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JCΦ90-Φ200 High efficiency extrusion line



JCΦ35-Φ80 High efficiency extrusion line



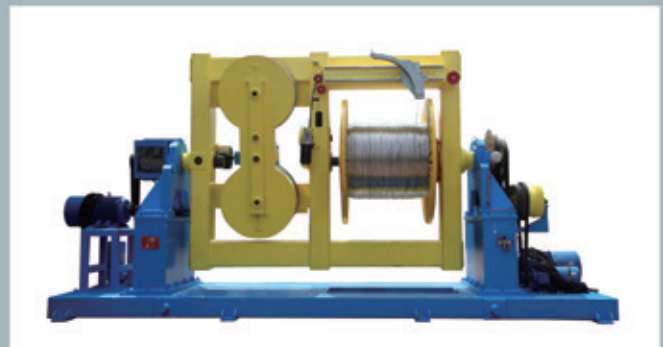
XBΦ500-Φ2500 Cantilever type single twisting machine



SJΦ1000-Φ2500 Double twist stranding machine



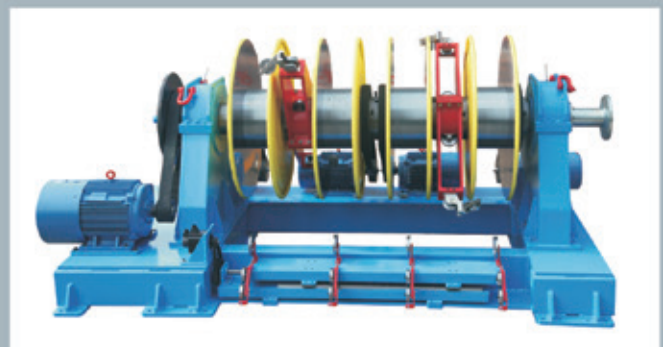
DJΦ630-Φ2500 A type Single twisting machine



DJΦ1000-Φ2000 Single twisting machine



Auto coiling and stacking line



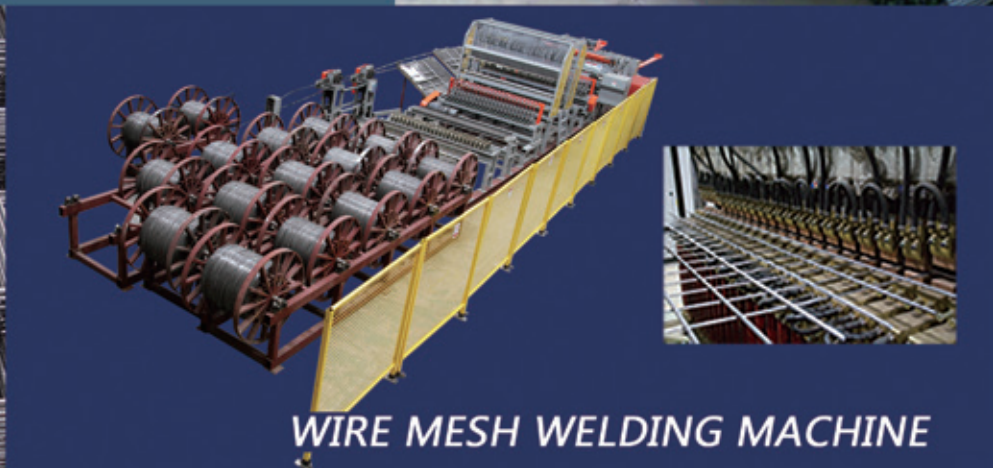
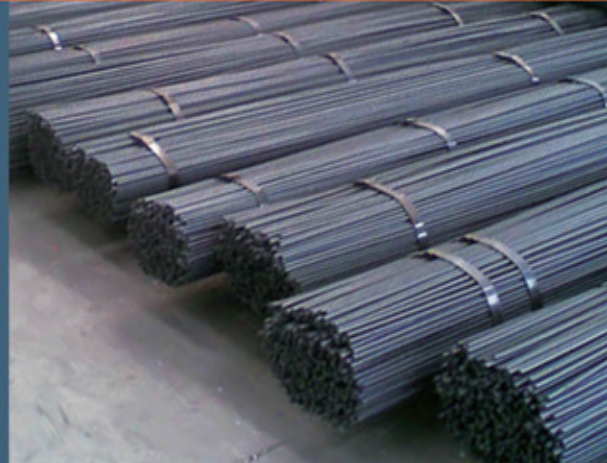
TXJΦ1200 Concentric stranding machine



STIRRUP BENDER

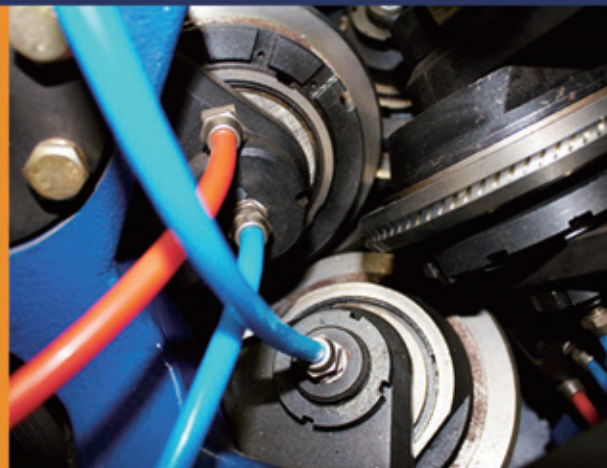


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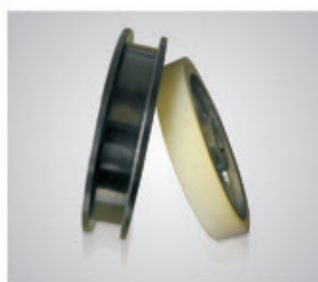
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Next Issue

**Getting Technical -
Optical Wrap Defect Inspection
for Cable**

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A glimpse into the future across the industry

Looking far into the future seems to be a pattern throughout this May issue of *Wire & Cable ASIA*.

Kobe Steel and partners Sugita Wire and the Fasten Group are increasing the production capacity at their Chinese joint venture that processes special steel wire rod into wire.

The venture – Jiangyin Sugita Fasten Spring Wire Co – anticipates expansion for advanced oil-tempered wire for cold-coiled suspension springs. The full story can be found on page 10.

UK company Metalube is continuing its expansion plans with the opening of a new office in Dubai – Metalube Arabia. The Manchester-based company's range of specialist lubricants has been well received in the area. The company also recently co-hosted a technical seminar with its distributor in the UAE. Full details are on page 15.

Starting from its Taiwan base, Unistrong Industrial is now expanding into China, Thailand and Indonesia, providing turnkey projects to an ever-expanding customer base.

The company offers tunnel pickling lines providing an output of 30,000 tons per month in Ningbo, China, and launched production in January 2015. Turn to page 22 for the full story.

Germany-based machine manufacturer Queins has launched an advanced horizontal planetary strander for the production of subsea cables.

The machine is designed for stranding of power conductors based on three reels. The full story can be found on page 25.

David Bell
Editor



When and where

2016

8–9 June:
Wire Expo –
trade exhibition –
Uncasville, CT, USA
Organisers:
Wire Association
International
Fax: +1 203 453 8384
Email: sales@wirednet.org
Website:
www.wireexpo16.com

2016

26–29 September:
wire China –
trade exhibition –
Shanghai, China
Organisers:
SECRI and Messe Düsseldorf
(Shanghai) Co Ltd
Fax: +86 216 169 8301
Email:
shanghai@mdc.com.cn
Website: www.wirechina.net

2016

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

2016

5–7 October
Wire and Cable India –
trade exhibition –
Mumbai, India
Organisers:
Messe Düsseldorf India
Pvt Ltd
Fax: +91 112 697 1746
Email: info@wire-india.com
Website:
www.wire-india.com



○ The connector being loaded onto the cable at Fukushima floating offshore wind farm demonstration

Connecting the largest floating wind turbine

FIRST Subsea has been awarded a contract to supply a cable connector for the third phase of Japan's Fukushima floating offshore wind farm demonstration.

In this latest phase of the project, the connector will be used to connect 22kV cable to the world's largest floating wind turbine.

First Subsea has provided all cable connectors for both 22kV and 66kV cables on the project.

In phase 1, two First Subsea cable connectors were used to connect 22kV cable to a 2MW wind turbine and a floating substation, and a third cable connector for a 66kV cable connection to the substation.

In phase 2, cable connectors were used for two 22kV cables from the substation to subsea cable joints close to the eventual positioning of the wind turbines in phases 3 and 4.

In phase 3, the First Subsea cable connector will complete the connection of the subsea cable joint to the 7MW floating wind turbine.

First Subsea's connector has a self-activating ball and taper mechanism, allowing offshore deployment without divers or the use of an ROV.

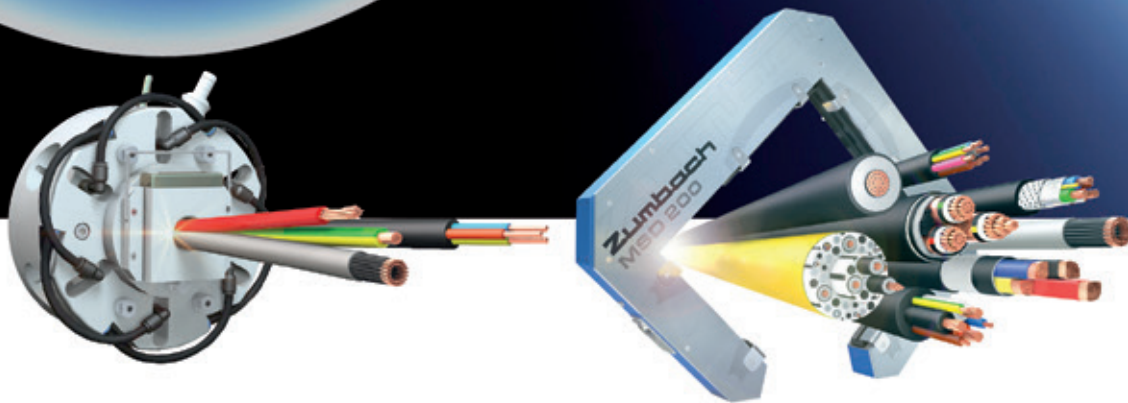
The male connectors are guided into receptacles on the wind turbine and substation and, once engaged, cannot be released until the load has been removed. A simple disengage mechanism allows the connector to be disconnected and recovered for re-use.

The self-activating connection offers significant savings in vessel time, and greater installation flexibility to cope with changes in weather conditions.

First Subsea Ltd – UK
Website: www.firstsubsea.com

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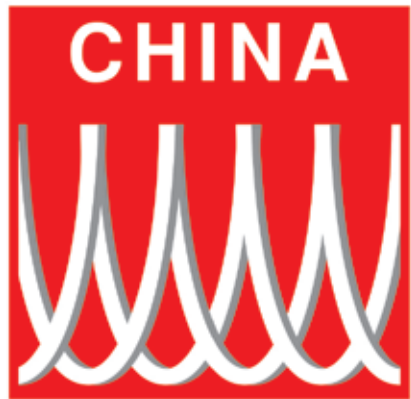
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Capacity increase at joint venture



○ The JYSF plant in Jiangyin, Jiangsu Province, China

KOBE Steel Ltd and partners Sugita Wire Ltd and China's Fasten Group have agreed to increase the production capacity of their Chinese joint venture that processes special steel wire rod into wire.

The joint venture, Jiangyin Sugita Fasten Spring Wire Co Ltd (also called JYSF), will install high-frequency induction tempering equipment and another wire drawing machine to produce oil-tempered wire at its plant in Jiangyin, Jiangsu Province. Plans call for mass production to start in October 2016.

JYSF was established in 2005 to produce and sell oil-tempered wire for cold-coiled suspension springs. Full-scale operation began in 2007. JYSF has been providing a stable supply of this high-quality wire in China, where the automotive market is anticipated to grow over the medium to long term.

As the need for lighter automobiles increases due to stricter environmental regulations, demand for advanced oil-tempered wire for cold-coiled suspension springs is anticipated to expand in the future.

The installation of induction tempering equipment will make possible rapid quenching and tempering to produce high-strength wire.

Jiangyin Sugita Fasten Spring Wire Co Ltd – China
Website: www.jysf-otw.com

Steep increase in profits

CMI Limited, a speciality cables manufacturer, has announced its unaudited financial results for the quarter ended 31st December 2015.

The revenues are at Rs 66.44 Cr in Q3 2015-2016 as against Rs 36.78 Cr in Q3 of 2014-15, showing an increase of 80.66 per cent. The revenues have also increased by over 15 per cent on a QoQ basis, up from Rs 57.57 Cr in Q2 2015-16.

The Profit after Tax (PAT) at Rs 4.81 Cr in Q3 2015-2016, against Rs 2.01 Cr in Q3 of 2014-15, marks an increase of 139 per cent in profitability. The PAT has also increased by over 19.66 per cent on a QoQ basis, up from Rs 4.02 Cr in Q2 2015-16.

CMI Ltd – India
Website: www.cmilimited.in

An astronaut in a white space suit is floating in space. In the background, the reddish-orange surface of Mars is visible on the left, and the dark, cratered surface of the Moon is in the upper center. The rest of the background is the blackness of space with some stars.

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Podcast chief's keynote address

MARK Horstman, host of the award-winning business podcast Manager Tools, will deliver the keynote address at this year's Wire Expo.

The address, sponsored by General Cable and Gem Gravure Co Inc, will be followed by a two-hour manufacturing management seminar to further explore the Manager Tools philosophy, during the Wire Association International-organised event from 7th to 9th June at the Mohegan Sun Resort Casino, Connecticut, USA.

Tim Wampler, a member of WAI's conference programming committee, and vice president of manufacturing at General Cable, said: "I am a huge fan of Mark's Manager Tools podcasts. The topics – including how to conduct one-on-ones; providing employee feedback; and driving results through weekly commitments – are relevant for every manager at any level and his advice is actionable."

Additional highlights will include:

- Workplace organisation and workforce management sessions
- A health and safety segment

Exceeding expectations

With today's fast moving technology, Mikrotek has moved forward to make dies which exceed customers' expectations.

Trust, quality, assured deliveries and the right choice of raw material are the key factors, which has made Mikrotek globally competitive.

The company's main aim is to produce quality products according to the customer requirements and to be a leader in providing excellent customer service.

The company's product line includes superfine natural diamond dies (0.013mm to 0.05mm), natural diamond dies, mono diamond dies, polycrystalline diamond dies, shaving dies, compacting dies, tungsten carbide dies, enamelling dies with TC and PCD inserts, reconditioning and repolishing services and die polishing equipment.

Mikrotek Machines Ltd – India
Website: www.mikrotek.in

- A capital expansion projects panel
- A mobile classroom to Davis Standard
- Peer networking opportunities
- Plant tour of Freeport McMoRan

Wire Expo 2016 exhibits in the centre's Uncas Ballroom are open from 8th to 9th June from 10am to 5pm, and 10am to

3pm, respectively. 75 per cent of booth inventory has been sold so far, representing nearly 200 exhibiting companies that manufacture wire and cable or supply the industry. Displays cover more than 120 product types.

Wire Association International – USA
Website: www.wirenet.org

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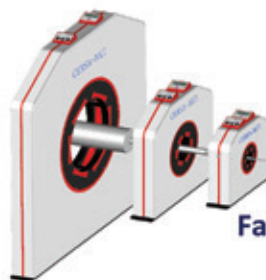
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Company prepares for 26 years in business



○ Staff at the annual holiday luncheon

MILTEC Corporation reflected on employee success last year and took the opportunity to recognise and thank employees, new and seasoned veterans, at its annual holiday luncheon.

There were several employees who celebrated milestones in 2015. One employee was recognised for their 25-year anniversary, followed by four employees who celebrated ten years and three who celebrated five years.

The company also recognised 12 employees who completed their one-year anniversary in 2015.

Several new employees joined the team in 2015, some of those filling key management positions in sales, human resources and the bulb division, while

others joined in research and development, purchasing and manufacturing.

Each year, Miltec formally recognises one individual who exemplifies customer satisfaction, time management, safety, initiative and the company's core values.

A committee of former recipients of the award collects nominations and ratings and selects the recipient of this honour.

This year's award went to Jennifer McCullough, who will be celebrating her fourth year with the company, and is an electro mechanical assembler, heavily involved in both of Miltec's MPI and HPI products.

She ensures high quality assemblies

and provides on-the-floor instruction and training to co-workers.

As the company approaches 26 years in business, president Bob Blandford took the opportunity to personally recognise and thank all employees, recapping 2015 and sharing the exciting forecast for 2016.

For 2016, plans are to grow employee population to support new business opportunities and the release of several new innovative products. In addition, Miltec will continue to train employees, and partner with various Maryland agencies in support of training to promote business growth.

Miltec UV – USA
Website: www.miltec.com

It's all in the name as Clifford changes to reflect diversity of machinery

Clifford Welding Systems (CWS) has undergone a name change to Clifford Machines & Technology (CMT).

The name change has been effected to better reflect the diversified range of machinery that is now being delivered to customers and to express the capabilities and ambitions of CMT to produce machines and solutions in the industrial equipment space.

Craig Markham, CEO, said: "We increasingly find ourselves receiving enquires to build capital equipment for customers not in our traditional wire and steel industries, customers that recognise CMT's world-class engineering, design, development and project capability.

"The new name is a good fit for the type of projects that we find ourselves involved with; delivering machinery and services to exciting new markets where our core capabilities allow us to deliver solutions to challenging problems."

Iain Ambler, technical director, added: "The Clifford name has been linked to the wire and steel industries for the last 50 years and yet all this time we have been providing machinery and solutions to business in industries outside this segment.

"Our new name reflects all the history and experience we have in the machine building space and speaks to our capabilities to produce equipment, incorporating cutting edge technologies, with the same Clifford quality, reliability and innovation that our customers have come to expect."

Clifford Machines & Technology – South Africa
Website: www.cliffeng.com

Customer satisfaction

Madem Gulf Ind concluded the 2015 customer satisfaction survey with 42 wire and cable manufacturing customers in Middle East, Asia and African countries.

Madem Gulf received 38 (90 per cent) responses polled in three categories: bad, good and very good; 100 per cent of responses fell into the good and very good categories. Madem Gulf polled the following services: claim response, quantities shipped X received, documentation, deliveries, quality inspections, performance, and packing.

Madem Gulf – Brazil
Website: www.mademreels.com

New Dubai office

LUBRICANTS innovator and manufacturer Metalube has continued its global expansion by opening an office in Dubai, creating Metalube Arabia.

Nick Pomeroy, who has worked in the region for the past ten years, will head the new operations. He said: "This is an exciting time for Metalube with the launch of a range of new products.

"One of the key areas in the region that we are focusing on is the oil and gas industry. It is so positive to work with an organisation that understands the importance of having a real and physical presence in the countries where it exports.



○ Delegates at the seminar held in Dubai



○ Nick Pomeroy will head up Metalube Arabia

He added: "So far the Metalube range of lubricants have been exceptionally well received here and we have big plans to launch a host of new product ranges into the region over the coming year. Our customers are comforted by the knowledge that we have industry experts on hand, to ensure a seamless operation."

The company also recently co-hosted a technical seminar with its distributor Mech N Tech Enterprises LLC in Dubai, United Arab Emirates (UAE). The seminar was held at Le Meridian, Dubai Airport, and was attended by over 100 people from all sectors of

manufacturing and maintenance from across the UAE.

Commercial director Douglas Hunt said: "We were delighted to jointly host this technical seminar with our distribution partners in Dubai – Mech N Tech Enterprises LLC. The company sees the UAE as a vital part of its growth plans. These seminars are an excellent way of presenting our brand and unique lubricant technologies to our clients in a very convivial place with great hospitality for our clients to enjoy."

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

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IWCS call for papers

THE IWCS International Cable & Connectivity Symposium has officially announced a call for papers for its 65th annual conference to be held in Providence, Rhode Island, USA, from 2nd to 5th October 2016.

For over 60 years, the IWCS Symposium has been a leading worldwide conference for peer-reviewed papers and presentations on technologies and trends in wire, cable and connectivity for the communications, data, electronics, power, industrial, automotive and aerospace industries.

Accepted papers will be published in the conference proceedings and authors will present their work at the 2016 IWCS Conference. Awards are given for the outstanding technical paper, outstanding poster paper and best presentation.

Abstracts for papers are sought from academic, manufacturing and user communities worldwide – including subject matter experts, application solutions providers and product innovators, as well as professionals who are engaged in various industry segments.

If the work is of interest to the worldwide cable and connectivity industry, it should be presented at the IWCS Conference. In the 2015 symposium, over 130 papers were presented to nearly 1,000 attendees.

The 2016 Symposium will emphasise innovations, new cable component applications and sustainability issues for raw material compounds, such as fluoropolymers, PVC, low smoke/flame retardant halogen free, olefins, thermoplastic elastomers, and thermoplastic urethanes.

Topics of interest also include, but are not limited to: assemblies; cable, fibre and conductor design; commercial applications for materials and processes; codes and standards; copper and optical connectivity; copper cables and accessories; environmental/sustainability recognition; fibre, fibre optic cables and components; FTTH/FTTX; installation techniques; manufacturing/processing; market studies; materials for cable and connectivity components; present and future network demands; and wire harness design and challenges.

In addition to the papers presented in the technical symposium, the conference includes an executive track with presentations by business leaders, key industry analysts and market experts.

A supplier exhibition of more than 120 suppliers of materials, components and accessories is another important aspect of IWCS, providing for new product presentations and an excellent networking opportunity with industry peers.

An industry-recognised certification programme of professional development courses is offered annually.

IWCS – USA
Website: www.iwcs.org

Wiedenbach to lead new 'industrial sectors'

WIEDENBACH has been appointed to lead the 'industrial sectors' division within Domino's global sector and solutions organisation (GSS-Industrial), which serves the cable and wire, electronics, automotive and building and construction industries.

The appointment represents a strategic step forward in Domino's relationship with Wiedenbach, which has been a member of the Domino Group for over ten years.

Wiedenbach will be responsible for creating and developing a global network of industrial sector specialists within Domino's channels, as part of GSS-Industrial's global remit to grow Domino's worldwide business through the coordination, development and support of strategies with all Domino subsidiaries and distributors.

The industrial sector will be headed up by Frank Dubbins, authorised officer of Wiedenbach, who said: "Thanks to the outstanding sales and

service network of the Domino Group, we will be able to respond quicker to future market trends and developments, as well as meet our customers' requirements by offering more up-to-date solutions."

Michael Woehrmann, managing director of Wiedenbach, added: "This appointment represents an exciting new opportunity for both companies.

"We're confident that Domino will benefit significantly from the commitment and experience Wiedenbach has in the industrial sector.

"At the same time, we look forward to playing a significant role in the realisation of this global network of industrial sector specialists."

