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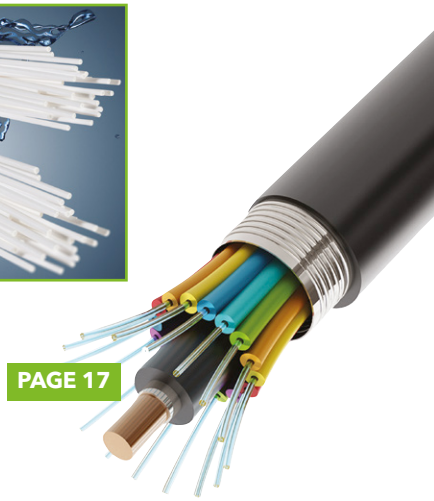
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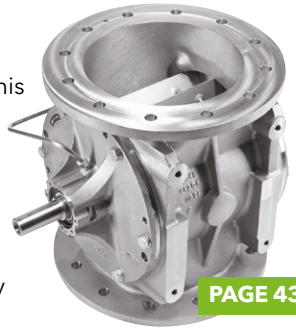
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› PVC additives › LFTs › TPE compounding › NPE 2018 review

Plus: Compounding World Expo preview › Plastics Recycling World Exhibition Preview

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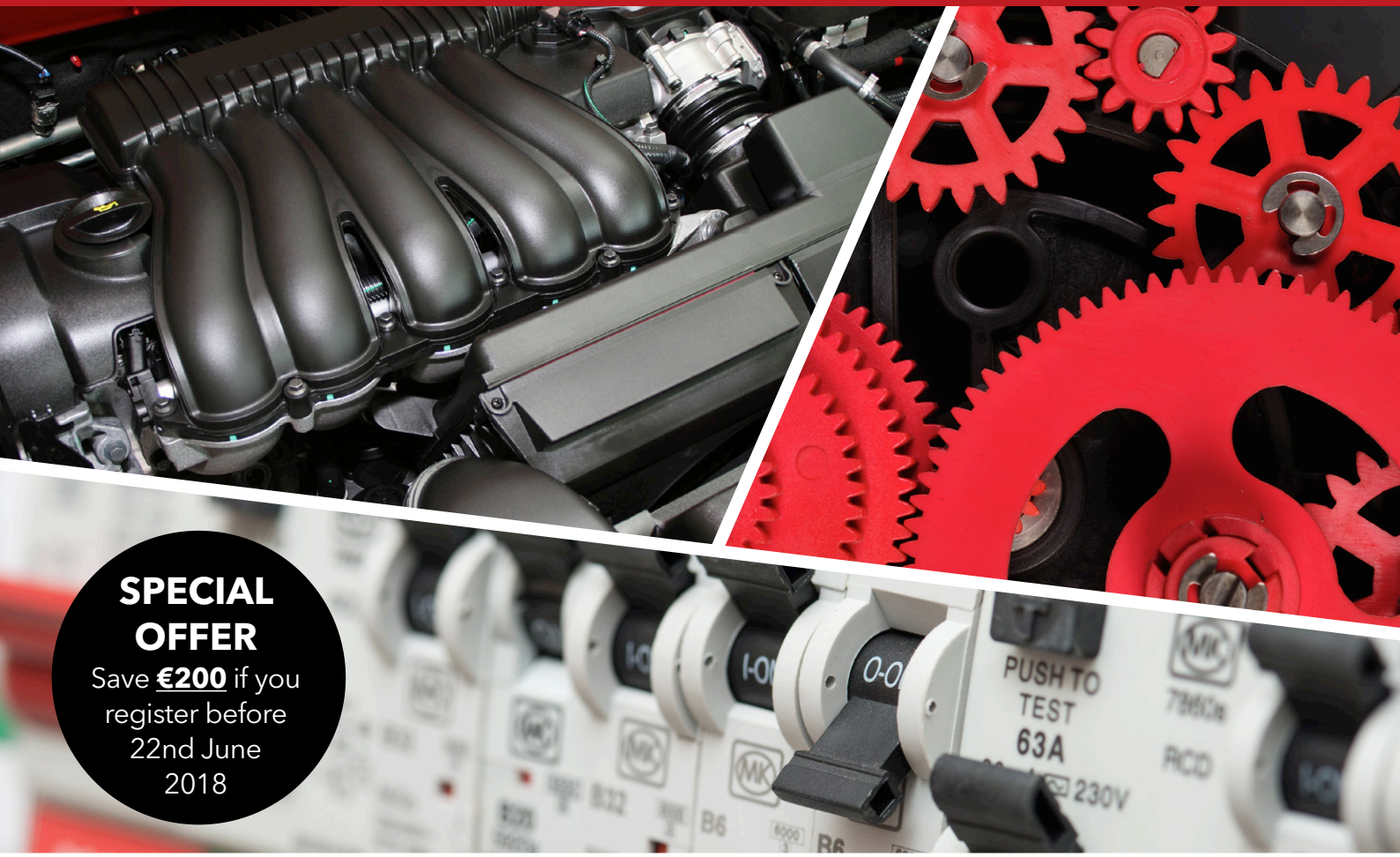

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Omya forms US alliances

Industrial minerals producer Omya has announced two new distribution agreements for the North American market.

Omya's US operation now handles natural-based lubricants, release agents, antistatic agents, antifogging agents and plasticisers for Malaysia's Emery Oleochemicals in the Mid-West, South-East, Central and Western US regions. These are marketed under the Loxiol and Edenol brands.

It is also now US and Canada national distributor for the full line of UV absorbers and hindered amine light stabilisers, plus selected photoinitiators and antioxidants, for South Korea's Songwon Industrial Group.

› **www.omya-na.com**

€1m investment lifts capacity at Wipag

Albis Plastic said an investment of €1m at the Wipag operation at Neuberg in Germany, which it acquired in January this year, will see capacity increase from 600 to 4,000 tpa.

The move, which includes commissioning of a new compounding line, will also enable it to move to full-scale production of Wipag's WIC-series polypropylene and polyamide compounds, which are reinforced with post-industrial reclaimed carbon fibre. These products have been produced on a pilot-scale line since 2014.

The acquired Wipag business includes the recycling and compounding facility at Neuburg and another site at Gardelegen in Germany – Wipag's shares in joint ventures with ACI in the US and PPR in the UK were not part of the Albis acquisition.

Aside from the carbon reinforced compounds, the company also produces PP, PA, ABS and PC/ABS compounds from the recycling of car bumpers, instrument panels and wheel arch liners.

Albis introduced its first glass-filled PA compound with recycled content more than 15 years ago and its current Altech ECO compounds, which use up to 100% recycled materials, are claimed to provide "Near-to-Prime" quality. The Wipag recycled carbon fibre WIC-series products will provide additional opportunities in lightweighting applications.

"We can come to the market with a CF compound that is much reduced in price, and it becomes affordable against GF [glass fibre]," said Albis Vice President Technical Compounds Bernd Sparenberg.

› **www.albis.com**

› **www.wipag.com**

Steilemann steps up to Covestro CEO

Covestro said Dr Markus Steilemann will take over the role of CEO on 1 June. He follows Patrick Thomas, who retires three months before his contract was due to end.

Thomas had been Covestro CEO since 2007, covering the company's transition to independence from Bayer in 2015. He also served in senior roles at CEFIC and the World Plastics Council, and as president of PlasticsEurope from 2011 to 2017.

Covestro supervisory board chairman Dr Richard Pott said Thomas "has significantly contributed to Covestro's remarkable success story". Since 2015, he said, the firm has achieved record results but also "developed an independent corporate culture and became a forerunner in innovation and sustainability in the chemical industry".

Retiring and incoming Covestro CEOs: Patrick Thomas (left) and Dr Markus Steilemann

Steilemann, currently Covestro's Chief Commercial Officer, was named as Thomas's successor in May 2017. He is joined on the board by Chief Technology Officer Dr Klaus Schäfer, whose contract has been renewed until the end of 2022, and Dr Thomas Töpfer, who joined as Chief Financial Officer in April.

› **www.covestro.com**

More big names join Essen compounding exhibition

Evonik, Merck and Wacker are among the latest polymer and additive suppliers to book stands at the Compounding World Expo, which will take place at Messe Essen in Germany on 27-28 June 2018. More than 93% of stands have now been taken at the exhibition, which is being organised by AMI and *Compounding World* magazine.

Essen's Compounding World Expo will bring together more than 135 global exhibitors

"We are delighted that more than 135 companies from around the world have already signed up to exhibit at the first Compounding World Expo," said Matt Wherlock, AMI's exhibition sales manager. "Visitors to the event will be guaranteed to meet an impressive array of leading suppliers of polymers, additives, compounds, machinery, equipment and related services," he added.

Other companies that have booked stands include Azo, BASF, Bekaert, Biesterfeld, Borealis, Brabender, Brenntag, Buss, Campine, Coperion, Dow Corning, Econ, Elix, Farrel Pomini, Fraunhofer, HPF, ICMA Saint Giorgio, Imerys, IMI Fabi, JSW, Kaneka, Krauss-Maffei Berstorff, Leistritz, LKAB, Maag, MCC, Mitsui, Mixaco, Mondo Minerals, Motan Colortronic, MPI Chemie, Omya, Orion, Polyplastic Compounds, Reverté, Schenck, Solvay, Unipetrol, Velox, Zeppelin and many more.

Admission to the Compounding World Expo and its conferences and seminars is free of charge. Click **HERE** to register for your free ticket.

Exhibition packages start at €1,800 for a 6m² shell-scheme space (only three left) and this includes unlimited exhibitor passes and extensive marketing support.

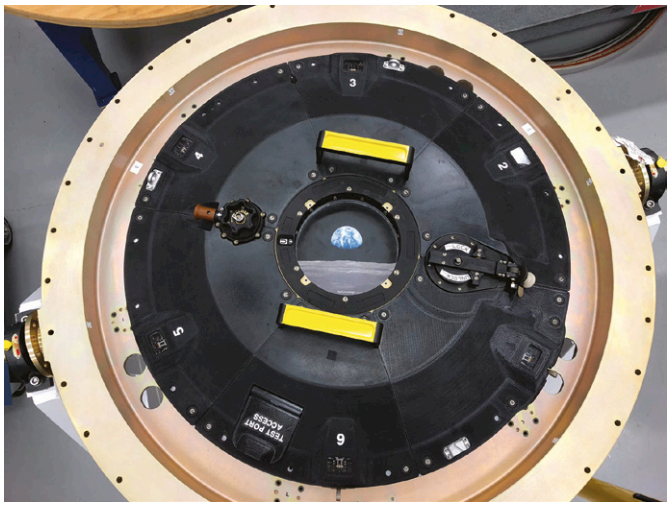
For details, contact Matt Wherlock at **matthew.wherlock@ami.international** or call +44 117 314 8122.

A full list of current exhibitors, plus the complete programme of training seminars, business debates and technical presentations across two conference theatres can be found at:
› **https://compoundingworldexpo.com/eu/**

NASA to put 3D PEKK in space

Additive manufacturing firm Stratasys and Phoenix Analysis & Design Technologies, an engineering services company, have joined with Lockheed Martin Space to deliver 3D printed parts for NASA.

The project will use the newly launched Stratasys Antero 800NA PEKK resin to produce six 3D-printed components that lock together to form a ring used in a critical component on Orion's docking hatch (*pictured*). A special electrostatic dissipative Antero grade will be used. Other parts will be produced in the company's Ultem 9085 resin.



Orion is NASA's deep-space spacecraft, for which two missions are currently planned. The first will be unmanned and will travel beyond the moon, while the second will have astronauts on board and will travel close to the moon in preparation for more complex future missions. The mission will have more than 100 3D-printed production parts on board.
› **www.stratasys.com**

Chinese firm invests in Georgia

Top Polymer Enterprise, a Chinese manufacturer of thermoplastic elastomer (TPEs), is to build a $15m facility at Social Circle, in Georgia in the US. It will be its first US facility and the initial phase will cover 5,575m² and inlcude three compounding lines.

Top Polymer has two production bases in China, at Dongguan in Guangdong province, and Liyang in Jiangsu province. It exports to more than 30 countries and regions.
› **www.topolymer.com**

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Vinyl and fluropolymers company **Mexichem** posted a 9% increase in revenues to $5.8bn for 2017 and a 24% gain in EBITDA to $1.1bn. Income from continuing operations – at $357m – was 15% higher year-on-year. The Mexico-headquartered company said the strong 2017 result was in large part due to higher PVC prices. Looking ahead, it said it expects EBITDA growth of 20-25% for 2018, with its business benefiting from the newly acquired micro-irrigation operation, Netafim.
www.mexichem.com

Italian compounder **VampTech** has acquired a minority share in Malaysia's **Unicolour Polymer Technology**, which has been serving as its local manufacturing partner for the past year. The agreement includes an option for VampTech to take full ownership of the business, which last year generated sales of more than €10m, at a future date.
www.vamptech.com

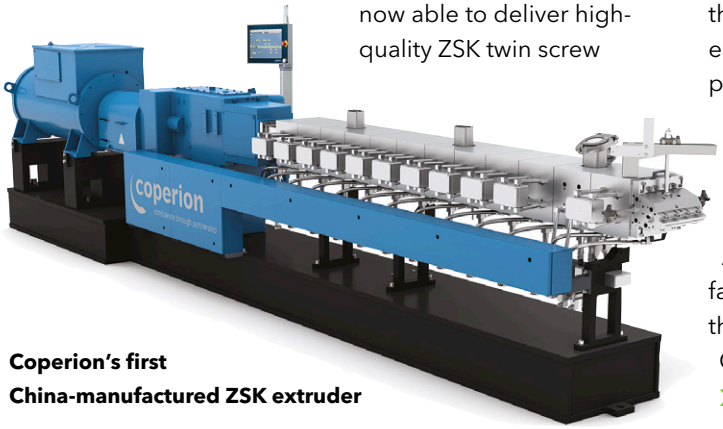
BASF has lifted force majeure that has been in place on its Ecoflex compostable polymers and Ecovio derivates since the autumn of last year, when the company found a fault in the plant heating circuit had contaminated products. It said, however, that inventory levels are still low.
www.basf.com

Coperion to build ZSK extruders in China

Compounding systems giant Coperion exhibited a ZSK 58 Mc18 twin-screw extruder at the Chinaplas show, the first machine from its high-end line to be assembled at its Chinese production plant at Nanjing.

The company has previously only made mid-range and entry level models at its Chinese facility, which has seen significant investment and the implementation of strict quality control in recent years.

"The investments into increasing the manufacturing capabilities and quality standards at our Nanjing site have been investments into our future," said Joanne Shen, Managing Director of Coperion Nanjing. "Thanks to this pioneering development of our facility we are now able to deliver high-quality ZSK twin screw extruders with local value added and tailored to the requirements of our Chinese customers."



Coperion's first China-manufactured ZSK extruder

The ZSK 58 Mc^{18} is the first locally-assembled machine size available in China; further ZSK machine sizes will follow soon. The company says the China-built models meet local market demands for efficient production, optimised throughput and high end-product quality while providing faster delivery times and cost savings.

Coperion will continue to assemble ZSK machines for the North American market in its US facility and manufacture for the rest of the world in Germany.

› **www.coperion.com**

FDA clears Total PCR resin

The US Food & Drug Administration (FDA) has confirmed that the secondary recycling process used at Total's Antwerp site to make its HDPE 'circular compounds' is effective in reducing contaminants from post-consumer recycled HDPE (PCR) HDPE material to allow its use in food packaging.

The FDA letter of non-objection clears Total's rPE 6306, which contains PCR-HDPE, for use in bottles for milk and juices, meat trays and other food packaging products at room and refrigeration temperatures.

"We had already demonstrated that a compound containing post-consumer HDPE and a specifically developed virgin 'booster' product provides the same or even better performance than conventional virgin product. Now, we are pleased to have received the non-objection letter from the US Food and Drug Administration confirming the success of our efforts in upgrading recyclates," said Jean Viallefont, Vice President Polymers Europe for Total.

The company has also developed a range of PP 'circular compounds' with a high PCR content. These are said to match key performance requirements for many applications, including crates, caps, bottles and buckets. The company is separately seeking to industrialise PS recycling.

› **www.polymers.total.com**

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BASF invests in Ultrason

BASF has started up a new line for production of its high-temperature resistant Ultrason polyarylsulphone at its site at Yeosu in Korea, upping the company's global production capacity for the polymer by 6,000tpa to 24,000tpa.

"This capacity expansion will strengthen our competitive position and drive the global versatility of our polyarylsulphone business," said Giorgio Greening, Head of BASF's Global Business Unit Styrenic Foams and Specialty Polymers. "The expanded production enables us to accompany our customers' growth at a high technical level and with the optimum product portfolio."

Opened in 2014, the Yeosu plant was BASF's first Ultrason production unit in Asia and its first outside of Germany (it also produces Ultrason polymers at Ludwigshafen). Both locations are built to manufacture the full Ultrason S, E and P series products.

BASF has installed new Ultrason capacity in Korea

Ultrason is used in the electronics, automotive and aerospace industries for production of heat-resistant, lightweight components. The polymer can withstand temperatures up to 220°C and offers very good chemical stability. Applications include automotive lighting reflectors, membranes for water filtration and medical devices.

› **www.basf.com**

Kureha adds PPS capacity

Japan's Kureha is to invest some €75m to expand production of polyphenylene sulphide (PPS) resin by 5,000 tonnes/year at its Iwaki factory in Fukushima, which is currently operating at its full capacity of 10,700 tonnes/year.

The expansion is expected to be completed in September 2020 and to begin operation in February 2021. Kureha is applying for funds from a Japanese government subsidy programme for areas impacted by the tsunami and nuclear reactor disasters of March 2011.

Kureha said demand is growing for PPS in industrial applications requiring high heat resistance and workability, particularly in automotive electronics and lightweight parts in general. It said it will continue to work with partner Polyplastics to market the PPS products.

