

▲ Chameleon technology allows production of perfectly homogeneous cables

## Cutting edge Chameleon

In a constant effort to provide cost-effective solutions and innovations to the cable industry, SAMP continuously invests in research and development. The latest and most important innovation is the Chameleon technology, a breakthrough solution for cable type changeover without production stop and speed limitations.

Like a chameleon with the ability to change colour fast and frequently, the brand new solution guarantees maximum flexibility, efficiency and reliability throughout the extrusion process.

Traditionally, when changing a cable type, when going from a striped cable to a non-striped one, the procedure to be followed is rather long and includes a number of steps:

1. Stop the production line
2. Cool down the machinery
3. Open the extrusion head
4. Replace the distributor or ring that creates the stripe on the cable with a similar device allowing the application of a single layer without stripe
5. Reheat the machinery
6. Start the production

This rough outline describes what takes place in the majority of the cases. SAMP has intentionally avoided to mention any other unconventional, home-made attempt to avoid production stop, since these cannot guarantee product homogeneity and therefore do not meet the market requirements, especially in

demanding fields such as automotive.

Needless to say, the process described leads to a production slowdown and delays can even amount to several hours in case of CV lines.

In order to maximise efficiency and eliminate non-productive time, SAMP has recently developed Chameleon, a revolutionary solution that allows the cable type changeover from a striped cable to a non-striped one, and vice-versa, in just a few seconds, without stopping the production line and disassembling the extrusion head.

By means of this system, the materials flowing from various extruders are all managed by a single device, which conveys them in the right direction depending on the type of cable to be produced. A simple gesture is enough to control the final melt flow directions.

The Chameleon technology allows the production of perfectly homogeneous cables, since all the insulation materials are obtained by working at the same temperature and the same pressure level. Moreover, the same distributor is used when producing striped and non-striped cables, so that no extra device is needed for the changeover.

Chameleon technology is suitable for all SAMP extrusion heads, including the more sophisticated like the TX6V, which is equipped with the "0-scrap" quick change colour system for the cable stripe, and the TX6V2, where the "0-scrap" system can be applied both to the stripe and the insulation. All parameters can be easily managed via the SAMP Supervision and Control Unit, through which production can be automatically programmed and a number of statistical and graphical analyses can be carried out.

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# CONTENTS

|   |     |
|---|-----|
| Carl Bechem GmbH.....                       | p16 |
| Beta LaserMike .....                        | p11 |
| BWE Ltd / TF Kable .....                    | p4  |
| Cimteq Ltd.....                             | p18 |
| Condat SA.....                              | p23 |
| data M Software GmbH.....                   | p13 |
| Eder Engineering GmbH .....                 | p8  |
| FIB SA.....                                 | p3  |
| Gauder Group .....                          | p23 |
| GEO-Reinigungstechnik GmbH.....             | p16 |
| GER SA.....                                 | p2  |
| Gürfil Sanayi ve Elektronik Cihazları       |     |
| Pazarlama A.....                            | p17 |
| Heinze & Streng GmbH.....                   | p20 |
| Jiangsu Jiacheng Technology Co Ltd .....    | p7  |
| lune Prozesstechnik GmbH.....               | p10 |
| Maillefer Extrusion OY.....                 | p20 |
| Marldon Group Ltd.....                      | p13 |
| Metalube Ltd.....                           | p9  |
| Maschinenfabrik Niehoff GmbH & Co KG.....   | p20 |
| Ormiston Wire.....                          | p4  |
| P W Hall Ltd.....                           | p8  |
| Polifibra SpA.....                          | p19 |
| Pressure Welding Machines Ltd.....          | p6  |
| Queins Machines GmbH.....                   | p23 |
| Rosendahl / Nextrom OY.....                 | p5  |
| SAMP SpA.....                               | p1  |
| Rolf Schlicht GmbH.....                     | p5  |
| Shanghai Kechen Wire & Cable Machinery      |     |
| Co Ltd .....                                | p8  |
| Shanghai Singcheer Technology Co Ltd.....   | p21 |
| Shanghai Kingway Technology Group Ltd ..... | p3  |
| Siebe Engineering GmbH.....                 | p19 |
| Sikora AG.....                              | p21 |
| South African Wire Association.....         | p10 |
| Joachim Uhing & Co KG.....                  | p2  |
| Wire Association International .....        | p18 |
| Zumbach Electronic AG.....                  | p17 |

## Technical Article .... 24

Degradation of mechanical properties of drawn copper wire by occurrence of dynamic recrystallisation

By Kazunari Yoshida, Naoyuki Katsuoaka, and Kota Doi, Tokai University; and Yasutomo Takemoto, Sumitomo Denso Co Ltd, Japan



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# WCN

## Uhing linear technology in action in all its glory

The RG rolling ring drive is possibly the most famous Uhing invention, and this is reason enough to present these products online around the world.

The rolling ring drive comes in countless variants and with a great range of accessories. The linear technology video shows the RG in the 'moving spool' winder and also with an electronic controller.



▲ The RG in the moving spool winder and with electronic controller

A feasible accessory for the rolling ring drive is the non-contact FA flange detecting system. It detects the coil width and the type of the coil flange automatically and matches the reversal points of the rolling ring drive accordingly. A laser sensor system checks the winding pattern continuously and triggers the reversal as soon as the material to be wound reaches the maximum height defined in the control software.

The linear drive nut RS comes with features and areas of applications as flexible as those of the rolling ring drive. It can be operated even in dirt-laden areas and meets the high requirements of the food industries.

The same also applies to the Easylock quick clamping system that develops high retaining forces on plain shafts. It is independent of the direction of rotation, vibration-proof and maintenance-free. Short change-over times are ensured by one hand operation. This property also applies to the Uhing U-Clip that securely fastens coils, rollers or cover parts on plain shafts.

Timing belt drives featuring high thrust forces, robustness and long service life complete the Uhing range of linear technology products. These guide systems have bases made of rigid and torsion-resistant aluminium sections. Attachments can be mounted and T-slotted nuts inserted into the slots of the base profile.

The Uhing linear technology products not only convince by their function but also by their design. The product video available on the Uhing website clearly demonstrates this.

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## South America and European deals

GER SA, of Nessonvaux, Belgium, recently sold several complete production lines for PC wire and PC strands to customers in South America and Eastern Europe.

Those lines comprised heavy duty rod breakdown machines, indenting units, low relaxation equipment, induction furnaces, coiling and coil handling machinery.

A total of 2140-feet open top containers were loaded and shipped out by the second-hand machinery specialist.



▲ Part of the shipments recently send out by GER

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## Online help for customers



▲ A screenshot of the new system from FIB

An online frequently asked questions and personalised documentary platform has been developed to give a 24/7 access to allow a better support to FIB's users.

Shared information, tips and tricks, structured proper documentation and tracking support are part of the system. Many other features are in development such as maintenance calendar and maintenance logbook.

This approach will help the production and maintenance teams in the handling of technical documentations, tunings, set-up and for the coordination between them.

To take advantage of the system contact Joseph Demonchaux on [j.demonchaux@fib.be](mailto:j.demonchaux@fib.be)

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## Research and development pays off

Shanghai Kingway has been concentrating on the technical research of dies for the wire drawing industry, and is dedicated to expanding research and development for the wire and cable industry.

ISO 9001 and SGS certified, Kingway monitors quality control all the way from raw material through the production process of dies.

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## DIARY OF WORLD CLASS WIRE & CABLE EVENTS FOR BUSINESS, TECHNOLOGY, EDUCATION & NETWORKING

### 2014

#### OCTOBER

**28-30** **Wire & Cable India 2014**  
*Mumbai, India*  
**Exhibition** → **Messe Düsseldorf GmbH**  
**Email:** [ryfischd@messe-duesseldorf.de](mailto:ryfischd@messe-duesseldorf.de)  
**Website:** [www.wire-india.com](http://www.wire-india.com)

#### NOVEMBER

**21** **IWMA Dinner Dance**  
*Royal Garden Hotel, London, UK*  
**Event** → **IWMA**  
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### 2015

#### FEBRUARY

**4** **IWMA AGM and Member's Lunch**  
*The Mere Golf Resort & Spa, Knutsford, UK*  
**Event** → **IWMA**  
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#### APRIL

**28-30** **Interwire 2015**  
*Atlanta, Georgia, USA*  
**Exhibition** → **WAI**  
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**Website:** [www.wirenet.org](http://www.wirenet.org)

#### MAY

**12-15** **wire Russia 2015**  
*Moscow, Russia*  
**Exhibition** → **Messe Düsseldorf GmbH**  
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**Website:** [www.wire-russia.com](http://www.wire-russia.com)

#### SEPTEMBER

**15-17** **wire Southeast Asia 2015**  
*Bangkok, Thailand*  
**Exhibition** → **Messe Düsseldorf GmbH**  
**Email:** [beatrice@mda.com.sg](mailto:beatrice@mda.com.sg)  
**Website:** [www.wire-southeastasia.com](http://www.wire-southeastasia.com)

#### OCTOBER

**6-8** **wire South America 2015**  
*São Paulo, Brazil*  
**Exhibition** → **Messe Düsseldorf GmbH**  
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**Website:** [www.wire-south-america.com](http://www.wire-south-america.com)

#### NOVEMBER

**3** **CabWire 2015 world conference**  
*Düsseldorf, Germany*  
*Innovations driving worldwide wire & cable markets*  
**Conference** → **IWMA**  
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**4** **Acelor/Mittal rod mill**  
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## First SheathEx order in Europe for BWE



▲ TF Kable has invested in BWE's SheathEx™ technology

Tele-Fonika Kable SA (TF Kable) is the first company in Europe to invest in BWE's SheathEx™ technology. Based in Poland, TF Kable is the largest cable company in Central and Eastern Europe delivering its products to more than 80 countries worldwide.

In 2013, the company was awarded the Special Honorary Distinction for its 500kV cable produced at the Bydgoszcz Plant. TF Kable's development and expansion programme included the purchase of the SheathEx line, which allowed the company to consolidate its position in the ranking of manufacturers specialising in the production of high

voltage (HV) and extra high voltage (EHV) cables.

TF Kable is now able to extrude a 'seamless' (no weld) aluminium sheath over cable. The aluminium sheath is produced from two 12mm diameter aluminium rods. The sheath is corrugated inline (helical or annular) to improve flexibility.

Mr Marcin Szymański, vice president high voltage systems, said: "This investment reflects consistent execution of TF Kable's strategy to expand in the EHV business. With our new SheathEx line we are able to serve our clients with a modern,

reliable and economic solution for power generation and transmission systems."

As well as this first contract in Europe, BWE has supplied a further six lines to cable companies in China. All are in full production and these cable manufacturers are now able to secure large cable contracts based on the aluminium sheath being 'seamless'.

With no weld, the cable sheath is now reliable against the ingress of moisture. By using aluminium instead of lead, the cable is much lighter, environmentally friendly and less harmful to health. An aluminium sheath has good mechanical properties making it stronger and lighter than lead with higher conductivity.

TF Kable also has a BWE Conform™ 350 machine. This machine is used to extrude round and sector shape solid aluminium conductor (SAC) from 2 x 9.5mm diameter aluminium rods.

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## It's all go for launch for Ormiston

Ormiston Wire provided wire for a new documentary film about Gerry and Sylvia Anderson 50 years after providing innovative wire for the iconic children's television show 'Thunderbirds'. The company supplied the makers of the documentary, titled 'Filmed in Supermarionation', with wire for the filming of new 'Thunderbirds' sequences.

The company was initially approached by AP Films in the 1960s to help solve the technical issues in filming marionettes for the original 'Thunderbirds' show. The innovative solution was a very thin yet durable metal wire filament to manipulate the puppets, which was darkened so there was no reflection, therefore making it as invisible as possible.

It developed, manufactured and supplied a chemically darkened 0.125mm diameter wire, which was used throughout the series until the Andersons moved into live-action productions in the early 70s.

'Filmed in Supermarionation' uses unseen archive footage, new interviews and clips from the shows to tell the story of Gerry and Sylvia Anderson's legendary TV productions in greater depth than ever before. Directed and produced by Stephen La Rivière, the definitive documentary presents the story of how series such as 'Thunderbirds', 'Stingray' and 'Captain Scarlet and the Mysterons' were brought to audiences around the world using pioneering puppetry techniques and special effects.

"'Thunderbirds' is an iconic British television series and is loved by different generations across the globe," said Mark Ormiston, managing director. "We were delighted to support the production of this documentary film 50 years after we first provided Gerry and Sylvia Anderson with wire for the marionettes."

'Filmed in Supermarionation' will premiere at the BFI later this year ahead of a general release in autumn 2014.

