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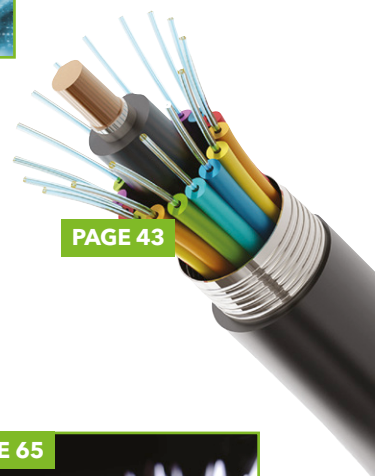
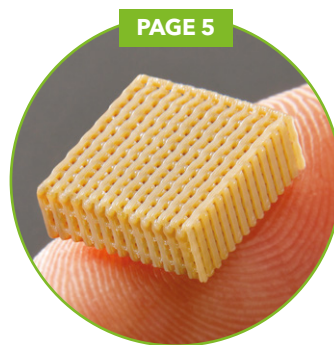
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Compounders head to Cleveland for sector's biggest-ever event

The compounding industry is heading to Cleveland, Ohio, for the first Compounding World Expo in North America. Taking place on 8-9 May at the Huntington Convention Center, it is going to be the biggest-ever focused event for the plastics compounding industry, building on the success of last year's debut expo in Essen, Germany.

More than 2,000 people have already registered to attend. The remaining free advance tickets for the exhibition and its two dedicated conference theatres are available online [HERE](#).

The number of exhibitors in the Compounding World Expo has grown to more than 145. At the time of writing there are just three booths left, with the exhibition space expected to sell out.



Tickets have also been selling fast for the networking party at the nearby Rock and Roll Hall of Fame on the evening of the first day of the exhibition. More than 600 have already been purchased, and the limited remaining tickets are available for \$20 including drinks and canapes [HERE](#).

"We've been delighted by the response to the US launch of our Compounding World Expo," said Andy

Beevers, Events and Magazines Director at AMI, the organiser of the event and the publisher of *Compounding World* magazine. "It's great to see everything coming together for what is going to be a really productive and enjoyable forum for the plastics compounding industry, providing excellent networking and

learning opportunities".

Visitors to the Compounding World Expo will also gain free admission to two adjacent exhibitions - the Plastics Recycling World Expo and the Plastics Extrusion World Expo - plus their three focused conference theatres. In total there are more than 260 exhibitors and over 130 speakers across the three expos and their conference theatres.

For more information, [CLICK HERE](#)

Exxon to build PP unit in US

ExxonMobil is to construct a new PP unit at its integrated petrochemicals plant at Baton Rouge, Louisiana, US, expanding its Gulf Coast capacity by up to 450,000 tonnes/yr. Work on the new PP unit will begin this year and start-up is anticipated by 2021, it said.

The move is in addition to the firm's plans to invest \$20bn in the region, including lubricants, ethane and LNG plants, as part of its 'Growing the Gulf' initiative.

www.exxonmobil.com

PolyOne sees flat first quarter

Sales for the first three months of the year at PolyOne were essentially the same as in Q1 2018 at \$900m, with growth of 3.5% from acquisitions offset by a 1.5% reduction in organic sales and a further 2% impact from unfavourable exchange rates.

The company said it expects to see an improvement in the second half of the year but is already addressing costs by "targeted workforce reductions" and reducing avoidable spending.

Robert Patterson, Chairman, President and CEO, said key factors behind the flat result included lower automotive

sales in Europe and China, which impacted the Colour, Additives & Inks and Speciality Engineered Materials segments, and a decline in construction related sales, which mainly hit the Performance Products & Solutions segment in

North America. This was only partly offset by a more favourable product mix and margin expansion in Distribution and improvement in composites and sustainable solutions.

"In fact, we had our best quarter ever for composites since we began investing in this space," he said in a statement, pointing to 10% organic growth plus a further 7% from the acquisition of Fiber-Line in January.

Sustainable solutions, including packaging technologies that extend shelf-life for perishable beverages, grew by 34% in China in Q1, the company reported.

www.polyone.com



PolyOne CEO Robert Patterson

Aurora expands in TPEs

Ohio, US-based Aurora Plastics has acquired Elastocon TPE Technologies, a compounder based in Springfield, Illinois. The move is its fourth acquisition in two years and is intended to enhance its portfolio of TPE compounds.

"Elastocon brings a broader offering of soft-touch and abrasion-resistant materials," said Aurora CEO Darrell Hughes.

Elastocon's TPE portfolio includes overmoulding, injection moulding and high-performance speciality grades, plus clear and oil-free grades with good tensile and tear strength properties, highly resilient



Elastocon has a strong position in TPEs for the automotive industry

TPEs for strap and tubing applications, and scratch- and mar-resistant materials for dampening pads and bumpers.

Aurora's current portfolio includes PVC compounds and alloys, CPE alloys,

low-smoke flame-retardant concentrates, purge compounds and TPE compounds. Its products go into medical, packaging, consumer, industrial and automotive markets.

> www.auroraplastics.com

Evonik to invest in clear PA

Evonik is expanding production of its Trogamid CX brand of transparent PA at the Marl Chemical Park in Germany. Work has already begun and is due to be complete in Q1 2020. It comprises a mix of debottlenecking and optimisation initiatives and will double the firm's global capacity.

"We've been observing consistently high demand, especially in the consumer goods segment, for specialised material solutions that combine highest transparency, quality and design freedom with the best processing characteristics," said Dr Iordanis Savvopoulos, head of Evonik's Granules & Compounds product line.

Trogamid CX finds uses as a lens material for eyewear in the sports sector, as a decorative material for automotive interiors, and in cosmetics and medical technology.

> www.evonik.com

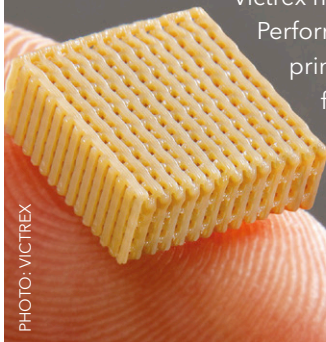
Victrex invests in Bond 3D

Victrex has made a "multi-million euro" investment in Bond High Performance 3D Technology, a Dutch firm that has developed 3D printing machinery and software to make high strength parts from high-performance thermoplastics such as PAEK.

The company said the aim is to speed the launch of 3D-printed PAEK and PEEK parts. Bond's 3D hardware and software is currently in the beta phase but it plans to scale it up and install more machines later this year.

> www.bond3d.com

> www.victrex.com



PTi and Farrel Pomini align in sheet

US firms Processing Technologies International (PTi) and Farrel Pomini have formed a strategic business alliance to supply integrated compounding and extrusion systems for production of plastic sheet under the Direct-to-Sheet (DTS) Compounding name.

The two companies said that DTS Compounding brings together their respective production technologies: PTi will contribute its sheet extrusion

machinery, notably the G-Series Rolls Stands; Farrel Pomini its CP Series II compounding system.

The goal of the alliance is to eliminate the need to create pre-compounded resins prior to extrusion processing. Polymers and additives "can be mixed and directly extruded to sheet in one cohesive and uninterrupted process," the companies said in a joint statement.

Claimed benefits include cost savings, process efficiencies and enhanced control of compounded materials where high volumes of mineral fillers are required in extruded sheet. DTS Compounding can be configured in line with a thermoformer or as a roll stock system producing wound rolls of sheet offline.

> www.ptiextruders.com

> www.farrel-pomini.com

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DEHP “legacy” use upheld

The European Commission has won a case in the European Court of Justice (ECJ) regarding use of ‘legacy’ additives in recycled PVC.

DEHP is one of a number of plasticisers that are restricted in Europe. However, in 2016 the Commission backed a recommendation by the European Chemicals Agency (ECHA) to grant a four-year authorisation for use of recycled PVC containing “legacy” DEHP by three PVC recycling companies - VinylLoop Ferrera, Stena Recycling and Plastic Planet.

ClientEarth, an environmental NGO, challenged this decision at the ECJ but in its decision on 4 April 2019 the court backed the Commission’s stance.

The Commission originally author-



The ECJ decision allows PVC containing “legacy” DEHP to be recycled

ised the three companies to use recycled PVC - which contained DEHP - in two ways: to formulate recycled PVC and dry-blends; and in industrial use of recycled soft PVC in various processes, including extrusion.

The issue of legacy additives affects other PVC products, such as pipes and profiles that historically used lead and cadmium stabilisers. Both substances have since been phased out in Europe but will still be present in the PVC recyclate that is commonly incorporated into window profiles.

Brigitte Dero, general manager of VinylPlus, said of legacy

additives: “The committees of ECHA concluded in favour of allowing - for 15 years - the recycling of PVC waste containing lead up to concentrations which should allow most recycling to go on - because the conditions applied ensure that the risk is controlled.”

> www.echa.europa.eu

> www.clientearth.org

Tramaco relocates operations

Rowa Group’s Tramaco, which manufactures foaming agents and masterbatches as well as surface primers and adhesion promoters, has relocated to Tornesch in Germany.

“The new location will not only provide additional production capacities that can be successively expanded, it will also create best conditions for meeting the future needs of our global business partners,” said Tramaco Managing Director Dr Carsten Mennerich.

Aside from the additional production capacity, the move also provides a new laboratory space.

> www.tramaco.de

Maag Americas adds ColoRex

Maag Americas has added the ColoRex colour mixer to its line of ambient pulverisers. The company said the machine is a high intensity mixer that is designed to mix product in-line with a pulveriser, eliminating the long clean-up times often associated with central mixing systems.

The ColoRex unit is suitable for most polymers and for production rates up to 907 kg/h. It can also be used off-line with a loader system and multiple feeders. Maag said the unit will allow the operator to colour natural or virgin resins directly out of the pulveriser or from a silo.

> www.maag.com/en/



Nouryon grows in US and Mexico

Nouryon (formerly AkzoNobel Specialty Chemicals) has announced plans to double production capacity for solvent-based organic peroxides at Los Reyes, Mexico, by Q2 2020.

The move is a response to ongoing growth in the North American petrochemicals, polyolefin and PVC markets and follows on from

the recent expansion of emulsion-based organic peroxide capacity at the site and the start-up of Butanox MEK peroxide production at Pasadena in Texas, US.

The company has just completed a €4m expansion at its organic peroxides site at Mahad in India. This has increased production capacity by 80% to support

growing demand in India and the Middle East.

■ Earlier this year, the company also announced that it has selected a US site for a world-scale polymerisation plant to make its Expancel brand of expandable microspheres. The project is scheduled for completion in late 2020.

> www.nouryon.com

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www.jm.com



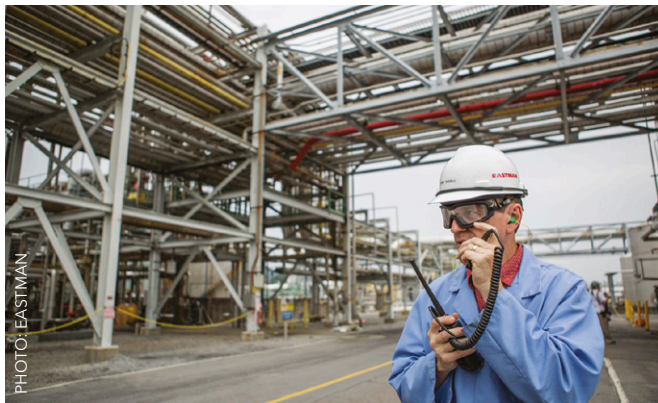
Johns Manville
A Berkshire Hathaway Company

Eastman works on PET and mixed recycling

Eastman has started a project to develop chemical recycling technology for polyesters. The US company said it is currently conducting an engineering feasibility study on the design and construction of a commercial scale methanolysis facility and has engaged in discussions with potential partners on the development of the facility. Its goal is to be operating a full-scale, advanced recycling facility within 24 to 36 months.

Eastman has more than three decades of expertise in using methanolysis, which enables polyester-based products to be broken down into their polymer building blocks. These can then be reintroduced to the production of new polyester materials.

The company says its advanced circular recycling technology can be used on low-quality polyester waste that would typically be



Eastman has completed pilot tests on a "carbon renewal technology" at its Kingsport site in the US

diverted to landfill. The technology can convert that material into high-quality polyesters suitable for use in a variety of end markets, including food contact applications.

The company has also announced a "carbon renewal technology" project, which it says is capable of recycling some of the most complex plastic waste, including non-polyester plastics and mixed plastics that cannot be recycled with

conventional recycling technologies, such as flexible packaging and plastic films. It has completed pilot tests at its Kingsport site in the US, and plans commercial production in 2019 by leveraging existing assets.

Eastman said that by modifying the front end of its cellulose production, this technology can use plastic waste as feedstock and convert it back to molecular components.

> www.eastman.com

Extended approval for 705

The US Food & Drug Administration has granted an extension of its approvals of SI Group's Weston 705 and 705T liquid phosphite antioxidants for use as food contact substances in styrene block polymers and repeat-use elastomers under conditions of use A through H with concentration up to 0.5 wt%. This confirms that they are toxicologically clean and can be widely applied in the growing elastomers industry.

Weston 705 and 705T have food contact approval in over 180 countries, also including the EU, China and Canada. They protect the colour and mechanical properties of polymers during the manufacturing, storage and conversion processes, including food contact applications.

> www.siigroup.com

EU challenged on chemical recycling

Chemical Recycling Europe (CRE), a newly established industry body representing firms active in chemical recycling of plastics, has issued a position paper describing chemical recycling as "a complementary recycling solution to boost plastics circularity and reduce the carbon footprint". As such, it said, it should form part of the EU strategy to reduce plastics waste and has not had enough emphasis in the European Commission's Circular Economy Action Plan.

Under this plan, CRE said, the EU has

set out ambitious targets for EU member states, including clear goals to curb plastic waste, increase resource efficiency, and create value and job growth in Europe. "However, by focusing its strategy on mechanical recycling, it falls short of presenting a comprehensive approach. Concrete steps towards increasing plastic waste recyclability and reducing landfilling and incineration involves supporting innovative recycling solutions such as chemical recycling," it said.

CRE warns that the targets in the EU

plastic strategy cannot be achieved by mechanical recycling alone as the collection and recycling system is not yet cost-effective and the quality of recyclate is not sufficient to replace virgin plastic on a large scale.

In addition, it said development of technologies to recycle hard-to-recycle plastic waste "is outpacing the regulation and policy around it" while the lack of a "structured and harmonised approach to waste collection and recycling" is constraining companies.

> www.chemicalrecyclingeurope.eu

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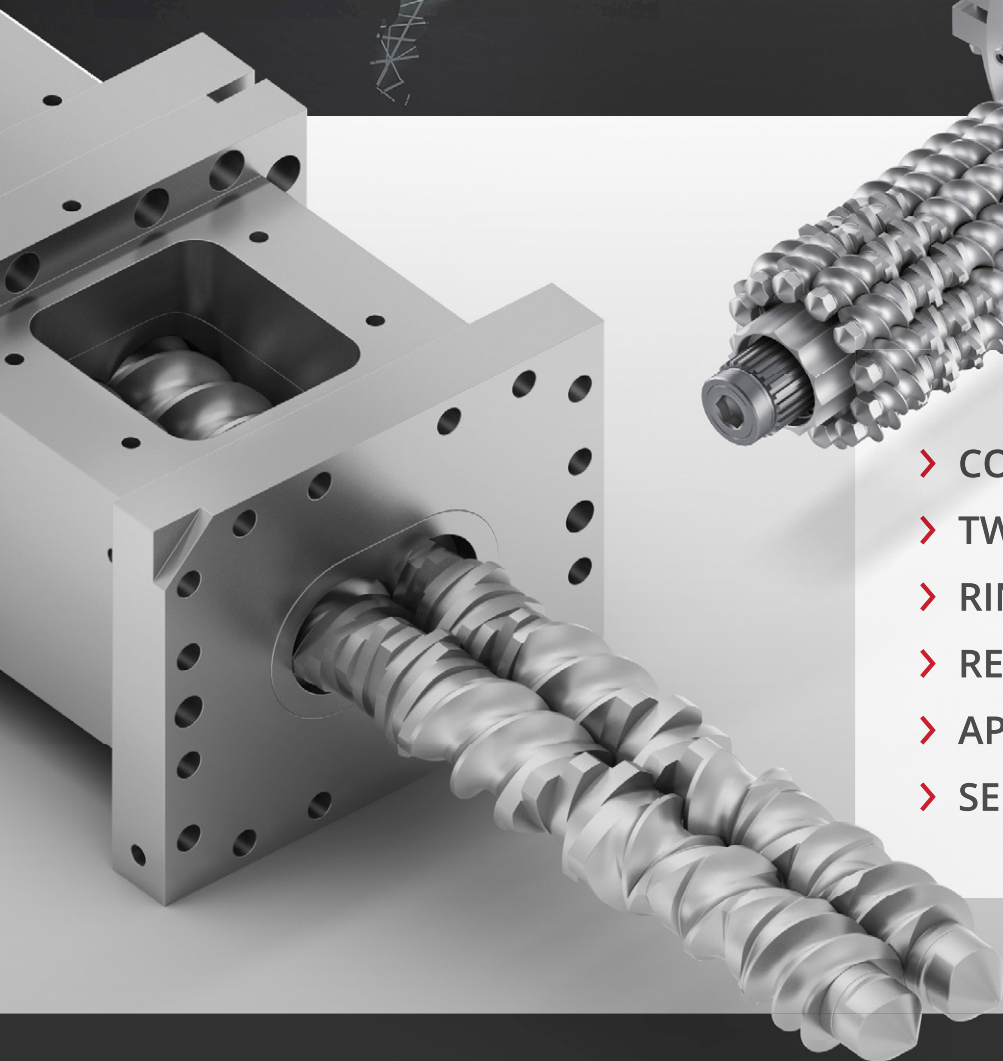
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Ube Industries invests in Repol

Ube Corporation Europe, the regional subsidiary of Japan's Ube Industries, is to acquire a majority stake in Spanish compounder Repol.

Based at Almazora in Castellón province, Repol compounds mostly PA6, PA66 and POM polymers for automotive applications, as well as for the industrial and electrical and electronic sectors. It employs 61.

Ube said that it is targeting its PA6 business for growth, particularly in extrusion though also in injection moulding applications. The acquisition, the company said, gives it an existing compounding plant, an additional base for its operations in Europe, a complementary relationship in PA 6, and access to Repol's compounding technologies and development

capabilities for other polymers.

In particular, Ube said Repol's plastic recycling technologies are expected to be an asset in future business development as regulation in Europe gets tighter.

The company said it will also be looking for synergies with its existing operations in Japan and Thailand.

> www.ube-ind.co.jp

Borealis starts US compounding plant

Borealis said its new, 30,000 tonnes/yr PP compounding plant at Taylorsville, in North Carolina in the US, is now onstream. The 4,650 m² facility has dedicated production lines for TPO- and short glass fibre-reinforced compounds, which will mainly be supplied to OEMs and Tier One companies in the regional automotive sector.

"Following the plant's mechanical completion in December, first samples were shipped in February and several projects with leading North American and



European OEMs have already been secured," said Lucrèce Foufopolous, EVP of Polyolefins and Innovation & Technology. The first products made there

include interior and exterior materials approved by Daimler and Volkswagen.

Borealis has also recently added Daplen EE058AI to its low-density PP portfolio

for automotive interior applications and showcased it at the VDI Plastics in Automotive Engineering congress at Mannheim, Germany, on 3-4 April. The material is already in use in the lower dashboard, glove box and centre console of the new Škoda Scala.

Daplen EE058AI is a 10% talc-filled and elastomer-modified grade formulated to meet the latest OEM requirements for low odour, emission and fogging levels while offering up to 6.5% weight savings.

> www.borealisgroup.com

MOL Group buys into recycling sector

Hungary's MOL Group has agreed to acquire Aurora, a family-owned German compounder of post-industrial plastic waste for the automotive, furniture, electrical, construction and machinery markets.

Aurora is headquartered at Neuenstein in Baden-Württemberg, Germany, and comprises three companies: Aurora Kunststoffe at the Neuenstein site itself, Aurora

Kunststoffe VS at Villingen-Schwenningen and Aurora Kunststoffe Walldürn in Walldürn. Its business is focused on recycling single-variety industrial plastic waste - primarily PA, PP and other engineering polymers - into plastic grinding materials, granulates and compounds.

"Aurora will continue to expand its expertise in the processing of engineering

plastics," said Gerhard Schweinle, Aurora founder and member of its management board. "Our extensive range of sustainably manufactured products and MOL's many years of experience will enable us to work more intensively to protect our raw material resources and relieve the burden on the environment."

MOL said it will now be able to offer a range of

recyclate-based compounds to complement its portfolio of virgin PP and PE, while using Aurora's know-how and its closed-loop logistical system for recycling. It added that the investment is in line with its MOL 2030 strategy to become "the leading chemical player in the Central and Eastern Europe region." It plans to invest some €4.5bn to that end.

> www.molgroup.info

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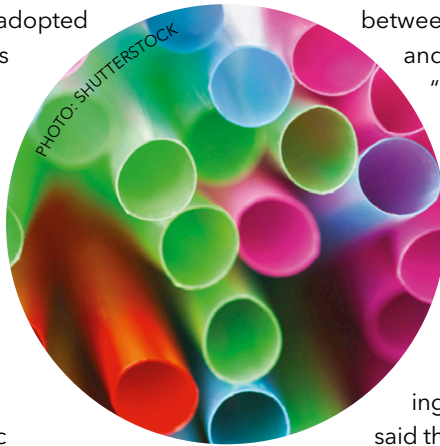


EU's single use plastics plans include oxo ban

The European Parliament adopted the EU's Single Use Plastics (SUP) Directive on 27 March. EU Member States have two years to introduce new legislation, which bans the use of certain products in the EU by 2021, including single-use plastic cutlery and plates, plastic straws, cotton bud sticks made of plastic and plastic balloon sticks as well as EPS food containers and cups and all oxo-degradable plastics.

The last of these is already being challenged by producers of oxo-degradable materials. In a statement, the Oxo-Biodegradable Plastics Association said the introduction of a ban before the completion of ECHA's analysis of the impact of the materials, which was requested by the Commission, breached EU law.

