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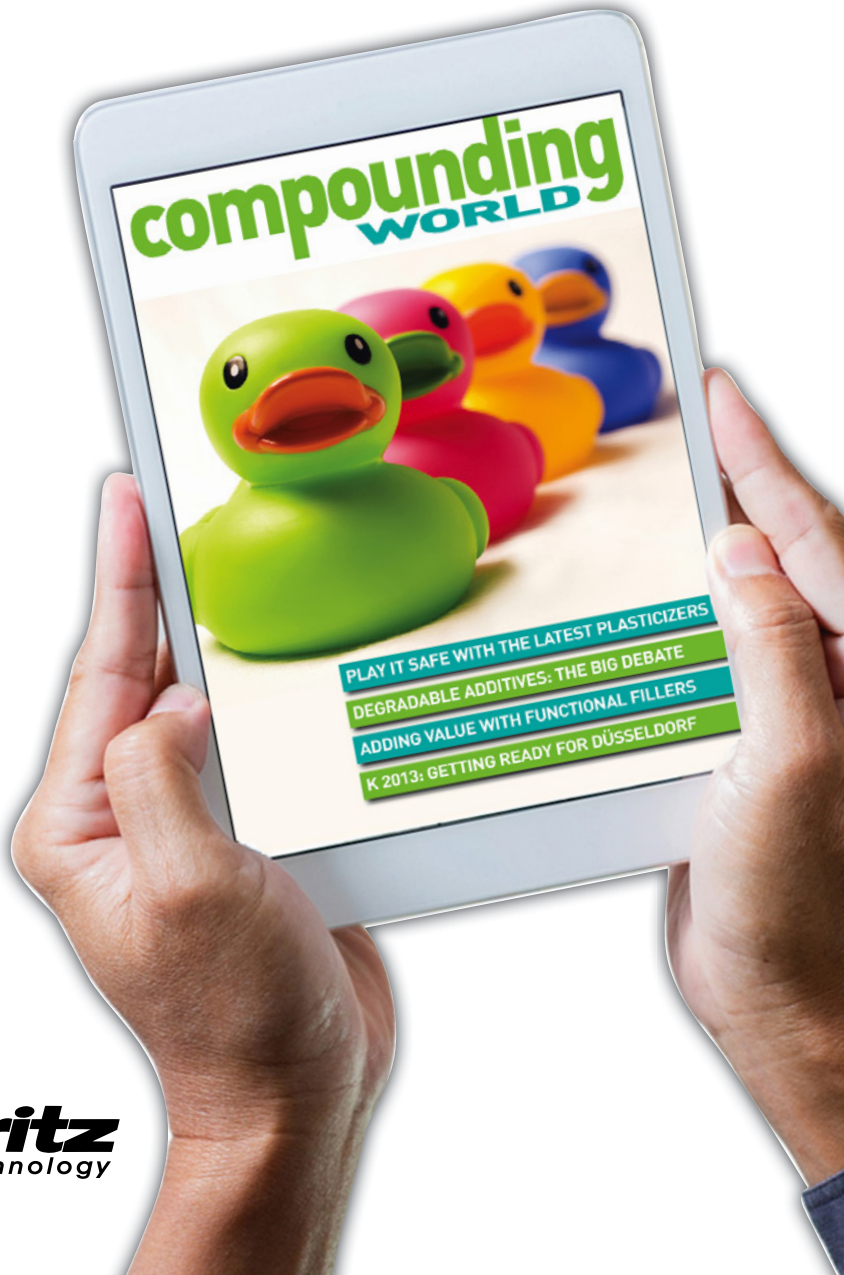

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Applied Market Information Ltd
AMI House, 6 Pritchard Street,
Bristol, BS2 8RH,
United Kingdom
Tel:+44 (0)117 924 9442
Fax:+44 (0)117 311 1534
www.amiplastics.com

Head of business publishing:	Andy Beevers	E-mail: abe@amiplastics.com
Editor:	Chris Smith	E-mail: cs@amiplastics.com
Contributing editor:	Jennifer Markarian	E-mail: editorial@compoundingworld.com
Sales & commercial manager:	Levent Tounjer	E-mail: lt@amiplastics.com Tel: +44 (0)117 924 9442
Advertisement manager:	Claire Bishop	E-mail: claire@amimagazines.com Direct tel: +44 (0)1732 605976

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Global tour update

One of the most enjoyable parts of publishing *Compounding World* magazine is running our live conferences around the world and connecting with readers from throughout the plastics compounding supply chain.

We have recently returned from our first Compounding World Asia conference in Singapore, which was a great success, attracting compounders from all over Asia-Pacific and beyond.

For the next stage of our global tour, we will be heading to **Philadelphia** on 8-9 December for the third Compounding World Forum. This year's US conference features an impressive line-up of speakers including influential leaders from major compounders, plus experts discussing a whole host of exciting materials developments. Examples include aliphatic polyketones, anticounterfeiting technologies, 3D printing resins, antimicrobials, carbon nanotubes, conductive compounds, impact modification, natural fibres, and additives for improving the properties of recyclates.

The event will also feature a packed exhibition area for networking. We have covered 48 of this year's exhibitors in our preview, which starts on page 67 of this issue. There is still time to reserve your place at the conference – booking details and the full speaker line-up can be found at **http://bit.ly/CWF15P**.

Next stop on our global circumnavigation will be **Cologne** in Germany for our second Compounding World Congress on 18-20 April 2016. The programme for this has just been published and you can find out which expert speakers will be covering which exciting subjects in the brand new brochure at **http://bit.ly/CWC16B**.

Our Cologne event was a sell-out last year with 230 attendees and 25 exhibitors. We've secured larger rooms this year, but still expect very strong demand for the available spaces.

Following a summer break, we will be heading back to **Singapore** for the second Compounding World Asia conference on 22-23 September 2016 (F1 fans may like to note that this is just four days after Singapore's spectacular night-time Grand Prix!). If you are interested in participating in the conference as a delegate, speaker, exhibitor or sponsor, then now is the time to get involved. Full details, including our early booking offer, can be found at **http://bit.ly/CWA16H**.

We hope that you will be able to join us at one of these worldwide stops over the next 10 months.

Andy Beevers
Head of Business Publishing, AMI

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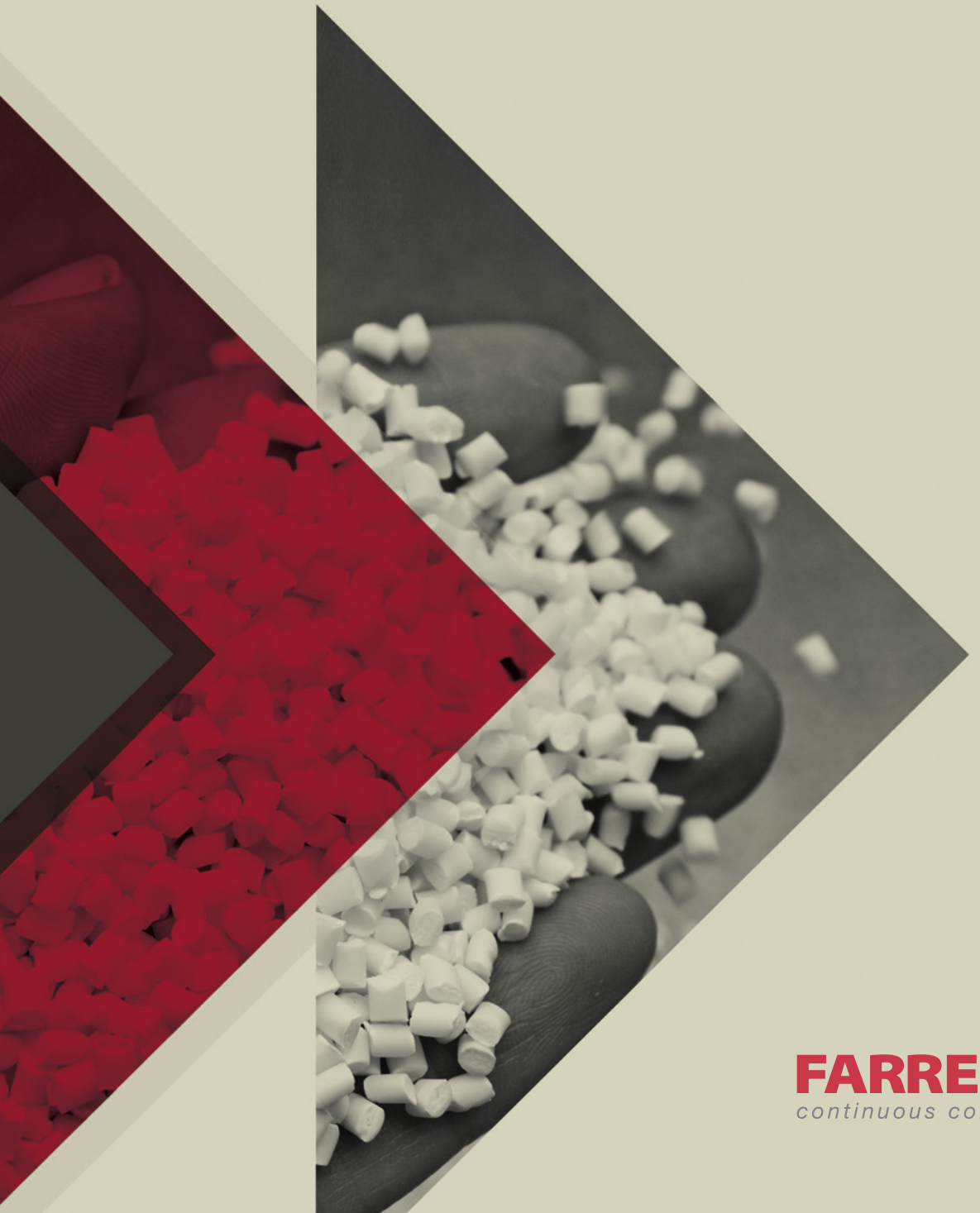

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Maag buys RE Scheer and Gala

Switzerland-based Maag, the gear pump, pelletizer and filtration systems manufacturer, has boosted its position in pelletizers with the acquisitions of Reduction Engineering Scheer and Gala Industries, both headquartered in the US.

Maag, part of the Fluids segment of diversified US manufacturer Dover Corporation, announced the acquisition of Gala Industries on 20 October and the purchase of Reduction Engineering on 5 November.

Gala Industries, which is located at Eagle Rock, Virginia, manufactures underwater pelletizing systems and centrifugal pellet dryers. Reduction Engineering is based at Kent in Ohio and manufactures strand pelletizers and ambient and cryogenic pulverizing systems.

Maag's global headquarters at Oberglatt in Switzerland

Maag said the acquisition of Gala would enhance its strong position in underwater pelletizers and centrifugal dryers while Reduction Engineering provided it with a new line of complementary products, including strand pelletizers for applications such as glass filled polymer.

The move also extends Maag's global footprint. The company has manufacturing facilities in Switzerland, Germany, Italy, the US and China and sales offices in France, Singapore, Taiwan, Malaysia, India and Brazil. Gala manufactures in the US and Germany and has a sales office in Thailand. Reduction Engineering has manufacturing in the US, Germany and China.

The newly acquired companies and other Maag-owned operations, including Automatik Pelletizing Systems, will continue to operate under their existing names. The combined business will be headed up by Maag President Ueli Thuerig.

"This is an exciting time for Maag and our customers," said Thuerig. "Maag will be able to offer our global customers a broad range of pelletizers and pulverizers as well as an expanded global sales and after sales support network," explains Ueli Thuerig.

Terms were not officially disclosed for either deal but Dover revealed in its Q3 results the combined acquisition of Gala and JK Group, an Italian supplier of inks and consumables for digital textile printing, will cost it about $520m.

www.gala-industries.com
www.maag.com
www.reductionengineering.com

WPC 2016 programme

AMI has published the full programme for its next Wood-Plastic Composite conference, which takes place in Vienna, Austria, on 7-9 March 2016.

Key participants include US market leader Trex, European WPC manufacturer Rehau, and Hardy Smith from India. The conference includes practical demonstrations at the nearby Battenfeld-Cincinnati plant.

For more information, visit the conference **website**.

Erema launches UpCentre polymer recycling service

Austrian recycling machinery maker Erema has launched a new recycling service – UpCentre – designed to allow customers to develop markets for recycled polymer based on the application of its Corema technology.

"With 'use instead of buy' as the motto, this service helps our customers to open up new markets for their recyclates. We give them the flexibility and speed they require in this phase," according to Erema's Corema product manager Robert Obermayr.

The Corema technology is a single-step recycling and compounding system designed to produce recycled pellet for direct replacement of virgin polymer.

The UpCentre service will be launched this month and is based on a Corema 1108T model. Erema said the UpCentre service will be able to compound quantities of between 2 and 200 tonnes a month for customers.

www.erema.at


Erema's Robert Obermayr says UpCentre aims to open up recycled polymer markets

EPIC buy for Solvay

Solvay is to buy the long-fibre thermoplastics (LFT) technology of EPIC Polymers, a hitherto privately-owned supplier of high strength, tribologically optimised and conductive thermoplastics based in Kaiserslautern, Germany.

Solvay said that the acquired technology and business will complement its offering of high performance lightweighting materials – which typically replace metal in under-the-hood components such as hot air ducts, powertrains, engine control units, oil and water modules – and extend its metal replacement potential to larger automotive semi-structural parts.

"Having this technology is an important step in the expansion of Solvay Specialty Polymers' broad offering of materials that are simultaneously light and ultra-performing," said Augusto Di Donfrancesco, president of Solvay's Specialty Polymers Global Business Unit.

High performance gear produced in a carbon fibre PA6,6 LFT from EPIC

EPIC director and co-founder Fred Panhuizen, who will remain with the business, said the company saw growth double last year and expected to see that growth repeat this year, driven by accelerating interest in lightweight technologies. "There is a lot of interest. Automotive is a large part but also in other industries," he said.

Panhuizen said EPIC has long used Solvay materials in its products and that the acquisition will provide it with back integration into important polymer streams. "We have had a very good relationship with them [Solvay] since our formation and they have always been more than just a supplier," he said.

Solvay plans to develop expertise to apply LFT technology to its own core polymers including KetaSpire PEEK and AvaSpire PAEK. It will also be applied to the Amodel brand of PPA, Ryton PPS and Technyl PA6,6 range.

www.solvay.com

www.epicpolymers.com

Carolina Color to expand

Carolina Color Corporation, a privately-owned US-based maker of colour concentrates, has announced plans to expand while staying within its long-standing location at Salisbury in North Carolina.

The company has acquired and will repurpose an old building behind the current plant, having recently removed an older, blighted home in the same area to make room for its new customer collaboration centre.

Carolina Color has capacity of about 11,300 tonnes/year across its sites at Salisbury and Delaware in Ohio.

www.carolinacolor.com

BASF starts up Korean compounding plant

BASF's Yesan facility will produce Ultramid and Ultradur compounds

BASF has started up its new 36,000 tonnes/year plant for production of Ultramid PA and Ultradur PBT compounds at Yesan in South Korea's Chung Nam province. The move doubles the company's compounding capacity for engineering plastics in Korea and brings its overall compounding capacity in Asia to 222,000 tonnes/year.

The new plant houses proprietary technologies similar to those used at other BASF compounding plants and will mainly serve the automotive, electrical and electronics industries in Korea and Japan.

BASF said it also intends to open a new engineering plastics product development laboratory at its site at Ansan in Gyeonggi province in Q2 2016. The company said the Korean engineering plastics market is expected to grow at 6%/year in the near future.

- BASF reported a 5% decline in sales to €17.4bn for the third quarter, which it attributed to weaker than expected market conditions. The Functional Materials division, which includes engineering plastics, saw sales remain stable at €4.5bn.

www.basf.com

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Cabot to cut 300 jobs worldwide

Boston, US-headquartered speciality chemicals and performance materials company Cabot Corporation has announced plans to restructure its operations in response to "challenging macroeconomic conditions."

Cabot Corporation posted a 21% decline in sales for its 2015 fiscal year, which ended 30 September, to $2.87bn. The company recorded a net loss of $331m, against a profit of $199m in 2014.

President and CEO Patrick Prevost said the company's business faced a number of challenges, including lower oil prices, slowing demand in Asia and South America and less favourable foreign currency exchange rates.

The restructuring plans will result in the loss of around 300 jobs and are expected to deliver cost savings of approximately $50m from fiscal 2015 to 2016, the company said in a statement.

www.cabotcorp.com

Euromap gets behind Brazilian show launch

Euromap, the umbrella organisation for the European plastics and rubber machinery industry, has announced its support for Plástico Brasil, a launch event for the plastics industry in Brazil.

Due to launch at the São Paulo Expo Exhibition & Convention Centre on 20-24 March 2017, Plástico Brasil will compete head-on with the incumbent Feiplastic show, which is due to take place at Anhembi, also in São Paulo, two months later on 22-27 May and is organised by Reed Exhibitions Alcantara Machado.

Euromap said that it gives the 'Supported by Euromap' endorsement to only a few exhibitions "in order to maintain high quality standards and avoid the indiscriminate proliferation of trade fair events". It will send experts to attend committee meetings and get involved in other bodies of Plástico Brasil, and will help with recruiting exhibitors and visitors and organise fringe events alongside ABIMAQ, the Brazilian Association for the Machinery & Equipment Industry.

Plástico Brasil will be hosted by ABIMAQ and organised by BTS Informa, Brazil's second largest trade show promoter.

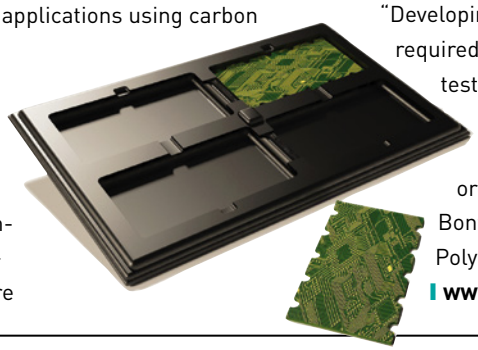
However, Feiplastic could be a hard incumbent to dislodge, given that it had 1,400 exhibitors, 70,000 visitors and a floor space of 85,000m^2 when it last took place in 2015. Both events claim a similar exhibitor profile, including basic products and raw materials, moulds and tools, converters, instrumentation and automation, technical projects and services and recycling, as well as machinery.

www.euromap.org
www.feiplastic.com.br
www.informagroup.com.br

Total adds ESD compounds

Total has announced worldwide availability of a new line of conductive compounds for electrostatic discharge (ESD) applications using carbon nanotubes (CNTs).

The new polyolefin and polystyrene-based compounds are formulated for extrusion, thermoforming, injection and rotational moulding and are available worldwide. They are aimed at applications such as electronic packaging.



"Developing such an innovative solution required several years of research, testing and product development, leading finally to the first successful commercial orders last quarter," said Xavier Bontemps, Senior VP of Total's Polymers Business Unit.

www.totalrefiningchemicals.com

New CEO for Albis Plastic

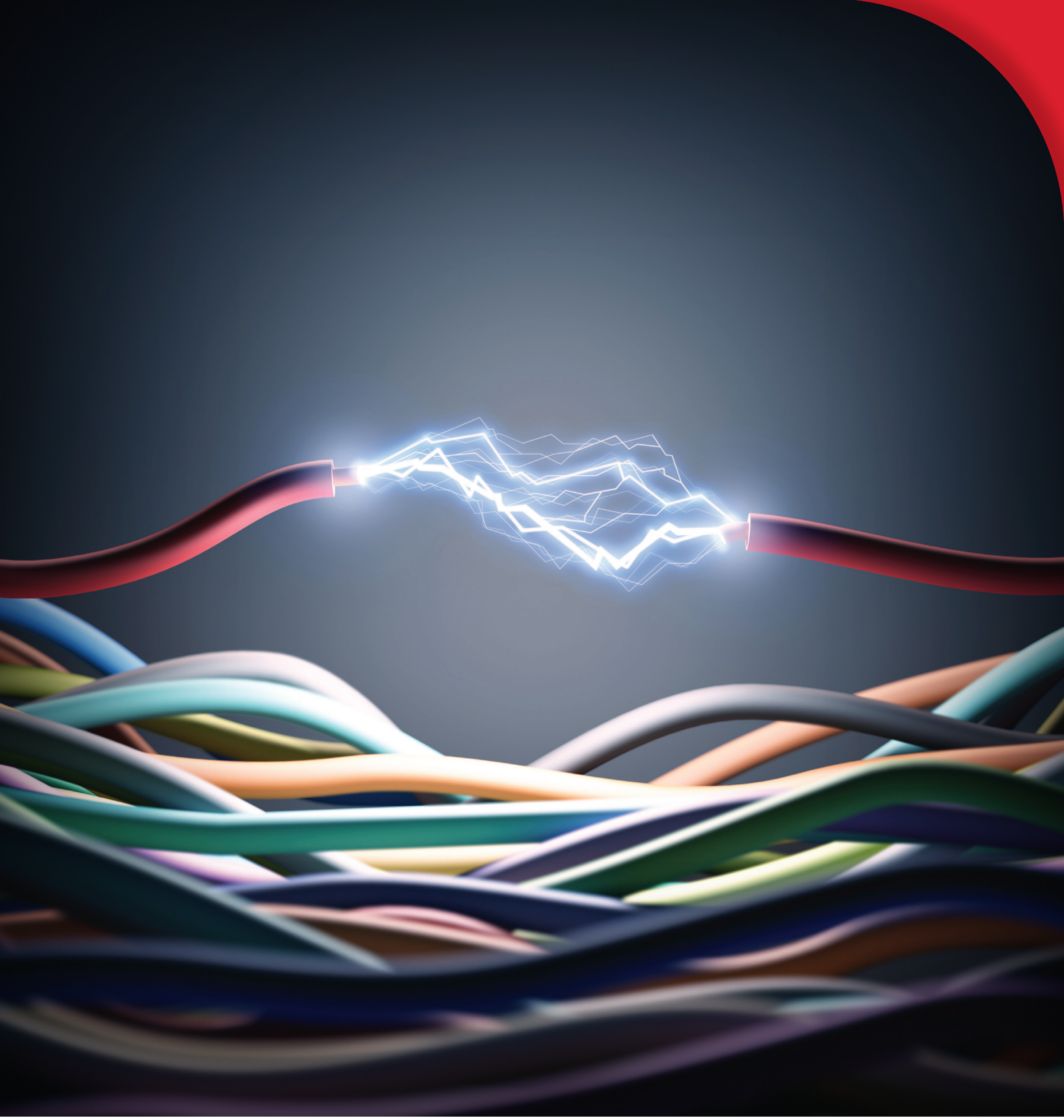
Hamburg, Germany-based Otto Krahn has announced that Philip Krahn will take on the role of CEO of its Albis Plastic subsidiary next year. He will also join Otto Krahn's executive board.

Krahn is a shareholder of the family-owned Otto Krahn company. He joined the group in 2010 and is currently managing director of Albis Plastic (Far East) with responsibility for its activities in Hong Kong and China.

Albis Plastic generated sales of €876m in 2014. The company is active in distribution and technical compounding and claims a nominal capacity of 140,000 tonnes/year.

www.albis.com

Philip Krahn takes on the Albis Plastic CEO role next year



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A. Schulman to close facilities

A. Schulman announced some reallocations of production in its Engineered Plastics business within its Q4 and full year results presentation, prompted by the acquisition of Citadal Plastics earlier this year.

Under the programme, the company will close three facilities in Evansville and consolidate production into other facilities there "to improve our capacity utilisation". It will also relocate production of its Engineered Plastics products from its Akron, Ohio, plant to one Evansville facility and invest at its Akron plant in order to boost the masterbatch product family. The company said the move will lead to about 26 job cuts.

Schulman expects the consolidation of the Engineered Plastic business to deliver annual savings of about $9.5m in 2016 and 2017. This will cost it $2-3m in pre-tax employee-related cash and other charges, as well as approximately $5 to $6m of pre-tax machinery and equipment accelerated depreciation, all of which should be taken by December.

"The consolidation of our Engineered Plastics business illustrates our continuing commitment to right-sizing our capacity and affirms our commitment to capturing our stated synergy savings of $25 million by the end of 2016," said President and CEO Bernard Rzepka.

A Schulman President and CEO Bernard Rzepka

Full year data from the company showed that net sales fell from $2.5bn to $2.4bn in 2015, with negative foreign currency translations and contributions almost exactly cancelling each other out. Operating income fell by $11.9m to $70.4m, again largely explained by currency moves. Otherwise, Rzepka said, Schulman had a third consecutive year of growth in sales, gross margin and EBITDA.

"Through our transformational acquisition of Citadel, we made significant strides toward our strategic vision of becoming the premier plastics solutions provider. At the same time, we continued to deliver strong operational and financial results," he said.

www.aschulman.com

GCR Group ups capacity

Spain's GCR Group is to install new compounding capacity at its La Bisbal del Penedès site in Tarragona that will raise capacity for production of its Granic line of mineral masterbatches to around 300,000 tonnes.

In a statement GCR said it has also developed new additions to its Ciclic range of recycled talc-filled compounds, which are produced in a separate plant at La Bisbal del Penedès.