Founded in 1978, Domino Printing Sciences offers a comprehensive portfolio of coding and marking solutions for the application of variable

and authentication data, bar codes and unique traceability codes onto product and packaging, across a wide variety of industrial sectors.

Satisfying the compliance and productivity requirements of manufacturers worldwide, Domino's innovative inkjet, laser, print and apply and thermal transfer overprinting technologies are used for primary, secondary and tertiary coding and marketing applications.

Domino employs 2,600 people worldwide and sells to more than 120 countries through a global network of 25 subsidiary offices and more than 200 distributors.

In 2004, Domino acquired Wiedenbach GmbH, a provider of inkjet printers for contactless product marking.

Wiedenbach Apparatebau GmbH
- Germany
Website: www.wiedenbach.com



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在Fukushima海上漂浮风力发电场演示连接器被安装到电缆上

连接最大的漂浮风力发电机

海底连接器专家First Subsea获得了合同，为日本近海福岛浮动海上风电场示范的第三阶段提供电缆连接器。

在最新的一期工程中，该连接器将被用于连接22kV电缆到世界上最大的浮动式风力涡轮机。

First Subsea已为福岛项目的22kV和66kV电缆提供了所有的电缆连接器。在第一阶段，二套First Subsea电缆连接器被用于连接22kV电缆到一台2MW风力涡轮机和一个浮动变电站，第三套电缆连接器为66kV电缆连接到变电站。

在第二阶段，电缆连接器被用于连接两条22kV电缆，从变电站到靠近在第三和第四阶段的风力涡轮机最终定位的海底电缆接头。

在第三阶段，First Subsea电缆连接器将完成海底电缆接头到7MW浮动风力涡轮机的连接。

First Subsea电缆连接器具有自激活球形和锥形槽机构，允许既无潜水员辅助，也无潜水器辅助的近海部署。连接器插头被引导到风力涡轮机和变电站上的插座中，而且，一旦接合，直到负载被移除之前不能被释放。一个简单的脱离机械装置允许连接器分

离，并回收再利用。自激活电缆连接能够显著节省船的时间，而且安装灵活性更大，以应付近海天气条件的变化。

First Subsea Ltd – 英国
网址: www.firstsubsea.com

Volvo汽车采用Leoni线束系统

Leoni客户名单新添Volvo Car Corporation。根据瑞典汽车制造商Volvo首个订单需求，Leoni线束将用于Volvo未来车型。“我们很高兴，Volvo Car Corporation将依靠我们的全球影响力和高品质的服务，” Leoni管理委员会成员Frank Hiller博士表示。第一份订单包括车身多处采用的线束，涵盖底盘、车门、顶棚和减震器等部位。Leoni将以强劲的研发能力和分布在美国、亚洲的七个线束系统生产基地为后盾，支持Volvo Cars全球增长计划。Volvo Cars成为其客户后，Leoni将扩大客户基础，迈上成长道路的新台阶。2014年，Leoni曾获得Volvo Cars中国母公司Geely的订单。

Leoni AG – 德国
网址: www.leoni.com

Miltec拥有26年行业经验



○ 公司员工参加年度节日午宴

在全体员工的努力下，Miltec Corporation在2015年取得了成功。值此一年一度节日午餐活动，公司特别感谢和激励了所有新老员工。

2015年，对于公司好几位员工来说都具有里程碑意义，其中一位在公司供职25年之久，一位10年，另三位5年。公司对其他十二名工作满一年的员工取得的成绩也表示认可。

2015年，也有几名新员工加入了这个团队，分别入职重要的销售管理岗位、人

力资源以及研发和采购制造等部门。每年，Miltec都将正式推出一位在客户满意度、时间管理、安全意识、主动性和公司核心价值观方面表现突出的员工。

历年的获奖者组成评委会，负责收集提名、评比和选定最终的获奖人。

今年的得奖者是Jennifer McCullough，她在公司任职四年，是一名机电装配师，承担了大量的MPI和HPI产品工作。她保证高品质组装和实地指导培训同事。

公司业务经历了26年的发展，总裁Bob Blandford先生借此机会与所有员工分享2015年取得的丰硕成果，对他们取得的成绩表示感谢，激励2016年再创佳绩。

展望2016，公司计划招揽更多人才，以支持新的业务发展和发布创新产品。此外，Miltec将继续培训员工，与马里的几个代理商紧密合作，促进业务增长。

Miltec UV – 美国
网址: www.miltec.com

Wiedenbach领导Domino Group 旗下新工业部门

Wiedenbach 加盟 Domino Group 已有十多年之久，此次任命意味着 Domino 和 Wiedenbach 的战略关系又迈进了一步。

Wiedenbach 负责创建和发展 Domino 集团内工业领域专家网络，作为 GSS-Industrial 全球资源的组成部分，通过与所有分公司和分销商建立合作、开发和支持战略来发展 Domino 全球业务。

Wiedenbach 授权 Frank Dubbins 负责领导工业部门，他表示：“由于 Domino 集团优越的销售服务网络，我们能够对未来市场趋势与发展做出更快的反应，通过提供更多最新的解决方案来满足客户的需求。”

Wiedenbach 总经理 Michael Woehrmann 补充说：“这项任命为两家公司带来了新的发展机遇。我们相信，Domino 将显著受益于 Wiedenbach 在工业领域内享有的声誉和经验。同时，我们期待着在全球工业领域专家网络中发挥重要的作用。”

Domino Printing Sciences 成立于1978年，成立至今一直致力于为全球各种应用提供全面的标识和打码解决方案，应用包括认证数据、条形码和独特的追踪追溯码，适用于各行业的众多产品与包装。

Domino 创新喷墨、激光打码、热转印打码等技术满足全球制造商合规性和生产力的需求，适用于一级、二级和三级编码和市场推广。

Domino 全球员工达2,600人，借助于25家办事处和200多家分销商组成的庞大网络营销体系，产品远销120多个国家。2004年，Domino 收购了非接触式产品标识喷墨打印机供应商 Wiedenbach GmbH 公司。

Wiedenbach Apparatebau GmbH – 德国
网址: www.wiedenbach.com

客户满意度

Madem Gulf Ind 2015年对42家 电线电缆制造商进行了客户满意度调查，这些客户主要来自中东、亚洲和非洲等国家。Madem Gulf 收到了38(90%)家客户的反馈，客户调查分为较差、较好和非常好三个等级，收到的38份问卷都反馈较好和非常好。Madem Gulf 接受调查的服务包括：需求回应、发货与收货数量、单据、交付、质检、性能与包装。

“我们感到非常高兴，公司连续四年创下了100%客户满意度的良好记录，再次增强了我们在该地区深化质量的战略政策。2015年，Madem Gulf 也因高质产品与服务赢得了更多的增值客户，”总经理 Adel Abdulla Mohammed 表示。

“客户满意度调查结果表明 Madem Gulf 的发展道路是正确的，我们有信心在2016年再攀新高度，尤其在执行 ISO 9001:2015 和 14001:2015 新的 ISO 质量管理体系标准后，将进一步加强和深化我们运营与产品的质量。”

“公司连续四年来取得了100%的客户满意度，表明我们致力于为全球客户提供最佳的产品与服务，”运营经理 Cristian Outeiral 补充说。“我们的调查反馈率从63%提升到90%也是很重要的。”

Madem Gulf – 巴西
网址: www.mademreels.com

合资企业增容



○ 中国江苏江阴 JYSF 工厂

Kobe Steel Ltd 及其两家合作伙伴 Sugita Wire Ltd 和中国法尔胜集团都同意中国合资企业增产特殊钢线。

合资企业名为江阴法尔胜杉田弹簧制线有限公司 (简称 JYSF)，将配置高频感应淬火设备和拉丝机，用于江苏江阴工厂生产油淬钢线。预计于 2016 年 10 月启动大规模生产。

JYSF 成立于 2005 年，主要制造与销售汽车冷卷悬架弹簧用油淬钢线。2007 年开始批量生产，JYSF 为中国汽车市场稳定提供高质钢线，该汽车市场在中长期有望实现增长。

随着环保法规的加强，轻量化需求也不断扩大，在这一背景下，市场对更高强度的冷卷悬架弹簧用油淬钢线将有更大的需求。因此，公司决定增强 JYSF 的设备，新的感应淬火设备具备急速淬火及退火能力，可生产高强度钢线。产能的提升将进一步强化 Kobe Steel 冷卷悬架弹簧用油淬钢线的供应体制和抓住中国市场对高强度材料的旺盛需求商机。

Jiangyin Sugita Fasten Spring Wire Co Ltd – 中国
网址: www.jysf-otw.com

播客主席发表主题演讲

Mark Horstman 将举办获奖企业播客 Manager Tools，并计划在今年的线材博览会 (Wire Expo) 上发表主题演讲。此次行业盛会由国际线材协会主办，于 6 月 7 日至 9 日在美国康涅狄格州 Mohegan Sun 度假酒店举行，展会期间将举行专题演讲会，General Cable 和 Gem Gravure Co Inc 两家公司为演讲会提供支持，紧随其后，将安排两个小时的生产管理研讨会，进一步探讨 Manager Tools 管理行销理念。

General Cable 制造副总裁 Tim Wampler 也是 WAI 会议策划委员会的成员之一，他表示：“我是 Mark 发行的 Manager Tools 播客的铁杆粉丝，主题包括如何做好 “one-on-ones” 系列；提供员工反馈；通过每周一次的承诺来推动效益 - 这些主题与各个层面的管理者都息息相关，其建议也是切实可行的。”

会议亮点还包括：

- 生产区域布局和人力资源管理
- 健康与安全管理
- 资本扩充项目
- Davis Standard 移动课堂
- 同行交流
- Freeport McMoRan 工厂参观

Wire Expo 2016 展品对外开放时间为 6 月 8 日上午 10 点到下午 5 点，6 月 9 日上午 10 点到下午 3 点，地点在展会中心 Uncas Ballroom。目前 75% 的展位已售出，近 200 家参展企业制造电线电缆或为行业供应商。展品覆盖 120 多个产品类型。

Wire Association International – 美国
网址: www.wirenet.org

IWCS 征集论文

IWCS 国际线缆行业会议宣布为召开第 65 届会议征集论文，会议将于 2016 年 10 月 2-5 日在美国罗得岛州普罗维登斯举行。60 多年以来，IWCS 是全球线缆行业公认的最具权威性的国际电线电缆行业会议，引领着行业最新技术发展潮流。会议环节包括论文张贴展示和论文大会演讲，内容涵盖通信、数据、电子、电力、工业、汽车和航空航天电线电缆等领域。论文提交截止日期为 2016 年 4 月 8 日。被录用的论文将出版在会议论文集中，作者在 2016 IWCS 大会上做论文演讲。优秀的技术论文、海报论文和最佳呈现的作品都将获得奖项。

论文摘要选自世界各地的学术、制造和用户群体 - 包括主题专家、应用解决方案供应商和产品创新者，以及从事各种行业领域的专业人士。如果作品能够引起全世界电线电缆行业的兴趣，就应该呈现在 IWCS 行业大会上。在 2015 年的会议上，向近 1000 位来宾展示了 130 多份技术报告。2016 行业大会将聚焦创新、新电缆组件应用和原料化合物的持续发展问题，比如含氟聚合物、聚氯乙烯、低烟/阻燃无卤、烯烃、热塑性弹性体和热塑性聚氨酯等。

讨论的话题还包括：组件；电缆、光纤和导线设计；材料和工艺的商业应用；规范和标准；铜和光纤连接；铜缆和附件；环保/可持续性识别；光纤、光缆和组件；FTTH/FTTX；安装技术；制造/加工；市场研究；电缆与连接组件材料；目前和未来网络需求；线束设计与挑战。除了在技术研讨会上展示论文外，会议还包括业界领袖、重要行业分析师和市场专家对报告的执行跟踪。

IWCS 另一重要环节是供应商展览，展会上，120 多家供应商展示了材料、组件和配件，为业内人士提供了一个推介新产品和相互交流的平台。专业发展课程行业公认认证方案每年一次。

IWCS – 美国
网址: www.iwcs.org

利润骤增

专业电缆制造商 CMI Limited 最近公布了截至 2015 年 12 月 31 日的季度未经审计财政业绩。公司 2015-2016 财年第三季度营业收入 66.44 Rs. Cr，相较于 2014-15 财年第三季度 36.78 Rs. Cr 提高了 80.66%。该营收额与 2015-16 财年第二季度 57.57 Rs. Cr 相比较，季度增长率也超过 15%。

2015-2016 财年第三季度税后利润 (PAT) 达 4.81 Rs. Cr，较之 2014-15 财年第三季度 2.01 Rs. Cr，利润率提高了 139%。2015-16 财第二季度税后利润为 4.02 Rs. Cr，由此可见，季度税后利润 (PAT) 也提高了 19.66%。截至 2015 年 12 月 31 日，季度每股收益 (EPS) 为 3.54 卢比，2014-15 财年第三季度为 1.97 卢比，上涨了 79.7%。2015-16 财年第二季度每股收益 (EPS) 为 3.21 卢比。

“本财年我们的目标是实现收入增长突破 225 Rs. Cr，我们看好公司及行业未来的发展前景。公司正在进行新的收购，这些举措有助于我们大幅超越行业的复合年增长率 (CAGR)，” 总经理 Amit Jain 先生表示。

CMI Ltd – 印度
网址: www.cmilimited.in

Metalube开设迪拜办事处

世界领先的润滑油创新与制造商Metalube继续扩大业务版图，在迪拜设立办事处，成立了新公司Metalube Arabia。

过去十年一直在该地区工作的Nick Pomeroy将负责新公司的运营工作。他说：“这对Metalube来说是令人兴奋的一刻，它将会带动一系列新产品的推广。”

“在该地区我们关注的一个关键领域是它的石油天然气行业。Metalube能在其产品主要的出口国家设立办事处，并意识到重要性，这非常令人振奋。我为能效力于这样的一家公司感到自豪。”

他还说：“到目前为止，Metalube一系列润滑油产品已被当地客户广泛认可接

○ Nick Pomeroy将领导阿拉伯公司Metalube Arabia



○ 代表们出席迪拜研讨会

受，而我们来年仍有许多大的计划将一系列新产品在该地区进行推广。客户对我们相当信任，因为他们知道我们拥有一批有行业知识的专家确保产品在生产中的正常运作。”

公司最近还与阿联酋迪拜的分销商Mech N Tech Enterprises LLC共同主办了一场技术研讨会。

研讨会在迪拜艾美酒店及会议中心举行，阿联酋全国制造与维护众多行业100余人出席了会议。与会的Metalube代表有总经理Robert Brown、商务总监Douglas Hunt和Metalube阿拉伯公司总经理Nick Pomeroy。

Hunt先生表示：“我们非常高兴与迪拜分销合作伙伴Mech N Tech Enterprises LLC共同举办这次的技术研讨会。公司将阿联酋视为其发展计划的重要组成部分。

“研讨会让我们能够在轻松愉快的氛围中向客户展示品牌和推介特种润滑油技术，同时客户也能享受到热情周到的服务。”

公司制造一系列有色金属拉丝油、保养润滑油和各种防腐蚀与成型油，在中国、印度和巴西设有办事处。

Metalube Ltd – 英国
网址: www.metalube.co.uk

产品超出客户预期

随着技术发展的日新月异，Mikrotek生产的模具产品已超越客户的预期要求。信任、质量、有保证的交付期和选择合适的原材料是Mikrotek在全球市场取胜的关键因素。公司目标是根据客户要求制造优质产品，成为提供卓越客户服务的市场领导者。公司产品线包括超细天然金刚石模具（0.013mm - 0.05mm）、天然金刚石模具、单晶金刚石模具、多晶金刚石模具、剃齿模、压制模具、碳化钨模具、带有TC和PCD刀片的涂漆模，另外，公司还提供修复与再抛光服务，以及模具抛光设备。

Mikrotek Machines Ltd – 印度
网址: www.mikrotek.in

Clifford公司更名

Clifford Welding Systems (CWS) 已启用新的公司名称Clifford Machines & Technology (CMT)。更名已经生效，新的名称更能体现公司能够为客户提供各种系列的机器以及CMT在工业设备领域生产机器与提供解决方案的能力与信心。

首席执行官Craig Markham说道：“我们更多地发现，给我们发来询盘的客户不再局限于传统线材与钢铁行业的设备制造，越来越多的客户认可CMTs世界级的工程、设计、开发与项目的能力。”

“新名称能更准确地说明公司业务，我们为新兴市场提供机械与服务，其核心能力使得我们能够为行业挑战性的问题提供解决方案。”技术总监Iain Ambler补充说：“Clifford这一名称在过去的50年里一直与线材、钢铁紧密相连，但同时我们也一直在为钢铁和线材以外的行业提供机械与解决方案。”

“新名称也体现了我们在机器制造领域所拥有的历史经验以及采用最先进的技术制造设备的能力，同时，秉承了Clifford一贯的品质和客户所期望的可靠性与创新。”

Clifford Machines & Technology – 南非
网址: www.cliffeng.com



○ The Unistrong tunnel-type pickling line

Tailored solutions

FOUNDED in Taiwan, Unistrong Industrial Ltd started with tooling and machinery products and is now involved in turnkey projects, providing tailored solutions to a customer base which has expanded to China, Thailand and Indonesia.

Unistrong offers tunnel pickling lines providing output of 30,000 tons per month in Ningbo, China, and launched production in January 2015. Each line is tailored to meet customers' specific needs.

The pickling line is a special design with a closed tunnel to minimise the exhaustion of corrosive fumes and maximum isolation to the outside

environment and operators, resulting in a cleaner environment, and safe working conditions.

Throughout the entire tunnel, the required treatment medium and time can be controlled automatically or manually for each type of material grade and type using the PLC-controlled system.

The PLC system will monitor multiple cranes to transport material automatically through necessary treatment steps through various chemical baths.

For that reason, the final surface quality is higher, with less chemical

and fresh water consumption. Other benefits of Unistrong's tunnel pickling line are:

- Hazardous-free working environment
- Qualified for worldwide environmental certifications
- Central and automatic control systems, automatic production
- Minimum operator errors
- Low manpower requirements
- Optimised chemical consumption
- Ability to process multiple material types simultaneously
- Various treatment programmes

Unistrong Industrial Co Ltd – Taiwan
Website: www.unistrong.com.tw

Update for Titan laser cutters



○ Major updates for the Titan family of laser cutting machines

FONON Corporation has unveiled ten major updates to the Titan family of large, flat-bed multipurpose laser cutting machines, integrating multiple subsystems and introducing several evolutionary improvements which increase end-user productivity, lower costs over time, minimise the Titan's floor space footprint and reduce its power consumption.

Designed to consume less than five per cent of the power required by common carbon dioxide (CO₂) laser systems, the Titan FX cutting machine is a maintenance-free, turnkey system, with an integrated laser source and heat exchange.

Its laser is modular, available in 1kW, 2kW or 4kW increments, allowing users to increase the laser cutting power up to 8kW, and field-upgradeable, empowering users themselves to quickly adapt the system to changes in their production environment. This eliminates many of the high installation and maintenance costs borne by users of typical laser cutting systems.

Technical advancements recently incorporated in many of Fonon's other laser material processing systems allow the Titan FX to adjust dynamically to slight variations in thickness across the metal plate.

Additionally, the updated Titan is equipped with a sealed feedback sensor, allowing flawless operation in harsh industrial environments. Its frictionless, direct drive linear-motion platform, software-controlled orthogonality and lightweight bridge enable tremendously high acceleration and "cutting on the fly" capabilities.

The new Titan design eliminates several components prone to failure in typical large-format laser cutting systems, increasing the system's long-term reliability.

Together these advancements enhance the user's productivity in terms of laser speed, acceleration, and laser placement accuracy and have the potential to save users hundreds of thousands of dollars per year.

Further user-centric advancements include the ability to recalibrate the gantry at the press of a single button, ensuring the material is always in alignment, free of seizures and unplanned machine failures. Power wattage upgrades to the laser do not require a specialised field engineer, and all operational steps are designed specifically for user best practices.

As with other Fonon systems delivered under the Laser Photonics brand, the Titan is a true plug-and-play system, requires no consumables, and is maintenance-free.

"Until now, the most advanced laser cutting technologies were available only to industrial giants," said Dmitry Nikitin, CTO and interim CEO of Fonon Corporation.

"The redesigned Titan FX laser cutting system, with its drastically reduced base price, ease of installation and low operational costs, opens the door for small and medium-size companies to avail of the most advanced cutting technology."

Fonon Corporation – USA
Website: www.fonon.us



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Hybrid assemblies from Northwire

NORTHWIRE Inc, a subsidiary of the Lemo Group, has been officially certified by Lemo to build and repair SMPTE hybrid fibre optic cable assemblies.

Fully compatible with Lemo push-pull connectors – including the hybrid electrical/fibre optic 3K series – Northwire's SMPTE 311 and ARIB versions are also compliant to RoHS2, REACH, ANSI and UL 758 AWM.

Resistant to crush, impact, abrasion, cut and VW-1 flame testing, the Lemo and Northwire combination is said to “ensure quality and performance for rugged outdoor broadcast applications”.

“In addition to celebrating our one-year anniversary within the Lemo group, Northwire has the pleasure of expanding our interconnectivity suite of products and services with Lemo to offer fully certified SMPTE and ARIB end-to-end

solutions,” said Mike Schauls, VP of operations and engineering.

“Around the world, our Lemo colleagues in the United Kingdom, Germany, Benelux, Japan, China, Singapore and the United States are equipped with fibre termination facilities and we are pleased to complement their efforts and expand Northwire's HD broadcast offering to our valued customers,” he added.

Northwire project managers, in collaboration with research and development, will focus on expanding SMPTE and ARIB product lines with halogen-free flame retardant, low smoke zero-halogen, low smoke halogen-free, riser, plenum rated and low temperature interconnectivity solutions.

Northwire Inc – USA
Website: www.northwire.com

Award-winner from Schleuniger

SWISS Schleuniger Group celebrated a great success at the productronica 2015 trade fair in Munich, Germany, with the company's CoaxCenter 6000 winning the productronica Innovation Award in Cables, Coils and Hybrids Cluster, prevailing against renowned competitors.

The CoaxCenter 6000 is claimed to be the world's first and currently only machine system that enables micro-coaxial cables to be processed fully automatically and with high precision. On behalf of the award panel, Christian Stoppok from the German Electrical and Electronic Manufacturers' Association (ZVEI) emphasised that the panel was particularly convinced by the innovative combination of a maximum degree of precision, the quality monitoring, and the processing volume.

Schleuniger CEO Christoph Schüpbach was extremely pleased about the prize and put this important award into a comprehensive context: “Our DNA drives us to perfect cable processing, to even better understand the current and future requirements of the industry, and respond with convincing solutions. Our CoaxCenter 6000 is just such a solution.”