PlasticsEurope said it welcomed the SUP Directive in terms of acknowledging that the fight against litter is a shared responsibility



Plastic drinking straws are among the banned single-use products

between authorities, producers and consumers. It said:

"Setting guidelines on definitions and categories should follow promptly to avoid the risk that different interpretations will prevail among Member States."

The IK plastics packaging association in Germany said there is a danger that the emotionally charged debate around plastics in the environment could lead to hasty decisions. Climate protection

should not be about banning plastic products, many of which help to reduce CO₂ emissions, save fuel, energy and water, it said, arguing that an anti-littering directive would have a greater impact on waste management and environmental protection.

- > www.europarl.europa.eu
- > www.biodeg.org
- > www.plasticseurope.org
- > www.kunststoffverpackungen.de

Ineos Styrolution plans site for StyLight composites

Ineos Styrolution is planning to set up a new production site for its SAN and PP-based composite range, StyLight. The production unit will be operational by 2022 and will probably be located in Germany, although that decision is yet to be finalised.

StyLight was originally launched at K2016. The products and processing was optimised in partnership

with the Neue Materialien Fürth and Neue Materialien Bayreuth research institutes in Germany.

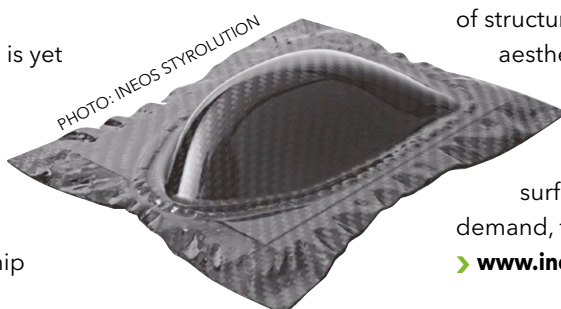
Since then, partnerships with Roctool and ARRK Shapers have led to its full

validation to the automotive interior specification of automotive OEMs. Applications have been identified in electronics, sports and other applications where the material's combination of structural stiffness,

aesthetics, processability, dimensional stability and near-Class A

surface quality are in demand, the company said.

- > www.ineos-styrolution.com



Steady growth for Hexpol

Hexpol, the Sweden-headquartered plastic compounding and rubber materials group, said sales for 2018 were up by 12.5% on 2017 to SEK12.7bn (€1.2bn), while net profits were up 4.8% to SEK1.6bn (€150m).

"We continued to strengthen our market positions in our main markets," said Mikael Fryklund, President and CEO. "Most important of all, however, were the two acquisitions implemented during the year, which, in line with our strategy, take us into new segments with value-generating offers in advanced elastomers while also allowing us to reach new geographic markets."

During 2018, Hexpol acquired Kirkhill Rubber, a specialist in the aerospace, automotive and medical technology sectors based in Long Beach, California, US. Kirkhill had recently expanded its business activities within silicone and fluororubber.

In early 2019, Hexpol acquired 80% of the shares in Mesgo Group, a major player in high-performance elastomers such as fluororubber and silicone and also active in conventional rubber and thermoplastic compounds. Mesgo has manufacturing in Italy, Poland and Turkey, which were all new locations for Hexpol.

- > www.hexpol.com

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Whether reprocessing mixed waste or creating high performance polymer alloys, compatibilisers could be the enabling technology. Peter Mapleston finds out more

PHOTO: SHUTTERSTOCK

Making the mix work

Achieving acceptable performance from inherently incompatible polymers can be quite a challenge but compatibilisers can provide a solution. Some of the currently available compatibiliser technologies require the use of reactive compounding and chemical reaction to achieve the desired results; others take a more mechanical approach and rely on chain entanglements. This article takes a look at some of the latest results from both schools.

Maleic anhydride finds its way into many compatibilising polymers. Maleic anhydride-grafted polypropylene (MAPP), for example, has been a popular choice as a coupling agent and compatibiliser for a long time. It is available in numerous variants from several companies, well-known names among them including **Addivant** with its Polybond 3000 series of modified PP resins, **Clariant** with its Licocene MS 641 TP polymer, **Eastman** with its G3003 and G-3015 PP grades, and **Polyram** with its Bondyram product line.

Possibly less well-known is **Polymer Asia**, based in Vietnam, which has partnered with Mitsui for global sales and marketing and technical support. Matthias Stücker, Deputy General Manager in the 2nd Performance Chemicals Division at **Mitsui &**

Co Deutschland, says it is having notable success with a recently-introduced PA Bond series of coupling agents that have extremely low VOC and FOG values. "We see that this topic is quite interesting for many of our customers, especially when we're talking about automotive applications and compounds containing natural fibres," he says.

Polymer Asia's product line features MA levels between 1.0 and 1.2%. Stücker says that the additives feature a "super-low" free MA content and low yellowness index (illustrated in Figure 1).

Polymer Asia launched the PA Bond product line in Asia five years ago, followed by a US launch in 2015. It debuted in Europe at K 2016. "Today, PA Bond has been approved by major global PP composite producers in addition to producers of niche products," says Stücker.

Two particular grades cited by Stücker – PA-Bond 363ZV and PA-Bond 700ZV – have no residual peroxide or styrene. "That results together with the low free MA content in extremely low VOC and less unpleasant interactions of those materials in the final compounds. Customer tests have shown extremely low VOC and fog values compared to known competitors," he says.

**Main image:
Reprocessing
of mixed
plastic waste is
just one
example where
compatibilisers
could be used
to good effect**



PHOTO: POLYMER ASIA

Figure 1: Photos show the whiteness of Polymer Asia's PA Bond grades in comparison with competitors. The left image shows PA Bond 363C with a Yellowness Index (YI) of 3.5 (left sample) against an alternative with a YI of 10.46. The right image shows PA Bond 700 with a YI of 13.53 (left sample) against a competitive product with YI of 21.97

Tisan Engineering Plastics is another relative newcomer to the maleic anhydride grafted polymer sector, launching its Olebond line of grafted PP, PE, EVA and ABS compounds last year. All are produced at its production plant in Istanbul in Turkey using reactive extrusion techniques and carry global approvals.

The company says its aim in the development of the Olebond product line was to engineer a range of compounds that improved both product performance and production efficiency. Applications include use as a compatibiliser, coupling agent, impact modifier and adhesive agent in markets such as compounding, composite and multilayer barrier pipe, halogen-free flame retardant cables, metal coating, co-extrusion, cast and blown films, and recycling.

The product line includes a number of grades suitable for impact modification of PA 6 and 66, including Olebond 7403 IM-C, 7403 IM-R, 7403 IM-Z. All three grades are based on high maleic anhydride grafted PE and, in addition to impact improvement, reduce moisture absorption to enhance dimensional stability.

Probably best known for its Xiran styrene maleic anhydride (SMA) and N-phenylmaleimide (SMANP-MI) injection moulding co- and terpolymers (produced in a plant originally built by DSM), **Polyscope**

has also been growing its business in what it calls "blend optimisers" under the Xibond banner, using similar chemistry. These products encompass compatibilisers, coupling agents, chain extenders, viscosity modifiers, and surface modifiers.

Xibond functional styrenics are especially suitable for polymer blends containing styrenics-based polymers such as ABS, HIPS and ASA, says Ardy Doelen, Sales and Business Development Manager at the company. He adds that in filled compounds, the functional groups in Xibond additives can also interact with reactive groups – such as OH and NH₂ – present in the filler.

Selection support

He says that one of the key findings of a marketing study it carried out was that product developers were looking to have quick access to support, hence the development of a new web-based selection tool. "The Xibond selector enables developers to quickly find the best Xibond solution to their challenges. Initially we found the most solutions in styrenics such as ABS and HIPS, but recently more solutions in polyamides and polyesters were released, he says.

Doelen adds that blends of polyamides and styrenics are becoming more interesting for various industries, including electronics, automotive and medical appliances. "The combination of PA6 and ABS is the most common blend, but without a compatibiliser these polymers cannot be blended and will result in delamination," he says.

Polyscope has developed a specific grade for polyamides and styrenics – Xibond 315. This grade features a moderate maleic anhydride content to ensure a reaction with the end groups of the polyamide and is also compatible with ABS. An addition of 2-3% of Xibond 315 is sufficient to lead to an optimised morphology [see Figure 2 and Table 1]. "It has proven to work very well with various combinations of PA6 and ABS," Doelen says.

PHOTO: POLYSCOPE

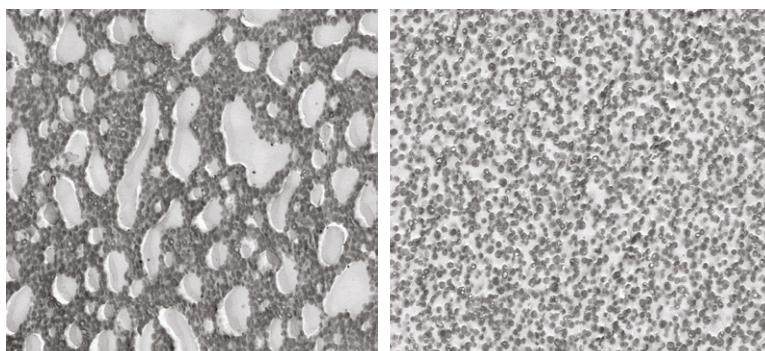


Figure 2: Microscopic images showing the morphology of a PA6/ABS blend before and after the addition of Xibond 315

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Table 1: Property profile of different blends of PA6 and ABS incorporating 2% Xibond 315. Properties are dependent on the raw material selection

Test	Method	40/60 Blend	50/50 Blend	70/30 Blend
Charpy notched -30°C	ISO 179/1eU	17	6	5
Charpy notched 23°C	ISO 179/1eA	NB	9	8
Tensile Modulus	ISO 527	1600	2300	2500
Elongation (strain) at break	ISO 528	180	220	380
Tensile stress at break	ISO 529	36	45	52
HDT A	ISO 75-1	69	72	58
Vicat B	ISO 306	92	108	140
MFI 240/10	ISO 1133	30	47	60

Source: Polyscope

Copolymer options

Last year, speciality chemicals company **Vertellus** added two new additions to its range of Zamac ethylene-maleic anhydride copolymers – ZeMac Extend P and Zamac Link NP.

ZeMac Extend P is a chain extender intended to help upgrade recycled PET, and possibly other polyesters, by increasing molecular weight and intrinsic viscosity. “Delivering improved melt viscosity and increasing melt strength, ZeMac Extend P reduces sagging of the extrudate, resulting in faster production,” Vertellus says. The company says it also counteracts hydrolytic degradation and improves impact strength.

According to Vertellus, ZeMac Extend P can be used in a breadth of target applications where it can deliver performance close to that achieved using 100% virgin materials. Examples include staple and filament fibre production; injection moulding; film, sheet, tape and profile extrusion; bottle blow moulding; and production of strapping and foamed sheet.

Meanwhile, Zamac Link NP is a compatibilising additive that is claimed to incorporate a new Vertellus technology, which the company says “allows compounders and moulders to reduce costs and boost sustainability efforts while integrating previously incompatible materials into their alloys.” Used at very low addition rates, the new additive permits the inclusion of PA and polyester materials, including post-consumer recycled PET, in the alloy production process.

“ZeMac Link NP is well suited for use in a breadth of alloy applications including office furniture, fasteners, hand tools, outdoor equipment, textile bobbins and automotive accessories such as hubcaps,” says Prasad Taranekar, Marketing Manager at Vertellus. Glass fibre, minerals and impact modifiers may also be

used with ZeMac Link NP.

The Compound Company – another company with roots in DSM (which divested its Yparex business in 2011) – offers polyolefin-based coupling agents and compatibilisers with very low amounts of residual maleic anhydride under the Yparex brand. Frank Huijnen, Business Development Manager Yparex within the company, says: “We notice an increase interest in biobased and biodegradable compatibilisers and coupling agents. Our biobased grades are being used in an increasing number of applications, and our biodegradable compatibilisers will be released later this year. There is quite some interest from both the injection moulding segment and the flexible packaging segment for biodegradable compatibilisers.”

Last December, The Compound Company announced it would build a new plant in Enschede, in the Netherlands, to double its capacity. “The investment was required because of significant growth we have seen in demand for our compounds and grafted polyolefins,” says Huijnen. “This plant has started production meanwhile.” The company has also made a recent acquisition, taking a controlling stake in Transmare Compound- ing in Roermond, also in The Netherlands.

Mixing up PE/PP

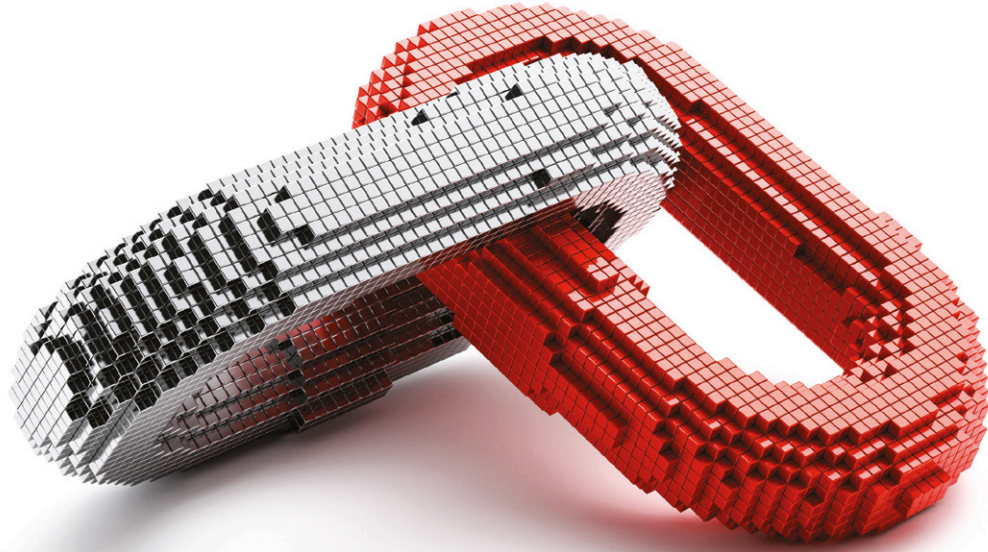
A team of researchers from **Cornell University** and the **University of Minnesota** led by Geoffrey W Coates are continuing their work on compatibilising polyethylene and polypropylene – which, despite their similar chemical make-up are incompatible.

They have developed ethylene-propylene multi-block copolymers (BCPs) with tuneable molecular weights that allow the creation of a new and

Right: Power tools are a potential application area for ZeMac Link NP from Vertellus, which allows formulation of alloys of PA/PET



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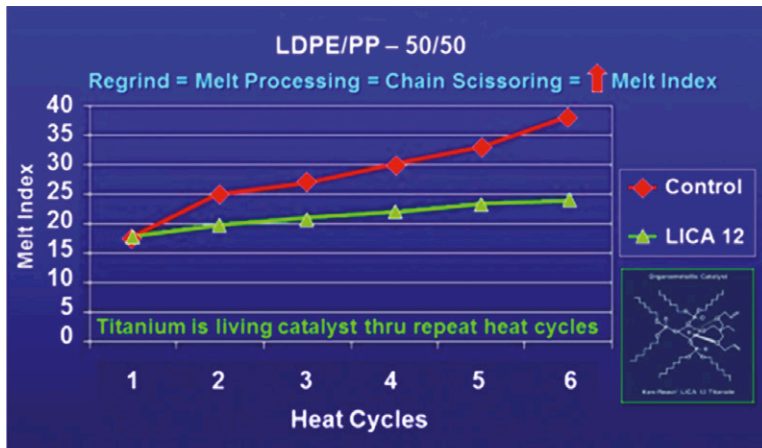


Figure 3: The repolymerisation effect of phosphato titanate catalysis on a 50/50 LDPE/PP regrind blend after six heat cycles demonstrated by melt index values. Control contains no catalyst

Source: Salvatore Monte/Kenrich Petrochemicals

mechanically tough product out of PE/PP blends. Their latest work, related to compatibilising isotactic PP and HDPE, is described in the American Chemical Society's journal *Macromolecules*, 2018 51 (21), 8585-8596.

"Tensile tests revealed a dramatic enhancement in toughness based on the strain at break, which increased from 10% for the unmodified blend to more than 300% with just 0.2 wt% BCP and over 500% with the addition of 0.5 wt% BCP or greater," the researchers say. "Incorporation of BCPs in blends also improved the impact toughness, doubling the Izod impact strength to a level comparable to the neat HDPE with just 1 wt% additive."

The researchers believe these large improvements are based on molecular entanglements and co-crystallisation of tetrablocks and diblocks, respectively. "These results demonstrate exciting opportunities to recycle the world's top two polymers through simple melt blending, obviating the need to separate these plastics in mixed waste streams," they say.

Addition of the compatibiliser does not require

any reactive compounding, a process that the Cornell team say presents many drawbacks. Firstly, they point out that reactions must be completed faster than the residence time in blending, which greatly limits the range of viable chemical reactions. In addition, they say the formed chemical bonds need to be stable under processing conditions involving relatively high temperatures and high shear, hazardous catalysts with heavy metal components are often needed to promote the reactions, and cross-linking often complicates control over morphology during processing.

On the other hand, nonreactive compatibilisation involves just the simple addition of premade compatibilisers along with the PP and PE during the blending procedure. "Ideally, the compatibilisers migrate to and remain at the interfaces defining the separate phases, 'emulsifying' the blend and facilitating the formation of finer dispersions of the minor phase," say the researchers.

Asked about the commercial prospects for the development, Coates told *Compounding World* magazine: "We have a partner and are gaining momentum. With that said, resin prices being so low are making it a tough business case." He said he hoped to have more information to share on future developments by the end of this year.

Reactive options

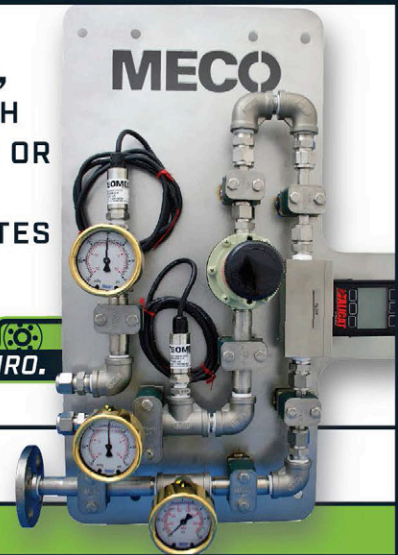
Salvatore Monte, President of **Kenrich Petrochemicals**, does see potential in the use of reactive compounding techniques and has long promoted the use of titanium and zirconium catalysts to regenerate various filled and unfilled plastics through repolymerisation. At the Society of Plastics Engineers' PO2019 conference in Houston in Texas, US, in February, he presented plenty of data examples showing how they can work with mixes of polyethylene and polypropylene.

"For example, where delamination occurs in the injection moulding of HDPE parts containing more

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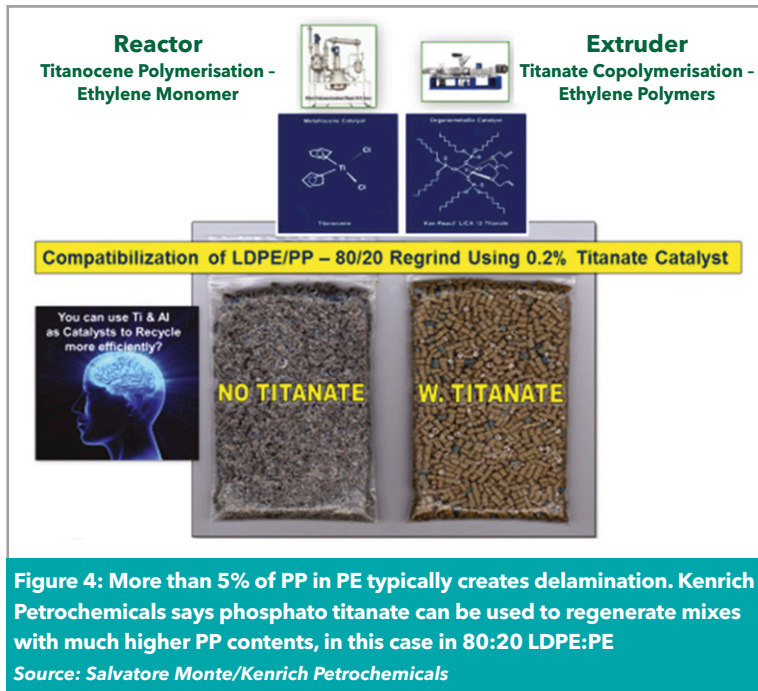
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than 5% PP, blends of PE/PP-50/50 are made compatible with titanate catalyst. Since Ti and Zr are used as catalysts in the formation of addition (polyolefin) and condensation (polyester) polymers, the catalytic compatibilisation effect will be shown to occur in a mixture of macromolecules such as HDPE/PP/PET," he said.

"Multi-polymer compatibility obviates the need for matching polarities such as needed with copolymer compatibilisers and depolymerisation concerns when maleated copolymers come in contact with condensation polymers such as PET and polyamide," he added.

In the abstract for a paper to be given later this

year, Monte says: "Current plastic recycling and sustainability goals are limited by the intrinsic incompatibility of many polymers and the negative effect of fillers and impurities on end-product properties, thus requiring a high degree of expensive sorting, separating and cleaning. Another barrier is the melt processing of polymers causes chain scissoring resulting in recycle and regrind materials having inferior properties compared to virgin.

"Current compatibilisers offered to recyclers are based on co-polymers or maleic anhydride modified polymers. Co-polymer compatibilisers require extensive sorting to match up the polarities of the recycled materials and maleic anhydride depolymerises condensation polymers such as PET and nylon, obviating their use in post-consumer recycle. MAH technology claims to be a coupling agent, which is true for rebuilding molecular weight - but, misnomered when applied to coupling filler and organic interfaces," he says.