The company said it expects production of these new post-industrial recycled PP automotive grades to amount to around 25,000 tonnes by 2017.

www.gcrgroup.es

Techmer ES to build new plant

Techmer ES, a producer of custom engineered thermoplastic compounds within Techmer PM, has revealed that construction is under way of a new facility at New Castle, Delaware, US.

Transition from the existing facility in Aston, Pennsylvania, is expected to begin in January 2016, with full operations starting in Q2. The new location, 32 km away from Aston, was chosen in part to allow the company to retain the existing workforce. It will employ 60 employees at startup, with the intention of increasing this to 100 within five years.

The company said the new plant has 50% more capacity to support its business growth and will help it to accelerate the introduction of its offer in high-growth areas such as 3D printing. Techmer ES will also invest in closed-loop utilities and recycling initiatives.

www.techmeres.com

Ensinger relocates its Austrian HQ

Ensinger has relocated its Austrian HQ from Lenzing to a purpose-built facility at Seewalchen am Attersee providing 1,400m² of office and 3,000m² of production space.

The company said the new location will house sales and distribution functions for its Compounds and Stock Shapes divisions as well as manufacturing for its Sintimid divison's Tecasint polyimide plate and tubes.

www.ensinger-online.com

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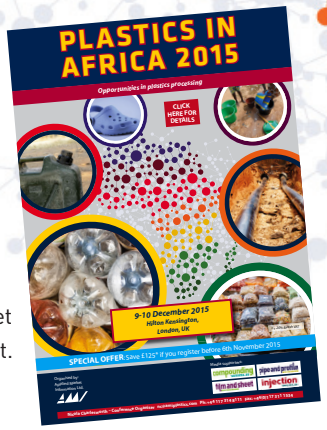
www.jm.com

Africa: opportunities in plastics

The African plastic market is one of the least developed in the world. Its polymer consumption per capita is below 7kg – just a quarter of the world average of 28kg.

It is also one of the most exciting markets for polymers in the world today with demand growing at double-digit rates in many countries.

To help companies tap into the opportunities that this fast-growing market offers AMI is holding its first international *Plastics in Africa* conference in London on 9-10 December 2015, at the Hilton Kensington Hotel.



Africa is a vast continent and is a very complex market for anyone looking to enter it. There are 53 countries with some 2,000 languages and dialects spoken. The needs of North Africa are markedly different to those of Sub-Saharan Africa – while the market conditions of the well-developed South African market are different again.

It is also a region with a growing, youthful population already highly concentrated in urban areas. Economic growth is not only fuelled by its natural resources and minerals but also by its rising consumer markets giving rise to a growing demand for a wide range of products requiring plastics, from mobile phones to packaging. While much of this is still currently imported there is now massive investment going on in plastics processing operations, much of it led by Asian investors.

At AMI's conference, delegates will be able to find out about the trends for polyolefins, PE, PP and PET in North Africa (from companies SIDPEC and CTC Maroc), the plastics industry in South Africa (Plastics SA), a case study of Nigeria (Hussaini Adamu Federal Polytechnic), the East African packaging processing and converting industry, as well as a private sector perspective on the plastics industry in East Africa (from Rwanda Resource Efficient and Cleaner Production Centre).

Other papers will look at the needs of African consumers, their profile and their packaging needs (in presentations from Tudor Rose International, MGA Southern Africa, Tetra Pak and Ube Engineering Plastics).

Machinery suppliers Nordson EDI, Reifenhauser and Starlinger are also represented.

It is clear that plastics will be called on to play a vital role in this rapidly developing region. AMI will present an update of its report on polymer demand in Africa (published in 2014) with forecasts for the next five years, identifying where the real growth opportunities will be.

● AMI's *Plastics in Africa 2015* conference will take place in London, UK on 9-10 December. Download the event brochure including the full speaker line-up and booking details at: **http://bit.ly/PinA15**

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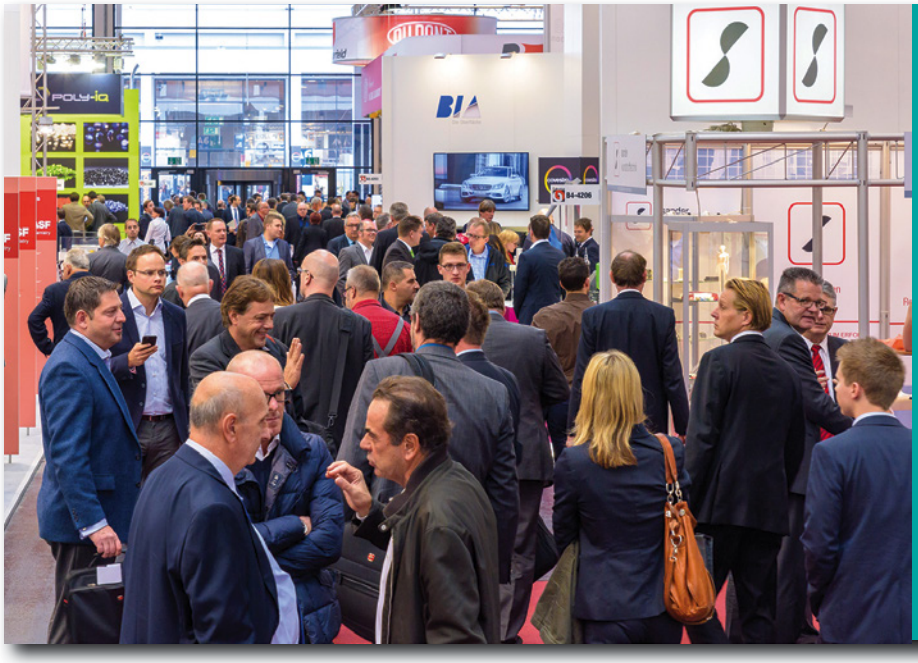


There was plenty for compounding visitors to see at Fakuma 2015, despite the German show's roots in injection moulding. **Peter Mapleston** reports

Fakuma 2015 plays host to compound innovations

Most visitors go to the Fakuma plastics exhibition in Friedrichshafen, Germany, to catch up on the latest developments in injection moulding technology. However, organiser P E Schall has in recent years drawn in exhibitors and visitors from other fields of plastics processing and there are now a good sprinkling of extrusion developments to take in, too. Compounding technology features high on that list.

Feddem was talking about its latest and largest twin-screw extruder at the show. The FED 82 MTS is capable of outputs of between two and four tonnes/h, although the machine's large size (screws are 82 mm in diameter) prevented it from being on the company's stand. Instead, a much smaller FED 26 MTS was on display.

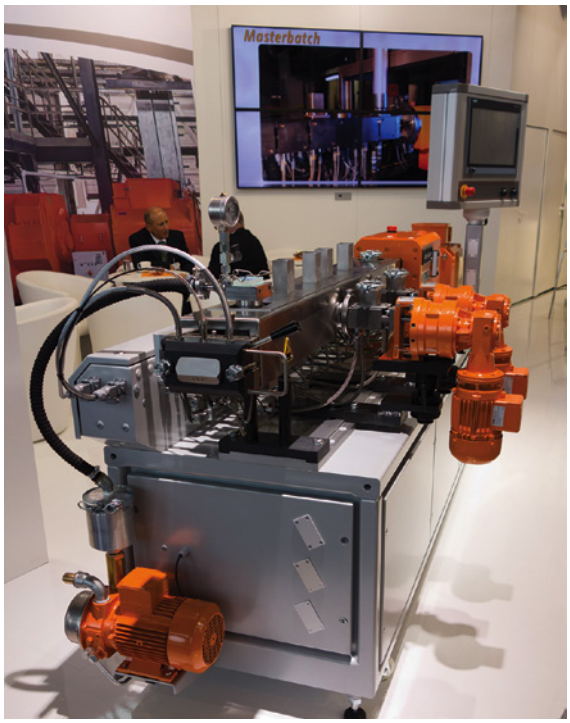
MTS units have an ID:OD ratio of 1.55 and are intended principally for compounding engineering thermoplastics. Managing director Dieter Gross said the company is working on further developments, including customized models and MTV units with higher ID:OD ratios (around 1.8) for processing highly filled materials. An MTV model with a 117-mm diameter is currently in production.

Feddem parent **Feddersen Group**, which also includes engineering plastics compounder Akro-Plastic and masterbatch producer AF-Color, has coined the expression ICX, for Innovative Compounding and eXtrusion technology. "This relates to how the group companies cooperate in the development of equipment and how we use it, so that we can offer products—materials and equipment—with the same high quality on a worldwide basis," said Gross.

Akro-Plastic has operations in Brazil and China, as well as in Germany. Managing Director Dirk Steinbrück, who also holds the same post at its two subsidiaries AF-Color and Bio-Fed (which make colour and additive masterbatch and supply biodegradable masterbatches and compounds respectively), pointed out that all group companies use Feddem compounding extruders in all their operations. Akro-Plastic was in fact the first compounder to take delivery of an FED 82 MTS.

KraussMaffei Berstorff highlighted its ZE BluePower range of compounding extruders. These were launched in prototype form at K 2013, and the company has been rolling them out commercially during this year. There are four models, with screw diameters of 42, 52, 65 and 80 mm. BluePower units have higher specific volumes than the models they replace, with an ID:OD ratio of 1.65. Maximum torque is 16 NM/cm^3. One of the most important features of the new units is the gearbox, said Schmitt, which has an efficiency of 98%, compared with 96.5% on the previous generation. The cooling system

Main image: More than 45,000 people attended last month's Fakuma trade fair in Germany



Right: Leistritz demonstrated its ZSE 27i MAXX extruder for lab and small batch applications

has also been improved, thanks to a system of spiral-shaped channels that create a lower pressure drop.

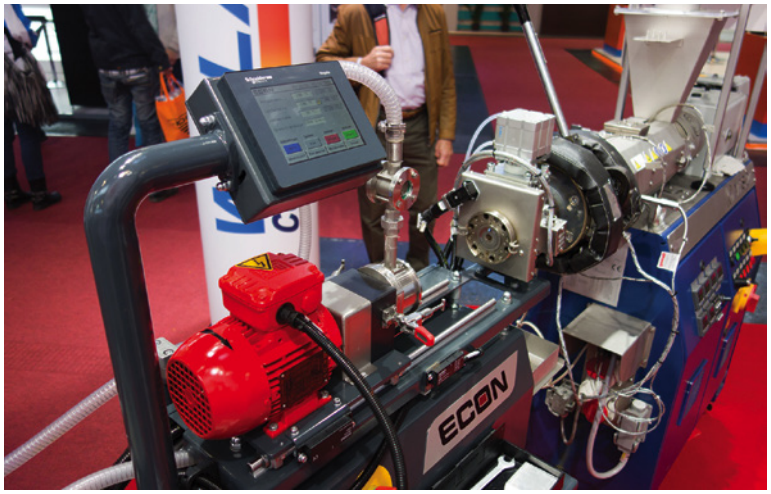
To achieve optimum wear protection, the BluePower units incorporate new wear liners that complement induction-hardened or coated barrel sections. Elliptical shoulder liners are said to provide high heat transfer and "perfect" tightness of the processing chamber, thanks to what the company describes as unparalleled fitting accuracy and axial fastening. The extruders also feature a new generation of enlarged side feeders.

At **Leistritz**, export sales manager Walter Theiler said business continues to be good for the company's twin-screw extruders. To underline his point, he said one major masterbatch customer that he expected to buy one machine at the show actually walked away having placed an order for three. On the stand, the company demonstrated a ZSE 27i MAXX, which Theiler said is suitable for laboratory work and also for production in companies producing small batches—something that is increasingly the case, he noted. It is suitable for outputs between 15 and 100 kg/h.

New from **Entex** was the ZSP 70 central spindle unit for its planetary roller extruders. This incorporates a new fitting for connecting the unit to the gearbox, providing extra working length. As a result, it is said to provide more than 30% extra torque compared with the standard spindle.

On the **Gneuss** stand, technical sales manager Andrew Prangnell said the company has been working with the SKZ plastics institute in Germany on addressing problems associated with incorporating nano particles of additives such as titanium dioxide effectively into plastics compounds. The two organisations' joint approach involves producing an aqueous slurry of nanoparticles, which is then combined with the plastic melt (PET is used in the tests, but the technology is applicable to other polymers such as polycarbonate and polypropylene) in a standard twin-screw extruder. The water is removed by passing the material through Gneuss's MRS multi-screw compounding system, connected to the twin-screw extruder in a cascade arrangement. "The twin-screw extruder provides intensive kneading, and the MRS appears to further improve dispersion, but its main role is in degassing, for which it is ideally suited," said Prangnell.

Below: An Econ EUP 10 underwater pelletizer next to a small compounding extruder from fellow Austrian equipment supplier MAS



Pelletizers

ECON was displaying a system capable of air and underwater pelletizing for the first time. The EWA – ECON Water & Air pelletizer can be switched between one mode and the other in around 15 minutes. The unit is designed especially for laboratory applications, where flexibility is particularly important, but the company is also working on larger versions for handling up to 1 tonne/h throughputs and possibly beyond.

ECON's lab-scale EUP 10 underwater pelletizing unit was also on show, fitted with a new Schneider control. Magdalena Deisl from the company's sales administration and marketing department said the head is more adaptable to extruders than before and drying has also been improved, thanks to the inclusion of an improved process water pump. A heat exchanger and fan can also be installed as options. ECON's pyrolysis unit for cleaning tools has also undergone a facelift, with an improved user interface.

Reduction Engineering continues to make improvements to its Scheer pelletizing systems. Its SGS E cantilevered model, which is well-suited for lines producing masterbatch, has been optimised for faster

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Above: Reduction Engineering's SGS E pelletizer gains remote control

and easier cleaning and the controller can now be mounted in various positions on the unit. No longer integrated into the cabinet, the controller is now a separate unit attached by a cable. This allows the operator to walk around the machine with it, attaching as required to one of several magnetic panels. This is said to be particularly useful for operations where the pelletizer may be switched from one line to another, or where adequate space is not available on the same side of the line.

The wider SGS L-10 range, meanwhile, which is intended for compounding lines, gets a redesign that makes it easier to clean. The front part of the cutting chamber, including the inlet chute and feed rolls, can now be pulled forward on linear guides to allow fast access. The SGS L-10 comes in in four sizes with working widths from 100 to 400 mm and throughputs up to 4 tonnes/h.

Fakuma came too early for **Maag** to discuss its biggest news, the acquisition of underwater pelletizing equipment specialist Gala (see page 7). Instead the company turned the spotlight on a sixth-generation Extrex melt pump and Optimized Temperature Pelletizing (OTP), as well as a new design for one of its piston-type melt filters (described in the September edition of *Compounding World*).

Maag said OTP opens the way to handle technical thermoplastics with high melt temperatures, notably polycarbonate, in its own underwater pelletizing system - Sphero. Alaaddin Aydin, director of the Maag Automatik extrusion business unit, said that it has been very difficult to pelletize such materials under water without producing voids in the pellets until now due to the high temperature difference between the water and the polymer. This freezes the pellet skin, preventing it from shrinking as it cools. As a consequence, producers have had to use strand pelletizing, losing out on advantages of underwater pelletizing such as a more spherical pellet shape, higher bulk density and fewer fines.

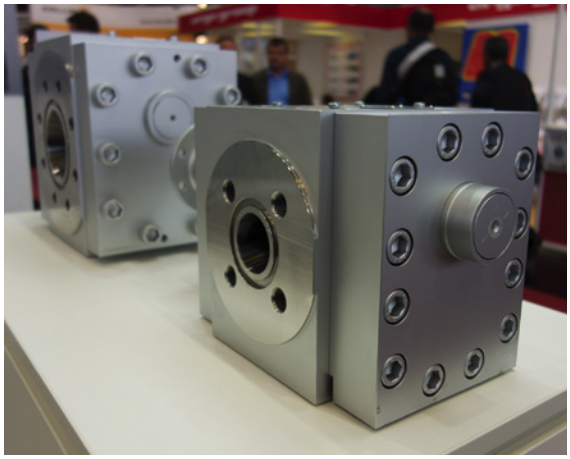
OTP overcomes this drawback by using a cutting chamber that is maintained under pressure, enabling the water temperature to rise to well over 100°C. In the transfer unit, the pellets are separated from the overheated water and handed over to the second cooling circuit, operating at less than 95°C. Aydin said first sales of OTP systems are expected very soon.

Aydin also drew attention to the massive reduction in size between the new sixth-generation Extrex melt pump and its predecessor. This has been made possible through the use of new gear and bearing geometries (and other undisclosed features made possible with new machining technologies and construction materials) that cut internal leakages to half those of the old one. The result is that the same throughput can be achieved with a much smaller bore. He said the new model can run at speeds around twice those of the previous generation while keeping the bearings at more or less the same temperature.

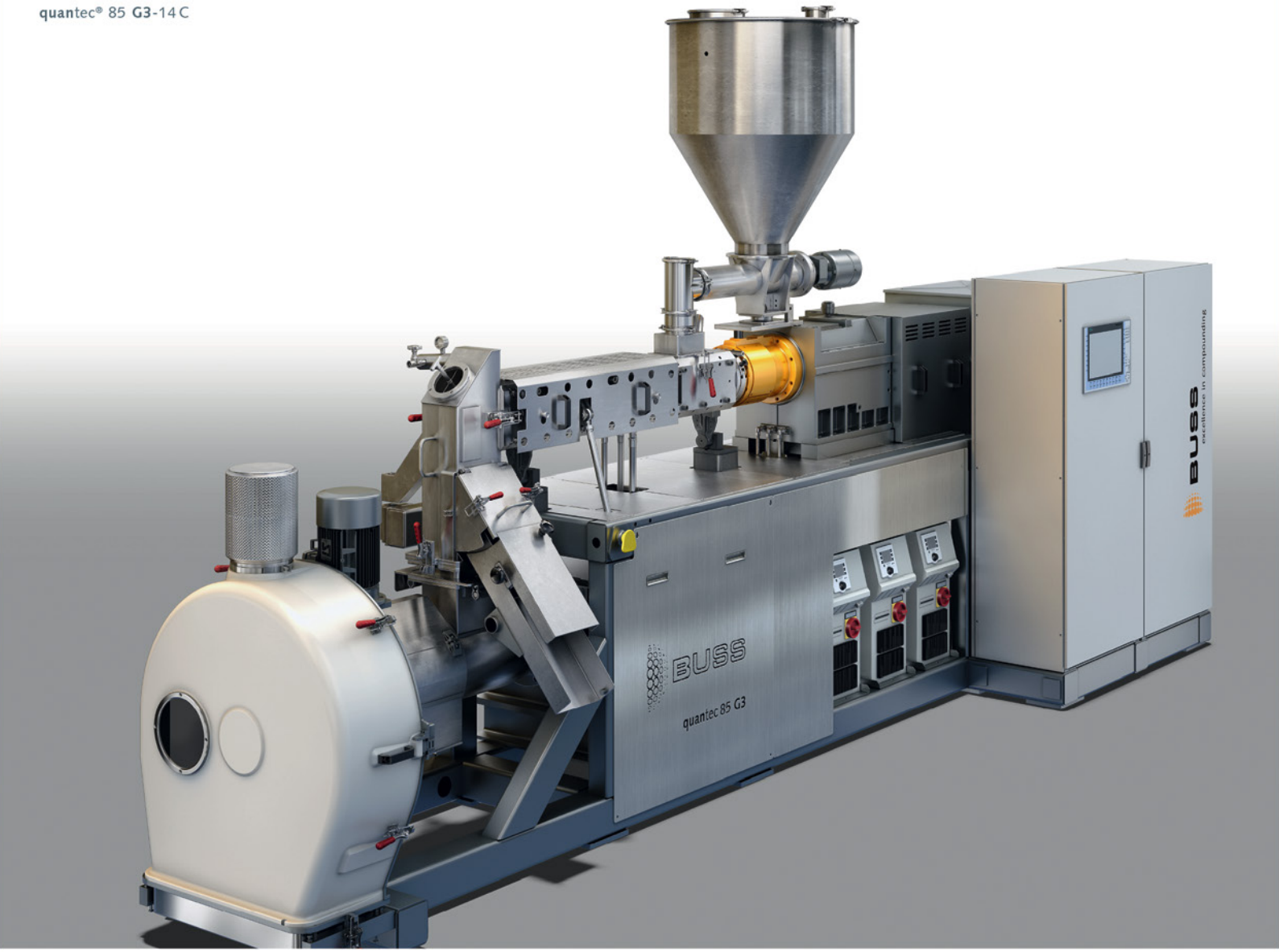
The new pump can also handle melt viscosities ranging over five orders of magnitude—much broader than previously. "We can now offer melt pumps for applications where in the past they would not normally be used," he said. "If volumetric efficiency is below 70%, melt pumps don't make sense, but with this new generation the figure is 85%."

Another company highlighting screen changers, gear pumps and underwater pelletizers was **Nordson Corp**, which includes BKG and Kreyenborg. Nordson BKG puts its pelletizers into three groups (Master-Line, Combi-Line, and Opti-Line) with increasingly more elaborate or sophisticated features, greater throughput, and higher cost. It said recent innovations have enhanced the performance of all three systems.

A new water filtration system for Opti-Line pelletizers uses more than 90% less energy than standard systems and cuts overall pelletizer power usage by 10 to 17%, for example. For Master-Line pelletizers, a new



Right: Maag showed its sixth generation Extrex melt pump (foreground) against its larger predecessor



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optional belt filter for the water system provides some of the finer-filtration and self-cleaning features available with the Opti-Line. For PET and PLA resins, Nordson has also developed the CrystallCut system, which pelletizes and crystallizes in one step.

Feeding and conveying

A highlight on the stand at **Coperion**, which now owns K-Tron, was the T35/S60 quick change feeder, shown together with a 2400 Series powder/pellet receiver and the ActiFlow "Smart Bulk Solids Activator." Coperion said the quick change feeders have been specially designed for applications requiring the high levels of flexibility in material handling and changeover. "Single screw feeders handle free flowing powders, granules, pellets and other free flowing materials, twin screw feeders are ideal for floodable powders and more difficult, sticky or hard-to-flow materials," a company spokesperson said.

The 2400 Series Receivers provide a high capacity sequencing system designed to handle powder, pellet, regrind and granular materials. ActiFlow consists of a vibratory drive and intelligent control unit, and is designed to work with Coperion K-Tron's line of gravimetric loss-in-weight feeders, continuously activating the material inside the hopper without exerting any mechanical force on it.

Left: Coperion showed the K-Tron T35 quick change feeder

Coperion was also highlighting a new automatic strand conveyance (ASC) system for compounding systems pelletizing at very high throughput rates. Recently introduced by Coperion Pelletizing Technology, the ASC system was too big to feature on the stand at the show. It is available in two sizes - the ASC 500 for throughput rates of up to 3.5 tonnes/h and the ASC 700 for up to 5 tonnes/h. Both are designed to work in conjunction with Coperion's two large strand pelletizers, the SP 500 HD (working width 500 mm) and the SP 700 HD (700 mm).

The ACS automatically guides the extruded strands via a cooling water chute and downstream conveyor belt into the feed mechanism of the pelletizer. An automatic start-up system facilitates production management, while any possible machine malfunctions caused by broken strands are avoided by the system's ability to rethread strands.

The system is modular, which Coperion said permits flexible and rapid adaptation to the requirements of the process. If, for example, strands require particularly intensive cooling, they can be spray-cooled with cold water on the downstream perforated conveyor after being cooled in the water chute. It may be used for a broad range of materials. Combination with a Coperion extruder permits direct integration of the strand conveyance control into the control system of the extruder, the company said.

Left: NGR demonstrated its A:Gran PET recycling system

For recycling operations

Next Generation Recyclingmaschinen (NGR) reported that is has designed equipment especially for reprocessing PET production waste from injection moulding operations, based on its P:React 300 system. The company said it produces high quality regranulate, even at lower output rates.

NGR said that because injection moulding of PET causes the material's intrinsic viscosity (IV) to fall, simple regrinding and reintroduction of the material back into the process would result in parts with lower mechanical properties. The P:React series uses liquid state polycondensation (LSP) to boost properties while producing PET suitable for food-contact applications in accordance with FDA regulations. It is intended for use with operations with high output rates such as bottle preform production.

At the show, NGR gave a demonstration of its A:Gran shredder/feeder/extruder combination, to show how PET melt preparation for P:React can easily be accomplished.

Erema was discussing its Intarema RegrindPro plant for handling thick-walled materials. "Reprocessing regrind without any problems and ensuring the functional properties of the end products requires a specific recycling process – one which conventional systems on the market have so far not been able to accomplish with due thoroughness," the company claimed. It said its new plant has been designed specifically for thick-walled material and, thanks to an extremely gentle process and highly efficient filtration, can make application-optimised recycled pellets.

Regrind material is heated prior to extrusion, which Erema said increases both flexibility in material selection and filtration efficiency. A preconditioning unit uses a slow-turning rotor disc that efficiently dries and degasses thick and moist particles. "Long residence times in the preconditioning unit are important so the regrind is not only dried but also so it has enough time to be warmed thoroughly and homogeneously," said Clemens Kitzberger, business development manager for post-consumer recycling. An additional benefit of the longer residence time is that powder additives such as $CaCO_3$ can be admixed in amounts of up to 20% and be distributed well.