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## Fine-tuning loose tube line

Staff from Rosendahl and Nextrom teamed up for what they describe as a 'ground-breaking' moment in fibre optic cable production after they redesigned, rebuilt, tested and fine-tuned the results for the loose tube line.



▲ The loose tube line from Rosendahl

The current trends in fibre optic cable manufacturing are all connected to the general

optimisation of each step of the production process. In order to improve cable performance and reduce the costs of the final product, many technologies and devices have been invented to minimise optical loss, increase production speed and allow more flexibility in the manufacturing process.

### New developments made especially for the loose tube process include:

- Improved high speed fibre pay-off design with reduced footprint for space saving
- Special processing unit of the ROEX extruder to optimise the process ability of typical material used for loose tube production
- Optimised and space saving cooling trough design – safe up to 9.5m in line length

- Better process feedback during production
- Typical line speed 600m/min for standard loose tube types
- New development of the crosshead series RX for optimised material flow in the melt distributor, in conjunction with a linear jelly needle guiding system for easier handling
- New generation of pulley clenching capstan SCC100 for accurate post shrinkage and EFL control, especially for dry tubes
- Improved online EFL measurement system

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### Nextrom OY – Finland

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## RSC powder coating machine

The machine model RSC was designed to powder hoses, profiles, strips, bands and cables evenly, finely dosed and absolutely dust free with powders like talc, stearate, lac powder, swellable powder, graphite, etc. Rolf Schlicht delivers machines for the smallest product diameters up to 200mm and bands up to 500mm width.

By the electrostatic charging of the powder, a strong adhesive power on the product and a very even layer on the surface are reached. The electrostatic also ensures that no powder falls from the product outside of the dusting chamber. The company can also deliver machines with just two or four powder nozzles depending on the application.

For powdering hoses, profiles and bands made of rubber, it is mostly the machine without electrostatic that is used. In the machine there is a fluidised powder hopper out of which the powder is sucked by pneumatic venturi pumps and blown through the guns or nozzles onto the product. For an optimal adjustment of the powder quantity the power of the electrostatic charging can be altered from 0-100kV, as well as the powder quantity and speed of the dust cloud. Depending on the product the powder gun can be equipped with different rebounding plates.

In the machine there is a fully automatic and maintenance-free filter system consisting of compact filter elements of large dimensions, which are cleaned off by a special process. No blowing-in of compressed air is necessary. Thanks to this filter system a strong and constant vacuum is generated in the machine, so that no powder escapes into the ambient atmosphere.

If there is not enough space in the line to place the machine Rolf Schlicht delivers a free-standing dusting chamber which is connected to the machine by hoses. For an extremely fine powdering of slow running products it offers as an option a fine dosing device to make sure that only a breath of powder is adhering on the strand.

An automatic 90l powder refilling hopper, a powder flow indicator giving an alarm in case no powder flows through the guns, an automatic adjustment of the electrostatic and the pneumatic in compliance with the extrusion speed, and an interface to connect the machine to the line can be supplied as accessories.

### Rolf Schlicht GmbH – Germany

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▲ The RSC powder coating machine

## Three new board members

The International Wire and Machinery Association's executive board has been strengthened following the appointment of three new members at its AGM in February.



Don Neville, managing director of RichardsApex Europe Ltd; Glyn Dawson, managing director of Whitelegg Machines Ltd; and Martin van der Zwan, co-owner of Cable Tapes UK Ltd, were all appointed at the meeting prior to the "Meet the Industry" luncheon at The Mere Resort, near Manchester, UK, on 12<sup>th</sup> February.

Prior to his current position Mr Neville worked extensively in the

wire and cable machinery sector throughout the Far East and North America, commencing in 1990 with Nokia-Maillefer followed by positions at both SAMP Sistemi and Niehoff Endex North America.

With a strong background in international market development he is looking forward to supporting the IWMA in all its existing and emerging programmes, designed to further the interests and opportunities of the membership at home and abroad.

Mr Dawson has been involved with the wire industry since his early years, and joined Whitelegg in 1992 after travelling widely and working at Emil Jaeger Maschinenfabrik in Germany. Although having had no technical training, Glyn's keen mind allowed him to master the ranges of CNC controlled machines and he commissioned these all over the world.

He looks forward to more involvement with the IWMA and working with the executive board for years to come.

Martin van der Zwan began working in the cable industry in 1977 at the BICC Wrexham factory. He served his time there working originally within the factory and then moved to work study and then material control. He retired from Pirelli (now Prysmian) in 2008 and set up his own company called Cable Tapes UK Ltd with Paul Haines, his business partner, and to date has been very successful.

He is a great supporter of the association's educational trust and believes it should strive to encourage young talent to come into the industry, ensuring it stays at the forefront of technology. He now feels that his knowledge and experience of the cable industry could be used to support other companies within this area with advice and assistance where required.

## PWM celebrates 30 years of service



▲ Staff of PWM and guests at the 30<sup>th</sup> anniversary celebrations at wire 2014

British company PWM (Pressure Welding Machines) Ltd celebrated 30 years of service to the wire and cable industry at wire 2014.

PWM, based in Kent, UK, designs, manufactures and supplies high-performance cold welding machines and dies to wire and cable manufacturers worldwide.

PWM's first machines were small, manually operated cold welders for joining fine wire and strip. The M10, M25 and M30 models for wire sizes 0.1mm to 1.8mm are all still produced today.

Over the years, PWM gradually expanded its range and introduced larger, powered cold welders,

including the P1500 rod welder for joining large rod sections up to 30mm diameter. Recent innovations include the portable HP100 and HP200 machines, which provide effortless welds on wire and strip 1mm to 5mm and 2mm to 6.5mm. All PWM machines and dies are precision engineered in-house to stringent quality standards by PWM's own team of skilled engineers and technicians.

PWM has a worldwide network of experienced agents who, together with its UK team, provide fast and efficient on-site support with full back-up and after-sales service.

PWM's on-going research and development programme ensures that it continues to offer wire and cable manufacturers the most advanced and comprehensive range of cold welders in the world. To explain the cold weld process, the company recently developed a series of videos demonstrating the technique.

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## Stalwart service from two board members

Two members of the International Wire and Machinery Association retired from the executive board at the annual general meeting in February.



▲ Terry Robinson, left, is presented with a gift on his retirement from the executive board by Paul Wright, board member

Terry Robinson, of XL Technologies UK Ltd, served as a board member, chairman, treasurer and a member of various sub-committees. Colin Dawson, of Whitelegg Machines Ltd, was a former chairman and elected president in 2012.

Mr Robinson's decision to retire from the board was strongly influenced by family duties. "I have enjoyed serving



▲ Colin Dawson, right, is thanked for his service by chairman Steven Rika

the association over the years and will, without doubt, miss the many friends I have made during my time at the IWMA," he said.

Mr Dawson's place on the board has been taken by his son, Glyn, who will continue the tradition of Whitelegg Machines being a long-standing supporter of the IWMA. The company was one of the original founding members in 1970.

IWMA's chairman Mr Steven Rika said of the retirements "I would like to thank both Terry and Colin on behalf of the board and our members for all their efforts over the years."

## Worldwide exports

Jiangsu Jiacheng Technology Co Ltd was founded in 2001 and manufactures high-speed wire drawing machines, rigid frame stranding machines, annealing and tinning machines, double twist bunching machine and extruders.

The company's own manufacturing plant has been making processing equipment, machine bodies and other key components over the last ten years. In addition to its ISO and CE certification, the company has a number of awards for high quality machine design.

Jiacheng's products are exported to America, Brazil, Russia, Korea, Japan, Vietnam, India, Iran, Pakistan, Bangladesh, Malaysia, Kenya, Syria, Dominica, Brazil, Peru, Egypt, etc.

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## Calling all members

Show customers and competitors alike that your company is serious about promoting new technology, education and growth within the wire and cable industry by including an 'IWMA Member' badge on your company website home page, email signature and stationery.

Through both the IWMA's Educational Trust Fund and its Travel Award scheme, the association actively encourages the gaining of new skills and experience for future rising stars in the industry.

The electronic file is available from the IWMA office in a variety of electronic formats to help promote your business.

## CabWire 2015 world technical conference – a date for your diary!

The IWMA is delighted to announce that the 7<sup>th</sup> biennial CabWire world cable and wire technical conference will take place on Tuesday, 3<sup>rd</sup> November 2015 in Düsseldorf, Germany, home of the wire industry.



The conference will be held at the Congress Center, and is already attracting interest following the successful CabWire conference which was held at the Palazzo Turati, Milan, in November last year, and attracted 200 wire and cable professionals from all over the world.

Preparations are well under way with Dr Probst, retiring CEO of

LEONI AG, committed as a keynote speaker and Acelor/Mittal preparing to host a visit for delegates to its rod mill in Duisburg on Wednesday 4<sup>th</sup> November.

There will also be an event at a downtown Düsseldorf location on the Tuesday evening where delegates will get the chance to network and socialise.

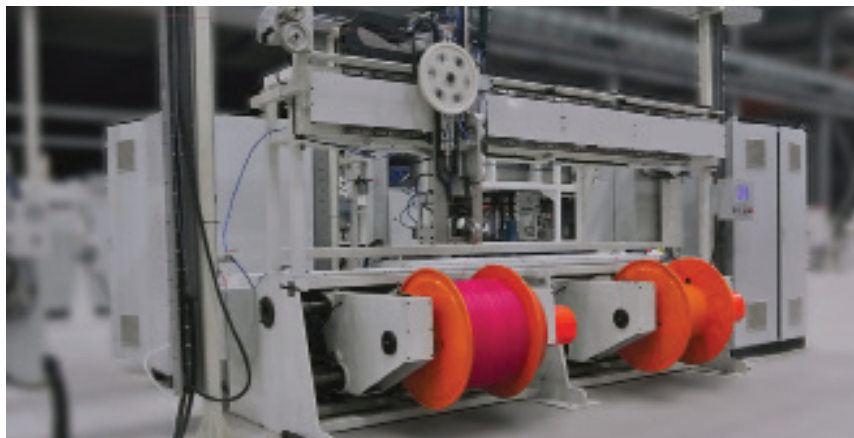
If you would like to be involved by presenting a paper at this exciting event, then please forward by email a short abstract of no more than 50 words to the IWMA office at [info@iwma.org](mailto:info@iwma.org)

There is also a variety of promotional opportunities available, such as sponsorship and table top displays. Similarly, if you are interested in attending as a delegate and would like to be kept up to date with conference developments then please get in touch.

## LinkedIn to us!

Remember to follow the IWMA LinkedIn page to ensure you are kept up to date with all activities, whether it is announcements about exhibitions, conferences and events or the education trust, as well as members' news.

## HDT-X series high-speed auto-reel-change dual take-up



▲ HDT-X series high-speed auto-reel-change dual take-up

When it comes to continuous production of large section cable sheathing, it is obviously not feasible to realise automatic reel change on dual take-up by the method of uniformly cutting which

is conventionally applied for small section cables.

Facing the above demand in 2013, KC Machine developed a dual reel static take-up with the function

of automatic reel change that is suitable for large section cable. It adopts the distinct design of hydraulic driven scissors, which guarantee the achievement of this function.

This kind of dual take-up features parallel positioning of two cantilever take-ups, which share one traversing mechanism driven by AC servo motor. The mechanical and electrical integrated impact design also saves space for the user.

The advantages of high speed, continuous production and raw material saving are able to help cable makers increase productive efficiency and save manpower.

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## Successful show for Eder



▲ The USP-TWIN ultrasonic machine from Eder

With over 65 years' experience in the field of reconditioning wire drawing dies, Eder Engineering celebrated wire 2014 in Düsseldorf with four firm orders given on the stand, and 64 specified enquiries.

More than 200 customers visited the stand during the week, embracing not only the ND/PCD die working equipment, the USP-TWIN ultrasonic machine and the HGM-21 wire-type sizing unit, but also showing great

interest in the ETC-1/HF and ETC-2 LS tungsten carbide die.

**All the machines are offered with the following advantages:**

- Large work range available
- Perform all grinding and polishing operations
- Processing of all die profile portions (cones and bearing)
- High precision of dies achieved by an efficient control system
- Easy to understand and operate
- One operator required only to double output
- Fast processing of all dies
- Durable equipment concept with minimal maintenance cost

Considering the high number and the remarkable value of precision dies in use in today's highly competitive wire drawing industry, it is worthwhile to save and repair them by means of suitably efficient equipment, not to endanger the necessary overall economy.

**Eder Engineering GmbH – Austria**  
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## Experience counts

PW Hall Ltd, based in Glasgow, UK, is a leading manufacturer of colour and additive masterbatches for wire and cable compounds.