It won the productronica Innovation Award in representation for the entire range of Schleuniger innovations. Mr Schüpbach is also pleased “that

our employees were rewarded for their continuous and outstanding commitment.”

The CoaxCenter 6000 was first presented to the public in 2015 at the Internecon exhibition in Tokyo, Japan, where it attracted considerable interest amongst visitors. The machine was designed to fulfil the modern communication society's increased data transfer demands in terms of data volume and data security and the resulting growing requirements on antenna components.

As a result, assemblers of such cables are increasingly coming up against limits, because the required length tolerances can hardly be fulfilled using manual or semi-automatic tools. Hence, the cable ends must be checked systematically and without errors. In particular, it was important to

exclude human sources of error, because even the slightest contact with the cable end can bend it and render the cable unusable.

The CoaxCenter 6000 systematically integrates and automates all the steps on a highly flexible machine platform. For the customer, this results in numerous benefits:

- The machine offers a high degree of stripping accuracy
- Fully automatic monitoring of the stripping results using QCam 360
- Production protocol with all the relevant process parameters including 3D images
- Maximum degree of flexibility with regard to the integration of additional process steps, such as crimping, tinning, and window stripping

In addition to these technological and qualitative innovations, the CoaxCenter 6000 achieves extremely high productivity.

The output of this machine is at least three times higher than with manual and semi-automatic processes, with considerably lower personnel and handling requirements and in perfect quality. The CoaxCenter 6000 will be released to the North America market this year.

Schleuniger – Switzerland
Website: www.schleuniger.com



○ The award-winning CoaxCenter 6000

Queins has one eye on the future

QUEINS Machines has manufactured a planetary strander for the next generation.

The Germany-based machine manufacturer claims to have developed and manufactured an advanced horizontal planetary strander for the production of subsea cables.

The planetary strander has been designed according to several customers' trend-setting and forward-thinking requirements.

The machine is designed for stranding of power conductors based on three reels with a filling weight of 55 tons each, three filler reels with a filling weight of 20 tons each and two fibre optic reels with filling weight of three tons each. Total product weight can reach up to 231 tons in a single path.

Other customer requirements such as delivering the machine on trucks to the site were achieved by a modular assembly for parts, which are beyond street transportable size. For loading the planetary cage there is no heavy-duty crane required.

The project had a guideline to achieve levels beyond the present standards of operator safety, low maintenance, high energy efficiency, high productivity and ergonomics.



○ The Queins plant in Monschau, Germany

As an example, one item to reach high energy efficiency was the use of the latest motor and drive technology with full energy recovery. This machine is presently being installed and is going into production during the second quarter of 2016.

Queins Machines GmbH – Germany
Website: www.queins.com

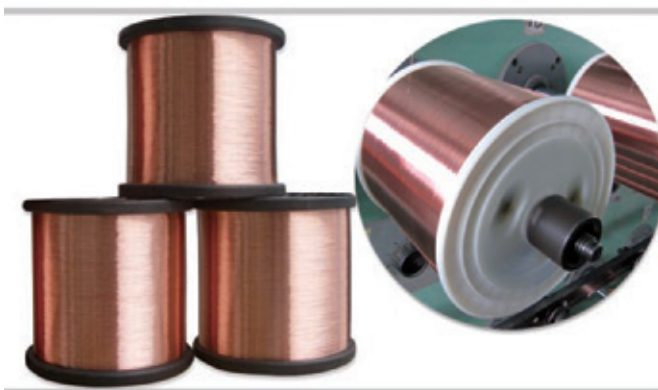


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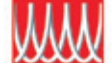
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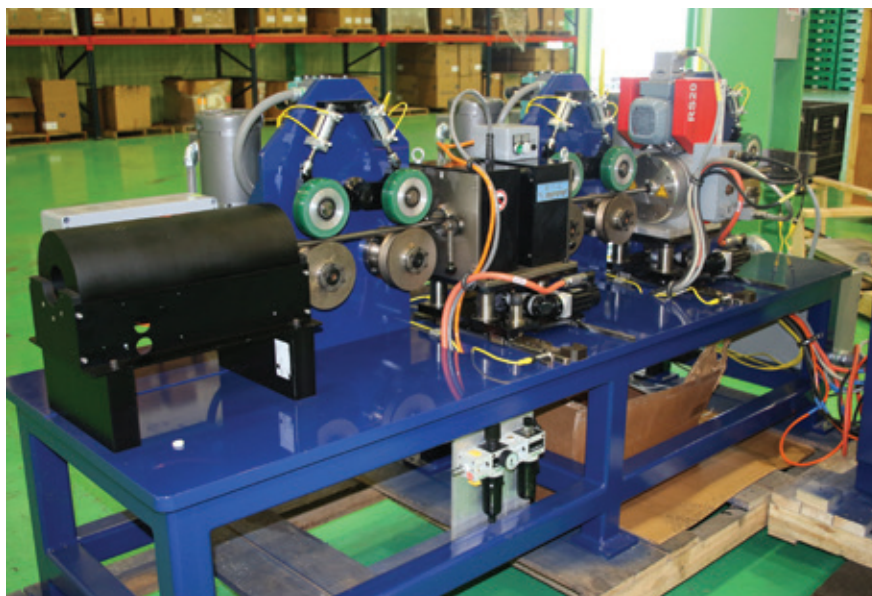

Capacitance Monitor ADM Series Infrared Diameter Gauge




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New RS20 sensor



○ The new RS20 sensor from Pruftechnik

AFTER the launch of the new RS20 sensor-type – eddycurrent testing systems with rotating mechanics – a number of machines have been installed at several key customers and good results achieved in various applications.

The system is primarily being used by manufacturers of steel bars or in wire drawing line applications.

The advantage of the system lies in the variable stepped probe discs that can be specifically tailored to the needs of

customers for each application and each diameter.

The relevant test equipment is available in different variants, from simple one-channel to a complex ten-channel version. This enables materials testing for transverse orientated defects, longitudinal orientated defects or a combination of both defect types.

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

Exhibition line-up from Schleuniger

Schleuniger Inc demonstrated a selection of its established wire processing products, and introduced some new additions, at the 2016 IPC Apex Expo, the conference and exhibition at the Las Vegas Convention Center.

Schleuniger debuted its newest cut and strip machine, the EcoStrip 9380. This flexible machine is designed for expanded capabilities due to its quick-change transport unit for belts, rollers and shortmode, and is compatible with a wide range of accessories, including pre-feeding, marking, stacking and coiling. An intuitive colour touchscreen user interface minimises training and set-up times and with optional Schleuniger software, the EcoStrip 9380 can easily be integrated into various networks.

Also new, Schleuniger demonstrated its UniCrimp 100 crimping press, a bench top machine that delivers up to two tons of force. The safety guards can be completely opened to allow easy access to the working area along with simple, fast changeover, adjustment and set-up times. The UniCrimp 100 accepts most applicators on the market and provides quality crimping for wires up to 6mm² (10 AWG).

Schleuniger also showcased its new ShieldCut 8100, for fast and safe cutting and removal of the braided shield layer from most shielded cables.

Schleuniger – Switzerland

Website: www.schleuniger.com

High-tech and cost-effective Profilemaster

THE new Profilemaster® PMM 30, 50 and 80 profile and shape measurement systems are the latest models available in Zumbach's Profilemaster family, enabling measurement systems using light section principle and machine vision.

The design was focused to achieve the best price and performance ratio for all profiles, tubes and cables made of plastic, rubber, metal, steel and other materials. Additionally, the Profilemaster PMM 30/50/80 fulfil the demands of the market for compact, industrial-proof and cost-effective systems.

Customer benefits include:

- Increase the accuracy of the end product
- Improved process control
- Scrap reduction
- Savings on raw material and post processing costs



○ Measuring unit Profilemaster® PMM 30/50/80

- Increased product quality = higher customer satisfaction
- Quick and easy installation on existing production lines
- Seamless integration of the PC-based system with the user's network

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

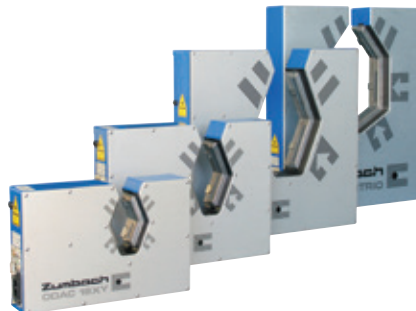
Intelligent communication from Profibus and Profinet

In industrial production, numerous automation, engineering and visualisation systems are connected to a bus. The Profibus interface enables centralised control of all devices involved in the production process as well as many standard diagnostic functions – and all this via a secure and fast connection.

The cyclic collection and preparation and reliable evaluation of the measuring data via the interface has a significant effect on the quality of the quality monitoring.

Zumbach's communication via Profibus DP not only significantly improves the workflow between individual production units, but it also requires little hardware (one engineering tool for all devices), reducing investment and service costs. Thanks to the bus topology, sensors can be coupled and uncoupled during operation.

Practically every Zumbach device is available for use in Profibus DP structures – directly or via a Profibus interface. Through the use of an intelligent Zumbach protocol, the



○ A selection of gauges with the Profibus/Profinet interface

complete functionality of each sensor is fully supported from the initialisation step all the way to the actual data exchange.

Profinet IO – the successor to Profibus DP – is designed for data exchange between Ethernet-based field devices. The open industrial Ethernet standard meets the increasing demands of automation reliably and sustainably with optimum flexibility, efficiency and performance.

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

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Process stability and reliability during subsea cable production

SUBSEA cables have already conquered the oceans for around 150 years. At the beginning, however, copper wires and insulation from gutta-percha were still in use. Today, modern optical fibre pairs are used for transatlantic data transmission.

Therefore, data transmission rates of 160 gigabits per second can be reached. Subsea cables are also indispensable for the power supply sector. Due to the trend toward renewable energy, ever-increasing offshore wind farms are built off the coasts and the produced electricity has to be transported back to the mainland.

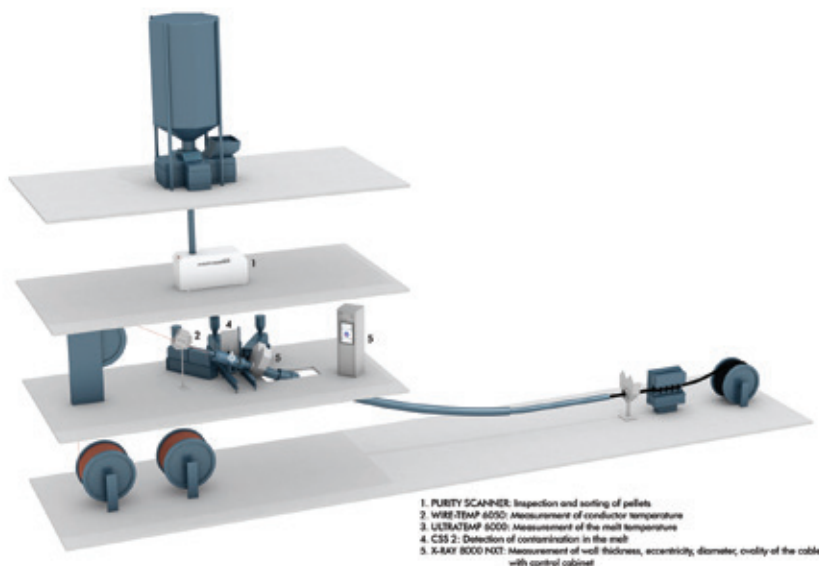
Subsea cables have to fulfil two main tasks: the transmission of energy and the transfer of data.

A wide range of cables can be used for this purpose. Whilst cables with a voltage of up to 150kV are often used for the energy transmission of offshore wind farms, when cables are in the Mediterranean Sea they are connected to the electricity network with a voltage of 30-60kV.

These cables, however, always have two things in common. They have to be manufactured for long distances with a minimum number of joints in order to avoid possible breakdown risks.

Also, due to the high voltage and the difficult maintenance of subsea cables, the production process has to meet extremely high demands. Quality and reliability for decades are considered a benchmark in this field.

Subsea cables are fitted with special high voltage insulation materials of the utmost purity in order to meet the high quality demands. The majority are manufactured in CCV lines (catenary continuous vulcanisation). In this field, X-ray technology from Sikora has ensured reliable quality control during the production process for more than two decades.



○ Figure of a CCV line with measuring devices for quality assurance (examples)

The measuring devices X-Ray 8000 NXT and X-Ray 6000 are especially interesting for the efficient measurement of the wall thickness of up to three insulation layers, for the concentricity, the diameter and the ovality of XLPE cables during the production process. Using the graphical visualisation of measuring values on the display and control devices of the Ecocontrol Series, the operator centres the crosshead to ensure the highest quality.

20 years ago, special devices were used for the examination of the PE/XLPE melt in cable production lines. The Sikora Purity Scanner now complements this process.

The device inspects the raw material before it enters the extrusion process, and sorts out contaminated material. The Purity Scanner detects organic and metallic contaminations from 50µm, with an effective throughput of up to several tons per hour.

Sikora's measuring and control technology is also used in the following

production processes in which the individual wires of the cables are twisted and coated. In order to control the correct compliance of the wall thickness of the outer layer, the X-Ray 6000 devices are simple to use.

Furthermore, as subsea cables, for example, are often developed for the transfer of DC voltage, the high-voltage measuring devices of the Spark 2000 Series are also good for quality assurance. According to regulations, those cables have to be checked for bare spots and insulation errors.

In this regard, the Sikora spark tester Spark 2000 is a useful tool to check the insulation. Pinholes, bare patches and other possible defects in the insulation can be detected while the dry cables are entering the bead chain electrode, directly after the cooling line. Therefore, the quality management is able to ensure that only flawless cables are distributed.

Sikora AG – Germany
Website: www.sikora.net

COVERAGE OF THE 2016 GUANGZHOU INTERNATIONAL METAL AND METALLURGY EXHIBITION STARTS ON PAGE 32



○ Unistrong隧道式酸洗线

为客户量身定制解决方案

Unistrong Industrial Ltd于1996年在台湾成立，最初服务于模具和机械产品，现已提供五金产品一条龙的服务，机械及五金模具等多样化的选择，以及客制化的解决方案，其业务版图已拓展到中国大陆、泰国和印度尼西亚。

Unistrong为中国宁波工厂提供的线材酸洗设备于2015年1月投产，月产能达万吨。

公司每条生产线都根据客户特殊要求量身定制。

酸洗线专门设计成带有封闭式隧道，将腐蚀性气体的侵蚀危害降至最低，同时最大化隔离外界环境和操作者，从而创造更加清洁的环境和安全的工作条件。

整个隧道，不同等级和类型的材料所需处理介质和时间都可通过PLC控制系统自动或手动控制。

PLC控制系统通过必要的处理步骤，经由各种化学槽，监控多个自动传输材料的起重机会。这使得线材最终的表面质量更高，消耗的化学品和淡水也更少。

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- 低人力需求
- 优化化学品消耗
- 能够同时处理多种类型的材料
- 各种处理方案

Unistrong Industrial Co Ltd – 台湾
网址: www.unistrong.com.tw

Titan系列激光切割机升级



○ Titan系列激光切割机重大升级

Fonon Corporation推出了十大更新产品Titan系列大型平台式多功能激光切割机，机器整合了多个子系统，取得了革命性的改进，从而提高了终端用户的生产力、降低了成本、最大限度地减少了Titan系列机器的地面空间和降低了功耗。

Titan FX切割机所需功率不足普通二氧化碳(CO₂)激光机消耗的5%，并且Titan FX切割机无需维护，是带有集成激光源和热交换的一站式系统。激光机系模块化设计，增量有1kW、2kW和4kW，允许用户增加激光切割功率至8kW，可现场升级，因此用户自身能够很快适应系统在生产环境中的变化，同时，也免除了许多典型的激光切割系统要求用户所承受的高安装与维护成本。

Fonon多数激光材料加工系统都整合了最新技术，允许Titan FX系列机器能够根据整个金属板厚度的微小变化做动态调整。此外，升级的Titan系列配备有密封反馈传感器，即使在苛刻的工业环境中也能完美运作。系统无摩擦、直驱线性运动平台、软件控制的正交与轻量化桥梁实现了加速度大幅提升和“飞行切割”的能力。

新的Titan设计去除了几个在典型的大幅面激光切割系统中容易导致系统故障的组件，因此提高了系统的长期可靠性。激光速度、加速度、激光定位精准率等方面的改进使得用户生产力显著提高，每年可望节省几十万美元成本。

另外，以客户为中心的改进包括只需按下一个单独按钮，就可以重新校准台架，确保材料始终对齐，无突发性和计划外的机器故障。电源功率升级到激光不需要安排专门的现场工程师，所有操作步骤根据用户实践进行最优化设计。与Fonon其它系统一样，以Laser Photonics品牌交付，Titan是名副其实的即插即用系统，无需耗材和维护。

“到目前为止，最先进的激光切割技术只能提供给工业巨头，”Fonon

Corporation首席技术官兼临时首席执行官Dmitriy Nikitin先生表示。“重新设计的Titan FX激光切割系统，因其显著降低的基价、易于安装和运营成本低，为中小企业开启了最先进切割技术的大门。”

Fonon Corporation – 美国
网址: www.fonon.us

热处理和高温测试

Grieve推出了2,000°F (~1,093.3°C) 燃气加热箱式炉No. 871，目前被用于热处理和高温测试。

650,000 BTU/HR安装在带有地装式助燃风机的三个调制天然气燃烧器中。工作区尺寸为30"宽x 48"深 x 30"高。

本机拥有的7"绝缘壁由5" 2,300°F陶瓷纤维和2" 1,700°F块状绝缘组成。6½"地面绝缘由4½" 2,300°F耐火砖和2" 1,900°F块状绝缘制造而成。板炉使用耐火砖制造，并由耐火砖墩提供支持。

板载控制器No. 871包括记录设计温控器的Partlow MRC 7000和一个电动式垂直升降门。

Grieve Corporation – 美国
网址: www.grievcorp.com

新型RS20传感器

新型RS20传感器 - 具有机械旋转涡流检测系统，被推出之后 - 已被多个重要客户的机器采用，并且在各种应用中取得了优良的效果。该系统主要适用于钢筋制造或拉丝生产线。优势在于其可变阶梯探测盘，根据客户的任何应用与尺寸需求进行量身定制。

提供的相关测试设备具有不同版本，从简单的单通道到复杂的十通道，因此，可进行横向缺陷、纵向缺陷或两种缺陷组合的材料测试。

Pruftechnik Dieter Busch AG – 德国
网址: www.pruftechnik.com

○ Pruftechnik制造的新型RS20传感器



Sikora确保海底电缆在生产过程中稳定可靠

海底电缆征服海洋已有约150年的历史。起初，使用的是铜线和杜仲胶绝缘。如今，现代化的光纤对用于跨大西洋的数据传输。

因此，实现了每秒160千兆位的数据传输速率。海底电缆也是供电部门必不可少的。由于可再生能源的发展趋势，越来越多的海上风电场都建在海岸上，生产的电再输送回陆地。

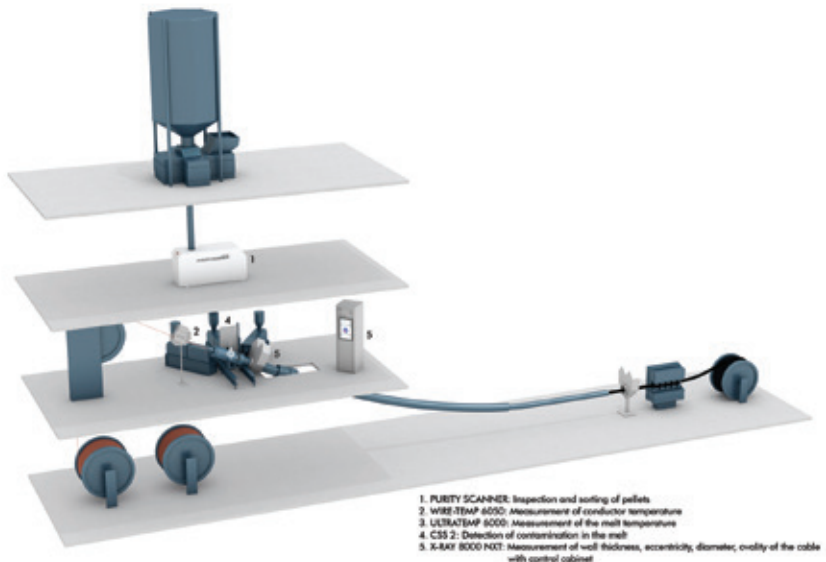
海底电缆必须完成两项任务：能源传输和数据传输。

广泛系列的电缆适用于此目的。高达150kV电压的电缆经常用于海上风电场的能源传输，然而，地中海电缆则与电压为30-60kV的电力网络相连。

这些电缆有两个共同点，即生产的长度要足够长，接头数要尽量少，以避免可能发生的故障风险。同时，由于海底电缆的高压和维护难度高，生产工艺必须满足非常苛刻的条件。几十年来，质量与可靠性被视为该领域的基准。

海底电缆具有最高纯度的特殊高压绝缘材料，以满足高品质的要求。多数海底电缆利用CCV（悬链式连续硫化）生产线制造而成。在该领域，Sikora公司推出的X射线技术已有二十多年的历史，可确保海底电缆生产过程中可靠的质量控制。

测量装置X-Ray 8000 NXT和X-Ray 6000特别适合于高效测量交联聚乙烯绝缘电缆生产过程中多达三个绝缘层的壁厚、同心度、直径和椭圆度。使用测量值的



1. PURITY SCANNER: Inspection and sorting of pellets
 2. WISE TEMP 6000: Measurement of conductor temperature
 3. ULTRAFAP 6000: Measurement of the melt temperature
 4. CSS 2: Detection of contamination in the melt
 5. X-RAY 8000 NXT: Measurement of wall thickness, eccentricity, diameter, ovality of the cable with control cabinet

具有测量装置的CCV生产线保证产品质量(实例)

图形可视化和Ecocontrol Series控制装置，操作者置十字头于中心位置，从而确保最高的质量。

20年前，特殊装置已用于检测电缆生产线中PE/XLPE的熔化。Sikora纯度扫描仪现已完善了这一过程。该装置在挤压工艺前检查原料，并筛选出被污染的材料。纯度扫描仪能检测出50μm以上的有机与金属污染物，扫描仪的有效吞吐量每小时达数吨。Sikora测量与控制技术也适用于电缆线材的扭绞和涂覆等制造过程。如果需要控制外层壁厚的准确性，X-Ray 6000是最佳选择。

此外，海底电缆经常被用于传输直流电压，Spark 2000 Series高压测量装置则用于保证质量。按照规定，这些电缆必须进行裸斑和绝缘误差的检查。

鉴于此，Sikora使用Spark 2000火花机用于有效检测绝缘。绝缘中的针孔、裸补丁和其它可能出现的缺陷都可以在干电缆进入珠链电极，直接在冷却线后进行检测。因此，质量管理确保生产的电缆完美无瑕。

Sikora AG – 德国
 网址: www.sikora.net

Queins着眼于未来

Queins Machines制造了下一代行星式绞线机。总部设在德国的机器制造商声称已经开发制造了用于海底电缆生产的先进水平行星式绞线机。该行星式绞线机根据引领潮流的前瞻性客户的思维设计而成。机器设计分别基于三个卷轴，每个充填重量55吨，三个填料卷轴，每个填充重量20吨，以及两个光纤卷轴，每个填充重量3吨，用于绞合电源导线。单一路径上的产品总重量达到231吨。

这些机器尺寸往往超出了道路运输的规定范围，公司通过模块化装配零件满足了客户要求卡车运送交付的需求。另外，装载行星式机架，也不需要重型起重机。目的是要在操作人员安全性、维护成本低、高效、高生产率和工效学等方面超越现行标准。该项目使用最新电机和全能量回收驱动技术来达到高效能，为业界树立了典型。

机器目前正在安装，预计2016年第二季度正式投入生产。

Queins Machines GmbH – 德国 网址: www.queins.com



Queins 德国蒙绍工厂



www.julang.com.cn

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LEADING MAGAZINES

for the wire and cable industries



India Insight

Using technology in the fight against power theft

TATA Power Delhi Distribution (TPDDL) is using technology interventions to track power theft in north and northwest Delhi.