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Fakuma visitor numbers level

Last month's Fakuma fair is over and the statistics are in. The 2015 event attracted an audience of 45,721, around the same level of attendance as the 2014 event (45,689). However, the organiser, P E Schall, claimed the event was more international than ever with visitors drawn from 120 countries.

According to Schall, the turnout reinforces hopes that the good business conditions that have been evident through 2014 and 2015 will continue on through 2016. "Decisive in this respect is fact that the Western European markets are demonstrating stronger than expected development, in particular in Spain, Portugal and Italy, as is also the case in the USA," the company said in its post-show analysis.

The next Fakuma show will take place from 17-21 October 2017 as the focus of the plastics industry turns to the K show in Dusseldorf, Germany, next year.

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New European regulations are demanding carbon black manufacturers meet even higher levels of product purity, while development of conductive and "green" sourced product continues apace. **Peter Mapleston** reports

Carbon blacks get fit for the future

Producers of carbon blacks for use in plastics compounds are hard at work on process as well as product developments. Tougher health and safety legislation in Europe has led to improvements in product purity at traditional suppliers, while new entrants to the market are making progress—possibly a little slower than originally anticipated but still in the right direction—on processes for creating "green" pyrolysis processes that give tyres and other hard-to-recycle products a second life. At the same time, there is much to report back from the conductive front.

Regulatory moves

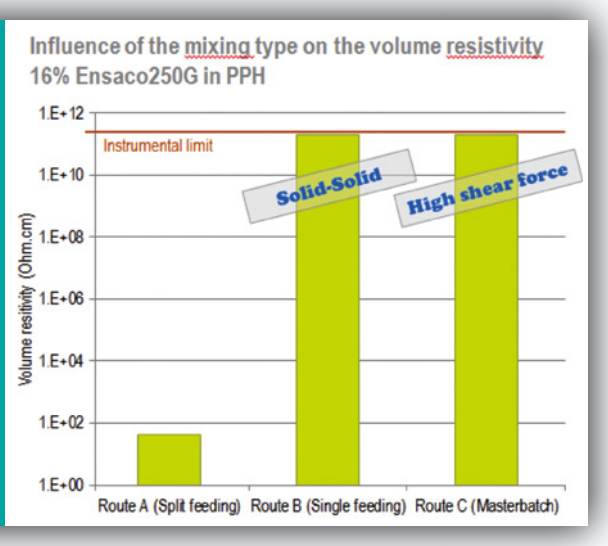
A number of carbon black manufacturers are drawing attention to their moves to fall in line with new European Union regulations covering various polycyclic aromatic hydrocarbons (PAHs) classified as carcinogens. Two years ago, the EU Commission issued regulation 1272/2013, which, as noted by carbon black supplier **Cabot**, "limits the content of eight PAHs in the accessible plastic or rubber parts of certain articles placed on the EU market from 27 December 2015 onward" (see box story on page 28 for more details).

The Commission says these PAHs "can be found in the plastic and rubber parts of a wide range of consumer articles. They are present as impurities in some of the raw materials used in the production of such articles, in particular in extender oils and in carbon black. They are not added intentionally to the articles and do not perform any specific function as constituents of the plastic or rubber parts.

"In addition, quality certifications such as the Geprüfte Sicherheit (GS) safety mark in Germany require a limited PAH content in certain consumer-based plastic products.

"In order to meet these requirements at the end of the year, global companies need to act now if they want to maintain compliance," says Vanessa Craigie, corporate communications manager at major carbon black producer Cabot Corp. "They must have a comprehensive plan in place to tackle this head on – and more specifically they need to take a hard look at the materials that go into their products."

Cabot says it has initiated a rigorous testing program to ensure the products certified meet these stringent PAH limits; several other suppliers have adopted similar policies. Craigie says 17 Cabot specialty carbon blacks for plastics applications are certified to comply



Conductive compounds produced on a twin screw extruder using split feeding will display higher conductivities than single feeding, where solid-solid contact reduces the carbon black structure, says Imerys

with the new EU regulation.

George Haines, global segment manager at Cabot, says: "We believe that we now offer the broadest range of specialty carbon blacks that are certified to facilitate compliance with the new REACH requirements. We have been a leader in providing high purity carbon blacks, including those used in applications that need to comply with EU food contact legislation requirements.

"Further, we are now taking steps to certify carbon blacks that enable customers to meet the updated GS Mark requirements. This work around PAHs builds on Cabot's leadership with high purity furnace blacks used in applications that need to meet the strict requirements laid out by the US FDA (21 CFR 178.3297)."

Omsk Carbon Group is another supplier highlighting its research on solutions to reduce PAH content in its carbon blacks. "PAHs are difficult to remove from the surface. Nevertheless, under vigorous conditions PAHs can be extracted and identified using instrumental procedures. The use of post-reactor technologies is one of the methods to reduce PAH content in carbon black," says Andrey Petin, director at the company's R&D Center for Carbon Materials.

"For our preliminary research, we used a pilot reactor, which enabled us to conduct tests on smaller scales. As a result of industrial testing, we managed to reduce the total content of restricted PAHs to less than 20 ppm, and reduce the benzo[a]pyrene content to less than 0.25 ppm. Such PAH level is considered carcinogenically safe and makes it possible to use carbon black to produce critical items with regard to safety," he says.

Petin says this work helped the company launch a new range of grades with reduced PAH content. These include Omcarb CH85, N220FA and S500FA.

He also cites work that Omsk Carbon Group has carried out in partnership with major (unidentified) masterbatch manufacturers to develop new grades of carbon black for plastic pipes which come into contact with drinking water. The program is aimed at improving resistance to UV exposure and ensuring organoleptic properties stability and product chemical purity, "which enables the use of carbon black in articles that come into contact with foodstuffs and human skin."

Conductivity issues

At **Imerys Graphite & Carbon**, global polymer technical leader Christine Van Bellingen says the company's Ensaco conductive carbon blacks "match the severest purity requirements, including for low PAH/BAP."

Imerys has been carrying out work to better understand and improve the effectiveness of carbon black as an electrically conductive additive in plastics

New PAH restrictions in force in Europe

EU Regulation 1272/2013 provides several amendments to Regulation 1907/2006 governing polycyclic aromatic hydrocarbons, PAHs in certain polymeric products. They come into force on 27 December 2015. Among the amendments are these two paragraphs:

Articles shall not be placed on the market for supply to the general public, if any of their rubber or plastic components that come into direct as well as prolonged or short-term repetitive contact with the human skin or the oral cavity, under normal or reasonably foreseeable conditions of use, contain more than 1 mg/kg (1 ppm) of any of the [8] listed PAHs. Such articles include amongst others: sport equipment such as bicycles, golf clubs, racquets; household utensils, trolleys, walking frames; tools for domestic use; clothing, footwear, gloves and sportswear; watch-straps, wrist-bands, masks, head-bands.

Toys, including activity toys, and childcare articles, shall not be placed on the market, if any of their rubber or plastic components that come into direct as well as prolonged or short-term repetitive contact with the human skin or the oral cavity, under normal or reasonably foreseeable conditions of use, contain more than 0.5 mg/kg (0.5 ppm) of any of the listed [8] PAHs.

The full regulation can be viewed as a pdf here.

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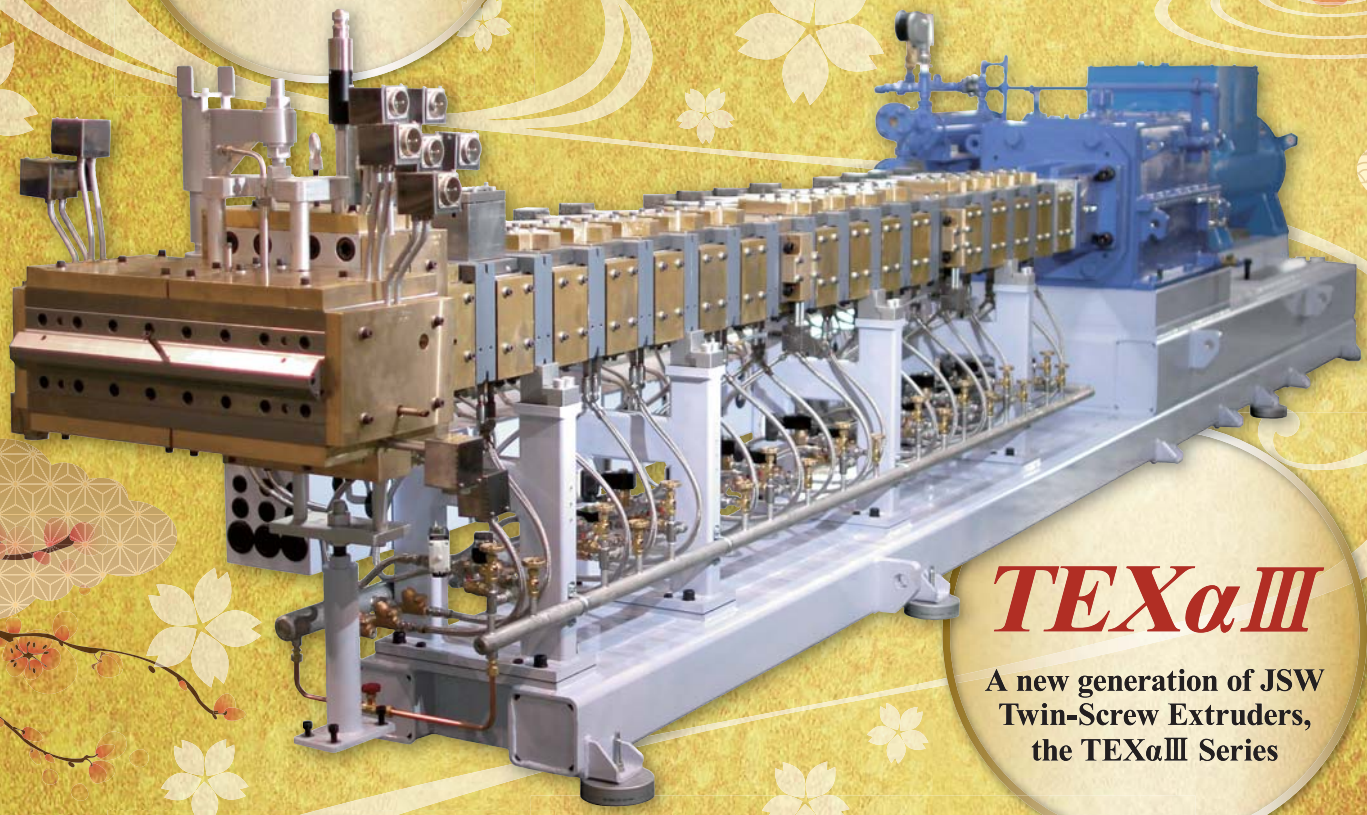

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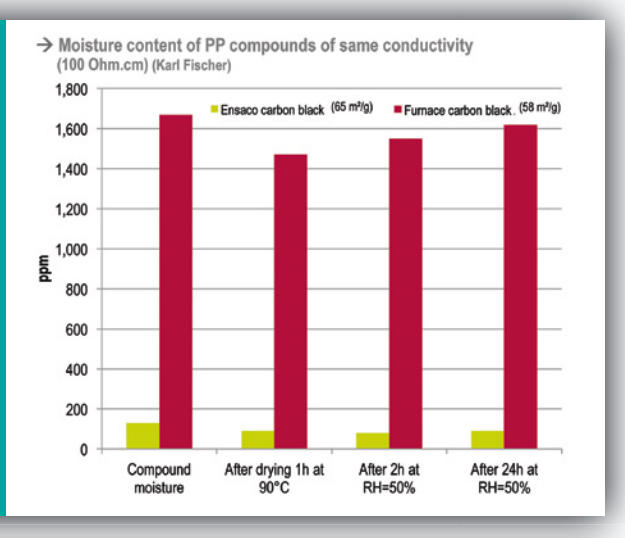
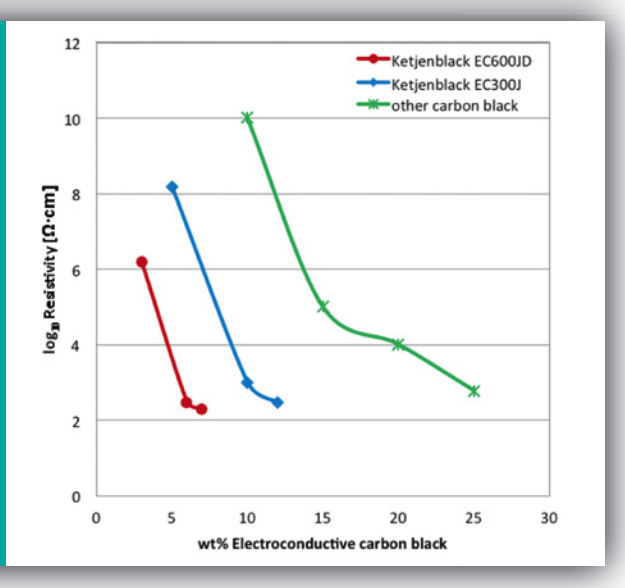


Moisture effect on conductivity for Imerys Ensaco carbon black and equivalent surface area furnace black

Source: Imerys



Comparison of the resistivity of EVA-based compounds charged with AkzoNobel's Ketjenblacks with a competitive electro-conductive carbon black

compounds. "When conductive compounds are made using a twin screw extruder, the split feeding technique [carbon black added downstream to the molten polymer] will lead to higher conductivities than the upfront single feeding technique where the solid-solid contact reduces too much the CB structure and conductivity," says Van Bellingen.

For compounders, she says, an apparently attractive solution could be to use conductive concentrates to make conductive end products, since this leaves them with the possibility of diluting with a cheap virgin polymer or with regrind. "This is a trend that [is increasingly popular] for the more commodity polyolefins and polystyrene-based injection moulding applications," she says.

However, Van Bellingen adds that the risks associated with this the practice should not be overlooked. "Any dilution should be carefully managed, considering the sharp slope of a percolation curve," she points out. "Half a percent too low in carbon black is enough to make the material becoming insulating rather than conductive."

There are other technical and commercial considerations too, says Van Bellingen. "Diluting a very viscous product (the concentrate) with a fluid polymer can lead to very inhomogeneous conductive end products. Last but not least, that route will require the use of higher carbon black loadings as a strong reduction in the structure of the black structure takes place during the realisation of the conductive concentrate." This structure reduction is caused by high shear forces applied on the CB aggregates to reduce viscosity.

"At each step of the manufacturing process, one should consider that the carbon black structure—the main factor in providing the electrical conductivity—is 'evolutive,' says Van Bellingen. "By far, using the split feeding direct compounding route is the safest and best performing route."

Watch out for water

Imerys Graphite & Carbon uses its own production process, different from the most widely used furnace process, to produce its Ensaco specialty conductive carbon blacks. Van Bellingen says the process delivers carbon blacks with a unique combination of high structure and low surface area, which guarantees very good dispersion in plastics compounds.

"It is known that lower surface area carbon blacks exhibit lower moisture pick-up than higher surface area carbon blacks," she says. "However carbon blacks of equal surface area may still differ from each other. When compared to a furnace black of equally low surface area, Ensaco250G [the company's workhorse conductive grade] still shows a lower moisture pick-up."

The Imerys Graphite & Carbon production process

Impurity levels in compounds containing AkzoNobel's Ketjenblacks and a competitive electro-conductive carbon black (target resistivity of 200 Ω·cm)

compound					
	Target resistivity [Ω·cm]	Required carbon black [wt%]	ash [wt%]	grit [ppm]	sulphur [wt%]
KB EC 300J	200	12	1.3 E-3	0.31	3.1 E-3
KB EC 600JD	200	5	0.8 E-3	0.19	3.0 E-3
Other carbon black	200	27	2.7 E-3	0.54	5.4 E-3

Impurity levels in compounds containg AkzoNobel's Ketjenblacks and a competitive electro-conductive carbon black (target resistivity of 200 Ω·cm)

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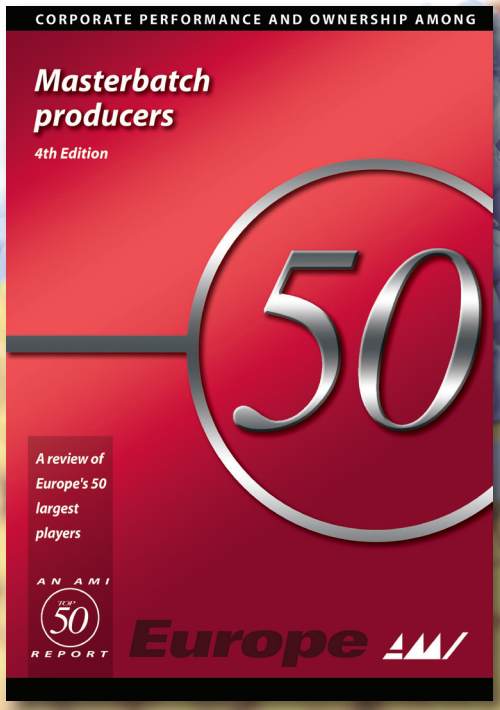

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delivers very graphitic carbon blacks, with a lower number of oxygenated groups on their surface than furnace blacks with the same surface area. This makes them much more hydrophobic, Van Bellingen claims. "The low moisture content and low moisture pick-up of a carbon black is crucial to ensure excellent system stability. This is obvious for the water sensitive polymers but also for many other polymers." She adds that a large part of any moisture in a carbon black will remain in the compound even after drying.

Super-conductive blacks

At **AkzoNobel**, technical development manager Elisa Conte highlights the company's Ketjenblack EC300J and EC600JD grades of high purity "super-conductive" carbon blacks. "Their high surface area, together with the highly branched micro-structure, constitutes the perfect environment for conducting electricity," she says. "This allows up to five times lower concentrations in polymer compounds compared to competitive materials, to reach the same resistivity."

According to Conte, nitrogen adsorption tests reveal surface areas of 800 and 1,400 m^2/g for Ketjenblack EC300J and EC600JD respectively. "High pore volume as revealed by dibutyl phthalate adsorption tests allows very low addition of Ketjenblaks to the compound, leading to materials inherently more resilient to mechanical stress," she says. "High loadings of blacks can hamper the dispersion process during compounding and compromise key physical properties such as elongation at break."

Conte also highlights the very low metals content in Ketjenblack products, at generally lower than 1 ppm.

Left: Post reactor technologies can reduce PAH content in carbon black, says Omsk Carbon Group

Above: Wire and cable is a typical application sector for Orion Engineered Carbons

This, together with very low levels of other contaminants, makes them particularly suitable for high-end applications where, she says, alternative products such as carbon nanotubes cannot be employed due to their high levels of metallic impurities. "Other commercial products in the market with comparable purity need to be added at much higher levels, introducing a higher level of impurity in the final compound," she adds.

A recent introduction is Ketjenblack EC600JD Powder (the current regular Ketjenblack EC600JD is supplied in soft pellet form). Conte says the new product form targets the battery industry and specific polymer compounding applications.

Orion Engineered Carbons highlights specialty conductive furnace blacks intended for compounds for premium applications. Two high-purity grades are ideal for medium and high-voltage cable applications, says technical market manager Bhuvanesh Yerigeri.

He describes XPB 565 as a non-treated furnace black with very high purity and excellent dispersion properties. It is designed for medium and high-voltage cable applications such as semi-conductive or conductive jacketing compounds, and where electrostatic dissipation (ESD) is desired (high-end electronic packaging applications, for example). He says the grade's low levels of ions and sulphur make it a particularly good choice for sensitive, strippable cable applications in semi-conductive compounds.

"Due to high physical cleanliness and smooth pellet quality, an excellent dispersion results in a high surface smoothness that reduces electrical stresses, which can promote the growth of water trees and hence reduced service life in extruded semi-conductive sheets," Yerigeri claims.

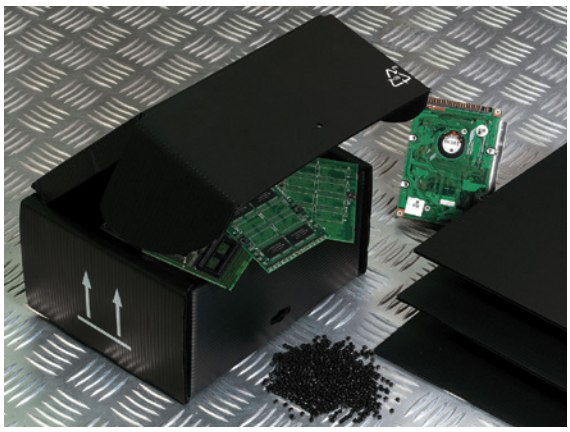
A second grade, Arosperse 5-183A, is a soft-beaded furnace black with low levels of impurities for use in semi-conductive shields for medium-voltage power transmission cables. It is said to be optimal for strippable compounds. Yerigeri adds that it is excellent for electronic packaging, which requires clean, smooth conductive surfaces.

Below: Batch production of carbon black by pyrolysis of used car tyres at Pyrolyx in the Netherlands

Cabot is continuing to invest in production of Vulcan XCmax 22 conductive carbon black, George Haines says (see CW Nov 2014). This is being qualified in a range of applications, including automotive, in both polyolefin and engineering resins.

Cabot continues to invest in innovations elsewhere too, Haines also says, most recently in the synthetic fibre area where it is in the process of introducing a new higher jetness carbon black that can be used in polyester synthetic fibre. He says the product is being

Right: Electronic packaging is a key market for conductive carbon blacks, according to Cabot



tested by leading fibre producers in Asia. Results show it gives higher jetness than the company's existing Black Pearls 5560 carbon black without significant downgrade in filter pack life.

Typically, there is a trade-off between filter pack life and jetness," Haines says. "With this new product, we are moving off that curve."

Carbon blacks from recyclate

Development work continues on production of carbon black from waste products. **Pyrolyx** cites its pyrolysis technology for treating used tyres, which yields not only carbon black but also gases "with natural gas-like quality." These can be sold as a valuable raw material, processed further, or used as energy carriers in the manufacture of additional carbon blacks (see CW Nov 2014).

Pyrolyx has a test plant in the Netherlands, where it says it has been able to consistently improve test results. "Traditional carbon black production requires approximately 1.8 tonnes of oil as feedstock, producing 1.0 tonnes CB, but also producing about 3.0 tonnes of CO_2 emissions," the company says. "2.5 tonnes end-of-life-tyre granulate as feedstock results in 1.0 tonnes CB

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Right: Black masterbatch containing carbon black produced using Aemerge's Carbonizer technology

[and] saves about 2.0 tonnes CO_2 emissions. The pyrolysis can be used for heating during production."

In June, Pyrolyx merged with CCT Stegelitz (CCT) in Germany, while in the US it has signed a letter of intent with the CH2E Group. "Together with CCT and CH2E, we have plans to build Pyrolyx plants," says company vice president Rolf-Hendrik Arens. "Our schedule depends on regulatory and structural requirements, but we like to start in 2016 with operations at both sites."

Arens notes that the merger with CCT makes Pyrolyx the only company in the world with both batch and continuous technologies for producing carbon black from waste. "Pyrolyx would like to build the continuous production line parallel to the CCT [batch] production line, which has been in operation since 2012," he says.

Aemerge is another company developing ways to create carbon-based products from waste. It says its Carbonizer technology can convert any organic waste stream into both clean energy and profitable material co-products with low to zero air emissions. It says its core differentiator is in its ability to accommodate multiple and mixed waste streams. Over 100 types of waste have been tested to date, including medical and hazardous industrial waste. It has a 2 tonne/hr facility in Indianapolis.

The company earlier reported on production of carbon black for plastics compounds from old wooden pallets (CW Nov 2014). "We have transitioned the waste feedstock that we treat away from wood and toward medical," says Adam Seger, head of sales and marketing. The company is currently researching the carbons generated.

A date for your diary

AMI's second Conductive Conference will take place in Philadelphia, US, on 27-28 September 2016. Covering both electrically and thermally conductive compounds, this event (which is sponsored by Premix) will be of interest to all involved in the formulation, processing and specification of these novel materials. To find out more about speaking, sponsoring, exhibiting or attending, contact conference coordinator Kelly Cressman, Tel: 00 1 610 478 0800; Email: kc@amiplastics-na.com or visit the website.

Click on the links for more information:

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18 - 20 April 2016

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AMI and Compounding World magazine are pleased to announce the 2nd edition of their Compounding World Congress, which takes place on 18-20 April 2016 at the Maritim Hotel, Cologne, Germany.

This conference will build on the success of the first Compounding World Congress, creating a vibrant meeting place for thermoplastics compounders from throughout Europe and beyond.

Selected by the editorial team of Compounding World magazine, the event's high-level programme will explore and develop many of the magazine's most popular themes in a live event. The conference will cover business strategies and new materials technologies, as well as providing practical advice on getting the most from compounding lines.

Its primary focus will be on the production of technical compounds based on engineering thermoplastics, thermoplastic elastomers and performance polyolefins for demanding applications in markets such as the automotive, electrical/electronic, medical and industrial sectors.

Dedicated sessions will focus on the latest additives and formulations for adding value and new functionality to thermoplastics. In addition, there will be analysis of key market trends in the compounding industry, plus discussions on how to grow business in an increasingly competitive global arena. Experts will also cover new developments in processing technology and provide tips on how to optimise compounding operations

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Delegates can visit the HPF mine and processing facility, as part of the conference. More details can be found on the next page.