With more than 30 years' experience in this market, the company offers an extensive range of polymer specific masterbatches to colour the following compounds used in the wire and cable industry:

PVC, PE, XLPE (Sioplas), LSZH, XLPE (Visico™/Ambicat™ ex-Borealis/Borouge), TPU, TPE and PBT.

There is increasing concern, particularly in hotter countries, over cables fading in colour after outdoor exposure, and PW Hall offers a wide range of colour masterbatches incorporating pigments with excellent light stability and weathering properties to avoid colour fading after short term exposure.

PW Hall has a well-established export business with an extensive network of overseas agents and distributors.

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**Website:** www.pwhall.co.uk



## Annual general meeting

The IWMA's next annual general meeting will be held at The Mere Hotel, Manchester, UK, on Wednesday 4<sup>th</sup> February 2015.

As in previous years, the AGM will be followed by a members' lunch – an ideal opportunity for members to network in a more social environment.

For more information about the AGM, please contact the IWMA office.

## A weekend in London – and dinner



Here's your chance to grab an entertaining weekend in London – and enjoy a night at the IWMA dinner dance at the Royal Garden Hotel, Kensington.

The annual evening takes place on Friday 21<sup>st</sup> November at this five-star hotel situated in the UK's capital city. The association's discount – previously available for up to four persons in your party – has now been extended to cover everyone in your party.

The closing date for bookings is Friday 26<sup>th</sup> September. No cancellations will be accepted after this date, but substitute names will be permitted; no refunds will be made for cancellations received after 26<sup>th</sup> September.

For further details please contact the IWMA office on +44 1926 834680 or visit the website at [www.iwma.org](http://www.iwma.org)

## Second Queen's Award for innovative Metalube



▲ The laboratory team at Metalube, from left to right, Lesley Hallam, Chris Nettleship, Kevin Duncan, Ben Clarkson, Naomi Pells, Wayne Thornhill and Beverley Gallifant

Specialist lubricant manufacturer Metalube has been awarded a highly prestigious Queen's Award for Enterprise for Innovation 2014.

This is the second successive year that it has been honoured with this accolade. Exporting to over 86 countries worldwide, the company won in the International Trade category in 2013.

An Innovation Award was made for inventing the synthetic grease OCG 6000 to protect overhead electrical conductors. The corrosion-preventing grease can operate at over 200°C with an operational life exceeding 20 years.

OCG 6000 extends the lives of conductors and ultimately saves capital investments by delaying future renewal of pylon infrastructure.

Chris Nettleship, technical director, said: "This is a great feather in our

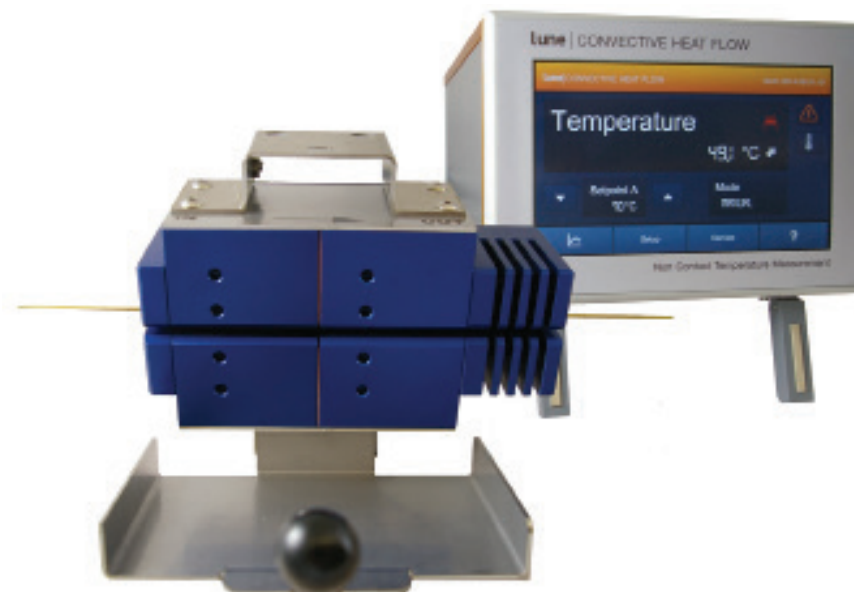
cap. To win the Queen's Award once is a major achievement, but to win two years in a row is a superb honour. I am so proud of all our chemists who innovate on a daily basis. It is fantastic that their hard work and technical expertise is now acknowledged by this esteemed recognition."

Metalube manufactures lubricants and greases mainly for the wire and cable industry.

The majority of households will own everyday appliances that use copper wire lubricated by the company, and its greases protect the overhead power cables that conduct electricity to homes. The experienced exporter employs 31 people and has offices in China, India and Brazil.

**Metalube Ltd – UK**  
**Email:** [post@metalube.co.uk](mailto:post@metalube.co.uk)  
**Website:** [www.metalube.co.uk](http://www.metalube.co.uk)

## lune introduces slotted head for wire diameters up to 7mm



▲ The lune CHF (convective heat flow) measurement system (here with slotted sensor head) records temperatures ranging between 10 and 250°C (50°-482°F) and offers a maintenance-free solution suitable for continuous operation without susceptible optics

Germany-based lune Prozesstechnik has extended its range of slotted heads for the continuous temperature measurement of wires. Now capable of measuring wires with diameters from 0.2mm to 7mm (0.008" to 0.28"), the Wiretemp LC is equipped with four sensors and offers flexibility and increased productivity as compared to the closed version.

"The slotted head can be easily and quickly assembled and mounted as

the complicated threading of the wire and cable is eliminated," said managing director Harald Boehnert. "With the capability of measuring wires with diameters up to 7mm customers benefit from increased flexibility and efficiency in their processes."

The lune CHF (convective heat flow) measurement system, which is also available for profiles, cables, foils, pipes, rollers or belts, records

temperatures ranging between 10 and 250°C (50°-482°F) and offers a maintenance-free solution suitable for continuous operation.

CHF measurement is physically based on the detection of the convective heat flow by means of a heat flow sensor. In contrast to common optical IR-measurement systems, the lune CHF is independent of emission factors, colour, speed, surface structure and varying distances between sensor head and surface. The system is wear-free as there are no moving parts. Moreover, the lune CHF features an automatic calibration system, so the user only needs to set the reference temperature.

With the CHF system, lune Prozesstechnik has further redeveloped the well-known Luxtron/Ircon measurement system, which ceased distribution in 2008. The powerful lune CHF electronics are suitable for the connection of Luxtron/Ircon sensor heads, and lune Prozesstechnik offers global repair and calibration services for all CHF sensor heads manufactured by Luxtron and Ircon. lune also develops customised and industry-specific sensor heads.

**lune Prozesstechnik GmbH – Germany**  
**Email:** boehnert@lune-gmbh.de  
**Website:** www.lune-gmbh.de

## SAWA on show

The South African Wire Association and seven member companies took part at the South African National Pavilion at wire 2014, sponsored by the South African Department of Trade and Industry.

South Africa is recognised as a reputable and stable trading partner of quality products and has a history of successful exports of wire rod, and value added downstream products such as wire of various qualities and grades, wire rope, strand, articles of formed wire, welded link chain, springs, nails, and manufactured items for agriculture, automotive, construction, mining, retail and security sectors.

All these wire products have been exported worldwide for many years and are renowned for innovation, quality, service and competitive pricing.

The South African Wire Association was created in 2002 to assist members to take part in global markets by creating an awareness of the importance and benefits of international trade for the members, the wire industry and to the South African economy.

This is achieved by utilising all resources available within the industry and government through the South African Department of Trade and Industry, to promote sustainable growth

and value for existing manufacturers and to facilitate entry into international trade by new industry entrants and emerging exporters.

The membership base includes large, medium and small manufacturers who will be able to accommodate specific requirements from South African materials. All members are reliable and competent exporters who adhere to the Association's code of conduct for international trade.

**South African Wire Association – South Africa**  
**Email:** sawa@sawa.co.za  
**Website:** www.sawa.co.za

## New sales managers and regional realignment



▲ Jesse Gallop, western district USA sales manager



▲ Michael Spurgin, south central USA sales manager



▲ Rafael Cairo, sales engineer for Brazil

Beta LaserMike has added three new team members to its Americas organisation, as well as sales territory changes to certain regions. This organisational re-alignment is in line with the company's on-going commitment to provide non-contact measurement and control solutions to its broad base of customers. The new sales managers will report directly to Bob Stockholm, director of sales for the Americas.

Jesse Gallop, western district USA sales manager: Mr Gallop will be responsible for the market penetration of Beta LaserMike's products and services with key customer accounts and target market segments. A key role will be working with the company's channel partners to drive continued sales growth in this region. He has 25 years of sales and account management experience in analytical instrumentation, most recently working for Thermo Scientific as seniors engineer.

Michael Spurgin, south central USA sales manager: Mr Spurgin is responsible for creating new business opportunities and managing customer relationships in South Arkansas, South Oklahoma, Louisiana and Texas.

He will play an essential role in the development of sales programmes aimed at expanding the company's footprint in this region. He previously worked as a sales specialist for the Keyence Corporation of America.

Rafael Cairo, sales engineer for Brazil: Mr Cairo is responsible for developing business opportunities with existing and potential customers in Brazil. He will focus on delivering Beta LaserMike's portfolio of measurement and control solutions for metrology, on-line gauging of rolled products, wire and cable, and plastic pipe and tube extrusion. He has several years, experience working for Keyence Brazil as a sales engineer supervisor, and previously worked for the equipment and pipeline division of Confab Industrial SA (Tenaris) as a sales engineer.

The following sales managers and their regional territories have been realigned:

Ethem Erdas, North Central Eastern USA: Mr Erdas will now be responsible for the region which includes eastern Ohio, West Virginia, western New York, and western Pennsylvania. He will work closely with Beta LaserMike's network of agents and representatives to drive

new business development and sales growth.

Mike Cooley, midwest USA: Mr Cooley will continue to oversee the Kansas, Iowa, Missouri, Minnesota, Nebraska, and North and South Dakotas regions and will now cover northern Arkansas and northern Oklahoma. In addition, he will be responsible for the metals market sales in Illinois. He will work closely with partner Concept Machine Tool and its Metrology division to develop the plastic medical tube extrusion business in Minnesota.

Brad Robillard, north central west USA: Mr Robillard assumes the regional territory responsibilities for Indiana, Kentucky, Michigan and western Ohio. Given the business opportunities in this region and the focus required to best serve key customers, he brings an exemplary track record of success in the sales of Beta LaserMike's measurement and controls solutions. He will be a tremendous asset to the company's base of customers in this region on many levels.

### Beta LaserMike – USA

**Email:** [sales@betalasermike.com](mailto:sales@betalasermike.com)

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

## Read all about it

Please remember that member news stories can be published on the IWMA website at any time, so submit them to [info@iwma.org](mailto:info@iwma.org) as part of your company's promotional campaign and they will be uploaded.

Case studies are also being included so if your company enjoys a significant business win or provides a customer with a solution to a particularly difficult problem, then the IWMA would be happy to help spread the news for you.



## IWMA new members

### VINSTON US CORPORATION

Vinston US Corp is the distribution and support centre for all Vinston products for North America. American owned and operated, it offers customers technical support, hands-on training and demonstrations. The Vinston product line is designed and integrated by top engineers educated in the United States and its machines are highly competitive in terms of quality, user friendliness, reliability, efficiency and cost. The Vinston brand is also rapidly expanding its customer base throughout Southeast Asia, Europe and South America.

### A KARPAT LTD

In the late 1950s, Anthony Karpat moved to Canada to sell various hardware items to local retailers in the Montreal area. His goal was simple: combine the time-tested European tradition of supplying quality items at a fair price, and deliver them on time. This tradition continues today. More than 40 years on, A Karpat Ltd offers an extensive line of quality hardware products to major retailers, distributors and industrial clients in Canada and the US.

### ADVARIS GMBH

As an independent software and consulting house, Advaris offers fully

integrated turnkey solutions from a single source. The autonomy of its software development allows the Advaris standard software to provide uncompromising industry-specific and customised business processes.

For more than ten years both small and medium-sized companies and global leaders in the cable industry have placed their trust in Advaris and have been successfully using its software.

### SINGHANIA INTERNATIONAL LTD

Singhania International Limited has been involved in the ferrous and non-ferrous industries, steel and related products for over 40 years. Based in India, it specialises in manufacturing quality steel wires and supports a wide spectrum of market sectors, including fasteners, automotive, bicycle and other specialised applications.

### MPI MACHINES LTD

MPI was established in 1979 and promoted by MPI Machines Ltd. The company is located in the central part of India at Gwalior. With continuous development in the wire and power and telephone cable Industries, the company has developed import substitutes and successfully commissioned its machines at various cable factories in

India, the Middle East and Europe to customers' satisfaction.