Power thieves are using advanced technologies to manipulate energy recording and display of meters through external means that generally do not leave any evidence of theft.

To curb power theft TPDDL has installed automated meter reading based energy systems at the distribution transformer level and undertaken four levels of energy audits of all distribution transformers on a regular basis.

This helps in identification of areas in terms of energy mismatch and hence provides actionable inputs for enforcement teams.

TPDDL also undertakes four levels of energy audit to identify areas with increased theft related issues and has established a special lab to analyse the effects of meter tampering, working with manufacturers to make the meters tamper proof.

The company has also extensively replaced bare LT conductors with LT ABC conductor and undertaken metering of unmetered consumers including slum clusters.

Commenting on the action, Praveer Sinha, CEO and managing director of TPDDL, said: "Power theft is a curse on our society and it is the honest consumers who are burdened unnecessarily. We are determined to stop this menace in our distribution network by using foolproof technology interventions."

Through the employment of technologies, and with improvements in billing and collection efficiency, TPDDL has already decreased aggregate technical and commercial losses to nine per cent from 53 per cent in 2002.

Tata Power – India Website: www.tatapower-dcl.com



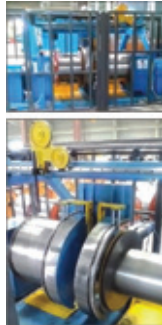
○ Praveer Sinha, CEO and managing director of TPDDL

Spooling without stopping

Sarvasv Group has introduced a dual take-up rod breakdown machine for copper and aluminium. The unit has been designed on European standards, but is made in India.

The dual take-up unit is said to substantially improve the productivity of the rod breakdown machine with no downtime for spool changeover. The machine has been designed for a 630mm spool and can run at speeds up to 25m per second.

Key features of the dual take-up unit include automatic cutting of the wire and automatic changeover to the empty spool; suitability for 630mm DIN 46397 spools; automatic length and weight setting on the spool; motorised spool loading; traversing of wire through the servo drive; fine control dancer unit; and PLC control via touchscreen display.



○ The dual take-up rod breakdown machine for copper and aluminium from Sarvasv

Sarvasv Group – India
Website: www.sarvasv.com

Contract to equip seven transmission substations

Avantha Group company CG has a contract to equip seven transmission substations for the Dominican Republic transmission utility ETED (Empresa de Transmisión Eléctrica Dominicana) with ZIV substation automation and telecommunication systems.

Delivery was scheduled for March 2016, with project commissioning by June 2016.

The project is part of the expansion of the electricity transmission system in the southern region of the Dominican Republic, where the largest wind farm in the country is located.

Cruce de Cabral substation is one of the seven substations to be equipped with ZIV solutions. It connects the national power grid to Los Cocos wind farm, the first and largest wind farm in the country, with a generating capacity of 77.2MW.

CG predicts strong growth in the smart grid segment with ZIV solutions, especially after a successful year with key wins from European utilities such as Iberdrola and Gas Natural Fenosa in Spain, EDP in Portugal and ERDF in France.

Commenting on this significant win, CG's CEO and managing director, Laurent Demortier, said: "We thank ETED

for this opportunity to partner them in the expansion of their transmission networks, which is critical to any country's growth."

CG – India
Website: www.cgglobal.com

Increased capacity for Indian manufacturer

Cable manufacturing company CMI Ltd has announced the acquisition of the fully developed manufacturing facility of Danish company FLSmidth at Bawal, Haryana. The facility is located in the industrial area of IMT, Bawal.

CMI's investment is expected to significantly augment the production capacity of the company. The company plans to begin production in the new facility within this financial year.

Commenting on the development, Amit Jain, managing director at CMI Ltd, said: "This is a new phase in the history of CMI. We are very bullish on the sector and are targeting a CAGR of 40 per cent going forward for the next three to five years. The acquisition is a step in that direction and will help CMI enhance its production capacity in order to achieve the desired growth."

CMI manufactures a wide variety of specialised cables for infrastructure, railways, the oil and refinery industries, engineering and EPCC contractors.

CMI Ltd – India
Website: www.cmilimited.in

Energy to benefit Bengal

Shapoorji Pallonji Group-owned engineering firm Sterling and Wilson has completed the commissioning of the entire grid-connected electrification project in Sagar Island in West Bengal, to the benefit of 226,000 people in the area.

The project, funded jointly by the World Bank and the state government, is poised to accelerate irrigation, support the local food processing industry, and strengthen education and health services, besides offering a boost to tourism in the area.

"Connecting the island, which is around 3.7km away from [the] mainland and separated by the river Muri Ganga on the eastern side, was one of the most demanding aspects of this project apart from the tight time schedule," said B Ogra, the company's president of electrical and solar division.

To implement the project within its 36-month time frame, Sterling and Wilson used around 31,000 PCC poles, 42km of trunk line and 448km of spur line, utilising a workforce sourced entirely from Kolkata and surrounding areas.

Sterling and Wilson Pvt Ltd – India
Website: www.sterlingandwilson.com

With 'digital globalisation', flows of data and information now generate more economic value than the global goods trade

The McKinsey Global Institute, the Washington-based research arm of consultants McKinsey & Co, ranked 139 countries by how linked-in they are to the rest of the world. At the top is Singapore, which has successfully made itself into a regional centre in Asia; followed by the Netherlands, one of Europe's main digital hubs; the United States; and Germany. China comes seventh. The 144-page McKinsey report "Digital Globalization: the New Era of Global Flows" finds a strong correlation between connectedness and gross domestic product. It asserts, "Remarkably, digital flows – which were practically non-existent just 15 years ago – now exert a larger impact on GDP growth than the centuries-old trade in goods."

Noting that virtually every type of cross-border transaction now has a digital component, McKinsey said that the amount of cross-border bandwidth has grown 45 times larger since 2005; and in the next five years it is projected to increase an additional nine times over. The company estimates that the world economy as a whole benefitted from cross-border data flows to the tune of about \$7.8 trillion in 2014. Transmitting information and facilitating finance, these data flows also enabled the movement of goods, services and people. McKinsey sees people as a major factor in connectedness and national economic health. Japan, the world's third-largest economy with a host of global brands, ranks surprisingly low, at No. 24, in connectedness. According to McKinsey this is mainly due to the limits it places on immigration.

- Reviewing the McKinsey report for *BloombergBusiness* (25th February), Rich Miller noted its rejection of the idea that globalisation is dead, as construed from the collapse of capital flows around the world after a peak close to \$12 trillion in 2007, before the financial crisis. Rather, he sees the explosion of data transmission as filling that void, observing that half of Facebook users had at least one international friend in 2015, up from just 16 per cent in 2012. "And it's more than just sharing cute cat videos," wrote Mr Miller. Facebook estimates that 50 million small- and medium-sized enterprises are on its platform, roughly double the total for 2013. McKinsey said in its report that, on average, 30 per cent of those entities' "friends" are from other countries.

Europe has lost none of its lustre for the Chinese telecom equipment and services provider Huawei

"European countries are the most open to new things and challenges. It's open, honest, transparent to Huawei, which we like a lot." From this and other remarks to Daniel Thomas of the *Financial Times* (London) on the eve of this year's Mobile World Congress, Vincent Peng, Huawei's European president, made plain that Europe still exerts a strong pull on his company. And after a decade of meteoric growth, it is well positioned for its next steps on the continent. As noted by Mr Thomas, Huawei is now on a par with the world's largest telecom equipment supplier, Sweden's Ericsson, and has become the third-largest smartphone vendor in the world, with seven R&D centres

employing 1,200 people in Europe alone. At the mobile technology event, held in Barcelona, Spain, 22nd to 25th February, Huawei occupied half of an enormous hangar to showcase its latest network services and products. Yet Mr Peng said more can be done in Europe. In consumer mobile, for example, he acknowledged that Huawei was still "second tier," with quite a big gap compared to tier one. He told Mr Thomas: "That is what we are working on."

But not solely. Huawei's plans for its network building division, which accounts for some 70 per cent of the company's sales, are especially detailed. Mr Peng wants to work with European technology groups to develop suites of services and applications that will enable connected homes and cities – the Internet of Things that has become a focus for every ambitious company in the telecom sector.

As Huawei understands the IoT opportunity, serving "smart cities" entails connectivity, infrastructure, content and applications. As part of its strategy to extend its influence more widely across Europe, the company intends to furnish this end-to-end support from centres in at least three new "connected cities" – probably London, Madrid and Berlin. ("Huawei Sets Out Third Stage of European Strategy," 22nd February). A challenge for Europe's technology sector, in Mr Peng's view, is a relatively narrow scope. When Huawei launched its Honor smartphone range, an online-only brand, it found that the only means open to it for promoting and selling the devices was through such USA media as Amazon, Facebook, Instagram and Twitter.

- "Europe has a lot of good companies but the environment is not good for them to scale up," Mr Peng told the *Financial Times*. "We need to work together to have a strong player not just in Europe but the world."

In Barcelona in February, signs were strong that Huawei's president for Europe had in mind the very player for the position.

Elsewhere in telecom . . .

- The technology research firm Gartner has forecast that, by the end of this year, 82 per cent of mobile phones shipped worldwide will be smartphones, up 12 per cent from 2015. The market research firm expects mobile phone shipments overall to increase 2.6 per cent this year. Gartner (Stamford, Connecticut, USA) looks for worldwide combined shipments of devices (mobile phones, PCs, tablets and ultramobiles) to reach 2.4 billion units in 2016, an increase of only 1.9 per cent from 2015; while end-user spending is expected to decline for the first time, by 0.5 per cent.
- RCR Wireless News reported (8th February) that the Republic of Korea has decided against awarding a fourth mobile carrier licence, rejecting the three candidates Sejong Telecom, K Mobile and Quantum Mobile. The government had been considering adding a new player since 2010, on grounds that the



entry would foster competition. The Korean mobile market is currently dominated by SK Telecom, with a market share of around 50 per cent, followed by KT and LG Uplus.

- Mobile operator Vodafone India announced the commercial launch on 10th February of its 4G LTE services in Mumbai. Also according to local press reports, the wholly owned subsidiary of Britain's Vodafone Group started selling LTE-enabled SIM cards in that city in early January, and later in the month introduced its 4G LTE service in Delhi and the surrounding NCR region. Earlier launch sites were Kerala, Karnataka and Kolkata. Vodafone India, which started up in 2007, currently serves some 188 million subscribers countrywide.
- "This isn't the first time Google has tried to offer Internet in San Francisco, which for a tech hub can be notoriously resistant to change." Klint Finley of *Wired Business* (24th February) was reporting the announcement by Google Fiber that it would make its high-speed Internet service available to San Francisco residential properties where fibre optic cables are already installed. He noted that, in 2007, Google and Earthlink proposed a citywide WiFi service to San Francisco "that ultimately fizzled." The Google Fiber announcement came on the heels of news that the company would also bring its service to Huntsville, Alabama, where it will license the city-owned fibre optic infrastructure and share that infrastructure with other providers.
- A Parks Associates report (4th February) finds that 19 per cent of broadband-enabled households in the USA currently own at least one Internet-connected "smart home" device (thermostat, sprinkler system, door lock, security camera) that permits remote control, monitoring, or notifications via a smartphone, tablet or computer. Parks (Dallas, Texas, USA), a market research and consulting company specialising in emerging consumer technology products, reported that upwards of 90 per cent of device owners use mobile apps to access cloud-supported services associated with their devices.

Highlights of the survey:

- 67 per cent of respondents connect at least one smart TV, Blu-ray player, gaming console, DVR/PVR or streaming media device to the Internet
- 33 per cent own at least one digital healthcare device, with six per cent of households owning three or more such units
- 45 per cent of car owners who also own a smartphone use the phone for direct access to maps and other navigation aids while driving
- As reported by Iain Morris in *Light Reading* (1st February), Deutsche Telekom is the latest operator to carry out trials of XG.FAST, an experimental technology intended to boost connection speeds over very short copper loops. According to a statement from Finland's Nokia Corp, which acquired Alcatel-Lucent in January, during trials with AlcaLu late last year the German operator achieved a speed of 11 gigabits/second (Gbps) over two bonded pairs at a distance of about 165 feet. Nokia said that tests using standard drop cable delivered more than 8Gbps over the same span, and that symmetrical speeds of more than 1Gbps were possible over 230 feet.

Mr Morris noted that Britain's BT Group held trials of XG.FAST in October 2015, when it reported having recorded speeds of 5Gbps over a distance of 115 feet. While BT aims to use ordinary G.fast technology to provide between 300 megabits/second (Mbps) and 500Mbps over distances of about 985 feet, Deutsche Telekom has not announced any G.fast plans.

Instead, wrote Mr Morris, it is investing in a technology known as vectoring, which improves the capability of copper connections by cutting out interference between lines. Spokespeople for Deutsche Telekom previously told *Light Reading* that the company will hold off on G.fast until it has first introduced vectoring, the rollout of which, according to Mr Morris, appears to have fallen behind schedule "in the wake of regulatory challenges."

It was pointed out by *Light Reading* that a major challenge

for XG.FAST will be the delivery of ultra-fast services over longer distances. Because it works in very high frequency ranges, it is badly affected by signal attenuation.

- In other news of Deutsche Telekom, Reuters on 1st March quoted sources close to the company as saying it had put the sale of T-Mobile US on ice: an auction of radio airwaves would likely keep the German parent busy for most of the year, and potential suitors will be waiting for a more favourable political environment towards telecom mergers. The US Federal Communications Commission was due to open an auction of low-frequency airwaves by 1st April, stalling mergers-and-acquisitions activity in the USA over a probable months-long bidding period.
- Tele Danmark Communications (TDC), the largest Danish telecom, is partnering with Chinese equipment vendor Huawei to upgrade its entire cable network to deliver download speeds of up to 1 gigabyte per second (Gbps) throughout Denmark. The upgrade to "Giga COAX" will commence this summer and is scheduled for completion by the end of 2017.

At that point, according to TDC's CEO Pernille Erenbjerg, half of all Danish households will have access to speeds "ten times [higher] than the government's objectives for the year 2020."

Representing one of the largest investments in digital infrastructure yet seen in Denmark, the DOCSIS 3.1-compliant architecture adopted by TDC involves network-wide end points, optical nodes, amplifiers, passive splitters, and corresponding engineering services.

The two partners conducted first trials of the technology in June 2015. As noted by Megan Crouse of *CED* magazine (1st February), upgrading coaxial networks to the gigabit level allows multi-service operators to offer IP-based and customised video services, while the D3.1 standard allows one coaxial cable to provide a maximum bandwidth of 2 Gbps uplink and 10 Gbps downlink.

在“数字全球化”背景下，数据与信息流产生的经济价值超过全球货物贸易

位于华盛顿州的麦肯锡全球研究所，是麦肯锡咨询公司的研发部门，该机构按照一国与世界其他国家的联系紧密程度对全球139个国家进行了排名。位于亚洲区域中心的新加坡拔得头筹；紧随其后的则是欧洲数据中心之一的荷兰；其次依次是美国、德国；中国排名第七位。

这份144页的麦肯锡《数字全球化：全球流动新纪元》报告显示，国内生产总值与连通性之间存在着强相关性。报告指出，“诞生仅15年的数字流动给国内生产总值增长带来的影响已经明显超越了历史悠久的货物贸易对国内生产总值增长的影响。”

麦肯锡报告指出，实质上现在每一种跨境交易都蕴含数字组成部分，自2005年来，跨境带宽已经增加了45倍；在接下来的五年内，预计还将增长9倍。麦肯锡公司预测，跨境数据流动在2014年给全球经济带来了多达7.8万亿美元的经济利益。这些数据流动通过传递信息、便利金融，亦大大推动了商品、服务和人的流动。麦肯锡认为人是连通性和国家经济健康的主要因素。排名世界第三经济体的日本，拥有大量国际品牌，但连通性方面的排名却格外低，为24名。据麦肯锡称，这主要是由于日本对移民的限制造成的。

里奇·米勒在回顾2月25日《彭博商业周刊》中的麦肯锡报告时注意到，这篇报告是对“全球化已死”观点的反驳（2007年金融危机之前，全球资本流动达到近12万亿美元的顶峰之后开始暴跌，被称为“全球化已死”）。相反，他认为，爆炸式的数据填补了那些空白，他观察到，2015年，一半的脸书用户至少拥有一位外国朋友，而在2012年，这一比例仅为16%。米勒先生写道：“人们不仅仅通过脸书分享可爱小动物的视频。”脸书平台预计有5千万中小型企业，比2013年翻了两番。麦肯锡在它的报告中指出，这些企业平均有30%的“好友”来自其他国家。

亿台，仅较2015年增长1.9%；而终端用户支出则首次出现下降，降幅约0.5%。

据RCR无线新闻2月8日报告，韩国决定不同意授予第四家移动运营许可证，世宗电信、K移动以及昆腾移动等三家候选人的申请被驳回。政府自2010年开始考虑增加新的运营商，理由是新力量的加入将使竞争更加激烈。韩国当前的移动市场主要由SK电信主导（约占市场份额50%），KT以及LG Uplus紧随其后。

移动运营商印度沃达丰宣布于2月10日在孟买商业发布他们的4G LTE服务。据当地报纸称，这家英国沃达丰独资控股的子公司早在1月初就开始销售可使用LTE的SIM卡，并在1月后期在德里以及附近NCR地区引进他们的4G LTE服务。早前发布城市包括：克拉拉邦、卡纳塔克邦和加尔各答。2007年成立的印度沃达丰，现在国内有1880万的消费者。

“这不是谷歌第一次尝试在旧金山提供互联网服务了，众所周知，旧金山作为技术中心很难改变。”有线商业的克林特·芬利2月24日报道称，谷歌光纤宣布在旧金山住宅物业中启用其高速因特网服务，公司在当地的光纤通讯电缆已经安装完毕。他指出，2007年谷歌与earthlink提议的旧金山市内无线网络“以失败告终”。此前，谷歌公司还宣布了其向亨茨维尔、阿拉巴马提供光纤服务的消息，谷歌在这些城市将向其他提供商颁发城市光纤基础设施许可证，从而与其他提供商一起分享这些基础设施。

市场调研公司帕克斯（Parks Associates）2月4日报告称，目前19%使用宽带的美国家庭至少拥有一台允许通过智能电话、平板电脑或者台式电脑远程控制、监控或通知的移动设备（恒温器、自动洒水器、门锁、安全摄像头）。帕克斯（德州达拉斯）是一家专门研究新兴消费者技术产品的市场调研和咨询公司，该公司报告称，超过90%的设备拥有者使用移动客户端通过云支持服务连接到他们的设备。

调查亮点:

67%的调查对象至少有一台智能电视、蓝牙播放器、游戏机、DVR/PVR或者流媒体设备连接到因特网。33%的调查对象至少拥有一台数字医疗保健设备，6%的家庭拥有三台或三台以上此类设备。45%的车主称当他们在开车时，会使用一台可以连接地图以及其他导航辅助设备的智能手机。

欧洲对于中国电信设备及服务提供商华为吸引力依旧

“欧洲的国家对新鲜事物、新的挑战最为开放。欧洲对华为的开放、诚实、透明，是我们最喜欢的。”在世界移动通信大会前夕，华为欧洲总裁彭博向金融时报（伦敦）记者丹尼尔·托马斯如是评论，由此他坦言，欧洲对华为公司仍有强大的吸引力。十年急速增长之后，华为在欧洲大陆蓄势待发。托马斯指出，华为的规模与世界上最大的电信设备提供商——瑞典爱立信不相上下，已成为世界第三大智能手机厂商，仅在欧洲就拥有7个研发中心、1200名员工。

华为在2月22到25日西班牙巴塞罗那移动电信会议上，占据了一半巨型悬挂展板展示自己最新的网络服务以及产品。彭先生称欧洲市场仍大有可为。他举例说：在移动消费品方面，他承认华为仍是“二线品牌”，与“一线品牌”差距甚大。他告诉托马斯先生：“这正是我们努力赶超的方向。”

不仅如此，华为公司对其网络建设部门的计划尤为详细——该部门创造了整个公司近70%的销售收入。彭先生想联合欧洲技术团体开发连接家庭和城市的服务和应用组件——物联网已经成为电信领域每一家有志公司的重点。正如华为对物联网机遇的理解，服务“智能城市”需要连通性、基础设施、

内容以及应用。华为公司打算至少对三个新的“互联城市”提供这种从中心到端对端的支持——有可能会选伦敦、马德里和柏林，这也是该公司扩大在欧洲影响的战略的一部分。（《华为欧洲战略进入第三阶段》，2月22日）

在彭先生看来，欧洲技术领域面临的一个挑战就是范围相对受限。华为在发布“荣耀”系列智能手机（一个仅在线上销售的品牌）时，发现他们只能在像亚马逊、脸书、Instagram以及推特这样的美国媒体上面进行营销推广。

“欧洲有许多好公司，但是环境却不是很利于他们发展扩张，”彭先生对《金融时报》记者说。“我们应该一起努力打造全球超强玩家，而不仅是欧洲最强。”在2月的巴塞罗那，华为欧洲总裁释放强烈信号，对这一超强玩家的位置势在必得。

电信业其他新闻.....

加特纳电信调研公司预测称，截至今年年底，全球售出的移动电话中82%是智能手机，较2015年增长12%。该调研公司预期今年移动电话发货量将增长2.6%。加特纳（康涅狄格州斯坦福）预期2016年全球混合装载设备（移动电话、电脑、平板、超级移动电脑）总量达到24

Telecom

With criminals using providers like Google, Facebook and Hotmail, the US seeks to empower Britain to direct-access data held by tech firms

"If US and British negotiators have their way, MI5, the British domestic security service, could one day go directly to American companies such as Facebook or Google with a wiretap order for the online chats of British suspects in a counterterrorism investigation."