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CONFERENCE PROGRAMME

Monday 18th April 2016

13.00-17.00 Site visit to HPF The Mineral Engineers, a division of Quarzwerke Group

Delegates will be taken by coaches to and from the HPF facility in nearby Frechen. There will be a tour of the R&D laboratories and a company presentation followed by a networking break.

17.00-19.30 Registration
18.00-19.30 Welcome Cocktail Reception

There are no conference sessions on this day

Tuesday 19th April 2016

08.00 Registration welcome coffee
09.00 Opening announcements

SESSION 1 – MARKET TRENDS AND STRATEGIES FOR SUCCESS

09.10 **Analysing trends in the global thermoplastics compounding industry**
Mr. Andy Beevers, Publisher, Compounding World magazine, APPLIED MARKET INFORMATION Ltd., United Kingdom

09.40 **Strategies for growing a profitable compounding business in an increasingly competitive global marketplace - panel discussion with:**
Mr. Massimo Pavin, CEO, SIRMAX SPA, Italy
Mr. Murat Cansever, Managing Partner (Technical), EUROTEC ENGINEERING PLASTICS, Turkey
More panellists to be confirmed

10.40-11.10 Morning coffee sponsored by: JSW THE JAPAN STEEL WORKS, LTD.

SESSION 2 – SCALING UP YOUR COMPOUNDING BUSINESS

11.10 **Realising lab scale R&D innovations on a complex global manufacturing environment – challenges & approach**
Dr. Shyam Sathyanarayana, Polymer Processing Expert, BASF CORPORATION, United States

11.40 **Industry 4.0 for PP-large scale compounding – an example of an inline MFI – closed loop control measurement**
Dipl.Ing. Sven Wolf, Managing Director, LEISTRITZ EXTRUSIONSTECHNIK GmbH, Germany

12.10 **Advances in polyolefin and polyamide compounds for automotive components: effects of raw materials & processing**
Dr. Abdullah Al-Mamun, Material & Process Development, Corporate Research & Development, ADLER PELZER GROUP, Germany

12.40-14.10 Lunch sponsored by: Penta A Piovan Company

SESSION 3 – EXPLORING RECYCLING OPPORTUNITIES

14.10 **Re-compounding: The up-cycling approach that enables a second life for plastics waste**
Pd.Dr. Manica Ulcnik-Krump, Head of R&D BU Recycled Resource, ALBA GROUP / INTERSEROH DIENSTLEISTUNGS GmbH, Germany

14.40 **Should recyclers compound or will compounders recycle?**
Mr. Michael Heinzlreiter, Head of Marketing & Business Development, NEXT GENERATION HOLDING GmbH, Germany

SESSION 4 – NEW OPPORTUNITIES FOR COMPOUNDERS

15.10 **The return of polyketones: developing new compounds and applications including long-fibre grades and tribological components**
Mr. Dipl.-Ing. Thilo Stier, Sales Director, Innovation Manager, AKRO-PLASTIC GmbH, Germany

15.40-16.10 Afternoon tea sponsored by: IMERYS

16.10 **Using reactive extrusion to produce polyamides – how compounders can become polymer manufacturers**
Mr. Quentin Huck, Commercial Manager, SETUP PERFORMANCE, France

SESSION 5 – BOOSTING POLYMER PERFORMANCE

16.40 **Compatibilisation of styrene based engineering plastics**
Mr. Ardy Doelen, Sales and Business Development Manager, POLYSCOPE POLYMERS B.V., Netherlands and
Mr. Michael Sommer, Business Development Manager Plastics, GUSTAV GROLMAN GmbH & Co. KG, Germany

17.10 **New developments in processing additives for polyolefins and engineering plastics**
Mr. Juan Bravo, International Technical Manager – Plastics, STRUKTOL CO. OF AMERICA, United States

17.50 End of Tuesday's conference sessions

20.00 Conference Dinner

Wednesday 20th April 2016

08.00 Registration and welcome coffee
08.30 Opening announcements

SESSION 6 – OPTIMISING FILLED AND REINFORCED COMPOUNDS

08.40 **Specifying and processing functional minerals to increase scratch resistance, reduce warpage and add reinforcement**
Dl. Veronica Mayer, Application Manager, KAERNTNER MONTANINDUSTRIE GmbH, Austria

09.10 **Enhancing the mechanical properties of thermoplastic composites with innovative coupling agents**
Ms. Elisa Conte, Technical Development Manager Polymer Additives, AKZONOBEL, Netherlands

09.40 **Optimisation of emission behaviour of PP-talc compounds**
Ms. Shilpa Khare, Research Engineer, FRAUNHOFER INSTITUTE FOR STRUCTURAL DURABILITY AND SYSTEM RELIABILITY LBF, Germany

10.10-10.40 Morning coffee sponsored by: BUSS excellence in compounding

SESSION 7 – NEW DEVELOPMENTS IN CONDUCTIVE COMPOUNDS

10.40 **Thermally conductive polycarbonates – a product class for the electronic industry**
Dr. Klaus S. Reinartz, Director Marketing LED EMEA, COVESTRO DEUTSCHLAND AG, Germany

11.10 **Developing a new generation of material additives for increasing the thermal conductivity of plastics while maintaining good mechanical and flow properties**
Mr. Péter Sebö, Market Development Manager, HPF THE MINERAL ENGINEERS / A DIVISION OF QUARZWERKE GROUP, Germany

11.40 **Exploring a new porous carbon material developed at Delft University of Technology for thermally and electrically conductive plastics**
Ms. Daniela Sordi, Chief Technology Officer, CARBON X, Netherlands

12.10-13.20 Lunch

SESSION 8 – MAKING THE MOST OF YOUR COMPOUNDING LINES

13.20 **How to improve the energy efficiency of plastics compounding operations**
Ing. Corrado Moneta, Technical Sales Manager, ICMA SAN GIORGIO S.p.A., Italy

13.50 **Reducing VOC levels of automotive compounds by optimising devolatilisation in twin-screw extrusion process**
Mr. Kenji Inagawa, Process Engineer, JAPAN STEEL WORKS EUROPE GmbH, Germany

14.20 **Advanced plant solutions for compounding industry: four concepts based on practical examples**
Mr. Thomas Stegmeier, Sales Manager AZO®POLY, AZO GmbH + Co. KG, Germany

14.50-15.20 Afternoon tea sponsored by: coperion

15.20 **Sustainable material handling solutions for a modern compounding process**
Mr. Pierluigi Mondati, General Manager, PENTA Srl, Italy

15.50 **More torque or more volume? Which is more important?**
Dr.-Ing. Thomas Winkelmann, Head of Development Plastics Technology, KRAUSSMAFFEI BERSTORFF, Germany

16.20 **Process optimisation - Techniques and options for more profitable twin-screw compounding**
Mr. Frank Lechner, Head of Process Technology Compounding & Extrusion, COPERION GmbH, Germany

16.50 Closing announcements and conference ends

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Signature: _____ Date: _____

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All payments to be made in Euros

Please tick box and write amount:

❑ Early bird admission fee: *(Until 4th April 2016)*	€1090 + €207.10* = €1297.10	_____
❑ Admission fee thereafter:	€1190 + €226.10* = €1416.10	_____
❑ Conference Dinner:	€85 + €16.15* = €101.15	_____
Table Top Exhibition Package (includes 1 delegate place)		
❑ German resident companies	€2500 + €475* = €2975	_____
❑ Non - German resident companies (***Only admission fee part of package is VAT chargeable at 19%*)	€2500 + €207.10** = €2707.10	_____
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Please note all delegates have to pay the VAT stated above

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COMPOUNDING WORLD CONGRESS 2016

CONFERENCE INFORMATION

Date and location
18-20 April 2016
Maritim Hotel
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50667 Cologne
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Fax: +49 221 2027 835

Registration fee
The registration fee includes attendance at all conference sessions, the Welcome Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

- ***Early bird registration:*** Register before 4th April 2016 for only €1090*. Thereafter the cost is €1190*.
- ***Group rates:*** For companies wishing to register two or more delegates, group discounts are available. Please contact the Conference Organiser for more details. (Please note to qualify for the group discount delegates must be booked at the same time, otherwise additional delegates may be charged at full price).

Compounding World Congress 2016 table top exhibition
A limited number of table top exhibition spaces are available in the spacious lobby area directly outside the conference room. The table top exhibition fee is excellent value for money and **includes 1 delegate place**. Exhibitors may either use tables provided by the hotel or bring their own stand or display.

Sponsor this event and promote your company
A variety of sponsorship opportunities are available at this event that can help to promote and enhance your company's products and services to this highly targeted international audience. For further information, please contact the Conference Organiser on: +44 (0) 117 314 8111.

Social events
The social events organised for Compounding World Congress 2016 will provide an ideal setting for delegates and speakers to mix business with pleasure.

- ***Welcome Cocktail Reception:*** A welcoming cocktail reception will be held on the first evening. All delegates are invited to attend and it will offer an excellent opportunity to meet speakers and other colleagues. The Welcome Cocktail Reception will run approximately from 18.00 to 19.30 and is included in the delegate fee.
- ***Conference Dinner:*** All delegates are warmly invited to attend the Conference Dinner, which will take place at a local restaurant on the evening of 19th April 2016. The additional cost is €85*.

Hotel accommodation
Delegates are responsible for booking their own accommodation. AMI has negotiated a room rate of €159 for a single room and €197 for a double (tax, breakfast and Wi-Fi included) at the Maritim Hotel in Cologne for a limited time only. To reserve a room, please contact the reservation department and state that you are attending "AMI's Compounding World Congress 2016" conference on:
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Cancellations
Full refunds, less a cancellation charge of €200 will only be made on cancellations received prior to 18th March 2016. Thereafter we regret that no refunds can be made. Delegates may be substituted at any time. Please note that refunds will not be given on table top bookings, sponsorship packages or Conference Dinner places.

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Whether to reduce long term wear or to ease one-off activation, tribological modification of plastics is an increasing demand. **Jennifer Markarian** reviews the latest additive and compound developments

Formulating to reduce friction and wear

Wherever moving parts come into contact, friction and wear can be a concern. Polymeric materials used in applications such as gears, bearings, conveyors and seals must resist wear, sometimes under high temperatures and pressures, for extended service periods. And the trend toward lighter-weight and thinner parts only intensifies this need for improved management of wear. But surface properties are not only a concern in long term applications. Wear many not be an issue in short-term or single-use applications such as medical devices, but low surface frictional properties can be vital.

A wide variety of polymers are used in wear applications today. While certain polymers display inherently better tribological properties than others (see Table 1 on page 42), lubricating additives also play a significant role in differentiating compounds and in enhancing compounds for specific application needs.

There are certain key basics to take into account when designing a part where tribological properties (wear and friction) are a concern. These include consideration of the two materials that will be in contact, the surface roughness of the parts, the usage parameters (continuous or intermittent, sliding speed, contact pressure), ambient conditions (temperature and humidity), and other application-related factors (such as whether foreign debris will be present and whether external lubricants will be used), explains Cliff Watkins, marketing director at distributor **PolySource**.

Low friction and wear are prime requirements in polymer gear applications

The most demanding applications are those with the highest pressure-velocity (PV) load, which is a measure of the contact pressure multiplied by the sliding speed. Frictional heat generated during use can be a concern that must be managed, says Watkins. High friction can also cause energy losses, so a low coefficient of friction is desired for applications such as bearings or gear wheels.

Common anti-friction additives that are compounded into a polymer to act as internal lubricants include those that act immediately by migrating to the surface (such as perfluoropolyether [PFPE] synthetic oil and silicone) and those that are distributed throughout the polymer and begin to lubricate when they are exposed after a "wear in" period, such as polytetrafluoroethylene (PTFE), fibres (aramid, carbon, and glass, for example), and other solid additives (such as molybdenum disulfide and graphite powder). **RTP Company** also offers its all-polymeric wear additive (APWA), which is an

olefin-based additive designed for immediate lubrication and for improved wear resistance compared to particulate-based alternatives and that does not exhibit the plateout associated with PTFE, according to the company.

Laurel Products, headquartered in Pennsylvania in the US, specialises in fluoropolymer additives to enhance wear performance, friction, and other properties. The company's fluorinated mica additive, Thor-FPz, imparts both the properties of a mica (hardness and abrasion resistance) and of a fluoropolymer (low coefficient of friction, low surface energy). The additive has been used in various engineering polymer matrices (for example, PTFE, PA, and POM) in applications including gears, ball-valve seats, and slide pads. "Laurel has quadrupled its production and sales of this unique additive since it was commercialised in 2014, and wear-reducing applications and opportunities continue to emerge in the compounding marketplace," says James Downing, business director at Laurel.

Laurel's Marzon fluoroadditives are said to be specially processed to improve specific properties, including a heat-treatment to improve thermal stability, thermal-vibratory processing to improve particle morphology and flowability, and the addition of hydrophilic molecules to optimise polarity and dispersability. The company's latest addition is Marzon 638, a polysiloxane-infused PTFE additive that is claimed to feature silicone/fluoropolymer chemistry within each discrete particle that provides both chemical and mechanical benefits.

Solvay Specialty Polymers produces PTFE micronised powders (Polymist and Algoflon L) and PFPE fluids (Fomblin, Fluorolink, and Galden). "PTFE leverages the hydrophobicity and low surface tension of the material to impart enhanced tribological properties to the matrix," says David Gibala, global business development manager at the company. The powder additive can be compounded directly or using a masterbatch of up to 40% to produce formulated compounds, which typically contain 10-20% PTFE, in a range of engineering and high-performance polymers. Special grades of micronised PTFE are optimised to withstand the high temperatures needed to compound PEEK and other high-melting specialty polymers. The company says PTFE does not migrate from the polymer, and its lubricating effect is most efficient following a short "wear in" period.

Table 1: Typical polymers used in wear-resistant applications

High-performance (higher temperature resistant) polymers:
- Polyetheretherketone (PEEK)
- Polyphenylene sulfide (PPS)
- Polyphthalamide (PPA)
- Polyethersulfone (PES)
- Polyimide (PI)

Technical or engineering polymers:
- Polyketone (PK)
- Polyamide (PA)
- Acetal or Polyoxymethylene (POM)

PFPE fluids, on the other hand, are used at low levels (less than 1%) and bloom quickly to form a thin lubricating layer at the surface. Solvay's fully fluorinated material can be compounded at temperatures up to 280°C. The company also offers PFPE with hydrogenated end groups that allow better compatibility in the matrix. The polarity of the end groups can be designed to modulate blooming rate for a specific matrix, according to Antonio Puppo, technical marketing for functional fluids at Solvay Specialty Polymers. These grades have a maximum compounding temperature of 250°C. PFPE oils should be added to the compounding process as a masterbatch, suggests Puppo.

Colloids, a UK masterbatch producer that opened a manufacturing facility in Chanshu in China in May of this year, offers high-end, friction-modifying masterbatches for engineering resins under the brandname PACE. "Graphite is the preferred type of low-friction additive in aqueous applications, whereas molybdenum disulphide is the material of choice where the component parts are in contact with metal surfaces," says Bob Thomas, technical director at the company. The company also produces a range of low-friction masterbatches containing silicone oil, erucamide or oleamide fatty acids. Silicone oil offers high temperature resistance making it suitable for use in engineering polymers. Erucamide and oleamide are only suitable for polyolefin applications.

"Choosing the correct additives and the correct level

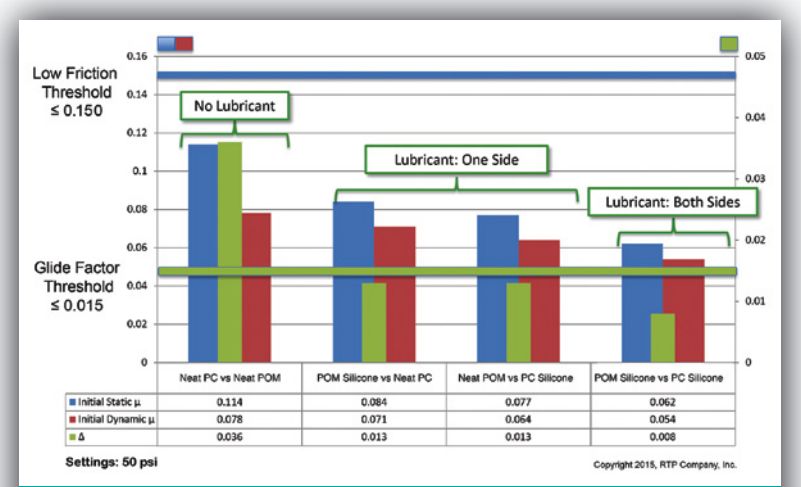

Table 2: Tribological test results of PC versus POM
Source: RTP Company

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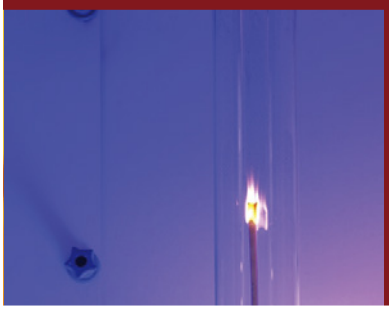

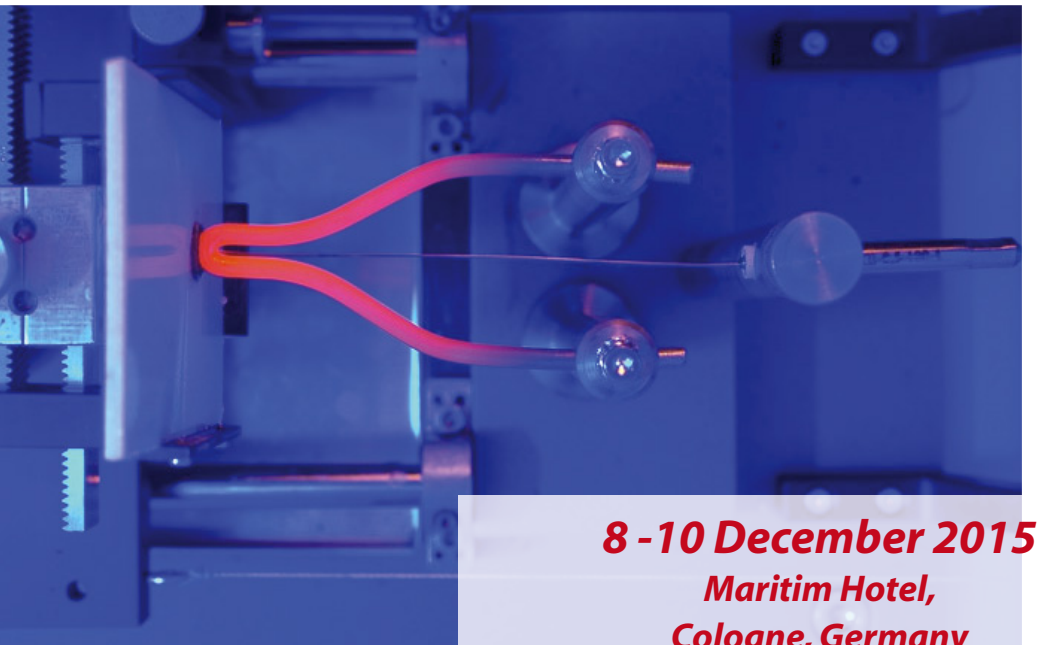

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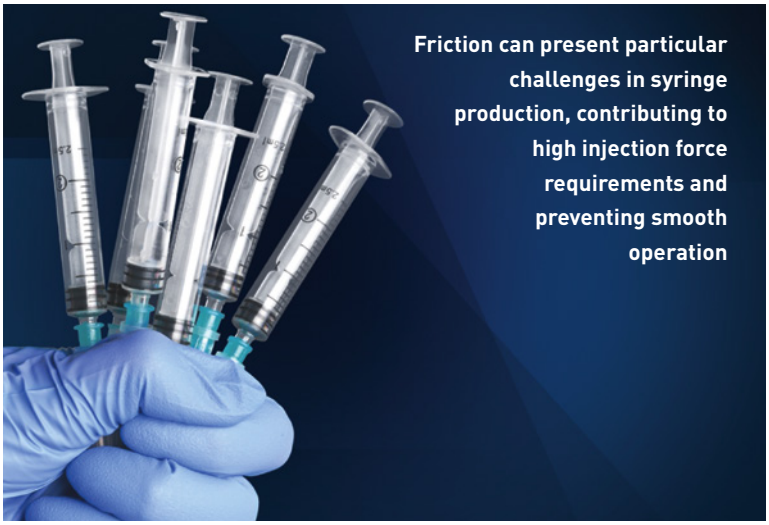
Adele Brown – Conference Manager ab@amiplastics.com Ph: +44(0)117 924 9442 Fax: +44(0)117 311 1534

is highly dependent on the application requirements," according to Thomas Collet, global product manager at **Lehmann&Voss&Co**. For example, aramid fibres, although more expensive than carbon or glass fibres, provide high wear resistance and reinforcement and are softer than carbon or glass, so they are better for contact with soft metals such as aluminum. Various tribological tests (including the pin on disk, pin on roll and thrust washer test) can be used to evaluate formulations. Customer-specific testing that simulates an application's temperatures and speeds, for example, is also crucial.



Friction can present particular challenges in syringe production, contributing to high injection force requirements and preventing smooth operation

Measuring friction

Recent research at **RTP Company** yields new insight into friction behavior, which is important for choosing materials for contact parts. Although initial studies were designed for single-use medical device applications, the concept can be applied to any other friction applications, says Josh Blackmore, global healthcare manager at the company, and tribological engineer Ben Gerjets.

Common friction-related problems include high "start up" force (which makes it difficult to initiate movement of a plunger through a barrel, for instance) and "stick-slip" or "stiction," where a material will start to slide but will "stick" rather than a consequence of stick-slip occurring at a fast rate. External lubricants may solve these problems, but manufacturers (especially in the medical sector) prefer to avoid wipe or spray-on lubricants for many reasons, not the least for

Right: Lehman & Voss introduced its Luvocom XTF family of PTFE modified compounds for extreme wear applications such as slip rings earlier this year

the difficulty in applying and controlling these products, explains Blackmore. Part designers would instead prefer to choose materials, possibly formulated with internal lubricants, that will slide smoothly. Identifying tests that can predict behavior is more efficient than trial-and-error methods.

Key tribology measurements include the static coefficient of friction (μ_s), which describes the force required to initiate motion of one surface past another, and the kinetic coefficient of friction (μ_k), which describes the force needed to sustain motion. RTP developed a new measurement—the "Glide Factor". It defines this as the difference between μ_s and μ_k measured with a modified ASTM D3702 thrust washer test measuring oscillating friction.

The researchers found that pressure or load can dramatically change the Glide Factor. After experimenting with several loads, the studies were performed at 50psi to simulate the force found in a typical drug-delivery device. "Materials with a low μ_s will slide easily past one another at start-up, and materials with a low Glide Factor are less likely to experience stick-slip. The Glide Factor concept can be used to establish thresholds for performance that will aid formulation development," says Gerjets.

Friction is a complex phenomenon that is affected not only by the materials in contact with each other and the applied force, but also by environmental factors (such as temperature) and use factors (such as human-skin oil on the surface or changes to the material surface over time), says Gerjets. Part designers want to choose a material pair that will work consistently, no matter what the external factors.

"We identified thresholds for both static coefficient of friction and Glide Factor using field data, and we worked with customers to verify our findings. A good formulation will be well below the thresholds so that the parts can tolerate variation in temperature or surface defects without problem," says Blackmore. For example, a typical medical-device combination of PC-POM without internal lubrication meets the static friction threshold, but not the Glide Factor threshold. When an internal lubricant is added to either material, however, the Glide Factor drops below the threshold. With lubricant in both materials, the Glide Factor is significantly below the threshold. A manufacturer of insulin auto-injector pens, for example, can choose lubricant in both materials to have greater assurance that the device will work well, and could even use this information to redesign the device with a smaller spring, says Blackmore. RTP is also developing correlations of their friction data with other critical factors for medical device design, such as the force needed to start an injection or to inject a drug at the correct rate.