### FAST CABLES LTD

Since its inception in 1985, Fast Cables Limited has provided excellent customer service and affordability for the cable industry in Pakistan.

The company's emphasis on quality has made it a reputable business in the region, and a chosen supplier to electrical consultants, engineers and architects in the country.

The manufacturing plant in Lahore is equipped with state-of-the-art technology along with an excellent quality assurance system. In addition to its current product portfolio, it manufactures electrical cables and conductors to cater to the specific needs of customers.

### FH MACHINERY

FH Machinery has more than 400 machines at its warehouse and is able to locate machinery on a bespoke basis for customers. As a single source supplier for new and used fastener, cold forming and wire forming equipment, the company's experienced sales staff can ensure customers are able to manufacture their products at the best possible prices.

| COMPANY                               | COUNTRY      | WEBSITE  |
|---------------------------------------|--------------|--|
| Vinston US Corp                       | USA          | <a href="http://www.vinstonus.com">www.vinstonus.com</a>                           |
| A Karpat Ltd                          | Canada       | <a href="http://www.akarpat.com">www.akarpat.com</a>                               |
| Advaris GmbH                          | Germany      | <a href="http://www.advaris.com">www.advaris.com</a>                               |
| Singhania Int Ltd                     | India        | <a href="http://www.singhaniainternational.com">www.singhaniainternational.com</a> |
| Paramount Conductors Ltd              | India        | <a href="http://www.paramountconductors.com">www.paramountconductors.com</a>       |
| MPI Machines                          | India        | <a href="http://www.mpigwl.com">www.mpigwl.com</a>                                 |
| Fast Cables Ltd                       | Pakistan     | <a href="http://www.fast-cables.com">www.fast-cables.com</a>                       |
| Shaoxing Kaichen Mica Material Co Ltd | China        | <a href="http://www.sxkcy.com">www.sxkcy.com</a>                                   |
| Gür Fil Sanayi ve Elektronik          | Turkey       | <a href="http://www.gurfil.com">www.gurfil.com</a>                                 |
| South African Wire Association        | South Africa | <a href="http://www.sawa.co.za">www.sawa.co.za</a>                                 |
| Australian Wire Association           | Australia    | <a href="http://www.wireassociation.com.au">www.wireassociation.com.au</a>         |
| Heinze & Streng GmbH                  | Germany      | <a href="http://www.heinze-streng.com">www.heinze-streng.com</a>                   |
| FH Machinery                          | USA          | <a href="http://www.fhmachinery.com">www.fhmachinery.com</a>                       |
| Shanghai Singcheer Technology Co Ltd  | China        | <a href="http://www.singcheer.cn">www.singcheer.cn</a>                             |
| FS Cables                             | UK           | <a href="http://www.fscables.com">www.fscables.com</a>                             |
| Longcombe Labels                      | UK           | <a href="http://www.longcombe.co.uk">www.longcombe.co.uk</a>                       |

## Air wipe efficiency



▲ High-speed air wipe model 838

Following the extrusion process, air wipes are used to remove cooling water, either droplets or films. Wiping is necessary to ensure proper operation of such equipment as spark testers, in-line printers and dimension gauges.

Marldon air wipes achieve maximum wiping action because the wipe orifice can be easily changed to the optimum diameter for efficient water removal for a given product diameter. Because this

orifice is adjustable, a wide range of product sizes can be accommodated with a single wipe.

Other brands of air wipes use a fixed orifice, which is efficient for only one product diameter. Different units must then be used to optimally wipe the full range of product diameters manufactured on a single production line.

All Marldon air wipes allow the passage of lumps by use of hinging mechanisms that open to allow lumps through, and then close back when they have passed.

Marldon air wipes are constructed of durable materials, including stainless steel, aluminium and ceramics, depending on the model.

The model 838 is a high-speed air wipe for small products up to 8mm in diameter. Multiple air jets provide maximum wiping action. The spring-loaded upper assembly will lift allowing easy threading and the passage of lumps. Wear-resistant ceramic inserts prolong the life of the

unit and assist breaking the surface tension of water. The 838 is effective at line speeds of up to 1,000m/minute.

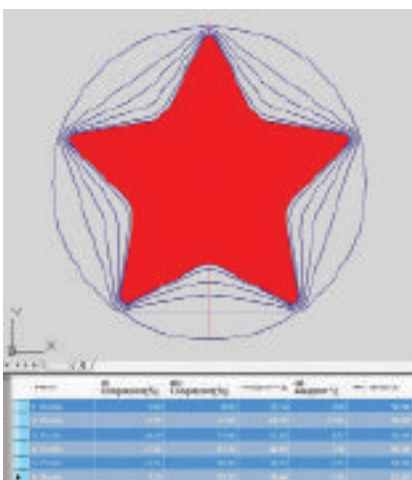
Marldon adjustable orifice air wipes have three sizes in the range, which can accommodate product diameters of up to 65mm. Made of stainless steel, they are effective at line speeds commensurate with most production line speeds.

Two wheels are mounted to a sturdy support bracket; the lower wheel is stationary and the upper wheel hinged to facilitate loading and to allow the passage of lumps. Adjusting the orifice is accomplished by rotating the indexed wheels to the appropriate diameter marking on the circumference then locking them in place. Air is supplied at an 'upstream' angle only to the orifice through which the cable passes to efficiently provide maximum wiping action all around the cable.

**Marldon Group Ltd – UK**  
**Email:** sales@marldon.com  
**Website:** www.marldon.com

## Profile wire rolling design and simulation – an integrated

Finite Element Analysis is a widely accepted tool to check a design prior to manufacturing. For example, the automotive industry makes use of the technology to improve its products with great success.



▲ Copra® RF WireRolling design software from data M

Due to its complexity, the rolling of profile wires is a challenge. FEA solutions are available, but this is only half of the story. To be able to perform an effective design optimisation, a powerful design tool and a seamless integration in FEA are also necessary.

The Copra® RF WireRolling solution from data M supplies all these demands. The design provides the necessary possibilities to define the shaping steps – manually, automatically or by combining both; the grade of deformation and the compression can be defined by the operator; and the calculation of the shape and of the cross-section area is done by the system.

All relevant information is shown in a table; changes will update the geometry instantly. The integrated definition of the machine data allows entering of the axis positions. The contour of the forming rolls is directly extracted from the profile shape in the

individual stations. The designer does not have to re-design the calculated shapes. Beneath top and bottom rolls, side rolls and accessory rolls can also be used.

After finishing the roll design, a direct interface to FEA assures that the complete process of building the FEA model is done automatically within a few minutes. Made by hand, this would usually take more than one day.

The simulation itself only takes a few minutes, so that the next optimisation step can be conducted in less than one hour. This means that a design can be optimised within one day – avoiding the most critical problems during the first setup as they could already be detected during the design stage.

**data M Software GmbH – Germany**  
**Email:** datam@datam.de  
**Website:** www.datam.de

## Düsseldorf success for association



Copyright: Messe Düsseldorf

A new look, increased membership enquiries and a constantly busy stand saw huge interest in the International Wire and Machinery Association at April's wire 2014 in Düsseldorf, Germany.

The exhibition was again excellently organised by Messe Düsseldorf with more than 1,300 companies from 54 countries exhibiting, occupying approximately 58,500m<sup>2</sup> of space – a two per cent increase compared with 2012.

The new-look IWMA image was well received and there was a great buzz on the stand as members entertained existing customers as well as potential new clients.

The stand's meeting room and office were in constant demand and the refreshments proved to be a welcome tonic during the busiest wire and cable show in the calendar.

The association was delighted to welcome new members during the week as well as receiving many new enquiries from companies interested

in joining in order to enjoy the many benefits of membership to the world's largest corporate wire and cable association.

Through the association's Educational Trust Fund, the IWMA is fully committed to providing educational opportunities within the wire and cable industry and was delighted to award the "John C Hogg Travel Award" for wire 2014 to 15 individuals.

This year's awardees came from China, India and the UK and represented the full spectrum of the industry.

Applicants for the award scheme were recommended or sponsored by a member of the IWMA and winners were provided with free air travel, accommodation and entry to the exhibition as well as free entry to the IWMA industry dinner held during the evening of Tuesday, 8<sup>th</sup> April.

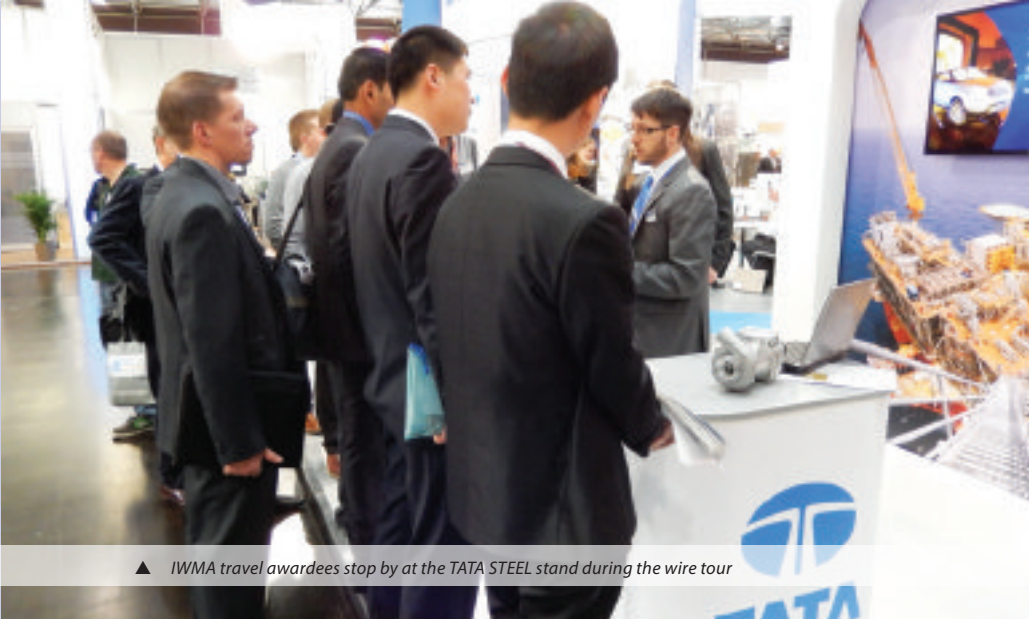
A three-hour tour of the exhibition was given to the group by Mr Geoff Church, IWMA executive board member, during which they were given

the opportunity to meet key influential individuals working within the industry from companies such as Mario Frigerio SpA, Niehoff, SAMP SpA, Tata UK, Condat, Queins Machinery and QED Wire Lines, providing the awardees with an overview of the typical manufacturing process route from feedstock through to the finished product.

Award winner Mr Kashyap Rao, of data M Software India Pvt Ltd, said: "We got the chance to visit various leading manufacturers in the wire and cable industry. Normally exhibitors are keener on visitors attending, but I think since we were from the IWMA team each exhibitor we visited explained their technology and products in a manner to educate and encourage us to enlighten our knowledge. I felt truly privileged to get this opportunity."

A presentation was made by representatives of the association and exhibition organisers, Messe Düsseldorf, at a special ceremony held on the IWMA stand during the afternoon of Wednesday 9<sup>th</sup> April.





▲ IWMA travel awardees stop by at the TATA STEEL stand during the wire tour



▲ Mr Friedrich-Georg Kehrer, Messe Dusseldorf GmbH Project Director (left) with IWMA executive board members Mr Peter Large (centre) and Mr Steven Rika (right)

### Educational Trust Fund



- Firmly committed to the future of the wire & cable industry
- Actively encourages training, skills and expertise
- Provides funding for the training of industry professionals
- Can be used for...
- Co...
- A...

### Publicity & Marketing

- Editorial included in Wire & Cable News newsletter
- Circulated to database of 12,000 industry professionals
- Distributed at international wire exhibitions and events
- Inclusion of news stories on www.iwma.org
- 100,000+ visits to www.iwma.org
- Listed on industry-leading directory



▲ Mr Friedrich-Georg Kehrer, Messe Dusseldorf GmbH Project Director (left) and Mr Steven Rika, IWMA Chairman (right) with the John C Hogg Travel Awardees



## Mechanical cleaning systems from the specialists

GEO-Reinigungstechnik specialises in the production of wet chemical cleaning systems for wire, strip, tube, cable, rod and similar longitudinal configurations. Almost all of today's demands on cleaning processes can be realised with proven GEO components, such as high performance ultrasonic tube reactors and high pressure or steam jets.

GEO in-line cleaning systems can be complemented by state-of-the-art systems for continuous bath monitoring and much more according to individual requirements.

For less demanding cleaning tasks, mechanical methods are suitable. The 'Primary Wire Wipe' system (PWW) enjoys excellent popularity in this field. The wire to be cleaned passes between two strips of absorbing tape material which move in opposite directions. In this way a clean tape surface is continuously presented to the wire or strip material.