› **www.kureha.co.jp**

Successful audit at R&P Polyplastic

Russian compounder R&P Polyplastic said last month that an audit of its quality management system carried out by PSMA Rus (Peugeot Citroen Mitsubishi) had been completed successfully.

"Quality endorsement of R&P Polyplastic compound materials by leading international manufacturing companies allows us to feel confident about the future and count on successful access to the European market," the company said in a statement.

› **www.polyplastic-compounds.ru**

Conventus to market UJU's PES in US

Conventus Polymers, a distributor of engineering thermoplastics based in Parsippany, New Jersey, US, is to market the Paryls brand of polyethersulphone (PES) from China's UJU New Materials in North America.

Conventus already distributes UJU's polysulphone (PSU) and polyphenylsulphone (PPSU) under the same name. It will now add three PES grades with varying viscosities: F2150, F2250, and F2350. These offer benefits such as high heat resistance (Tg 225°C), along with good dimensional stability and electrical properties.

John Jorgensen, President of Conventus, said that demand for higher heat materials has grown significantly. "Although market penetration is typically measured in years for an overseas supplier like UJU, the company benefited from quick adoption at major OEMs due to severe supply shortages of PSU, PES, PPSU, and polyetherimide in 2015 and 2016," he said.

UJU originally built up its business platform in Asia. It tripled capacity with a second manufacturing site in 2016 and launched PES commercially in late 2017. It sees North America as a key market segment, according to Steven Xu, Global Vice President of Sales and Marketing.

› **www.usa-uju.com**

› **www.conventuspolymers.com**

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Melt process may cut cost of carbon fibres

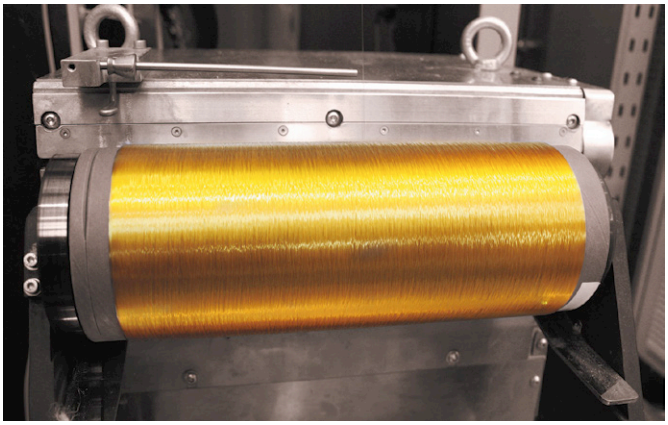
The Fraunhofer Institute for Applied Polymer Research (IAP) has revealed a new technology – ComCarbon – that it claims will "make it possible in the future to produce carbon fibres at low cost for the mass market".

Although carbon fibres are widely used for reinforcement in lightweight composites for high-end applications, they have struggled to compete with glass and natural fibres in the automotive and construction industries due to high production costs. About half of this is attributed to the cost of solution spinning the polyacrylonitrile (PAN) precursor fibre, which cannot be melt processed.

ComCarbon is an alternative precursor technology, developed by Fraunhofer, that uses an inexpensive melt spinning process and special meltable PAN co-polymers to cut precursor fibre production cost by around 60%. Once spun, they are converted to an unmeltable state and processed into carbon fibres in the same way as conventional precursors.

Melt spinning avoids the use of solvents, which have to be recycled at high cost, so it reduces the environmental impact of the process. According to the Fraunhofer research team, this means all of the material can be used and significantly higher spinning speeds can be achieved.

› **www.ipa.fraunhofer.de**



ComCarbon melt spun PAN cuts precursor production cost by 60%

New owners for recycler QCP

LyondellBasell and waste management group Suez have completed their takeover of plastics recycler Quality Circular Polymers (QCP) in the Netherlands.

LyondellBasell will add QCP's recycled PE and PP products to its range of virgin polyolefin materials. "Partnering with Suez allows us to contribute to the circular economy in a way that no plastics company has before," said LyondellBasell CEO Bob Patel. "With QCP, we have combined our respective expertise with Suez to create an innovative system that can be scaled as the circular economy grows."

Preparation area at QCP's PP and PE recycling facility in Geleen, Netherlands

QCP plans to increase production of recycled PP and HDPE at its facility at the Chemelot chemicals park in Geleen from 35,000 tonnes in 2018 to 100,000 tonnes by 2020.

› **www.qcpolymers.com**
› **www.lyondellbasell.com**
› **www.suez.com**

NEWS IN BRIEF...

Ineos Styrolution is to commission an engineering study for construction of a world-scale styrene monomer plant in the US Gulf Coast, where it can access both infrastructure and low-cost feedstock and energy from shale gas. CEO Kevin McQuade said that the plan "supports our 'Triple Shift' growth strategy and maintains our leading position as a global styrenics supplier".
www.ineos-styrolution.com

Orion Engineered Carbons is to expand capacity at its facility at Ravenna in Italy by adding a new speciality carbon black line. The company said the products would target applications in growing markets, citing coatings, polymers and printing. It is expected to begin production in Q4. The total to be invested by the company was not disclosed.
www.orioncarbons.com

Saudi Aramco and **Total** have signed a memorandum of understanding to build a large petrochemical complex at Jubail in Saudi Arabia, that will be integrated downstream of the existing 440,000 barrels/day Satorp refinery. The $5bn complex will feature a mixed-feed steam cracker with 1.5m tpa of capacity for ethylene and related petrochemicals. Front-end engineering should start in Q3 2018.
www.saudiaramco.com
www.total.com

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Compounding World Expo: free conferences unveiled

The full speaker line-ups have been revealed for the two free-to-attend conference theatres at the Compounding World Expo. The event is being organised by AMI and *Compounding World* magazine at Messe Essen in Germany on 27-28 June 2018. The two theatres will host a series of training seminars, business debates and technical presentations throughout the two days.

The opening keynote address on the first day of the exhibition will be given by Andrew Reynolds, a founder of AMI and director of Advance Bidco, the owner of AMI. He will set the scene with a paper analysing global trends in plastics compounding markets. On the following day, the opening keynote will be delivered by Chris Smith, the editor of *Compounding World*. He will highlight five compounding innovations to watch.

Across the two days of the conference there will be four business debates addressing the future of technical compounds, masterbatch, PVC compounds, and polyolefin compounds. These will feature influential business leaders from some of the world's biggest compounders and masterbatch makers, such as A Schulman, Ampacet, Clariant, Kingfa, PolyOne and Washington Penn.

There will also be six practical training seminars covering topics such as:

Keynote addresses at the Compounding World Expo will be given by Andrew Reynolds, a founder of AMI (left), and AMI Magazines Editor-in-Chief Chris Smith

specifying and scaling up twin-screw extruders; computer modelling of the compounding process; optimising screw configurations; complying with REACH 2018 chemicals legislation; and understanding the psychology of colour.

In between the business debates and training seminars, there will be a series of presentations covering key business issues and technology developments.

Business issues to be explored include: the impact of REACH and the threat to raw materials availability; opportunities and innovations in cable compounds: and market trends in Russia's compounding sector. These topics will be covered by representatives from the European Masterbatchers and Compounders association, the Portuguese compounder Automotive Compounding Industry, and R&P Polyplastic, a leading Russian compounder.

The Compounding World Expo will also feature presentations on developments in polymers, additives and compounds. These will examine topics such as electrically and thermally conductive compounds; flame retardants; compatibilisation; friction modification; nanocomposites; carrier resins; cross-linking agents; functional fillers; thermoplastic elastomers; and high-temperature polyamides. Talks will be delivered by technical experts from companies including Borealis, Europiren, Falcone, Georg H Luh, HPF, Interface Polymers, Polyscope, Unipetrol, and Ziegler.

Process optimisation for compounders will also feature, with presentations on the latest technologies and techniques for maximising filler loadings, raising product quality, increasing throughput, improving pelletising, and exploiting reactive extrusion. These topics will be covered by speakers from Aimplas, Coperion, Dynsico, Maag, Maris, Sikora and X-Compound.

At the end of the first day of the expo, there will be an opportunity to relax when one of the conference theatres will show the World Cup match between Germany and Korea on the big screen, starting at 16:00. This will be followed by a networking party for visitors and exhibitors in Messe Essen's beer garden.

Register for your free ticket to the conferences **HERE**. This ticket provides free admission to the Compounding World Expo plus the Plastics Recycling World Exhibition in the adjacent hall at Messe Essen. The two shows will feature more than 180 exhibitors, three free conference theatres, and more than 70 speakers across the two days.

Compounding WORLD EXPO 2018

For more information on the Compounding World Expo, including the full conference programme and the current exhibitors list, please visit:
› **https://compoundingworldexpo.com/eu/**

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Cable makers focus on CPR

*Implementation of the EU's long evolving Construction Products Regulation has placed new demands on cable producers and the cable supply chain. **Peter Mapleston** finds out more*

New standards for building products are providing a strong impulse for development of materials for wire and cable applications. EU Regulation 305/2011 for buildings – also known as the Construction Products Regulation (CPR) – may have been written seven years ago but it is only now that its effect is really beginning to be felt along the cable supply chain. Cable makers are facing new obligations and producers of additives and cable compounds are coming forward to help them meet them.

The CPR is intended to harmonise European laws relating to marketing of construction products. It should provide a level playing field across the region in relation to requirements on provision of performance information. Definitions of levels of reaction to fire and release of dangerous substances from power, communication and control cables were set out in the harmonised product standard EN50575.

The regulations require cable manufacturers to issue a Declaration of Performance (DoP) and to label products meeting the relevant standards with the CE mark – the manufacturer assumes responsibility for the conformity of the cable with the declared performance and testing of materials must be carried out independently at an accredited testing laboratory. The period during which this pan-European standard co-existed with other national legislation ended last July and CE marking according to the CPR is now mandatory across the EU.

The EN50575 standard requires not only the flame spread tests used in the past, but also on heat release smoke production, flaming droplets and acidity. It provides seven "Euroclasses" that classify the reaction of cables to fire: A is the top category (non-flammable), followed by B1, B2, C, D, E, and F (undetermined performance). There are

Main image: The EU Construction Products Regulation is having an impact across the European wire and cable industry, introducing new testing and compliance demands

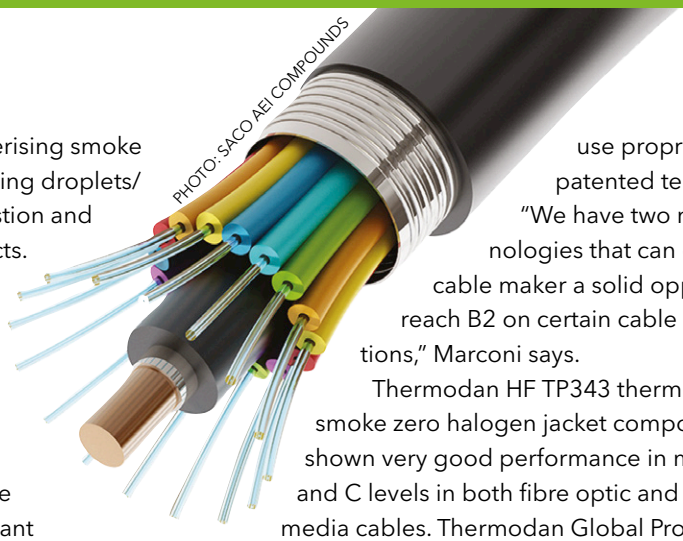
PHOTO: SACO AEI COMPOUNDS

Right: Thermodan compounds meet the demanding performance requirements for fibre optic and copper media cables

also additional criteria characterising smoke production, occurrence of flaming droplets/particles and acidity of combustion and thermal decomposition products.

The CPR is adding to the testing and certification burden on cable companies, and this new burden grows with the level of performance declared. Most cable formulations of Class D and above have required a full redesign to warrant conformity to the CPR, says Rob Lammertink, Director Polymers & Coatings at **LKAB Minerals** in the Netherlands.

"Leading companies are increasingly choosing UltraCarb to enhance cable compound performances for CE marked cables. LKAB Minerals continually develops its UltraCarb range of natural flame-retardant fillers," Lammertink says.

The latest addition to the company's range, UltraCarb LH3, was specifically designed to be used in highly filled thermoplastic compounds. "Since full production started in 2016, UltraCarb LH3 has seen strong year-on-year growth. The product has found a high level of acceptance from the technically and commercially challenging market for halogen-free cable sheathing compounds," he says.

Significant challenges

Allan Marconi, Marketing Manager at compound producer **SACO AEI Polymers**, also says the new regulation has presented the industry with some headaches. "The CPR has provided significant challenges for cable makers in meeting the appropriate level of the requirement as dictated by the installed environment," he says.

The company has just announced what it describes as some breakthrough low smoke halogen-free compounds for wire and cable that use proprietary patented technologies. "We have two new technologies that can give the cable maker a solid opportunity to reach B2 on certain cable constructions," Marconi says.

Thermodan HF TP343 thermoplastic low smoke zero halogen jacket compound has shown very good performance in meeting B2 and C levels in both fibre optic and copper media cables. Thermodan Global Product Manager Dean Jenne says it has been developed in response to the need for a more cost-effective solution for this market. "In copper media cables, the 22-mil [0.56-mm] thin wall jacket reduces the cable diameter by up to 7%, saving space, up to 30% reduction in weight and significant volume cost savings over conventional LSHF jacket solutions," he says.

Pexidan HF S/C-UV, a moisture-curing low-smoke zero-halogen XLPE thermoset jacket compound, also has the capability to fit into the higher-level performance classifications of CPR. Jenne says it meets the need for a more cost-effective solution for the fast-growing low smoke zero halogen application sector in North America.

However, Jenne explains that the results any wire and cable maker will get in classes of CPR are also dependent on factors beyond the actual compound itself. "No compound manufacturer can guarantee the cable maker to meet a specific level of CPR, only that their experience is that the compound has the capability to meet CPR. B2 and C are the classifications most commonly required," he says.

Below: SACO AEI Compounds has launched two novel low smoke halogen free compound families for the cable industry

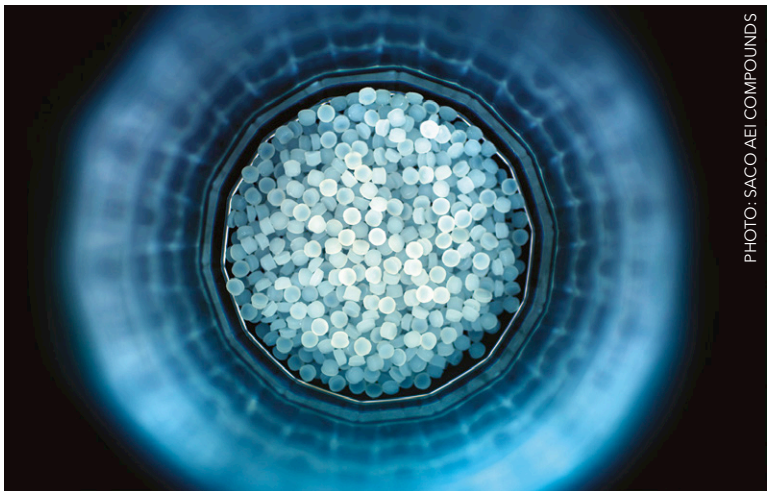
PHOTO: SACO AEI COMPOUNDS

HFFR introductions

Unsurprisingly, the CPR cropped up in numerous discussions about materials on view at the Wire 2018 exhibition in Düsseldorf, Germany, in April. Italian compounder **Padanaplast** introduced a range of new Cogegum AFR and Cogegum GFR wire and cable compounds incorporating an advanced halogen-free flame-retardant (HFFR) technology at the show. The new materials meet requirements of CPR and also ISO 6722 for automotive cables.

"The zero-halogen FR technology of our new compounds virtually eliminates the health hazards, disorientation and corrosivity associated with halogenated materials in fires," says Antonello Casale, R&I & Tech Service Manager at the company. "And importantly for processors, this superior self-extinguishing, low-smoke and low-toxicity behaviour doesn't compromise the excellent

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Many a cable fire can result in a major conflagration, threatening people and property. This is a problem area for which BYK has developed an effective additive solution with its innovative flame-retardant synergist, CLOISITE. CLOISITE leads to improved flame retardancy in halogen-free cable formulations, even with a low dosage. By forming a stable combustion crust, CLOISITE prevents flaming droplets, thereby satisfying the strictest fire standards.

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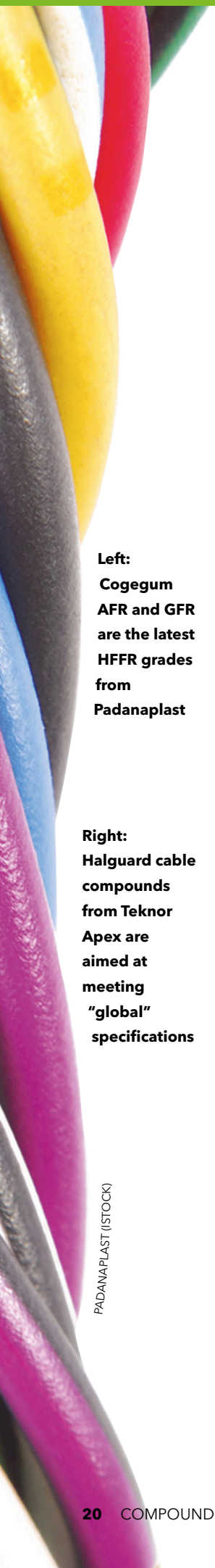

Left: Cogegum AFR and GFR are the latest HFFR grades from Padanaplast

Right: Halguard cable compounds from Teknor Apex are aimed at meeting "global" specifications

PADANAPLAST (ISTOCK)

extrusion properties of our products."

Padanaplast introduced five grades for building and construction and two targeted at applications in automotive. Except for one all-thermoplastic sheathing grade, all these compounds are silane-crosslinkable products of the Cogegum GFR series based on Sioplas process technology.