Dealing with wear

While friction is a concern for short-term use, wear is the concern for long-term applications such as gears or seals. Some sealing applications, such as automotive transmission seals, pump seals, and offshore oil and gas gaskets, must resist wear under high temperatures and high pressure and velocity (PV) ratios. **RTP**

Table 3: Bevel gear load comparison of polyketone against POM and PA66 alternative and combinations showing loading period and failure type

	Unit	PK / PK mated without lubrication	POM / POM lubricated mating	POM / PA 6.6 lubricated	POM TF / PA 6.6 lubricated	PA 6.6 / PA 6.6 mated without lubrication	PA 6.6 / PA 6.6 lubricated mating
Speed	rpm	1,600	1,600	1,600	1,600	1,600	1,600
Torque	Nm	5.5	5.5	5.5	5.5	5.5	5.5
Loading period	min	91	58	53	72	25	61
Breakage behaviour	-	Melt at hub	Tooth breakage tip abrasion	Melt at hub	Melt at hub	Tooth breakage tip abrasion	Melt at hub

Source: Akro-Plastic

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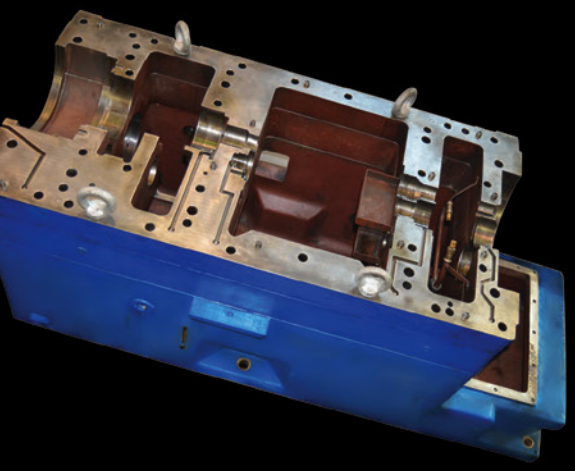

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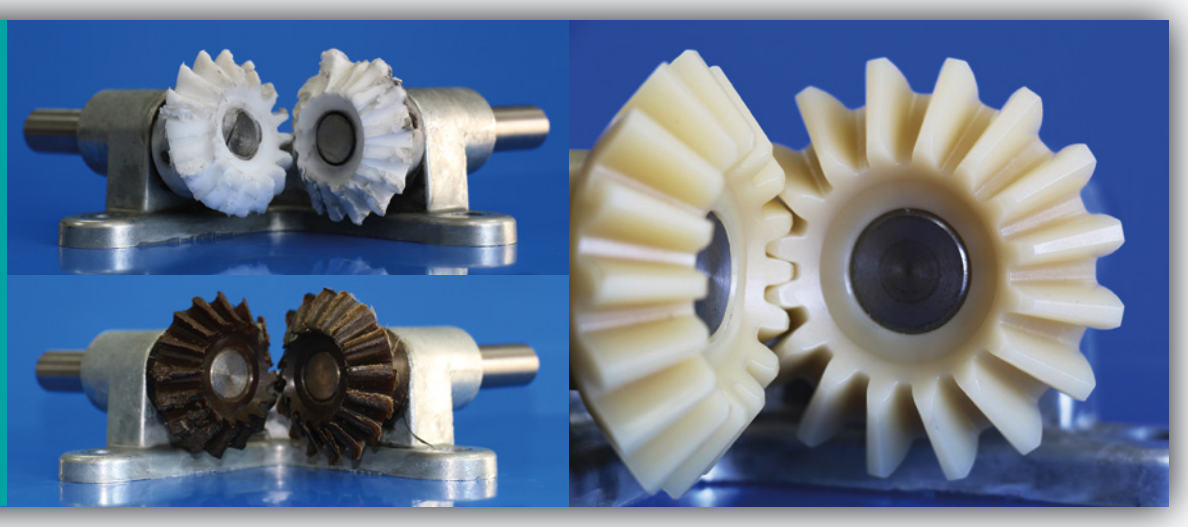
Company's UltraWear compounds were introduced in 2013 for these extreme applications that have conventionally used thermosets. UltraWear compounds using synergistic wear additives in PEEK, PPA, and PPS have been tested at PV ratios up to 100,000 and temperatures up to 205°C (400°F), says the company.

Additives used in the UltraWear compounds include combinations of carbon fibre/ceramics, carbon fibre/graphite/PTFE, and proprietary packages. Ceramics have been found to provide the best performance in very severe wear environments (high pressures, velocities, and temperatures) and are used synergistically with other additives in RTP's highest performance selection.

Collet at **Lehmann & Voss** also notes an increasing demand for materials that function in high pressure and elevated temperature applications. The company, a compounder of high-performance specialty materials, introduced its Luvocom XTF family of high-performance compounds modified with a proprietary PTFE formulation designed for extreme wear applications in March this year. The first compounds in the series are based on PEEK; compounds based on other high-performance polymers are currently in development. "By substituting standard PTFE additives with our proprietary lubricant and by optimising our processing technology, we have been able to substantially elevate wear resistance performance with these new compounds," says Collet.

The **3M Dyneon** Compound New Sealing Technology (NST) 1111R incorporates a 3M Dyneon PTFE matrix and a 3M microsphere filler system to improve properties (including friction and wear) for polymeric seal applications, such as shaft seals and transmission seal rings where low friction and wear resistance are key. Compared to a standard PTFE compound (Dyneon PTFE Compound TF 4105 with glass fibres) used for this application, the new compound offers a 17% improvement in friction coefficient. In addition, optimised friction and wear behavior leads to longer service life and less fuel consumption, according to 3M.

Celanese introduced a tribologically modified acetal copolymer called Hostaform SlideX POM in October last year. The compound is designed for use in manufacture of injection molded parts with good mechanical properties and a very low coefficient of friction and wear rate. The company claims it can help reduce energy loss, heat generation and noise in mechanical systems



Akro-Plastic loading comparison results of POM (top left) and PA66 (bottom left) bevel gears show severe tooth damage. The PK alternative (far right) ultimately survived longer, failing at the hub

such as gear shift systems, stabiliser joints, roller shutter devices, furniture slide systems, or speed masters.

Opportunities for polyketone

Polyketones (PKs), which were available up until 2000 until Shell Chemical discontinued production, have recently become available again from South Korea's **Hyosung**, which started up a 50,000 tonne (110 million lb) commercial plant in June of this year. The company announced plans in August for a second plant expected to start up in 2020. Although PK is limited to temperatures under 220°C, it offers an unusual combination of mechanical properties, barrier properties, broad chemical resistance, and low water absorption, in addition to wear resistance.

This performance combination gives PK an edge over POM and PA in some applications and several compounders, including A. Schulman, Lehmann&Voss, Ensinger, and Akro-Plastic, introduced PK compounds in 2014 and 2015. Early in 2015, PolySource became an authorised distributor for PK in North America.

In addition to its previously mentioned property combination, a further unusual feature of PK is that PK-PK material pairs show much lower wear than other like-paired materials, according to Oliver Frey, head of the compounding department at **Ensinger**. Although it is a common principle to avoid having like materials in contact for wear applications, it can't always be avoided, and in such cases PK might present a solution, he says. At the upcoming Compounding World Forum in Philadelphia (8-9 December) Frey will give a presentation on the properties of tribological materials, different material classes, and the use of PK in these applications.

Akro-Plastic reports that in a test of combinations of materials in gears, PK-PK gears without lubrication lasted longer (91 minutes at 1600 rpm and a maximum torque of 5.5 Nm) than the user's existing combinations of POM mated with lubricated PA 6.6 (72 minutes) or POM mated with lubricated POM (58 minutes). See Figure 1 on page 46 for full results.

According to Thilo Stier, head of sales and innovation at Akro-Plastic, PK is a sensitive material to compound and is prone to crosslinking if the residence time in the extruder is too long. Akro-Plastic uses a compounding extruder from its sister company Feddem that is specially designed with no kneading blocks. It also uses a die-head design that eliminates dead areas. Extremes in pH can also cause crosslinking, he adds. Stier says that temperature control during compounding is also crucial for PK but that, with care, Akro-Plastic is able to compound up to 60% glass fibre.

Carbon fibre is desirable for wear applications because of its combination of lower wear and higher mechanical strength compared to glass fibres (plus carbon fibres are lighter in weight). The limiting factor, however, is typically their high cost. Akro-Plastic is currently working with BMW on a process that allows compounding of post-industrial, pre-treated carbon fibre that is a residual material from BMW's production process. "Using post-industrial recycle brings the price of carbon fibre down to only two to three times more than glass fibre," says Stier.

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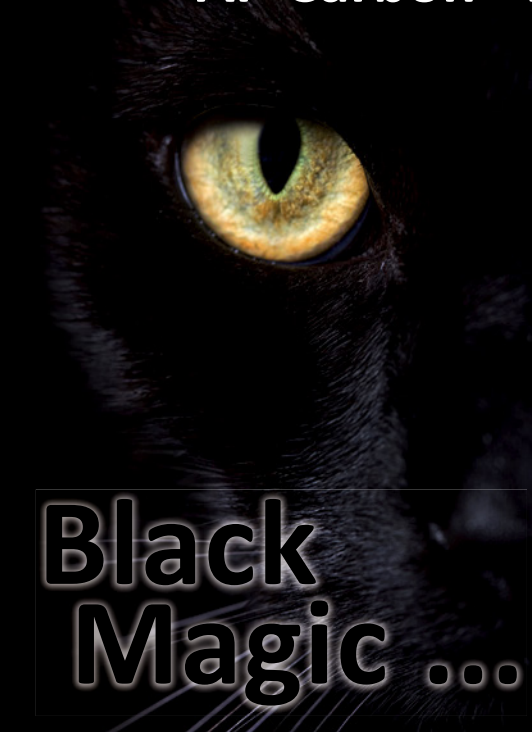

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Batch mixers are getting smaller, more energy efficient, and more productive. **Peter Mapleston** reviews some of the latest developments in the sector

Equipment makers mix it up

The trend across the compounding industry today is to more flexible production. Suppliers of batch mixers are responding to that with the development of mixing machines that are more compact, more energy efficient, and easier and quicker to clean and maintain. Meanwhile, manufacturers of continuous mixing equipment are not standing still. This article looks at the latest developments in both sectors and explores why compounders might consider moving from one technology to the other.

Michael Kaiser, regional sales manager at batch mixer producer **MTI**, says the company sees a general trend across all compounding applications towards smaller more flexible mixing units rather than high capacity systems. "The complete mixing process including the material handling systems is becoming more complicated. The number of ingredients is increasing, there is a constant drive to increase the amount of fillers and the optimal moment to feed raw materials into the mixer is receiving more attention," he says.

"We also see a lot of developments with more 'health friendly' plasticizers and newly-built mixing units are mostly equipped with aspiration systems to improve the quality of the mixed materials. Especially with PVC compounding units, the necessity for a cooling mixer between high/speed mixers and compounders is coming under question more and more."

Kaiser says MTI is responding to these demands by offering tailor-made solutions alongside its standardised mixing equipment. For example, the company not only provides solutions for minimum contamination of the mixers by material deposits inside the mixers, but also offers options for quick and easy cleaning to keep down times to a minimum, he says.

MTI highlights its capability in mixing systems for lines producing pipe in polyethylene polymer crosslinked using peroxides—PE-Xa. Crosslinked PE is widely used for gas, heating and water pipe systems and, according to MTI, production of PE-Xa piping is growing steadily. It says high-volume manufacturers of small-diameter pipe in particular increasingly prefer the two-stage production process, in which polymer and additives are batch mixed prior to extrusion.

The company says its equipment provides more thorough intermixing of the raw materials than is possible with mixing in the extruder, and so delivers a higher quality and more homogeneous result. It says customer trials show that even if the mix is stored for several weeks prior to further processing, cross-linking levels remained virtually unchanged due to the intense peroxide diffusion.

Kaiser says growth in PE-Xa pipe production is being brought on in part by the increase in the use of twin-screw extrusion technology (taking the place of slower ram extrusion). This has made the production of PE-Xa pipes more competitive. "With higher output and more production lines, a central mixing unit has logistical and economic advantages compared to an

Main image: Cooling and energy efficiency are high development priorities at Italian mixer manufacturer Promixon. This image shows its TMX turbo tool

Right: A complete MTI mixing system for PE-Xa at pipe maker Agru-Frank in Germany

individual dosing/mixing system on each production line," he says.

A single MTI mixing system can serve multiple extrusion lines while the spatial separation of the two stages helps pipe makers meet safety requirements applying to the processing and storage of peroxide and other additives, which carry an explosion risk. Organic peroxide is both flammable and toxic (although the hazard is reduced with peroxide/white oil solutions), while PE and additives in powder form are typically classified as combustible substances or substances carrying a powder explosion hazard.

Explosive markets

Kaiser says MTI mixers are ATEX (explosive atmosphere)-compliant. "We continuously adapt to changing standards," says. "The mixing technology continuously improves, especially the development of mixing tools to improve the mixing performance for individual materials and mixing processes and of course wear protection."

Right: MTI's Uni Tec batch mixer features low speed mixing for thermally sensitive blends

MTI offers universal Uni Tec and horizontal Flex-Line mixers for this and other applications. Both use short mixing cycles that put minimal strain on the raw materials, but still provide a high quality mix. They operate under ambient conditions or with pre-defined temperature profiles. MTI has been selling both types of mixers since the mid-70s, but Kaiser says they have evolved in terms of energy consumption, flexibility and control systems.

Flex units are high speed mixers (turbo mixers) that have multiple mixing tools rotating at high speed (tip speeds are around 30 m/s). Through intense material movement, the dispersion of ingredients is very good but the friction created also causes the material temperature to increase quite rapidly. Uni Tec models are low speed mixers, which have just one mixing tool rotating with a tip speed of around 0.8 m/s. This type of mixer is used for materials that require gentle handling or that must not be exposed to a significant increase in temperature during mixing. In cases where dispersion by the one mixing tool is insufficient, one or more high speed choppers can be installed to improve mixing quality.

At **Mixaco**, sales manager Andreas Backhaus emphasises developments in container mixers for compounds and masterbatches. He says the company continues to improve its Multi Tool mixing technology, which was first introduced in 2009, with the addition of extra features. He too highlights conformity to increasingly tough ATEX requirements.

Versatile mixing options

Backhaus calls the company's CM MT container mixer series a "Jack-of-all-trades," with its suitability for use in all areas where high-quality materials are used. Models are available in sizes from 6 to 2,000 litres. "With its numerous individual tool possibilities, any desired mixing result can be dependably obtained," Backhaus claims.

He also cites high dispersion and homogeneity without the transfer of excess mechanical energy into heat in the product, making the MT very well suited for processing heat-sensitive materials. "The temperature increase in the MT container mixer is up to ten times less than in a conventional mixer– typically between 0.5 and 1°C per minute," he says.

The mixer can be configured for various ATEX conditions, including ATEX 20/22. For this application, Mixaco uses a newly developed technology (certified by German TÜV), which operates without the need for a nitrogen atmosphere.

Backhaus also highlights Mixaco's "tool-free" Revolution mixer for homogenising granulates gently with

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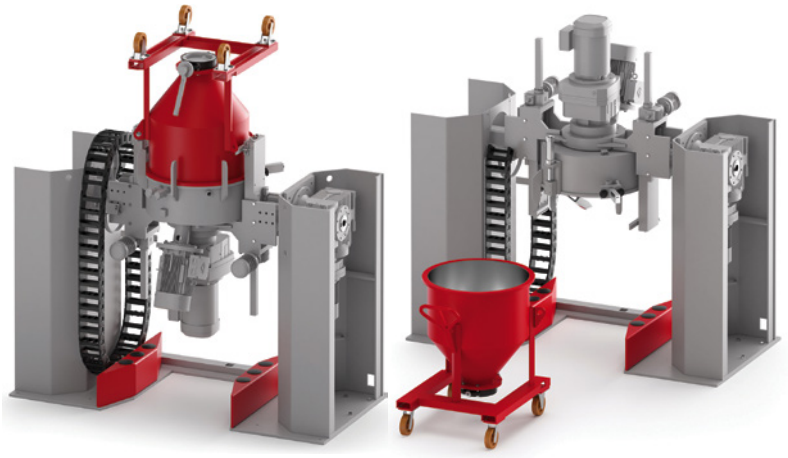

Above: A Mixaco CM Multi Tool container mixer shown in the mixing (left) and loading position

very low abrasion—and hence low dust formation. This unit can be used for various applications, including controlled tempering of mixtures or the uniform wetting of granulates with liquid peroxide.

Zeppelin Systems has launched the Henschel CMS (Container Mixer Series) for compounds and masterbatches. These are exchangeable, static, non-rotating high-intensity mixing containers with tip speeds of 10 to 60 m/s. R&D manager Henning Kreis says the series has been designed for very easy handling and gives "excellent" dispersing results.

"The outstanding container handling is a real novelty on the market," claims Kreis. "By using the latest design of tilting brackets, the container docking is very easy, even with larger machines," he says. "The container clamping to the mixing head is carried out by a centring fork and spindle stroke gear at the container head. This leads to very high tensioning forces and additional safety by means of self-retention of the spindle stroke gear and motor brake."

Container movement, driving-in and centring into the mixer is carried out by this automatic centring fork. "No matter which position the container is entered, it will be centred automatically to the precise position for lifting," Kreis says. He adds that no additional guidance units or centring rails on the floor are required.

Below: The multiple round bar-profile tool in Henschel's mixer is said to provide high mix quality in vertical mixing positions

Zeppelin has also developed what Kreis describes as a special multiple round bar-profile style tool to achieve best mixing quality based on the vertical mixing position. He says this significantly improves homogenisation and dispersion. "The quite common build-ups and caking [that can occur with] difficult materials are minimised or even eliminated," he says.

Optimised for cleaning

This lightweight mixing tool, which is claimed to generate less heat than earlier types, has been optimised for assembly and cleaning. Kreis says operators will appreciate the considerably easier cleaning and overall handling of the entire mixing system.

The Henschel CMS 600 unit by Zeppelin Systems

Promixon highlights the suitability of its TMX turbomixer, in single configuration or combined with its CMX horizontal cooler, for the production of products such as PVC dry-blend, wood-plastics composites, masterbatch and various powders. The company, which also offers the TRX high speed container mixer, claims to have delivered 80 mixing plants in the two years since it was founded. Sales this year are likely to be double those of 2014, according to a representative.

Promixon recently inaugurated a new 1,500 m^2 building, which includes a test room for customers to try out materials and equipment. Major developments at the company have focused on mixing tools with enhanced performance, increased cooling efficiency, energy savings, and an extended range of mixing devices designed to cope with the wide variety of mixing demands by its customers.

Promixon cites its recent supply of a Problend-

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Right: A Promixon Problend-TC hot/cold mixing system for PVC dry-blend and WPC

TC/2500/8600/VS hot/cold mixing combination to Shaw Industries Group for production of PVC flooring. It claims this is the biggest single mixing plant ever manufactured. The equipment works in combination with a calender supplied by another unidentified Italian producer, and a feeding plant with a German extruder. Shaw Industries installed the mixing equipment this summer.

Working with wood

Caccia Engineering offers equipment for batch mixing thermoplastics (virgin or recycled) with organic fillers, typically wood-based. Models range in volume from 200 up to 1,500 litres. Systems consist of WCP turbo mixers, vacuum units with separating filters for extracting humidity, and AC or AG Series coolers that can be coupled with a flexible screw conveyor.

The company says the systems have been purpose-designed and modified to achieve the best quality in compounds containing vegetable matter. "Due to the high percentage of humidity present inside these compounds, the vacuum unit is constantly operational for the whole phase of compound agitation and friction heating inside the turbo mixer," it says. A short time before the unloading phase, atmospheric pressure is restored inside the mixer and the compound is poured into the cooler.

Right: A Caccia turbo mixer for wood plastic composites

All contact surfaces are made of stainless steel or aluminum, whereas the multi-stage mixing tool has a wear-resistant coating. The typical heating temperature for these compounds can reach 175°C. The cooler brings this down to around 70°C so that the batch can be conveyed easily without any agglomerates. Finally, a flexible screw conveyor, which also breaks up any lumps, conveys the compound directly to an extruder or a storage container.

Plasmec recently launched the Plasmec Formul@1. "As well as meeting quickly and satisfactorily the most varied issues regarding maintenance, process, use and management, guaranteed by an innovative logging system for administration of technical assistance cases, [the new machine concept] is also a door from which to obtain information and share current and future joint projects." The company says the Plasmec Formul@1 will also be the foundation of a future project that will see the creation of archives shared between the company and its customers.

Batch or continuous

Ajax Equipment supplies both batch and continuous mixers. Eddie McGee, the company's technical director, says its emphasis is currently more focused on continuous mixers. These feature two inter-meshing screws and are used for mixing the dry ingredients with each other and/or with liquid additions. Unlike continuous mixers from companies such as Farrel and TPEI (covered later in this article), Ajax machines normally do not melt the materials.

McGee says batch mixing has the advantage of being well-understood, and it enables ease of quality monitoring and precise control of material quantities. But he says it also has a number of drawbacks. "In principle, mixing can be continued until such time as satisfactory homogeneity is achieved, but this can be

Right: This Plasmec batch mixer was on display at Plast 2015

PHOTO: PETER MAPLESTON

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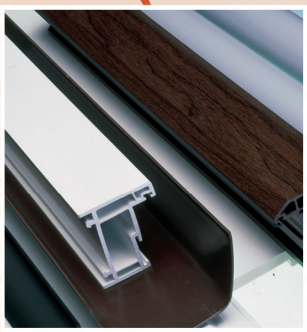

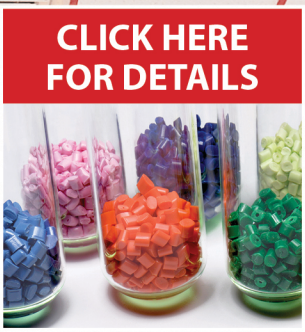


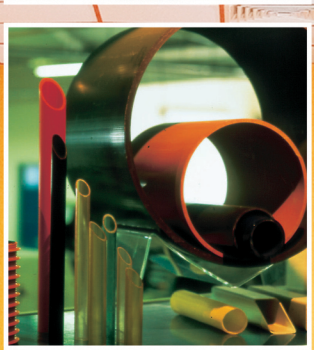

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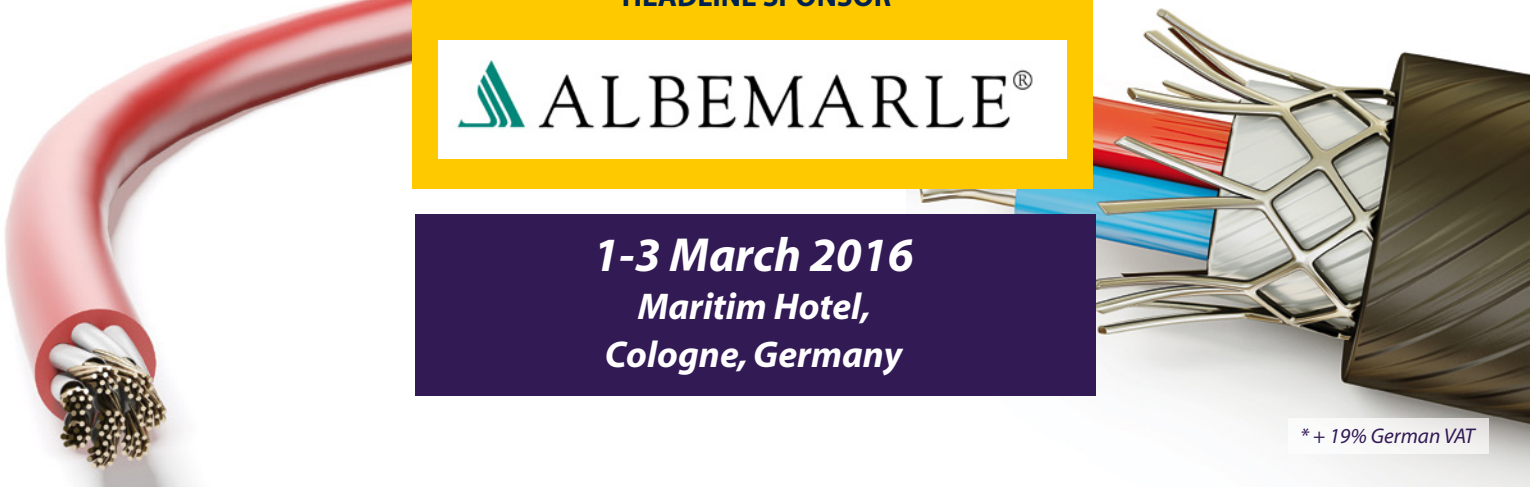

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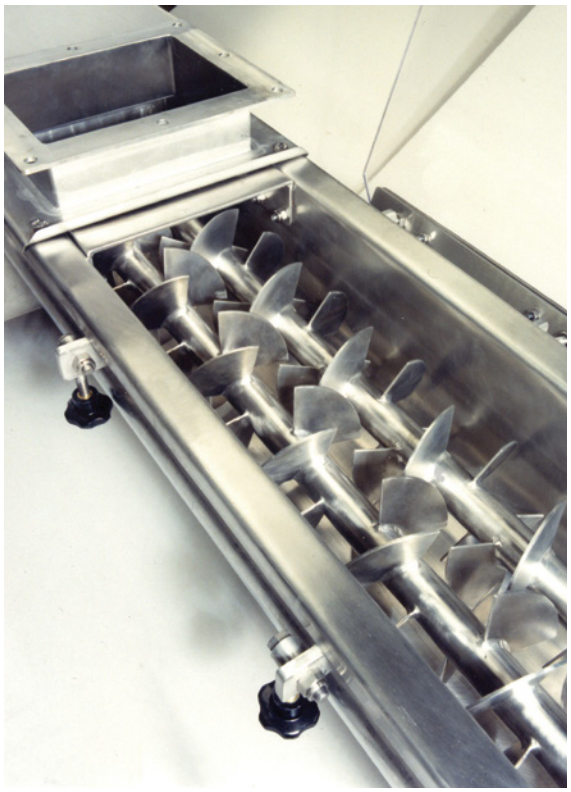

Left: Ajax claims continuous mixers provide improved control and flexibility

difficult to predict and there can be deterioration in quality if the batch is overmixed," he says.