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New data acquisition and management tools - and the principles of Industry 4.0 - are leading to smarter production systems. Peter Mapleston reports



PHOTO: SHUTTERSTOCK

Making compounding operations smarter

State-of-the-art data acquisition, processing and analysis can significantly simplify the daily production routines of compounding companies and provide valuable in-depth information for process optimisation. Complete systems involve what some may regard as complex, or even daunting, combinations of hardware and software but that should not be used as a reason for compounding companies, whatever their size, not to take the plunge and make full use of the data their equipment is creating. In many cases, investing in the expertise that is needed to run these systems can deliver considerable paybacks.

The expression Industry 4.0 gets casually thrown into many discussions about production data, but again, this should not be a disincentive to read on. Industry 4.0 is a snappy - and pretty successful - catchphrase dreamt up originally within the German government to promote computerisation in the country's manufacturing sector. It aims to describe a series of principles rather than set solid international standards. And for good reason.

As Luis Roca Blay, who is Head of Compounding at the Spanish technical institute **Aimplas**, explains: "The final goal of Industry 4.0 is not to create a new system for controlling the process, but to improve the effectiveness of companies by, among other things, reducing time to market, improving innovation, and saving money in resources."

In a presentation at this year's Hanover Fair in April, Frans Cronje, Managing Director and co-founder of **DataProphet**, a specialist in developing artificial intelligence (AI) solutions for the manufacturing sector, said that with the unprecedented amount of data coming off production lines, there is an urgent need to augment human analysis with AI, separating the data that can provide real value. There is just too much data available for any one person to analyse. "There is a real danger that operators are being blinded by a blizzard of information and are missing real opportunities for process and quality improvement," he said.

Existing technologies often fail at pre-empting production glitches and fail to spot the changing

Main image: Powerful data acquisition and cloud-based computing tools open up new opportunities in compounding plant operation and optimisation

Right: Coperion's CPCC "smart" control system is designed specifically for compounding plant

conditions that can impact quality, Cronje claimed. "Each process step can have hundreds of variables that affect the quality of the output and operational effectiveness. Even the skilled experts lose control of their process."

His solution is to use AI to find complex patterns in datasets and develop distinct operating models for the production facility. He points to DataProphet's Omni product, intended to reduce the cost of non-quality for manufacturing industries, which can then produce control plans that bring production into a stable and optimised state.

"Cutting-edge machine learning techniques allow Omni to understand the effect that a small change in an arbitrary process step will have on all downstream process steps," he said. "Process steps are no longer operated and controlled in isolation and for each prescribed change, Omni can quantify the expected magnitude of its effect on production."

Omni is a cross-industry product, but there are numerous systems, not necessarily with such grand goals, available specifically for plastics compounders.

From line to ERP

Coperion says that its Coperion Production Control Center (CPCC) "smart" control system provides compounders with an intelligent solution for the control of compounding systems. "The CPCC incorporates all the essential functions of a manufacturing execution system (MES), such as company data capture, KPI determination, traceability and order management," the company says.

Critically, CPCC facilitates overall control of continuous production on multiple production lines. Other key advantages cited by the supplier



PHOTO: COPERION

include complete documentation of the production process and the ability to trace the finished product right down to the batches of raw material used. Its use of generally accepted standards makes it easy to integrate into an existing IT infrastructure.

"The CPCC consolidates the experience that Coperion has gained while implementing over 150 compounding lines and is tailored precisely to compounders' requirements," the company claims. "This development enables Coperion to offer its customers an intelligent Industry 4.0/digitalisation application that paves the way to smart factories." The first CPCC system went into operation at an undisclosed customer at the end of last year, it says.

Transparent production

The CPCC automates the key tasks of the production process by connecting to an ERP system. This then sends the CPCC master formulations containing component proportions and batch data for the raw material used. The system uses this data and previously recorded production line parameters to create "production recipe versions" for that production line. These include operating and work instructions for compounding line operators. It then performs an automated consistency check.

The ERP system's order planning can then use the production recipe versions to create an up-to-date list of the production orders that are to be carried out. It then sends this to the CPCC, which passes the production order data to the relevant compounding line and initiates production there.

The CPCC records process data for each filled package produced and sends it to the ERP system. Barcodes make each filled package seamlessly traceable. The ERP system also receives additional information, such as the status of the current production order, and, when a production order is completed, an overview of the raw materials

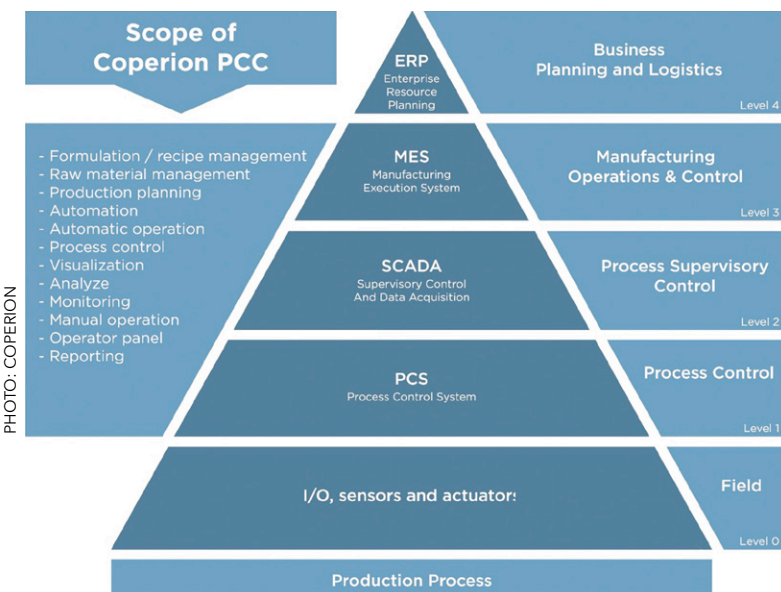
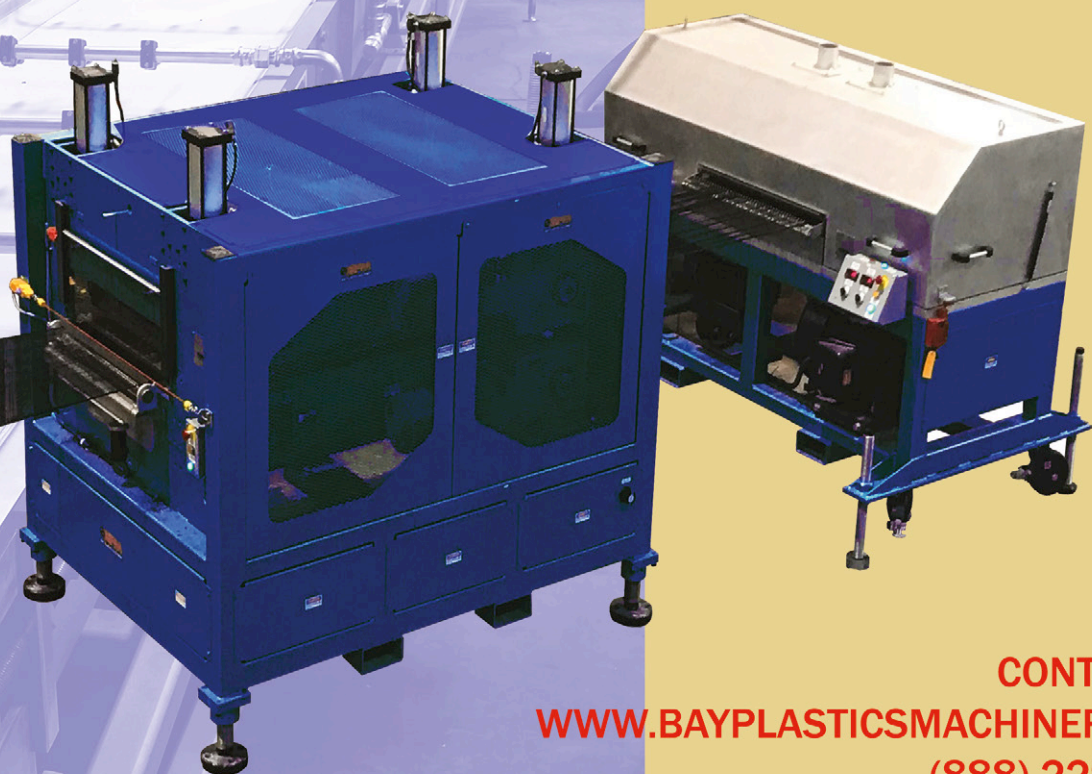
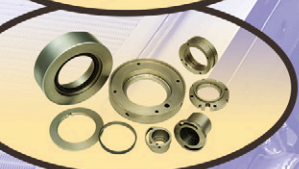
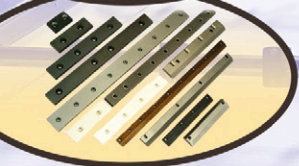
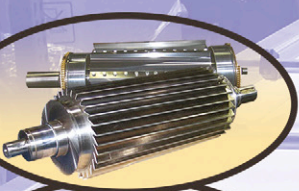


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Above: This pyramid schematic shows how the Coperion CPCC integrates MES, SCADA, and process control functions

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consumed, quantities of finished products and quantities of materials that are not within specification. The CPCC stores all this production and process data in an integrated database and forwards it to a long-term archive.

Communication from the CPCC to Coperion's production lines uses the OPC UA (Unified Architecture) communication protocol, so third-party systems can also connect to it.

Innovative data

KraussMaffei Berstorff offers what it says are two innovative data acquisition solutions as options on its new ZE BluePower twin-screw extruders. "This enables perfect integration of advanced compounding equipment with industry 4.0 technologies," it says. The first is designed to synchronously collect all production data from a compounding line. The company says it is composed of "perfectly tuned" hardware and software components for acquisition, recording, evaluation and further processing of all process and measured values.

The modular system is easy to configure, KraussMaffei claims. As such, it can be adapted to a wide range of different applications and scaled in size. It is also suited for interface-independent operation, which means that any interface can be integrated into an overall system that collects and visualises the desired process data. Pressure, temperature, speed and volume flow values of all upstream and downstream components - metering systems, melt filters, melt pumps and pelletising systems, and so on - as well as the extruder parameters, are all combined in a single system.

The second development from the company

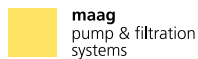


PHOTO: KRAUSSMAFFEI BERSTORFF

uses colour measurement to instantly detect metering errors, in the process reducing production scrap and enhancing line efficiency. Light is projected into the melt, reflected and then detected by a high-resolution glass fibre sensor. Data on colour and brightness is compared with a previously defined setpoint and the system is integrated into the overall line control.

Al Bailey, **Entek's** East Coast Controls Manager in the US, explains how his company designs systems to make its extruders compatible with Industry 4.0 in plant compounding operations. "Entek has eight control engineers on staff and four controls engineers dedicated to the extrusion business. This allows for customisation of extruders to work as a part of a line instead of just stand-alone. All of our major components - PLCs, HMIs, VFDs, etc - communicate with each other through

Above: Process data acquisition systems for KraussMaffei Berstorff twin-screw extruders help fully optimise production potential



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Above: Entek's PLC controller next to one of its twin-screw extruders

Ethernet connections," he says. "Since Entek's HMI has the ability to store data via an SQL database, this data is accessible by other applications. Entek is already integrating the material handling, extruder, pelletiser, classifier, and finish goods equipment to work together in one control platform, as one unit instead of a collection of independent machines. This allows for increased interlocking, automation, optimisation, and decreased waste," Bailey says.

ERP for plastics

Canadian company **CyFrame** offers ERP integrated solutions for small to medium size plastic processing companies. The company says the software offers integrated functionality for quoting, order entry, production planning, scheduling, and control, quality assurance, shipping as well as billing management. CyFrame claims to have a number of customers in the compounding industry, but does not divulge names.

The company says that, unlike a typical ERP, CyFrame drives precise reporting and dashboard controls to improve production planning and scheduling of machinery, raw material allocation and consumption, work in process (WIP) inventory, and serialised lot controlled finished goods by location. The system is claimed to be readily

conceptualised to manage efficiency by machine, recipes, alternate recipes, multi-level bills of material, multiple routings, without a learning curve or customisation.

As part of its integration service, CyFrame plans either an onsite or remote diagnostic of a potential customer's business workflow. This is conducted by its plastics process improvement specialists so that it can provide an analysis on how and what can be substantially improved and at what effort to the business. The company then delivers the entire suite. "All functionality is readily available for our clients to leverage when it is needed from order planning to machine monitoring, material certification, maintained, quality through warehouse location management," says the company's Sales Director, Rick Dunne.

"We support a single, flexible, multi-process, global version, updated bimonthly to continuously bring new capabilities and improvements to the end customers in support of their ever-evolving requirements at no additional charge," he says.

Dunne says the aim is to provide complete enterprise reporting via a multitude of pre-defined system reports, using multiple filters and search criteria in many different formats. "Reports are all real time, can be automated, scheduled, emailed or exported in addition to user defined report capability," he says. The CyFrame system is web-based, eliminating the need for proprietary hardware, and the company says it does not require internal technical expertise.

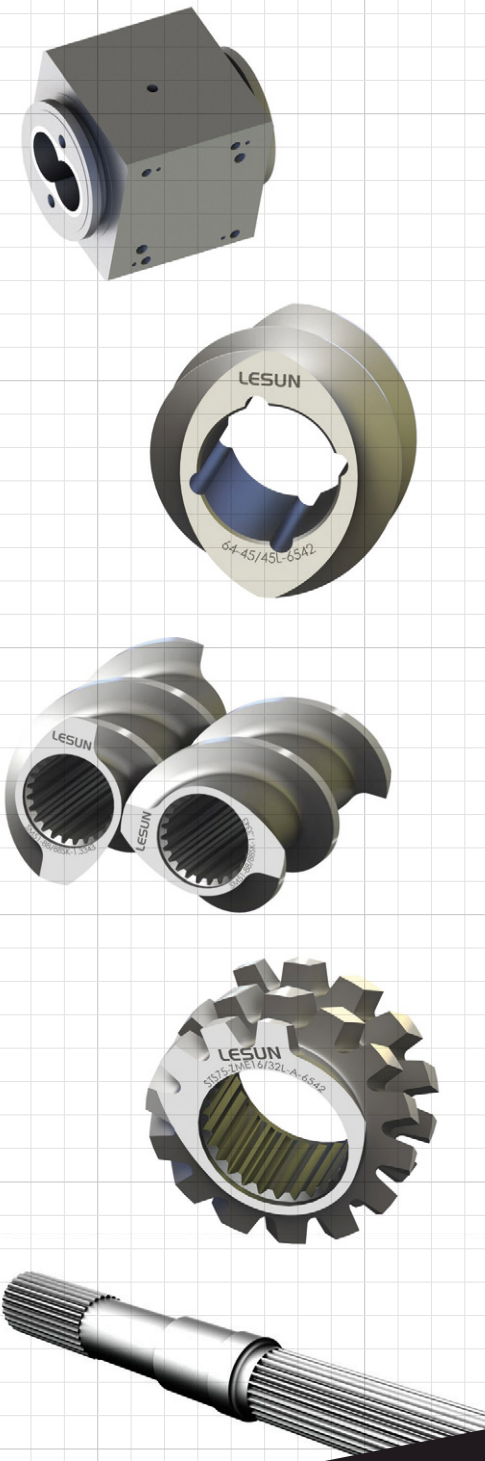
An insider solution

Formulas Made Easy is a Windows-based system for creating and maintaining colorant and compounding formulas developed by an ex-compounder. "Formulas Made Easy is ERP Software for Plastics," says Bruce Muller at **Plastics Consulting**. He previously owned Accurate Color and Accurate Compounder, since acquired by Teknor Apex. ➤

Right: The CyFrame system allows key plant data to be viewed on mobile devices



PHOTO: CYFRAME

The image displays several industrial components: a grey cast housing with a central opening, a circular barrel with a blue internal screw element and the text 'LESUN' and '64-45/45L-65K2', two smaller barrels with 'LESUN' markings, a gear-like barrel with 'LESUN' and '5375-1461/132L-A-65K2', and a long shaft with a threaded section.

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Right: Plant data should be an appreciating asset, according to industrial automations specialist Oden

“FME is designed specifically for manufacturing colorants including masterbatch, concentrate, dry colour and liquid colours. FME is also available in a version for plastics compounders to maintain compounding formulas and their specifications, schedule extruders, mixers and pulverisers,” he says.

After a formula is created with the software, it is tracked from sales through production to delivery. Inventory is automatically updated including re-order notification. Production batch cards, material purchase orders and customer invoices are all created within Formulas Made Easy.

By sharing information through a password protected network, formulas, pricing and order status are instantly available to all appropriate departments. All are completely secure, while manual filing, lost formulas and mathematical errors are eliminated. “By automating formula maintenance, Formulas Made Easy reduces labour costs, reduces errors, improves customer service and assists in maintaining ISO compliance,” he says.

Formulas Made Easy is designed for multiple plants or single locations. Muller says many compounders he has worked with have difficulty realising how little control they have over their compounding process. “Some compounders use QuickBooks or nothing at all,” he says. He recalls demonstrating his system to a very large compounder that had invested over one million dollars in converting a pharmaceutical ERP to track and cost their compounds. “My system complete, with on-site installation, was \$50,000 at that time,” he adds.

Beyond ERP

But plant control doesn't end at ERP. **Oden Technologies** describes itself as “an Industry 4.0 company” combining industrial hardware, wireless connectivity, and big data architecture into one simple platform so all manufacturers can analyse and optimise their production, from any device.

Willem Sundblad, CEO of Oden, emphasises the importance of obtaining good data from production and using it well, noting that the cost of poor quality in manufacturing can be massive. In a recent webinar, he said that in most factories, 10-20% of revenues are lost to the cost of poor quality. That is through the time taken to remake parts, investigate quality failures, the scrap itself, and so on. “Scada, ERP, MES, QA systems are not built to give you an intelligent system,” he said. “We have to think in a different way.”

Sundblad claims that with other data collecting systems, data has been a depreciating asset: the more data they take in, the slower they become. “If you build your architecture right, data becomes an



PHOTO: SHUTTERSTOCK

appreciating asset, because the marginal cost of storing it is so low,” he said.

Such a system can be installed quickly (days rather than months), and the costs of storing data are low. Small data collection devices plugged into machines or PLCs send information wirelessly to a central platform. “There’s a staggering opportunity for efficiency and production leaps by introducing machines to the power of IoT and cloud analytics,” Sundblad says.

Earlier this year, Oden launched a partner programme to help machinery manufacturers eliminate unplanned downtime at their customers. Oden’s Vice President of Business Development Steve Braig (previously with injection moulding technology companies Engel and Trexel) is overseeing the programme.

Using Oden’s platform, machine makers can provide their customers with real-time alerts and fix equipment before it fails, effectively eliminating unplanned downtime. “Their customers will benefit from the option to outsource the maintenance and repair of their assets to the equipment maker, reducing their MRO costs and increasing machine availability,” says Sundblad. Predictive analytics in the Oden platform can be applied to monitoring critical machine components and sub-systems of production, delivering real-time insights into the inner workings of their equipment, and predictive maintenance post-sale.

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The Compounding World Congress returns to Cologne in Germany in June, presenting an opportunity to explore the latest developments in the technical compounding arena. We preview the event

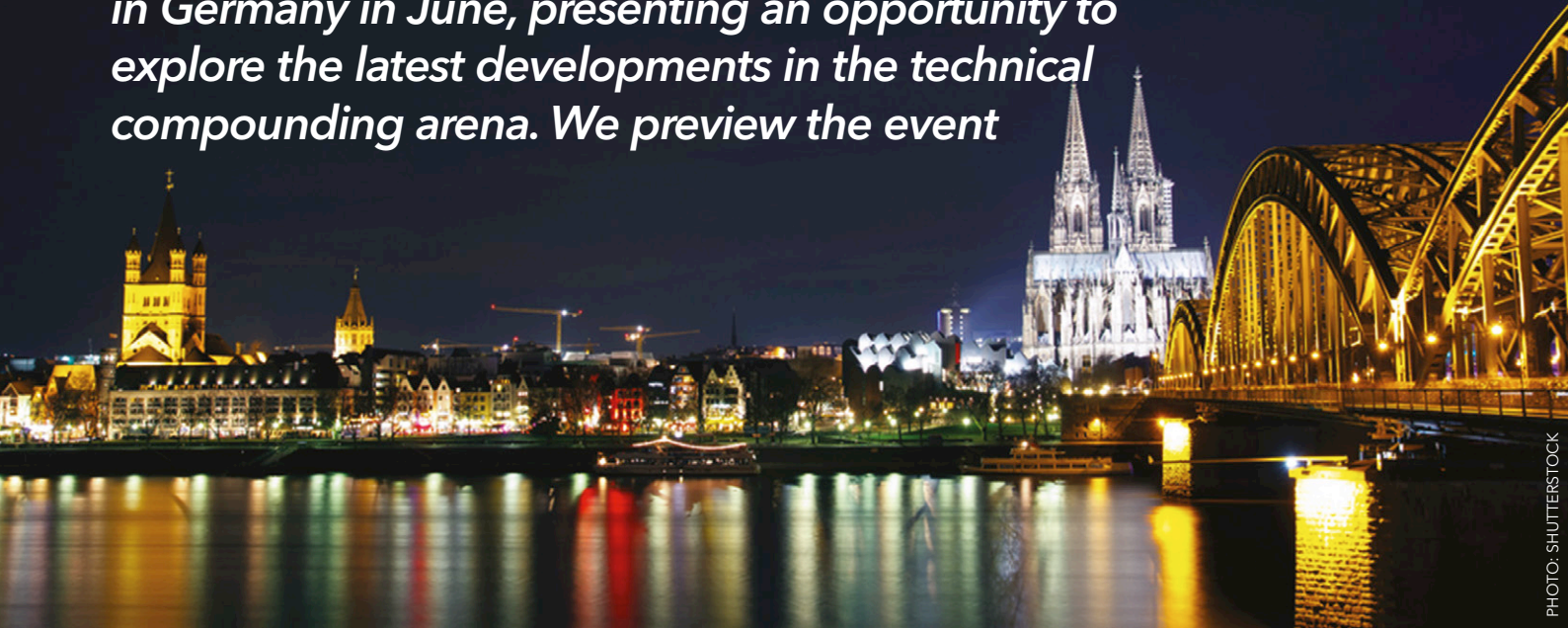


PHOTO: SHUTTERSTOCK

Technical compounding in spotlight in Cologne

AMI's meeting point for the European technical compounding sector - the Compounding World Congress - returns to Cologne in Germany on 4-5 June, providing an opportunity for attendees to catch up with the latest European and global market trends and to explore key technical and commercial developments.

