500公斤卷轴
废品率	高——湿工艺很难控制 操作人员经验和技能是关键	低 内嵌可编程控制器为基础的质量控制
焊接损耗	高——锡浴的助焊剂污染	低——免助焊剂生产
生产控制	有限的可编程控制器与人工辅助——复杂的多 线生产/线对线基准	完全可编程控制器控制生产——内嵌可编程控制器 质量控制和警报系统
资本投资	低	高
生产线占地面积	大	紧凑

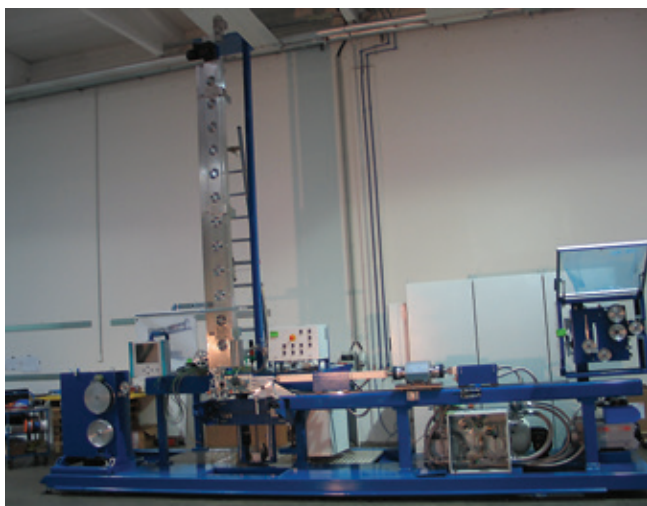
表1: 光伏导电带生产中传统和等离子预制板镀锡采用的典型生产参数

### 关键参数: 曲弧度

低曲弧度对于保证互联焊带在穿线过程中的直线安装非常重要。太阳能面板生产已经实现全自动化，穿线速度变得更快。

高产能全自动化穿线机可能遭受由于处理过的互联色带过高的曲弧度导致的不必要的停工时间。曲弧度太高的色带甚至可能导致焊点脆弱或者穿线机上的废品率增加。现在通常追

图5: 用于光伏导电带生产的等离子预制板镀锡线



求的目标曲弧度是<5毫米/米。对曲弧度的要求有更严格的趋势，这就要求更细致地评估光伏导电带生产工艺以及面板生产过程中穿线机的放线功能。

为了使曲弧度最小化，光伏焊带生产企业须考虑从以下几个方面加以改进：

- 卷轴上层缠绕的精确性，要求精密机械和精确过程控制。
- 稳定的导电带质量，尤其是涂层厚度的低公差
- 选择尺寸合适的卷轴。

生产商很清楚卷线筒边缘上焊带在安装过程中会改变方向，使边缘上最小可能外倾角受到限制。卷轴上尽可能小的曲弧度取决于导电带的尺寸和卷线筒的筒径。

然而，面板生产商或穿线机供应商自己就可以试着改进穿线机上的放线系统，以便在焊接前改进焊带安装。加大卷轴尺寸也可能有助于降低卷轴边缘产生的外倾角。

## 光伏导电带生产：等离子预制板与传统镀锡

传统铜线镀锡首先将铜线滚过熔融锡/焊剂池，然后对涂覆线材进行擦拭，并在冷却塔里垂直冷却。只有表面清洁且适当活化的导线才可能实现金属间粘接。

在用助焊剂进行表面活化之前，通常会用酸洗或侵蚀清洁导线表面。助焊剂是一种肮脏和牺牲环境的过程，也可能对操作人员造成损害。

下图对比了传统热浸镀锡和等离子预制板镀锡的工艺流程步骤。

等离子预制板工艺在焊带进入锡浴池允许锡粘着之前先对铜带进行退火、清洁和活化，无需助焊剂。

免助焊剂镀锡加速了金属间化合物层的形成，反过来使镀锡速度与传统工艺镀锡速度相比有可观的提升。

等离子预制板工艺经过调整可以将焊带退火以满足要求的任何柔韧度。可以实现屈服强度在50兆帕以下且粒度小的完全再结晶。

镀锡同时进行退火减少了对软质材料操作的次数。更小的应力和机械变形减小了轧线收带和镀锡放线产生的屈服强度和曲弧度的可能性。

使用超软色带的情况下，认识到精准操作和精确绕线的必要性很重要。

操作超软色带使用的精密传输系统可能是一项昂贵的投资，但它是每条镀锡生产线必备的。更快的镀锡生产线进而可以减少传输系统分配到每单位产出上的资本投资。

传统镀锡线要求镀锡前进行酸洗、冲洗和使用助焊剂。这些湿进程不但引起环境问题，而且不利于操作员的身心健康。

锡浴的助焊剂污染导致高昂的锡渣成本。使用湿工艺增加了必须严密监控的生产参数。

贵重、精密、公差严格的产品，如互联焊带的生产要求对生产条件进行严格控制，防止废品率超标。而当涉及到湿工艺时这通常很难办到。

这两种工艺的区别可以分为与生产效率相关的区别和产成品质量区别。

虽然等离子预制板镀锡工艺的投资成本更高，但是它带来的大量好处可以转化为可观的长期收益：

- 与5至60米/分钟的传统工艺生产速度相比，超过150米/分钟的生产速度意味着需要更少的镀锡生产线、更小的机械占地面积和更少的人力
- 工艺稳定性，等离子预制板镀锡生产线正常生产运行时间的延长和更少的卷轴切换意味着需要更少的操作材料和人员
- 为等离子准备的干燥表面替代了传统工艺的清洁、漂洗、烘干、加助焊剂、废渣处理和污水处理过程
- 免助焊剂生产使锡浪费减少
- 不同产品和规格之间的快速切换
- 更少的能源、人力、化学品及对它们的操作和维护带来的生产成本节约
- 等离子预制板镀锡工艺的在线质量控制转化为稳定的产品质量、更少的废品和更低的退货率