"So this is not a solution for all mixing issues. Batch mixing is particularly prone to inconsistencies between batches caused by changes in temperature, humidity, powder particle size and storage. Any problems that may be found in batches are only detectable after the mixing process has been completed on significant inventory, which, if possible, is time-consuming and expensive to correct," he says.

Continuous mixing gets around many of these problems, McGee claims. He says the technology offers greater mixing flexibility than batch mixers and is particularly good for difficult-to-mix ingredients. "Paddle and ribbon screw geometries in continuous mixers allow greater control and more efficient mixing with negligible damage to materials," he says. "Mixing element geometry can be used to provide a more intensive mixing action, while the open form and geometry of the ribbon screw is ideal for gentle mixing." The flexibility of the continuous mixer is further increased by the use of interchangeable mixing shafts, allowing the machine to be used for a wide range of compounding.

Right: TPEI's "one-touch" process control system uses real-time analysis to ease optimisation

"Avoiding inconsistencies that can arise from batch manufacture is a prime benefit of continuous mixing but others include processing product that is more readily free flowing at a constant temperature and requires consistent ingredient distribution," McGee says.

"On-going advances in continuous mixing technology are removing many of the barriers to switching from batch to continuous mixing. Companies who had previously rejected change to continuous operation because of the demanding requirements of quality control and verification can now take advantage of improvements in in-line measuring techniques and control technology," he says.

Continuous melt mixing

Earlier this year, *Compounding World* reported from the Plast 2015 exhibition in Milan that **Farrel Pomini** is reporting growth in business for its Continuous Mixer. Business unit director Paul Lloyd says the equipment has particular strengths in production of masterbatches, PVC and compounds of temperature-sensitive materials. Strong growth around the world in luxury vinyl tiles (LVTs) for industrial and domestic use has also provided a boost for sales last year and this, he says.

Farrel Pomini recently updated its FCM series, widely used in the flexible PVC sector, with the addition of the high-torque FCM HT series. The latest model in the range is a seven-inch version, the 7FCM-HT, which fits between the existing 6FCM-HT and the 9FCM-HT. It has a maximum output of 3,000 kg/h.

Technical Process & Engineering (TPEI) is another producer of continuous mixers and recently added 760m^2 of combined manufacturing, office and assembly space. "These updated capabilities have allowed us to incorporate cutting edge PLC systems and automation into our machines," says Application Specialist Slayton Altenburg.

The company is currently developing a "one touch" process parameter system. "By gathering data from many points throughout the compounding process we are trying to "teach" the PLC to optimise the process it is running by fine tuning compounding conditions based on real time analysis of microclimates existing within the machine," says Altenburg, who explains the aim is to achieve a greater level of consistency and repeatability.

"We have also had success with rotor and machine configurations adapted to specific compound ingredients. These designs will allow for heavy pigment loading of colour concentrates, up to 50% of colorant." TPEI's 1FR lab machine has also been refined to accommodate a larger group of materials, he adds. "Much attention has been given to developing more accurate scale-up equations from lab size and proof-of-concept to rail-car production levels."

Click on the links for more information:

- **www.mti-mixer.de**
- **http://mixaco.com**
- **www.zeppelin-systems.com**
- **www.promixon.com**
- **www.cacciaeng.it**
- **www.plasmec.it**
- **www.ajax.co.uk**
- **www.farrel-pomini.com**
- **www.tpei.com**

Turn page for more details ➤

compounding WORLD Forum 2015

The international conference on business strategies and new technologies for compounders









December 8-9, 2015
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compounding WORLD Forum 2015

December 8-9, 2015
Loews Philadelphia Hotel,
Philadelphia, Pennsylvania, USA

Applied Market Information LLC and *Compounding World* magazine are pleased to announce that the third ***Compounding World* Forum** takes place on December 8-9, 2015 at the Loews Philadelphia Hotel, in downtown Philadelphia, PA, USA.

This conference features a high-level program brought together by the editorial team of *Compounding World*, exploring and developing many of the magazine's most popular themes in a live event.

Building on the considerable success of last year's conference, which attracted over 310 participants from 18 countries, this event will offer excellent opportunities for learning, discussion and networking.

The conference will cover business strategies and new materials technologies, as well as providing practical advice on getting the most from compounding lines. The primary focus will be on the production of technical compounds based on engineering thermoplastics, performance polyolefins and thermoplastic elastomers. Target end-use markets include the automotive, medical, electrical/electronic and consumer goods sectors.

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- **Discover new additive and materials technologies**
- **Learn practical tips for getting the most from compounding lines**
- **Gain insights into global market trends and business strategies**
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Applied Market Information LLC (AMI LLC) is the leading supplier of plastics consultancy and information services to the global plastics industry. Based in Wyomissing, PA, AMI LLC organizes a series of conferences providing an outstanding range of opportunities for business networking.

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***COMPOUNDING WORLD* MAGAZINE**

Compounding World is the monthly digital magazine for the global plastics compounding industry. Published by AMI, it is available free-of-charge online and via free apps for iPads, iPhones and Android-based devices.

www.compoundingworld.com

THE ESSENTIAL MEETING PLACE FOR COMPOUNDERS

Last year, the Compounding World Forum strengthened its position as the leading meeting place for the international plastics compounding industry, attracting over 310 attendees from 18 countries, plus more than 50 exhibitors.

Compounders that have attended the Compounding World Forum include: A Schulman • AGC FluoroCompounds • Albis • Alloy Polymers • Americhem • Ametek Westchester Plastics • Ampacet • APPL Industries • Asahi Kasei Plastics • Ascend Performance Materials • BASF • Borealis • Cabot • CCP Masterbatch • Celanese • Champlain Cable • Chase Plastic Services • Chevron Phillips Chemical • Chroma • Citadel Plastics • Clariant • Colorant Chromatics • Colortech • Competitive Green Technologies • Continental Compounders • Corning Cable Systems • CTC Plastics • Dow Chemical • Duromer Products • Elix Polymers • Enviroplas • ExCista • Felix Compounds • Foster Corporation • Gendon Polymers • Heritage Plastics • Hudson Color Concentrates • Infinity Compounding • Ingenia • Interfacial Solutions • Inteva Products • Invista • IPEX • ITW Formex • Kraiburg TPE • Lehvoss • LTL Color Compounders • Lubrizol • Manner Polymers • Marmon • Mesa Industries • Mitsubishi Chemical Performance Polymers • Modern Dispersions • Nanocomp Technologies • Omni Plastics • Penn Color • PET Processors • Plasticomp • PMC Polymer Products • Polyfil • Polymaterials • Polymera • PolyOne • Polyram • Polyscope • Polyvel • Polyvisions • PTT Global Chemical • Rhetech • Rimtec • Roscom • Rowa Royal Building Products • S&E Specialty Polymers • Sabic • Saco Polymers • Sirmax • So.F.teR • Solvay Specialty Polymers • Southwire • Star Thermoplastics • Styrolution • Styron • Sylvin Technologies • Tapco Group • Tasnee Petrochemicals • TE Connectivity • Tech Blend • Techmer PM • Teknor Apex • Toray Resin • Toyota Tsusho • TPC Wire & Cable • Triad Polymers • Vinacolour • Washington Penn Plastic • Welset • Westlake Chemical • and more!

Companies that have exhibited at the Compounding World Forum include: 3M Advanced Materials • Aaron Equipment • Albemarle • Ametek Westchester Plastics • Asahi Kasei Asaclean • B&P Process Equipment • Bay Plastics Machinery • Brabender Technologie • Brüggemann Chemical • CA Picard • Century Extrusion • Cimbar Performance Minerals • Croda • CW Brabender Instruments • Daihachi Chemical • Eckart • Entek • Excaliber Minerals • ExxonMobil Chemical • Felix Compounds • Fortune International • Fres-Co Systems • Gala Industries • ICMA San Giorgio • Imerys Graphite & Carbon • Jordi Labs • JSW • Laurel Products • LKAB Minerals • Maag Automatik • Mixaco • Modern Dispersions • Momentive • NFM • Norac Additives • Nordson • Omya • Palsgaard • Parkinson Technologies / Key Filters • Pelletron • Pinfa • PMC Polymer Products • Polymaterials • Polyram • Polyscope Polymers • Procotex • Promixon • Reduction Engineering Scheer • Roscom • Rowa • Saint-Gobain • Schenck Process • Sikora • Steer • Struktol • Sushrut Polymers • Total Cray Valley • TPEI • Trendelkamp • Trinity Resources • Welset • WestOne Distribution • Wittmann Extrusion • Xtrutech

CONFERENCE HOTLINE

Contact: Kelly Cressman, Conference Coordinator
Tel: +1 610 478 0800
Fax: +1 610 478 0900
Email: kc@amiplastics-na.com

Turn page for booking details ➤

COMPOUNDING WORLD FORUM 2015 CONFERENCE PROGRAM

Tuesday, December 8, 2015

8:00 Registration and welcome coffee
9:00 Opening announcements

SESSION 1 – GLOBAL COMPOUNDING MARKET TRENDS AND STRATEGIES

9:10 **Analyzing the current and future status of the global compounding industry**
Mr. Andy Beevers, Publisher/Editor, *Compounding World* Magazine,
APPLIED MARKET INFORMATION Ltd., United Kingdom

9:40 Strategies for growing a profitable compounding business in an increasingly competitive global marketplace
PANEL DISCUSSION FEATURING:
Mr. Bernard Rzepka, President & Chief Executive Officer, A. SCHULMAN, United States
Mr. Glenn Rasberry, Vice President, Sales & Marketing, AMETEK WESTCHESTER PLASTICS, United States
Mr. Suresh Swaminathan, Senior Vice President, TEKNOR APEX COMPANY, United States
Mr. Carlos A. Carreno, President, INFINITY LTL ENGINEERED COMPOUNDS, United States

10:40-11:20 Coffee break sponsored by: CPM CENTURY EXTRUSION

SESSION 2 – THE OUTLOOK FOR MANUFACTURING IN THE AMERICAS

11:20 **A European perspective on investing in compounding plants in the Americas**
Dr. Lorenzo Ferro, Vice President Sales & Marketing, SIRMAX NORTH AMERICA, INC., United States

11:50 **The future of manufacturing in North America**
Dr. Kirk Hanawalt, President, ENTEK, United States

12:20 **What the digital revolution means for US manufacturing**
Mr. Jacob Goodwin, Director of Membership Engagement and Communications, DIGITAL MANUFACTURING & DESIGN INNOVATION INSTITUTE (DMDII), United States

12:50-2:20 Lunch

SESSION 3 – DEVELOPING NEW MARKETS AND PRODUCTS

2:20 **Natural fibre reinforced thermoplastics for automotive applications**
Dr. Alexis Baltazar, Product and Process Development Project Manager, MAGNA INTERNATIONAL, Canada

2:50 **Developing advanced compounds for 3D printing applications**
Mr. Tom Drye, Managing Director, TECHMER ENGINEERED SOLUTIONS, LLC, United States

3:20 **New compounds for tribological applications – exploring the potential of aliphatic polyketones**
Dr. Oliver Frey, Head of Compounding Department, ENSINGER GmbH, Germany

3:50-4:30 Coffee break sponsored by: MDV

4:30 **Development of an underwater pelletizing technology for thermoplastic micro granules for use in rotational molding**
Mr. Uwe Neumann, Sales Director, ECON GmbH, Austria

5:00 **Benefits of adding thermal conductivity to plastics in electronics applications**
Dr. Chandra Raman, Applications Development Leader, MOMENTIVE PERFORMANCE MATERIALS, United States

5:30-7:00 Cocktail reception sponsored by: OMYA

Wednesday, December 9, 2015

8:30 Welcome coffee
9:00 Opening announcements

SESSION 4 – ADDING VALUE WITH THE LATEST ADDITIVES

9:10 **Antimicrobial additives for polymers: Selection, case studies and regulatory update**
Dr. Ivan Ong, V.P. R&D, MICROBAN PRODUCTS COMPANY, United States

9:40 **The effect of carbon nanotube fibers on composite properties**
Dr. Joseph Johnson, Principal Scientist, NANOCOMP TECHNOLOGIES, INC., United States

10:10 **Green, safe, sustainable and high-performing functional agents for demanding polymer applications**
Ms. Ekaterina Merzlikina, Technical Sales Manager, PALSGAARD A/S, Denmark

10:40-11:20 Coffee break

11:20 **Robust anti-counterfeiting and efficient material sorting by innovative fluorescent material markers**
Dr. Martin Fahr, R&D, POLYSECURE GmbH, Germany

11:50 **Innovative additives for upgrading the properties of recycled and virgin polyamides and other engineering plastics**
Dr. Ashok M. Adur, Global Commercial Development Director, Plastics, VERTELLUS SPECIALTIES INC., United States

12:20 **Selective phase migration of impact modifiers in polymer blends**
Dr. Jason Lyons, R&D Manager, ARKEMA, United States

12:50-2:00 Lunch

SESSION 5 – GETTING THE MOST FROM COMPOUNDING LINES

2:00 **Conquering the limitations of twin-screw extruders using fractional lobed elements**
Dr. Babu Padmanabhan, Managing Director and Chief Knowledge Officer, STEER ENGINEERING Pvt. Ltd., India

2:30 **One-dimensional simulation for twin-screw compounding: Limitations and opportunities**
Mr. Adam Dreiblatt, Director of Process Technology, CPM CENTURY EXTRUSION, United States

3:00 **Reactive extrusion: Opportunities for improved product performance and manufacturing productivity**
Dr. Paul Andersen, Director, Process Technology, COPERION CORP., United States

3:30-3:45 Closing remarks

3:45 Conference ends

Conference bag sponsored by: STEER

Conference lanyard sponsored by: NFM

Apple Watch giveaway sponsored by: DREYTEK

AMI reserves the right to alter the programme without notice. The latest programme including any new speakers or changes to schedules can be viewed on our website: ***www.amiplastics-na.com***

Click here for a PDF of the brochure

CONFERENCE DETAILS

Image courtesy of:
Loews Philadelphia Hotel

DATE AND LOCATION:
December 8-9, 2015
Loews Philadelphia Hotel
1200 Market Street
Philadelphia, PA 19107, USA
Tel: +1 215 627 1200

HOTEL ACCOMMODATION
The conference fee does not include lodging. We have negotiated a special rate of $189 plus tax per night for a single or double occupancy at the Loews Philadelphia Hotel. To make a reservation, please contact the hotel's reservation department at +1 888 575 6397 by November 6, 2015 and indicate that you will be attending "AMI's Compounding World Forum" to qualify for the special room rate. The hotel rate is guaranteed for a limited number of rooms so do not delay in making your reservation for a room at the conference location.

REGISTRATION FEE
Register before September 25, 2015 for only $1,190. Thereafter the fee will be $1,390. Registration includes all sessions, conference proceedings, cocktail reception, luncheons and break refreshments.

GROUP RATES
For companies wishing to register two or more delegates, group discounts are available. Please contact the Conference Coordinator for more details.

SPONSOR THIS EVENT AND PROMOTE YOUR COMPANY
AMI events are more than just arenas for listening and networking. They also represent highly targeted opportunities to enhance your image and promote your products and services to an international audience.

Each event offers the following unique awareness building opportunities: sponsorship of the welcome cocktail reception, lunches, coffee breaks, and much more. For further information please contact the Conference Coordinator at +1 610 478 0800.

EXHIBITION PACKAGE
This package includes an exhibition space in the conference room where we will be hosting registration, the cocktail reception and coffee breaks, giving exhibitors maximum exposure. It also includes 1 free delegate place. Exhibitors may either use tables provided by the hotel or bring their own stand or display. A limited number of tables are available and are assigned on a first come, first serve basis. The cost of this package is $2,390. Please note: When applicable, exhibitors are responsible for any electricity and/or handling fees involved with their booth. For further information please contact the Conference Coordinator.

SOCIAL EVENTS
The social events organized for AMI's Compounding World Forum 2015 will provide an ideal setting for delegates and speakers to mix business with pleasure. On the first evening, everyone is warmly invited to attend the cocktail reception.

SUBSTITUTIONS / CANCELLATIONS
Delegates may be substituted at any time at no charge. We ask that you provide ample notification of substitution in order that materials can be prepared. Full refunds, less an administrative charge of $200 will only be made on cancellations received prior to September 25, 2015. We regret that we cannot make refunds on cancellations received after this date or for no-shows at the conference. Please note that refunds cannot be made on table top bookings or sponsorship packages.

FAX FORM TO: +1 610 478 0900

CONFERENCE HOTLINE

Ms. Kelly Cressman, Conference Coordinator

Applied Market Information LLC
1210 Broadcasting Road, Suite #103
Wyomissing, PA 19610, USA

Tel: +1 610 478 0800
Fax: +1 610 478 0900
Email: kc@amiplastics-na.com

Please make copies of this registration form for others to use or download a PDF file copy of the brochure from our web site at **www.amiplastics-na.com**

REGISTRATION FORM

Compounding World Forum 2015
December 8-9, 2015
Loews Philadelphia Hotel,
Philadelphia, PA, USA

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Address: _____

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Company activity: _____

Delegate Details

If more than one delegate please photocopy form

Title: _____ First name: _____

Surname: _____

Position: _____

Email: _____

Special dietary requirements: _____

Payment Details

Please make payments in US Dollars ($)

❑	**Delegate fee** (before September 25, 2015)	**$1190**	_____
❑	**Delegate fee** (thereafter)	**$1390**	_____
❑	**Exhibition package** (includes exhibition space and one delegate space)	**$2390**	_____
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We look at a selection of the companies that will be exhibiting at the Compounding World Forum in Philadelphia next month

Compounding World Forum: exhibition preview

The third Compounding World Forum, which takes place in Philadelphia, PA, US on 8-9 December 2015, will feature a large and diverse range of exhibitors in addition to its comprehensive conference programme and extensive networking sessions. The event is organised by *Compounding World* magazine in conjunction with AMI, and this year it is sponsored by Steer, Modern Dispersions, Omya, Dreytek, NFM, CPM Century Extrusion and Nordson.

The conference programme, which was selected by *Compounding World*'s editorial team, features 18 presentations plus a panel discussion with four influential industry leaders. The speakers will cover key strategic issues and technology developments including: global market trends; thermally conductive compounds; natural fibre reinforcements for automotive parts; the return of polyketones; anti-counterfeiting technologies; materials for 3D printing; antimicrobials; computer simulation of the compounding process; digital manufacturing; and getting the most from twin-screw extruders.

We published two detailed previews of the conference presentations in our September and October editions. You can read them here: **http://bit.ly/CWFprev1** and **http://bit.ly/CWFprev2**.

So far, 48 companies have booked their table-top displays in the event's exhibition area. This space will be used before, after and between the conference sessions for refreshment breaks, lunches and the drinks reception, providing plenty of excellent networking opportunities.

Please note that the exhibition area is only open to conference attendees – full details and a booking form can be found at: **http://bit.ly/CWF15P**.

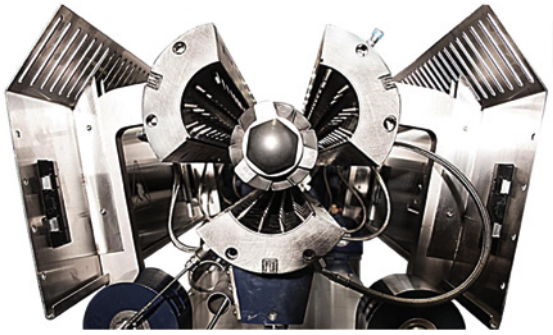
The exhibitors will include suppliers of the full range of compounding equipment including twin-screw extruders, kneaders, mixers, pelletizers, screen-changers, gear pumps, materials handling equipment, quality control systems, plus replacement parts.

On the additives front, the exhibition will include suppliers of fillers, reinforcements, pigments, conductive additives, processing aids, flame retardants, stabilizers, compatibilizers, antioxidants, UV absorbers, lubricants, coupling agents, impact modifiers, plus anti-static and anti-fogging agents.

In addition, the exhibition will include several leading compounders specialising in areas such as toll compounding, additive masterbatches, and engineering plastics.

The following pages feature profiles of the 48 exhibitors that are confirmed at the time of writing. A very limited number of additional exhibition packages are still available on a first-come, first-served basis - see the end of this preview for details.

Main image: The exhibition area at the Compounding World Forum always provides excellent networking opportunities



Right: B&P Process Equipment will be discussing its ground-breaking Trivolution Tri-kneader

This year's exhibitors

3V is a diversified global manufacturer of specialty chemicals and additives, including UV absorbers, antioxidants, flame retardants, optical brighteners and antistatic agents. It is headquartered in Italy and its American operations include a 65-acre manufacturing site in Georgetown, South Carolina.
www.3v.com

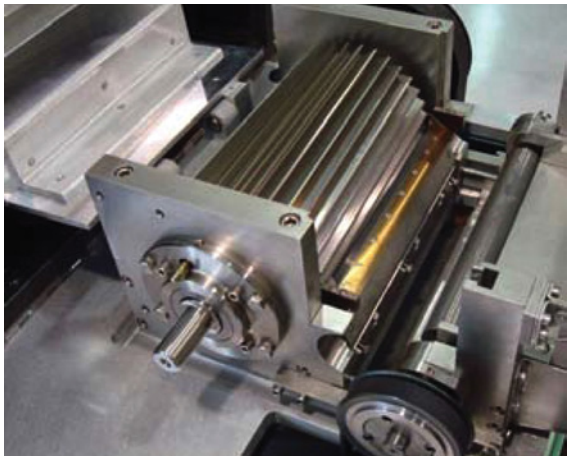
Aaron Equipment is a leading international supplier of used, reconditioned and new process equipment. Trading for more than 75 years, it has an extensive inventory of machinery for the compounding industry and a large and experienced team to provide help and support.
www.aaronequipment.com

Addivant supplies a wide range of additives for polymers including antioxidants, light stabilizers, modifiers, polymerization inhibitors, antiozonants and curing agents. It offers solutions for engineering plastics, biopolymers, elastomers, polyolefins, PVC, styrenics, polyurethanes and rubber.
www.addivant.com

Right: Brabender's FlexWall feeders are designed to cope with hard-to-handle materials

Alternative Rubber & Plastics is an ISO 9001 certified distribution company supplying raw materials to the plastics and rubber industries. Its broad product range includes Keliren CPE for improving the impact resistance and weatherability of PVC, and Nitriflex NBR for use in PVC, EVA or ABS.
www.altrubber.com

Ametek Westchester Plastics is a major independent toll compounder of engineering resins, alloys, blends, reactive modifiers and other thermoplastics. It operates two large custom-compounding plants in the US located at Nesquehoning, Pennsylvania, and at Wapakoneta, Ohio.
www.ametek-westchesterplas.com



Right: Bay Plastics Machinery will be highlighting its strand pelletizing systems

B&P Process Equipment is a US-based manufacturer of the full range of compounding equipment including kneaders, twin-screw extruders and mixers. It will be highlighting the latest achievements of its ground-breaking Trivolution Tri-kneader, which opens up new levels of mixing performance.
www.bpprocess.com

Bay Plastics Machinery supplies a full range of strand pelletizers, water baths, air knives and spare parts. Located in Bay City, Michigan, the company also provides comprehensive support services including rotor sharpening, pelletizer rebuilds and repairs, technical support and testing.
www.bayplasticsmachinery.com

Brabender Technologie is an international supplier of high-precision feeding equipment, including FlexWall, agitated, vibratory and weigh-belt designs. It specialises in the starve feeding of pellets, powders, flakes and fibres into co-rotating twin-screw extruders for compounding applications.
www.brabenderti.com

Budenheim offers a range of additives for a wide variety of polymers. They include flame retardants for engineering plastics, polyolefins, TPEs and WPCs, plus smoke suppressants for PVC. It also supplies specialty additives for foamed plastics, and heating accelerators for polyolefins and PET.
www.budenheim.com

Buss is the world's leading manufacturer of kneader systems for the compounding of plastics. Its latest Quantec and MX machines are ideally suited to a range of demanding applications including PVC compounds, cable

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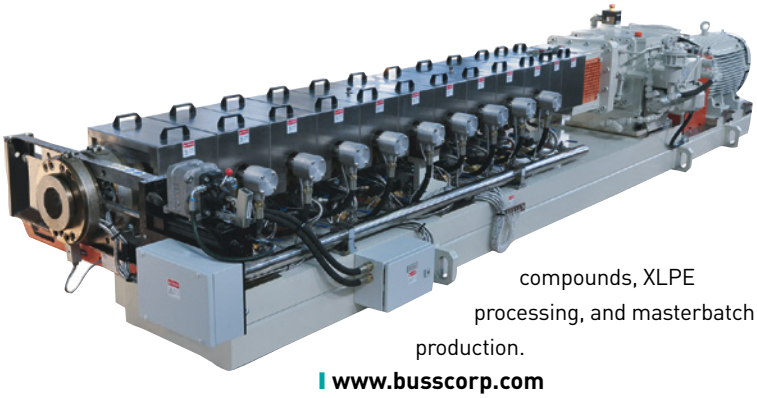


compounds, XLPE processing, and masterbatch production.

www.busscorp.com

Above: Century Extrusion supplies twin-screw extruders, replacement parts and related support services

CPM Century Extrusion is an international supplier of twin-screw extruders, replacement parts and support services. It has a factory located in Traverse City, Michigan, US, while its sister company Ruiya Extrusion has a manufacturing plant in Nanjing, China.

www.centuryextrusion.com

C.W. Brabender Instruments manufactures lab-scale twin-screw compounding lines. These include table-top and free-standing models with clam-shell barrels and 12- to 20-mm diameter screws. It also supplies other materials development and testing equipment, including rheometers and mixers.

www.cwbrabender.com

Dreytek Performance Products is a distribution company that offers a broad array of specialty polymers and additives for compounded products. These include NPS chopped and milled PAN carbon fibres, Krefine carbon for ESD applications, Kitamura PTFE and ZY-PEEK.