Primarily focused on the production of engineering thermoplastics, thermoplastic elastomers and performance polyolefins for demanding applications in markets such as the automotive, electrical/electronic, medical and industrial sectors, this two-day event has established itself as a key learning and networking location for all in the technical compounding supply chain. This article takes a closer look at what the event holds in store and identifies its line-up of expert speakers.

The 2019 edition of the Compounding World Congress will be opened by **Chris Smith**, Editor of *Compounding World* magazine at **AMI** in the UK, who will present some global and European compounding market data and review recent significant investment and acquisitions. He will then moderate a panel discussion exploring the future of technical compounding and strategies for success. Expert participants in this international

panel include: **Christine Van Bellingen**, Business Development Manager at **Witcom Engineering Plastics** in the Netherlands; **Murat Cansever**, Managing Partner (Technical) at **Eurotec** in Turkey; **Dr Adam Galambos**, Director of Technology - Europe at **Audia Plastics/Washington Penn Plastics Company** in Slovakia; **Dr Oliver Frey**, Head of Compounding at **Ensinger** in Germany; and **Heinrich Lingnau**, Senior Advisor to the Polymer Industries in Europe, Middle East, Africa at **Lingnau Consulting**.

The conference will then turn to the fast developing area of recycled plastics. **Dr Grégory Coué**, Technical Manager at **Kompuestos** in Spain, will open the discussion with a presentation looking at additive package development to improve mechanical recycling of plastic waste into high-value compounds. **Michael Sommer**, Business Development Manager Plastics at **Grolman Group** in Germany, will continue the theme with an explanation of the selection of additives to improve the properties and processing of compounds based on recycled polymers.

The next session will look at process monitoring. **Dr-Ing Christian Beinert**, Head of Department Polymer Processing and Component Design at the

Main image:
AMI's fourth Compounding World Congress will bring Europe's technical compounders to Cologne in Germany in June



Fraunhofer Institute for Structural Durability and System Reliability LBF in Germany, will speak about the application of Industry 4.0 technologies for monitoring compounding processes. Then, **Luis Roca Blay**, Head of Compounding at **AIMPLAS** in Spain, will detail the technical institute's work on the prediction of mechanical properties of carbon-fibre-reinforced thermoplastics using inline measurement of electrical conductivity during compounding.

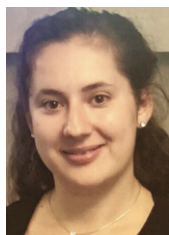


The final session of the first day of the Compounding World Congress will examine formulation optimisation. **Dr Gary Ogden**, Technical Manager at **Wells Plastics** in the UK, will present some case-studies covering formulation and production of cost-effective multi-component additive masterbatches. **Secil Yilancioglu**, R&D Manager at **Eurotec** in Turkey, will cover the challenges of developing density-modified compounds that meet demands for light-weight or heavy-weight thermoplastic components. And the development of a customised flame-retardant compound from concept to finished product will be detailed by **Dr Pascal Wolfer**, Senior R&D Manager at **Lapp Engineering** in Switzerland.



Adding functionality

Development of added-value compounds with enhanced functionality will be the theme for the opening session of the second day. **Tom Daniëls**, Global Market Manager Conductive Plastics at



Expert participants at the Compounding World Congress in Cologne, Germany, in June include (from top): Witcom Engineering Plastics Business Development Manager Christine Van Bellingen; Eurotec Managing Partner (Technical) Murat Cansever; Audia Plastics/Washington Penn Plastics Director of Technology Europe Dr Adam Galambos; Eurotec R&D Manager Secil Yilancioglu; BASF Advanced Materials & Systems researcher Dr Itana Lohse; and Coperion Global Head of Process Technology Frank Lechner



Bekaert Fibre Technologies in Belgium, will open proceedings with an examination of the use of the latest metal fibre technologies to significantly increase electrical conductivity of thermoplastic compounds for EMI and ESD applications. **Michaël Claes**, Chief Technology Officer/Global Strategic Account Manager, **Nanocyl** in Belgium, will detail adoption trends and future opportunities for nanocomposites based on carbon nanotubes, presenting an application case-study. Then **Anna Ellett**, Field Application Engineer Polymers at **Imerys Graphite & Carbon** in Belgium, will present the findings of a research project examining tribological performance of graphite-filled compounds.

The next session will focus on formulation and processing of heavily-filled compounds. **Dr Itana Lohse**, Advanced Materials & Systems Research - Polymer Processing & Engineering at **BASF** in Germany, will explore the opportunities and challenges presented by highly-filled polymer compounds. **Ralf J Dahl**, Director Sales Extrusion at **KraussMaffei Berstorff** in Germany, will provide tips on how to achieve high-performance and energy-efficient production of such compounds. And **Frank Asmuss**, Business Development Manager at **Nordson** in Germany, will follow with a look at the design and operation of underwater pelletisers for highly-filled compounds.

The final session of the conference will look at optimised production. **Frank Lechner**, Global Head of Process Technology at **Coperion** in Germany, will open with a presentation explaining how to implement a logic-based programme for compounding line debottlenecking and how that can improve profitability. Dipl Ing **Bernward Hüppmeier**, Business Development at **Brabender Technologie** in Germany, will discuss ways to improve handling of non-flowable, long-fibre materials. And **Peter Gohl**, Sales Engineer at **Farrel Corporation** in the US, will close the conference with a discussion of optimised production of PLA compounds using continuous mixer technology.

About the Compounding World Congress

AMI's fourth Compounding World Congress takes place in Cologne in Germany on 4-5 June 2019. The event provides an unmatched international forum in which to explore new business strategies and identify new materials and process innovations to enhance the performance of technical thermoplastic compounders.

The conference brings together industry expert speakers to explain how to overcome the most difficult market and technical challenges, while a special panel debate will examine how to grow business in today's increasingly competitive global arena. In addition to the formal conference sessions, the event will also present plenty of informal networking opportunities during the networking breaks and evening reception.

To find out more about the Compounding World Congress 2019, visit the [CONFERENCE WEBSITE](#) or contact Conference Organiser Sophie Roxburgh. Tel: +44 (0) 117 314 8111; Email: sophie.roxburgh@ami.international





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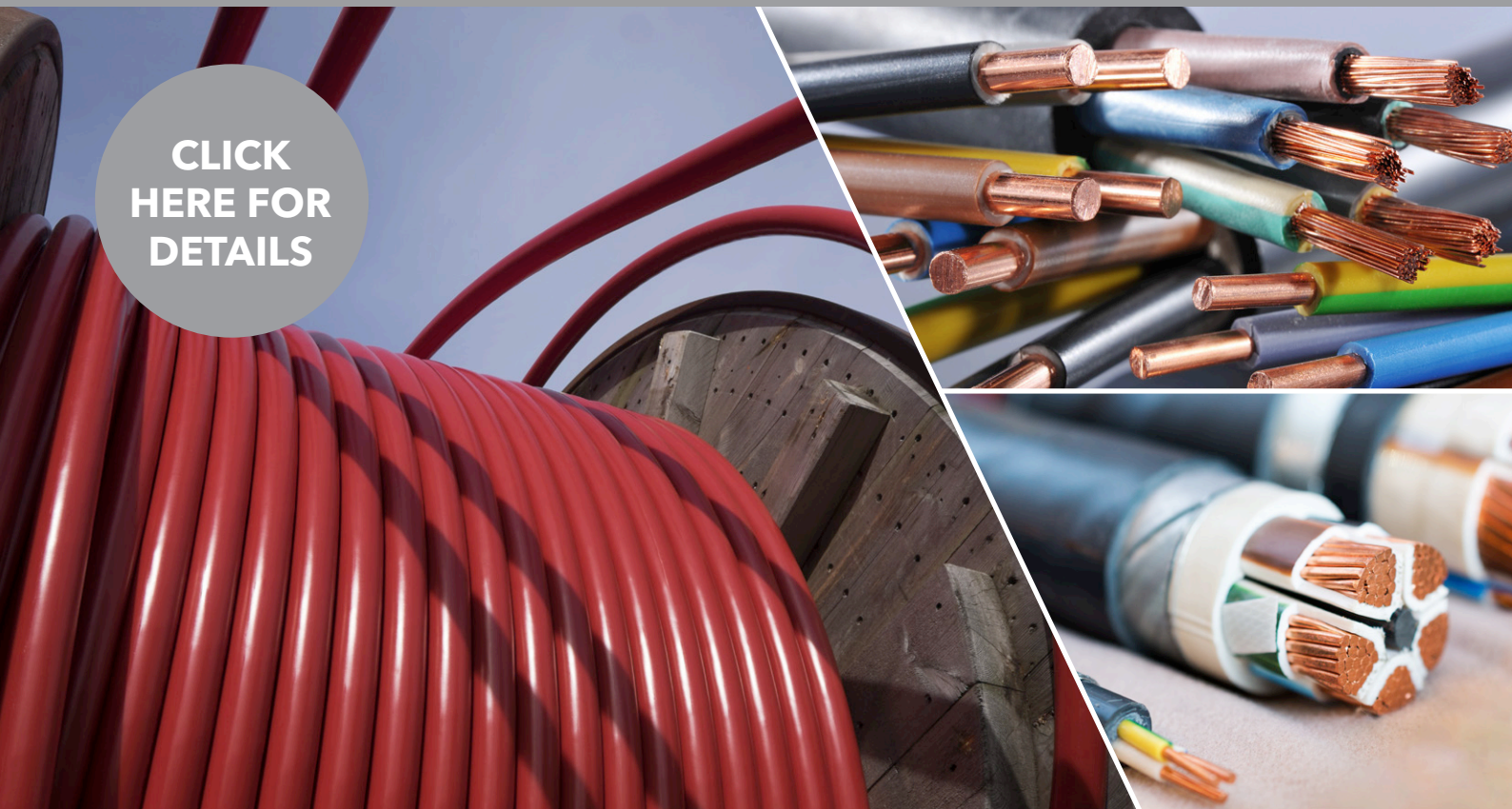
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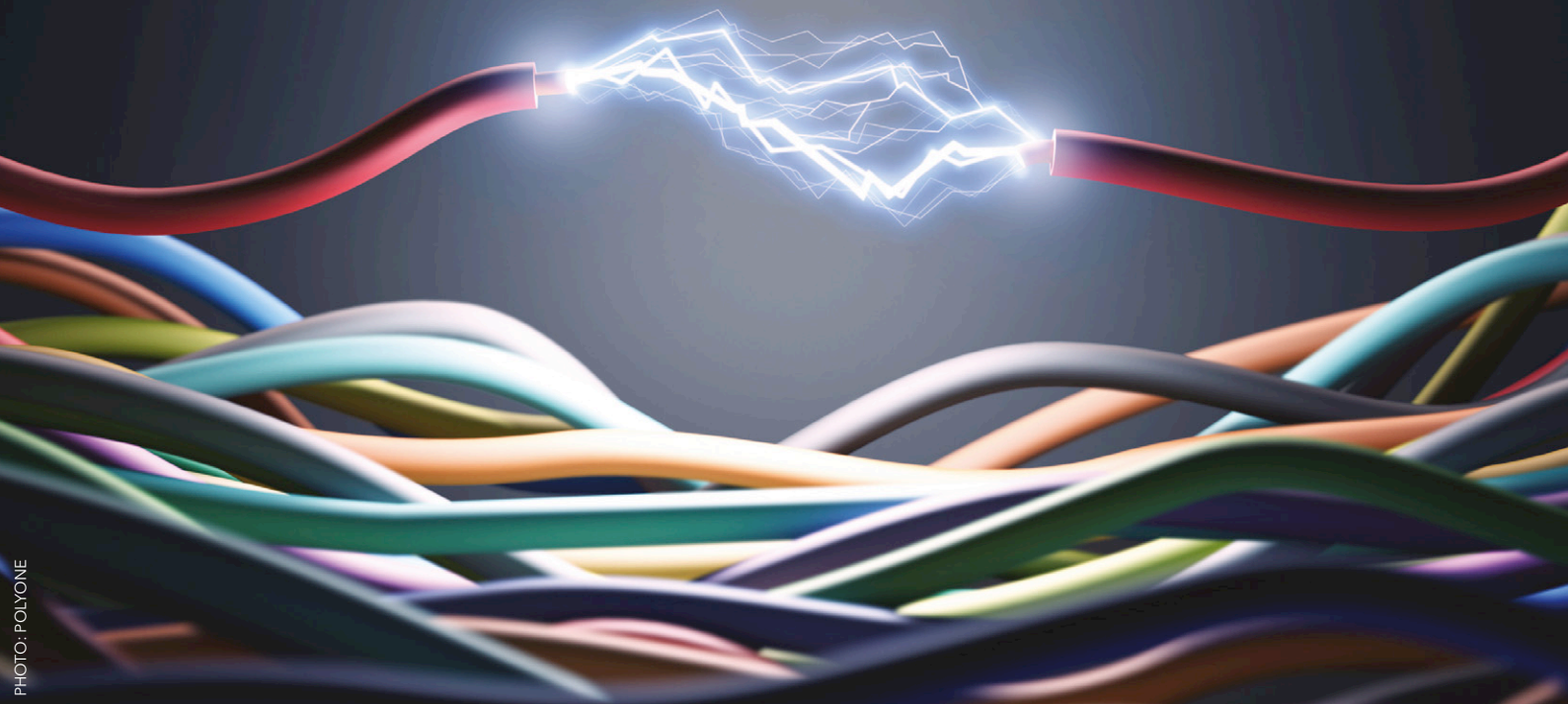
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Wired for performance

New formulations targeted for specific applications and the need to achieve higher production volumes with increased flexibility are key challenges facing cable compounders, writes Mark Holmes



The cable compounding industry is seeing considerable change imposed on it. The increasingly complex and tailored polymer formulations required to meet today's highly specific wire and cable applications means compounders require ever greater levels of production flexibility. Meanwhile, the need to achieve higher production volumes while meeting stricter construction and environmental regulations is placing additional demands on the sector, as is the substitution of many traditionally-used polymers and additives with newer alternatives.

A number of interesting growth areas in the wire and cable business are highlighted by technical experts at **Buss**, the Switzerland-headquartered manufacturer of kneader compounding extruders and a key supplier to the sector. "High voltage cable compounds for renewable power applications is one growth area," says Andreas Niklaus, Senior Process Engineer. "In addition, there is a need for higher volume cable production, as well as for higher voltage applications. The transmission of DC instead of AC also requires modified

compound properties. Stricter construction product regulations (CPR) and higher temperature ratings for halogen-free flame retardant (HFFR) compounds, for example in automotive and photovoltaic/solar applications, will boost demand for HFFR cables. Finally, there is also a requirement for flame retardant TPU cables for automation and robotics, with higher mechanical properties and chemical resistance."

Head of Process at the company, Dr. Francois Loviat, adds that there is a clear trend - not only in the EU and US but also in Asia - to replace overhead systems for transmission of electrical power with underground lines. This is driven by several factors, including new construction standards, the need for better safety and more reliability, and the need to transport electricity over longer distances (underground cables have a lower voltage drop than overhead lines). He says another trend is the more stringent ecological and safety regulations worldwide, which are pushing the replacement of halogen-containing materials with low smoke halogen-free alternatives.

Main image: Demands are increasing on cable compound producers, with fire retardance and processing both key requirements

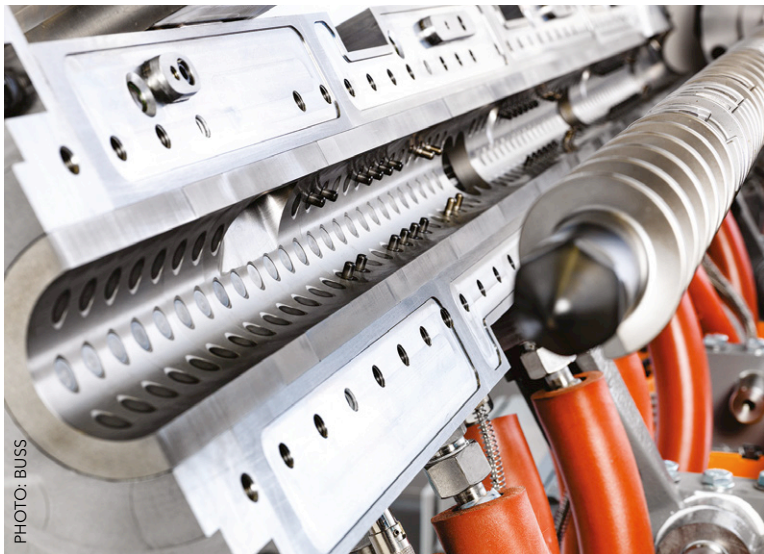


PHOTO: BUSS

Above:
Flexibility is a prime feature of the latest Buss Compeo kneader extruder

There are other factors driving new cable and wire technical developments, too. "Regulations are removing well known products, such as PVC, from certain applications," Niklaus says. "There is also demand for higher voltages in XLPE insulation compounds, better electrical properties for data cables, and improved mechanical properties with thinner cable constructions. Economically, formulations are getting better adapted and specified for the required properties to get lower material costs. With higher volumes of compounds, this is an important factor. Replacing existing raw materials with cheaper ones is also a significant trend."

Buss Process Engineer Robert Hollosi says that formulations are getting more specific to the required cable application. "Compounding and formulation know-how is increasingly being held by the cable producer, not shared with a toll compounder and other end users," he says. "There is also always a need for better performing materials, driven by new regulations such as flame retardancy, or technological requirements including mechanical and electrical properties. The ban of some additives, such as organometallic stabilisers, is also a major technical issue at present."

Flexible compounding

The company's technical team believe that more complex formulations call for more flexible compounding equipment. Maintaining good dispersion with new fillers requires more flexible screw geometries, as well as differently designed mixing elements, to obtain the best dispersion quality. This flexibility also means being able to change between XLPE-LV, HFFR (Halogen-Free Flame Retardant) and PVC compounds with ease. In addition, more abrasive materials are now being used in the cable compounding process, so higher wear resistant construction materials are required as well as gentler mixing. Other cable compounding requirements include more effective and flexible feeding of raw materials, such as liquids, pellets and powders, as well as better ventilation and degassing, they say.

The latest Buss kneader extruder development is the Compeo series, which can be equipped with 2, 3, 4 and 6-flighted kneading elements that can be combined to obtain the best mixing result for a specific requirement. Each element type is also available with different flight shapes to achieve the most suitable screw geometry. The Compeo design also includes an enlarged main feed port with patented venting arrangement and side feeders for improved feeding of powders. This is said to guarantee optimum filling in the intake section and allow further optimisation of the compounding line. And a new counter-rotating twin screw discharge helps to build up the pressure for pelletising gently and more flexibly for a wider variety of product viscosities. The company says this also opens up new opportunities where high discharge pressures are required, such as direct extrusion.

According to Buss, a comparison of pure 3 and 4-flighted screw geometries against the combination of 2, 3 and 4-flighted screw elements has shown reduced energy consumption and substantially improved dispersion of demanding fillers. Smart combinations of these elements create a

Lewa delivers precision in silane dosing

German metering pump manufacturer **Lewa** has supplied an undisclosed cable manufacturer with equipment to precisely dose silanes in its continuous production process.

As the accuracy of dosing of the silane additive has a direct influence on the quality of the end product, the company says that fast response and

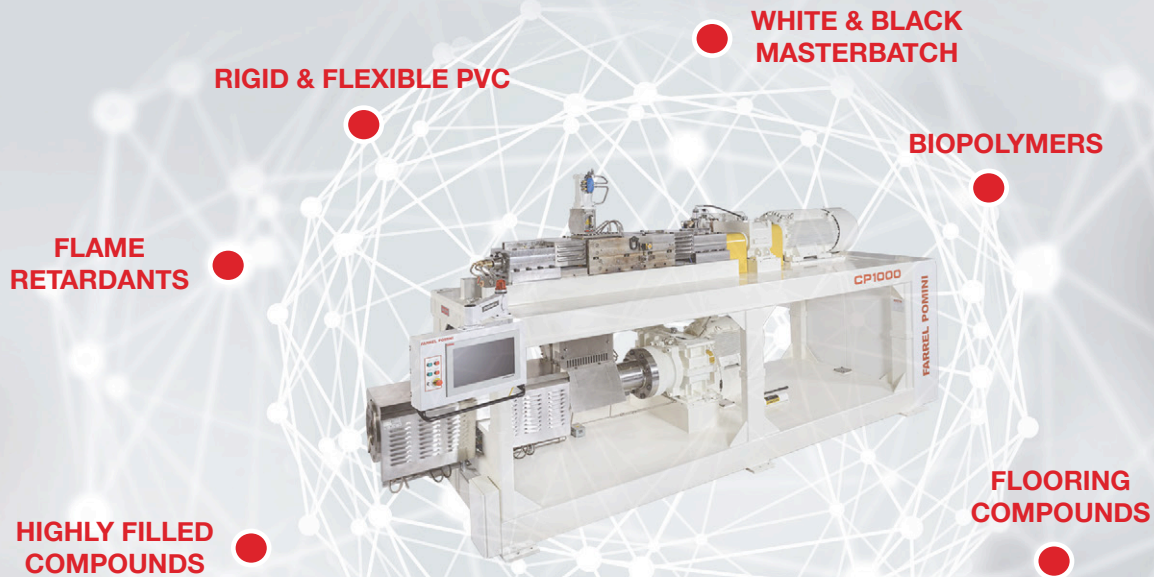
precise control of flow rate has to be guaranteed - even when different types of silane are being used for different products.

The cable producer uses various types of silane cross-linking and adhesion agents at its manufacturing sites around the world. Each metering system uses Lewa's Ecoflow dia-

phragm metering pump - which provides flow rates of 0.5-10 l/h - in combination with the company's Lewa Smart Control technology and a high precision mass-flow meter. Minor modifications were made to adapt the dosing systems to national regulations in each location.