The new DRB brush cleaning system for wires, cables and pipes



▲ The DRB brush system from GEO-Reinigungstechnik

is a compact, eco-friendly and cost-effective system for the removal of residual scales, tinsel and dust,

as well as to reduce excess drawing agent. For this purpose the material passes through a rotating spiral brush. Depending on the application and material the brushes can have nylon, brass or steel bristles. The rotary movement of the brush supports the wiping effect of this well-proven tool.

Further contamination removed from the wire does not clog-up the brush because centrifugal force throws a major part of the removed contamination into the base of the unit. Inside a lidded working box two separate compartments include a rotating unit to fix a cut to length spiral brush and an air wipe. Removed dirt is caught in the trough and collected in a removable, draw type container. Following the spiral brush the air jet nozzle blows off any remaining loose particles.

**GEO-Reinigungstechnik GmbH – Germany**

**Email:** [info@geo-reinigungstechnik.de](mailto:info@geo-reinigungstechnik.de)

**Website:** [www.geo-reinigungstechnik.de](http://www.geo-reinigungstechnik.de)

## Fully synthetic products replace drawing emulsions in copper wire drawing

Wire producers express a wish for more stable drawing processes in the susceptible field of production technology. The thinner the drawn wire, the more sensitive the process and the more important the fine-tuning. In demanding fine and superfine wire drawing processes fully synthetic lubricants offer considerably increased performance on multi-wire drawing machines compared to conventional drawing lubricants.

Through the consequent and continuous development of fully synthetic drawing lubricants, Bechem faces the challenge to substitute drawing emulsions. Its new Unopol S-series fully synthetic drawing lubricants exceed the performance of drawing emulsions and minimise emulsion related maintenance.

Core product of this series is Bechem Unopol S 643. According to the manufacturer, the water soluble, mineral-oil free drawing lubricant

shows a lifetime of the drawing die and drawing lubricant never achieved before, and offers an outstanding process stability when drawing bare, tin, nickel and silver plated copper wires up to a final diameter of 0.05mm. Even with final diameters of 0.1mm to 0.4mm this product guarantees excellent drawing results and contributes to reduced production costs.

Compared to conventional mineral-oil containing lubricants, this new product series offers various advantages: Fully synthetic products release tramp oil and show excellent filterability. Hardness, electrolyte and very good bio stability are additional important features. Optimal wetting properties ensure cleaner drawing machines and working environment.

**Carl Bechem GmbH – Germany**

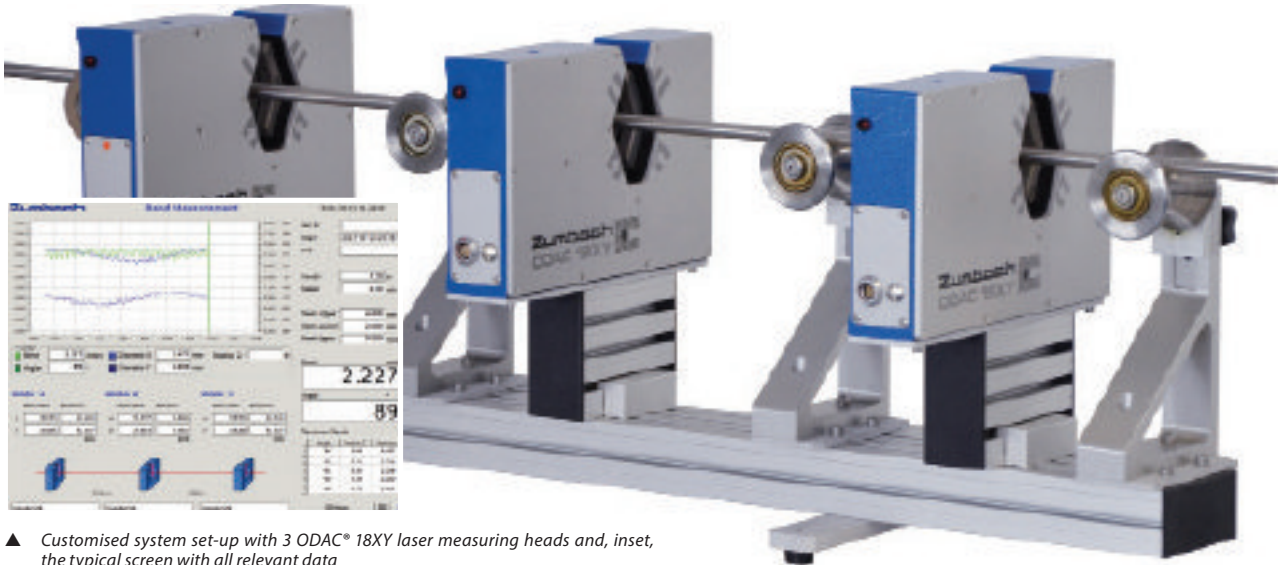
**Email:** [bechem@bechem.de](mailto:bechem@bechem.de)

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



▲ Importance is placed on fine-tuning in the drawing of copper wire

## Quality supervision



▲ Customised system set-up with 3 ODAC® 18XY laser measuring heads and, inset, the typical screen with all relevant data

Bendcheck – Zumbach’s laser measurement system – supervises quality directly in the production process.

This non-contact measuring solution opens tremendous potential to tube and rod manufacturers for in-line quality assurance, and is achieved without laborious, manual measurements. Many manufacturers of pipe and steel bar are constantly faced with the same problem, as straightness is a significant criteria of quality. Zumbach offers solutions with its Bendcheck system.

### Advantages for the quality control:

- Synchronous real-time scanning in the production process
- Quality assurance right after the straightening process

- Important for the steel industry
- Direct integration into the production process (customer specific installation)
- No time-consuming and laborious checks with manual tools

The basic function of the Bendcheck system is the measurement of any bend/deflections within round products. The system measures the position and diameter of the product at three different locations along its axis.

Bendcheck calculates the deviation of position measured by the central measuring head from a virtual straight line projected from the position measurement of the left head in comparison to the position measurement of the right head. The operator can select the preferred

formula for the bend calculation depending product requirements.

Thanks to this information, the bend of the product is continuously calculated and graphically displayed. As soon as the product leaves the measurement field, a complete data log file is released for each product, featuring position, diameter and bend measurements.

The relevant data is visualised on a clearly arranged display. Diameter, absolute bending value, bending angle as well as the individual current measurements of the three measuring heads are visible at a glance.

**Zumbach Electronic AG – Switzerland**  
**Email:** info@zumbach.com  
**Website:** www.zumbach.com

## Certified quality



▲ Just a sample of the tapes offered by Gurfil

After relocating in 2010 due to increased demand in the domestic and international market, Gurfil now serves customers in Europe, Africa,

the Middle East and Eastern bloc countries.

Serving the cable and electrical industry since 1981, the company is ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 certified, and all products come with RoHS certification.

Gurfil’s state-of-the-art production line of full automated computerised slitting, rewinding, spooling and rotogravure laminating machines are

designed and produced by its own engineers for high quality, stable and fast production.

The company has implemented a flexible production technology according to customer demand, and to satisfy the market with a wide range of products.

**Gürfil Sanayi ve Elektronik Cihazları Pazarlama A – Turkey**  
**Email:** murat@gurfil.com  
**Website:** www.gurfil.com



## Cimteq unveils manufacturing simulation software

Cimteq recently announced its latest innovative product which has been enthusiastically received by a number of current and prospective customers. The software, designed to seamlessly integrate with current ERP systems, will enable cable manufacturing companies around the world to dramatically optimise their production environment, whilst simultaneously reducing costs and improving efficiency.

Cimteq's Manufacturing Simulation Module (MSM) is a module of its cable design software, CableBuilder. MSM is a system so innovative in its design it will transform the way that companies operate in both an administrative and a productive capacity.

The system allows the manufacturer to define a set of rules relating to their processes and capabilities; MSM is then able to simulate the production costs and capabilities of the company to achieve unparalleled benefits. From creating the initial quotation right through to generating production process instructions, MSM will ensure complete cost accuracy whilst also minimising wastage and improving consistency. As with all of Cimteq's products, MSM

can be tailored to each individual manufacturer's requirements and as a result companies will extract different benefits from the system depending upon their needs.

Ali Shehab, CEO of Cimteq, said: "At Cimteq we are committed to innovation in order to provide our customers with the software they require to ensure that their companies are running at maximum efficiency with minimal levels of waste in terms of both material and time.

"MSM is intuitive in its design, for example it can be taught to understand component length and the losses associated with it, as a result the engineer can define unique rules specific to that particular company within the system, which will ultimately result in minimising these losses and improve production efficiency."

The system's unique ability to understand cable length and the variables associated with it has a huge impact on a company's capacity to exploit the concept of length based costing to ensure maximum profitability. Using MSM a company can simulate the production cycle and ascertain all the variable elements involved, such as machine running

costs, material usage and associated wastage, to produce real time production figures for any given length of cable.

This provides an invaluable insight into the profitability and associated costs of a theoretical order, allowing for extremely accurate quotations and minimal risk of unprofitable orders resulting from errors in estimating.

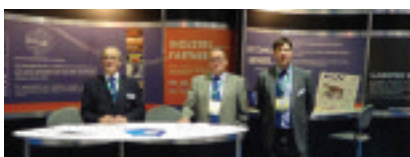
The applications of MSM and the resulting benefits are vast. Cimteq is aware that every cable manufacturing company is different in the way that it operates; this is clearly reflected in the design of MSM in that it can be adapted to ensure it offers each company a bespoke solution which is the best fit for their particular requirements.

Cimteq's mission is to provide customers with solutions to help them streamline their production process and it is apparent that with this new product offering the company has once again raised the bar within the industry.

**Cimteq Ltd – UK**  
**Email:** info@cimteq.com  
**Website:** www.cimteq.com

## 18<sup>th</sup> staging of Interwire

The Wire Association International (WAI) Inc will return to the Georgia World Congress Center, Atlanta, Georgia, USA, for the 18<sup>th</sup> staging of its biennial Interwire exposition and its 85<sup>th</sup> annual convention, to be held 28<sup>th</sup>-30<sup>th</sup> April 2015.



▲ IWMA attending Interwire 2013

In 2013 the wire and cable event – which remains the largest of its kind in the Americas – attracted visitors from 59 countries.

WAI expects more than 450 exhibiting companies to take part in the upcoming exposition. At Interwire, information is exchanged, and wire and cable making supplies and

machinery are debuted, reviewed and sold.

Remarking on the event, exhibitor Tony DeRosa, general manager Frigeco Inc, said: "The globalisation of production, markets and competition is reshaping the way we do business. Interwire gives us the opportunity to meet industry professionals and engage in an open exchange of ideas and discuss innovations resulting from our collective knowledge and experience.

"Furthermore, the technical programme provides a conduit to pass the stewardship of our industry to the next generation of professionals to prepare them for the challenges of tomorrow."

Other highlights include a networking gala, production solutions demonstrations, plant

tours, a "Fundamentals of Wire Manufacturing" course, presentation of WAI's Mordica and Donnellan Memorial awards, technical paper awards, committee and leadership meetings, WAI member rewards activities, and a concurrent Global Continuous Casting Forum on both copper and aluminium.

Conference sessions will feature both practical and technical presentations. Authors interested in sharing their work should send a manuscript abstract to WAI's Marc Murray, director of education and member services, at mmurray@wirenet.org by October/November 2014. A limited number of presentations will be accepted.

**Wire Association International – USA**  
**Email:** info@wirenet.org

## Polifibra's new appointment

Polifibra has appointed Davide D'Agostini as international sales manager.



▲ New international sales manager Davide D'Agostini

Established in 1969 and acquired by Ritrama Group in 2011, Polifibra is a manufacturer of flexible insulating materials, including aluminium and copper foil laminates, for use in the production of power, data and telecommunication cables for motors and transformers. Its also produces a comprehensive range of foil laminates for industrial applications and more recently, even decorative closures for the wine bottling industry.

Mr D'Agostini previously worked as business manager for a large industrial manufacturing group, which also specialised in the production of hi-tech materials, and therefore brings a wealth of knowledge and experience in the development of new applications across global markets.

Polifibra celebrates 45 years in the wire and cable industry this year and believes this appointment will ensure its continued success for many years to come.

**Polifibra SpA – Italy**  
**Email:** info@pf-polifibra.com  
**Website:** www.pf-polifibra.com

## Colourful world of Siebe

Siebe has introduced its latest innovation, the Siebe Colour Match System for wires.

The application is for inline control of colour during production of colour quality testing for harnessing or laboratory control. The device can detect single colour cored insulation as well as stripe-coded wires and shows both colours.