Liz.gershon@dreytek.com

Right: C.W. Brabender Instruments specialises in lab-scale twin-screw compounding lines

Econ is an Austrian manufacturer of underwater pelletizing systems that now has a US subsidiary. Its pelletizers feature thermal insulation technology for quick and easy start-ups and improved temperature control across the die face. It also offers pellet drying systems and screen-changers.

www.econ.eu

Entek is a major US-based manufacturer of co-rotating twin-screw extruders for compounding applications, including turn-key systems. Through its Entek Plus business unit, the group also supplies replacement wear parts, not only for its own extruders, but for other makes as well.

www.entekextruders.com

Fortune International Technology is a distributor of colorants and additives with offices in Chicago, Cincinnati and Cleveland. The company has developed relationships with the largest ISO certified Chinese suppliers of organic, inorganic and pearlescent pigments as well as various additives.

www.fortuneintltech.com

Fres-co System offers distinctive barrier packaging solutions for protecting the integrity of polymer resins and a range of other products. Its Termalock industrial sealer is an affordable and advanced solution to improve production efficiency, extend product shelf-life and reduce transportation costs.

www.fresco.com

Gala Industries is a leading global manufacturer of pelletizing systems and centrifugal dryers, with locations in the US, Germany and Thailand. Its pellet production processes are used in a wide array of applications from commodity plastics and recycling to engineering resins and reaction processes.

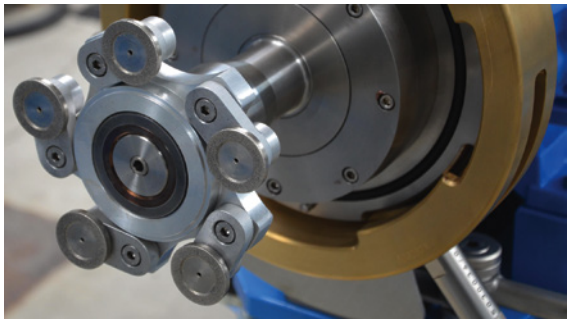
www.gala-industries.com

Hangzhou JLS is a supplier of halogen-free flame retardants that has its HQ in China and operates a global marketing network. Its product range includes ammonium polyphosphate, melamine cyanurate, melamine polyphosphate and intumescent flame retardants, plus HFFR compounds.

www.jlschemical.com

Imerys Graphite & Carbon supplies a range of specialty carbons for polymer compounds. These include Ensaco Timcal carbon blacks for adding electrical conductivity, plus Timrex Timcal graphite and coke powders. Timrex C-Therm grades are used for adding thermal conductivity.

www.imerys-graphite-and-carbon.com



Right: Gala's die plate grinding tool is an example of its focus on increasing pelletizing productivity

PolymerFoam2016

International conference on foam technology and applications in thermoplastic and elastomeric products

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Images courtesy of: **Reedy Chemical Foam, Biopolymer Network Ltd., Hanon Systems, and Coperion GmbH**

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Right: Japan Steel Works recently launched a lab version of its TEX Alpha III twin-screw extruder

IMI FABI is a leading talc manufacturer with mining and milling locations around the world. Headquartered in Postalesio, Italy, the company has grown over the years and now has operations in Europe, North America, Asia and the Middle East, supplying consistent products globally.
www.imifabi.com

Japan Steel Works (JSW) is a major supplier of twin-screw extruders as well as support services and parts. Its latest TEX Alpha III series machines deliver high torque, screw speeds and durability. The Japanese company operates technical trial centres in Novi, Michigan, USA, and in Overpelt, Belgium.
www.jswcompounding-usa.com

Maag Automatik produces a wide range of pelletizing systems including underwater, strand, belt-conveyor and drop-pelletizing designs. In addition, the company offers pellet dryers and pelletizing components. It is part of Maag, which also manufactures gear pumps and melt filtration systems.
www.maag.com

Mixaco is a leading supplier of mixers for the plastics colour industry, including high, medium and low intensity blending systems. Headquartered in Germany, the company has a test facility in Greer, South Carolina. This can be used for blender trials and for developing new formulations.
www.mixaco.com

Modern Dispersions Inc (MDI) is a leading manufacturer and compounder of black masterbatch and specialty compounds, including conductive grades and WPCs. It is one of the largest carbon black masterbatch producers in North America with plants in Leominster, MA and Fitzgerald, GA.
www.moderndispersions.com

Right: NFM Welding Engineers will be discussing its TEM co-rotating twin-screw extruders

NFM Welding Engineers produces TEM co-rotating twin-screw extruders that are used for compounding polyolefins or engineering resins, as well as for masterbatch production and recycling. It also offers WE counter-rotating non-intermeshing machines with high free-volume and low-shear.
www.nfm.net

Nordson's Polymer Processing Systems group includes: Nordson BKG, which produces pelletizing systems; Nordson Kreyenborg, the melt filtration and pumping specialist; Nordson Xaloy, which focuses on screws and barrels; and, Nordson Extrusion Dies Industries, the flat die producer.
www.nordsonpolymerprocessing.com

Omya is a leading global producer of mineral fillers and pigments based on calcium carbonate. It is also a worldwide distributor of specialty chemicals including a wide range of plastics additives, such as pigments, biocides, impact modifiers, flame retardants, plus antistatic and antiblocking agents.
www.omya.com

Palsgaard of Sweden produces sustainable vegetable-based functional agents for polymer applications. Its additives, which are are food-contact-approved, include anti-fogging and anti-static agents for polyolefins and additive masterbatch applications.
www.palsgaard.com

Plas Mec of Italy is a leading manufacturer of industrial mixing systems for a variety of applications including masterbatch, pigments, PVC dry blend, wood-plastic composites, thermoplastic rubbers and powder coatings. It also offers laboratory mixers and operates an extensive test facility.
www.plasmec.it

Pluss Advanced Technologies of India is a materials research and manufacturing company

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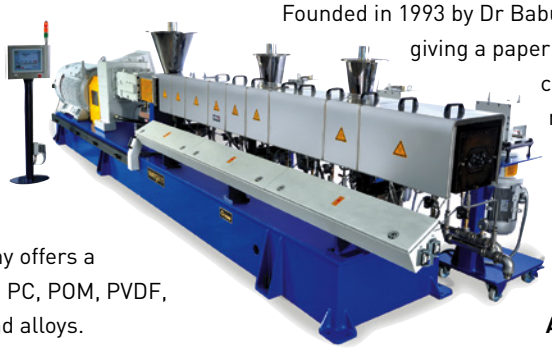
Right: Polyscope will be showcasing the properties and application of its SMA copolymers

focused on specialty polymeric additives and phase change materials. It offers functionalised polymers to improve the properties of engineering plastics in a wide range of different ways.
www.pluss.co.in



Right: Steer will be highlighting the capabilities of its twin-screw extruders, such as this Omega machine

Polyram is a leading manufacturer of engineering thermoplastic compounds for the automotive, electrical, irrigation and construction industries. Headquartered in Israel, the international company offers a wide range of PA, PE, PBT, PET, PC, POM, PVDF, LGF and styrenic compounds and alloys.
www.polyram.co.il

Polyscope is a leading producer of styrene maleic anhydride (SMA) copolymers, which it offers as Xiran resins, compounds, powders and liquids. It recently launched Xeran high-molecular weight SMA compatibilizers and coupling agents for engineering plastics.
www.polyscope.eu

Promixon manufactures mixing systems for plastics and powder coatings. Its range includes high-speed TMX turbomixers and CMX high-efficiency coolers for the production of PVC dryblend. The turbomixers can also be used for mixing powders, additives, colours, masterbatch and polymers.
www.promixon.com

Right: Schenck Process focuses on feeding equipment that can handle difficult-to-feed materials

Saint-Gobain Ceramic Materials will be showcasing its hexagonal boron nitride products, specifically its CarboTherm thermal management fillers for the production of thermally conductive plastic compounds. The additives are electrically insulating, lubricous and non-abrading.
www.saint-gobain.com

Schenck Process specialises in measuring and process technologies for industrial weighing, feeding, conveying, screening, automation and air filtration. Its dry bulk solids handling equipment is capable of handling difficult-to-feed materials such as TiO_2, carbon black, wood flour, and iron based oxides.
www.schenckprocess.com

Sikora supplies innovative online measuring, control, inspection and sorting equipment for the wire/cable, hose/tube, optical fibre and plastics industries. Its latest product is the Purity Scanner for inspecting and sorting plastics pellets, reliably removing any contaminated material.
www.sikora.com

Steer develops, manufactures and supplies innovative twin-screw extruders for compounding applications. Founded in 1993 by Dr Babu Padmanabhan (who will be giving a paper at the conference), the company is known for its novel and highly efficient screw element designs.
www.steerworld.com

Sun Plastech manufactures and distributes **Asaclean** purging compound. The resin-based, mechanical-type purging compound contains no harmful chemicals and is specially formulated to ensure excellent compatibility with various types of thermoplastic resins.
www.asaclean.com

Tomra Sorting is a leading provider of sensor-based sorting and processing technology including special systems for polymer pellet sorting. Pellets can be separated according to colour, structure and shape to improve the product quality by removing any defective material or contaminants.
www.tomra.com

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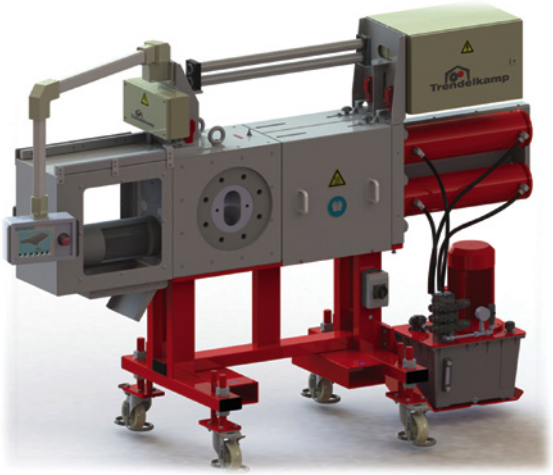
Right: TPEI's Free Rotor continuous mixers are capable of processing a wide variety of thermoplastics

Total Cray Valley is a global manufacturer of specialty low molecular weight additives based on various chemistries. These include functional dyne-based polymers, styrene maleic anhydride copolymers; (meth)acrylate functional metallic monomers, and hydrocarbon resins.
www.crayvalley.com

Right: Zoltek is focused on reducing the cost of carbon fibres to broaden their applications

TPEI is a leading American producer of continuous mixers and single-screw extruders, which are used together in its integrated compounding systems. These are capable of processing a wide variety of thermoplastics and rubbers, and can be used to deliver very high filler or pigment loadings.
www.tpei.com

Trendelkamp supplies melt filtration systems, pellet classifiers, diverter valves and degassing systems for extruders. Its range of screen-changers includes continuous, discontinuous and back-flush designs. The company has its headquarters in Germany and a US subsidiary in Atlanta, Georgia.
www.trendelkamp.com



Right: Trendelkamp supplies melt filtration systems for extruders

Waste to Energy Partners works with facilities that create and/or accept solid waste. It collaborates with them to develop projects that will help to divert solid waste from landfills and produce renewable energy with an abundantly available resource.
www.wastetoenergypartners.com

Wittmann Extrusion offers a wide range of equipment for extrusion lines including: continuous blending; extrusion yield control systems; film/trim scrap recovery; die tooling; cooling tanks; vacuum sizing and calibration tanks; haul offs; cutters; texturing; and collection units.
www.wittmann-group.com

Xtrutech specialises in the design and optimisation of twin-screw extruders. It supplies spare parts, such as screw elements, shafts, and barrel housings and liners, for a wide range of different twin screw extruder makes and models. It also produces its own XTS twin-screw extruders and ancillary equipment.
www.xtrutech.com

Zeppelin Systems is a leading manufacturer of plants for storing, conveying, mixing, blending and dosing bulk solids. Its extensive product range includes a wide range of Henschel mixers plus twin-screw compounders as well as single-screw extruders.
www.zeppelin-systems.com

Zoltek is a carbon fibre supplier focused on reducing the cost of this high-performance reinforcement to accelerate its commercialisation in mainstream applications. Part of the Toray Group, Zoltek offers continuous tow, chopped fibres and milled fibres for engineering plastics.
www.zoltek.com

More information

The exhibition and the conference sessions at the **Compounding World Forum** are only open to registered attendees. For more details on how to book your place, visit **http://bit.ly/CWF15P**.

At the time of writing, a very limited number of exhibition spaces are still available on a first-come, first-served basis. For details, please contact Kelly Cressman: Phone: +1 610 478 0800; Email: **kc@amiplastics-na.com**.
www.amiconferences.com

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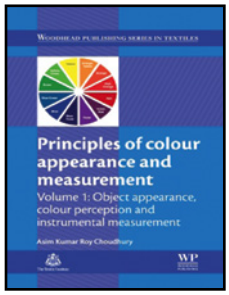
PRINCIPLES OF COLOUR APPEARANCE AND MEASUREMENT, VOL.1



2014, by Choudhury,
€203.00 or £150.00 or $240.00

Object appearance, colour perception and instrumental measurement.

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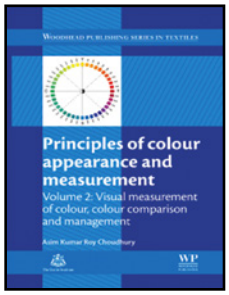
PRINCIPLES OF COLOUR APPEARANCE AND MEASUREMENT, VOL.2



2014, by Choudhury,
€169.00 or £125.00 or $200.00

Visual measurement of colour, colour comparison and management.

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2014, by Christie,
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Fully revised and expanded guide to the chemistry of dyes and pigments.

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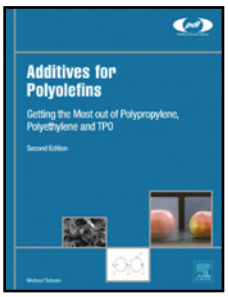

2015, by Tolinski,
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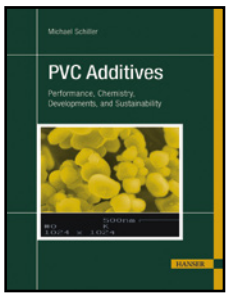

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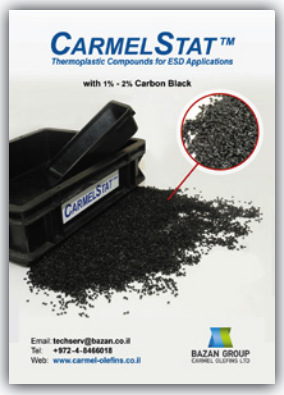
Bazan Group: Antistatic compounds



The CarmelStat range of carbon-black filled compounds from Bazan Group's Carmel Olefins provide ESD-protection solutions for a wide range of industries. This 8-page brochure details mechanical and electrical performance.

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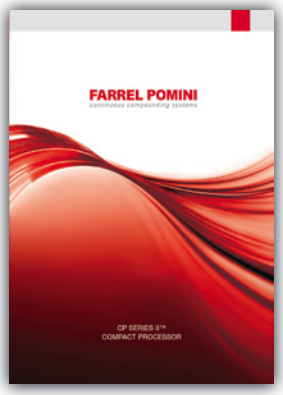
Farrel Pomini: CP Series II



This brochure focuses on Farrel Pomini's CP Series II Compact Processor, which combines an independently controlled continuous mixer with an extruder system to ensure excellent levels of dispersion.

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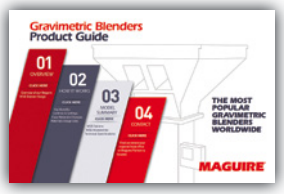
Maguire: gravimetric blenders



This interactive product guide covers Maguire's full range of WSB gravimetric blenders. It explains how the blenders operate and includes technical specifications, key benefits, plus options and accessories.

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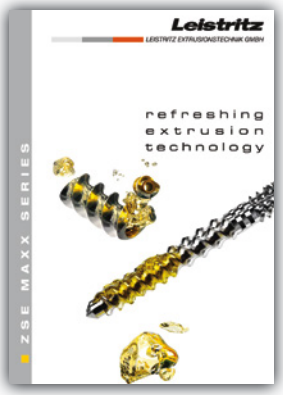
Leistritz: ZSE MAXX extruders



This 12-page brochure covers Leistritz's state-of-the-art ZSE MAXX twin-screw extruders in great detail. These high-torque, high-volume machines have been developed to deliver improvements in productivity, throughput and quality.

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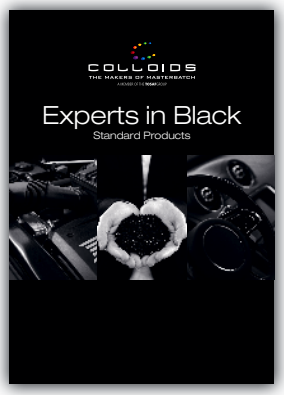
Colloids: Experts in black



Colloids offers one of the widest standard ranges of black masterbatch on the market. This publication lists details of 26 standard grades, providing data on carrier resins, polymer compatibility, carbon black type, food approval and usage recommendations.

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ENTEK: Extrusion Solutions

This six-page newsletter from ENTEK details the use of the company's twin-screw extruders at composite roof shingle producer DaVinci Roofscapes. It also includes information on the company's QC3 productivity technologies, now available on 27, 43 and 53mm models.

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Stretch & Shrink Film

AMI's 10th annual Stretch & Shrink Film conference is being held in New Orleans, Louisiana, USA, on 17-18 November. The programme covers the latest business trends, materials developments, and process technologies.

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Waterproof Membranes

AMI's Waterproof Membranes conference is next being held in Bonn, Germany on 17-19 November. Check out the programme which covers market trends, technical innovations, manufacturing, installation techniques and performance issues.

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Wind Turbine Blade Manufacture

AMI's sixth Wind Turbine Blade Manufacture conference will be held in Dusseldorf, Germany, on 30 November to 2 December. This event brings together energy farmers, turbine producers, blade manufacturers, design engineers and composites experts.

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Thin Wall Packaging

AMI's 10th international Thin Wall Packaging conference will take place on 1-3 December 2015 in Cologne, Germany. Download the programme, which covers developments in plastics tubs, cups and tray packaging.

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AMI Strategy Seminars

AMI's research director Andrew Reynolds is running a series of one-day Global Plastics Industry Seminars in 2015 with dates set for Europe, Asia and the Middle East. This brochure has all the details.

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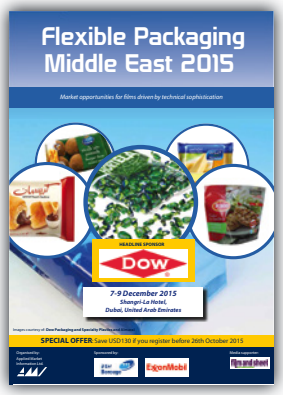
Flexible Packaging Middle East



AMI is holding its seventh Flexible Packaging Middle East conference on 7-9 December in Dubai, UAE. Download the brochure to check out the line-up of expert speakers covering market and technology developments.

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Compounding World Forum

The third Compounding World Forum will be held in Philadelphia on 8-9 December. Its programme boasts experts on additive technologies and process optimisation, plus influential leaders from the international compounding industry.

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Oil & Gas Non-Metallics

AMI's international conference on polymer material selection, qualification and use in oilfield and gas engineering applications will be held in London, UK on 8-10 December. Check out the full programme in this four-page brochure.

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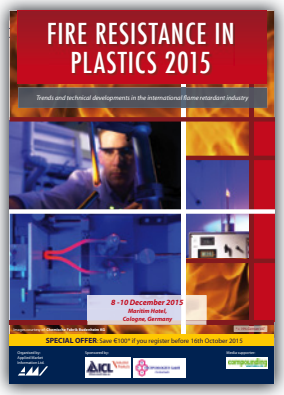
Fire Resistance in Plastics



AMI's 10th Fire Resistance in Plastics conference returns to Cologne, Germany on 8-10 December. Download the comprehensive programme that covers changing market demands plus the latest FR additives and compounds.

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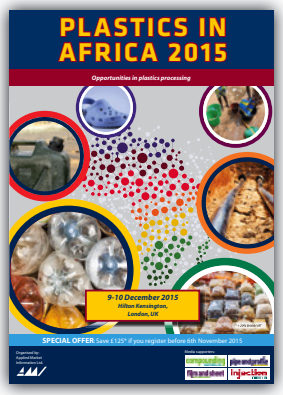
Plastics in Africa



AMI's first international conference on Plastics in Africa is taking place on 9-10 December in London, UK. The programme features leading experts who will provide very valuable insights into this dynamic emerging market.

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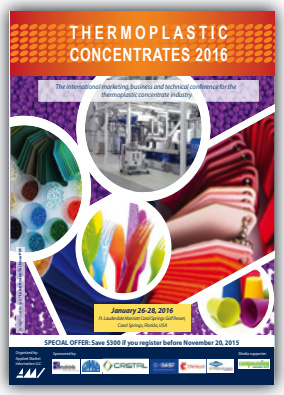
Thermoplastic Concentrates



AMI's well-established Thermoplastics Concentrates conference continues to attract an influential audience and an impressive line-up of speakers covering the latest masterbatch trends. Download the brochure to check out this year's programme.

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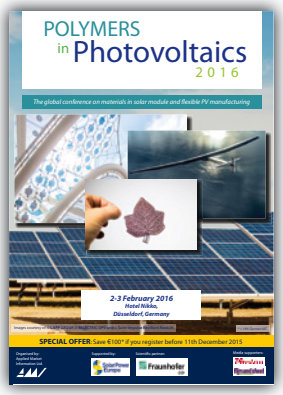
Polymers in Photovoltaics



AMI's global conference on materials for solar module and flexible PV manufacturing will next take place on 2-3 February in Dusseldorf, Germany. Download this brochure to see the full line-up of speakers.

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Polyethylene Films

Polyethylene Films 2016 will take place on 2-4 February at Daytona Beach, Florida, USA. The programme for this market leading event covers film production, market strategies, advanced materials, and machinery developments.

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The Grass Yarn & Tufters Forum

The 11th Grass Yarn & Tufters Forum takes place in Berlin, Germany, on 15-17 February 2016, providing an unmatched opportunity to explore the technical and commercial developments taking place in the artificial grass and synthetic turf industry.

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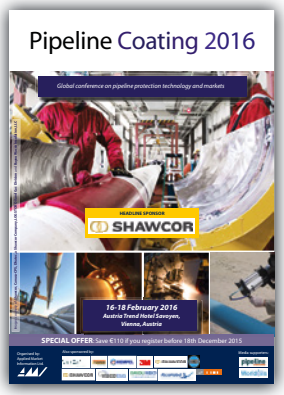
Pipeline Coating 2016



Taking place in Vienna, Austria, on 16-18 February 2016, AMI's Pipeline Coating conference provides a unique forum for the world's leading pipeline experts to discuss the latest pipeline protection technology and industry trends.

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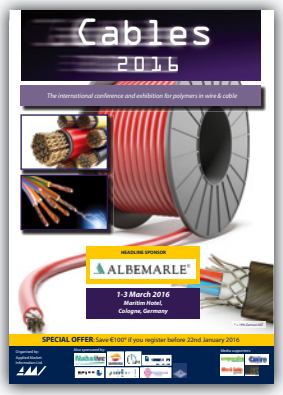
Cables 2016



AMI's 16th international conference and exhibition for polymers in wire and cable applications is being held in Cologne, Germany, on 1-3 March 2016. This prestigious event regularly attracts over 250 attendees.

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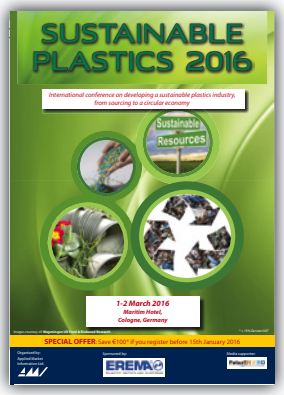
Sustainable Plastics



This conference on developing a sustainable plastics industry is on 1-2 March 2016 in Cologne, Germany. Critical issues from eco-design through to end-of-life recovery will be covered by expert speakers, including representatives from Philips, Renault and Marks & Spencer Foods.

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Wood-Plastic Composites

AMI's 11th Wood-Plastic Composites conference will take place on 7-9 March 2016 in Vienna, Austria. Check out the impressive programme, which includes a site visit and machine demos at Battenfeld-Cincinnati.