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Right: LKAB's UltraCarb is being used as an alternative to ATH in cable compounds

larger processing window without severe reduction of throughput, compared to 4-flighted kneaders. The company says this leads to higher flexibility in running various formulations at a constantly high throughput rate.

"The latest generation of our compounding machines, the Compeo, is just being introduced into the market," says Loviat. "The huge flexibility of this machine allows the production of a wide variety of cable compounds, from rubber to PVC, including low smoke halogen-free compounds, XLPE and even engineering plastics on the same machine, which was not the case on former generations of machines. This will allow cable producers to standardise their machine park for greater efficiency and simplified maintenance activities."

Alternative supply

Cable compound producers are also having to deal with shortages of some of their material staples. **LKAB Minerals** says, with aluminium trihydroxide (ATH) currently in short supply, manufacturers of cable compounds are looking for alternatives and it is seeing increased demand for its UltraCarb filler.

"UltraCarb, a product manufactured from hydromagnesite and huntite, was already positioned as a natural mineral replacement for ATH, with both performance and sustainability benefits," says Ian Yates, UltraCarb Business Development Manager at LKAB Minerals. "These latest developments add better sustainability to the list of reasons to change; in particular, availability and long-term pricing stability."

The company says, when used as a fire retardant, ATH releases water in a single action process, while UltraCarb offers a three-stage fire retardant mechanism with water release, CO₂ release and finally char formation as temperatures rise further. This three-stage mechanism is claimed to allow the filler to offer significant improvement in fire retardancy and safety. As a consequence, UltraCarb is widely used in halogen-free and PVC cable sheathings, foam insulation and rubber products.

LKAB Minerals also recently commissioned an evaluation of the environmental impact of UltraCarb in compliance with ISO 14040-14044. It concluded that using UltraCarb in place of traditional flame retardant fillers such as ATH resulted in 40-45% lower greenhouse gas emissions and

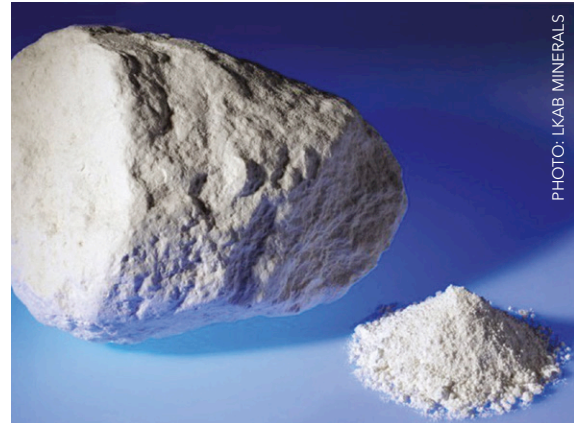


PHOTO: LKAB MINERALS

energy consumption, according to the company.

"Experience has shown that to obtain the full performance benefits of UltraCarb some modification to formulation and processing conditions is often necessary when compared with traditional ATH-based formulations," says Yates. "In co-operation with customers and major machine manufacturers, LKAB Minerals has developed and tested formulations successfully and UltraCarb has gained high industry acceptance. We can see from the requests we are receiving that the uncertainty of ATH developments has brought an increased interest to consider a change of flame retardant. Since we doubled our production capacity and developed additional grades, such as UltraCarb LH3 for this market, we are also ready to support these initiatives."

Media solutions

Turning to compound developments, **Saco AEI Polymers** has introduced Thermodan HF TP343NT, a high performance, low smoke halogen-free, thermoplastic wire and cable jacket compound for copper media cables - category 5e and 6 and UL subject 444 - that passes the UL 1666 riser flame test. When used as a jacket for fibre optic cables, TP343NT can help meet the stringent new European CPR regulations at the B2 classification. Thermodan HF TP343NT is natural in colour, UV resistant and certified halogen-free by UL to UL 2885.

The company has also introduced Pexidan HF S/C-UV, a low smoke zero-halogen, moisture cured XLPE jacket compound. The Pexidan HF S/C-UV system is suitable for applications in: UL 1277 tray cables and UL subject 13 power-limited tray cables; mass transit systems; thermoset fibre optic cables for European CPR requirements and hazardous environments; offshore petrochemical oil platforms; and substation control cables. When used with Pexidan HF X/T low smoke zero-halogen insulation compound and an LSZH barrier tape, or with Pexidan V/T-2 halogenated insulation com-

Below: Thermodan HF TP343NT is a low smoke halogen-free thermoplastic compound for copper and fibre optic cable jackets from Saco AEI

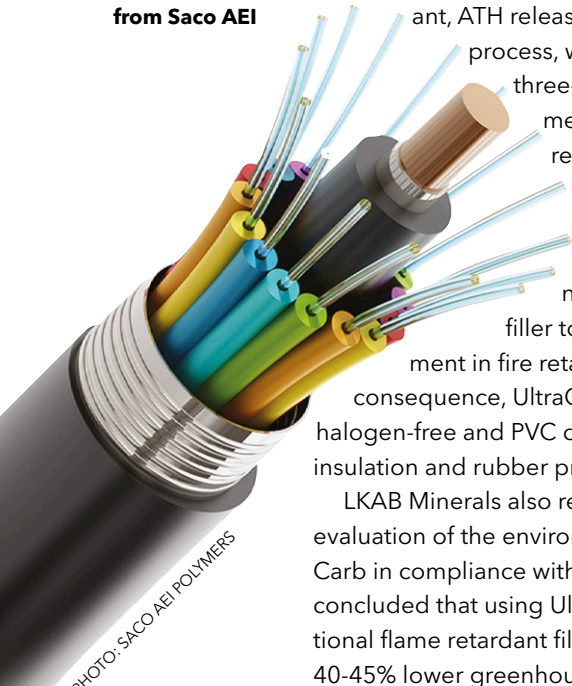
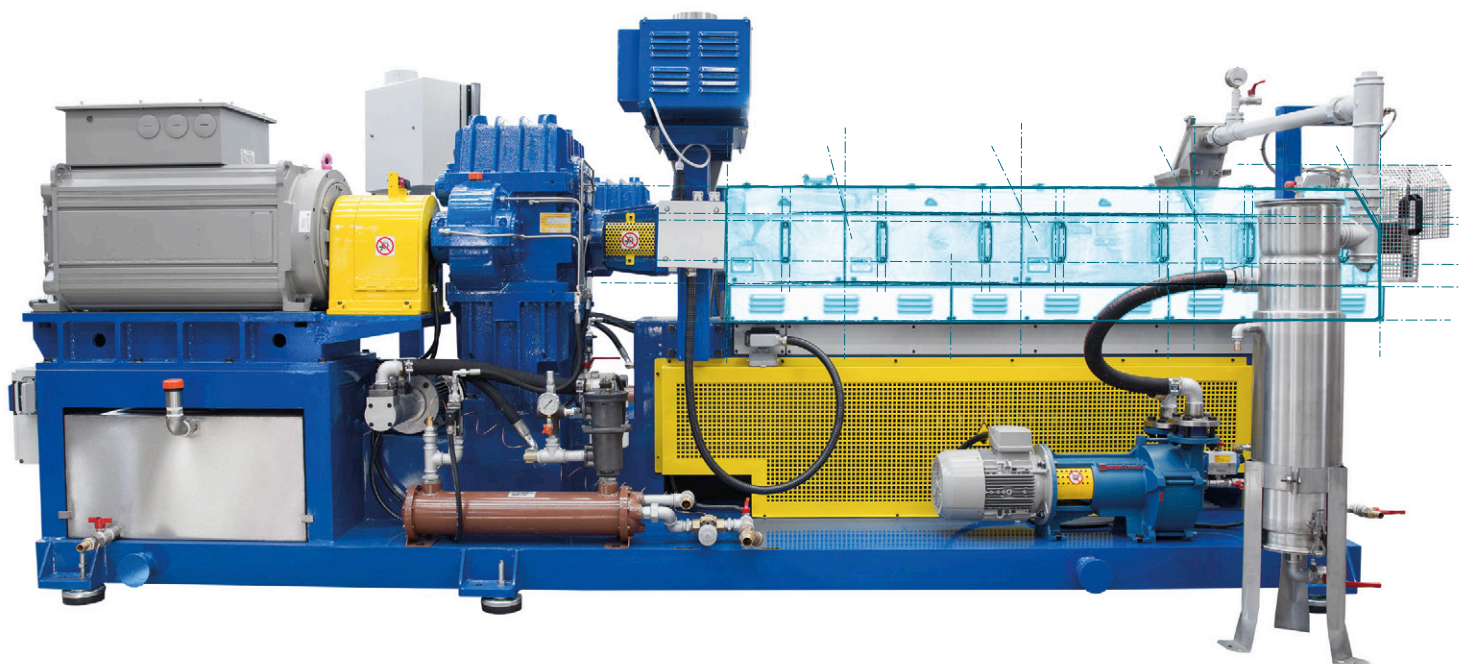


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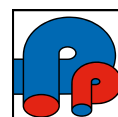
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Right:
Melos has developed new halogen-free compounds for optical fibre applications



pounds, the finished cable is capable of passing CSA FT4 and UL 1685 flame tests. Additionally, Pexidan HF S/C-UV can pass UL cold impact at -40°C, is rated Oil Res I & II, and is certified halogen free by UL to UL 2885.

The Geon Plenstar series of fire-resistant, plenum cable jacketing compounds from **PolyOne** includes five grades of cable jacketing materials. The company says all meet UL approvals for plenum applications and offer physical properties required for telecommunications cables. Addressable applications for the Plenstar series are Cat 3 to Cat 6 multi-conductor cables with a 75°C UL temperature rating and passing UL 444. Customisation is possible for modified performance enhancements and custom colours can be developed.

The company also offers a range high-performance and flame-resistant polymers, colorants and additives for wire and cable applications. The portfolio includes ECCOH non-halogenated formulations offering flame retardance with low toxicity and smoke density, as well as the Colorant Chromatics cross-linkable formulations formulated for high temperature resistance and good cut-through resistance, abrasion performance and mechanical toughness. The Colorant Chromatics line also includes chemical and physical foaming additives to enhance electrical properties, reduce cable weight and improve cost effectiveness. Other PolyOne offerings for the cable industry include the OnCap anti-rodent and anti-termite masterbatches and OnCap nucleating foaming agent, which is used in manufacture of coaxial PE cables via gas injection foaming.

Custom solutions are a hallmark of the PolyOne offering, with a recent collaboration with a Chinese manufacturer of data cables one example. The company was having difficulty finding a supplier of fluoropolymer colour and additive masterbatches

that met its quality requirements and was reporting higher scrap rates from its cable lines, leading to delayed deliveries. In addition to higher quality, it also needed a supplier that could certify the materials met RoHS REACH requirements so it could market its products to international customers.

PolyOne developed a Colorant Chromatics masterbatch that easily integrated into the cable company's production lines. Based on the manufacturer's rolling forecast, it provided local stock to keep delivery times to the minimum. Lead times for meeting customer orders shrank from four weeks to one. According to PolyOne, the transition to Colorant Chromatics fluoropolymer colour concentrates helped reduce the cable maker's scrap rate from 10% to less than 5%. Production efficiency increased by 20%.

Fibre optic options

German cable compound specialist **Melos** has developed a number of grades for sheathing fibre optic cable constructions. Mecoline S TP 1005 F is said to offer a reliable halogen-free, fire-retardant alternative to PBT in 'loose tube' applications due to its low shrinkage properties, high melt strength and relative stiffness (E-modulus). Other fire-retardant sheathing options, such as Mecoline S TP 1006 F (aluminium hydroxide-based) and Mecoline IS TP 1033 F (magnesium hydroxide-based) can also be considered, the company says. Both are easy processible compounds demonstrating low shrinkage. All sheathing compounds can also be supplied with an additional UV package to withstand 720 hours of UV weathering resistance in compliance with ISO 4892-2.

In critical applications, a bedding compound can improve the flame retardant properties of fibre optic cables. Melos says that its bedding compound FM 0474/5 (LOI 63) can provide a cost-

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Table 1: Key properties of Flexalloy 89504-90 and 89504-90FR thermoplastic elastomer PVC compounds

Properties and Units	ASTM/ UL Test	Flexalloy PVC Elastomer	
		89504-90	89504-90 FR
Hardness, Shore A (+/-3, 15 sec.)	D-2240	90	90
Specific gravity	D-792	1.24	1.28
Tensile strength, psi	D-638	2,830	2,830
Elongation, %	D638	340	340
Brittle point, °C	D-746	-46	-46
Oxygen index, %	D-2863	27.0	29.5
Volume resistivity @ 50°C, Ohm-cm	D-257	1.68x10 ¹⁴	1.68x10 ¹⁴
Dielectric constant @ 1kHz/@ 1 MHz	D-150	4.83/3.18	4.67/3.20
Dissipation factor @ 1kHz/@ 1 MHz	D-150	0.0612/0.0874	0.0616/0.0805
Max. continuous operating temperature, °C	UL 2556	105	105
UL QMTT2 Recognitions	-	TW, THW, THHW	TW, THW, THHW

Source: Teknor-Apex

effective way to enhance fire-resistance.

Mexichem Specialty Compounds has developed a low smoke plenum PVC compound to replace data cable insulation and jacket materials. The company says current demands on fire alarm and security systems require any cable used for these systems to be installed in plenum air handling spaces and comply with the low smoke and com-

bustibility requirements of NFPA 262/UL 910. The new SmokeGuard compound enables manufacturers to use a single material as both the insulation and jacket in a variety of cable designs, including fire alarm (FPLP) and security (CL2P/CL3P) cables.

Mexichem says the compound was developed to meet exacting benchmark standards, including conforming to the low smoke and combustibility requirements of NFPA 262 / UL 910, as well as the insulation and jacket requirements of UL 1424 (Power-Limited Fire-Alarm Circuits) and UL 13 (Power-Limited Circuit Cables). It also needed to perform optimally at high extrusion rates and be suitable for production of shielded and unshielded cable designs that vary in conductor count and AWG size.

The SmokeGuard 1042, 1045, and 1046 series products are optimised for various customers' process and cable designs. Customer extrusion trials were performed with acceptable processability and resulted in cables that complied with the NFPA 262 test, as well as all other requirements outlined in UL 1424 and UL 13.

Mexichem developed Megolon HF 8142, a low smoke halogen-free (LSHF) compound initially to



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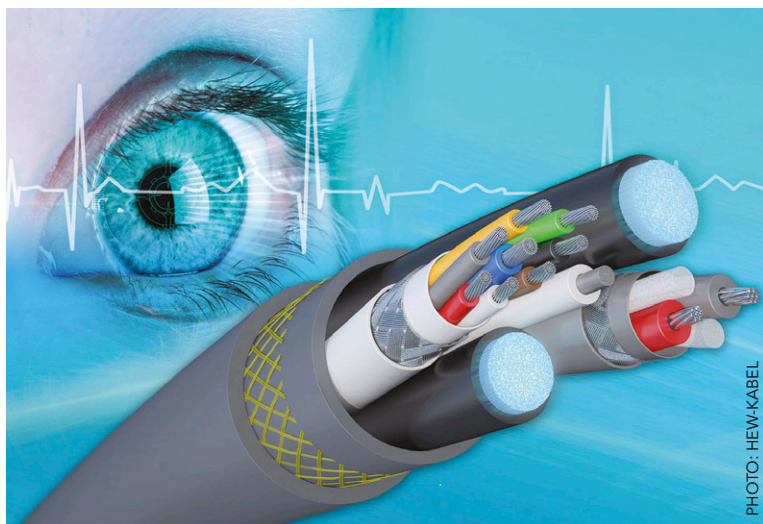


www.aci.com.pt



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Above:
Hew-Kabel's
Hew-Silindo
low friction
jacket com-
compound is
intended for
medical
diagnostic
cables

overcome a temporary market shortage problem in North America for a particular halogen-free product for copper and fibre communication cables. The product was used in cable jackets and tight buffer applications but supply was tight. The company developed Meglon HF 8142 as an alternative that, it says, met all the attributes of the incumbent material but also processed more easily. While the original material shortage has been overcome, Mexichem says it has retained the business and Megolon HF 8142 is currently sold as a cable jacket and tight buffer compound for many cable designs worldwide.

PVC versatility

Teknor Apex Company recently launched two PVC elastomer compounds for wire and cable insulation that exhibit enhanced performance and application versatility. The company says that the Flexalloy 89504-90 and 89504-90FR thermoplastic elastomer compounds provide better low temperature flexibility than standard PVC and offer an improved capability to withstand repeated flexing over extended working lifetimes. Both grades have Shore A hardness ratings of 90, are UL recognised for Oil I and II insulation applications, and meet the requirements of the VW1 (UL 83) flame test (Table 1). The FR grade provides a greater level of flame resistance and has UL recognition for the 720 hour sunlight resistance test in all colours.

“Teknor Apex received dual UL recognition for Flexalloy 89504-90 products as both ‘PVC’ and ‘elastomer’ compounds, enabling them to be used for all cable types within UL 62 and many wet-rated applications under UL 83,” says David Braun, Wire and Cable Industry Manager for the Vinyl Division of Teknor Apex. “In cases where these insulation compounds are matched with our extensive line of Flexalloy jacket materials, manufacturers can use

Teknor Apex as a single cable compound source.”

Recommended applications for Flexalloy 89504-90 compounds include factory automation and robotics cables; control and instrumentation cables (TC, PLTC, ITC and CIC); custom appliance wires; flexible cords (UL 62), including electric vehicle charging cables; portable power cables such as those used on construction sites; stage lighting cables; and welding cables.

The Engineered Polymers business of the **Lubrizol Corporation** has developed halogen-free solutions for cable applications and expanded its Estane flame retardant thermoplastic polyurethane (TPU) portfolio for emerging end applications in automation. Lubrizol’s TPU grades are widely used in cable and wire jacketing due to the demand for lower flame spread, low smoke densities and higher limiting oxygen index (LOI), in combination with good hydrolysis, good abrasion and weather resistance. Lubrizol says its wire and cable solutions deliver value by elevating high-temperature performance while providing good mechanical properties.

Estane TPUs are recyclable, durable and resistant to flex fatigue. The latest Estane polymers for cable protection include hardnesses ranging from UL-94 V-2 to V-0. Estane ZHF 90AT8 NAT01 is the latest addition to the product line and is especially designed for cables in robotics, construction and communications. The company says that it has developments underway for halogen-free, flame retardant polymer solutions for VDE and UL1581 requirements such as FT-1, FT-2, VW-1, cable flame and cable bundle.

German company **Hew-Kabel** has introduced a range of special cables for medical technology applications that it offers with its optional Hew-Silindo low friction jacket materials. Intended for use in diagnostics, surgery and patient monitoring, friction is said to be permanently minimised, even after five hundred autoclave cycles. The company says the Hew-Silindo jacket reliably prevents the “stick-slip” effect without compromising performance or haptics. It can be sterilised and is biocompatible according to EN ISO 10993-5.

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2019

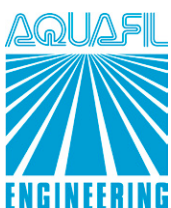
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Looking ahead to Chinaplas

Chinaplas returns to Guangzhou this year and is expected to draw some 180,000 visitors. We preview the show and take a look at some of the innovations for compounders

Chinaplas returns to Guangzhou this year (it alternates between the southern Chinese city and Shanghai each year). The show, which runs from 21-24 May, will again be held at the China Import and Export Fair complex at Pazhou. Around 3,500 exhibitors will be there and the organiser, Adsale, is expecting around 180,000 visitors.

Many of the traditional Chinaplas features return for the 2019 event with some, such as recycling, being elevated to a more prominent standing. Adsale says that this more intense focus is a response to changes that have taken place in the local recycling market since China banned the import of waste plastics in 2017.

"In the past, the waste processing and recycling industry relied heavily on imports - lacking a complete recycling chain - while recycling rate and proportion of large-scale recycling are both low," according to Adsale. "With the implementation of the ban, it is bound to intensify the shortage of raw materials, and the recycling system of renewable resources is in urgent need of change."

Adsale says that China's ongoing productivity - and growth in plastics production - will also mean a necessary improvement in recycling. "It is predicted that by 2025, China will produce nearly a quarter of the world's total urban solid waste," an Adsale spokesperson said. "And we know that by improving the recycling rate of waste plastics, the development of a circular economy can be greatly promoted."

Other feature areas of interest to compounders include: Medical Plastics Connect; Tech Talk; Design X Innovation; and Industry 4.0 Factory of the Future. But for all these extra features, the main reason for visiting the show will be the exhibitors and the products on show.

Colloids will show a number of new speciality black masterbatch products, including a high UV protection black masterbatch for production of overground PE drip pipe, tape and lay-flat tubing crop irrigation systems for the agricultural market. To maximise processing and UV resistance performance, the formulation combines an optimised carrier and antioxidant system with a high quality

**Main image:
Some 180,000
visitors are
expected for
Chinaplas
2019, which
takes place in
Guangzhou
from 21-24
May**

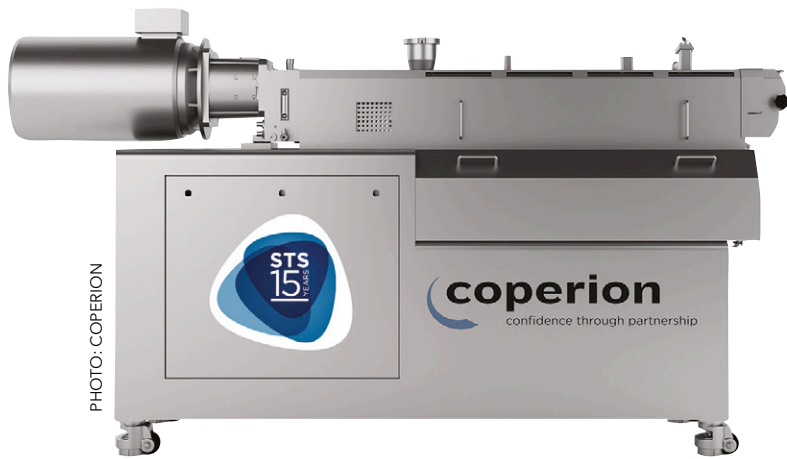


PHOTO: COPERION

Above:
Coperion extends its STS range to include a first laboratory variant

carbon black pigment. It will enable irrigation system producers to offer products capable of lasting for at least two growing seasons in a temperate climate.