Ellen Nakashima and Andrea Peterson of the *Washington Post* were reporting on talks centred on a joint effort to empower the British government to serve wiretap orders directly on USA telecom firms for live intercepts in national security and criminal investigations involving its own citizens. Britain would also be able to serve orders to obtain stored data, such as emails. ("The British Want to Come to America — With Wiretap Orders and Search Warrants," 4th February)

The initiative was prompted by what tech firms and the two transatlantic allies claim is an untenable situation in which governments such as Britain cannot move quickly on domestic probes because companies in the USA hold (and withhold) pertinent data. The *Post* reporters observed that the issue highlights how national borders are increasingly leapfrogged by digital data, "creating vexing challenges for national security and public safety, and new concerns about privacy."

The text of a draft document serving as the basis for the negotiations had not been made public at the time of this writing, but the *Washington Post* obtained a review copy. It indicates that Britain would still be obliged to follow US rules on obtaining warrants; and it would not be able to directly obtain the records of American citizens or residents whose names happened to surface in the course of an inquiry.

The British system does not require a judge to approve search and wiretap warrants for surveillance based on probable cause, as is the practice in the United States. Instead, the home secretary, who oversees police and internal affairs, grants approval if the cabinet member seeking the warrant deems it necessary for national security or to prevent serious crime. The intrusion must be "proportionate" to the perceived threat.

Ms Nakashima and Ms Peterson noted that senior Obama administration officials say they are satisfied that British rules for data requests include "robust protections" for privacy and that neither the USA government nor Congress seeks changes in the British standards. But privacy advocates in both Britain and USA have gone on the alert.

The sticking point: privacy and civil liberties

"What it means is they're going to allow a country that doesn't require independent judicial authorisation before getting a wiretap to continue that practice, which seems

to be a pretty fundamental constitutional protection in the United States," Eric King, a privacy advocate and visiting lecturer in surveillance law at Queen Mary University of London, told the *Post*. "That's being traded away."

Officials of the US State and Justice departments emphasised that the talks are at a very early stage, and said they will seek to ensure that the outcome protects civil liberties. Any final agreement will need congressional action, through amendments to surveillance laws such as the Wiretap Act and the Stored Communications Act.

But Gregory Nojeim, senior counsel at the Center for Democracy & Technology, a Washington-based privacy group, said allowing Britain to go to USA firms directly with wiretap orders would amount to "a sea change" in US law. He told the *Post*: "I don't see Congress going down that road."

Given the current state of gridlock in the US Congress in a presidential election year, the issue will likely not come up for consideration quickly. In the meantime, to obtain data from an American tech firm, a foreign government must rely on a mutual legal assistance treaty (MLAT). Here, a formal diplomatic request for the data is made to the Justice Department, which then seeks a court order on behalf of the petitioner – a process said to take an average of ten months.

The *Washington Post* provided a hypothetical example of what this might mean for British law enforcement: London police are investigating a murder-for-hire plot. The suspects are using Hotmail to communicate. Their emails are on a Microsoft server in Redmond, Washington, USA. Under the MLAT system in effect now, the London authorities wishing to access the data must be prepared for a months-long wait.

Of related interest . . .

Privacy is also a concern for Transport for London, or TfL, as it considers using the Internet of Things to help solve traffic congestion problems. Citing London-based *Computing* magazine as a source, Esther Shein of *FierceCities* reported (16th February) that the transport agency is looking at deploying sensors throughout the city to capture data on passenger behaviour.

According to CIO Steve Townsend, in its careful examination of where to place the sensors to best justify their cost TfL is "looking at how data can maximise every inch of tarmac in London." But Mr Townsend said that anonymous data collection will ensure that the agency will not know the exact whereabouts of specific individuals.

Apple's refusal to hack into an iPhone in the possession of the FBI spotlights the tension between privacy and public safety

While the initiative described ("The US seeks to empower Britain") is a challenge for the long term, the United States finds itself confronting a more immediate privacy-versus-security issue.

On 16th February, iPhone developer Apple Inc defied a federal court order directing it to unlock an iPhone to gain access to encrypted data that officials deem necessary to their investigation of shootings that left 14 people dead in San Bernardino, California, on 2nd December last year.

Apple (Cupertino, California) initially assisted the Federal Bureau of Investigation but balked at creating a new piece of software to open the iPhone, currently in the hands of the FBI. The unit was the property of one of the husband-and-wife pair of shooters, themselves among the dead.

Framing the controversy in the context of the global threat of terrorism, Andrew Ross Sorkin of the *New York Times* asked some rhetorical questions. Does Apple have a moral obligation to help the government learn more about the attack?

Or does it have a moral obligation to protect its customers' privacy? How about its shareholders? Which of these should take precedence? To Mr Sorkin, these boil down to a single reflection: what does it mean to be a good corporate citizen? ("For Apple, a Search for a Moral High Ground in a Heated Debate," 22nd February)

Timothy D Cook, Apple's CEO, argued that complying with the court order would threaten "everyone's civil liberties" and make his customers more vulnerable to digital crime. And his counterparts at several technology companies support him. Facebook's CEO Mark Zuckerberg said onstage on 22nd February at the Mobile World Congress in Barcelona: "We're sympathetic with Apple on this one."

Mr Cook, who succeeded the legendary Steve Jobs at the helm of Apple, enjoys a reputation for high-mindedness. He pushes "greenness" and, as reported by Mr Sorkin, on one occasion reprimanded a shareholder who enquired into return on investment.

But in his tussle with the USA the Apple chief has a more nuts-and-bolts concern: the possibility that, if his company complies with the court's order, other governments might follow suit and require the "iBehemoth" to give them access for their own investigative purposes. If Apple were to refuse the request of, say, the Chinese government, it would risk being barred from doing business in China, its second-largest customer outside of its home market.

And, wrote Mr Sorkin, there is also the possibility that, if Apple were to build special software for the FBI, it could fall into the wrong hands, leading to even greater privacy and safety concerns.

'A world we have never seen before'

Probably needless to say, law enforcement officials were sharply critical of the position taken by Mr Cook. "There was once such a thing called corporate responsibility," William J Bratton, the police commissioner of New York City, told the *Times* regarding Apple. "Now, it's corporate irresponsibility."

"What are we really doing here? We're protecting a terrorist," Michael Ramos, the San Bernardino County district attorney, told *Bloomberg News*, referencing the December rampage. "There's no way around that."

For its part, the Justice Department, whose jurisdiction includes the FBI, has suggested that Apple's position "appears to be based on its concern for its business model and public brand marketing strategy." James Comey, the FBI director, rejected Apple's contention that the request for intervention has implications far beyond the case at hand. To Mr Comey, what the government seeks is limited to this particular case, and thus presents a narrow legal issue.

⊕ As principled as the Apple stance may be, Mr Sorkin acknowledged, it still has the effect of hindering (or at least not helping) a criminal investigation that the company is uniquely situated to assist. He was moved to pose another question: at what point is there a moral obligation for a company to help law enforcement, regardless of the business or privacy risk, in the event of a terrorist attack, or any crime?

⊕ This raised one point on which the two sides – poles apart otherwise – appeared to be of one mind.

In A Message to Our Customers (16th February), Apple's Mr Cook wrote, "This moment calls for public discussion, and we want our customers and people around the country to understand what is at stake."

In a statement issued on 21st February, Mr Comey of the FBI wrote: "[The tension between privacy and safety] should be resolved by the American people deciding how we want to govern ourselves in a world we have never seen before."

Airlines

Delta and American do pitched battle for a largely symbolic supremacy in Los Angeles

Airports in the USA are much alike, distinguishable chiefly by degrees of dilapidation (Los Angeles) or spruceness (LAX again, after recent terminal renovations). Now, the airport on the Pacific is carving out another distinction for itself: as a battleground for two carriers – American Airlines Group Inc and Delta Air Lines Inc – vying to be No. 1 at the largest airport in one of the world's most lucrative air travel markets.

To Justin Bachman, an aviation/travel reporter at *Bloomberg Businessweek*, the fixed purpose of the rivals is very evident. American has said it will build two gates at LAX to allow 20 new daily flights, for a total of 220 flights and 70 destinations. And Delta celebrated the completion last summer of a \$229 million renovation of Terminal 5, from which it operates, including a private entrance for Hollywood celebrities and other elite travellers.

Delta says it has doubled its non-stop destinations from Los Angeles to nearly 60 since 2012, and doubled its seat count since 2009. But, with 15.4 per cent of passenger share, Delta still trails American, which has 17.8 per cent, as well as both United Continental Holdings Inc and Southwest Airlines Co, according to the latest federal statistics. So the lines are drawn. But Mr Bachman is not looking for a clear winner, doubting that LAX will ever be a true "fortress hub"

like Atlanta (Delta), Dallas-Fort Worth (American), or Newark (United), in which a single airline can command as much as 75 per cent of the traffic. ("This Is Why No Airline Will Ever Dominate LAX," 2nd February)

For one thing, he wrote, LAX isn't the only game in town. It splits air traffic with four other airports within 55 miles. Another factor is the popularity of Los Angeles as a tourist and business destination. Andrew Nocella, American's chief marketing officer, told *Bloomberg* that most dominant hubs are skewed toward connecting service, with only about one-third of passengers starting or ending there. He said, "In [Los Angeles], you see almost the reverse."

This dynamic also hampers other major cities, such as New York and Washington, which haven't evolved into dominant hubs. At Chicago O'Hare, both United and American have hubs and split passenger share between them.

Mr Bachman pointed out that geography also plays a part. Its position on the West Coast means LAX is not as useful as a connection hub for east-west domestic flyers. With most of its connecting flows today to and from Hawaii and Asia, Mr Nocella conceded that "LA is just in a different set of circumstances."

⦿ But such considerations do not dampen the enthusiasm of Doug Parker, CEO of American Airlines. In an employee newsletter dated 13th January and reported by *Bloomberg*, Mr Parker wrote: "Right now it's a race between us and Delta to be the biggest at LAX, but we feel good about our chances of winning that race."

Like the purchaser of a lottery ticket, Mr Parker may be dazzled by the size of the prize. Almost 75 million passengers went through LAX in 2015, setting a record for the second successive year.

In good times for airlines in the USA, a pilot shortage is cited in a bankruptcy petition by a short-haul carrier

On 25th February, Indianapolis-based Republic Airways filed for bankruptcy – the first by a big US airline since American applied for protection from its creditors in 2011. In a period of record profits for the American air travel industry, Republic attributed the move to a scarcity of pilots.

Republic operates a fleet of smaller planes that provide flights for larger airlines including American and Delta. As reported by *Bloomberg News* (26th February), although it signed a three-year union contract with its pilots last year, Republic still had to ground aircraft just as it was trying to renegotiate agreements with the larger carriers and to rework terms of aircraft leases.

While the labour contract talks went on, Republic was losing as many as 40 pilots a month and adding about 30, according to analyst Duane Pfennigwerth, of *Evercore ISI* (New York). Another industry observer consulted by *Bloomberg* – Golden, Colorado-based aviation consultant Dan Akins – said that, while the new contract helped shore up Republic's roster of pilots, their higher pay meant the company had to seek more compensation from Delta, American and United.

Mr Akins was involved in the negotiations between the company and the pilots' union last summer. If Republic was struggling to get the three major airlines to pay higher fees, he speculated that it might have turned to bankruptcy court to force their hand. "It's not the preferred path," he said. "And I know [Republic] did not want to do it."

Bloomberg noted that, even with the improved pilots' contract, Republic's recruiting efforts were hampered after the US Federal Aviation Administration boosted the flight experience requirement for first officers sixfold, to 1,500 hours, and set new limits on hours in the cockpit.

As of the third quarter of 2015, Republic operated 110 of the 550 aircraft flown by the ten smaller carriers used by American Airlines. It accounted for 16 per cent of the 3,400 daily regional flights by American, the airline said. At that time, again according to *Bloomberg*, Republic's Shuttle America flew about 15 per cent of all Delta Connection flights.

"Republic is a valued long-time partner," American said in an email to *Bloomberg*. "It's very early in this process and we will work with Republic and our other regional partners to make sure we take care of our customers."

⦿ Another company concerned about a ripple effect from a Republic bankruptcy is the Canadian plane maker Bombardier Inc, which has struggled to market the C Series jet it has in development. *Bloomberg* in Canada reported that the aircraft is more than two years late and about \$2 billion over budget.

"For now, it's business as usual, but we are monitoring the situation closely," said Marianella de la Barrera, a spokeswoman for Bombardier. "We've seen many customers go through restructuring and bankruptcy protection only to emerge strong and better equipped to deal with today's challenges."

International

The return of 80 million Iranians to the global marketplace is ripe with opportunity for China and Europe – but not the USA

"The Great Race – for what a Western ambassador in Tehran described as 'the last gold mine on Earth' – has begun."

The reference, by Robin Wright of the *New Yorker*, is of course to Iran – the largest economy to return to market since the collapse of the Soviet Union in 1991. Iran is flush with cash after gaining access to \$100 billion in oil revenues frozen in foreign banks during the period of international sanctions.

The release of the funds was a condition of the nuclear deal promoted by US President Barack Obama and signed on 16th January between Iran and the P5+1 group of world powers: the US, Britain, France, China and Russia, plus Germany.

The Iran that is now free to sell its oil and to purchase goods with the proceeds is a populous nation with a crumbling infrastructure. Hence the “race” to Tehran, from East and West, by those eager to be of service to a well-heeled prospective customer in need of approximately everything. (“Iran Is Back in Business,” 25th January)

China was first off the mark. On 23rd January, the very day the sanctions were lifted, the Islamic Republic welcomed Chinese President Xi Jinping – and a delegation of three deputy premiers, six cabinet ministers, and a planeload of business executives – with considerable fanfare.

Ms Wright reported that the two countries announced plans to resurrect the ancient Silk Road that once defined trade across Asia, “this time with high-speed trains.” They also agreed to increase trade to \$600 billion over the next decade.

But Iran was keeping its options open. Two days later, Iranian President Hassan Rouhani arrived in Europe for four days of talks with his Italian and French counterparts, as well as Pope Francis. At the presidential palace in Rome he was greeted by an honour guard; the Iranian national anthem was performed. Mr Rouhani tweeted, “Looking forward to deepening bilateral ties and exploring opportunities for constructive engagement.”

Ms Wright took note of the irony. This was, she wrote on *newyorker.com*, “in a country where, less than two weeks earlier, business dealings with Iran had been a crime.”

Another prominent European contender for Iranian business is Britain. Foreign Secretary Philip Hammond had said earlier in the month, when the nuclear agreement was signed, “I hope British businesses seize the opportunities available to them through the phased lifting of sanctions on Iran.”

An exception for aircraft

The Iranian government has said it needs another 400 civilian aircraft over the next few years and has leaked plans to buy more than a hundred passenger planes from Airbus, of France. The deal, worth an estimated \$10 billion, would begin to update one of the world’s oldest fleets, its equipment dating to before the 1979 revolution.

It would appear that the United States alone does not stand to benefit importantly from Iran’s return. Despite the energetic diplomacy of US Secretary of State John Kerry, the two nations have not renewed diplomatic relations; and American sanctions against Iran remain in place, barring all investments and most sales.

But, Tehran having indicated an interest in acquiring some Boeings, the Obama Administration in January lifted the ban on selling American aircraft to Iran.

🌐 The International Monetary Fund projects that Iran’s economy will grow 5.5 per cent this year and again in 2017. Tehran has said it hopes to attract up to \$50 billion of foreign capital, annually, over the next five years. Before leaving home for Europe, Mr Rouhani told the Iranian parliament: “Government policies in

the post-sanctions era will focus on attracting foreign investment, expanding non-oil exports, and making the best use of financial assets.”

Back in business, indeed.

A step in the evolution of former Cold War foes: an Alabama-based builder of farm machinery sets up shop in Cuba

As an example of the rapidly improving relationship between the United States and Cuba, *USA Today* reported that the first American-owned factory to be built and operated in Cuba in over half a century is slated to begin production by early 2017. Cleber LLC (Paint Rock, Alabama), which builds farming tractors, has the necessary approvals from the US Treasury Department and in February was finalising its paperwork with the Cuban government.

A certain similarity may be noted between the Cleber experience and the variance that allows the USA to sell airplanes to Iran. To foster greater cooperation between Washington and Havana, the Obama administration has been working around the edges of the embargo that restricts most US trade with Cuba.

One adjustment allows American companies to sell products and services directly to private Cuban entrepreneurs, including those who work in private farming cooperatives. (“Feds Approve First US Factory in Cuba,” 15th February)

The partners who run Cleber – Horace Clemmons and Saul Berenthal – formulated their plan as soon as Mr Obama’s intentions for Cuba became clear. Long-time business associates, they founded the company to produce a machine specifically for the island’s small farms, which they estimate account for 70 per cent of agricultural production in Cuba.

Cleber will make a small, red tractor it calls the “Oggún” in homage to the Afro-Cuban Santería spirit of metalwork. At first, Mr Berenthal told Alan Gomez of *USA Today*, Americans will make the parts in Paint Rock, and assemble them at a facility in the Mariel Special Economic Zone, about 30 miles west of Havana.

The port-accessible plant is expected to turn out about 1,000 tractors a year to be sold in Cuba and throughout Latin America. To keep them affordable for small-scale farmers, the 25-horsepower tractors – designed to accommodate an array of attachments, for flexibility – will be offered for under \$10,000.

🌐 The eventual goal for Cleber is to have American workers train Cubans to do the work and manage the operation at Mariel.

“Cuba doesn’t want to just import, Cuba wants to do production,” said Mr Berenthal. “[What it] prefers is that we bring not only employment and technology to Cuba but also management skills.”

Dorothy Fabian
Features Editor

电信新闻

随着犯罪分子开始使用诸如Google、Facebook以及Hotmail等网络服务提供商，美国正设法授权英国直接访问科技公司保有的数据

“如果英美双方的谈判代表能实现他们的想法，那么很可能有一天，军情五处(MI5)（即英国国家安全局）会在某反恐调查中直接向Facebook或Google之类的美国公司下发窃听命令，要求窃听英国嫌疑犯的在线聊天。”《华盛顿邮报(Washington Post)》的中岛埃伦(Ellen Nakashima)和安德烈·彼得森(Andrea Peterson)在英美会谈中发来报道。此次会谈的中心是双方通过共同努力，授权英国政府直接对美国电信公司发出窃听命令，要求这些公司在涉及英国公民的国家安全和刑事调查中进行现场拦截。英国还将能够发布获取电子邮件等存储数据的命令。（《英国想带着他们的窃听命令和搜查令来美国》，2月4日）

这一计划最初是由一些科技公司和这两个跨太平洋同盟国所声称的难以维持的局面促成的，在这种局面中，由于美国公司掌握着（也可能是隐瞒着）相关数据，所以有些政府，比如英国政府便无法在国内调查中快速采取行动。《华盛顿邮报》记者注意到，这个话题突显出数字数据日益超越国界的问题，“对国家安全和公共安全带来了棘手的挑战和对隐私问题的新的担忧。”

在本报道发出的时候，作为谈判基础的文件草稿文本还尚未公开，但是《华盛顿邮报》拿到了一份审查副本。该副本表明英国仍将不得不遵守美国关于获得授权的规定；并且如果某调查过程中恰好出现美国公民或居民的名字，英国政府也将不能直接获取他们的档案记录。

按照英国制度，基于合理理由的监视不需要法官批准搜查和窃听命令，美国的做法也是如此。相反，如果内阁成员认为为了国家安全或防止严重犯罪有必要寻求授权，那么负责监督治安和内务的内政大臣就会授权批准。侵扰程度必须与人们感知到的威胁“成正比”。

中岛女士和彼得森女士注意到，奥巴马政府的高级官员说过他们很满意英国对于数据请求的规定，规定中包含了对隐私的“强有力的保护”，美国政府和国会都不会试图改变英国的标准。但是英美两国的隐私保护提倡者都在保持着警惕。

症结：隐私和公民自由问题

“这意味着他们将允许一个实施窃听前不需要单独司法授权的国家进行窃听，而这看起来似乎是美国宪法最基本的保障，”隐私保护提倡者、伦敦大学玛丽皇后学院监督法方面的客座讲师——埃里克·金(Eric King)向《华盛顿邮报》讲述道。“隐私保护被卖掉了。”

美国国务院和司法部门的官员强调说，会谈尚处于早期，且他们会争取保证谈判结果有利于保护公民自由。任何最终协定都需要国会通过对诸如窃听法和存储通信法等监督法进行修正来作出决议。

但是位于华盛顿的一个隐私保护团体——民主科技中心的高级法律顾问格里高利·诺耶姆说道，允许英国直接带着窃听命令到美国公司去就相当于对美国法律的“一次彻底变革”。他告诉《华盛顿邮报》：“我不认为国会会走这条路。”

考虑到当前美国国会在总统大选之年所面临的僵局状况，这个问题将很可能不会很快被纳入考虑范围。在此期间，外国政府要从美国的科技公司获取数据必须依赖双边法律互助协

议(MLAT)。这时，他们就会向司法部门发出针对数据的正式外交请求，而后司法部门会代表诉愿人寻求法院指令——据说这套流程平均要耗时10个月。

关于这对英国的法律实施意味着什么，《华盛顿邮报》虚构了一个例子：伦敦警察正在调查一桩雇凶杀人案。嫌疑人使用Hotmail进行交流。他们的邮件被存储在华盛顿雷德蒙德微软公司的一个服务器上。那么在现行的双边法律互助协议体系下，伦敦当局想要获取数据必须做好等待数月的准备。

相关消息.....