Global compliance

Teknor Apex featured its Halguard low-smoke HFFR compounds, which are designed to enable compliance with the newly implemented fire safety requirements in Europe while also meeting standards adhered to in North America and other regions. The company points out that fire safety is a critical issue for buildings, regardless of the region they are located. However, North American fire safety standards for cables are significantly different from those used in Europe and many other regions of the world. It says the new Halguard compounds enable manufacturers to meet the growing demand for "global" products that can enable compliance with fire codes in multiple jurisdictions. Among Halguard compounds now available are products suitable for supporting Euroclass B2 and below while also being able to pass UL 1666 Riser flame test.

While PVC continues to be the preferred solution for many wire and cable applications, Teknor Apex developed its Halguard technology for customers that sell to jurisdictions or applications where halogen-free compounds are the required alternative. "Halguard compounds overcome the limitations of other LS HFFR compounds by being generally more flexible for an equivalent level of flame retardance and easier to extrude," says David Braun, the company's Wire and Cable Industry Manager.

The need for materials that comply with specifications in different global markets is echoed by Denise Wallace, Marketing Manager Compounds BU (USA) in the Vinyl Business Group at **Mexichem Specialty Compounds** (MSC). She says the company's broad range of compound types helps the many cable makers looking for compounds that will answer both the US fire standards (NEC hierarchy from UL 1581 to NFPA 262 performance) as well as CPR. "Often times, they are seeking one material that will perform globally or they are looking for synergies to streamline their portfolio while focusing on next-generation performance," she says.

Wallace also notes that fibre optic cable manufacturers are looking to expand their product offerings by pushing the low temperature limitations of traditional materials. "They are seeking solutions that can be installed indoors and outdoors without compromising the integrity of the cable," she says.

For cables needing to meet the most stringent US NEC flame testing standard, Mexichem's plenum-capable compound, Smokeguard, is said to provide a solution while also addressing factors such as low temperature or indoor/outdoor performance criteria. "When facing CPR classes such as B2, MSC's LS HFFR compound Megolon has earned its place based on its heat release and low smoke production capabilities," says Wallace. "For cables needing minimal flame performance, MSC's Garaflex TPE series of compounds allows for the flexibility needed for applications such as electric vehicle cables."

Also at Wire 2018, Spanish additives company **Tolsa** shone the spotlight on the latest advances in its Adins Clay high-performance flame retardant (FR) synergists. These are based on what Tolsa calls a "breakthrough technology" using natural silicates, which makes it possible to replace part of flame retardant systems used at high loadings to allow better processing.

The synergists work with standard wire and cable formulations based on halogen and halogen-free solutions. Tolsa says they have proven to be very efficient in HFFR systems based on EVA/PE and alumina trihydrate (ATH) and/or magnesium hydroxide. Now, Tolsa says there are also important gains when using the additives in other base polymers including EPDM rubbers and silicones.

Tolsa is also looking to complement its special additives portfolio for wire and cable by developing additives for chlorinated polyethylene (CPE). Preliminary studies with its Adins additives have shown good fire retardancy performance and reduced smoke production and ATO content, it says. It will complete its study with formulation readjustments during the year.

Meanwhile, **Nabaltec** has developed a new mineral-based masterbatch, Apyral AOH EXL 500-17-C, which it claims is a highly efficient flame-retardant synergist for ATH. It can be easily blended with mineral fillers and is highly compatible with numerous polymers, the supplier says. At addition levels of only 4 wt%, the additive is said to improve fire retardancy significantly compared to ATH on its own. Corina Neumeister, R&D/Technical Service

PHOTO: TEKNOR APEX

“ ENTEK Twin-Screw Extruders Have Been an Integral Part of Our Growth, and Their Technical Support Sets Them Apart”

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Wayne Miller, Vice President Manufacturing, Penn Color, Inc.

Jeff Zaskoda, Penn Color Plant Manager (left) and ENTEK’s Bill Petrozelli at Penn Color’s Milton, WI Facility

“Business has grown strongly and consistently for Penn Color, both for our thermoplastic and liquid dispersants businesses. We’ve added several new facilities and added capacity at legacy facilities, all in the support of growth related to our thermoplastic color and additive businesses.

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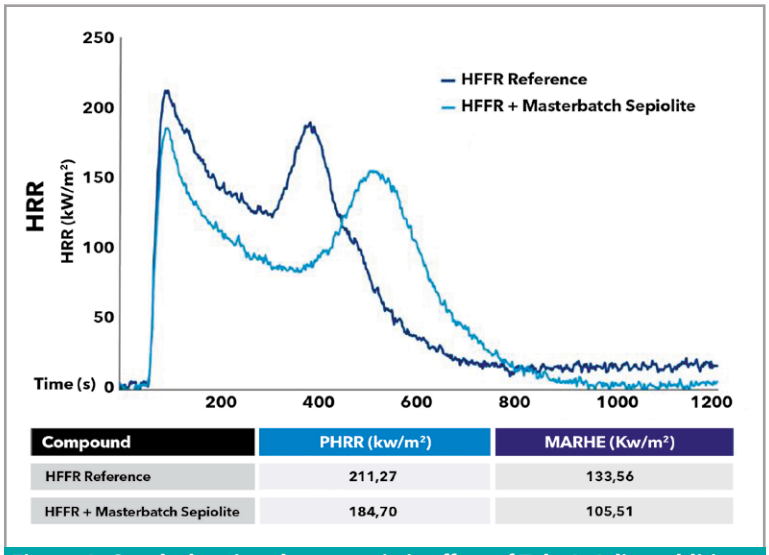
Compounding WORLD

Manager, Cables & Polymers at the company, says that while some nanoclay synergists impair compound processability, this is not the case with Apyral AOH EXL 500-17-C.

Automotive offerings

Borealis launched new grades of polypropylene for flame retardant cables at Wire 2018. The company's speciality flame retardant (FR) cable grade portfolio has been extended with two new HFFR polypropylene (PP) solutions for wires capable of withstanding high temperatures. Borealis says that in vehicles, extremely robust FR cables are essential to facilitate an increasing number of functions in a safe manner (on-board entertainment, alternative powertrains, safety functions, and the like). The new FR grades, FR4850 and FR4852, are said to offer benefits such as improved insulation at temperatures over 125°C, as well as protection from wear and tear, temperature, and chemicals over the vehicle's lifespan.

The automotive market is likely to see increased volumes of fluoropolymers as well – especially in applications where failure may not an option – according to Cy Genna, Regional Product & Marketing Manager for Teflon products with **Chemours** in the US. He points out that fluoropolymer materials stand out for their high and low temperature stability, resistance to chemicals and UV radiation, very good fire resistance without the need for additives, and very good dielectrics. Across the market for data cables, the need to transmit more data, faster, often over longer distances, all the time, is boosting the need for higher performance polymers for insulation and jacketing. This is being augmented by the growing use of cables that transmit both power and data.



Compound	PHRR (kw/m²)	MARHE (Kw/m²)
HFFR Reference	211,27	133,56
HFFR + Masterbatch Sepiolite	184,70	105,51

Figure 1: Graph showing the synergistic effect of Tolsa's Adins additive on heat release rate in a fire retardant cable compound containing ATH
Source: Delta Tecnic

PVC developments

AkzoNobel Specialty Chemicals (currently being sold to The Carlyle Group) recently announced a development that has a direct impact on US producers of PVC polymer and an indirect impact on PVC compounders and processors. It has started supplying the first-ever emulsion-based organic peroxides in the US for the manufacture of PVC. It says these emulsion products are safer alternatives to solvent-based peroxides for making PVC.

"Organic peroxides often decompose at very low temperatures, which can lead to combustion

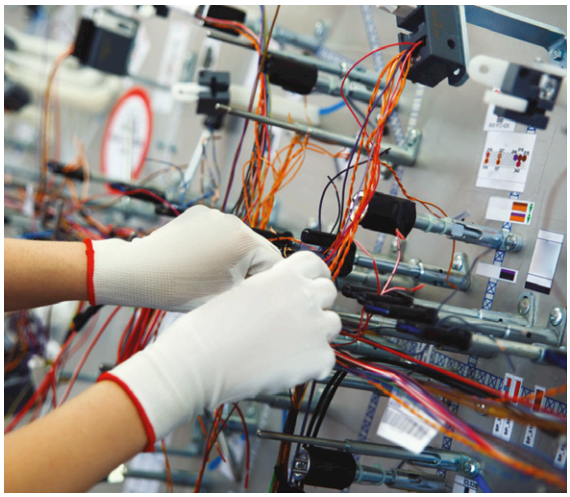


PHOTO: SHUTTERSTOCK

Right: Automotive wiring systems have to meet increasingly stringent fire and performance requirements

when not stored or handled properly. Emulsions contain water, significantly reducing the chance of combustion, and increasing the transport, storage and handling safety. The improved safety characteristics also allow for bulk storage and fully automated handling, reducing the risk of manual operation mishaps," says Rob van de Graaf, Director of Sales, Americas - Polymer Chemistry.

"European PVC manufacturers started using AkzoNobel's emulsion-based organic peroxides more than 10 years ago. With the introduction to the US, we believe our customers there will realise the same benefits," says Johan Landfors, Member of the Executive Committee responsible for Polymer Chemistry.

While European PVC producers started using the emulsion-based organic peroxides principally for safety reasons, AkzoNobel claims emulsion peroxide PVC is more consistent, contains fewer fisheyes, and is whiter than PVC made with solvent-based peroxides. That means less TiO_2 (or alternative whitener) needs to be used in compounds. Emulsion-based peroxides, when introduced into the polymerisation process using AkzoNobel's CID Continuous Initiator Dosing (CiD) technology, also help raise output by as much as 40% by cutting batch times.

Van de Graaf doesn't have a definitive answer for the delayed adoption of emulsion peroxides in the US, but suggests the different make-up of the sectors in the two regions may also be a factor. Europe has many smaller PVC producers, while the US has four very big ones and that may also mean the US industry is more conservative in its thinking. The shift in direction of US producers may be a consequence of Hurricane Harvey, which last year devastated the Mexican Gulf coast and, in doing so, knocked out Arkema's peroxide plant at Crosby in Texas. Flooding there disabled the refrigeration on the peroxide storage tanks, resulting in them overheating and ultimately exploding.

XLPE stabilisation

Addivant has provided more details on Lowinox Fast XL, a high-performance liquid antioxidant blend it launched last year for the stabilisation of peroxide cross-linkable polyethylene (XLPE) insulation compounds used in production of medium voltage (MV) and high voltage (HV) power cables. Lowinox Fast XL can either be added during the production of the XLPE compounds themselves or used for cables produced using the Direct Peroxide Injection (DPI) process.

Lowinox Fast XL has been designed to minimise the interaction between the antioxidant and peroxide, Addivant says, allowing faster crosslinking speeds. Catenary continuous vulcanisation (CCV) lines can are said to be able to run 5-7% faster without compromising technical performance. "Excellent stability with the peroxide allows premixing long in advance, providing cable producers with greater production flexibility and manpower reduction," says Mark Moody, Key

Left: Inside the Borealis HV test facility in Sweden

Borealis invests in testing lab

Borealis (and sister company Borouge) inaugurated a newly expanded high voltage (HV) electrical testing facility at the Borealis Innovation Centre in Stenungsund, Sweden in March.

Some €4m has been invested in order to expand and equip the laboratory with the latest testing equipment. The facility, which is claimed to be unique among polymer producers, now offers alternate current (AC) and direct current (DC) simulation testing for performance of commercial cable materials in the medium, high and extra high voltage ranges.

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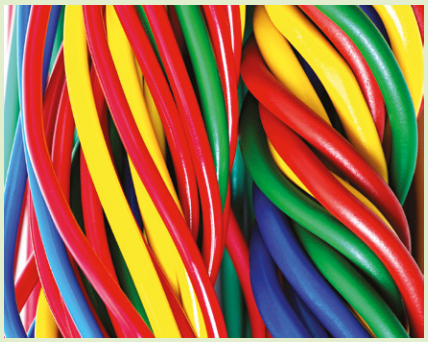
Report to expose global cable trends

Compounding World publisher AMI sees higher technical requirements and new legislation driving developments in plastics for cables for the future, with the continuing trend to halogen-free formulations favouring polyolefin-based solutions.

According to consultant Cristina de Santos, who is currently working on AMI Consulting's first global report on the cables market (Polymeric Materials in the Global Cable Industry 2012 to 2023), power and HFFR will be the key growth sectors in cable materials for the short term. While PVC compounds currently hold something like a 60% market share of the global market, this is falling in percentage terms. However, overall market growth means PVC volumes remain more or less the same.

Santos also cites the impact of the EU CPR regulation on the cable sector. "CPR has proven to be a controversial topic," she says. "The regulation has been intended to make the European industry more competitive by lowering barriers to market entry across its member countries. However, smaller players believe it is likely to benefit larger players. Also, due to the need to provide test results for each product family, this regulation is likely to skew production towards larger families of products."

PHOTO: SHUTTERSTOCK



PVC is losing global market share to polyolefins, but volumes are holding up

De Santos says many in the market see the CPR as one step towards a much needed homogenisation within the European market. "CPR is only the very first step, as regulations setting up the minimum performance levels required by law in each end-use application are still different in each European country," she says. "However, this regulation has already had a significant impact on material selection within the cable industry."

The study Polymeric Materials in the Global Cable Industry 2012 to 2023 will be published in September of this year. For more information contact Cristina de Santos. Email: **cristina.desantos@ami.international**.

Account and Innovation Marketing Manager, Polymer Modifiers, EMEA at Addivant.

Speaking at the Cables 2018 conference organised by AMI in Cologne, Germany, in March, Moody said that producers of MV and HV peroxide crosslinked polyethylene insulated cables have the choice of either ready-to-use XLPE compounds (normally the preserve of large compounders who are backwardly integrated into LDPE) or producing the XLPE in-situ themselves using DPI. "In both cases the XLPE must contain a suitable antioxidant package as well as the organic peroxide," he said. "Our new liquid antioxidant solution can be used in both of these processes."

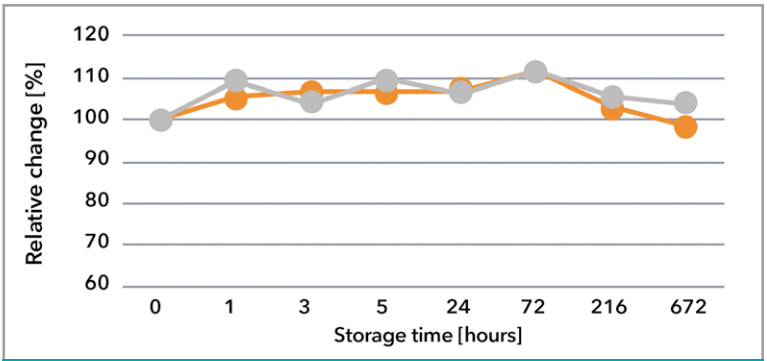


Figure 2: Variation of XLPE peroxide cross linking efficiency with storage time for premixed blends with Addivant's Lowinox Fast XL liquid antioxidant ***Source: Addivant***

Moody described two laboratory studies carried out by Addivant. In the first, an LDPE base resin was kept constant and the effect of using different antioxidants commonly used in MV and HV XLPE insulation compounds was investigated together with Lowinox Fast XL. In the second, the LDPE base resin was varied and only Lowinox Fast XL was used.

"The laboratory data indicates that Lowinox Fast XL performs just as well as the existing solid antioxidants currently used in MV and HV XLPE compounds in all the tests," Moody said. "Assessment in different LDPE base resins has demonstrated that Lowinox Fast XL can be used with the most important LDPE base resins available in the market place as a straight forward replacement of the currently used liquid antioxidants."

CLICK ON THE LINKS FOR MORE INFORMATION:

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Polycompound's development centre was extended in 2014

Capabilities include clean area compound production

Polycompound marks 30 years

Switzerland-based Polycompound marks its 30th anniversary this year, underlining the ongoing success of its co-kneader-based technical toll compounding business strategy with plans for yet more investment at its site at Sissach.

This year will see the privately-owned company add more production and warehousing capacity at its 6,000m^2 site, enabling it to push annual production considerably above its current 9,000 tonnes. Its exclusive focus on toll production will, however, remain unchanged.

"Our partners want to be sure that their know-how, their formulations, process details and marketing details are kept strictly confidential. This is not possible with a partner simply providing a secrecy agreement," says Polycompound CEO Thomas Manetsch. "Our business model is an insurance for our clients that we will keep information confidential and safe."

The company also remains committed to co-kneader compounding technology. "The co-kneader is the right machine for our targeted markets," explains Stefan Rohr, Head of Process Technology. "Thirty years of experience have proven that high-filled shear sensitive materials are best compounded on this technology."

Polycompound's expertise in co-kneader processing extends further than its own 30-year history. The company was set up in 1988 by four former employees of the Swiss co-kneader extruder maker Buss following its decision to end in-house toll compounding. The quartet took on one of the company's co-kneaders – an MDK100 – and established Polycompound in space rented from Sissach-based agricultural products firm Nebiker.

Their technical and cable industry toll compounding business grew fast. In 1989, the original MDK100 (which is still in operation today) was joined by a larger Buss MBK140 line, taking annual production to more than 1,000 tonnes. A smaller MDK46 line was installed in 1991 to compound implantable medical compounds.

By the time of the company's 10th anniversary, Polycompound had added three more lines – MDK46, MDK100 and MDK200 models – and annual production capacity exceeded 5,000 tonnes. Expertise had extended to include production of foam compounds, HFFR and semiconducting cable materials, and reinforced polyamides.

Polycompound's innovative approach to technology continued into the new millennium. It invested in plant and extruder upgrades in 2007 to safely handle bio-based fillers and nanotube additives. It also replaced one of its MDK140 lines with a larger MDK200 system, pushing annual production over 9,000 tonnes. In 2014 the company's development centre was extended, allowing it to offer customers the best possible tolling support, and was further upgraded with a new X-Compound co-kneader the following year.

Today, the company operates seven co-kneader compounding lines ranging from lab units to high volume production systems with capacities of more than 1,500 kg/h. Employment stands at more than 50 people, many of which have been with the company for more than 15 years. "Polycompound is continuously investing in production equipment and capacity, but also in our people," says Manetsch. "Our people, our long term staff and our new employees, are the base of our success."