The company will also exhibit a new high performance, low VOC black masterbatch for use in high intensity black-coloured foam parts that must meet the increasingly stringent automotive emission criteria for volatiles. The black masterbatch products have been successfully tested to VDA 277 and 278 automotive emission test methods.

> www.colloids.co.uk

Coperion will mark the 15th anniversary of the introduction of its Chinese-manufactured STS twin screw extruder with the launch of a new laboratory model. The STS 25 Mc¹¹ extruder uses 25mm diameter screws and is designed for R&D applications or for production of small batches.

Incorporating the design features of larger STS Mc¹¹ series machines, the laboratory model is intended for production of batch sizes of as small as 2 kg and throughputs of up to 90 kg/h. By using the same screw D_o/D_i ratio of 1.55 and maximum specific torque of 11.3 Nm/cm³ as the rest of the STS Mc¹¹ extruder series, the company says production can be reliably scaled up to larger STS units. The machine at the show will be presented with a Coperion K-Tron K-ML-SFS-KT20 twin screw feeder.

The company will also exhibit a 58mm model from its highest performing ZSK line. The ZSK 58 Mc¹⁸ will be equipped with an SP 320 Treasure strand pelletiser, a Coperion K-Tron Quick Change twin screw feeder fitted with ActiFlow bulk solids activator, Electronic Pressure Compensation (EPC) and 2415 vacuum receiver for refill, as well as the K-ML-BSP-150-S Bulk Solids Pump (BSP) feeder for granular materials.

The SP 320 Treasure strand pelletiser is engineered for processing of highly abrasive reinforced products. It features a working width of 320 mm and can process up to 80 strands at throughput

Right:
Coperion's SP 320 Treasure strand pelletiser is tailored to the demands of the Chinese market

rates up to 2,500 kg/h. Tailored to the demands of the Chinese market, it is assembled at Coperion's Nanjing facility using a cutting chamber produced at the Coperion Pelletizing Technology plant in Germany.

> www.coperion.com

Coperion K-Tron will showcase a variety of equipment at Chinaplas, including a number of feeding solutions. Its K2-ML-D5-T35/S60 Quick Change (QC) feeder features the ActiFlow bulk solids activator and Electronic Pressure Compensation (EPC) in combination with a 2400 Series vacuum receiver for refill. The K2-ML-D5-T35/S60 is designed for applications requiring quick change-over of materials and convenience of fast cleaning. It allows for the removal of the entire feeding module for rapid replacement with a second unit.

The ActiFlow smart bulk solids activator provides an effective means to prevent bridging and rat-holing of cohesive bulk materials in hoppers without internal agitation. It is a no product contact device consisting of a vibratory drive and control unit, and is designed to work with Coperion K-Tron's line of gravimetric loss-in-weight feeders.

Also on display will be the company's K-ML-BSP-150-S Bulk Solids Pump (BSP) feeder, for gentle feeding of free flowing granular materials. The BSP feeder uses a positive displacement action to feed free flowing materials with high accuracy, offering uniform discharge, consistent volume and gentle handling. With no pockets or screws and only one moving part, the compact feeder is cleaned in seconds, making it ideal for applications with frequent material changes.

> www.coperion.com

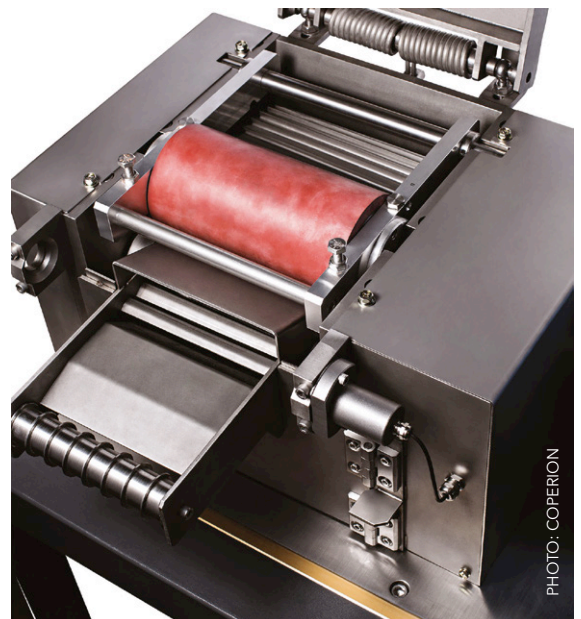


PHOTO: COPERION

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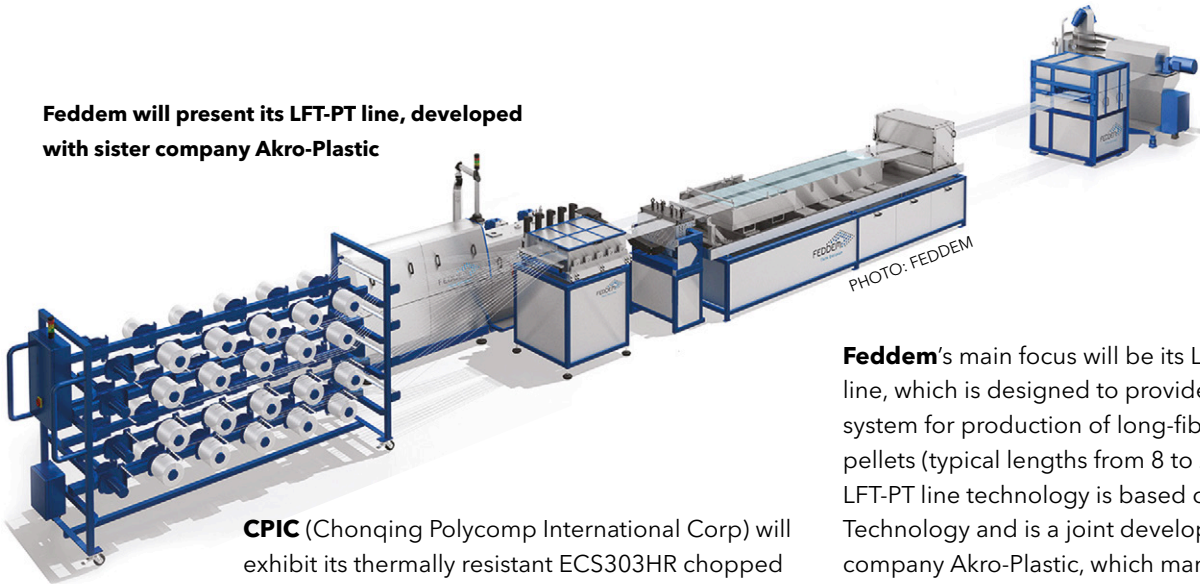
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Feddem will present its LFT-PT line, developed with sister company Akro-Plastic



CPIC (Chongqing Polycomp International Corp) will exhibit its thermally resistant ECS303HR chopped strand glass fibre, which has been developed for PBT applications. The product is said to be highly reactive to create a good interfacial bond between the fibre and resin. After aging in 120°C hot water, ECS303HR is said to retain 20% higher strength than competitor grades.

> www.cpicfiber.com

Croda will launch new permanent static dissipative polymers and amine-free anti-static additives for demanding applications such as automotive and electronics. The company's lonphase inherently dissipative polymers provide an immediate and permanent conductive effect that is not dependent on humidity. They provide a uniform and homogenous distribution in the host polymer and offer excellent processability and surface quality. Multiple grades are available to suit different polymer types, including polyolefins, styrenics and PC blends.

The company will also show its Atmer 511 long-term amine-free additive, which is suitable for use in applications where amine-containing additives are restricted. Intended for use in PP, the new grade complements the established range of Atmer migrating short and medium-term additives and externally coated additives for static protection.

> www.croda.com

Feddem's main focus will be its LFT-PT Extrusion line, which is designed to provide a state-of-the-art system for production of long-fibre-reinforced pellets (typical lengths from 8 to 25 mm). The LFT-PT line technology is based on Feddem's ICX Technology and is a joint development with sister company Akro-Plastic, which manufactures masterbatch, compounds and LFTs.

Specially developed FME mixing elements replace conventional kneading blocks, which avoids temperature peaks during mixing and allows for a gentler treatment of the product during the compounding process. FME mixing elements also require less energy for mixing than kneading blocks (a 10% energy saving in the mixing zone is claimed).

> www.feddem.com

HPF The Mineral Engineers, part of Quwarzwerke, will be displaying its high-performance fillers, which are based on naturally occurring and synthetic minerals such as quartz, wollastonite, kaolin or mica. The product line includes the Silatherm family of fillers developed to increase thermal conductivity of plastics. Optimised particle sizes and specially developed surface coatings enable high filling levels to be used without sacrificing processing or mechanical properties.

The company will also present its Kaolin TEC 110 phyllosilicate. This features an extremely-hexagonal quality offering very good reinforcing properties. As kaolin releases crystal water on heating it is also claimed to support the effectiveness of flame retardants.

> www.quarzwerte.com

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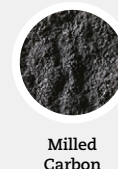
- easy dosing/dispersion
- ideal for compounding
- improved tribology
- increased wear resistance
- extra sizing: better adhesion to the matrix
- increased mechanical reinforcement



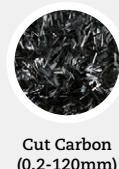
CARBON:

- easy dosing/dispersion
- dust free
- improved tribology
- increased conductivity
- increased mechanical reinforcement

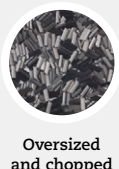
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Right: Maag will show its third generation Baoli dry-cut pelletiser

Lotte Chemical will introduce its TIPP (Transparent Impact Resistant Polypropylene) at the show. Suitable for transparent applications such as injection or blow moulded containers, extruded films and medical parts, the resin can be masterbatch coloured or used in natural form. It is said to offer impact resistance equivalent to that of a conventional random PP copolymer and the stress whitening performance of general impact grades.

The company will show its Evermoin non-silver antimicrobial technology, which is available in PP, ABS and PC compounds. The additive is said to be fast acting and has been tested to inhibit 99.9+ growth rate of positive and negative pathogens including Staphylococcus aureus and Escherichia coli. It is compliant with ISO 10993-5 and ISO 10993-10 standards and has been approved by the FDA (US FDA 21 CFR 181.32).

> www.lotteadms.com



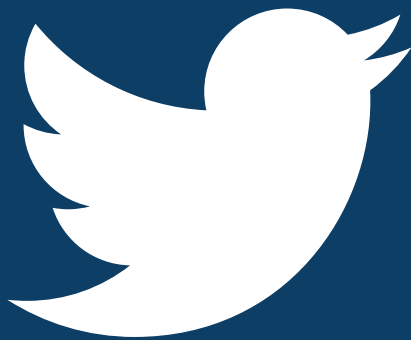
PHOTO: MAAG

Maag will present a broad range of high-performance pelletisers, melt filters and gear pumps that help compounders and recyclers combine high productivity with high product quality.

The company's pelletising display includes the Baoli-3 third-generation dry-cut pelletisers for handling both hard and soft materials. Maag has installed close to 800 Baoli units in China to date. Key components of the machines are manufactured in Germany, with assembly performed locally. As with previous Baoli generations, the automated cutting chamber locking system enables fast handling while supporting operator safety.

The company will also show a Pearlo underwater pelletising system for production of spherical pellets at throughputs of up to 36,000 kg/h. Compact and modular in design, the electronically-controlled EAC technology used on the Pearlo

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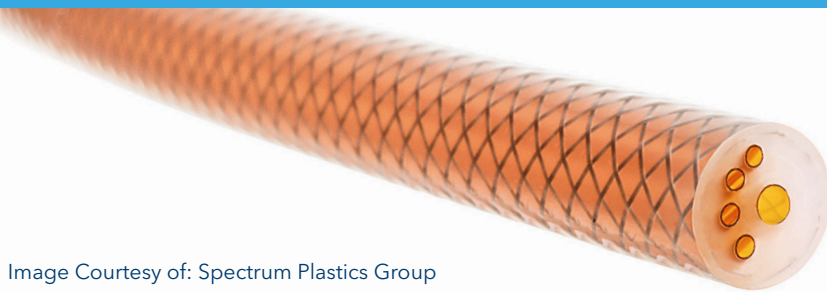


Image Courtesy of: Spectrum Plastics Group

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Right: Sikora's Purity Concept V is said to make detailed pellet inspection a simpler process

machines ensures precise feed of the pelletising knives during operation, so enabling long runtimes without interruption or loss of pellet quality.

An ERF350 high-performance melt filter from recently-acquired Ettlinger will also be shown at Chinaplas. It reliably filters plastic melts with impurity levels up to 18%. Designed for high efficiency operation, it can achieve a maximum throughput of 3,800 kg/h, depending on the type of melt and degree of impurities, as well as the selected filtration rating. The ERF350 is suitable for all commonly used polyolefins and polystyrenes as well as technical plastics such as styrene copolymers, TPE and TPU.

➤ www.maag.com

Natureworks will aim to show the performance that can be achieved from its Ingeo polylactic acid (PLA) resins. Key to that will be a new refrigerator liner that shows how Ingeo's properties can be leveraged to increase energy efficiency - peer-reviewed research at the US Department of Energy Oak Ridge National Laboratory showed potential annual savings of 7-15% over the life of the appliance.

Specific to the market in China, the company will also be showing Ingeo tapes and peanuts for e-commerce packaging and carrier bag films. And a new generation of Ingeo-based tea bags and coffee capsules will demonstrate how beverage taste and aroma can be maintained in a fully compostable system.

➤ www.natureworkslc.com

Shandong Lutai's Graphene Polymer Composites R&D Centre will display its SCM-6 graphene filled PVC masterbatch. It uses a grafting technique to fix the graphene in the PVC, which is said to result in good nanoscale dispersion. The masterbatch is claimed to achieve permanent high conductivity in final compounds (surface resistivity of 10^6 - $10^8 \Omega$) and is suitable for production of anti-static films and dust management components.

➤ www.lutaigraphene.com

Sikora will show two solutions for checking quality of compounded plastics at Chinaplas, including its online Purity Scanner Advanced and automated offline Purity Scanner V.

The Purity Scanner Advanced online inspection

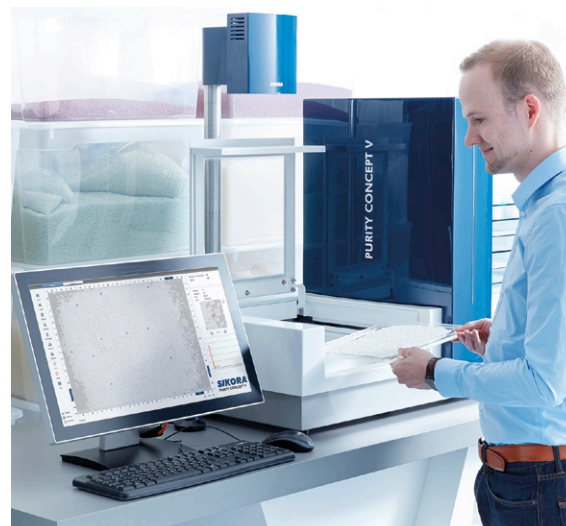


PHOTO: SIKORA

and sorting system combines X-ray and optical technology to detect contamination inside plastic pellets as well as on their surface. Up to three optical cameras can be used, depending on the expected contamination and application, and these can detect both yellowing and black specks on transparent or opaque parts. X-ray cameras can detect internal metallic contamination. Any sub-standard pellets are sorted out automatically.

The offline Purity Concept V provides an automated system for sample testing or incoming inspection and analysis. Material samples are simply placed on a sample tray and moved through the inspection area where a colour camera identifies and marks contaminated material within seconds. Images are automatically recorded, analysed and evaluated. According to the company, the system is more accurate, more reproducible and more reliable than using a manual light table.

➤ www.sikora.net

Zhejiang Java Specialty Chemicals will present its JavachemAF fluorine-containing UHMW polysiloxane additive for improving processing and hydrophobicity of PP, TPE and TPV compounds. Used at addition rates of up to 2%, the additive can reduce die drool during extrusion processing and improves release in injection moulding processing applications. It also enhances surface appearance, and resistance to abrasion, hydrolysis and chemicals, as well as providing a self-cleaning effect.

➤ <http://en.javachem.com>

Chinaplas 2019 - Key information

Dates: 21-24 May 2019 **Opening Hours:** 09:30-17:30 daily (09:30-16:00 on final day)

Venue: China Import & Export Fair Complex, Pazhou, Guangzhou, China

Admission: 4-day pass costs RMB80 on site (RMB50 online before 14 May 2019)

Organiser: Adsale Exhibition Services **Website:** www.chinaplasonline.com

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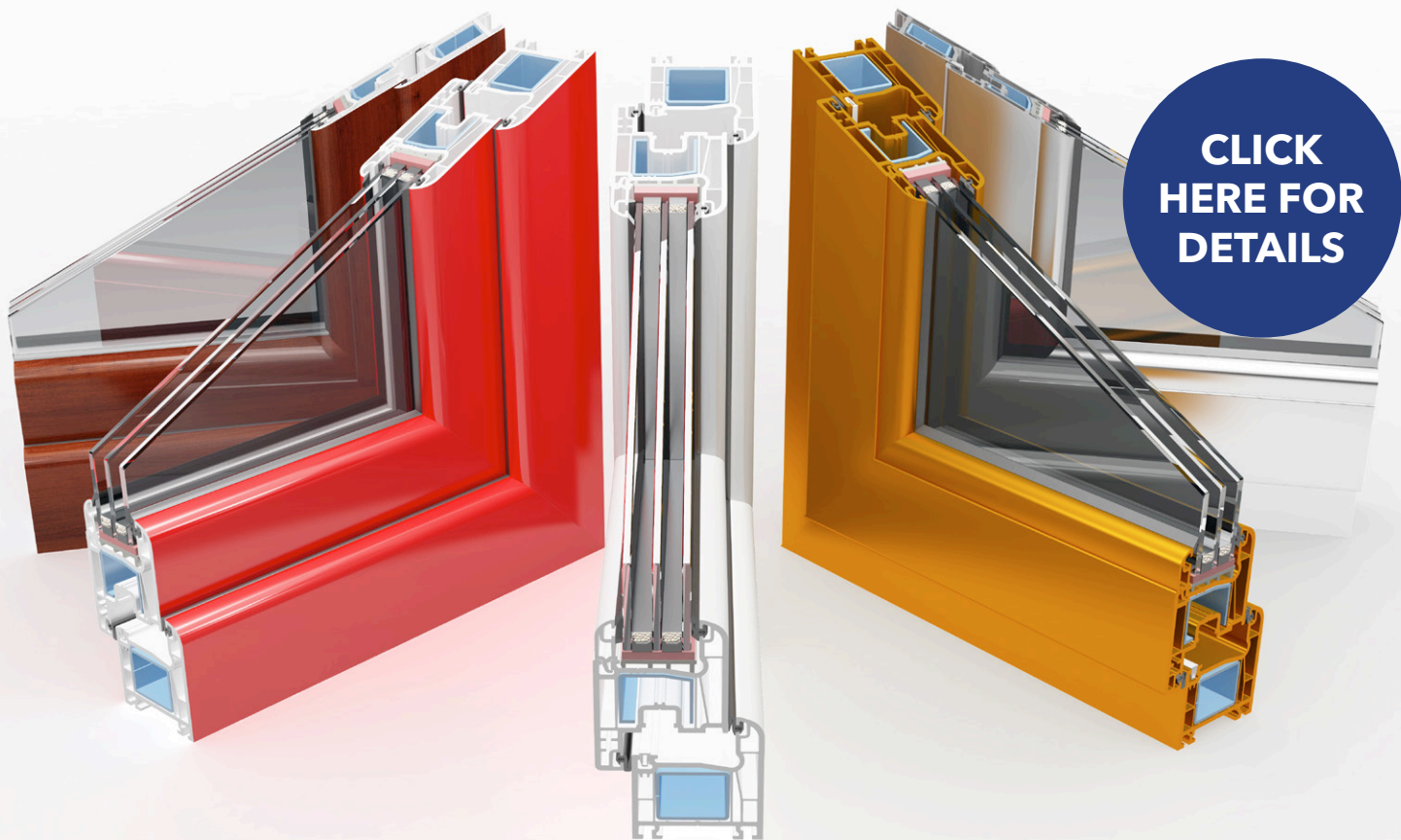
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Getting heavy with plastics



Polymer compounds tend to be light weight, at least compared to their main rivals, but there are applications where greater density is a benefit. Mark Holmes finds out more

While many applications for plastic compounds benefit from their lightweighting advantages, there are situations where adding density and weight to plastics is beneficial. In automotive, for example, high density polymer formulations are widely used to control interior noise and vibration. High density materials can also block x-rays, useful in some healthcare products. And the additional heft can create a perception of quality, adding a premium in certain packaging applications.

Achieving high densities in plastics means high filler loadings. That may sound like a recipe for poor processability but the high density of the fillers in typical use means high weight percentage loadings convert to much lower volume percent loadings. As a consequence, processing is not compromised excessively.

Several fillers are commonly used to add density to plastics. Barium sulphate, which is white in powder form and has a density of 4.0-4.5 g/cm³

depending on purity, provides high density and radio opacity, making it useful for applications in sound dampening and x-ray visibility for medical implants. Magnetite iron oxide (Fe₃O₄) is a black lustrous powder offering density of 5.2 g/cm³. Haematite iron oxide (Fe₂O₃) is a coarse, shiny gunmetal grey colour that, when ground below 5 microns in size, changes colour to rust red. With the same density as magnetite, it is normally less expensive than magnetite, making it an attractive alternative it is highly effective in sound deadening applications. As both magnetite and haematite fillers are oxidised forms of iron, both are immune from corrosion in the final plastic compound.