隐私也是伦敦交通局(简称TfL)关注的问题，因为它正考虑使用物联网来帮助其解决交通拥堵问题。《激烈的城市(FierceCities)》的记者埃斯特·希恩(Esther Shein) 2月16日引用总部位于伦敦的《电脑(Computing)》杂志的信息来源，报道称交通部门正考虑在全市范围内部署传感器来捕捉旅客行为数据。

首席信息官(CIO)史蒂夫·唐森披露，伦敦交通局在关于在何处放置传感器以使成本达到最合理化的仔细审查中，正“考虑如何能使伦敦的每一英寸柏油路提供的信息实现最大化。”但是唐森先生说匿名数据收集能够确保交通局不会知道每个人的精确去向。

苹果公司拒绝入侵美国联邦调查局(FBI)手中的一部iPhone手机一事将公众的注意力集中到了隐私和公共安全之间的紧张关系上

如果说上述计划（《美国计划授权英国》）是一项长期挑战，那么美国发现自己正面临着一个更迫切的隐私与安全问题。2月16日，iPhone手机开发商苹果公司违抗了联邦法庭的一项命令，这项命令要求它解锁一部iPhone手机以获取加密数据，官员们认为这些数据对于他们的一项调查是必要的，这项调查涉及去年12月2日发生在美国加利福尼亚州圣杯纳诺迪市的一起致使14人死亡的枪击案。

苹果公司（总部位于加利福尼亚州库比蒂诺市）最初协助了联邦调查局，但是它拒绝创建一个新的软件来打开当前在联邦调查局的手中那部iPhone手机。那部手机是属于开枪的夫妇其中一人的，他们两人也都已在枪击案中死亡。

如果把这次争议放入到全球恐怖主义威胁的背景下，《纽约时报(New York Times)》的安德鲁·罗斯·索尔金(Andrew Ross Sorkin)发出了一连串质疑。苹果公司在道德上是否有义务帮助政府了解更多关于枪击案的事实“还是对保护客户隐私负有道德义务”亦或是对它的股东们“哪个应该优先考虑？对于索金先生，这些问题都归结为一个反思：做一个好的企业公民意味着什么”（《苹果公司，在激烈的辩论中寻找一块道德高地》，2月22日）

苹果公司的首席执行官(CEO)蒂莫西·D·库克(Timothy D Cook)认为，遵守法院命令将威胁到“每个人的公民自由”，让其顾客更容易受到数字犯罪的威胁。几家科技公司同行的首席执行官也都支持他。Facebook的首席执行官马克·扎克伯格(Mark Zuckerberg)于2月22日在巴塞罗那全球移动通讯大会上演讲时说：“在这件事上我们支持苹果公司。”

库克先生继史蒂夫·乔布斯(Steve Jobs)之后掌舵苹果公司，享有品格高尚的美誉。据索金先生报道，库克推行“绿色环保”，有一次还训斥了一名研究投资回报的股东。

但在这场与美国的争议中，这位苹果公司首席执行官面临一个更具体的问题：即有这样一种可能，如果他的公司遵守了法院的命

令,那么其他国家政府便可能效仿,要求“iBehemoth”基于调查目的给他们访问权限。如果苹果拒绝他们的请求,以中国政府为例,那么它可能面临被禁止在中国经营的风险,而中国市场是其本土市场以外的第二大市场。

索金先生写道,还有一种可能性,如果苹果公司为联邦调查局创建一款特殊的软件,它有可能落入别人手中,从而导致更大的隐私和安全问题。

“一个我们从未见过的世界”

也许无需多说,执法官员对库克的立场是极为不满的。“曾经有这样一种东西叫企业责任,”对于苹果公司的这种做法,纽约市警察局长威廉·J·布拉顿(William J Bratton)向《泰晤士报(Times)》记者这样说道。“现在,这是企业不负责任。”

“我们这到底是在干什么?我们在保护一个恐怖分子,”提到12月的暴乱,圣贝纳迪诺县地区检察官迈克尔·拉莫斯(Michael Ramos)对彭博新闻社(Bloomberg News)如是说。“没办法。”

就其本身而言,直接管辖联邦调查局的美国司法部认为,苹果公司的立场“似乎是出于该公司对其商业模式和公共品牌营销策略的担忧。”联邦调查局主任詹姆斯·科米(James Comey)驳斥了苹果的观点,即要求他们干预这件事的意义远远超出了手头的这件案子。而对科米先生而言,政府的诉求仅限于这个特殊的案子,因而就提出了一个狭隘的法律问题。

① 苹果公司虽然坚持自己的立场和原则,索金先生承认,但它仍对刑事调查造成了阻碍(或至少没有帮助),而该公司本来对协助调查是可以起到特殊作用的。他有感而发提出了另一个问题:公司在什么情况下能够不考虑商业或隐私风险,负起帮助执法的道德义务,在恐怖袭击事件中?或是在任何案件中?

② 这引出了双方——截然相反的一个观点——然而发过来又似乎是同一个想法。在《致客户的一则消息》中(2月16日),苹果公司库克先生写道,“这个时候需要公开讨论,我们希望我们的客户和全国各地的人们明白什么正处于危险当中。”在2月21日发表的一份声明中,美国联邦调查局的科米先生写道:“[隐私和安全之间的紧张关系]应该由美国人民来解决,以决定我们在一个前所未见的世界里该如何统治我们自己。”

航空新闻

达美航空公司(Delta)和美国航空公司在洛杉矶就一个象征性的主权地位展开了激战

美国的机场都很相似,区别主要在于破损程度(洛杉矶机场)或整洁程度(依然是洛杉矶国际机场(LAX),在最近进行了航站楼改造后)。现在,这个位于太平洋岸边的机场正在为自己打造又一个区分标识:作为两家运营商的战场——美国航空集团和达美航空公司——这两家公司正在争夺这个最大的机场中的1号地位,而洛杉矶是全世界最赚钱的航空市场之一。

对《彭博商业周刊(Bloomberg Businessweek)》的航空/旅游专栏记者贾斯汀·巴赫曼(Justin Bachman)而言,这对竞争对手的确切目的非常明显。美国航空已表示将在洛杉矶国际机场再建两个登机口以容纳每日新增的20架次航班,总计达到每天220架次航班,飞往70个目的地。去年夏天达美航空公司庆祝耗资2.29亿美元完成了5号航站楼的翻新运作,其中包含一个好莱坞明星和其他精英旅客专用的私人入口。

达美航空公司表示,自2012年以来,该公司从洛杉矶直飞目的地的航线数量已经翻了一番,达到近60条,并且飞机座位数量

自2009年以来也增加了一倍。但是,根据最新的联邦统计数据,占据15.4%乘客市场份额的达美航空公司仍然落后于市场份额17.8%的美国航空公司以及联合大陆控股公司和西南航空公司。

所以情况很明显了。但是巴赫曼(Bachman)先生并不是在寻找一个赢家,而是质疑洛杉矶国际机场会不会像亚特兰大机场(达美航空公司)、达拉斯-沃斯堡机场(美国航空公司)或纽瓦克机场(联合大陆控股公司)那样成为一个真正的“航空枢纽”,在这样的机场中一家航空公司可以管理多达75%的航空流量。(《这就是为什么没有航空公司能掌控洛杉矶国际机场的原因》,2月2日)

一方面,他写道,洛杉矶国际机场并不是洛杉矶地区唯一的机场,它要和55英里内的其他四个机场分割空中运输。另一个因素是洛杉矶是著名的旅游和商业旅行目的地。美国航空公司首席营销官安德鲁·诺科拉(Andrew Nocella)告诉彭博社(Bloomberg),最具优势的航空枢纽应是倾向于中转服务的,只有大约三分之一的乘客以这些枢纽作为起始地和目的地。他说,“在[洛杉矶国际机场],您看到的情况却几乎完全相反。”

这种动态也束缚了其他主要城市,如纽约和华盛顿的发展,它们也没能发展成为占主导地位的航空枢纽。在芝加哥奥黑尔国际机场(O'Hare),联合大陆控股公司(美国航空公司)都有指挥中心且均分乘客份额。巴赫曼先生指出,地理位置也起到了很重要的作用。洛杉矶国际机场位于西海岸,这就意味着它无法成为东西方向飞行的国内旅客的中转枢纽。如今它的中转客流主要是往来夏威夷和亚洲的,诺科拉先生承认“洛杉矶国际机场与那些枢纽机场的情况确实不同。”

③ 但是这样的考虑并没有浇灭美国航空公司首席执行官道格·帕克(Doug Parker)的热情。彭博社报道,帕克先生在一封1月13日的员工内部通讯邮件中写道:“现在我们在和达美航空公司之间还在争夺洛杉矶国际机场的主导地位,但我们对自己赢得比赛很有信心。”

就像购买彩票的人一样,帕克先生可能是被奖品大小迷花了眼。2015年,洛杉矶国际机场客运量近7500万人次,连续第二年创造了纪录。

在全美国的航空公司处于繁荣时期时,有短途航空公司在破产申请中就提到了飞行员短缺问题

2月25日,位于印第安纳波利斯的共和国航空公司申请破产——这是2011年美国航空公司申请债权人保护以来首次有美国大型航空公司申请破产。在美国航空工业利润创纪录的时期,共和国航空公司将其这一行动归结于飞行员的短缺。

共和国航空公司运营的一队小飞机为一些较大的航空公司提供航班,其中包括美国航空公司和达美航空公司。据《彭博新闻》(2月26日)报道,虽然去年共和国航空公司和它的飞行员签订了为期3年的劳工合同,它仍不得不停飞一些飞机,正如它试图与一些更大的运营商重新谈判重新修订飞机租赁协议一样。

据Evercore ISI(纽约)分析师杜安·芬尼格沃斯分析,劳动合同谈判进行期间,共和国航空公司每月要损失多达40名飞行员,同时有30名飞行员新加入进来。彭博社咨询的另一名行业观察者——位于科罗拉多州戈尔登(Golden)的航空顾问丹·埃金斯说,虽然新合同有利于共和国航空公司留住飞行员,但给他们提高工资就意味着公司必须从达美航空公司、美国航空公司和联合大陆控股公司寻求更多的补偿金。

埃金斯先生去年夏天参与了公司和飞行员工会之间的谈判。他推测如果共和国航空公司要努力争取三大航空公司支付更高的费用,它可能转向破产法庭以对他们施加压力。“这不是首选途径,”他说。“我知道[共和国公司]并不想这么做。”

彭博社注意到，即使飞行员合同得到了改善，共和国航空公司的招聘工作还是受到了阻碍，因为美国联邦航空管理局将大副的飞行经验要求提高了6倍，达到1500小时，并对其在驾驶舱的时间设置了新的限制。截至2015年第三季度，美国航空公司使用的10家小运营商执飞的550架飞机中有110架由共和国航空公司运营。美国航空公司说这占到它3400条日常区域航线的16%。据彭博社报道，当时共和国航空公司下属的美利坚短程运输公司的飞行量约占达美航空公司所有中转航班的15%。

“共和国航空公司是一个宝贵的长期合作伙伴，”美国航空公司在发给彭博社的电子邮件中表示。“现在尚处于整个过程中非常早期的阶段，我们将与共和国航空公司和其他区域合作伙伴共同努力，以确保服务好我们的客户。”

④ 另一家关心共和国航空公司破产带来的连锁反应的是加拿大的飞机制造商庞巴迪公司，它一直在努力将其正在开发中的C系列飞机打入市场。彭博社加拿大分社报道说，这架飞机的研发比预期晚了两年多，并且超出预算约20亿美元。

“现在，一切照旧，但我们正在密切监测形势，”庞巴迪公司的发言人Marianella de la Barrera说，“我们看到过许多客户经过重组和破产保护之后却变得更加强劲，能更好地应对当今挑战的情形。”

国际新闻

8000万伊朗人回归全球市场的时机已经成熟，为中国和欧洲带来机遇——但不包括美国

“德黑兰一位西方大使称为‘地球上最后的金矿’的——伟大的比赛——已经开始。”

《纽约客(New Yorker)》记者罗宾·赖特(Robin Wright)的这句引用当然是针对伊朗的——这个自1991年苏联解体以来最大的经济体终于重返市场了。伊朗在获得了国际制裁期间冻结在外资银行的1000亿美元的石油收入后现金异常充裕。这笔资金的释放是核协议的一个条件，而这一核协议是由美国总统巴拉克·奥巴马(Barack Obama)促成的，由伊朗和五常加一(P5+1)：美国、英国、法国、中国、德国和俄罗斯于1月16日共同签署。

伊朗现在自由出售石油并利用所获收益来购买商品，它是个人口大国，但基础设施却摇摇欲坠。因此东西方那些渴望为几乎对一切都有需求的富有的潜在客户服务的人便“争相”赶往德黑兰。(《伊朗回归商界》，1月25日)

中国是第一个采取行动的。1月23日，制裁被取消的当天，伊斯兰共和国举行了热烈的欢迎仪式，迎接中国国家主席习近平和由三个副总理、六个内阁部长以及一飞机的企业高管组成的代表团。莱特女士报道说，两国宣布复兴古丝绸之路的计划。丝绸之路曾经是整个亚洲贸易的特色，“这一次它将搭上高速列车。”他们还就未来10年内使贸易额增加至6000亿美元达成了共识。

但是伊朗保留选择权。两天后，伊朗总统哈山·鲁哈尼抵达欧洲，与意大利和法国总统以及教皇弗朗西斯进行了为期四天的会谈。罗马总统府仪仗队对他表示欢迎；他们奏起了伊朗国歌。鲁哈尼先生写道：“期待深化双边关系，探索建设性交往的机会。”

莱特女士注意到这其中的讽刺意味。这是她在纽约客网站(newyorker.com)上所写的，“不到两个星期前，该国与伊朗经商还算是犯罪。”另一个争夺伊朗业务的重要欧洲竞争者就是英国。外交大臣菲利普·哈蒙德(Philip Hammond)在本月早些时候(核协议签订时)说，“我希望在逐步解除对伊朗制裁的过程中，英国企业能抓住机会。”

飞机行业是个例外

伊朗政府已表示，它在未来几年内还需要400架民用飞机，并透露了准备向法国空中客车公司购买超过一百架客机的计划。这笔估计价值在100亿美元的交易将开始更新世界上最古老的飞机队伍，其设备历史可以追溯到1979年革命之前。

看来，只有美国不打算从伊朗获得大量收益回报。尽管美国国务卿约翰·克里(John Kerry)积极外交，但两国还未恢复外交关系，美国对伊朗的制裁仍在继续，禁止一切投资和大部分销售。

但是，随着德黑兰对购买一些波音客机表示感兴趣，奥巴马政府于1月份解除了禁止向伊朗出售美国飞机的禁令。

⑤ 国际货币基金组织(IMF)预计伊朗的经济今年将增长5.5%，2017年将再增长5.5%。德黑兰已表示，它希望在接下来的五年内每年吸引500亿美元的外国资本。在离开伊朗前往欧洲之前，鲁哈尼先生对伊朗议会说：“在制裁后时代，政府政策将专注于吸引外国投资，扩大非石油出口，以及最大限度地利用金融资产。”

伊朗真的回归商界了。

前冷战对手向前进了一步：阿拉巴马州的一家农业机械制造商在古巴开设了店铺

作为美国和古巴之间关系迅速改善的一个例子，《今日美国(USA Today)》报道，半个多世纪以来第一家准备在古巴建造和运营的美国工厂预计将于2017年初投产。制造农用拖拉机的Cleber有限责任公司(位于阿拉巴马州佩恩特罗克市)已获得美国财政部批准，并将于2月份完成向古巴政府提供文书的工作。

需要注意到，Cleber公司的经历和允许美国向伊朗出售飞机的变化之间具有一定的相似性。为了加强华盛顿和哈瓦那之间的合作，奥巴马政府一直在致力于弱化限制美国与古巴之间大多数贸易的禁令。其中的一项调整便是允许美国公司将产品和服务直接卖给古巴的私人企业家，包括那些在私人农业合作社工作的人员。(《联邦政府批准了第一家在古巴的美国工厂》，2月15日)

经营Cleber公司的两位合作伙伴——霍勒斯·克莱蒙斯(Horace Clemmons)和索尔·伯恩塔尔(Saul Berenthal)——在奥巴马对古巴的态度变得明朗后马上制定了他们的计划。作为长期的商业伙伴，他们成立了这家公司，生产专用于这个小岛上的小农场的机器，他们估计小农场占到了古巴农业生产的70%。

Cleber公司将生产一款红色小拖拉机，命名为“Oggún”，以向非洲-古巴-萨泰里阿教(Afro-Cuban Santería)的金属加工精神致敬。伯恩塔尔先生告诉《今日美国》的艾伦·戈麦斯，美国人刚开始会在佩恩特罗克生产零部件，然后在哈瓦那以西约30英里的马里埃尔经济特区的工厂里组装零部件。

他们接近港口的工厂预计每年将生产约1000台拖拉机，在古巴和整个拉丁美洲进行销售。为了让小型农场主负担得起，他们将把这些25马力的拖拉机设计为能够灵活地安装一组附加装置——其售价将在10,000美元以下。

⑥ Cleber公司的最终目标是让美国工人培训古巴人做这项工作并经营管理马里埃尔工厂。

“古巴不想只进口，古巴还想自己生产，”伯恩塔尔先生说。“[它]更希望我们不仅为其创造就业、引进技术，还要引入管理技能。”

专栏编辑: Dorothy Fabian

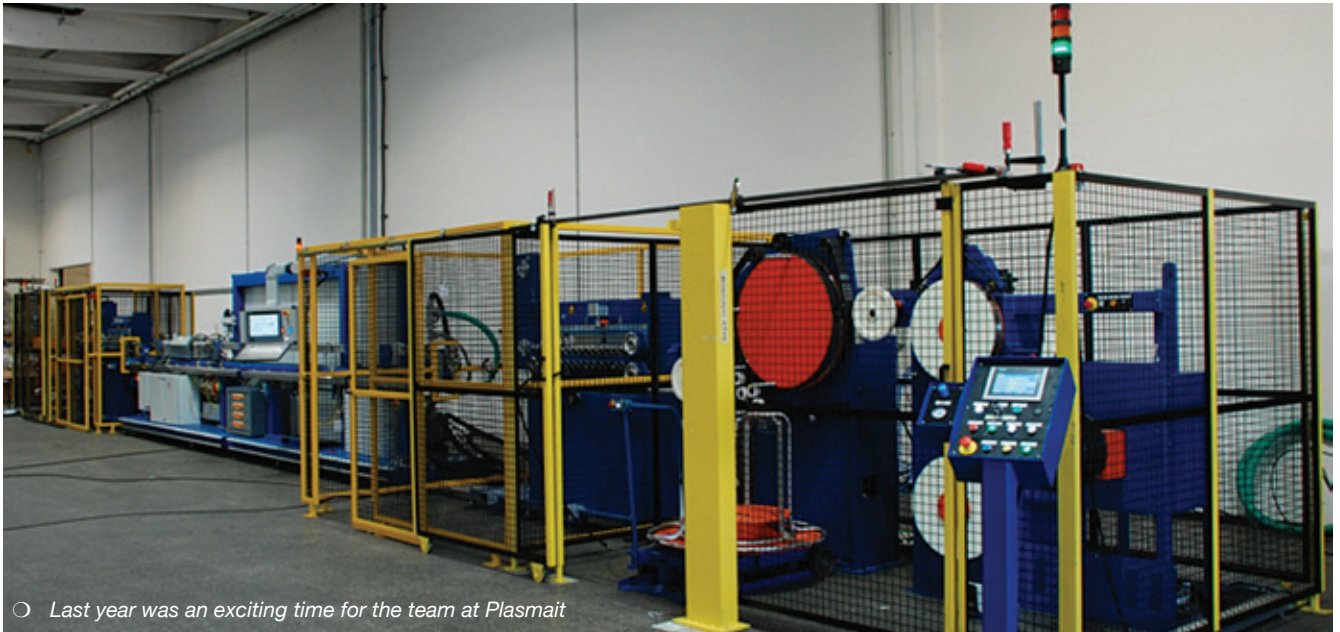
Furnaces and heat treatments



Of all the processes that benefit from the skill and experience of the wire maker, heat treatment stands out. Heating rates in actual practice routinely exceed those in controlled laboratory experiments, with changes in the material occurring at temperatures a few degrees above “ideal” transformation temperatures. In the plant, transformation changes during cooling generally occur at temperatures a few degrees below those plotted in the textbook graphs.

Because the temperatures at which transformation takes place are critical to heat treatment, understanding these graduations is key to the hardness and strength of the wire that comes out of the furnace. When this knowledge is second nature to the wire maker, it is key to the quality of the finished product that comes out of the plant.

Versatile heat and surface treatment process



○ Last year was an exciting time for the team at Plasmait

2015 was an exciting time for the Plasmait team. The company sold a range of plasma heat and surface treatment machines in the ferrous and non-ferrous markets. Plasma is proving its performance in an increasingly wide range of materials, from mainstream copper alloy and aluminium wire to specialist medical tubes and ropes, jewellery strands, aerospace materials, electronics and semiconductor wire and strip.

Most significant is Plasmait's success in the stainless steel and nickel alloy wire and tube markets. Deployments included annealing lines for large and intermediate stainless steel wire boasting a single line output of 170kg/h and more for martensitic stainless steels.

Stainless steel wires from 1 to 10mm can now be produced scratch-free and pile-free at high speed. Superior surface and homogeneous recrystallisation with small grain improves subsequent drawing and reduces the number of wire breaks on the drawing machine.

The new fine wire annealing line allows recrystallisation annealing at up to 25m/s on a range of fine stainless steel and nickel alloy wires. It is now possible to anneal fine stainless wires in-line with the drawing machine.

Annealing fine wire at up to 20 times the speed of a traditional strand furnace means fewer take-ups and payoffs and hence lower cost of total capital investment. The PlasmaAnnealer can cold start production in a few minutes and can be stopped immediately. This avoids long heating-up and cooling-down times and associated energy costs that are symptomatic of a conventional tube furnace.

The first plasma annealer for taped copper conductors has been in operation for more than a decade. The latest one was installed in 2015.

The shortcomings of the traditionally used batch annealing process can be avoided with continuous plasma annealing and cleaning used in front of the taping line.

Round or rectangular conductors can be plasma annealed and cleaned in-line with a conventional taping line. Plasma annealed conductors feature better accuracy in mechanical properties and better surface finish, which results in superior tape adhesion.

Plasma heat and surface treatment can be effectively deployed for plating applications. Plasma-treated copper or aluminium wires can be hot-dip coated or electroplated without the need for chemical cleaning or fluxing. For example, PV ribbon can be annealed to a super-soft state and tinned without the need for chemicals.

Plasma surface activation can also improve lubricant pickup in a drawing line. Plasma surface treatment ensures good lubricant adhesion during the drawing of stainless steel or titanium rods.