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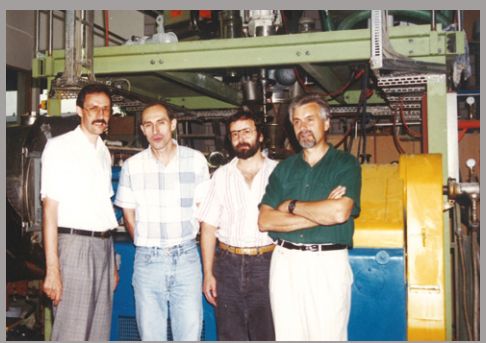

Polycompound's founding quartet pictured in 1992. From left, Kurt Breitenstein, Hanspeter Lösch, Franz Brun and Othmar Kym. Lösch and Brun still sit on the board of directors

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Wednesday 27 June

10:30-11:15

Specification of twin-screw extruders for polymer compounding applications

Adam Dreiblatt, director of process technology at CPM Extrusion Group

Adam Dreiblatt has more 35 years of twin-screw extrusion experience. Prior to joining CPM in 2007 he ran a consulting and training company focused on compounding technology, and he developed training workshops for the Society of Plastics Engineers. CPM manufactures compounding lines in the USA, Germany and China.

13:00-13:45

REACH 2018 – is your company compliant?

Dr Anna Gergely, director, EHS regulatory, Steptoe & Johnson

Dr Anna Gergely has a PhD in analytical chemistry and worked in a technical position at Monsanto before moving into the legal field, so she is well placed to relate regulatory developments to the world of plastics additives and compounds. Steptoe & Johnson is an international law firm with offices in the USA, UK, Belgium and China.

15:00-15:45

What's happening inside your twin-screw extruder? Using computer modelling to optimise compounding operations

Laurent Ratte, sales manager, Sciences Computers Consultant (SCC)

SCC is a leader in computer simulation for twin-screw extrusion with its Ludovic software package being widely used to analyse and optimise the compounding of thermoplastics compounds. Laurence Ratte manages the France-based company's workshops to educate the industry about the simulation technology.

Thursday 28 June

10:30-11:15

Top tips for optimising screw configurations in co-rotating twin-screw extruders

Luis Roca Blay, head of compounding, Aimplas

Luis Roca Blay is head of compounding at Aimplas, the Plastics Technology Centre of Spain, which provides R&D, technical support and testing services to the polymer industry. He has been with the organisation since 2000 and in his current role he leads research projects and delivers courses in compounding and additives.

13:00-13:45

The psychology of colour and its importance in buying decisions

Denis Keller, head of colour marketing, Europe, PolyOne

Dennis Keller is the head of colour marketing in Europe for leading global compounder and masterbatch maker PolyOne. He will discuss the psychology of colour in what will be a very valuable seminar for anyone involved in the development, production or application of colour compounds and masterbatch.

15:00-15:45

Scale-up strategies for twin-screw compounding extruders

Adam Dreiblatt, director of process technology at CPM Extrusion Group

Adam Dreiblatt has more 35 years of twin-screw extrusion experience. Prior to joining CPM in 2007 he ran a consulting and training company focused on compounding technology, and he developed training workshops for the Society of Plastics Engineers. CPM manufactures compounding lines in the USA, Germany and China.

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Looking towards Industry 4.0

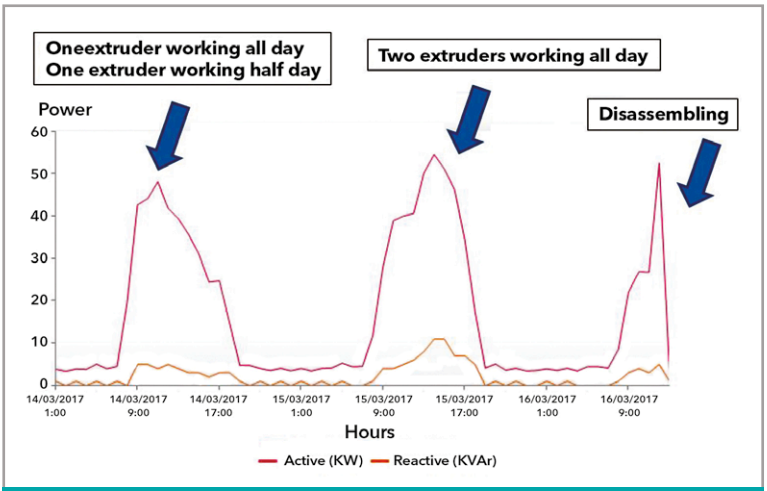
Industry 4.0 has the potential to revolutionise manufacturing industry. Compounding systems and equipment suppliers are already starting to implement some of its components, writes ***Jennifer Markarian***

Industry 4.0–the fourth industrial revolution–promises to change manufacturing, just as the previous industrial revolutions before it. The Industry 4.0 vision is one of communication of data across individual items of plant equipment using the industrial internet of things (IIoT) concept, allowing machines to learn and improving themselves. Collecting more data from sensors mounted on individual machines and using this data to improve processes and products is a first step towards operating under this new paradigm.

Adoption of Industry 4.0 technologies, such as networking of machines and the use of predictive maintenance, is further ahead in injection moulding than in the compounding segment. However, interest from compounders and resin producers is growing and projects to implement new tools in the compounding area are certainly in development.

Data, when translated into knowledge, is power and plastics processors can use Industry 4.0 tools to harness this power to improve process capabilities and make manufacturing more efficient. "In the compounding sector, companies have recognised many opportunities to benefit from the huge amount of accessible production data," says Dr Christian Hopmann, an Industry 4.0 authority at the **Institute of Plastics Processing** (IKV) in Industry and the Skilled Crafts at RWTH Aachen University, Germany. He cites the simple example of using sensors to measure the functionality of heating elements. "If one element is down, the rest of the system compensates this for as long as it takes an operator to restore the heating element, which reduces downtime and increases productivity," he explains. ›

Main image: Extrusion equipment suppliers and compounders are exploring the potential available from Industry 4.0 data collection technologies



Monitoring energy consumption can help identify optimal working practices ***Source: AIMPLAS***

Data extracted from the compounding process can provide information about the effectiveness of the manufacturing operation. For example, monitoring energy consumption can identify which lines are running effectively. Factors such as staff skill and the number and duration of stops for changeover and maintenance can be treated statistically to see which ones are affecting quality and productivity, suggests Luis Roca Blay, Head of Compounding at the Spanish technical institute **AIMPLAS**. Good working practices then can be exported from the better-performing lines to the poorer-performing ones, he explains. Another use of data could be inline measurement of compound properties. AIMPLAS is monitoring electrical conductivity inline, for example, and using it as a screening method to determine the optimal processing conditions.

Real-time control

Advanced process control employs real-time data gathered from the product and process that is then used to adjust process variables to obtain tighter control, and so a better end product. This type of closed-loop control is being used in a large-scale polypropylene manufacturing facility to reduce variability in melt flow index (MFI), says Sven Wolf, Managing Director of **Leistritz Extrusiontechnik**. In this case, an in-line rheometer measures MFI near the outlet of the twin-screw compounding extruder and this data is used by the control software to predict how peroxide dosing needs to be adjusted at the input to keep the outlet MFI at the desired setpoint. This self-optimising control system can keep the MFI within ±1%, according to Wolf.

"Typically, variation in MFI on polyolefin datasheets may be ±5%, and in reality may be ±3% from batch to batch. This high variation affects the downstream process and can cause problems for injection moulders. Improving the process capability of the resin compounding process to reduce MFI variation, however, creates higher quality product," he says.

Previously, in-line rheometers based on fixed capillary geometry could only measure single points on the viscosity curve. However, a new instrument developed by Leistritz and the **Institute for Polymer Extrusion and Compounding** (IPEC) at the Johannes Kepler University (JKU) in Linz, Austria, measures shear and elongational viscosity along the entire viscosity curve to obtain a more complete picture of melt quality. The online elongation and shear rheometer uses a patented slit die geometry and can be used in either an in-line mode, in which the melt is diverted through the rheometer and back into the melt stream, or in an on-line mode, in which the melt can be discharged after going through the rheometer. Wolf says this is the first instrument of its type that can perform such measurements in both in or on-line configurations, enabling it to be used in advanced process control.

The new instrument provides more information than is possible with a simple MFI. For example, because elongational viscosity is sensitive to fibre content and distribution, it can present a picture of differences in glass and natural-fiber filled compounds.

Other properties can also be measured in-line. Leistritz has worked with **ColVisTec**, which supplies UV-Vis spectroscopic tools for in-line measurement, to develop colour monitoring and control systems. In-line measurement and closed-loop control of colour is now being used in masterbatch production, says Wolf.

Right: Leistritz says its new Elongational Rheomoeter can be used in-line to provide advanced process control

Colour management

Liquid colour and additive supplier **Riverdale Global** is introducing GlobalTracker, a web-based solution that captures real-time input from liquid-colour metering devices and uses it to automate purchasing, production management, and compliance functions, as well as enable remote troubleshooting.

Transmission boxes at the customer's plant receive data from the metering controllers and transmit it to

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PHOTO: MAGUIRE PRODUCTS

Right: The removable touchscreen interface available with the Maguire 4088 controller, which offers faster processing and increased data buffering

Riverdale Global via the internet or a cellular network. The GlobalTracker software on the Riverdale Global servers tracks material usage and records job-specific data. This capability extends to all production lines, whether in a single facility or at multiple plants. In turn, the customer can access GlobalTracker information using a desktop, tablet, or smart phone to obtain information on orders, search their order history by order or by production job, see their current colour match status, submit new colour matches, and document production runs for compliance with job specifications or regulatory requirements.

The official market introduction for the technology is set for NPE 2018, but the company has completed some test installations with a few clients. Riverdale Global President Paul Maguire says the data tracking and analysis has provided insight that allowed better control and consistency of the colour going into the process.

"Collecting the right data and analysing it correctly will quickly bring to light where a process is varying. Ultimately, we are working to provide our customers the most economical and sustainable way to colour plastics through our Computerised Colour solutions. GlobalTracker is one of the tools to make this happen," says Maguire, who sees a trend towards customers expecting such features as a norm. "Younger generations, in particular, assume all of the data is accessible in one way or another. I have also found that customers are willing to use these features when they see the actual value in them. Technology, when done right, should add value and not complicate a process or create a new point of failure."

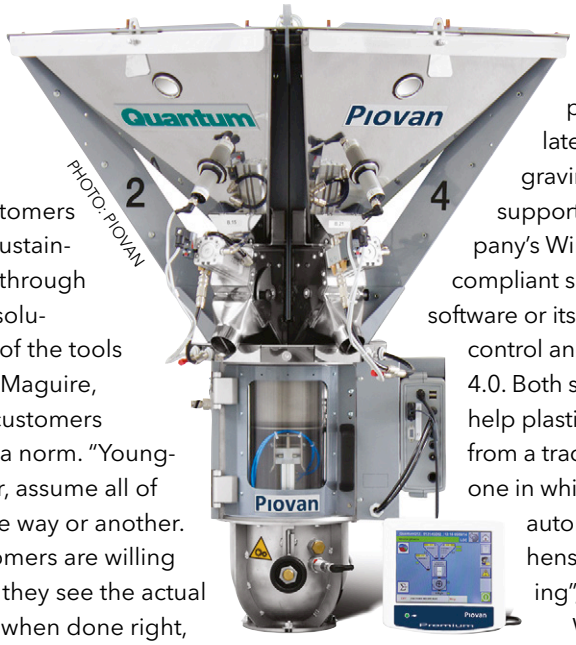
Blender control

Blending and dosing equipment for plastics compound and masterbatch production already generally operates under tight control to be able to accurately dose low levels of additives, and in some cases is operating in closed-loop control with the extruder. To function within Industry 4.0, however, blender controls also need to be able to communicate easily with upstream and downstream equipment.

The latest controller from **Maguire Products** – the Maguire 4088 - operates at seven times the speed of the previous-generation 1212 unit and provides eight times the memory and 45 times the resolution in the load cells used to weigh batch ingredients, says Frank Kavanagh, The company's Vice-President of Sales and Marketing. "The increased memory makes possible more storage for data logs and the ability to handle larger communication buffers. The faster processor and the higher memory are capable of handling the high traffic demands of an industrial Ethernet network," he says.

"These enhancements increase the volume, speed, and reliability of data transfer. Valuable information on the makeup and consumption of the raw materials being metered into the extrusion process can be readily shared with third-party devices," he says. "Currently we communicate data over the Internet using Modbus TCP and our own MLAN TCP Protocol. We have also partnered with three OPC Server developers to provide all of our data to third-party devices via the OPC UA."

PHOTO: PIOVAN



Right: Piovan's Quantum batch blenders integrate with its Industry 4.0 compliant Winfactory 4.0 supervision system

Italy's **Piovan** is among the leaders in applying Industry 4.0 principles in plastics manufacturing. Its latest Quantum series of gravimetric batch blenders supports connection into the company's Winfactory 4.0 OPC-UA compliant smart factory supervision software or its latest materials handling control and monitoring system, FACS 4.0. Both solutions are designed to help plastics processors "transition from a traditional factory setup to one in which computers and automation provide comprehensive control and monitoring", the company says.

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PHOTO: COPERION

Right: Coperion's ServiceBox online monitoring system is installed on more than 800 compounding extruders

flexible system based on OPC-UA architecture. It is open, so equipment from any manufacturer can be connected with no need for any "translation" devices, and data exchange is immediate. FACS 4.0, meanwhile, is a two-wire system that works on a Windows platform to provide full control and monitoring of a Piovan material handling system, presenting data on a range of handheld devices.

Production control

Monitoring and predicting material usage can increase production efficiency. The **Coperion** Production Control Center (CPCC) monitors and controls single-line or multi-line compounding and plastic processing plants. The CPCC production planning tool handles order data, recipes, and raw material data to generate production jobs for the entire plant and helps optimise production schedules, according to Michael Volz, Head of Automation at Coperion. The CPCC can also be used as a gateway to a superordinate enterprise resource planning (ERP) system, allowing connection of a plant's data to a multi-site planning system. The system supports graphical and tabular reporting of operating and process data and can track material details for quality and legal reporting requirements.

Analysis of this data can help optimise production by providing information about the stability of a process or by helping identify causes of problems. In particular, a "fingerprint" of a plant can be created using reference data and then process data can be compared to this ideal, says Volz.

The CPCC also has a built-in maintenance tool for predictive maintenance. Coperion's other predictive maintenance tools include the Coperion ServiceBox, which supports online monitoring of equipment. "Since 2009, the ServiceBox has been installed in over 800 Coperion extruders worldwide, of which 60 are permanently monitored remotely by Coperion service staff. All Coperion extruders equipped with the ServiceBox can be monitored remotely for troubleshooting and/or maintenance purposes," says Joern Matzke, Head of Business Unit Service Compounding & Extrusion at Coperion.

A key to achieving some of the benefits of Industry 4.0 is enabling machines to communicate via the IIoT. New machines are being built with the technology to connect via the IIoT, says Matt Ramsdell, Customer Service Manager at **Entek**. Upgrading older machinery to allow IIoT connection, however, is a significant challenge. Currently, Entek offers an upgrade from manual controls to an automated programmable logic controller (PLC) and human-machine interface (HMI) that allows the user to trend, monitor, and store historical data to improve and streamline their processes.

"Connecting these controls to the IoT allows our customer to have remote monitoring of these systems and the ability to share data between plant sites. Real-time data from actual production results can be used to help make products more consistent between plant locations," says Ramsdell. Remote access can allow Entek to help troubleshoot equipment and process issues without having to send technicians to a site, thus keeping downtime to a minimum, he adds.

Predicting maintenance

Sensors are now being used to monitor compounding extruders and auxiliary equipment and indicate when maintenance is needed (covered in detail in the Maintaining Effective Production feature in last month's edition of *Compounding World*). This predictive maintenance improves efficiency because operators can be alerted to perform maintenance before equipment breaks down, and maintenance intervals can be adjusted to actual conditions.

Leistritz is supplying condition monitor sensors on new gear boxes as standard from this year. "Multiple sensors in the gear box measure different variables that describe its condition and indicate when maintenance is required and when oil should be changed," says Wolf. The sensors could also identify which gears and bearings are exhibiting vibration that indicates a problem or potential failure. Leistritz says it is developing sensors that

PHOTO: ENTEK

New production machinery is being produced with IIoT connectivity on board, says Entek

can be retrofitted to existing machines.

Another innovative sensor from the extruder manufacturer is a patented RFID chip that can be embedded into screw shafts to collect data about the work the screw has done using a "load factor" based on torque, pressure, and recipe. When the screw is changed, the extruder control system can read this load factor and identify whether maintenance or replacement is needed. "This technology was originally developed for pharmaceutical and medical applications, which require extensive documentation," explains Wolf. However, he says it could also prove beneficial for some plastics compounding extruders.

PHOTO: SHUTTERSTOCK

Industry 4.0 barriers

The growing awareness of Industry 4.0 capabilities and their benefits is leading to increased interest in the compounding industry. "Some of the measurement and control tools have been available for some time but there were few drivers for implementation in compounding. Now, companies are beginning to see the advantages and their customers are also asking them what they are doing in Industry 4.0," says Wolf.

However, there are challenges to be addressed. Standard interfaces that enable machines to communicate with each other are needed. OPC Unified Architecture (OPC UA) from the OPC Foundation is a platform-independent standard that many groups, including the Euromap European plastics and rubber machinery organisation and the German machinery association VDMA, are using for hardware interfaces.

Cybersecurity is also a legitimate concern, and

Above: There are still data protection and security issues to be addressed within the highly connected Industry 4.0 environment

PHOTO: SHUTTERSTOCK

Above: Knowing what data to collect will be a big challenge for compounders as they move to Industry 4.0 systems

safeguards need to be put in place to protect data so that it is shared as intended. Within the EU, upcoming data privacy regulations are creating uncertainty over the industrial data sharing that is a hallmark of Industry 4.0. Some are concerned that personal data, such as operator names, connected to equipment data could restrict sharing.