Tungsten can be used where very high density compounds are sought, such as for lead replacement applications. It offers a density of 19.25 g/cm³. Other high density, radio-opaque filler options available to compound developers include bismuth subcarbonate, bismuth oxychloride

Main image:
Magnetite is finding increasing interest as a high density filler for plastics

Right: Magnetite iron oxide (Fe₃O₄) is a black lustrous powder offering a density of 5.2 g/cm³

ride and bismuth trioxide.

Magnetite is proving to be an increasingly useful high density filler for plastic compounds, according to Dr Chris DeArmitt, an industry consultant and President of **Phantom Plastics**. "Compared with typical mineral fillers, advantageous properties include greater Mohs hardness, electrical conductivity and higher volumetric heat capacity, while it is also both attracted by a magnet and microwave heatable," he says.

"In addition, it [magnetite] is x-ray opaque and can be used to block radiation. In terms of adding density to polymers, a 40 wt% loading of magnetite is equivalent to a 10.3 vol% loading and can provide a polymer density of 1.34 g/cm³ - an increase of 49%. For the equivalent wt% filler loading of calcium carbonate or talc, the increase in density is 37%," he says.

At higher filler levels the increase is even more pronounced. At an identical filler loading of 41 vol% - which is 80 wt% for magnetite and 68 wt% for calcium carbonate and talc - a polymer density of 2.66 g/cm³ can be achieved, an increase of 196%. The comparable figure for the mineral fillers is an 82% increase," DeArmitt explains.

However, a number of issues are potentially holding back wider use of magnetite in polymer compounds. "New sources of magnetite are needed," DeArmitt says. "There are not many sources of high purity magnetite in the world suitable for use as speciality fillers for polymers."

DeArmitt works with **Arctic Minerals**, which offers its MagniFlex magnetite black iron oxide for polymer applications. It recently also developed a red iron oxide-based product based on haematite. "This was recently introduced to the market and is already seeing significant sales, indicating that

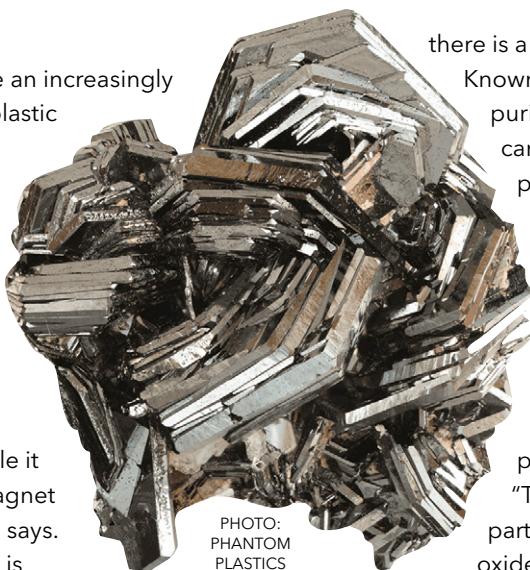


PHOTO: PHANTOM PLASTICS

there is a need for such a product.

Known as DenzFlex, it is a high purity synthetic iron oxide that can also replace expensive pigments," DeArmitt says. He adds that at least one other source is understood to be evaluating and considering an entry into the polymer market.

Other factors influencing the take-up of magnetite in polymers include processing. "There is a drive for finer particles because current iron oxides are a little coarser than we

would like. Finer particle size means better impact resistance, higher elongation to break and better surface finish," DeArmitt says.

He explains that the most prevalent magnetite products in the market are coarse compared to other speciality fillers, with a mean size of 15 microns up to a top size of 45 microns. "New products now being launched include a magnetite with a mean size of around 10 microns and a top size of 30 microns. No new processing methods are required. However, it does require a further investment in more energy to mill finer. Nevertheless, the new finer forms of magnetite are cheaper than incumbent coarser types, primarily due to optimised logistics," he says.

Magnetite has FDA indirect food contact approval. It can also be surface treated to help processing or to enhance properties. "Iron oxides can be treated with stearic acid or silane type treatments. Surface treatments lead to better impact resistance and improved flow. This means higher loadings are possible and because iron oxides are relatively hard, surface treatments can lower wear," DeArmitt says.

Another supplier of Magnetite is **LKAB Minerals**. According to Rob Lammertink, the company's Director Polymers & Coatings, the key to formulation of high density polymer compounds is achieving an optimal cost/performance balance. He says its MagniF magnetite grades can be used as a filler in a wide range of polymers and rubbers to provide a level of density that is difficult to achieve with other standard mineral products. High filler levels can also be reached without surface treatment of the filler particles.

MagniF is described as a pure and fine greyish-black powder milled from magnetite mined and processed at LKAB Mineral's resources in the north of Sweden. Primarily used for its high density,

Below: MagniF magnetite fillers from LKAB Minerals are used in automotive sound deadening components



PHOTO: LKAB MINERALS

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PHOTO: LKAB MINERALS

Above: This cable tie for food industry applications is produced using MagniF magnetite filler

MagniF is also microwave heatable. According to Lammertink, MagniF-filled polymers are straightforward to compound and to mould or extrude. They are suitable for sound and vibration dampening applications within the automotive industry.

“As a very pure additive made from magnetite, MagniF has been used for decades in high density compounds in areas that need sound and vibration damping or polymer-based products that need a quality feel,” he says. “MagniF offers a high density of 5.2 g/cm³. It is both electrically and thermally conductive and provides a high specific heat capacity. Filler levels above 80% by weight are achievable with standard compounding equipment resulting in compound densities of up to 3 g/cm³ in polypropylene. Compounding is straightforward as MagniF has a low influence on viscosity and behaves isotropically.”

According to Stefan Viering, R&D Project Engineer at LKAB Minerals, there are a number of market factors driving new trends in high density compounds at present, including improved heat transfer in polymers and additional food contact requirements. “LKAB offers MagniF F-grades that are very pure and comply with FDA and EC directives for food contact applications. On the technical front, the market also continues to request optimal mechanical properties, easy processing and handling and tailor-made cost/performance balanced products,” he says.

“LKAB Minerals has developed new cost-efficient MagniF products for sound damping sheets in appliances and automotive applications. Another example of a MagniF application is thin packaging films in the meat and bakery industry that require metal detectability,” he says.

The newly developed MagniF UF series provides good metal detectability in thin packaging film structures. The products offer a very narrow particle size distribution, providing improved mechanical, aesthetical and processing properties. “The

Right: Premium packaging applications such as cosmetics benefit from the haptics of high density polymer compounds

products find their fit in the existing market between natural magnetite and synthetic magnetite,” Viering says. “In addition, one of the future developments being worked on is the addition of MagniF in polymer compounds to support recyclability. Specifically, there will be new solutions to support the recycling of single use plastic in packaging, for example, which continues to be a high priority for the industry.”

Among producers of density modified formulations, **PolyOne Corporation** reports finding applications in the speciality packaging sector, where its Gravi-Tech compounds are adding weight and aesthetics to luxury closure designs. The company says consumers of luxury cosmetics and spirits tend to perceive added-value in packaging that incorporates weight, aesthetics, and visual surface effects into the closure. When designing these in metals such as aluminium, zinc, iron, steel or other alloys, there are usually processing challenges and complexities to be faced. Injection mouldable Gravi-Tech density modified formulations can help achieve the evenly distributed weight, complex designs and visual surface effects of metal without the extra costs and steps associated with die cast mould tooling or secondary assembly operations.

For brand owners, PolyOne says the advantages of Gravi-Tech mean that a weighted closure for a luxury brand product can be created that can be up to four times the weight of aluminium. Complex designs are possible without expensive tooling as Gravi-Tech can be injection moulded using lower cost moulds made of P20 or H13 steel. Visual surface effects and aesthetics can be added without difficulty. Various aesthetic appearances can also be achieved, including colour variation, metallic finishes, or marbling and swirling. Gravi-



PHOTO: POLYONE

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Right: Ecomass Technologies specialises in production of high density compounds

Tech materials are FDA compliant and based on a non-formaldehyde formulation.

According to PolyOne, there are also advantages for converters in using the Gravi-Tech materials. They allow plastics converters to compete in premium markets where they can provide luxury aesthetics that match metal alternatives. The manufacturing process is simplified compared to injection moulding followed by the subsequent incorporation of a metal weight, eliminating a costly assembly process and the associated inventory of multiple component parts. In addition, the Gravi-Tech material provides more consistent weight distribution across the packaging component.

Another manufacturer of high density compounds for luxury packaging applications is **LEHVOSS Group**. It has developed its LucoCom HW for the production of high quality, heavy bottle closures for premium spirits, where the weight conveys quality without adding to the cost and in many cases providing enhanced design flexibility.

LucoCom HW high density materials are available with densities of up to 5.0 g/cm³. The company says the compounds provide good processing characteristics, design freedom and cost savings compared with metals in premium closure applications. It adds that closures produced using LucoCom HW can be printed, metallised and coloured. Aside from heavy closures, other examples of applications for LucoCom HW can be found in weights in the sporting sector and in casings, closures and decorative articles items in various consumer goods. Technical applications include vibration absorption, increasing weight and shielding.

RTP Company also offers custom-formulated thermoplastic high gravity compounds designed to replace metals while retaining a weightier feel. Suitable for injection moulding processing, densities of up to 11 g/cm³ are possible. Other features include multiple base polymer options for inherent chemical and corrosion resistance and that balance density, durability and cost. Custom colour matching is available.

The company's high gravity compounds can be moulded to complex designs and present an environmentally and cost-friendly option for metal/lead replacement. The compounds offer improved sound and vibration dampening, and can increase perceived value by adding weight, says the company. They can also fulfil a technical role, allowing designers to adjust centre of gravity in products such as tennis racquets.

Specialising in high density and lead replacement applications, **Ecomass Technologies**, which



PHOTO: ECOMASS TECHNOLOGIES

is based in Austin, in Texas in the US, manufactures high density compounds that can be formulated up to 11 g/cm³ and can be used in a wide array of applications, including weighting, balancing, radiation shielding and vibration damping. All Ecomass Compounds meet the EU RoHS Directive, are 100% lead free, and do not contain any toxic constituents or material considered hazardous by the US EPA. They also comply with Section 1502 of the Dodd-Frank Act.

The company recently developed a high density compound for researchers at the University of Texas at Austin Jackson School of Geological Sciences, who wanted to produce a series of "smart" rocks for analysis of flash flooding and sediment flow in rivers and streams. Similar in weight and shape to real river rocks, each smart rock carries electronics designed to capture acceleration and motion data along with an RFID identification chip within an internal cavity.

The researchers had originally used concrete cases but found these had a limited lifetime. They then moved to lead-weighted plastic cases but discovered this interfered with the RFID data retrieval. Ecomass Technologies developed an injection moulding grade based on PA12 with a copper powder filler that provided a density of 3.3 g/cm³ together with good toughness (Ecomass Compound 1050CO78).

CLICK ON THE LINKS FOR MORE INFORMATION:

- > www.phantomplastics.com
- > www.arcticminerals.com
- > www.lkabminerals.com
- > www.polyone.com
- > www.lehvoss.de
- > www.rtpcompany.com
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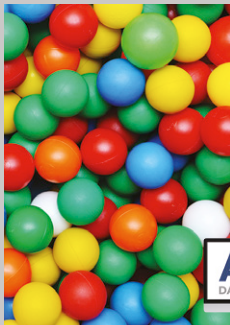
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Find out about the latest developments in the compounding industry in the United States, Canada and Mexico. This directory gives key location and production details on all the players.

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Speakers at the Polymer Foam conference in Pittsburgh in June will cover advances in processing, technologies and applications

Expanding opportunity for polymer foams

The use of foam technology is increasing rapidly across all fields of plastics processing. Applications have been expanding across many markets, including construction, infrastructure, packaging, transportation and energy generation.

The 7th edition of AMI's Polymer Foam US conference explores advances in a wide range of polymer foam materials, processes and applications. Presentation topics cover foam technology and applications in thermoplastics and elastomers, future trends in applications and markets, innovation in the foam industry, optimisation of foam processing, interplay between chemical and physical blowing agents, regulatory status and new developments in additives and sustainable solutions.

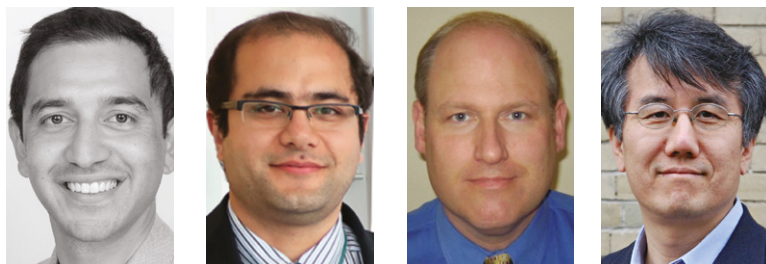
This two-day event takes place on 18-19 June 2019 in Pittsburgh, PA, US, and brings together expert industry speakers from the entire supply chain to evaluate and discuss the trends, challenges and opportunities facing the polymer foam industry across multiple end-use applications.

In this article we preview the event, with a closer look at the line-up of expert speakers.

Speakers in the opening session of Polymer Foam 2019 explore future trends in a variety of markets and applications. **Klaus Brenner**, Head of

Global Engineering and Design at **Greiner Aerospace** in Austria, gives the audience an overview of design and production trends and innovation in aircraft interiors and seating. Increased use of polymer foams in structural sandwich core materials is discussed by **Russell Elkin**, Product Development Manager USA at **3A Composites**, who highlights future trends in applications for these materials and discusses future market potential. This is followed by **Steven Sopher**, Technical Director at **JSP** in the US, talking about particle foam properties for the growing sporting goods and impact protection markets.

After the networking break, the session continues with a paper from **Rob Dernovsek**, Manufacturing Area Manager at **Polycon Industries** - a division of Magna Exteriors - in Canada, who will discuss the company's work with foams. Next, **Rohit Ghosh**, Head of Marketing at **BASF Corp** in the US, shares with the audience how BASF is encouraging innovative practices that are tailored towards their customers' needs and how the foam industry can adapt some simple steps to drive innovation. The final talk in this session is given by **Andrew B Cole**, Executive Director at the **Canadian Urethane Foam Contractors Association (CUFCA)**, who



Speakers at Polymer Foam in Pittsburgh in June include (from left to right) Rohit Ghosh from BASF, Alireza Tabatabaei from Woodbridge Foam Corp, Steve Sopher from JSP, Professor Chul Park from the University of Toronto

reviews the success of the field quality assurance program in the Canadian spray foam industry.

Blowing agents

The second session explores the changing regulatory landscape for blowing agents and also highlights some technical advances. **Margaret Sheppard**, Lead Environmental Protection Specialist at the **Environmental Protection Agency** in the US, updates the audience about regulatory changes in blowing agents and shares an overview of classification of new blowing agents. International regulations regarding employees coming into contact with the powdered ADCA blowing agent and performance of the masterbatch ADCA blowing agent as an alternative are subjects discussed by **Benjamin J Reisman**, Head of Materials Development at **Palziv** in Israel. **Peter Schroeck**, President & CEO at **Reedy Chemical Foam** in the US, explores chemical blowing agents for thermoplastic elastomers in the final part of this session.

Fire resistance

Shari Kram, Senior Research Scientist at **Dow** in the US, shares her experience in the transition to a polymeric flame retardant for PS foam across China, Europe and the US. Developments in fire performance in PU and PET foams are highlighted by **Margaret Baumann**, Business Manager, Americas at **FRX Polymers** in the US.

To round off the first day's proceedings, a

networking drinks reception is being held in the exhibition room, where delegates and speakers can network with industry peers.

Sustainable foam

Day two of Polymer Foam 2019 is opened by **Mario Grenier**, VP & General Manager at **Dyne-A-Pak** in Canada, who delivers an overview of developments in recycling and sustainability of polymer foams including trends in bio-based materials and packaging. The session continues with a panel discussion focussing on sustainability in the foam industry. Led by **Steven Sopher**, Technical Director at **JSP** in the US, the discussion will explore tangible sustainable solutions and focus on how the industry can apply sustainable practices moving forward. Panellists include **Prof Chul B Park**, Professor at the **University of Toronto** in Canada, and **Denisa George**, Marketing Manager Polyolefin Foams, at **Borealis** in the UK. More panellists will be confirmed closer to the event.

Improving processing

The final session of the conference is opened by **Prof Chul B Park** and **Dr Vahid Shaayegan**, Research Director and Postdoctoral Fellow, both from the **University of Toronto** in Canada, who look at foaming mechanisms of pure and reinforced polypropylene in foam injection moulding. Low density polypropylene extrusion foaming with decreased cell size in the presence of crystals and additives is the presentation subject from **Dr Alireza Tabatabaei**, Senior Development Engineer at **Woodbridge Foam Corporation** in Canada. Next, **Dr Denis Rodrigue**, Professor at the **Department of Chemical Engineering, Laval University** in Canada, discusses piezoelectric properties of polyethylene foams with a focus on optimisation of the processing and post-processing conditions.

Closing the conference is **Samuel Dix**, R&D Director at **Trexel** in the US, who compares foaming level, structure and operating cost of two different foaming techniques in injection moulding.

Polymer Foam US conference

The 7th edition of AMI's Polymer Foam US conference will take place on 18-19 June 2019 in Pittsburgh, PA. The event provides an international forum for all companies involved in the manufacture, supply and use of polymer foam, from end users and manufacturers to converters and suppliers.

In addition to the formal conference sessions, the event provides extensive networking opportunities throughout the informal breaks, including access to the table top exhibition area and complementary cocktail reception at the end of the first day. To find out more about attending the conference, taking a table-top exhibition space, or becoming a conference sponsor, visit the [conference website](#) or contact Conference Coordinator Christa Beveridge Tel: +1 610 478 0800, christa.beveridge@ami.international.



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BUSS: COMPEO KNEADER



The Compeo is the latest generation of kneader extruder from Buss and is designed to provide the utmost flexibility in application. This 12-page brochure details key features and model specifications.

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COPERION: STS EXTRUDERS



Coperion's STS Mc11 line of twin screw extruders provides performance at a competitive price. This brochure describes the full features of the range, from the newly launched 90 kg/h 25mm diameter laboratory model to the 4,200 kg/h 96mm version.

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CPM EXTRUSION: SYSTEMS AND PARTS



This new brochure from CPM Group details the extended range of compounding extruders, production lines and replacement parts available from the company following its recent acquisition of Germany-based Extricom.

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LEISTRITZ: MASTERBATCH SYSTEMS



Additive and colour masterbatch production places specific demands on compounding equipment. This 16-page brochure from Leistritz explains how its ZSE 35 iMAXX masterbatch twin screw extruder rises to the challenge.

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DOVER CHEMICAL: STABILISERS



Doverphos LGP-11 is a new liquid polymeric phosphite stabiliser from Dover Chemical that provides a suitable alternative to TNPP. This brochure provides more details of the additive, including process stability and migration data.

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BAY PLASTICS: STRAND PELLETISERS



Bay Plastics provides strand pelletisers and associated equipment to handle just about for any application. This four-page brochure details its full range of pelletisers, wet and dry-cut slides, water baths, air knives and dewatering units.

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POLYMER SOURCING & DISTRIBUTION



The 14th edition of AMI's Polymer Sourcing & Distribution conference will be held on 13-15 May 2019 in Barcelona, Spain. The event attracts attendees from across the plastics supply chain, from polymer producers and traders to processors and brand owners.

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PERFORMANCE POLYPROPYLENE 2019



The second AMI Performance Polypropylene conference will be held in Cologne in Germany on 14-15 May 2019. The event will attract a global audience to discuss the latest developments in high performance PP compounds.

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PLASTIC CLOSURE INNOVATIONS



Now in its seventh year, AMI's Plastic Closure Innovations conference takes place in Barcelona in Spain on 3-5 June 2019. This leading meeting point for the European industry focuses on innovation in both food and non-food closure applications.

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PROFILES USA



Profiles 2019 USA, AMI's 19th international conference on plastics in exterior building applications, takes place on 4-5 June in Pittsburgh, PA, US. It covers the latest market trends and polymer material and processing developments.

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OIL & GAS POLYMER ENGINEERING US



Taking place in Houston on 4-5 June 2019, AMI's fifth US conference for oil and gas operators, contractors, equipment manufacturers and researchers will provide detailed insight into the formulation, qualification and use of O&G polymer products.

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COMPOUNDING WORLD CONGRESS



The fourth Compounding World Congress takes place on 4-5 June 2019 in Cologne, Germany. This high level event covers the market trends, business developments, and technical innovations impacting on producers of technical compounds.

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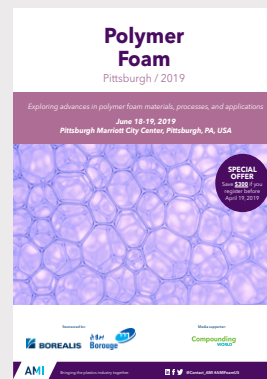
POLYMERS IN CABLES USA 2019



The 11th North American edition of AMI's Polymers in Cables conference takes place in Philadelphia, PA, US, on 18-19 June. It explores developments in polymers and additives, fire resistance and sustainable cable performance.

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POLYMER FOAM USA 2019



The seventh edition of AMI's Polymer Foam USA conference takes place on 18-19 June 2019 in Pittsburgh in the US. This international event examines the latest foaming technologies and applications in thermoplastics and elastomers.

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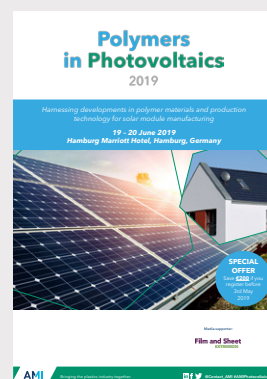
PLASTICS RECYCLING TECHNOLOGY



AMI's second Plastics Recycling Technology conference takes place in Berlin in Germany on 18-19 June 2019, bringing together key players and industry experts to explore how technology will enable increased plastic recycling rates.