Reference colour can be taken from an RAL database or a user-defined database, where new entries are created with a teach-in function.

The result is either nearest database colour or colour difference to selected reference (in units of Lab-dE). Minimum wire diameter is 1mm (40 mil), minimum stripe width is 0.5mm (20 mil). Two device types are available: Inline with TCP-IP connection to line PLC or stand-alone with touch screen. The offline device comes with a touch screen and turn mechanism for 360° inspection.

**Siebe Engineering GmbH – Germany**  
**Email:** vkde@siebe.de  
**Website:** www.siebe.de

# Still No. 1...

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# ...For 14 Years!

## Multiwire drawing technology – a success since mid-1980s



▲ The MMH 104/RMA 201 type multiwire drawing line for wires made of aluminium and aluminium alloys

More than 1,100 multiwire drawing lines of the MMH type engineered and manufactured by Maschinenfabrik Niehoff are in operation all over the world.

Multiwire drawing has become a standard operation procedure in the copper wire industry – and Niehoff has a remarkable share in this development. Not only the copper wire, but also the aluminium wire industry benefits from it.

In close cooperation with aluminium wire manufacturers, Niehoff has expanded the MMH technology successfully to the multiwire drawing of aluminium and aluminium alloy wires. One of Niehoff's highlights at the wire 2014 trade fair was the drawing line type MMH 104/RMA 201 designed for the simultaneous drawing of 8 or 16 aluminium or aluminium alloy wires to a minimum final diameter of 0.15mm.

The MMH type lines launched in the mid-1980s are based on a modular construction concept and can be perfectly tailored to the specific requirements of each customer. Regardless of the actual material, the wires drawn on such lines show highly homogeneous characteristics which surpass the strictest specifications and processing requirements. They are ideally suited for downstream processes such as high-quality stranding or braiding.

Because of the MMH machines' advanced construction and operation concept, more and more new units are ordered and existing MMH machines – even those of the first generations – are upgraded and modernised by Niehoff specialists.

**Maschinenfabrik Niehoff GmbH & Co KG – Germany**  
**Email:** info@niehoff.de  
**Website:** www.niehoff.de

## Best value for different capacities and budgets



▲ The automatic dual take-up EKP 8

Maillefer's solutions allows a choice between three different levels of production lines in terms of capacity, cost, automation, flexibility, product range and space and maintenance requirements.

**Enter:** This is a compact quality solution for more sustainable production. It is ideal for those searching for an affordable investment that is easy to start and maintain in different production environments.

**Extend:** Extend is a lean and proven production solution for changing market needs. Its good upgradability and versatile product range guarantee a technical fit for the future.

**Explore:** This is the ultimate in demanding deliveries with the lowest total cost of ownership. It is a high output solution to explore the market in the front row.

New in medium voltage solutions is the air-cooled extruder MXI 150 with 300kg/h output for MV cable production, part of EPL 30/Enter.

The automatic dual take-up EKP 8 is for building low voltage wires up to 10mm<sup>2</sup> conductors and with a reel range of 400-800mm. This is part of the EEL 20/Enter.

New in rubber solutions is the dual-layer rubber crosshead DHR 130 for versatile rubber cable production, part of EPL 20/Extend.

New in fibre optic solutions is the compression caterpillar CCA 1000 for high-speed fibre optic loose tube production, part of OEL 40/Explore.

Maillefer will also be at wire China (stand W1F24) and stand 1E01 at Wire & Cable India.

**Maillefer Extrusion OY – Finland**  
**Email:** info@maillefer.net  
**Website:** www.maillefer.net

## Experience

Heinze and Streng is an international trading company with many years' experience in the wire and cable industry.

Its wide range of products includes various spare and worn parts, equipment, complete solutions and new machines for bunching.

**Heinze & Streng GmbH – Germany**  
**Email:** info@heinze-streng-gmbh.de  
**Website:** www.heinze-streng-gmbh.de



## 100 per cent pellet inspection and sorting



▲ The new Purity Scanner from Sikora

The purity of XLPE pellets as they are used for the insulation of medium, high and extra-high voltage cables as well as for on- and offshore cables is a decisive characteristic for the quality of the end product. Damage caused by breakdowns due to contaminated material can easily run into the millions.

Therefore, the production of highly clean material as well as the continuous detection and sorting out of contaminated pellets before they get into the extrusion process is of essential importance.

The Purity Scanner intelligently combines X-ray technology with an optical system. This allows the detection of metallic and organic impurities of 50µm in the pellet itself and on its surface to 100 per cent. Contaminated pellets are separated and sorted out in order to ensure that they do not get into the extrusion process.

The application of both technologies is unique and is exceeding previous solutions on the market. Due to the specially developed X-ray technology, the Purity Scanner is the first system that inspects transparent and coloured (eg black) pellets as well as semi-conductive XLPE material for impurities and sorts them out automatically.

The feeding of the pellets is carried out via a vibrating ramp. The material does not come into contact with the ambient air as the transport system is hermetically sealed.

**Sikora AG – Germany**  
**Email:** sales@sikora.net  
**Website:** www.sikora.net

## Singcheer to supply overall solution for automotive wire maker

Singcheer has just launched its new product, SPS (cone spool take up) for automotive wire makers.

Due to the rapid growth of the Chinese automotive industry, there will be a great demand for automotive wire in the near future. Most of the automotive wire makers are expanding their capacity to meet more orders from wiring harness makers. It will be the trend that cone spool packaging systems will substitute others to fit for the wiring harness manufacturing process.



▲ With an eye on the future for the Chinese automotive wire industry, Singcheer has launched the SPS

The SPS can be integrated with any new or existing production line. The first order (four sets) has been finished and will be delivered to the customer soon. Singcheer has also made a new model of extruder with compact design and an Italian gearbox. Another important component of the automotive wire line is the QCC crosshead for continuous operation. Singcheer's QCC system has been found to be highly efficient and reliable.

During the past ten years, with continuous improvement and development, Singcheer has developed a firm foothold in China and is now looking to expand its business activities in the international market.

**Shanghai Singcheer Technology – China**  
**Email:** market@singcheer.cn  
**Website:** www.singcheer.cn

## Next issue

**Members:** Please send us your editorials for free publication in the next WCN (or on the IWMA website at any time between editions of WCN).

One of the strictly members-only benefits of belonging to the IWMA is the facility to publish your company's editorials in WCN, both the hard copy and electronic versions, completely free of charge, and reach thousands of readers worldwide.

In addition to worldwide distribution WCN is freely distributed at all major industry trade fairs and IWMA technical events. The next important upcoming exhibitions are wire Russia and Interwire in 2015.

Members should also bear in mind that the IWMA website can accept editorials at any time during the year.

Providing editorial for WCN and the website can help members in many ways:

- **Communicating important messages worldwide**
- **Attracting interest from the high number of national visitors to this year's exhibitions**
- **Creating a high profile at all events**
- **Advising customers of personnel changes**
- **Announcing major new developments**
- **Celebrating winning of new contracts/orders**
- **Staying one step ahead of the competition**

Please send us your editorials (not advertisements) with supporting photos to info@iwma.org for the Spring 2015 edition.

If marketing and public relations is not your area of responsibility please make sure that the relevant department/person is aware of this information.

**Please submit editorials by 10<sup>th</sup> November 2014.**

## Improved show services for members

The world's largest corporate membership association for the wire and cable industry – the International Wire and Machinery Association – will be providing a host of hospitality services for its members and their clients to use later this year at wire China and Wire & Cable India.

With a larger stand than in previous years, more centrally positioned for the convenience of members, the IWMA continues to be a valued industry partner of 'wire'.

For wire China 2014, taking place from 24<sup>th</sup> to 27<sup>th</sup> September at the Shanghai New International EXPO Centre (SNIEC), and Wire & Cable India 2014 which will take place at the Bombay Convention & Exhibition Centre in Mumbai from 28<sup>th</sup> to 30<sup>th</sup> October, the IWMA will offer improved services to members such as hospitality facilities, meeting and office space, translation services, Internet facilities and general exhibition advice and assistance.

In fact the IWMA stand at all regional wire shows will mirror the quality and range of services that are provided at the Düsseldorf show, the largest in the industry, and provide greater visibility for the association and its members alike, whilst continuing to provide the highest level of support and expertise that everyone has come to expect.

Shell scheme stand application packs for these prestigious wire and cable exhibitions are available upon request from the IWMA office. Once completed, they should be returned to the IWMA or forwarded directly to Messe Düsseldorf, which will then confirm your company stand allocation.

If your company wishes to exhibit at either of these well-established exhibitions, then please contact the IWMA office for an application pack. We would be delighted to help.

### wire China 2014

wire China, launched in 2004, co-organised and developed jointly by Messe Düsseldorf and its subsidiary in China together with Shanghai Electric Cable Research Institute, has now become the leading trade fair of its kind in Asia, not only in exhibition scale but also for its international influence.

Over the years it has been playing an irreplaceable part in the industries' trading and communication aspects. Together with industry players, wire

to exceed 55 per cent by 2015. The annual social fixed asset investment will top 30 trillion RMB, with that in infrastructure, eg power, construction, real estate, and water conservancy, totalling more than 15 trillion RMB, bringing rosy market prospects and numerous business opportunities to wire and cable industries.

### Wire & Cable India 2014

Just a month later it will be the turn of Mumbai to host countries from around the world with the increasingly popular Wire & Cable India.

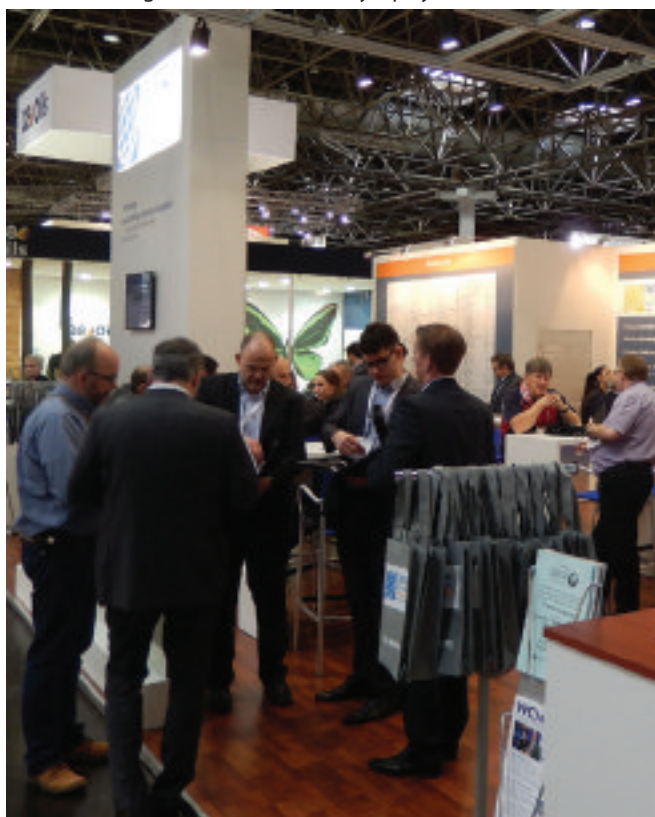
The main customers for the wire and cable industry in India are the automotive, telecommunication and construction industries and all will come together for the 5<sup>th</sup> wire & Cable India international exhibition.

In the past few years, these three industries have witnessed a rapid expansion and that has led to an annual growth of about 25 per cent in India.

The Indian government has begun to focus primarily on public private partnerships with major infrastructure projects being the growth engine, especially for the development of the transport sector.

As per the details provided in the Automotive Mission Plan 2006-2016, the Indian government is geared up to double the automobile industry's contribution to the country's GDP by 2016 and furthermore intends to create 25 million new jobs in the industry.

The telecommunications market in India is the third largest in the world and it is the fastest growing. This growth is being witnessed in the wireless and telephony sectors. Furthermore, in the Internet sector the government is making endeavours to provide the rural regions of India with broadband connections.



China is committed to driving the development of China's wire and cable industry, witnessing achievements and exploring opportunities. The trade fair is widely acclaimed among Chinese and foreign exhibitors and visitors alike.

World-renowned companies and leading brands, industry experts and industry players will meet again here in September and brainstorm the latest developments and applications in the industry.

China's urban population is estimated

## Range of lubricants from Condat



▲ Eco-friendly lubricants for the wire industry

At wire China 2014 in Shanghai, Condat will present its latest developments in surface technologies for metal forming and its extensive range of lubricants for wire drawing and cold rolling including:

- Vicafil: a comprehensive range of wire drawing powders, wet lubricants, pastes, neat oils and greases
- Steelskin: advanced lubricant specialities for special wire drawing applications
- Galvasmooth: smoke free charcoals for high zinc weight galvanised wires

At the show Condat will promote two innovative products:

Vicafil TS 7300 AD: Based on water soluble mineral salts, Vicafil TS 7300 AD is simply added to the Borax solution. It improves significantly standard Borax coatings and provides

a better coat weight control. In case of high moisture it helps keeping the coating even and adherent with no need to process the coils again. Wire drawing is therefore much more efficient.