Future thinking

Despite the clear challenges, research into cutting-edge Industry 4.0 tools continues. At the **Linz Institute of Techology** (LIT) within the Johannes Kepler University (JKU) at Linz in Austria, the Institute for Polymer Extrusion and Compounding (IPEC) is bringing together industry and academia to investigate several Industry 4.0 concepts. One of the projects, PRO2Future, is equipping a sheet line in a technical lab with sensors that will record up to 700 data points while the line is running. Researchers will use this data to create a "digital twin" of the entire line, from the raw material input to (in the case of the sheet line) the winder. The digital twin is a model, based on actual process data, that simulates the process. Experiments can be run on the model to optimise recipes or processing conditions or to speed commissioning time.

Another project at JKU is its own LIT Factory, a pilot-scale operation conceived to develop and demonstrate the use of Industry 4.0 tools in plastic processes including extrusion, injection moulding, and recycling. Leistritz is one of the industrial partners in the project.

Institutes at **RWTH Aachen** have been collaborating on improving production systems for the past 14 years, but are now planning a new collaboration to research issues related to the "internet of production," says Hopmann. "What we call the 'internet of production' will be a socio-technical environment of interconnected machines and devices from all over the world that provide access to a huge amount of production data analysed in various ways. The digital shadow of a production system that is formed in this way, will thereby support both research and industry with smart data to generate reliable models of real production processes," he says.

The challenge for plastics compounding will be to generate process models and to identify the right data. "Data access is no longer the challenging aspect as we have plenty of sensors and systems monitoring every single condition change of a production system, but interpretation is," Hopmann says.

CLICK ON THE LINKS FOR MORE INFORMATION:

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NPE2018 to set new record

The US plastics industry will converge on Orlando in Florida this month for what will be the biggest ever NPE show. We take a look at some of the highlights for compounders

The big US plastics show, NPE2018, takes place on May 7-11 at the Orange County Convention Center (OCCC) in Orlando, Florida, and will extend over more floor area than ever before. The Plastics Industry Association, which organises the triennial event, said that 1.2m ft² (111,483m²) of exhibition floor space had been sold to 2,150 exhibitors by early April. This is 75,000 ft² (6,970m²) more than NPE2015, which was previously the most successful NPE event.

Projected attendance for NPE2018 is more than 65,000 people. Susan Krys, Vice President of Tradeshows and Marketing at the Plastics Industry Association, said: "We predict that this pre-show momentum will continue, making NPE2018: The Plastics Show one of the largest industry gatherings ever."

In addition to the machinery, materials and service supplier exhibits, the OCCC will also play host to seminars and conferences organised by, or running alongside, NPE2018. These events encompass industry-wide themes, such as at the Plastics Leadership Summit, as well as technology-focused events like Antec and seminars on 3D printing.

Unsurprisingly, recycling is a big theme for the 2018 event – the organisers have set a 100% waste diversion goal with Commercial Plastics Recycling running an on-site recycling service through the show. Visitors wanting to discover more on plastics recycling may also want to consider NPE2018's Re|focus Sustainability & Recycling Summit or two newly co-located events, the Agricultural Plastics Recycling Conference and Carpet America Recovery Effort.

The South Hall is the location for the Re|focus Summit and also the Re|focus Zone, which showcases the innovative equipment, materials and technology of 56 exhibitors, including: additives that increase purity in upcycling materials; innovations in bioplastics; increased use of chemical recycling; and emerging trends in solvent extraction.

NPE 2018 is going to be a big event so it makes sound sense to prepare for your visit. Over the next 19 pages we take a look at some of the innovations that may be of interest to polymer compounding visitors. ›

Main image: The Orange County Convention Centre will host the biggest ever NPE trade show this month

PHOTO: PLASTICS INDUSTRY ASSOCIATION

Right: NPE 2018 is on course to exceed the 2015 attendance, says organiser Plastics Industry Association

Albis Plastics will show its AlcomTCD PA6 5060 FR 16089 and Alcom TCD PA6 5070 FR 15021 WT thermally conductive and electrically insulating PA6-based compounds for applications requiring improved thermal management.

Albis says that the new materials significantly improve service life and efficiency in LED applications and meet UL94 V-0 flame retardant requirements. Two silver-grey metallic colours have been developed, which are suitable for thermally conductive decorative elements or as 'cool-touch' housing components.

Alperform LD and LDX-Batch are flexible and cost-effective solutions for light-diffusing colouring of polycarbonate and PMMA. They are said to enable quick and simple adaptation of optical properties to optimise transmission and light diffusion, increase light efficiency, and prevent hot spots. The company will also be introducing Alperform LB-Batch, a masterbatch for cost effective self-colouring of ABS and PC used in highly reflective and opaque components, including lamp housings and extrusion profiles for linear LED applications.

Sustainability will also be a theme on the Albis stand. The company will be showing its Altech Prime and Altech ECO recycled compounds, which are based on post-industrial feedstock and provide recycled content of up to 100%. It will also highlight several compounds based on recycled carbon fibre from CFRP production remnants from the automotive and aviation industries. The WIC PP and WIC PA products could replace relatively heavy glass fibre reinforced compounds with at up to a 30% weight reduction.

› **www.albis.com**

Below: Colloids will add new E-TEC compounds for demanding applications such as automotive engine parts

PHOTO: COLLOIDS

Americhem will display its full line of Ecap high-performance pre-colour capstock compounds, comprised of PVC, ASA and PE. The company says these product lines offer a mix of enhanced dimensional stability, good durability and aesthetic appeal, allowing customers to choose the best solution to suit their base resin preference.

Americhem says the Ecap products can also help improve impact performance, resistance to moisture whitening, scratch and mar resistance, adhesion to substrates, and potentially offer a Class A fire rating.

Americhem has also extended its range of antimicrobial functional additives to provide protection for PA, PE, PP, TPE, TPO, PVC and other polymers. The nShield range of products are said to be designed to suit various polymer chemistries, surface characteristics and processing requirements.

› **www.americhem.com**

Baerlocher will present several new additive products at the show, including what it describes as a one-for-one drop in replacement for phosphite stabilisers for use in polyolefins and other polymers where improved hydrolytic stability and polymer solubility is required.

Other new additions include a new calcium and zinc-based PVC stabilisation package that avoids the need for barium chemistries and a tin-free stabiliser system for use in vinyl tile core layers. The company will also show some new additions to its Baerolub single component lubricants and its lubricant one-packs for building profile applications.

Baerlocher will also provide more details of its move to globalise formulations for its Baeropol RST (Resin Stabilisation Technology) platform for polyolefins. The company says this will support regional sources of supply.

› **www.baerlocher.com**

Colloids, a subsidiary of Tosaf, will introduce two new compound and masterbatch product families into the US at NPE aimed at high performance applications in automotive, electrical & electronics,

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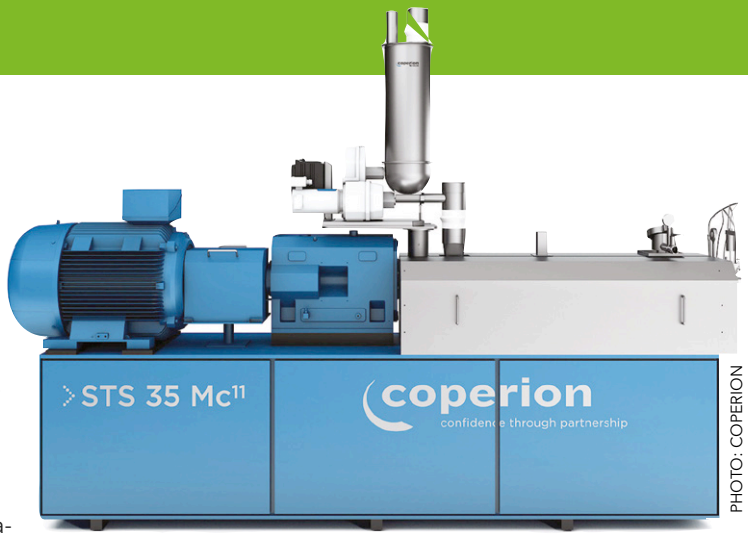


PHOTO: COPERION

Right: Coperion's STS 35Mc11 will be shown optimised for colour masterbatch production

and ESD packaging applications. The additions to the company's T-TEC lines cover high temperature resistance and permanent electrically dissipative performance.

The high-temperature masterbatches and compounds are intended for use in high performance amorphous and semi-crystalline engineering polymers requiring continuous operating temperatures above 150°C and multiple heat histories exceeding 350°C. Complementing the Colloids range of PACE engineering polymer masterbatches, the new high temperature masterbatch grades have been formulated using specially selected pigments and carrier systems based on PPS, PPSU, PPA and PEEK. They are available in standard blue, red, green, brown, grey or black, as well as in customer bespoke colours.

The permanently electrically conductive ESD additions to the E-TEC family includes 11 products offering surface resistivities from 1 x 10^9 to less than 10^3 Ohms square (according to ASTM D257 and IEC61340-2-3). The are said to be formulated to provide good mechanical and processing properties.

› **www.colloids.com**

Below: The SP 100 Pure strand pelletiser from Coperion

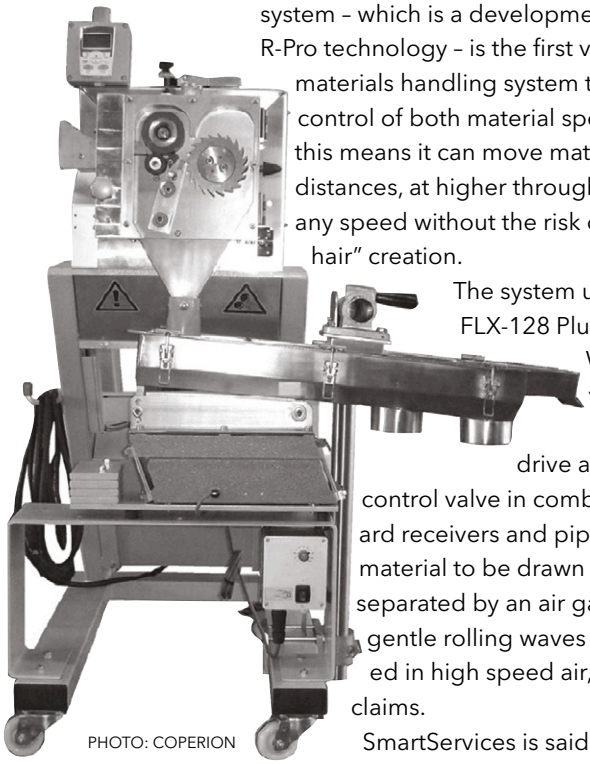


PHOTO: COPERION

Conair will unveil the latest update to its Wave Conveying technology and will launch a new Industry 4.0-based materials management, monitoring and visualisation technology marketed under the SmartServices name.

The company claims the Wave Conveying system – which is a development of the company's R-Pro technology – is the first vacuum-powered materials handling system to provide precise control of both material speed and flow. It says this means it can move materials over longer distances, at higher throughputs and at almost any speed without the risk of dust or "angel hair" creation.

The system uses Conair's FLX-128 Plus conveying control, Wave Conveying vacuum pump with variable-frequency drive and Wave Conveying control valve in combination with standard receivers and pipework. This allows material to be drawn in pulses, each separated by an air gap, and moved in gentle rolling waves rather than suspended in high speed air, the company claims.

SmartServices is said to combine equipment monitoring and visualisation with cloud-based storage and analytics. Conair says it is designed to provide new levels of process, performance and quality optimisation, along with predictive diagnostics and maintenance features to maximum equipment uptime.

The system uses wireless machine adaptors (WMAs) installed in the controller of each item of equipment that collect and transmit data to the cloud-based SmartServices database, where it is presented to the system user in a clear dashboard format allowing performance, status and alarms to be monitored.

› **www.conairgroup.com**

Coperion and **Coperion K-Tron** will show their latest innovations for the compounding industry, including a 35mm STS Mc11 twin screw extruder optimised for masterbatch production, an SP100 pure strand pelletiser, plus a new US-manufactured rotary valve and improved twin screw feeder.

Providing a specific torque of 11.3 Nm/cm^3 and screw speeds of up to 900 rpm, the STS Mc^{11} extruder has been optimised for colour masterbatch production and includes a number of new features that improve handling and ease of cleaning. These include a new base frame with integrated water manifold and wiring connections and a re-engineered extruder cover design that allow easy access to the process section while reducing dust contamination and providing a smoother surface for easier cleaning.

Barrel heater shells on the new model are fitted with insulation plates to minimise surface temperatures on the processing section while the feed barrel opening is equipped with a removable sleeve, which supports simple cleaning and quicker colour change-over. A tray has also been added to the vent port to collect any vent flow and the die head has been redesigned for faster cleaning between production runs.

The STS 35 Mc^{11} at the show will be fitted with a Coperion K-Tron K2-MV-T35 volumetric twin screw feeder, which is designed to provide economic and

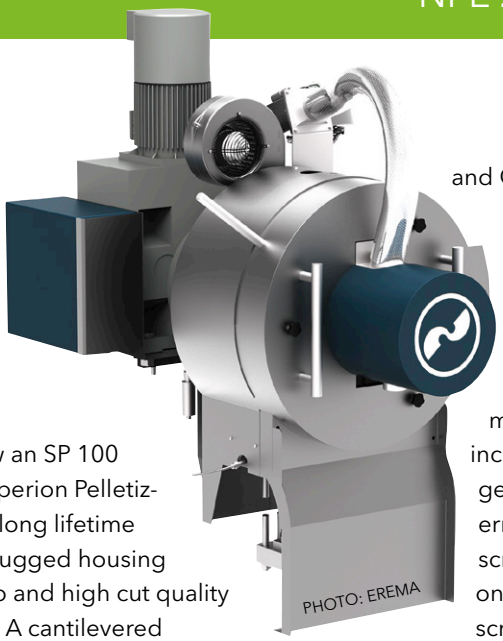


PHOTO: EREMA

Left: Erema's Powerfil division will show examples from its melt filter family, such as this Laserfilter

reliable metering of colour premix batches into the extruder feed opening. The T35 feeder can handle free flowing and very poor flowing powders as well as fibres, flakes and other bulk materials.

The company will also show an SP 100 Pure strand pelletiser from Coperion Pelletizing Technology. Designed for long lifetime operation, the unit features a rugged housing to provide a sturdy cutting gap and high cut quality over the whole working width. A cantilevered bearing design is said to offer easy access and quick cleaning while options include pellet length regulation, driven upper feed roll, cutting head cooling, and transfer signal to the extruder controller.

Coperion K-Tron will display a US-manufactured ZRD rotary valve. Produced at its facility at Salina in Kansas, local production will allow the company to offer US customers a faster delivery and improved support and repair. ZRD valves are engineered for heavy-duty discharging and conveying of powder and granular materials and support pressure differentials up to 1.5 bar(g) and temperatures up to 100°C (higher temperature options are available).

The company will also show its Mix-A-Lot mechanical bulk mixer. Designed for efficient, high speed homogenisation of materials, the mixer is available in three versions offering throughputs of up to 5 tonnes/h.

A BSP feeder will be demonstrated on the booth as part of a recirculating system with a 2415 receiver. It has been developed to provide gentle, precise feeding of free-flowing pellets, granules, and friable bulk materials and uses a simple rotating disc feed system to eliminate the need for screws, augers, belts or vibratory trays to convey the material. Three sizes are available, offering feed rates of 2 to 6,700 dm³/h.

› **www.coperion.com**

Entek will show a 33mm version of its QC³ twin-screw extruder design for the first time. The QC³ 33mm is designed for production of small-size compound batches and includes all the QC³ features established in the current 27mm, 43mm and 53mm versions – specifically Quick-Change, Quick-Clean, and Quality Control.

Entek says it has introduced the 33mm extruder to meet demand for a machine that can handle small lots but offers more output than the laboratory machine. New mechanical design features include: self-aligning screw-gearbox couplings for fast and error-proof installation of screws; lock-and-key features on splined shafts to prevent screw timing errors; gauges for quick monitoring of lube and cooling system running conditions; quick change strand die; robust and easily removable barrel shroud; and a tip wrench to remove tips with screws in the extruder.

Below: Coperion K-Tron is now making its ZRD rotary valve in the US

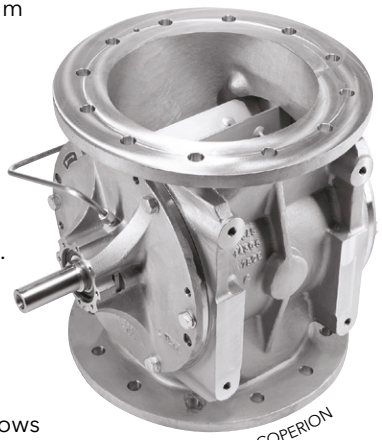


PHOTO: COPERION

The company will also show a 73mm version of its twin-screw extruder for high output custom compounding, such as bio-resin production, wood-plastic composites and large lots of colour compounds. The machine is available with a 600hp motor and offers screw speeds of up to 900 rpm.

Entek will highlight its screw design software with two interactive work stations allowing visitors to design screw and barrel layouts for specific applications. The software allows drag and drop functionality on all components that customers need to specify, such as barrel sections, screws and metallurgy. In addition, there is automatic calculation of remaining space on the screw shafts, as well as safeguards to prevent placement of certain elements where they do not belong.