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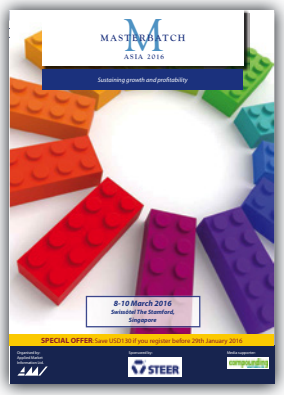
Masterbatch Asia 2016



Now in its 12th year, Masterbatch Asia takes place from 8-10 March in Singapore and provides an international forum for all in the Asian masterbatch production sector and its supply chain to learn about the trends that will influence the industry across the region.

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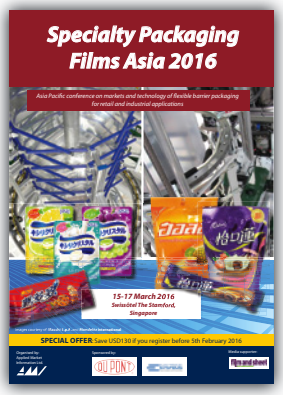
Specialty Plastics Films Asia



AMI's third Specialty Packaging Films Asia conference takes place in Singapore on 15-17 March. This high level event will bring together an international audience of speakers from across the supply chain to detail new technical and commercial developments.

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Polymer Foam 2016

Taking place in Newark, NJ, USA, on 5-6 April 2016, Polymer Foam will give attendees an opportunity to network and discuss the latest foam production technologies and markets and to explore new and emerging applications of cellular polymer materials.

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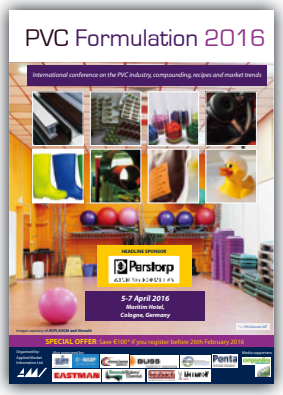
PVC Formulation 2016



The eighth PVC Formulation conference takes place in Cologne in Germany on 5-7 April 2016. This leading international event provides a place for PVC compounders to keep pace with the latest technical, market, additive and recipe developments.

➤ **Click here to download**

Polymer Testing & Analysis

This brand new conference will be held in Cologne, Germany, on 12-14 April and will provide a valuable meeting place for scientists, researchers and R&D professionals developing, testing and analysing new polymer materials and products.

➤ **Click here to download**

Compounding World Congress

Taking place in Cologne, Germany, on 18-20 April, AMI's second Compounding World Congress will provide a vibrant meeting place for compounders from across Europe and further afield to discuss some of the market trends and technical innovations shaping this industry.

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To see our full line-up of more than 30 plastics industry events over the next 12 months, please visit www.amiconferences.com

S&E Specialty Polymers, LLC

Head office location:	Lunenburg, Massachusetts, US
Date founded:	2004
Managing Partner:	Duane Shooltz
Ownership:	Privately owned
No. of employees:	64
Plant locations:	Lunenburg, Massachusetts
Production 2014:	10,500 tonnes
Profile:	S&E Specialty Polymers is a US custom and toll manufacturer of advanced plastic compounds and masterbatches. Early in 2014 the company installed an Entek 53mm co-rotating twin screw extruder, which raised its annual masterbatch tolling capacity to 7,000 tonnes. With a wide range of manufacturing capabilities and an annual capacity of around 30,000 tonnes, S&E is well positioned for further growth in demand.
Product line:	S&E produces a wide range of PVC, TPR, TPE and TPO formulations, with special emphasis on flame retardant, low smoke and zero halogen polyolefin and PVC compounds and masterbatches. It supplies a variety of industries including automotive, wire & cable, battery, footwear and other consumer, industrial and general purpose applications. S&E's manufacturing systems feature six production lines, three continuous processors, Banbury extruder, the latest Entek line and another 28mm twin screw extruder which is dedicated for R&D requirements.
Product strengths:	Tolling and colour matching capabilities allow S&E to participate at the highest level within the compounding industry. The company holds ISO 9001 and ISO 17025 certifications and numerous UL and automotive approvals.

To be considered for 'Compounder of the Month' contact Karla Vittova at kv@amiplastics.com

compounding WORLD

Forthcoming features

The next issues of Compounding World magazine will have special reports on the following subjects:

December
Flame retardants
Laboratory compounders
Anti-counterfeiting additives

January 2016

Editorial submissions should be sent to Chris Smith: cs@amiplastics.com

For information on advertising in these issues, please contact:
Levent Tounjer: lt@amiplastics.com Tel: +44 (0)117 314 8183
Claire Bishop: claire@amimagazines.com Tel: +44 (0) 1732 605976

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Compounding World – Oct
The October edition of Compounding World looks at market developments in the global TiO_2 industry. It also reviews the latest innovations in reinforcing fibres and in-line pellet inspection technology. Plus, it includes a detailed preview of Germany's Fakuma show.

➤ Click here to view

Compounding World – Sept
The 90-page September edition of Compounding World takes a look at the latest developments in pigments for plastics, plus a review of polyolefin additives and the latest innovations in polymer testing systems.

➤ Click here to view

Injection World – Oct
The October edition looks at polymer and processing developments in the Electrical & Electronics markets, innovations in additive manufacturing, and the latest materials handling equipment. Plus, a 15-page preview of Germany's Fakuma show.

➤ Click here to view

Injection World – Sept
The September issue of Injection World examines how moulders can cut their energy usage and reviews the latest developments in medical moulding. Plus, cleanroom selection tips and innovations in optical plastics production.

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Pipe and Profile – Oct
The October edition of Pipe and Profile Extrusion looks at the latest developments in PVC-O pipe and reviews new pipe inspection techniques. It also explores the latest innovations in post processing equipment and high efficiency extruder technology.

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Film and Sheet – Oct
The October edition of Film and Sheet Extrusion takes a close look at the latest polymer innovations for photovoltaic applications. It also examines new developments in multi-layer packaging, advances in extruder technology, and additives for enhancing the performance of polyolefins.

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Global exhibition guide

2015		
17-20 November	Iplas, Guayaquil, Ecuador	www.aseplas.ec
18-21 November	Plastics & Rubber Indonesia, Jakarta	www.plasticsandrubberindonesia.com
27-30 November	Indplas, Kolkata, India	www.indplas.in
3-6 December	Plast Eurasia, Istanbul, Turkey	www.plasteurasia.com
2016		
18-21 January	Saudi Plastics & Petrochem, Riyadh	www.saudipp.com
26-29 January	Interplastica, Moscow, Russia	www.interplastica.de
22-25 February	Plastivision Arabia, Sharjah, UAE	www.plastivision.ae
1-3 March	Plastics & Rubber Vietnam, Ho Chi Minh	www.plasticsvietnam.com
8-10 March	JEC World, Paris, France	www.jeccomposites.com
8-11 March	Plastimagen, Mexico City, Mexico	www.plastimagen.com.mx
13-14 April	Plastteknik Nordic, Malmö, Sweden	www.easyfairs.com
25-28 April	Chinaplas, Shanghai, China	www.chinaplasonline.com
4-7 May	Plastech Izmir, Izmir, Turkey	plastech.izfas.com.tr
13-16 June	Argenplas, Buenos Aires, Argentina	www.argenplas.com.ar
14-15 June	PDM, Telford, UK	www.pdmevent.com
26-30 September	Colombiaplast, Bogota, Colombia	www.colombiaplast.com

AMI conferences

8-9 December	Compounding World Forum, Philadelphia, PA, USA
8-10 December	Fire Resistance in Plastics, Cologne, Germany
9-10 December	Plastics in Africa, London, UK
26-28 January	Thermoplastic Concentrates, Coral Springs, FL, USA
1-3 March	Cables, Cologne, Germany
1-2 March	Sustainable Plastics, Cologne, Germany
7-9 March	Wood-Plastic Composites, Vienna, Austria
8-10 March	Masterbatch Asia, Singapore
5-7 April	PVC Formulation 2016, Cologne, Germany
12-14 April	Polymer Testing & Analysis, Cologne, Germany
18-20 April	Compounding World Congress, Cologne, Germany

For information on all these events and other conferences on film, sheet, pipe and packaging applications, see

www.amiplastics.com

OCTOBER 2015 EDITION

Extrusion Solutions

THE LATEST EXTRUDING NEWS FROM ENTEK

DaVinci Roofscapes CHOOSES ENTEK

Industry Leader in Composite Roof Shingles Relies on ENTEK Twin-Screw Extruders for Compounding Needs

Founded in 1999, DaVinci Roofscapes (Lenexa, KS – davinciroofscapes.com) is a pioneer in the development and commercialization of composite polymer roofing. The first DaVinci roofing product was installed in 2001; today, their line of polymer slate and shake roof tiles can be found on buildings across the USA and internationally – from Canada to the Caribbean to China.

The proprietary materials compounded by DaVinci are the secret to their product success. The environmental challenges the materials must meet are daunting: the roofing products are embedded with state-of-the-art UV stabilizers and are designed to resist curling, cracking and fading, mold, algae, fungus and insects. In addition, they are designed to resist water absorption, which eliminates freeze-thaw issues. With such critical performance requirements, these materials need excellent compounding machinery and equipment; because of this, DaVinci turned to ENTEK for its extrusion needs.

Up and Running

DaVinci first approached ENTEK when the company needed assistance with its non-ENTEK twin-screw extruders. "They were having some production issues with their existing machines, and we helped them with advice and new replacement wear parts to help them improve their processing," said Linda Campbell, ENTEK Regional Sales Manager.

Because of the expertise ENTEK showed in helping solve some of DaVinci's processing issues, the company purchased a new ENTEK 73mm twin-screw extruder to support their growing business. The results have been impressive.

"The ENTEK 73mm twin-screw extruder is a workhorse," said Johnny Lopez, Compounding Manager at DaVinci. "It outperforms our other larger twin-screw extruders."

In addition to the excellent output, the ENTEK extruder and auxiliaries have helped DaVinci ensure optimum product quality.

(continues on page 4)

"The new QC³™ platform is one that we are truly proud to have brought to market. It represents the best of what a team of professionals can do when they actually ask customers what they want..."

2015 – A Very Good Year

Welcome to the latest issue of *Extrusion Solutions*.

As this issue goes to press it's been just over six months since NPE2015 was held in Orlando, FL. It would be an understatement to say this was a great show, both for ENTEK and the North American plastics industry as a whole.

NPE2015 brought in a record number of exhibitors, and almost 20% more show space was used than at the last NPE. The mood on the show floor was upbeat and we at ENTEK were especially happy with the large turnout of interested visitors to our booth, many who came to see our newest machine, the QC³-43MM twin-screw extruder. Interest in our new machine was great and we are continuing to see a lot of NPE-generated activity.

A big thank you goes out to all of our internal team here at ENTEK who worked many long hours planning and executing our NPE booth, displays and messaging. I also want to thank all of you who stopped by to see us at NPE, and we will look forward to seeing you again in Orlando at NPE2018!

QC³™ Updates

We are happy to announce some news regarding ENTEK's new QC³™ (Quick Change, Quick Clean, and Quality Control) machine platform:

1) we have added a new machine, our QC³-43MM twin-screw extruder, to our in-house development lab, where it is now being used for customer compounding trials (see story on p. 5), and
2) we have recently expanded the QC³™ platform by adding many of the features of the QC³-43MM twin-screw extruder to our 27MM and 53MM machines (see story on p. 3).

The new QC³™ platform is one that we are truly proud to have brought to market. It represents the best of what a team of professionals can do when they actually ask customers what they want, and need, in a twin-screw extruder – and then set out to provide a machine that meets or exceeds those needs.

Good Times

I'm happy to report that business at ENTEK is good, and well balanced: we are welcoming numerous new customers, continuing to support existing customers, and helping them grow their businesses around the globe.

Our sales of ENTEK twin-screw extruders and replacement wear parts are strong, and Plant Services continues to be a growing part of our business. Teams of ENTEK engineers (electrical, mechanical, controls, and others) are working to design and install complete extrusion systems and manufacturing plants.

Thank you to all of our customers for their continued support.

As always, I encourage you to contact me anytime at khanawalt@entek.com.

Sincerely,

Kirk R. Hanawalt

Dr. Kirk Hanawalt
President, ENTEK Extruders

ENTEK Expands QC3™ (Quick-Change, Quick-Clean, and Quality Control) Capabilities to Additional Co-rotating Twin-Screw Extruder Models

ENTEK has recently introduced new QC3™ (Quick-Change, Quick-Clean, and Quality Control) features to both its 27MM and 53MM co-rotating twin-screw extruders. These features were originally introduced on the all-new ENTEK QC3-43MM co-rotating twin-screw extruder that the company launched at NPE 2015 in Orlando, FL.

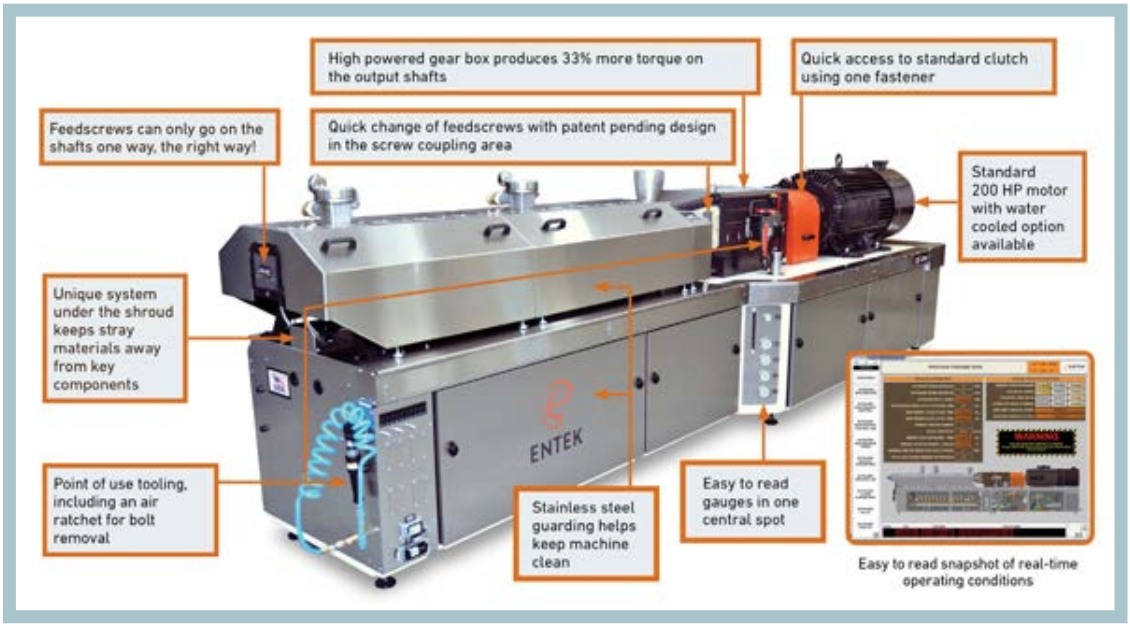
The addition of these new features to the ENTEK 27MM and 53MM twin-screw extruders marks the next phase of the plan to integrate many of the features of the QC3-43MM machine into the entire ENTEK twin-screw extruder product line. These features were incorporated into the new QC3-43MM after several years of design and development, where ENTEK worked closely with its customers and used lean principles to deliver a machine that provides important benefits to compounders.

New features now being incorporated into the ENTEK 27MM and 53MM co-rotating twin-screw extruders include:

- quick-align shaft to gearbox couplers
- shroud covers incorporate single-turn fasteners
- quick-open guards for easy access to screw couplings and clutch
- air deflector on end of motor
- point-of-use tool kit with all necessary tools mounted in holder on machine

"The response to our new QC3-43MM machine has been tremendous, and we are happy to be able to now offer our customers the same features on our 27MM and 53MM twin-screw extruders as well," said John Effmann, ENTEK Extruders' Director of Sales & Marketing. "All of these benefits were things that our customers communicated to us that they wanted, to solve common problems, make their lives easier and ultimately improve their productivity."

ENTEK builds co-rotating twin-screw extruders up to 133MM. The plan is to phase in the QC3™ design changes to the entire machinery line in the future.



QC3™ Features and Benefits

'QC3™' stands for Quick Change, Quick Clean, and Quality Control, and represents features that provide important benefits to compounders:

• **Quick Change:** allows for fast, easy screw-set changeovers. New self-alignment feature takes the worry out of installing the screws into couplings. Guards come off quickly, and go back on the same way. All necessary tools for changeover and maintenance are mounted at point-of-use on the extruder.

(continued on next page)

ENTEK Expands QC^{3}™

(continued from page 3)

• **Quick Clean:** New extruder frame design deflects dust and keeps machine clean under the hood, and Stainless Steel and powder-coated surfaces look great today and 10 years from now. Optional device allows for fast, easy barrel cleaning.

• **Quality Control:** All QC^{3}™ twin-screw extruders are engineered and built at ENTEK's headquarters in Lebanon, Oregon U.S.A. Top-quality components manufactured here in ENTEK's shop give years of top-quality performance. Because ENTEK is a processor and a machinery builder, it features vertically integrated operations and has engineering and manufacturing capabilities that are second to none in the twin-screw extrusion market.

• **Ease of Use:** SMART controls feature enhanced graphics, recipe system, trending software, and web-based connectivity for remote troubleshooting.

The graphic on p. 3 shows many of the QC features incorporated into the new ENTEK QC^{3}-43MM co-rotating twin-screw extruder. For further information on these exciting new features contact any ENTEK salesperson (see list on p. 6).

Upcoming Events

ENTEK is participating at the following shows/conferences. If you plan on attending any of these events, please stop by and see us!

November 2 – 3, 2015 – Charlotte, NC

ENTEK's Director of Engineering, John Gillespie will present "Using Lean Principles and Customer Research to Design and Produce a Next Generation Co-Rotating Twin Screw Extruder" on Monday, 11/2 at 3:30 p.m. and ENTEK will also have a tabletop exhibit.

For further information visit extrusionconference.com

December 8 – 9, 2015 – Philadelphia

ENTEK's President, Dr. Kirk Hanawalt will present "The Future of Manufacturing in North America" on Tuesday, 12/8 at 11:50 a.m. and ENTEK will also have a tabletop exhibit.

For further information visit amiplastics.com/events

January 26 – 28, 2016 – Coral Springs, FL

ENTEK will have a tabletop exhibit.

For further information visit amiplastics.com/events

February 1 – 3, 2016 – New Orleans, LA

ENTEK will have a tabletop exhibit.

For further information visit plasticsrecycling.com

DaVinci Chooses ENTEK

(continued from page 1)

When analyzing their production process, ENTEK identified a way to improve quality control and recommended that DaVinci incorporate underwater cutting technology for the material being compounded. A Gala pelletizer was added to the production line, and this dramatically improved product consistency.

"You never want to waste material, but when you're compounding highly filled and customized materials like DaVinci uses, it becomes more important than ever to maximize efficiency," said Linda Campbell. "We helped them improve their process, and they worked hard on their end to not only improve their quality but also to increase processing rates."

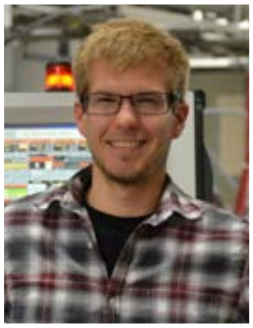
Growth for the Future

Based on the success they've achieved, DaVinci continues to grow. The company is considering expanding its production by adding an additional extrusion line, and when they do, ENTEK will be the first supplier they call. "We are very pleased with the market growth we've seen for our composite roofing products, and we are happy to partner with ENTEK for our extrusion needs," said Bryan Ward, President of DaVinci Roofscapes. "They are a big part of our success and we look forward to a mutually beneficial relationship in the years ahead."

Wear Parts & Turnkey Plant Services

Lab News

Meet Sam Goral – ENTEK's new Process Engineer



ENTEK is proud to have Sam Goral on board as the newest member of the engineering team. Sam graduated in the spring from Oregon State University with a B.S in chemical engineering and is now working at ENTEK as a Process Engineer. Leveraging his experience in mathematical modelling, programming, chemistry, process control, and experimental design, Sam is already making a difference at ENTEK.

ENTEK provides a full service in-house lab for customers to test their formulations on an ENTEK extruder before they buy a machine. Sam has been busy optimizing customer formulations on the new ENTEK QC^3-43MM extruder in the ENTEK development lab. Sam's can-do attitude fits like a glove at ENTEK, and his unique perspective has already helped several customers succeed with challenging material trials.

New QC^3-43MM Twin-Screw Extruder in Lab

We are pleased to announce that we now have our newest twin-screw extruder, the QC^3- 43MM, up and running in our in-house development lab. Its numerous Quick Change, Quick Clean and Quality Control features make it the perfect machine for running internal and customer trials. Come see this new machine in action!

Interested in Scheduling a Lab Trial?

ENTEK invites you to take advantage of our compounding expertise. We have helped numerous companies bring their ideas to market in areas such as bioresins, wood and fiber-plastic composites, color compounding, and specialty sheet applications, to name a few. If you'd like more information on how to schedule a lab trial for your materials at ENTEK, contact John Effmann at 541-259-1068 or JEffmann@entek.com.

Replacement Wear Parts Update

A Growing Business -Large Parts for Non-ENTEK Brand Twin-Screw Extruders

In the last issue of *Extrusion Solutions* (March 2015), we ran a story on how ENTEK has recently expanded its replacement wear parts offerings for twin-screw extruders to include large-size screws and barrels, at sizes up to 250mm. Since then, this business has continued to grow and the company has provided replacement parts at sizes of 133mm, 160mm, and 250mm to numerous compounders running non-ENTEK brand twin-screw extruders.

All parts are manufactured at ENTEK's headquarters in Lebanon, Oregon USA. Many parts are in stock, and some are available for next-day shipment.

Tammy Straw, ENTEK's Business Development Coordinator, said ENTEK has a unique advantage to other twin-screw extruder parts suppliers. "We have substantial internal resources here, including specially-trained engineering and manufacturing personnel, and a large state-of-the-art machine shop," she said. "This is to support all ENTEK operations including the manufacturing of twin-screw extruders and wear parts, as well as the company's world-leading battery separator production operation, all here at our Lebanon, Oregon headquarters."

Additional Parts-Related Services

ENTEK provides a variety of additional services to help customers with their replacement wear parts needs, including:

- Cost effective parts stocking programs, customized for specific customer requirements
- Barrel and screw measurement
- Screw layout review and optimization
- In-plant process training
- Machine rebuild services
- Control system upgrades
- Remote troubleshooting
- Maintenance check-ups

To obtain a quote for replacement wear parts, or to learn more about ENTEK's aftermarket services, contact Tammy Straw, ENTEK Business Development Coordinator, at (541) 259-1068 or tstraw@entek.com.

NPE 2015 – What a Show!

The North American plastics industry put on its best show ever at NPE2015, held from March 23-27 in Orlando, FL. The show's sponsor, the Society of the Plastics Industry (SPI), reports that in the 69-year history of the show, NPE2015 set records for number of exhibitors (2,029), amount of space (1,128,200 net square feet), and number of companies in attendance (23,396). In addition, the total number of show visitors (65,810) was 19% greater than the last NPE, held in 2012.

ENTEK would like to thank everyone who stopped by their booth at NPE. The company enjoyed its best-ever NPE show; ENTEK generated tremendous interest with the introduction of its new QC³-43MM twin-screw extruder, and took in a record number of leads. John Effmann, ENTEK Director of Sales and Marketing, reports that post-NPE activity is still strong more than six months after the show.

"We are pursuing no fewer than 5 business opportunities right now that are all huge potential, that are a direct result of NPE2015," he said. "All of these were opportunities we did not know about until the show."

The next NPE will be held in Orlando from May 7-11, 2018.

ENTEK's Tammy Straw Named to NPE2018 Marketing Committee

ENTEK is pleased to announce that ENTEK Business Development Coordinator, Tammy Straw has been named to the NPE2018 Marketing Committee. This committee is comprised of a select group of plastics industry marketing professionals who meet on a regular basis to plan and execute promotional activities leading up to the next NPE.

"I'm honored to be a part of this committee," said Tammy. "I've worked for ENTEK at every NPE since 2003 and have always enjoyed it. I look forward to working with some of my industry colleagues to make NPE2018 bigger and better than ever."

Who to Contact

ENTEK
PO Box 39, 200 Hansard Avenue
Lebanon, OR 97355
Tel. 541-259-1068
FAX 541-259-8018
www.entek.com

Dr. Kirk Hanawalt
President
E-mail: khanawalt@entek.com

John Effmann
Director of Sales & Marketing
E-mail: jeffmann@entek.com

Tammy Straw
Business Development Coordinator
E-mail: tstraw@entek.com

Stephanie Bell
Sales Project Engineer
E-mail: sbell@entek.com

North America

Bill Petrozelli
Regional Sales Manager
Tel. 541-259-1068 ext. 8117
FAX 541-259-8018
E-mail: bpetrozelli@entek.com

Linda Campbell
Regional Sales Manager
Tel. 541-259-1068
FAX 541-259-8018
E-mail: lcampbell@entek.com

Europe

John Effmann
Director of Sales and Marketing
E-mail: jeffmann@entek.com

Asia

Tay Hwa Beng
Asian Sales Manager
Tel. +65-997579621
E-mail: hbtay@entek.com

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