Vicafil Sumac 5: This has been designed for wire drawing at very high speeds. It offers the ability to work at higher temperature/speed whilst providing a high lubricating stability. It is ideal for stainless steel and high carbon spring wire, bead wire and steel cord applications.

With a complete set of new wire drawing solutions, Condat can help reduce production and processing costs whilst keeping caution to the environment and people.

**Condat SA – France**  
**Email:** info@condat.fr  
**Website:** www.condat.fr

## New online look



▲ A screenshot of the company's new website

It's a new website and look for German new and second-hand cable and rope machinery specialist Queins Machines.

You can now also download the latest catalogue from the company, which has also made the new website available in four different languages – English, German, French and Spanish.

Not only does the website feature a new layout, there is new content and it is now easier to browse through the broad range of new machines and second hand machines, including stranding, armouring, bunching, taping, winding and unwinding, extruding and wire drawing.

A product search option is also available.

**Queins Machines GmbH – Germany**  
**Email:** info@queins.com  
**Website:** www.queins.com

## Gauder Group heads for wire China



▲ A planetary strander from Pouttier

Pourtier, Setic and Daloo, members of the Gauder Group, will be welcoming visitors to Stand W1E26 at wire China to present its comprehensive range of equipment and services. The company will be on show from 24<sup>th</sup> to 27<sup>th</sup> September.

The Pouttier brand has enlarged its offering for large equipment required for the production of submarine and umbilical cables. Its heavy-duty stranders and cablers, made in Europe, are for the production of all types of high voltage and extra-high voltage power cable, from overhead to insulated, AC type (using high quality Milliken conductor) or DC type (using large round compacted conductor or trapezoidal wires).

The well-known Setic brand provides high-speed double twist bunchers/

strandings for the automotive industry as well as complete solutions to produce high quality LAN, special and control cables with enhanced performances (in one or two steps according to product mix).

All these machines are made in France and some are also manufactured by the Gauder Group China division with the same quality standards, for direct supply to the Asian market.

For cable producers wanting simple and reliable solutions for the production of power and communication cables at affordable prices, Daloo is the unique choice proposing complete stranding lines and accessories. The design is based on European experience and the manufacturing is done in China following Gauder Group's strict quality criteria.

'C2S', the Cable Services & Systems division, whose turnover has been rising by 350 per cent for ten years, takes care of all brand wire and cable production lines, worldwide.

**Gauder Group – France**  
**Website:** www.gaudergroup.com



## Degradation of mechanical properties of drawn copper wire by occurrence of dynamic recrystallisation

By Kazunari Yoshida, Naoyuki Katsuoka, and Kota Doi, Tokai University; and Yasutomo Takemoto, Sumitomo Denso Co Ltd, Japan

### Abstract

Copper wires have a drawback in that their mechanical properties change abruptly owing to the occurrence of dynamic recrystallisation during wire drawing, transportation, or storage. Therefore, an investigation of the occurrence of dynamic recrystallisation in drawn copper wires was carried out. The authors have clarified that dynamic recrystallisation occurs when the total reduction is very high during the drawing of copper wire, resulting in a marked decline of the tensile strength, Young's modulus, and residual stress along with the progression of recrystallisation. Metallographic observation and crystallographic orientation measurement for the drawn copper wires were carried out to examine the ease of occurrence of dynamic recrystallisation.

### Introduction

A decrease in the strength of copper wires can be naturally caused during wire drawing, transportation or storage of copper wire products. The decrease in strength of copper wires during cold wire drawing is due to the occurrence of dynamic recrystallisation<sup>1)5)</sup>. However, the causes and timing of dynamic recrystallisation are still not clear. Also, the reasons for the decrease in strength during the transportation or storage of drawn wires are not clear.

The purpose of this study is to examine the cause of the occurrence of dynamic recrystallisation during cold wire drawing and the reasons for the decrease in strength of drawn wires. Moreover, the correlation between crystal texture and wire strength during wire drawing and the effect of heating during transportation or storage on mechanical properties were examined. EBSD (electron back scatter diffraction)

and XRD (X-ray diffraction) were used for crystal orientation analysis, and a nano-indenter and slit method were used for the measurement of Young's modulus and residual stress respectively.

Furthermore, high-purity copper wires which have recently been used as bonding wires in electronic components were drawn in addition to normal ETP (electric tough pitch) copper wires, and the ease of the occurrence of dynamic recrystallisation was examined.

### Tested materials and experimental method

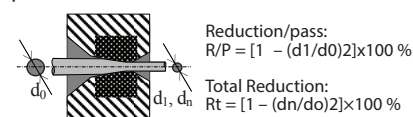
ETP copper wires (JIS C1100) of  $\phi 8\text{mm}$  and high-purity copper wires (6N level) were used in the experiment. Table 1 shows the chemical composition of the tested ETP copper wire and that of the high-purity copper wire. A continuous wire drawing machine,

|    | ETP copper |         | High-purity copper |           |
|----|------------|---------|--------------------|-----------|
|    | [ppm]      | [ppm]   | [ppm]              | [ppm]     |
| O  | 289        | Ni 0.4  | O <1               | Ni 0.001  |
| Ag | 10.2       | Bi <0.1 | Ag 0.085           | Bi <0.001 |
| Pb | <0.1       | As 0.4  | Pb 0.001           | As <0.01  |
| Sn | 0.9        | Sb 1    | Sn <0.01           | Sb <0.002 |
| Fe | <0.1       |         | Fe 0.012           |           |

▲ Table 1: Chemical composition of tested copper wire

the drawing speed of which is 1,002-1,998m/min, was used for wire drawing, and a water-soluble lubricant, Lubright, was used. A cemented carbide die, the die half angle ( $\alpha$ ) of which is  $6^\circ$ , was used for the drawing of wires with a diameter of more than 1mm, and a diamond die, the die half angle ( $\alpha$ ) of which is  $8^\circ$ , was used for the drawing of wires with a diameter of 1mm or less. The reduction per pass was about 20%. The definitions of reduction per pass

(R/P) and total reduction (Rt) are shown in Figure 1. Here,  $d_n$  means the diameter of the drawn wire after  $n$  passes.



▲ Figure 1: Definitions of reduction/pass R/P and total reduction Rt in wire drawing

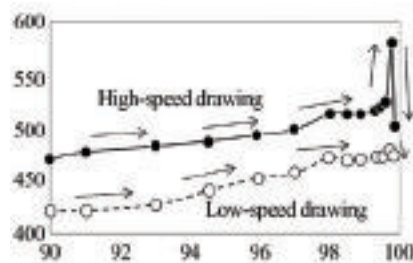
SEM (scanning electron microscope) was used for metallographic observation, and EBSD and XRD were used for crystal orientation analysis. A micro-indentation hardness tester (nano-indenter) was used for the measurement of the Young's modulus of drawn wires.

### Dynamic recrystallisation in ETP copper wire drawing

#### Tensile strength of drawn wires for various degrees of drawing

A  $\phi 8\text{mm}$  wire rod was drawn repeatedly using a die of  $\alpha=6^\circ$  under conditions such as R/P=20% and average drawing speed = 1,500m/min. The correlation between Rt (total reduction) and the tensile strength of drawn wires was examined. The results are shown in Figure 2.

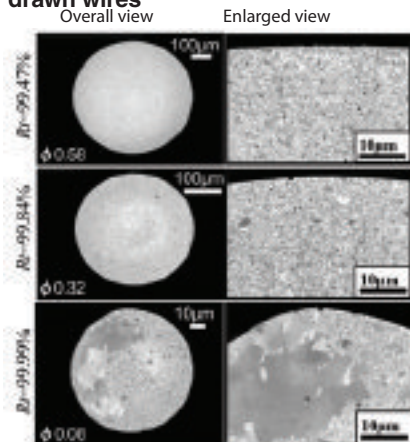
The tensile strength of a drawn wire



▲ Figure 2: Change in tensile strength of drawn wires for various total reductions

increases until Rt reaches 99.5%, but it decreases with further increasing total reduction. This is attributable to the occurrence of dynamic recrystallisation, as shown in Figure 3. The tensile strength of a wire drawn at a high speed is higher than that of a wire drawn at a low speed. However, as mentioned above, the tensile strength of a wire drawn to an excessive Rt decreases, even if the wire is drawn at a low speed.

### Transition of crystal orientation of drawn wires



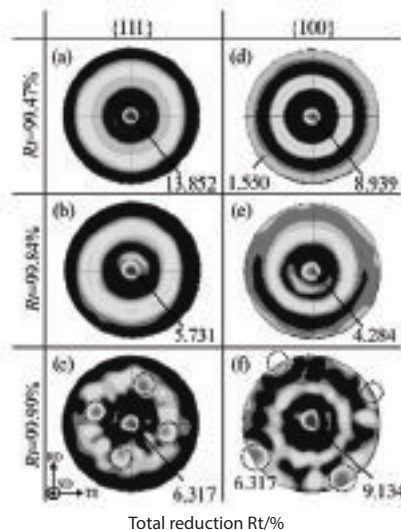
▲ Figure 3: Metal structure in the cross section of drawn wires obtained by high-speed drawing

Regarding three types of drawn wire, the Rt values of which are 99.47%, 99.84%, and 99.99%, pole figures of {111} formed by drawing and {100} formed by recrystallisation were made, and they were analysed to obtain a better understanding of the transition of crystal orientation caused by the occurrence of dynamic recrystallisation in ETP copper wire continuous drawing. Figure 4 shows the pole figures obtained by EBSD measurement for a wire of Rt=99.47% before the occurrence of dynamic recrystallisation, a wire of Rt=99.84% in which the occurrence of dynamic recrystallisation is just beginning, and a wire of Rt=99.99% in which dynamic recrystallisation is ongoing.

First focusing on {111} pole figure, the wire of Rt=99.47% in Figure 4(a), in which dynamic recrystallisation has not yet occurred, shows a peak in the ND (normal direction), which is the drawing direction of the wire, and the orientation intensity is slightly lower than 14, meaning that the wire drawing direction is highly

oriented. However, the occurrence of dynamic recrystallisation causes slight fluctuation on the hitherto stable ring, as shown in Figure 4(b), and the orientation intensity toward the ND is decreased to slightly lower than 6. Further drawing promotes dynamic recrystallisation and collapses the rings markedly, as shown in Figure 4(c), and peaks are also formed in an area other than the ND as shown by dotted lines. Wire drawing causes the partial occurrence of recrystallisation but, on the other hand, a {111} crystal grains are also formed due to slip, resulting in the fluctuation of the orientation intensity toward the ND.

Next, looking at the {100} pole figure, it can be observed in Figure 4(d) that

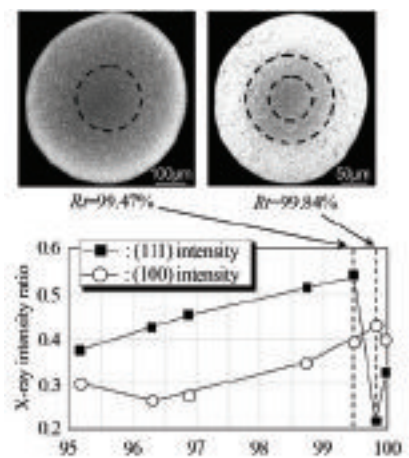


▲ Fig 4 {111} and {100} pole figures of continuously drawn wires with various Rt obtained by EBSD

there is a peak in the ND and stable rings are formed around the ND and its outer circumferential area when there is no occurrence of dynamic recrystallisation. Compared with the {111}, the orientation intensity of drawn wire is slightly low, but the {100} texture, which is oriented in the direction of drawing, is formed. Owing to the occurrence of dynamic recrystallisation, as shown in Figure 4(e), rings start to fluctuate, and eventually marked fluctuation of rings, as shown in Figure 4(f), occurs, and then new peaks are formed in the dotted areas shown in Figure 4(f). {111} pole figure is formed in various locations and directions owing to the promotion of dynamic recrystallisation. This result is very similar to the process<sup>(6)</sup> in which crystal texture is formed by annealing.

The {100} diffraction intensity of wires with different Rt was measured by using XRD. Figure 5 shows the results and crystal orientation maps, which are analysed by using EBSD. For microscale fine wires, multiple wires were lined up and measured by using XRD. The {100} diffraction intensity increases along with the increase in Rt until Rt reaches 99.5%, but it decreases rapidly once Rt exceeds 99.8%. It is clear that the result of diffraction intensity measurement by using XRD agrees well with the result of the crystal orientation map analysed by using EBSD.