› **www.entek.com**

Erema North America will highlight its systems for the recycling of post-consumer materials with a high degree of contamination – it recently added

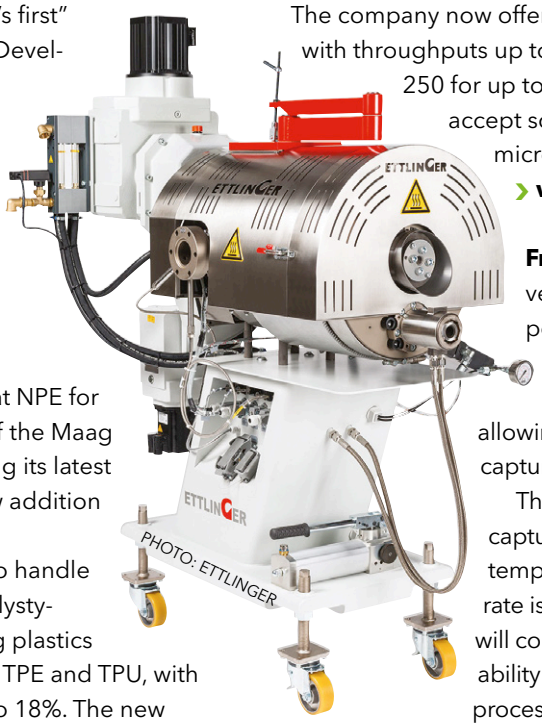
Below: Entek will show a 33mm QC³ compounder for the first time at NPE

PHOTO: ENTEK

an Intarema TVEplus with Laserfilter to its US Technical Centre – and will show its melt filters from business unit Powerfil. The latter are available as individual components for extrusion plants from other suppliers.

At the show, an Intarema T 1108 will be reprocessing clean LDPE production waste direct and without pre-shredding. In addition, Erema will provide details on its "world's first" rPET Inline Preform system. Developed with SIPA of Italy, the system is designed to provide a direct processing solution to make food-contact-compliant preforms from rPET flakes in a continuous process.

› **www.erema.com**



Right: An ERF series melt filter by Ettlinger

Ettlinger will be exhibiting at NPE for the first time as a member of the Maag group of companies, showing its latest ERF350 melt filter and a new addition to its ECO filter series.

ERF filters are designed to handle standard polyolefins and polystyrenes, as well as engineering plastics such as styrene copolymers, TPE and TPU, with contamination levels of up to 18%. The new ERF350 is an updated version offering near 30% increased filtration area with no increase in footprint. Depending on the level of contamination of the melt and the screen size used it can deliver a maximum throughput of 3,750 kg/h.

Ettlinger has sold close to 400 ERF Series melt filters since the design was introduced in 2004 and says the US recycling industry is proving a good market, especially for its top of the range ERF 500 model that offers throughputs of up to 6,000 kg/h. It has already sold 14 of these units in the US.

While the ERF filter is designed to handle heavily contaminated resins, Ettlinger's ECO Series filters target easy flowing materials such as PET or PA with contaminant levels of less than 1.5%. The units are said to be proving popular in production lines for PET strapping and thermoforming sheet. The company now offers two models: the ECO 200 with throughputs up to 1,750 kg/h and the ECO 250 for up to 3,000 kg/h. Both can accept screens from 80 to 1,000 microns.

› **www.ettlinger.com**

Frigel will launch the latest version of its Microgel portable temperature control units, which now incorporate digital controls allowing the user to continuously capture energy consumption data.

The company says the ability to capture energy data in addition to temperature, pressure and flow rate is a first for a portable unit and will considerably enhance users' ability to fine tune the production processes and to optimise energy use. Data is stored in a historical log file and is easily accessible via a touchscreen.

Other Frigel equipment on display includes a Microgel combination chiller. The temperature control units are equipped with energy saving variable speed drives and available for seamless integration with a cooling tower and an Ecodry closed loop adiabatic central cooling system with optional BWR water recovery (the latter captures all unevaporated water to reduce operating cost).

› **www.frigel.com**

Right: Frigel's Microgel units now feature standard digital control and energy monitoring

Gneuss will show several updated models from its range of Rotary Filtration Systems. Key developments include modified screen changer housings that permit operation on a wider range of applications at higher pressures, enlarged active filtration areas, and further standardisation of components and modules to shorten delivery lead times and lower cost.

The company's premium RSFgenius filter includes integrated self cleaning and is designed for very demanding applications and quality requirements with filtration below 10 microns/1200 mesh available. An RSFgenius 150 with an active filtration area of 70 square inches will be exhibited

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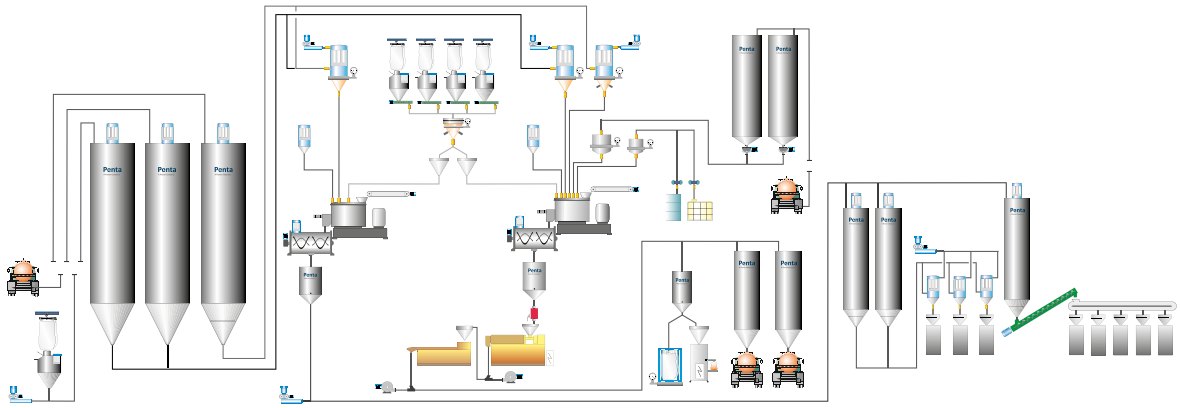

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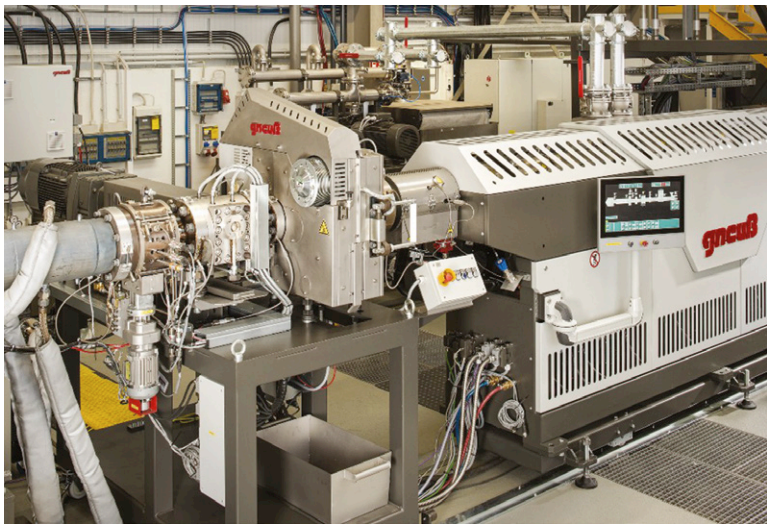
PHOTO: GNEUSS



Above: An RSFgenius filter is being shown by Gneuss on a 150 MRS extrusion system

at NPE as part of a recycling system built around one of the company's MRS extruders. Two other RSFgenius units in different sizes will also be on display.

The company will also show an SFXmagnus filter with an active filtration area of 23 square inches. These units are designed for automatic operation and are characterised by an extra large active screen surface area and compact design. And Gneuss will exhibit a KF 150 continuous screen changer with an active screen area of 28 square inches.

› **www.gneuss.de**

Kraiburg-TPE, which recently expanded capacity at its US plant at Buford in Georgia from 6,000 to 10,000 tonnes/y, will show several new additions to its range including its AD/EPDM/UV product line, which are formulated for automotive exterior applications such as seals where adhesion to EPDM is required.

AD/EPDM/UV grades are characterised by low processing temperatures and exhibit minimal bleeding and colour stability when exposed to elevated temperatures and UV radiation. Good adhesion is achieved during the moulding process, which allows reliable ejection of in composite glass channel guide production, and the materials can be readily flocked.

The company will also show its VS/AD/HM series of TPEs for consumer electronics applications requiring adhesion to PC, ABS, PC/ABS, PU, ASA, SAN, PA12 and PA6. Available in black or natural, the materials offer a silky smooth satin finish and good resistance to skin oils, creams and common household detergents. Other products on the stand include the FC/HT range of transparent TPEs designed for seal applications requiring adhesion to PP.

› **www.kraiburg-tpe.com**

KraussMaffei Berstorff will demonstrate direct production of PE colour masterbatches on a ZE 28 BluePower twin-screw extruder, which will be equipped with a 46D screw and both liquid and solids metering systems.

The company says colour masterbatches are usually based on mono-concentrates produced on single-screw extruders, stored and then fed into a twin-screw extruder in a second process step. This intermediate mono-concentrate step can be eliminated using liquid colour compounding technology. The resulting colour masterbatches are claimed to be produced cost-effectively and to provide good colour precision. The company says that the twin-screw extruder's self-cleaning function means that changes from dark to bright colours can be made easily, while recipes can be stored in the units Process Control Advanced system.

The company will also show its ZE 28 BluePower laboratory extruder, a flexible twin-screw extruder that is well suited for research and development applications as well as small-batch production. All extruders in the ZE BluePower series feature an OD/ID ratio of 1.65, specific torque from 13.6-16 Nm/cm^3, high drive power, and are rated for speeds from 900-1,200 rpm. The extruders use higher torque oval liners for increased free volume, improved side feeders and degassing units, as well as an optional energy management tool. The 4D and 6D barrel sections can be combined with a large range of modular screw elements to create bespoke machinery configurations for any application.

› **www.kraussmaffeiberstorff.com**

Kreyenborg will show its IR-Clean and PET-Booster systems in Orlando, both of which exploit the energy-saving potential of its infrared IRD drying technology.

IR-Clean is a vacuum-free low cost option for

PHOTO: KRAUSSMAFFEI BERSTORFF

Right: KraussMaffei Berstorff will demonstrate this line for direct colour masterbatch production with liquid colorants

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Right: Leistritz will show a purpose designed system for direct production of 3D print filaments

decontamination of recycled PET flake materials that uses the high temperature and continuous exchange of surface of the IRD technology to remove volatiles. EFSA-approved and covered by a US FDA Letter of Non-Objection, the system is suitable for use with any extrusion line and is said to be particularly suitable for retrofit applications.

The company's PET-Booster system is targeted at PET sheet, film and fibre production and is claimed to dry and crystallise PET within 7-10 minutes.

› **www.kreyenborg.com**

Lehvoss North America will introduce Luvocom 1114, a high performance PEEK compound designed to provide good tribological and thermal performance. The company says the wear and friction characteristics for the new grade exhibit a low and particularly uniform curve up to 165°C (329°F), as well as an elevated heat deflection temperature.

Luvocom 3F is the company's latest offering for extrusion-based 3D printing processes, including fused filament fabrication. The product line is dedicated to easy 3D printing and the polymers are said to offer improved layer bonding and enhanced printability. The company claims parts printed using the compounds are consistent with injectin moulded alternatives.

Lehvoss will also show its Luvobatch PA BA 1001/1002 endothermic blowing agent for reinforced polyamides. It says that glass, carbon fibre and mineral reinforced PA compounds are becoming increasingly important in weight reduction applications. By using its blowing agent, density of the materials can be reduced by up to 30% with minimal loss of mechanical properties. The blowing agent helps avoid sink marks and

Below: This ZE50 MAXX extruder with extended barrel and dual feeders will be shown at the Leistritz booth

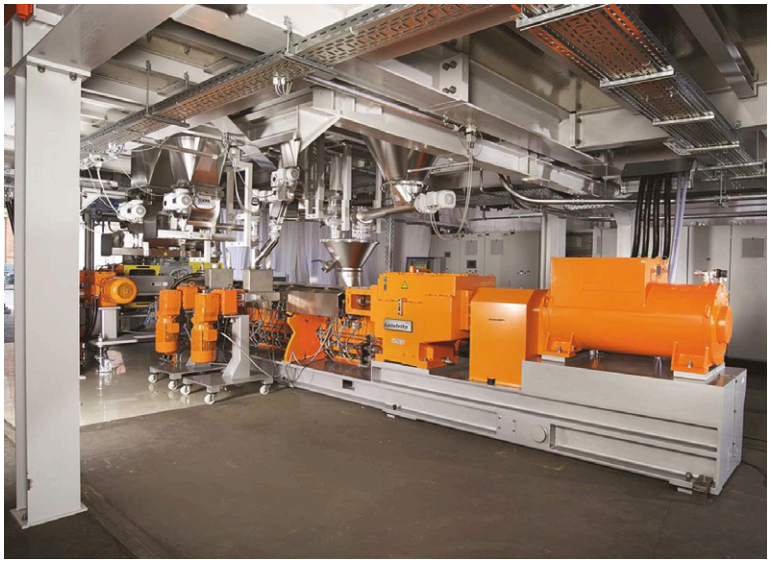

PHOTO: LEISTRITZ

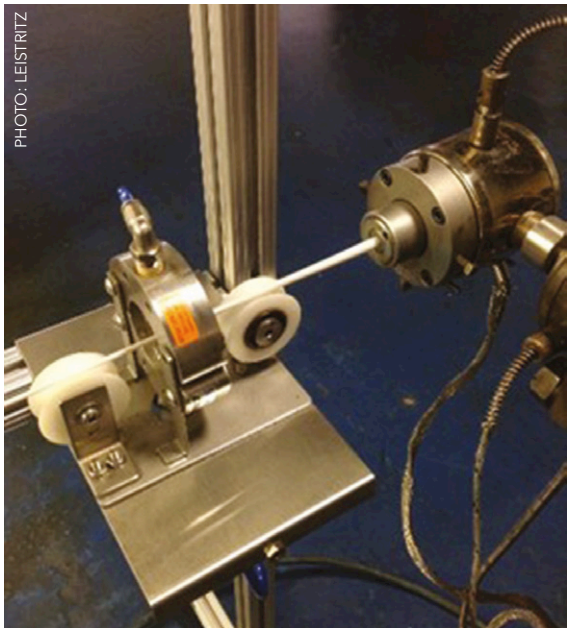

PHOTO: LEISTRITZ

contraction cavities. Used as a carrier system, it can reduce or prevent the delamination in components subject to high mechanical stress that may arise during the addition of masterbatch based on polyethylene or universal carriers.

› **www.luvocom.com**

Leistritz will show two new compounding extrusion lines – including a purpose-designed 3Dprint filament system – and will introduce its new inline rheometer.

The ZSE 18 3D filament system is built around a ZSE18 twin screw extruder equipped with loss-in-weight feeders, gear pump, die, custom air-rack for cooling and sizing of the filament, belt puller, laser gauge and winder. Rated for operation up to 425°C, the system can handle throughputs of up to 20 kg/h and has been developed with product development in mind – it offers "on-the-fly" recipe modification for rapid sampling. The system shown at NPE will be available for customer trials at the Leistritz facility at Somerville in New Jersey.

Also on display will be a ZE50 MAXX twin screw unit with an extended modular barrel and screw enclosed in an insulated cover. The extended processing unit allows multiple downstream operations to be carried out including multi-stage venting, liquid injection and the incorporation of up to two of the company's LSB 50 XX side stuffers for introduction of fillers or fibre reinforcements into the melt stream (LSB XX units offer a segmented screw design for maximum feeding flexibility, standard screw and barrel cooling and heating and the option of internal screw cooling). Suitable for a wide range of compounding duties, the ZSE 50 MAXX can be equipped with a 600 HP AC motor

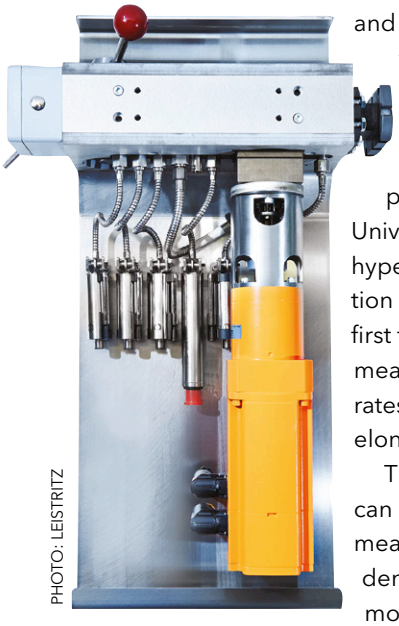

PHOTO: LEISTRITZ

Above: Leistritz's elongational rheometer is suitable for off-line or in-line measurement

and offers a maximum throughput of more than 1,000 kg/h at 1,200 rpm screw speed.

Leistritz will also show its inline elongational rheometer. Developed in partnership with the Johannes Keppler University in Austria, this uses a patented hyperbolic narrowing die that allows generation of constant elongational flow (said to be first for an online device). It can provide measurement of shear viscosity and shear rates in the range from 10 to 10,000s^{-1} and elongational rates in the range 5 to 75s^{-1}.

The company claims that the instrument can rapidly determine viscosity curves and measure melt flow index, IV value and melt density, allowing it to be used as a tool to monitor reactive processing techniques. It is available as a standalone device for offline use or as an integrated system for use with Leistritz or alternative extruders.

› **www.leistritz.com**

Linde will launch a new physical foaming process for production of injection moulded parts without the need for any machinery modifications or retrofit equipment. The company says that its Plastimun Foam Injection Molding process impregnates the plastic granules with CO_2 in a proprietary unit before they are introduced to the moulding machine. It sees the technology as a rival for other physical foam injection moulding processes in production of lightweight automotive and white goods components, as well as an alternative to chemically blown foaming techniques.

› **www.lindeus.com**

Right: Maguire will launch its MMT micro tower blending and feeding system in Orlando

Maag Americas will show a full range of gear pumps, screen changers, pellet dryers and pelletisers in Orlando, as well as a new modular extrusion cart. The latter uses a tripod rather than a traditional four-wheel design to save space and is engineered to handle the four most common extrusion pump models. The customer only has to change the adaptor plate to fit a larger pump or gearbox. It will be shown with an Extrex x^6 series gear pump.