传统镀锡的关键生产参数与等离子预制板镀锡的生产参数比较见下表。

除了生产效率，与传统镀锡工艺相比，等离子工艺也能带来很多产品质量优势。

高级和持续的产品质量表现在：

- 对卷轴的屈服强度在60兆帕以下、伸长率超过30%的超级柔软导线
- 光滑、一致、有光泽、厚度公差更严格的涂层



图6: 等离子预制板镀锡线的触屏、用户友好人机界面

- 干燥、免助焊剂、无化学添加镀锡减化了流程控制，转化为更稳定的产品质量
- 内嵌激光涂层厚度测量系统可以在高速等离子生产线上得到合理运用
- 计算机的应用，附有警报和表面错误数据库的在线产品质量控制简化了质量控制活动
- 电脑辅助生产办法数据库既是操作员和产品经理的一种不可或缺的工具，也是生产诀窍管理不可分割的一部分。

等离子预制板工艺的持续性、自从2007年等离子预制板镀锡工艺首次引入光伏焊带生产中以来，它便因产品质量的稳定性、操作的低成本、低废品率、低锡渣率赢得了许多光伏焊带生产企业的青睐。

**Plasmait GmbH**  
Philipsstraße 27 / C3, 8403  
Lebring  
Austria  
电话: +43 3182 52 4751  
电子邮件: info@plasmait.com  
网址: www.plasmait.com

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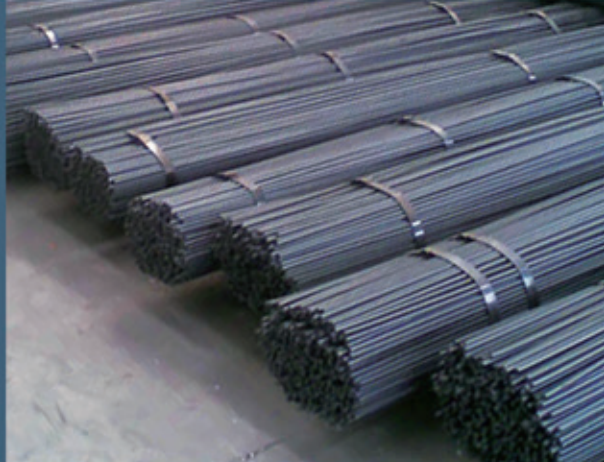
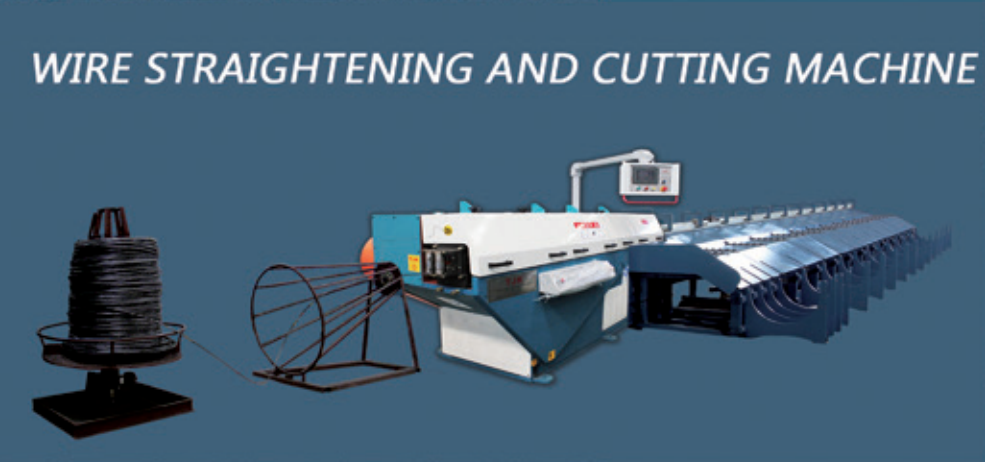


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**US copies only:** Wire & Cable ASIA (ISSN No: 0218-3277, USPS No: 022-979) is published bi-monthly by Intras Ltd and distributed in the USA by Asendia USA, 17B S Middlesex Ave, Monroe NJ 08831. Periodicals postage paid at New Brunswick, NJ and additional mailing offices.  
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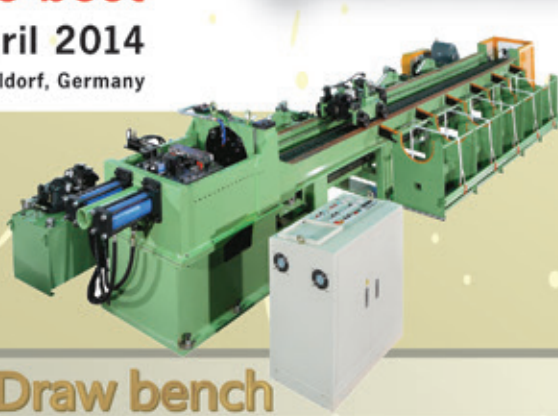


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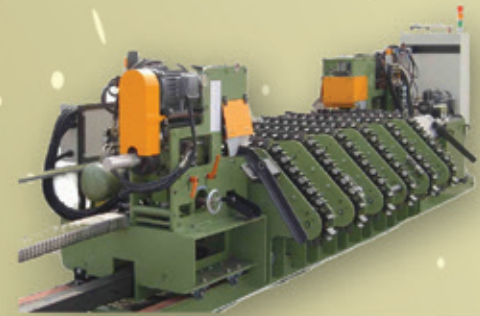
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