### Young's modulus of drawn wires



▲ Figure 5: X-ray intensity and reverse pole figure by EBSD of drawn wires with various Rt

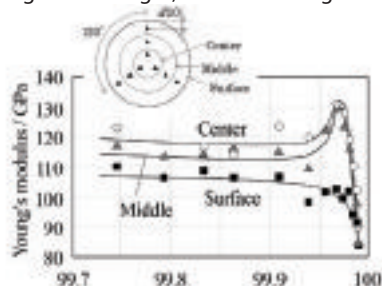
The Young's modulus of wires with different Rt was examined by using a nano-indenter. Wright has reported that the Young's modulus of copper wire varies with the crystal orientation and there is a threefold difference between 111 {and} 100<sup>(7)</sup>. In this experiment, Young's modulus was measured at nine points in three directions and each direction had three measurement points extending from the centre part to the surface part. Figure 6 shows the correlation between Rt and Young's modulus, which was calculated by using the data obtained by a nano-indenter.

The Young's modulus of drawn wires with on Rt of 99.9% or lower did not fluctuate, and showed values of 110-120GPa. Also, it became clear that there is little change in Young's modulus from the centre part to the surface part of a drawn wire. However, once Rt exceeds 99.99%, the Young's modulus of a drawn wire decreases

sharply to 90 GPa. Also, it became clear that the Young's modulus in the centre part of a drawn wire is higher than that near the surface part. It is presumed that the Young's modulus near the surface decreased much more than that in the centre part because of the occurrence of dynamic recrystallisation and the existence of many {100} direction in the surface part.

### Axial residual stress of drawn wires

Residual stress has an effect on wire fatigue strength, wire straightness,



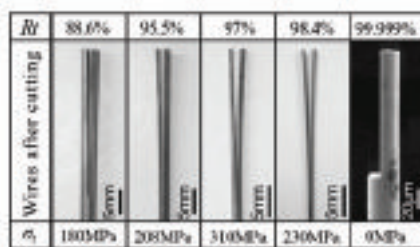
▲ Figure 6: Relationship between Rt and Young's modulus

and productivity for post processing such as coiling<sup>(8)</sup>. Wires of Rt=88.2%, 95.4%, 97.0% and 98.4%, in which dynamic recrystallisation did not occur, and wires of Rt=99.999%, in which dynamic recrystallization occurred, were prepared and their axial residual stresses were measured by the slit method. Drawn wires with a diameter of 1mm or more were slit by using a wire-cut electrical discharge machine. However, the diameter of wires of Rt=99.9995% is 30 $\mu$ m, so it was impossible to use the wire-cut electrical discharge machine, therefore, a portion of a half section of the wires was removed by using a FIB (focused ion beam<sup>(9)</sup>). Axial residual stress was calculated from the wire end curvature after slitting<sup>(10-11)</sup>. Figure 7 shows images of wires after wire cutting and values of axial residual stress. The correlation between Rt and axial residual stress is shown in Figure 8.

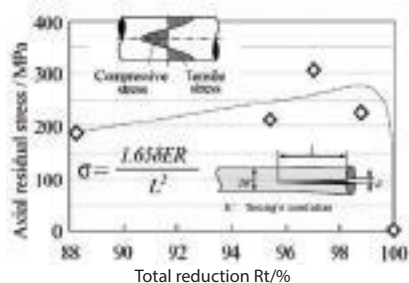
As shown in Figure 8, axial residual stress has an effect on the occurrence of a large tensile stress on the wire surface and also the compression stress in the wire centre part. Under such a stress condition, the larger the residual stress becomes, the larger the curvature of the slit wire end grows. In wire drawing, axial residual stress increases along with the increase in Rt. A wire showed a maximum

value of 300MPa when Rt was approximately 97%. This was caused by the difference in strain between the surface and the centre part of a wire, which increases along with the increase in the number of instances of drawing. However, residual stress decreases rapidly thereafter, and the residual stress of a wire of Rt=99.999% became about 0. As described above, it is presumed that this event was caused by the following: dynamic recrystallisation occurred in almost the entire area of the wire, the {111} crystal orientation decreased, and other crystal orientations increased.

### Change in tensile strength of low-temperature-heated drawn wires



▲ Figure 7: Residual stress of drawn wires measured by slit method and RMS-FIB method



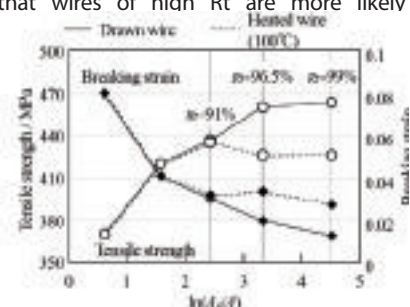
▲ Figure 8: Measurement of axial residual stress of drawn wires by slit method

Wires of Rt=91%, 96.5% and 99%, which were drawn at a low speed, were prepared, and these wires were subjected to low-temperature heating at 100°C for one hour. Subsequently, their tensile strength and breaking strain were examined, and the effect of low-temperature heating on the mechanical properties of the drawn wires was examined. (See Figure 9).

For wires of Rt=91% or less, there is little change in tensile strength and breaking strain as a result of low-temperature heating. For wires of high Rt such as 96.5% and 99%, it is found that the tensile strength decreases by about 40MPa and the

breaking strain increases by 0.02 even at the low heating temperature of 100°C.

It is presumed from the above findings that wires of high Rt are more likely



▲ Figure 9: Change in mechanical properties for various Rt drawn wire upon heating to 100°C

to undergo recrystallisation and some crystals are recrystallised after low-temperature heating.

As a result of the examination of the effect of low-temperature heating on Young's modulus, it was found that the Young's modulus of wires that show no dynamic recrystallisation during drawing is likely to decrease along with the increase in Rt. This agrees with the report of Obara<sup>(12)</sup>, that the recrystallisation temperature of copper decreases along with the increase in Rt. This indicates that the stacking-fault energy in a face-centred cubic crystal is indirectly related to the above results<sup>(13)</sup>.

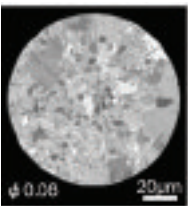
### Dynamic recrystallisation in high-purity copper wire drawing

High-purity copper wires are used in electric/electronic components<sup>(14)</sup>. They are processed into ultrafine wires by drawing before use, as is the case of ETP copper wires. It has been reported that the recrystallisation temperature varies with the amount of impurities contained<sup>(15)</sup>. This suggests that the timing of when dynamic recrystallisation occurs differs between ETP copper drawn wires and high-purity copper drawn wires. The amounts of impurities contained in wires used in this study were 0.015-0.04% in ETP copper and 0.00005% in high-purity copper, thus, there was a large difference in their purity. A further experiment was conducted to examine the ease of occurrence of dynamic recrystallisation in high-purity copper wire drawing.



A high-purity copper wire was drawn into a fine wire of  $R_t=99.99\%$  by single drawing. Figure 10 shows a SEM image of the cross-sectional metal structure of a drawn wire of  $R_t=99.99\%$ . Grain coarsening and the occurrence of dynamic recrystallisation of a high-purity copper wire of  $R_t=99.99\%$  can be confirmed.

Crystal orientation analysis by using EBSD was conducted to clarify crystallographically that dynamic recrystallisation occurs in high-purity copper wire. Figure 11 shows  $\{111\}$  and  $\{100\}$  pole figures of a high-purity copper wire of  $R_t=99.99\%$ .

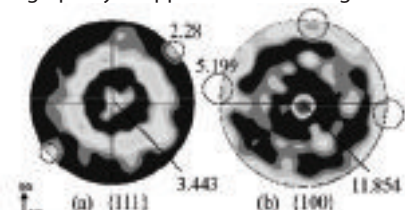


As can be seen in Figure 11(a), there is no intensified orientation in

▲ Figure 10: Metal structure of high-purity copper wire after drawing ( $R_t=99.99\%$ )

a particular direction. Orientation intensity in the ND should be intensified by drawing, but it resulted in a slightly larger value than 3, which is considerably below that of ETP copper wire drawing. Examining the dotted areas, it is possible to confirm that the orientation also disperses toward the TD (transverse direction) and RD (right angle direction). As can be seen in the  $\{100\}$  pole figure in Figure 11(b), peaks in not only the ND but also the TD and RD, which are in the dotted areas, are newly formed, similarly to those for an ETP copper wire formed during continuous drawing. Moreover, the peak intensity of the two orientations perpendicular to the ND is reversed.

Dynamic recrystallisation occurred in high-purity copper wire drawing even



▲ Figure 11:  $\{111\}$  and  $\{100\}$  pole figures of high-purity copper wire ( $R_t=99.99\%$ ) after low-speed drawing

under conditions where there was no occurrence of dynamic recrystallisation when an ETP copper wire was drawn at

a low speed.

Therefore, it was found that the higher the purity of a copper wire, the more likely dynamic recrystallisation occurs. To prevent the decrease in strength of drawn wires, it is necessary to ensure the following: optimum timing for the annealing process, selection of a suitable degree of drawing ( $R_t$ ), and temperature control during the storage of drawn wires.

## Conclusions

Experiments were conducted to determine the cause of the occurrence of dynamic recrystallisation during copper wire drawing and the decrease in strength during transportation or storage after drawing. The ease of occurrence of dynamic recrystallisation in drawing was compared between 6N high-purity copper wire and ETP copper wire. The results are as follows:

- 1) Along with the increase in  $R_t$  of a drawn ETP copper wire, the tensile strength of the wire increases. However, in the case of a wire for which  $R_t$  is 99.8% or more, dynamic recrystallisation occurs when the wire is drawn, resulting in an abrupt decrease in tensile strength.
- 2) The crystal orientation of a wire changes when dynamic recrystallisation of the ETP copper wire progresses owing to the excessive  $R_t$ , resulting in an orientation similar to the pole figures of  $\{111\}$  and  $\{100\}$  of annealed wire.
- 3) The Young's modulus of a drawn ETP copper wire decreases when an excessive  $R_t$  is applied to the wire. In particular, the Young's modulus around the wire surface becomes lower than that at the centre part of the wire. The  $R_t$  at which the decrease in Young's modulus starts agrees with the  $R_t$  at which dynamic recrystallisation occurs.
- 4) The more excessive the  $R_t$  of a drawn wire, the easier the occurrence of dynamic recrystallisation, even when the wire is processed by heat treatment at a low temperature of 100° Celsius.
- 5) 6N high-purity copper wires are more likely to undergo dynamic

recrystallisation than ETP copper wires.

It follows that the control of the copper wire drawing process including  $R_t$  is important to prevent the decrease in strength and the occurrence of dynamic recrystallisation of a drawn wire. Also, to prevent the decrease in tensile strength during storage or transportation, the ambient temperature must not exceed the recrystallisation temperature of a drawn wire, which is lowered by drawing.

## Acknowledgement

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- 1) Kazunari Yoshida, Yasutoshi Takemoto and Naoyuki Katsuoka: Wire J International, January, 2011, 57-61
- 2) Kazunari Yoshida, Yasutoshi Takemoto and Naoyuki Katsuoka: 50<sup>th</sup> domestic conference of copper and brass association, 2010, 45-46
- 3) H.J.Frost, M.F.Ashby: Deformation mechanism maps, Pergamon Press, 1982, 14-15
- 4) H.J.MacQueen: J of Metals, February, 1980, 17
- 5) Naotsugu Inakazu, Yasuyuki Kaneko, Yasutoshi Takemoto, Eisaku Suzuki and Masato Fukagaya: Journal of the JSTP, 34-388, 1993, 508-513
- 6) Naotsugu Inakazu: Metal Wire Drawing and Fiber Textures, Kindai Hensyu, 1985, 337-338
- 7) R N Wright: Wire J International, April, 1997, 70-73
- 8) Norihito Kuntani and Motoh Asakawa: Journal of the JSTP, 38-433, 1997, 147-152
- 9) Tsutomu Yamashita and Kazunari Yoshida: Journal of the JSTP, 47-548, 2006, 855-859
- 10) H.Sutou: Residual stress and distortion, Uchida Rokakuhou Publishing, 1994, 48-49
- 11) Kazunari Yoshida and Ryoto Koyama: Wire J. International, July, 2012, 56-60
- 12) Shiro Obara: Introduction of metallurgy, Asakura Publishing Co Ltd, 1974, 115
- 13) A T English and G Y Chin: Acta Metal, 13 1965, 1013
- 14) Home page of Mitsubishi Cable Industries, <http://www.mitsubishi-cable.co.jp/ja/index.html>
- 15) Kouzo Osamura: Study of metal structure, Asakura Publishing Co Ltd, 1997, 146



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