The pelletiser line-up includes a Gala-Automatik EAC-7 Pearlo underwater model, which is available for throughputs up to 36 tonnes/h. Gala-Automatik will also show a Model 420 Cyclo centrifugal dryer, an energy efficient unit designed for use with Pearlo and the company's M-USG and P-USG series underwater strand pelletisers.

Dry cut pelletisers will be represented by a Maag Primo E model, a compact unit for production of high quality pellets, and an RES Bullet 64. The latter features tool-free removal of feed and discharge shutes to provide fast job changeover and easy cleaning. It is suitable for both lab and production applications.

Other RES equipment on display will include a Chameleon colour mixer. Rated at throughputs of up to 900 kg/h, it is said to provide a highly cost effective alternative to current mixing solutions, offering a compact footprint and optional jacketed vessel. The Chameleon combines well with the company's REX Duo pulverising unit, which will also be on display.

The Maag display will be completed with an FSC plate screen changer. Designed for reliable and leak-free operation, this hydraulically-operated unit is equipped with a pressure adaptive sealing technology to minimise the risk of melt leakage.

› **www.maag.com**

PHOTO: MAAG

Right: Maag will show examples from across its pump, pelletiser and screenchanger range

Maguire will introduce its new compact MMT Micro Tower unit, which is designed for small volume processing and combines loading, dosing, mixing and dispensing functions.

The MMT Micro Tower can mix up to three materials, such as virgin resin, regrind, and additive or masterbatch, in 4.5 kg batches and offers a throughput of up to 45 kg/h. The compact unit is

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PHOTO: MILLIKEN

Above: Milliken will show a new addition to its Hyperform HPN family of PP nucleators

designed to mount at the throat of the processing machine. The loader and three material hoppers operate on a loss-in-weight basis.

No floor space is required for a vacuum pump; the unit features a blower driven by a lightweight brushless motor. Filters are cleaned using Maguire's proprietary dust-clearing blow-back system.

Maguire will also show a new intermediate-sized addition to its vacuum resin dryer range. The VBD-600 dryer offers throughputs of up to 275 kg/h and will be equipped with a new controller that monitors energy consumption and enables processors to track consumption over time. VBD dryers are claimed to consume up to 80% less energy than a desiccant type and to dry resin in one sixth of the time.

› **www.maguire.com**

Right: Nordson's BKG HiCut cutter hub is claimed to provide increased output

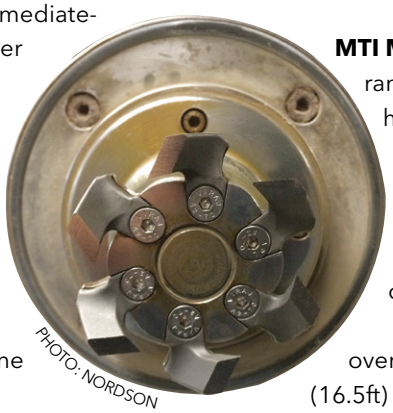


PHOTO: NORDSON

Milliken will showcase NX UltraClear PP, a PP clarified with its Millad NX 8000 to enhance aesthetics and clarity. The company says the clarifier also encourages broader use of PP through higher temperature resistance, light weight and easy recyclability.

The company will also be introducing a new addition to its Hyperform HPN nucleator family. It says that the performance modifier improves the impact resistance and melt flow properties of PP impact copolymers, enhancing strength and support to maximise stiffness and enabling thinner gauges.

Milliken's other Hyperform HPN nucleating agents for PP and PE will also be showcased. These materials are claimed to provide a good balance of impact resistance and stiffness performance, as well as improved shrinkage control to reduce warpage. ClearShield UV absorbers for PET will also be highlighted on the booth. These are claimed to provide good UV protection and improved colour stability to extend the shelf life of foods and beverages, personal care products and household cleaners.

› **www.milliken.com**

Right: MTI will show a Flex-line type M2000/K8000 mixer

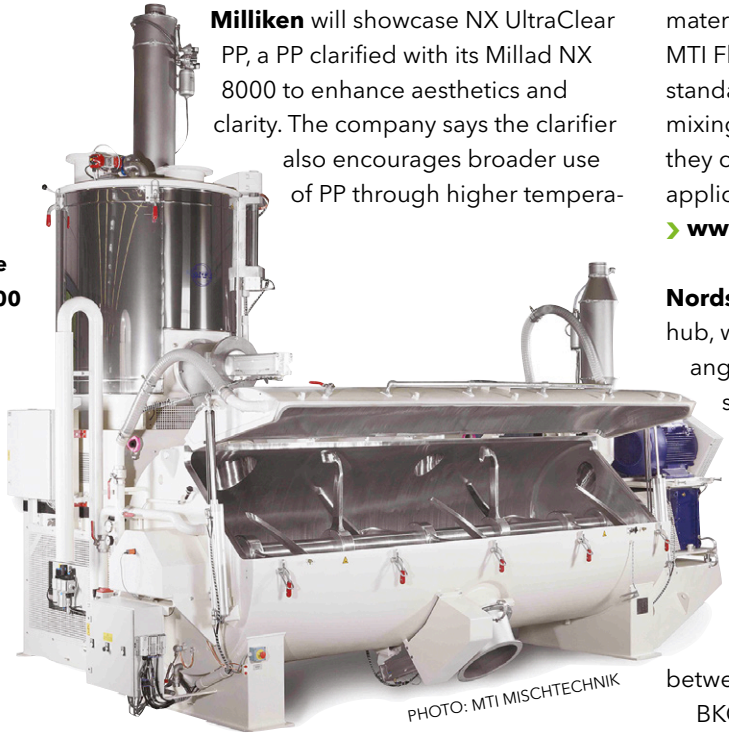


PHOTO: MTI MISCHTECHNIK

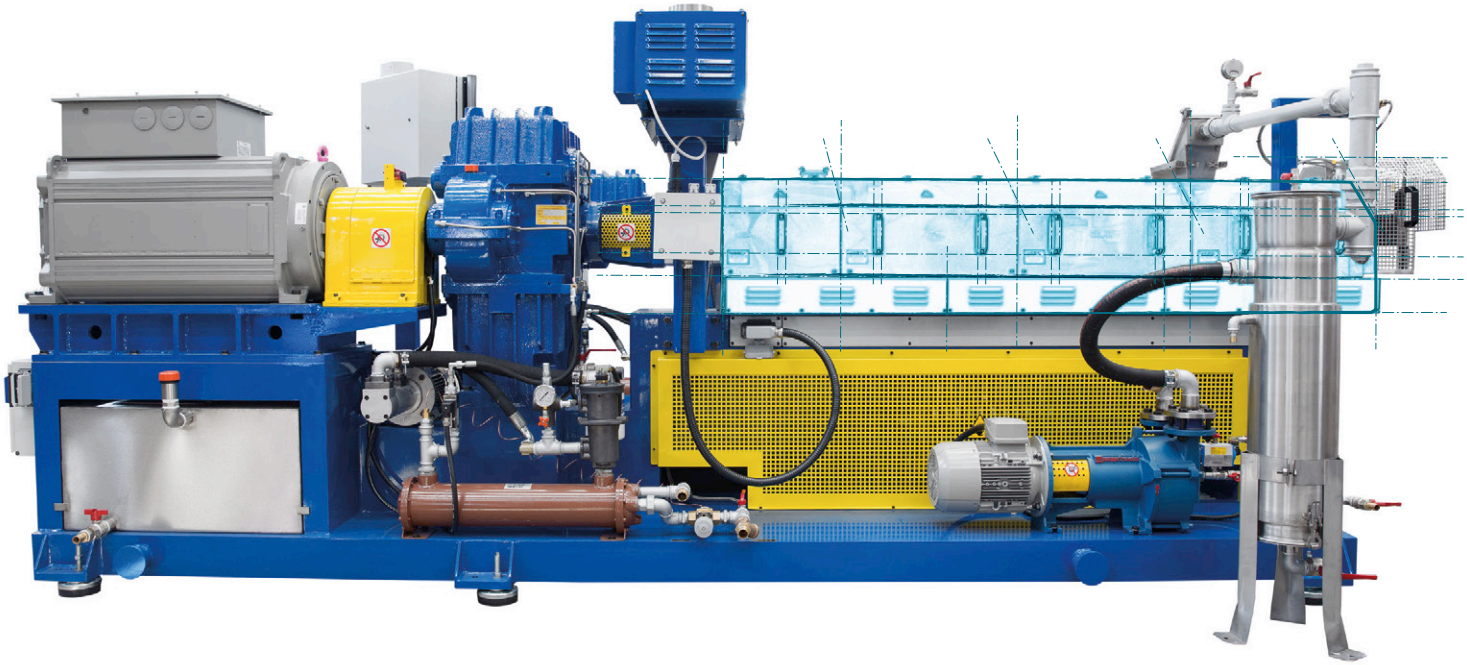
MTI Mischtechnik will present its range of container-type, vertical, horizontal, cooling, and heating/cooling mixers, including a heating/cooling mixer combination MTI Flex-line type M2000/K8000 that provides 8,000 litres of cooling vessel capacity.

The M2000/K8000 measures over 7m (23ft) in length and 5m (16.5ft) in height and is rated for a typical batch volume of 950kg (2,100 lbs). It can provide more than 7,500kg (16,600 lbs) of mixed material per hour. The company says that, like all MTI Flex-line mixers, the machine provides a high standard of mixing quality even with exacting mixing tasks. Designed on a modular principle, they can be individually configured for almost any application.

› **www.mti-mixer.de**

Nordson will demonstrate the BKG HiCut cutter hub, which can accommodate up to 100% more angled blades per hub and up to 54% more straight blades. This makes it possible to increase throughput or reduce pelletiser rpm, which decreases wear to the die plate and blades, the company says.

Blades on the BKG HiCut cutter hubs have round edges and smooth surfaces with countersunk screws to optimise flow and reduce swirling. There is also more space between the blades so pellets do not accumulate. BKG HiCut designs are compatible with all



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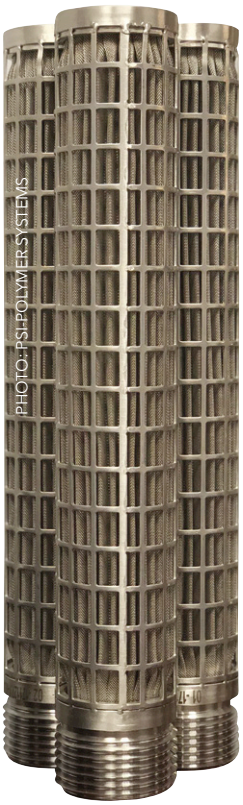
PHOTO: PSI-POLYMER SYSTEMS

Right: New from PSI is the ILF-55 in line filtration system

existing pelletiser systems. For some products, the increased throughput achievable with the new design makes it possible to invest in a smaller pelletiser, saving costs.

› **www.nordson.com**

PSI-Polymer Systems will launch its ILF-55 in-line filtration system, a discontinuous, high capacity filter that is intended for long batch production runs where the extrusion process cannot be disturbed and where uncompromised ultra-high filtration levels must be continuously maintained.

ILF filters are typically used where screen changers are either too large for the application or otherwise cannot satisfy the filtration level requirement without incurring an unacceptable pressure drop. They feature a canister housing into which the filter pod assemblies are inserted. Vessel size and filtration media are selected to minimise pressure drop for optimal flow and run time.

ILF vessels can be fixed in-line or interchangeable and are supplied with three or seven filter tubes. The interchangeable vessel option accommodates quick changeovers. Polymers typically processed include ABS, cellulose, EVA, HMA, PE, PE-X, PET, PETG, PA, PP and PS.

Below: PSI will introduce its Vessel Gear Pump for throughputs of up to 9,000 kg/h

The company will also introduce its Vessel Gear Pump (VGP), intended for use beneath polymer reactor/devolatilisation vessels or after large twin screw compounding extruders to discharge a steady volumetric output direct to the pelletiser. VGP series models are available for rates to 20,000 lbs/h (9,072 kg/h). The high efficiency pumps generate high discharge pressures while accommodating low-pressure infeed of high and low viscosity materials.

› **www.psi-polymersystems.com**

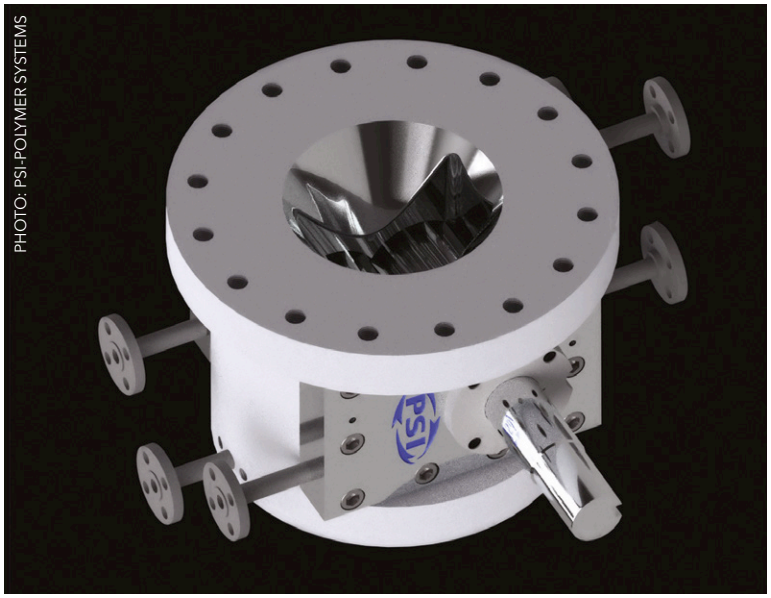
PHOTO: PSI-POLYMER SYSTEMS

RTP Company will showcase product samples and an assortment of real-world applications created from its engineered thermoplastics, with carbon fibre reinforced, high temperature resistant and abrasion resistant grades topping the list.

The Carbon Fiber Compounds products are lighter, stiffer, and stronger than glass-filled alternatives, providing a lightweight alternative to both metal and glass reinforced plastic materials without sacrificing strength or performance. Its High Temperature Solutions family offers improved performance at elevated temperatures, including retention of physical properties, chemical resistance, and dimensional stability for autoclaving, reflow soldering and high continuous use applications.

The Abrasion Resistant Alloys line is said to offer abrasion resistance comparable to UHMWPE but in an injection molding grade. Abrasion Resistant Alloys can be supplied with different secondary additive combinations to provide additional functionality such as wear and friction resistance, flame retardancy, and conductivity.

› **www.rtpcompany.com**

SABIC will display its Thermocomp AM family of eight high-performance materials designed for large format additive manufacturing applications. Reinforced with carbon or glass fibre, the new compounds are based on four amorphous resins - ABS, PPE, PC and PEI – and are intended for demanding applications in the tooling, aerospace, automotive and defence industries.

The company will also show its Noryl glass-reinforced polyphenylene ether (PPE) resin for building and construction applications, Flowpact PP copolymer range for packaging production, and Lexan CXT high-clarity, high-PC copolymer for injection moulding applications.

› **www.sabic.com**

SACO AEI Polymers will be showing examples from its extensive range of wire and cable compounds and introducing some new additions to its

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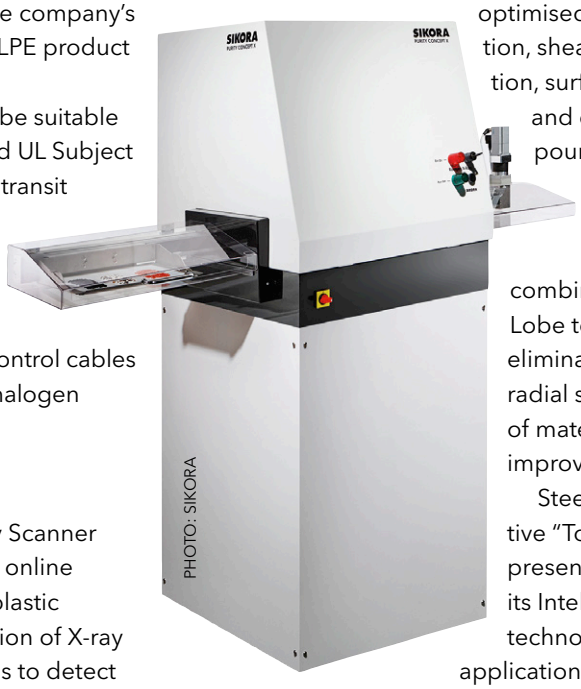
low smoke zero halogen product line.

Thermodan HF HF TP343NT is a high performance low smoke halogen-free cable jacket compound that meets the requirements of UL 444 Copper Media Communication Cables; Category 5e and 6 and passes the UL 1666 Riser Flame Test over conventional 4 pair HDPE insulations at a 22-mil jacket wall. The grade also meets the new European CPR B2 classification for fibre optic cable jacketing. It is natural in colour, UV resistant, and is certified 'Halogen Free' by UL to UL2885.

The latest addition to the company's moisture-curing Pexidan XLPE product line is HF S/CUV

System, which is said to be suitable for UL 1277 tray control and UL Subject 13 instrumentation cables, transit systems; thermoset fibre optic cables for CPR and hazardous environments; offshore oil platforms and substation control cables requiring low smoke zero halogen technology.

› **www.sacoaei.com**



Right: Sikora's Purity Concept system provides 100% pellet inspection

Sikora will exhibit its Purity Scanner Advanced, which provides online inspection and sorting of plastic granules using a combination of X-ray and optical camera systems to detect contamination on the surface as well as the interior of plastic pellets. Contaminated pellets are automatically sorted out and can be classified depending on the type of contamination and application.

For smaller material throughputs, and for applications where sampling analysis or incoming goods inspection are sufficient, the company also offers the Purity Concept System. These can be equipped with X-ray technology, optical cameras or infrared sensors and can detect contamination in pellets and flakes.

› **www.sikora.net**

Starlinger will demonstrate its odour neutralising technology for plastics recycling. The three-step procedure - material preparation, degassing and post-treatment - works without the use of additives and removes even deeply embedded odours, according to the company.