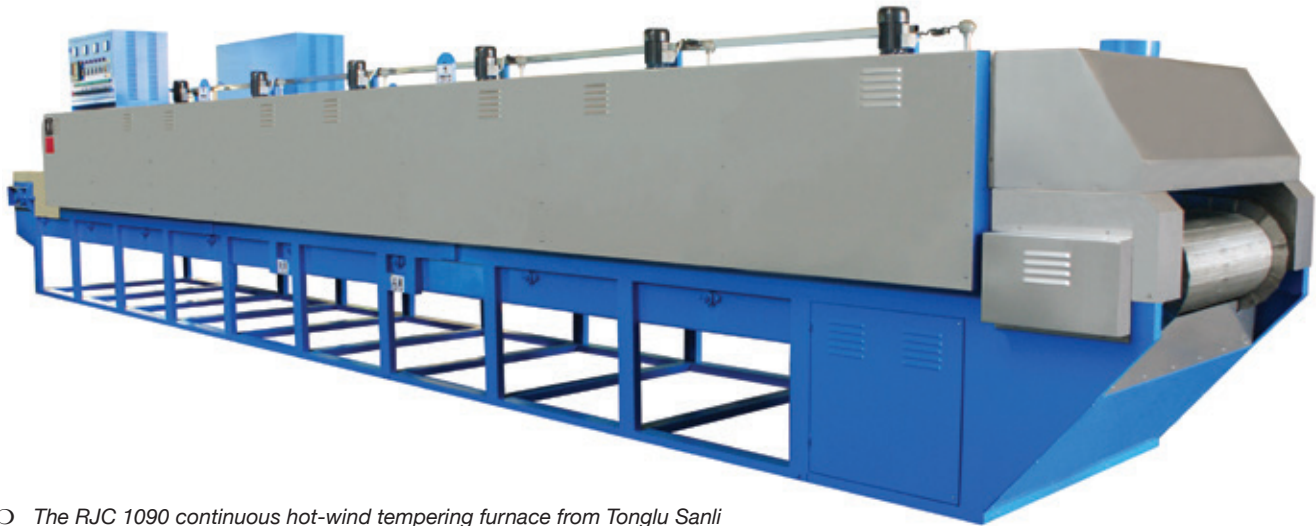
Surface activation is achieved at low temperatures, which makes the process particularly economical compared to expensive-to-run traditional processes such as brushing, acid treatment or sand blasting.

Among the latest deployments was also a plasma annealer for stranded conductors and ropes. The annealer was designed to allow for rapid heat penetration through the cross-section of the stranded construction.

With plasma heat treatment, the individual wires can be annealed or stress relieved to equal temper/softness.

Plasmait GmbH – Austria
Website: www.plasmait.com

The specialist in the thermal treatment of springs, hardware and fasteners



○ The RJC 1090 continuous hot-wind tempering furnace from Tonglu Sanli

As a large furnace manufacturer for springs, hardware and fasteners in China, Tonglu Sanli has focussed in recent years on the development of its overseas market to better serve its customers around the world with good quality at reasonable prices.

From small precision springs to big automobile suspension and train springs, Tonglu has developed a full range of different sizes of hot wind tempering furnaces, equipped with PID intelligent temperature controller and integrated auto-control system.

The temperature can be set freely with a tolerance of $\pm 3^{\circ}\text{C}$ under a 500° hearth temperature environment, installed with hot wind mixing device which ensures the balanced and precise hearth temperature, and thus the quality of the parts to be treated is guaranteed.

Smooth and stable auto-running of stainless steel belt, stepless speed regulation and auto speed control allows an increase in productivity and a decrease of labour intensity.

Brand-new structure, with all-fibre furnace lining allows fast heating-up, and reduction of electricity consumption. This is a simple and secure operation with no sodium nitrite needed, and giving off much less pollution.

Auto-feeding, auto-placement and auto-discharging can be

offered based on the customers' special requirements. This can be applied to the carburising, carbonitriding, quenching under controlled atmosphere of self drilling screws, nuts, bolts, wallboard nails, chipboard screws, bolts and nuts for furniture, wooden screws, dry wall screws, machine screws, tapping screws, springs, spring washers, standard parts, bearings, gearing chains, automobile parts, knitting devices and hardware.

Perfect temperature distribution allows the quality of the treated pieces to be uniform and reliable.

Together with the feeding machine, cleaning machine, quenching tank, tempering furnace, blackening tank and drying furnace, an automatic production line can be quickly set up.

With dozens of patents in furnace design, Tonglu continuously sticks to its principal objective of environmental protection by using responsibly the refractories, and special designs to prevent the maximum loss of energy.

To perfect its product range in the industry, Tonglu manufactures at the same time the grinding machines, grinding wheels, chamfering machines and dust collectors.

Tonglu Sanli Furnace Co Ltd – China
Website: www.sanlidun.com.cn

Experience counts at FIB

Present in 70 countries world-wide, FIB Belgium is experienced in the framework of equipment for heat treatment of steel wires such as pit, bell and continuous heat/galvanising treatment lines.



○ Equipment for heat treatment from FIB

The company has introduced several new technologies for the heat treatment of wires and small strips. The new austenitising and annealing furnace technology IMFLEX was introduced two years ago and has demonstrated its capacity to decrease the carbon footprint by 27 per cent.

Regarding steel wire galvanising lines, FIB also introduced its ZinXaver technology that allows decreasing the length of the galvanising bath by 30 per cent.

FIB Belgium sa – Belgium
Website: www.fib.be

Experience and innovation

QED specialises in equipment for in-line heat-treating, cleaning and coating of steel wire. Its furnaces are custom-built for multi-strand annealing, stress relieving, patenting and tempering processes.

With a bed of fine aluminium oxide particles and precise air and gas control, its fluidbed furnaces offer an environmentally friendly heat-treating solution in an energy efficient package. The fluidbed's rapid heat transfer results in significantly shorter furnace length and therefore more compact and easier to operate process lines. These fluidbeds operate from DV=120 to DV=240 and from 1.5 t/h to 8 t/h production with satisfied customers on six continents.

○ Two of QED's galvanising lines at Mid-South in Nashville, USA



A powerful S7 Siemens PLC is at the heart of QED's furnace control systems. Programmed with user-friendly software and advanced combustion algorithms, they deliver precision gas flow and accurate temperature control. One of the interesting new developments is a web-enabled system for smartphone monitoring and remote troubleshooting of control panels.

The addition of pulse firing technology to QED's muffle tube austenitising furnace improves the thermal efficiency and increases temperature uniformity. This is due to the higher than average flame velocity and superior convective heat-transfer. Pulse firing also offers lower NOx emissions and more flexibility in burner and zone control.

With a view to improved efficiency and to minimise environmental impact, QED developed the dual loop pressure/temperature combustion control system. This patented system maintains a steady output with precise air-gas ratio on all multiple burner furnaces.

The latest development in ceramic lined furnaces is the advanced recuperative technology Mark 4 immersion burner, which offers dramatically higher combustion efficiency from an extended double pass pre-heat design. Constructed of stainless and high nickel alloy steels, this new burner offers an extended operating lifespan, a cooler skin temperature and reduced maintenance.

QED – Canada

Website: www.qedwire.com

Heat treating and high temperature testing

No. 871 is a 2,000°F (~1,093.3°C) gas-heated box furnace from Grieve, currently used for heat treating and high temperature testing.

650,000 BTU/HR are installed in three modulating natural gas burners with a floor mounted combustion air blower. Workspace dimensions are 30" wide x 48" deep x 30" high.

The unit has 7" insulated walls comprised of 5" of 2,300°F ceramic fibre and 2" of 1,700°F block insulation. The 6½" floor insulation is made of 4½" of 2,300°F firebrick and 2" of 1,900°F block insulation. The plate hearth is made of firebrick and is supported by firebrick piers.

Controls onboard No. 871 include a Partlow MRC 7000 recording and programming temperature controller and an electrically operated vertical lift door.

Grieve Corporation – USA

Website: www.grievcorp.com



○ The No. 871 gas-heated box furnace from Grieve

The Effect of Cable Construction on Flame Retardancy in Moisture-cure Compounds

By Peter C Dreux, Abhijit Ghosh-Dastidar, Kurt A Bolz, The Dow Chemical Company

Abstract

Flame retardant fillers are used in insulation and jacket coatings to produce building and industrial cables that meet critical fire safety standards and codes. These flame retardant additives mitigate the inherent fuel properties of the base resins used to provide electrical insulation to the underlying conductor, thereby slowing the spread of fire and providing critical escape time should a fire start.

VW-1 (UL 44 and UL 2556) is an industry specification describing the flame retardancy of a polymer coated wire and its likelihood to propagate a fire after the removal of the initial heat source.

With the advent of moisture cross-linked formulations in wire and cable systems, and the use of a draft-free burn chamber, compound manufacturers and cable producers have found it more and more challenging to pass VW-1. Beyond the critical parameter of polymer compound formulation, a further understanding of the cable construction including insulation wall thickness and conductor core (solid vs stranded) is necessary in the design of systems that will meet this level of burn performance.

In this work, the effects of wire construction, including insulation thickness and conductor type, are investigated on the burn performance of various flame retardant formulations.

Moisture-cured, low voltage wire insulations are made by mixing ethylene-vinylsilane copolymer, dibutyltin dilaurate catalyst masterbatch and varying levels of flame retardant masterbatch, and extruding on wires. Burn performance is described by burn time and char length of wires passing VW-1 as tested in a UL certified burn chamber.

1 Introduction

Underwriters Laboratories Inc (UL[®]) has established the specification UL-44 (Thermoset-Insulated Wires and Cables) for type XHH, XHHW, XHHW-2 RHH,

RHW, RHW-2, RH and SIS insulated wires. In addition to dictating maximum operating voltages, conductor properties (size, metal type, solid vs stranded, etc) and insulation thicknesses, UL-44 specifies performance requirements for the insulation materials.

These performance criteria are defined in terms of physical and electrical properties, fluid resistance, and thermomechanical performance. In addition, designations of flame retardancy are defined with FV-2/VW-1, vertical specimen, having one of the most rigorous burn compliance criteria.

To achieve a marking of VW-1, a finished wire, either a 14 AWG (2.08mm²) copper or 12 AWG (3.31mm²) aluminium conductor with a 30 mil (0.76mm) insulation layer must not be capable of conveying flame along its length or in its vicinity in accordance with the test^[1]. While the specification is not explicit about the use of solid versus stranded conductor, insulation formulators typically test specimens using solid conductors.

This is largely due to the fact that other physical and electrical testing beyond flame performance does require the use of solid conductors. However, because of their flexibility and relative ease in handling during installation, cable manufacturers by and large produce only stranded conductors, even at smaller gauge sizes.

Therefore samples submitted by cable producers for VW-1 testing, either for new product introductions or existing product compliance, are typically made using stranded conductors.

It is therefore imperative that compound manufacturers understand and are able to predict the burn performance of their flame retardant compounds on a given conductor type. The conductor size is known to be a key parameter in the burn performance of wire and cable constructions, with larger conductors providing a greater heat-sink, and thus a disruption to the 'fire triangle' (heat/oxygen/fuel)^[2].

There has been no effort in either the industry or the literature to determine if burn performance is significantly impacted by the type of conductor, stranded vs solid.

Sample	Thickness (mm)	Type	Press (MPa)	Speed (rpm)	Line speed (m/min)	Melt temp (°C)
HB-1	0.76	Solid	10.5	50	2.7	159
VB-1	0.76	Solid	14.1	50	2.7	162
VB-2	0.76	Solid	15.1	50	2.7	159
HB-1	0.76	Strand	10.0	55	2.7	161
VB-1	0.76	Strand	13.9	55	2.7	161
VB-2	0.76	Strand	13.4	55	2.7	162
HB-1	1.52	Solid	10.1	80	2.1	160
VB-1	1.52	Solid	12.5	80	2.1	160
VB-2	1.52	Solid	11.8	80	2.1	160
HB-1	1.52	Strand	9.3	85	2.1	160
VB-1	1.52	Strand	12.9	85	2.1	160
VB-2	1.52	Strand	13.3	85	2.1	160

○ **Table 1:** Extrusion conditions of various moisture-cure constructions

The purpose of this paper is to study the effect of conductor type, stranded vs solid copper, on VW-1 burn performance for four moisture-cure compounds of varying degrees of flame retardancy.

In addition to conductor type, insulation thickness, which has been shown to be detrimental to flame performance in halogen-free systems^[3], will be studied. The flame performance will be characterised by the samples' ability to pass the VW-1 test, the average sample burn time and the charred or uncharred length.

2 Experimental

2.1 Materials

The samples tested in this paper were various moisture-cure formulations extrusion coated on to 14 AWG (2.08mm²) copper conductors. Both solid and stranded conductors were used. 30 and 60 mil (0.76 and 1.52mm) insulation layers were studied during the course of these experiments.

The moisture-cure formulations used were designated horizontal burn formulation 1 (HB-1), enhanced horizontal burn formulation 1 (EHB-1), and vertical burn formulations 1 and 2 (VB-1 and VB-2, respectively).

Prior to extrusion all materials, excluding base resins, were dried in a vacuum oven in the presence of desiccant (Dri-Rite: anhydrous calcium sulphate) for 24 hours at 60°C. The dried materials were then weighed and sealed in foil bags to minimise moisture absorption and prevent pre-cure or scorch during extrusion.

2.2 Wire Extrusion

Insulation coated wires were made using a mini wire line extruder. The unit consisted of a Brabender ¾" extruder with variable speed drive, a 24:1 Maddox mixing head screw, a Brabender cross-head wire die, water cooling trough with air wipe, a laser micrometer and a Con-Air variable speed wire puller. All extrusions were done using a 150°C flat temperature profile across the three heating zones of the barrel as well as the die.

A layered screen pack geometry containing screens of 20/40/60/20 mesh and a die plate were used to filter the molten polymer just prior to reaching the die opening. In addition, the screens provided sufficient back pressure to ensure better melt mixing of the various formulations. A 67 mil (1.7mm) tip and a 124 mil (3.15mm) die were used to produce 14 AWG wires with a 30 mil wall thickness. The same 67 mil tip was used with a 174 mil (4.42mm) die to produce coated wires with 60 mil of insulation.

Table 1 shows the head pressure, screw and line speeds and melt temperatures for each sample produced.

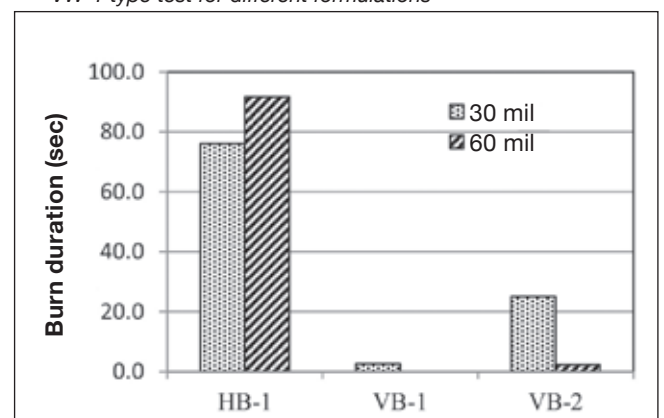
2.3 Moisture curing

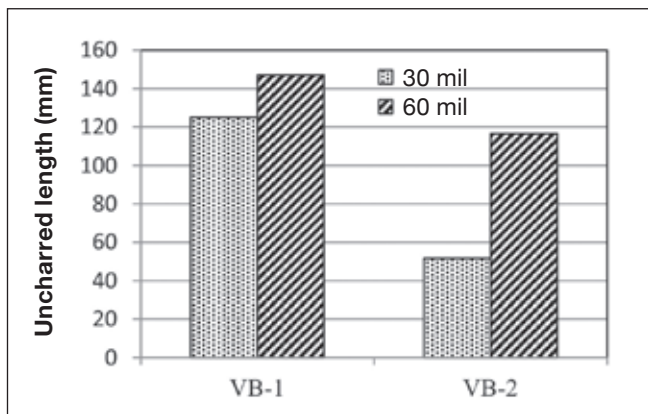
All wires were cured in a 90°C water bath for 18 hours to ensure full crosslinking. Prior to flame testing the wires were allowed to condition in a temperature and humidity controlled room (25°C and 50% RH) for 24 hours.

2.4 Burn Testing

Three cured and conditioned specimens from each formulation shown in Table 1 were subjected to FV-2/VW-1 burns in accordance with UL Standard for Safety for Wire and Cable Test Methods, UL25546. Section 9.4 of the standard defines the resistance of a wire to the vertical propagation of flame and dropping of flaming particles^[4].

○ **Figure 1:** Effect of insulation thickness on burn duration in VW-1 type test for different formulations





○ **Figure 2:** Effect of insulation thickness on uncharred length in VW-1 type test for different FR formulations (solid conductors)

24" wire specimens affixed with Kraft paper strips at their tops were suspended vertically in a draft-free chamber. A $37 \pm 1 \text{ MJ/m}^3$ methane flame was impinged upon the samples at an angle of 20° to the vertical.

The impingement point of the flame was $254 \pm 2\text{mm}$ below the bottom of the Kraft paper strip. A continuous layer of surgical cotton was placed below the specimens such that the surface of the cotton was $235 \pm 6\text{mm}$ below the impingement point of the flame.

Each specimen was subjected to five 15-second applications of flame. The interval between flame applications was 15 seconds and the interval was maintained for all applications where the specimen self-extinguished prior to the elapse of the 15 seconds.

For samples burning longer than 15 seconds but shorter than 60 seconds, the next application of flame was done when the sample self extinguished. In order for a sample to have passed the VW-1 burn test, all of the following criteria must have been met:

- Less than 25 per cent of the Kraft paper indicator was burned
- The specimen did not burn longer than 60 seconds after any of the five applications of flame
- The cotton batting was not ignited by either flaming or glowing particles or flaming drops

In addition to these criteria, the burn performances of the specimens in this study were characterised by the following parameters:

- Uncharred length – the distance below the Kraft paper indicator that is not burned and maintained a smooth, unblemished surface after wiping with a soft cloth
- Average burn time – the duration that the specimen continued to burn after the removal of the flame and averaged over the five flame applications. For burn durations greater than 60 seconds, the time was measured until the Kraft paper began to burn

3 Results and Discussion

3.1 Effect of insulation thickness

The effect of insulation thickness on the performance of multiple compositions in a VW-1 type test is shown in Figure 1 for 14 AWG solid Cu conductors. The results show that for the two higher flame-retardant compositions, the burn duration decreases as insulation thickness increases with

no burn time recorded for the 60 mil insulation with VB-1 formulation. These results are in line with the expectation that for insulation or articles made with flame-retardant materials, it is increasingly difficult to start a sustainable fire.

The data also shows that for the less flame-retardant material, ie, for HB-1 sample in this case, the opposite may be true.

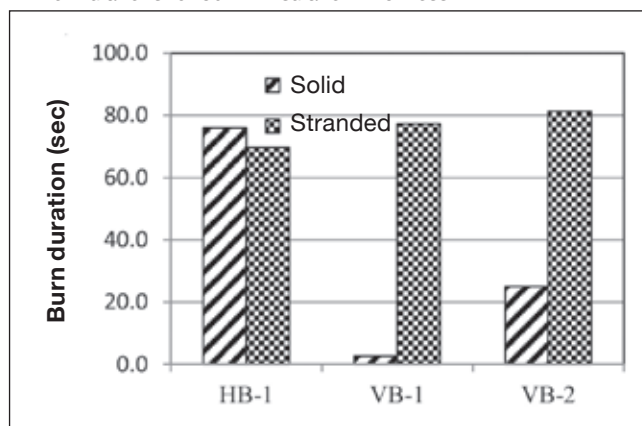
This observation can be easily explained by the fact that below a minimum level of flame-retardance when thicker materials do catch and support a sustaining flame, they will just burn longer because of the larger mass of available flammable material. For both cases with HB-1 formulation, the wire samples burn all the way through the flag leaving no uncharred length.

The effect of insulation thickness on the burn behaviour can also be expressed by the uncharred length of the samples as shown in Figure 2.

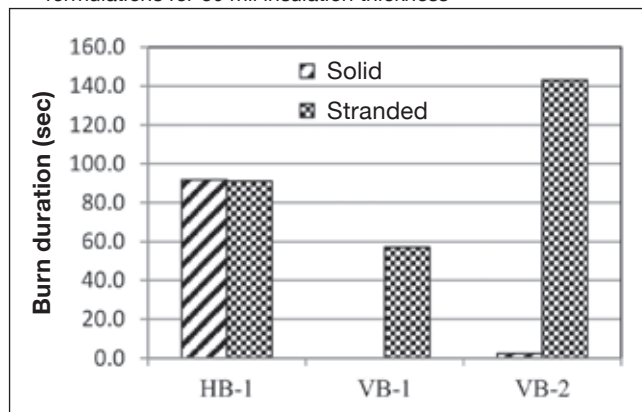
The results are shown only for the VW-1 rated samples as the horizontal burn rated sample burns through the entire length of the wire leaving no uncharred length. It is seen that for both the formulations, the uncharred length is higher for the thicker sample, indicating a greater flame-retardance with increase in thickness.

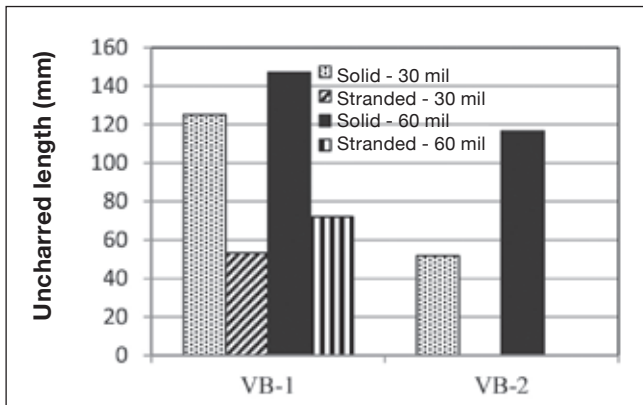
The data also suggests that VB-1 is better than VB-2 in flame-retardance as evidenced by the higher uncharred length and shorter burn duration.

○ **Figure 3:** Effect of conductor type on burn duration for different formulations for 30 mil insulation thickness



○ **Figure 4:** Effect of conductor type on burn duration for different formulations for 60 mil insulation thickness





○ **Figure 5:** Effect of conductor type on uncharred length for different formulations

Formulation	LOI, %
HB-1	24
VB-1	27
VB-2	27

○ **Table 2:** Limiting Oxygen Index of the flame-retardant formulations studied

3.2 Effect of conductor type (Solid vs stranded)

Even though a systematic study of the effect of insulation thickness on burn properties for low voltage wire is not available in the literature, similar studies have been conducted for other flame retardant articles, an example of which is fabrics for upholstery or children's clothing^[3].

Comparison of such studies with flame retardant wires needs to be made with some caution since the presence of a metallic conductor with its high thermal conductivity provides a thermal sink for the hot insulation and adds to the complexity in understanding the effects of various construction and geometric parameters of the polymeric layer.

In this study, another aspect of the conductor, ie, solid vs stranded copper, is investigated for its effect on the burn behaviour of the wire.

Figure 3 shows the effect of the conductor type on burn duration for all the formulations in a VW-1 burn test for 30 mil insulation thickness. For both the vertical burn rated compositions, the flame extinguishes much sooner for the solid conductor than that for the stranded ones, suggesting that using solid conductor provides a better flame-retardance for the wires.

One possible reason for the superior performance of the system with solid conductor may be due to the intimate contact it provides with the insulation, thereby acting as a better dissipator of heat from the polymer.

For the stranded conductors, on the other hand, the voids between the polymeric layer and solid copper act as thermal insulation and thus trap more heat inside the polymer. The difference is significant since passing VW-1 burn test requires the burn duration to be less than 60 seconds for the samples. For both the vertical burn rated formulations, when a stranded conductor is used, the samples exceed the maximum limit for burn duration, thus failing the test.