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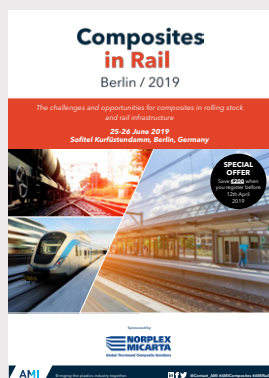
POLYMERS IN PHOTOVOLTAICS



The Polymers in Photovoltaics conference returns to Hamburg in Germany on 19-20 June 2019. The event brings solar module manufacturing professionals together with polymer experts to discuss industry developments.

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COMPOSITES IN RAIL



This brand new event takes place in Berlin in Germany on 25-26 June 2019. With environmental issues very much on the rail industry agenda, it will allow all in the composite supply chain to explore technical solutions and future opportunities.

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MEDICAL TUBING 2019



The vital role of polymers in the healthcare sector will be examined at AMI's third Medical Tubing conference in Berlin in Germany on 25-26 June 2019. Learn about the latest industry demands, regulations, materials and processing innovations.

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Tecnaro GmbH

Head office location: Ilsfeld, Germany

Date founded: 1998

Managing Directors: Helmut Nägele, Jürgen Pfitzer

Ownership: Privately Owned

No. of employees: 35

Production (tonnes): 4,000-6,000 tonnes/yr

Plant locations: Ilsfeld, Germany

Profile: Tecnaro was originally established in 1998 as a spinoff from the Fraunhofer institute. The company develops and produces thermoplastic bioplastic and biocomposite compounds from renewable raw materials. Its products are sold worldwide through the Albis Plastics global network, among other distributors. The company's portfolio of products includes more than 3,500 formulations which are divided into three material groups: Arboform, Arboblend and Arbofill.

Product line: Arboform is a range of 100% renewable compounds based on wood-derived lignin and natural fibres and fillers; Arboblend materials are 100% bio-based compounds based on polymers such as PLA, PHA, starch and bio-based PE and PET combined with natural waxes and fibres; Arbofill compounds are up to 80% renewable and combine natural fibres and fillers with conventional petrochemical polymers. Tecnaro compounds can be processed by many methods, including extrusion and injection and blow moulding.

Product strengths: Tecnaro's use of renewable raw materials means its products have strong sustainability credentials. The company can formulate materials to meet specific application requirements.

To be considered for 'Compounder of the Month' contact Elizabeth Carroll: elizabeth.carroll@ami.international

Compounding FORTHCOMING FEATURES WORLD

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

June

PVC additives ● Functional fillers
Cleanroom compounding
Clarifiers and nucleators
Review: Compounding World Expo

July

Antimicrobials and biocides
Screenchangers/melt filters
Colour measurement
Feeding and dosing

Editorial submissions should be sent to Chris Smith: chris.smith@ami.international

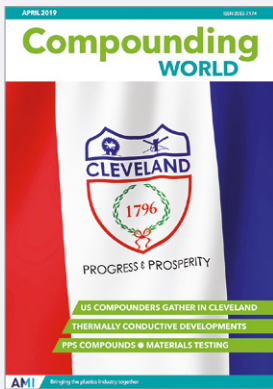
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Compounding World April 2019

Compounding World's April issue contains an extensive preview of AMI's Compounding World Expo in Cleveland in May, covering all the exhibitors at this key event. Plus features on thermally conductive compounds, PPS materials, processing aids and materials testing equipment.

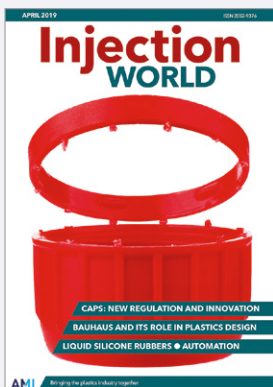
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Compounding World March 2019

The March issue of Compounding World magazine has features on special effect pigments, reinforcement with natural fibres and twin-screw extruders. Plus a preview of the conference at Compounding World Expo in Cleveland, US

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Injection World April 2019

The April edition of Injection World looks at caps and closures and the drivers for innovation in the segment. Also included are features on LSR moulding and the role played by the Bauhaus in the history of plastics design.

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Plastics Recycling World March/April 2019

The March/April edition of Plastics Recycling World examines the latest developments in melt filters and details innovations in WEEE recycling and polymer compatibilisation. Plus, we preview next month's Plastics Recycling World Expo in the US.

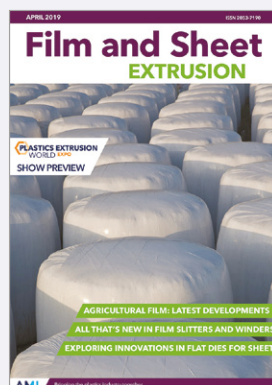
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Pipe and Profile Extrusion May 2019

The May edition of Pipe and Profile Extrusion looks at the essential steps required when planning a new die design project. It also reviews the latest pressure pipe materials and recycling moves, plus previews the upcoming Chinaplas show.

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Film and Sheet Extrusion April 2019

The April issue of Film and Sheet Extrusion looks forward to the exhibitors at AMI's Plastics Extrusion World Expo in the US next month. Features in the magazine cover agricultural film, flat dies and slitter-rewinders.

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GLOBAL EXHIBITION GUIDE

2019	8-9 May	Compounding World Expo, Cleveland, US	www.compoundingworldexpo.com/na
	8-9 May	Plastics Recycling World Expo, Cleveland, US	www.plasticsrecyclingworldexpo.com/na/
	8-9 May	Plastics Extrusion World Expo	www.extrusion-expo.com/na/
	8-9 May	Plasttechnik Nordic Malmö, Sweden	www.easyfairs.com
	21-24 May	Chinaplas 2019, Guangzhou, China	www.chinaplasonline.com
	21-24 May	Moulding Expo, Stuttgart, Germany	www.moulding-expo.com
	28-31 May	Plastpol 2019, Kielce, Poland	www.targikielce.pl
	19-22 June	Interplas Thailand, Bangkok	www.interplsthailand.com
	5-7 September	Utech Asia, Guangzhou, China	www.puchina.eu
	18-21 September	T-Plas / Tiprex, Bangkok, Thailand	www.tplas.com
16-23 October	K 2019, Dusseldorf, Germany	www.k-online.com	
25-28 November	Plastivision Arabia, Sharjah	www.plastivision.ae	
27-29 November	Plastics & Rubber Vietnam	www.plasticsvietnam.com	
2020-2021	16-20 January	Plastivision India, Mumbai, India	www.plastivision.org
	21-23 January	Swiss Plastics, Lucerne, Switzerland	www.swissplastics-expo.ch
	7-13 May	Interpack, Dusseldorf, Germany	www.interpack.com
	13-17 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
	4-7 May 2021	Plast 2021, Milan, Italy	www.plastonline.org/en


AMI CONFERENCES

13-15 May 2019	Polymer Sourcing & Distribution, Barcelona, Spain
14-15 May 2019	Performance Polypropylene, Cologne, Germany
4-5 June 2019	Profiles 2019 USA, Pittsburgh, PA, USA
4-5 June 2019	Compounding World Congress, Cologne, Germany
18-19 June 2019	Performance Polyamides USA, Troy, MI, USA
18-19 June 2019	Polymers in Cables 2019 USA, Philadelphia, PA, USA

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

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Polymers in Cables

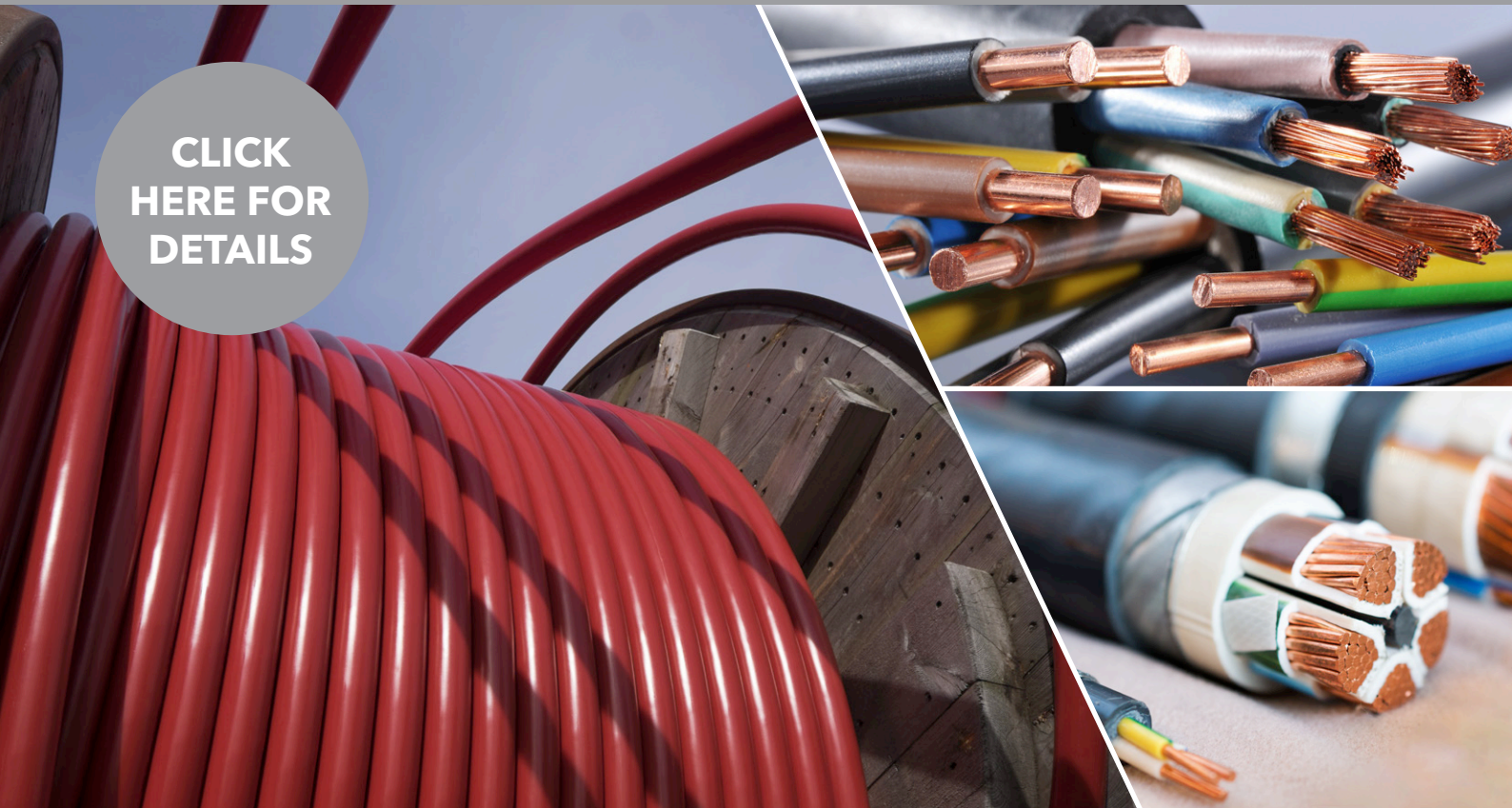
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Exploring trends and innovations in polymeric material solutions

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Hotel Sofitel, Philadelphia, Pennsylvania, USA

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Polymers in Cables

2019



The eleventh edition of AMI's international wire & cable conference, will take place on June 18-19, 2019 at the Hotel Sofitel, Philadelphia, Pennsylvania, USA.

Recognized for many years as one of the leading international cable conferences, Polymers in Cables 2019 places the developments of new materials, testing procedures, regulatory requirements, cable manufacturing processes, and end-use applications in the context of the challenging business and political environment in which cable producers, their suppliers, and customers operate.

The conference regularly attracts over 100 international delegates and is complemented by an interactive exhibition.

The current business environment offers challenges but also opportunities for all companies involved in this highly innovative industry. It is vital for companies to be aware of the latest developments in markets, materials, testing & regulation, processes, and end-use applications.

The intensive two-day program covers topics from the whole wire & cable supply chain, including the fields of new polymeric material developments, flame retardant technologies, and end-use applications.

Whatever your involvement in the cables industry, either as a cable producer, end-user, specifier, consultant, raw material supplier, compounder or equipment manufacturer, this event provides you with an ideal opportunity to network with professional speakers and senior-level delegates to find out about the latest material, technology and business trends - All in one place.



*"This is the cable conference.
Excellent reputation,
everybody is here."*

Wacker Chemie AG representative

Five good reasons to attend:

- **Get the latest information on new developments in the cables industry - from raw materials to end-use applications**
- **Stay competitive in a rapidly changing global market, using the opportunity of face to face discussions with key players in this market segment**
- **Network with professional speakers and senior-level delegates to find out about the latest material, technology and business trends**
- **Get more insight into this diverse and complex cable market to identify new opportunities in market, material, and process developments**
- **Enrich your ability to compare your company performance with other leading players in this industry**

Ways to get involved:

ATTEND

Register before April 12, 2019 and pay \$1,115 saving \$300 on the full price of \$1,415. There are additional discounts for group bookings. The registration fee includes attendance at all conference sessions, the Networking Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

SPONSOR

A variety of sponsorship opportunities are available at this conference to help to promote your company's products and services to this highly targeted international audience. Contact the Conference Hotline for further information.

EXHIBIT

Make it easy to engage with the audience at this busy event with your own highly visible exhibition space. Bring your own display stand and / or banners and use the space to showcase your company's products and services and make a lasting impact. The exhibition runs throughout the conference by the main meeting room and is host to the networking functions.

Space is limited so to avoid disappointment please register for this service as soon as possible.

CONFERENCE HOTLINE

Contact: Ms. Kelly DeFino, Conference Team Manager US
Tel: +1 610 478 0800
Email: kelly.defino@ami.international

SAVE \$300

Register before
April 12,
2019

Tuesday, June 18, 2019

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

SESSION 1 - MARKET INFORMATION

- 9:10 **Insights into the NAFTA cable market from a global perspective**
Ms. Astrid Aupetit, Senior Research Analyst,
AMI CONSULTING, United Kingdom
- 9:40 **PVC material trends for wire and cable products**
Mr. Joe Schilens, Senior Industry Manager,
POLYONE, United States
- 10:10 **Global market for low smoke and halogen free FR cables - overview and trends**
Mr. Christopher Bradlee, Market Development Manager -
Performance Materials,
BASF CORPORATION, United States
- 10:40 - 11:20 Coffee break

SESSION 2 - NEW MATERIAL SOLUTIONS FOR IMPROVED CABLE PERFORMANCE

- 11:20 **Polymer modifier technology for high performance wire and cable compounds**
Mr. Paul Brigandi, Application Development Leader,
DOW, INC., United States
- 11:50 **Silicone performance additive for cable compounds**
Dr. Daniel Calimente, Technical Manager,
WACKER CHEMICAL CORPORATION, United States
- 12:20 - 2:00 Lunch
- 2:00 **How to improve polymer properties: two examples - chemical crosslinking of PVC and ceramifiable compounds**
Dr. Günter Beyer, CEO,
FIRE & POLYMER, Belgium
- 2:30 **The spectrum of ionic crosslinking with zinc-based monomers**
Mr. Steven K. Henning, Global Research & Business
Development Director,
TOTAL PETROCHEMICALS & REFINING USA, INC., United States
- 3:00 **Light weight and highly flexible XLPO compounds**
Mr. Edgar Alexandre, Director Business Development and
R&D, ACI - AUTOMOTIVE COMPOUNDING INDUSTRY LD^a /
PERPLASTIC GROUP, Portugal
- 3:30 - 4:10 Coffee break

SESSION 3 - ADVANCED COMPOUNDING & CABLE MANUFACTURING TECHNOLOGIES

- 4:10 **Innovative continuous kneading technology for cable compounding**
Mr. Mas Iwan Konggidinata, Process Engineer
BUSS INC. USA, United States
- 4:40 **Pelletizing of cable compounds: new concept for more uniform pellets without fines**
Ms. Sabine Schoenfeld, Director of Process Technology
COPERION CORPERATION, United States
- 5:10 **Simplicity blenders for cable extrusions**
Mr. Mark Jordan, Director of Business Development,
ADVANCED BLENDING SOLUTIONS, United States

- 5:40 **PANEL DISCUSSION: Future challenges and opportunities in a growing market segment with steadily increasing requirements**

Mr. Daniel Masakowski, Director of Materials Development,
MARMON INNOVATION & TECHNOLOGY, United States

Dr. Günter Beyer, CEO,
FIRE & POLYMER, Belgium

Dr. Charles Hills, Application Development Engineer - Energy,
BOREALIS COMPOUNDS, INC., United States

Mr. Changmo Ko, Principal Researcher,
LS CABLE & SYSTEM, Korea

Mr. Paul Lorigan, Technical Director,
T & T MARKETING INC, AN M. HOLLAND COMPANY,
United States

- 6:30 - 8:00 Cocktail Reception

Wednesday, June 19, 2019

- 8:30 Welcome coffee
9:00 Opening announcements

SESSION 4 - NEW CHALLENGES & OPPORTUNITIES IN CABLE END-USE APPLICATIONS

- 9:10 **New wire and cable compound developments driven by climate change**
Mr. Paul Lorigan, Technical Director,
T & T MARKETING INC, AN M. HOLLAND COMPANY,
United States
- 9:40 **Innovative LSZH compounds for European CPR certification requirements**
Mr. Allan Peter Marconi, Business Development Manager,
SACO AEI POLYMERS, United States
- 10:10 **Achieving V-0 in styrenic block copolymers compounds without sacrificing surface aesthetics for thin-wall wire & cable applications**
Dr. Avi Gadkari, Business Development Manager,
TEKNOR APEX COMPANY, United States

- 10:40 - 11:20 Coffee Break

SESSION 5 - REQUIREMENTS & ENHANCEMENTS IN FLAME RETARDANT CABLE CONSTRUCTIONS

- 11:20 **New ethylene vinyl acetate copolymers for highly-filled wire and cable compounds**
Dr. Nagarjuna Palyam, Senior Engineer,
CELANESE, United States
- 11:50 **Advanced flame-retardant fillers**
Mr. David Reece, Technical Manager, Thermoplastics,
HUBER ENGINEERED MATERIALS, United States
- 12:20 **A comparison of halogenated vs. halogen free cable insulation**
Mr. Daniel Masakowski, Director of Materials Development,
MARMON INNOVATION & TECHNOLOGY, United States
- 12:50 Afternoon wrap up and questions
- 1:00 - 2:00 Lunch
- 2:00 Conference ends

AMI reserves the right to alter the program without notice. The latest program including any new speakers or changes to schedules can be viewed on our website www.ami.international

REGISTRATION FORM

Register online

PLEASE COMPLETE IN BLOCK CAPITALS

Company: _____

Address: _____

Country: _____

Tel: _____ Fax: _____

Company activity: _____

Purchase order no. (if applicable): _____

Invoice address (if different from above): _____

DELEGATE/EXHIBITOR DETAILS

Title: Mr/Mrs/Dr/Other: _____

First name: _____

Surname: _____

Position: _____

Email: _____

Special dietary requirements: _____

Signature: _____ Date: _____

Please confirm that you agree to your name being published alongside your company name and job title on the delegate list.

Yes No

By registering for this event (please tick these boxes);

I agree to AMI's Privacy Policy (www.ami.international/about/legal)

I agree to AMI's Terms & Conditions (www.ami.international/about/tac)

PARTICIPATION

Price

Early Booking Delegate Admission Fee: \$1,115.00
(Until April 12, 2019)

Delegate Admission Fee: \$1,415.00

Exhibition Space: \$2,040.00

Total: _____

METHOD OF PAYMENT

You will be sent an invoice in 7-14 working days.

Pay by Credit Card by registering online:

Alternatively, please provide your contact details and we will send you a link to a secure payment gateway via email.

Name: _____

Email: _____

Bank transfer quoting: 'Your invoice and A/C No.'

Account number: 2000030701584

Routing number: 121000248 SWIFT: WFBUS6S

Note: You are responsible for any bank charges involved with the transaction

By Check: Made payable to "Applied Market Information LLC"

POLYMERS IN CABLES 2019 CONFERENCE INFORMATION

June 18-19, 2019

Hotel Sofitel Philadelphia

120 South 17th Street

Philadelphia, PA 19103, USA

Tel: +1 215 569 8300

HOTEL ACCOMMODATION

Delegates are responsible for booking their own accommodation. We have negotiated a room rate of \$199 plus tax per night at the Hotel Sofitel in Philadelphia, PA until May 27, 2019. To make a reservation, please contact the hotel's reservation department at +1 215 569 8300 and indicate that you will be attending "AMI's Polymers in Cables conference" to qualify for the special room rate. The hotel is guaranteed for a limited number of rooms so do not delay in making your reservation for a room at the conference location.

Please make your reservation using the direct hyperlink which can be found on our website www.ami.international/events (click on 'Polymers in Cables 2019' followed by Accommodation).

PARTICIPATION OPPORTUNITIES

Delegate registration: includes attendance at all conference sessions, a set of conference proceedings, entrance into the Networking Cocktail Reception, lunch and coffee breaks.

Sponsor this event: maximize your company profile before, during and after the event by becoming a sponsor. For further information, please contact the Conference Coordinator.

Exhibition space: an excellent way to enhance your business opportunities and make it easy for delegates to find you! Includes:

- entry for one representative from your company
- one exhibition space in the networking area
- your company profile in the conference proceedings
- new and existing product display
- handing out brochures and promotional items from your stand

Spaces are allocated on a first-come, first-served basis and sell quickly.

Group discounts: when registering as a group you may be entitled to discounts. Contact the Conference Coordinator for more information.

Networking Cocktail Reception

A networking cocktail reception will be held on the first evening. This offers an excellent opportunity for delegates to meet with speakers and other colleagues. All delegates are invited to attend and admission is included in the delegate fee.

CANCELLATIONS

Full refunds, less a cancellation charge of \$300 will be made on cancellations received prior to April 12, 2019. 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 exhibition upgrades or sponsorship packages.

CONFERENCE HOTLINE

MS. KELLY DEFINO, CONFERENCE TEAM MANAGER US

AMI

1210 Broadcasting Road, Suite #103

Wyomissing, PA 19610 USA

Tel: +1 610 478 0800

Email: kelly.defino@ami.international

The latest program, including any new speakers, changes to the schedule, and any amendments to pricing and terms and conditions can be viewed on our website: www.ami.international