In fact, for the VB-2 sample, the entire length of the wire is consumed, leaving no uncharred length (shown in Figure 5). On the other hand, the constructions with solid conductors pass the VW-1 test with comfortable margins.

The burn duration data shown in Figure 3 for the HB-1 samples could also be somewhat misleading without considering the fact that for both instances (solid and stranded), the wires burn through the flag, leaving no uncharred sample. Interestingly, even though the VB-1 stranded sample burns for a long time (>60 sec), it still leaves substantial uncharred length after flame extinction.

The effect of solid vs stranded conductor for 60 mil insulation thickness is illustrated in Figure 4. As seen for 30 mil thickness, both solid and stranded HB-1 samples burn completely through their entire length. The same is true for the VB-2 sample with stranded conductor. The results again show that for identical formulation and geometry, stranded conductors exhibit a poorer burn performance.

For the same VW-1 burn tests conducted to compare the effect of conductor type, the results are also expressed by the uncharred length of the wire samples for the vertical burn rated formulations in Figure 5.

As discussed earlier, irrespective of insulation thickness, both the VB-2 stranded wires burned completely and did not leave any uncharred length. Overall, the data again shows the superior burn performance of wires made with solid conductors as opposed to the stranded ones. The results also confirm that the VB-1 formulation is comparatively better in flame retardance than the VB-2 material.

In fact, for the 30-mil stranded wire, which is the most difficult condition for a formulation to pass VW-1 test among all the conditions studied, the VB-1 sample came very close to passing with only the burn duration time exceeding the maximum allowed time by a few seconds. On the other hand, the VB-2 sample completely burned out even for the 60 mil insulation thickness when a stranded conductor was used.

As a side experiment, the Limiting Oxygen Index (LOI) for the three FR formulations was measured and the results are shown in Table 2.

The LOI data confirms that the VB-1 and 2 formulations are superior to HB-1 composition in flame retardance. However, the differences between the two vertical burn rated materials cannot be distinguished by the LOI data even though they showed marked difference in the VW-1 test.

4 Conclusions

Investigation into the effects of the two important cable construction parameters, namely insulation thickness and conductor type (solid vs stranded), for VW-1 burn performance provides some important insights.

The effect of insulation thickness very much falls in line with the behaviour seen for the other FR articles such as textiles and home furnishings, where larger thickness provides better flame resistance^[5].

The likely explanation for this phenomenon is the higher thermal mass provided by a thicker article thus acting as a bigger heat sink. Moreover, as the outer layer burns and creates a protective char layer, it provides a barrier for the air to reach the inner material, thus starving the system of necessary oxygen.

At the same time the heat continues to get dissipated into the polymer and the conductor, further helping the cause of fire retardance. The results comparing solid vs stranded conductor also reveal a very significant impact of the construction in their relative burn behaviour.

The inferior burn performance exhibited by the stranded wire is probably due to the presence of voids between insulation interior and the conductor. The presence of voids increases resistance to heat transfer between the insulation and the conductor and does not carry away heat as efficiently as that with a solid conductor.

UL burn tests specify use of solid 14 AWG conductors with a 30 mil insulation thickness for VW-1 burn test under UL 44 protocol. However, material qualified for VW-1 rating is routinely used for 14 AWG stranded Cu conductor.

The results clearly demonstrate that the use of stranded conductor adversely affects the burn behaviour and may lead to failure in the VW-1 test for marginal compounds.

5 References

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电缆结构对于湿气固化化合物阻燃性的影响

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摘要

建筑和工业电缆的绝缘层和保护层涂料采用了阻燃剂填料，用于达到消防安全标准和符合规范。基料树脂可为其覆盖下的导线提供电气绝缘，而上述阻燃剂添加物则可减轻其原有的燃料特性，从而减缓火情的蔓延并在火灾中为人员撤离提供宝贵的时间。

VW-1 (UL44和UL 2556) 是一项行业规范，规定了聚合物涂层电缆的阻燃性以及消除最初热源后，其传播火情的可能性。

随着水分子交联材料在电线电缆架构中的应用以及对无风燃烧室的采用，化合物制造商和电缆生产商发现他们越来越难以通过VW-1条款。

不仅仅是聚合物复合配方的临界参数，还需要对包括绝缘层厚度和导线核心（单芯结构还是绞合结构）在内的电缆构造进行进一步的分析，才可达到这一燃烧性能的规范水平。

在这项研究中，将对包括绝缘层厚度和导线类型的电线构造进行研究，从而明确这些构造对于不同阻燃剂配方燃烧性能的影响。湿气固化低压电线绝缘层由混合乙酸乙烯基硅烷共聚物、二月桂酸二丁基锡催化剂母胶和不同等级的阻燃母胶制成并压制在电线上。

燃烧性能是指燃烧时长和通过VW-1时的电线碳化长度，这一性能需在美国保险商实验室 (UL) 认证的燃烧实验室内进行测试。

1 简介

针对XHH、XHHW、XHHW-2 RHH、RHW、RHW-2、RH和SIS型绝缘电线，美国保险商实验室 (UL®) 制定了UL-44规范（热固性绝缘电线和电缆）。

除了规定了最高操作电压、导线性能（尺寸、金属种类以及单芯结构还是绞合结构等）和绝缘层厚度，UL-44还指定了绝缘材料的性能要求。这些性能标准依据物理和电气特性、流体阻力和热机械性能进行制定。另外，FV-2、VW-1和纵向样本中规定了阻燃性，是最为严格的燃烧遵从准则之一。

为了达到VW-1的标准，依照试验，无论是14 AWG（美国线规）（2.08平方毫米）的铜制导线还是12 AWG（3.31平方毫米）的铝制导线，绝缘层为30密耳（0.76毫米）的成品电线都不能在其线长范围或附近区域内蔓延火情^[1]。

尽管该规范未明确指明是使用单芯结构还是绞合结构导线，但是绝缘材料设计人员主要测试采用单芯结构导线的样品。

这主要是因为其他燃烧性能的物理和电气试验中都采用了单芯结构结构的导线。但是由于其在安装过程中的灵活性和相对方便性，电缆制造商主要还是生产绞合导线，甚至是生产较小计量尺寸的导线。

因此，对于电缆制造商提交的用于VW-1试验的样品，无论是开发的新产品还是现有标准的产品，都普遍采用了绞合导线。因此化合物制造商必须理解并预测其指定导线类型阻燃化合物的燃烧性能。

导线尺寸是电线电缆结构燃烧性能的关键性参数，尺寸越大其散热性能就越好，从而瓦解“火三角”（热度、氧气和燃料）^[2]。行业和学术界内还未有研究用以明确导线类型（即使用单芯还是绞合导线）是否会对燃烧性能产生显著影响。

本文的目的在于研究导线类型（即使用单芯还是绞合铜质导线）对VW-1燃烧性能的影响，包含了四种具有不同阻燃性水平的湿气固化化合物。

除了导线类型，还将研究绝缘层的厚度，尽管它已被证明会威胁到无卤素系统内的燃烧性能^[3]。燃烧性能包括样品是否能通过VW-1试验的要求、平均样品燃烧时间和碳化或未碳化的电缆线长。

2 试验

2.1 材料

本文中测试的样品为14 AWG（2.08平方毫米）铜质导线上压制覆盖的多种湿气固化涂层配方。均采用了单芯导线和绞合导线。在这些实验中对30和60密耳（0.76和1.52毫米）的绝缘层进行了研究。其中的湿气固化涂层配方指定采用横向燃烧配方1（HB-1），增强型横向燃烧配方2（EHB-1）以及纵向燃烧配方1和2（分别是VB-1和VB-2）。

除了基体树脂之外的材料需在压制前，在放有干燥剂（Dri-Rite：无水硫酸钙）的真空干燥箱中以60°C的温度干燥24个小时。干燥的材料将进行称重并密封在箔衬袋中，尽量减少材料的吸水率并防止在挤出过程中的预固化或碳化。

2.2 电线挤出

绝缘涂层电线采用迷你线材挤出机进行挤出。该生产组件包含配备有变速传动装置的布拉本德3/4挤出机、一个24:1的万多克斯混合型螺杆头、一个布拉本德十字头拉丝模具、装有空气擦的冷却水槽、一台激光测微仪和一台Con-Air变速拉线机。

所有的挤出流程都在压制管和模具的三个加热区以150°C的均匀温度条件下完成。分层的几何结构滤网包含了20/40/60/20网格的滤网，结合模板用以在材料到达模具孔之前过滤掉融

样品	厚度 (毫米)	类型	压力 (公称压力)	线速 (米每分钟)	线速 (米每分钟)	熔化温度 (摄氏度)
HB-1	0.76	单芯结构	10.5	50	2.7	159
VB-1	0.76	单芯结构	14.1	50	2.7	162
VB-2	0.76	单芯结构	15.1	50	2.7	159
HB-1	0.76	绞合结构	10.0	55	2.7	161
VB-1	0.76	绞合结构	13.9	55	2.7	161
VB-2	0.76	绞合结构	13.4	55	2.7	162
HB-1	1.52	单芯结构	10.1	80	2.1	160
VB-1	1.52	单芯结构	12.5	80	2.1	160
VB-2	1.52	单芯结构	11.8	80	2.1	160
HB-1	1.52	绞合结构	9.3	85	2.1	160
VB-1	1.52	绞合结构	12.9	85	2.1	160
VB-2	1.52	绞合结构	13.3	85	2.1	160

表一：不同湿气固化结构的挤出条件

化的聚合物。除此之外，这些滤网还提供了充分的背压，用以确保更好地混合熔融不同材料成分。采用67密耳（1.7毫米）的尖端和174密耳（4.42毫米）的冲模用以生产具有60密耳绝缘层的涂层电线。表一是各样品制作过程中的排出压力、转速和线速以及熔化温度。

2.3 湿气固化

所有的线材都需在90°C的水浴中固化18个小时用以确保充分交联。在燃烧试验前，这些线材需在温度和湿度控制室内（25°C和相对湿度50%）放置24个小时。

2.4 燃烧试验

表一中每种配方材料的三类固化和处理过的样品均依据“保险商实验所电线和电缆试验方法标准UL25546，第9.4款：电线对于纵向燃烧蔓延和燃烧颗粒物坠落的阻燃标准^[4]”进行FV-2和VW-1的燃烧测试。

在24英寸的电线样品顶端贴上牛皮纸带并垂直悬挂于无风室内。每立方米37 ±1兆焦耳（MJ/m³）的甲烷火焰以20度的垂直角度冲击样品。

火焰的冲击点位于牛皮纸带低端下方的254 ±2毫米处。样品下方安置有多层外科棉，棉层表面位于火焰冲击点下方235 ±6毫米处。每个样品会经受五次，每次15秒的火焰冲击。火

焰冲击间的间隔为15秒，如果在15秒的间隔时间结束之前样品上的火焰就已熄灭，间隔时间依旧保持不变。

对于燃烧时长大于15秒但小于60秒的样品，当样品自行熄灭火焰后才会执行下一次的火焰冲击。为了使所有样品通过VW-1燃烧测试，必选满足以下条件：

- 牛皮纸带的燃烧率小于25%
- 经受五次火焰冲击后，样品的燃烧时间少于60秒
- 棉絮不可被任何火焰、灼热颗粒或燃烧坠物引燃

除了这些条件之外，在本研究中的样品燃烧性能可依据以下参数进行定义：

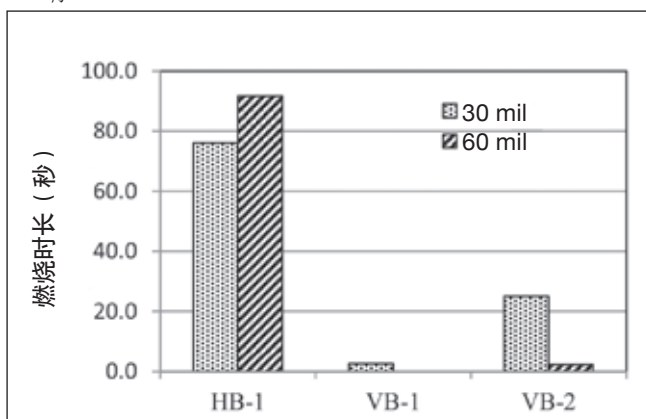
- 未炭化长度- 牛皮纸带下方未燃烧的电线长度，或在用软布擦拭后可保持表面光洁的电线长度
- 平均燃烧时长- 在移开火焰后样品持续燃烧的时长以及五次火焰冲击下的平均燃烧时长。对于燃烧时长大于60秒的样品，计时将直至牛皮纸带开始燃烧为止。

3 试验结果和讨论

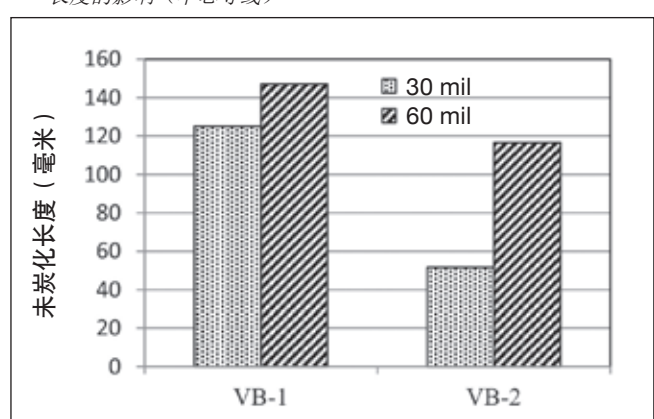
3.1 绝缘层厚度效果

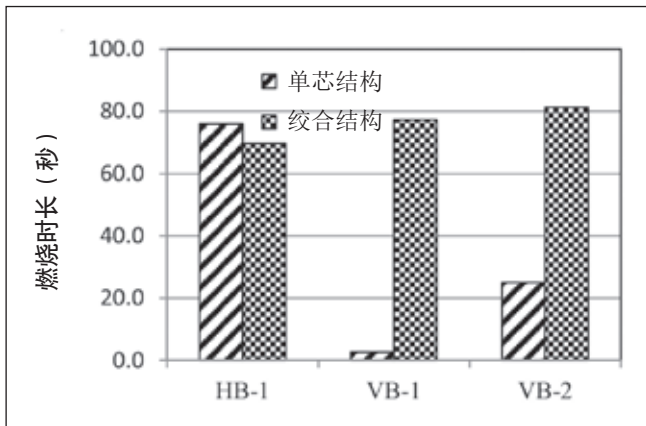
图一中是14 AWG单芯铜制导线在VW-1类型测试中，绝缘层厚度对于不同成分性能的影响。试验结果显示，对于两类具

图一：VW-1类型试验中，绝缘体厚度对于不同成分燃烧时长的影响

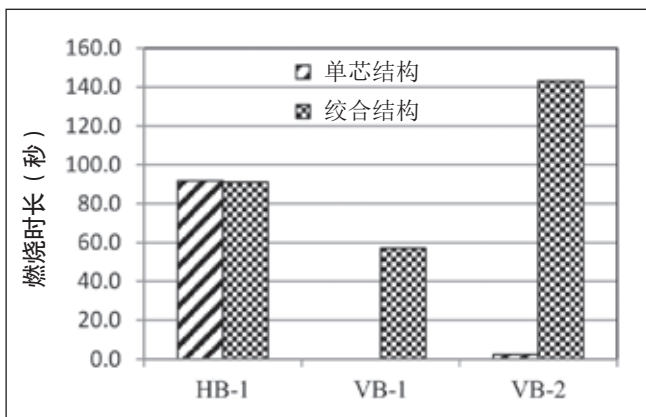


图二：VW-1类型试验中，绝缘体厚度对于不同阻燃成分未炭化长度的影响（单芯导线）





○ 图三:30密耳绝缘层条件下, 导线类型对于不同成分的燃烧时长的影响



○ 图四:30密耳绝缘层条件下, 导线类型对于不同成分的燃烧时长的影响

有较高阻燃性的成分, 绝缘层厚度的增加会降低电线的燃烧时长, 含有VB-1成分的60密耳绝缘层记录到的燃烧时长为零。

这些试验结果与对绝缘层或阻燃材料制品的预期结果一致, 即火焰的持续燃烧越来越难以维持。

数据显示, 对于阻燃性较弱的材料, 即本例中HB-1样品, 试验结果可能正相反。这一观测结果表明在低于最低阻燃性水平的情况下, 当较厚的材料着火并持续燃烧时, 由于可燃性材料较多, 燃烧时间也会更长。在HB-1配方的两项实例中, 电线样品一直燃烧至标记点, 未炭化长度为零。

如图二所示, 样品的未炭化长度也可指示绝缘层厚度对于燃烧性能的影响。由于横向燃烧规定样品的燃烧面积覆盖整个线长, 未炭化长度为零, 因此显示了VW-1规定样品的试验结果。由此可见对于这两种配方, 涂层越薄则未炭化长度越大, 表明涂层越厚则阻燃性能越强。这些数据还表明, 相较于VB-2, VB-1的阻燃性能更佳, 后者的未炭化长度更长并且燃烧时间更短。

3.2 导线或类型的影响 (单芯结构还是绞合结构)

虽然本文没有对绝缘层厚度对于低压电线燃烧性能的影响进行系统性的研究, 但是对于其他阻燃材料的类似研究已经开始进行了, 其中一项是家具装饰用品或儿童衣物的纤维织物的研究⁹。

由于金属导线的高导热性降低了保温性能同时增加了理解不同结构和聚合物涂层几何参数效果的难度, 因此在比较研究此类阻燃性电线时, 需格外仔细周密。

在本研究中, 导线的另一考虑因素, 即是采用铜质的单芯结构还是绞合结构也被纳入研究, 用以调查其对电线燃烧性能的影响。

图三中是在VW-1燃烧试验中, 导线类型对于所有30密耳绝缘层成分的燃烧时长的影响。对于这两类纵向燃烧规定成分, 相较于绞合导线, 单芯导线的火焰熄灭得更快, 表明采用单芯导线的阻燃性更高。

单芯导线具有更佳性能的其中一个原因可能在于其与绝缘层的紧密联接, 从而为聚合物提供更好的散热性能。另一方面, 对于绞合结构的导线来说, 聚合物层和固体铜线之间的空隙形成了隔热层, 从而在聚合物内留存了更多的热量。

由于VW-1燃烧试验要求样品的燃烧时长小于60秒, 因此采用两种结构的试验结果差别很大。在使用两种纵向燃烧规定成分的条件下, 当采用绞合导线时, 样品的燃烧时长会超过最大限制而使试验失败。

在实际试验中, VB-2样品的整个电线长度都燃烧殆尽, 未炭化长度为零(如图五所示)。另一方面, 通过VW-1试验的单芯导线则保留有一定的余量。

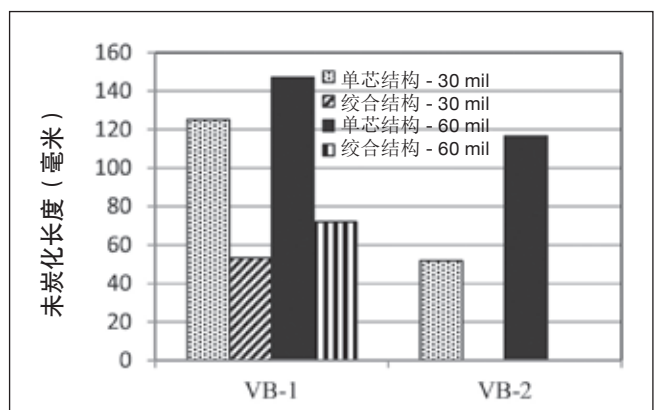
如图三所示, 在不考虑两类结构(单芯结构和绞合结构)的情况下, HB-1样品的燃烧时长数据具有一些误导性, 电线燃烧至标记处, 样品全部炭化。

值得注意的是, 虽然VB-1绞合样品燃烧时间较长(大于60秒), 在火焰熄灭后, 该样品仍保留足够的未炭化长度。

图四中是在绝缘层厚度为60密耳的条件下, 采用单芯导线和绞合导线的效果。在绝缘层厚度为30密耳的条件下, 单芯和绞合结构的HB-1样品全部燃烧殆尽。

绞合导线的VB-2样品也有相同的试验结果。这些试验结果再次表明, 在相同的成分和几何结构条件下, 绞合导线的燃烧性能较差。

如图五所示, 在为比较导线类型效果而进行的VW-1燃烧试验中, 以纵向燃烧规定成分下电线样品的未炭化长度作为试验结果。



○ 图五: 导线类型对于不同成分的未炭化长度的影响

配方材料	LOI, %
HB-1	24
VB-1	27
VB-2	27

○ 表二: 阻燃成分研究的极限氧指数

如上文讨论，在不考虑绝缘层厚度的情况下，VB-2绞合导线都燃烧殆尽，未炭化长度为零。总之，这一数据再次表明相较于绞合导线，单芯导线具有的燃烧性能更佳。

这些结果也表明VB-1成分在阻燃性方面比VB-2材料更佳。事实上，在所有的研究条件中，30密耳的绞合导线条件是最难通过VW-1试验的，VB-1样品很接近该试验的合格标准，只是其燃烧时长超过规定的最高时长数秒钟。

而另一方面，即使绝缘体厚度达60密耳，在采用了绞合电线的条件下，VB-2样品仍然燃烧殆尽。

作为辅助实验，研究还测量了三类阻燃性成分的极限氧指数(LOI)，结果如表二所示。

极限氧指数的数据证实，相较于HB-1合成物，VB-1和VB-2成分的阻燃性更佳。但是即使极限氧指数在VW-1实验中可表面显著差别，但却不能区分两类垂直燃烧规定材料的差别。

4 结论

研究两类关键电缆结构参数（即绝缘层厚度和导线类型（单芯或绞合导线））对于VW-1燃烧性能的效果，提供了一些重要的参考因素。

绝缘层厚度的效果与其他诸如纺织品和家具之类的阻燃产品的效果相同，即绝缘层越厚则阻燃性能越佳^[9]。该现象的原因可能在于较厚的制品可容纳更多的热量，从而成为了不错的散热器。

此外，由于外部层面的燃烧而生成了防护性的炭化层，为内部材料阻挡了空气，从而隔绝了燃烧需要的氧气。同时，聚合物和导线内的热量持续消散，进一步增强了阻燃性。单芯导线和绞合导线的比较结果同样也表明了导线结构对于燃烧性能的影响。

绞合电线的燃烧性能较差的原因可能在于内部绝缘层和导线间的空隙。这些空隙阻碍了热量在绝缘层和导线内的传播，无法如单芯导线般有效散发热量。保险商实验室的燃烧试验规定了在UL44规定下的VW-1燃烧试验中，厚度为30密耳绝缘层的单芯14 AWG导线的使用。

但是VW-1等级的材料要求通常适用于14 AWG的单芯铜质导线。这些结果清楚表明采用绞合导线对于燃烧性能具有不利影响，可能会导致部分化合物无法通过VW-1试验。

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