The company will also highlight its latest technology for rPET sheet production. The Viscotec deCON/viscoSHEET can process 100% rPET in-house waste and virgin material at guaranteed IV levels. Suitable for direct food contact applications, benefits include good flexibility and low energy consumption.

› **www.starlinger.com**

Steer will display its Omega Fractional Lobe Processor at the show, the latest version of its co-rotating twin screw compounder designed for demanding mixing and reactive processing techniques.

According to the company, the machine can be optimised to perform devolatilisation, shear, compression, elongation, surface renewal, distribution and dispersion of the compoundin ingredients, either alone with minimal interfering effects from other actions or in combination. The Fractional Lobe technology is said to eliminate hot zones and meta-radial shear, minimising the risk of material degradation and improving process control.

Steer will also use an interactive "Touch and Tell" system to present the benefits offered by its Intelligent Compounding technology in 20 different applications, including filler, additive, black, white and colour masterbatch, pearlescent pigments, recycled polymers, flame retardants and long fibre reinforced thermoplastics.

› **www.steerworld.com**

Struktol will introduce its expanded line of additives for reuse/recycled plastics and polymer compounds that contain recycled content. The company says that its products are suitable for a variety of different resin systems from polyolefins to engineered plastics, offering greater processing efficiency and enhanced performance.

For engineering plastics, Struktol offers multiple products that combine a compatibiliser with lubricants to create a combination that aids in incorporation of fillers (mineral or glass) with improved mixing and flow properties as well as mould release. The company says that these products result in better processing, improved surface quality, and in some cases, better physical properties.

Struktol TR 229 is for use in both polycarbonate (PC) and PC/acrylonitrile-butadiene-styrene (ABS) blends as well as PA 6 and 6,6 compounds. Struktol

TR 219 has applications in PA 6 and 6,6 compounds and has been found to be effective in polyester (PET and PBT) compounds, especially in recycled or recyclate-containing applications or in cases where the polyester compound is contaminated with other plastics.

For recycled polypropylene, Struktol RP 23 is a new multi-functional package that incorporates vis-breaking technology with lubricant and mould release functionality. This product expands the current line of products, which includes RP 11 and RP 38 (the latter provides viscosity modification and lubrication in recycled PP compounds containing moderate to high levels of PE contamination).

Other products on show include Struktol TR 251, a combination product that includes both surfactant and lubricant technology for enhanced functionality in polyolefins and engineered plastics, and Struktol TR 052 compatibiliser and blending aid.

› **www.struktol.com**

Teknor Apex will introduce two new lines of PVC compounds, including a range that complies with the new California Proposition 65, and an line of TPEs for injection syringe plunger applications.

Aimed at the building industry, the Apex 2324A2 Series PVC compounds are formulated to comply with the California Proposition 65 ingredients list without sacrificing performance in either indoor or outdoor applications. The family of eight compounds covers the Shore A hardness range from 55 to 90. The opaque grades are said to process well by extrusion over a wide temperature range and in some cases are suitable for co-extrusion with rigid PVC.

The Apex 1523-LG Series compounds are low gloss flexible PVC injection moulding grades developed for automotive window encapsulation where they provide a good cosmetic match to EPDM while retaining PVC's cost-performance benefits. According to Teknor Apex, the lowest SPI gloss levels for standard PVC compounds used for window encapsulation are in the 9 to 12 range and are achieved through etching or sandblasting of the tool surface; Apex 1523-LG Series compounds achieve a gloss level in the 3 to 4 range with no tool surface treatment (and hence less ongoing tooling maintenance costs).

PHOTO: TEKNOR APEX

Above: Teknor Apex will launch a new range of TPEs for syringe stoppers

In the medical sector, the company says its latest Medalist TPEs provide better sliding performance against glass and plastic syringe bodies, are less costly to mould than commonly used rubbers, and provide the opportunity to simplify manufacturing thorugh techniques such as overmoulding.

Stoppers moulded from the new Medalist TPEs display consistent piston release and travel force due to their low coefficient of friction. The compounds can be overmoulded onto PP, as well as engineering resins including polycarbonate, ABS, PC/ABS, acrylic, acetal, PBT, and COPE. Unlike most TPVs, Medalist TPEs do not require pre-drying, says the company.

› **www.teknorapex.com**

PHOTO: TEKNOR APEX

Above: Apex 1523-LG PVC from Teknor Apex is intended for window glass encapsulation

Tolsa will highlight new technical developments in its Adins range of high-performance flame retardant synergists. The additives are based on natural silicates, offering tailored performance benefits and making it possible to replace part of a high-loaded flame retardant system to provide better processability.

Adins Clay works with standard wire and cable formulations based on halogen and halogen-free solutions. The company says that the synergists have demonstrated good efficiency in HFFR systems based on EVA/PE and ATH and/or magne-

PHOTO: TOLSA

Left: Tolsa will present the latest additions to its Adins flame retardant synergists for wire and cable

sium hydroxide (MDH). In recent developments, Tolsa says the additives can now offer benefits in other base polymers including rubbers and silicones, broadening their field of application.

Tolsa is also currently developing additives for use in chlorinated polyethylene (CPE). Preliminary studies have shown good fire retardancy performance and reduced smoke production and ATO content, the company says.

› **www.tolsa.com**

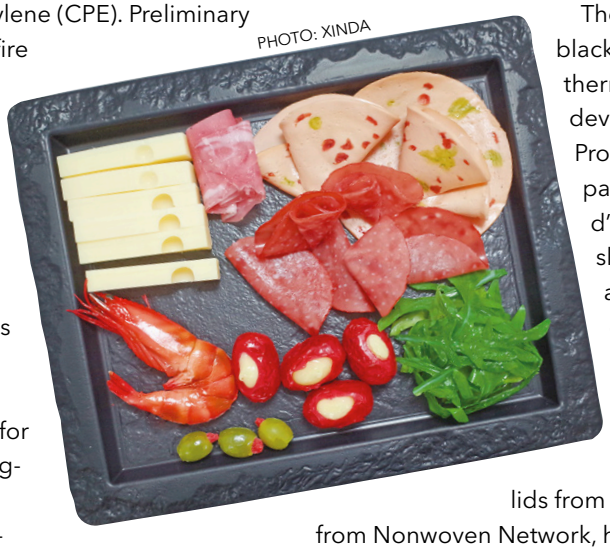


PHOTO: XINDA

Left: Total-Corbion display includes this PLA food tray by Pack & Proper

Tosaf will present examples from its full range of compounds and additive and colour masterbatches for applications such as packaging, agriculture, sports & leisure and building & construction. Among the latest additions to the range are a new anti-fog barrier masterbatch for film and packaging, a highly chemical resistant UV masterbatch for agricultural films, a halogen-free flame retardant (HFFR) masterbatch for construction products, a matt-finish product with a low seal initiation temperature for BOPP films, and a white masterbatch for extrusion coating. The company has also extended its line of special effect colour masterbatches.

› **www.tosaf.com**

Total-Corbion, which is on track to start up a 75,000 tonnes/yr PLA production plant in Thailand later this year, will exhibit a collection of products produced using its Luminy standard and high heat resistant PLA polymers.

The main feature will be a black coloured disposable thermoformed platter developed by Pack & Proper for presentation packaging of hors d'ouevres. It provides a slate-like premium appearance. Other PLA examples on display include coffee capsules for Nespresso machines from ATI, take-away coffee cup lids from WinGram, tea bags from Nonwoven Network, heat stable IBM bottles from ERT, and thermoformed thin-wall single-use coffee cups from Pack & Proper. The company will be demonstrating the heat resistance of its latest PLA grades throughout each day by serving visitors with a fresh coffee dispensed into a PLA-lined paper cup, part of EcNow's Earth Smart range.

› **www.total-corbion.com**

Below: Zwick will present a full range of materials testing equipment

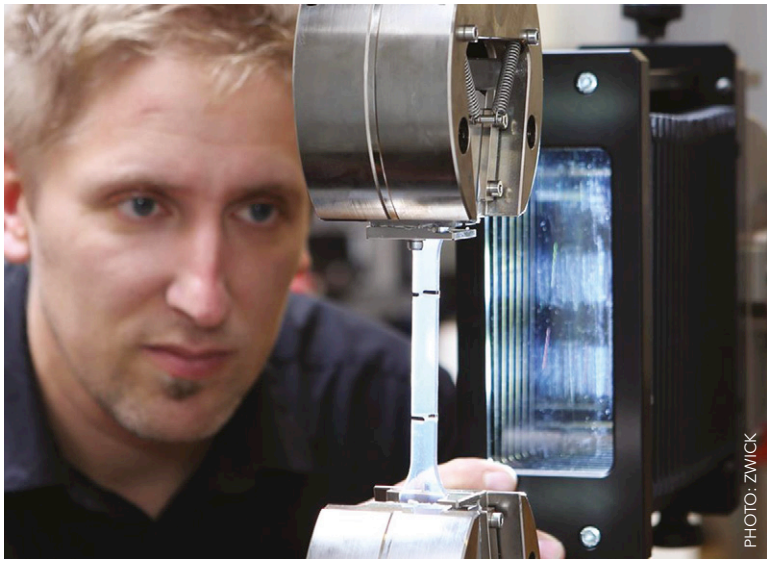


PHOTO: ZWICK

Zwick USA will display a complete range of plastics testing equipment and software at NPE, including its testXpert III workflow software for managing test procedures. Equipment on show will include a 10 kN AllroundLine universal testing machine, Aflow and Mflow melt flow indexers, a 5.5J pendulum impact tester, and a ZwickiLine testing machine.

AllroundLine testing machines are designed to deliver flexibility and to simplify test protocol management. Features include dual test areas, which reduces changeover times between tests and makes it possible to use one machine instead of two in many laboratory applications.

Melt flow index testing equipment includes the Mflow, which features a modular design and supports determination of melt mass and melt volume flow rate, and the Aflow fully automatic instrument.

› **www.zwick.com**

NPE 2018 – Key Information

Dates: May 7-11, 2018 **Website:** www.npe.org **Organiser:** Plastics Industry Association
Venue: Orange County Convention Center, Orlando, Florida, USA **Opening Hours:** 09:00-17:00
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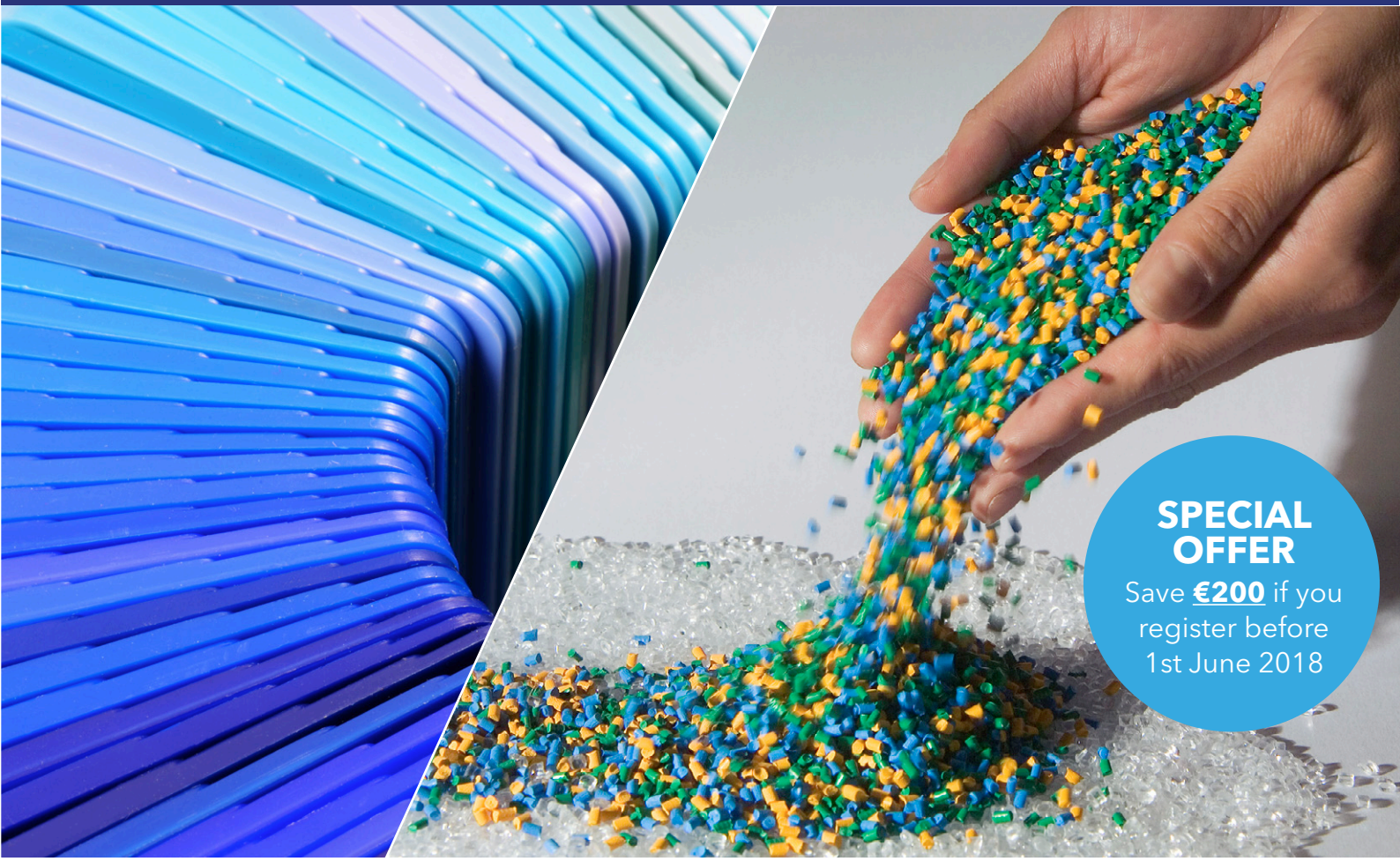

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Whether to manage mixed waste streams or to develop innovative polymer blends, compatibilisation is set to be a key future technology. Peter Mapleston reports

Main image: Realising the circular economy will likely mean dealing with mixed polymer streams. Compatibilisation could help manage that challenge

As the circular economy takes form, the need to increase the value of recycled plastics will intensify. Ideally, of course, materials will be separated into perfect streams of single polymer types; reality is likely to be quite different – mixed streams will be the norm. Compatibilisers could help extract the full potential of these streams, making it possible to obtain good performance from engineering plastics contaminated with commodities, and from mixtures of polar and non-polar polymers. They can also play an important role in the creation of blends of virgin polymers, helping compounders create blends that are tailor-made for specific applications. This article reviews of some of the latest developments in the field.

Copolyolefins score

Block and graft copolymers that have polar and non-polar sections are well-established as compatibilising agents for otherwise immiscible polymer blends. The advantage of such "amphiphilic" copolymers compared to low molar mass additives is the achievement of entanglements of the compatibiliser with the blend components on both sides of the interface. This results in improved mechanical strength, says Dr Rudolf Pfaendner, Director of the Plastics Division at **Fraunhofer LBF** (Structural Durability and System Reliability).

Pfaendner says Fraunhofer LBF continues to develop its versatile toolbox for the compatibilisation of polymer blends based on amphiphilic block and graft copolymers to address new compatibilising issues. "LBF is specialised in the synthesis of block copolymers where a direct access to block copolymers via typical processes such as living ionic or controlled radical polymerisations is impossible," he says.

An example is the preparation of polyolefin block copolymers to improve the compatibility of various polyolefins to other blend partners. Since polyolefins cannot be prepared by living and controlled techniques, LBF uses a two-step strategy. Polybutadiene block copolymers are prepared and then hydrogenated to create compatibility to the respective polyolefin. "Changing the reaction conditions during anionic butadiene polymerisation, a compatibility to all common polyolefins (PE-HD, -LD ,-LLD, PP, POE) can be achieved," he says. Combining different polymerisation and coupling techniques enables the compatibilisation of unusual blend compositions and recyclates.

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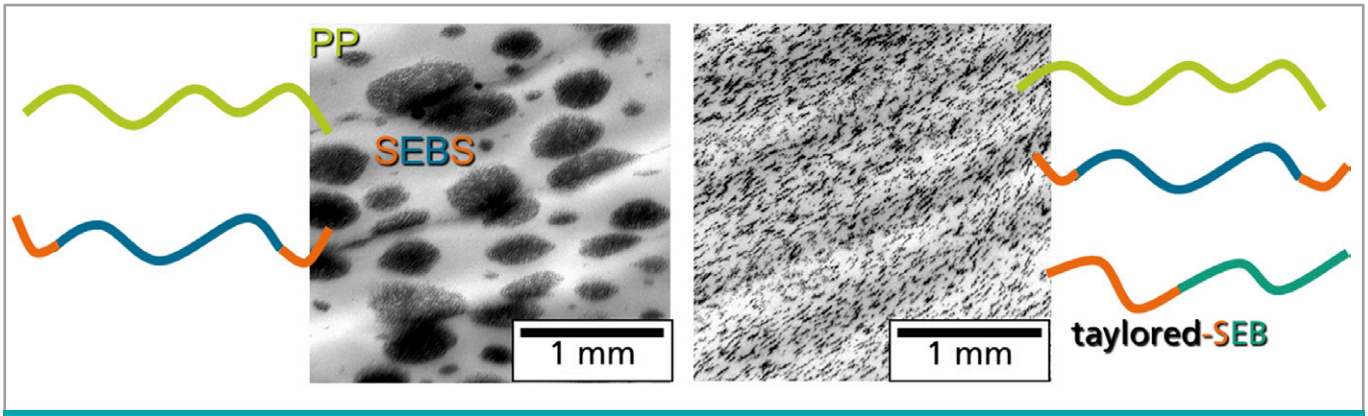

Compatibilisation of a PP/SEBS-blend using a tailor-made SEB-diblock copolymer
Source: Fraunhofer IHB

Compatibilising PC/ABS

Hao Duan at Chinese company **Fine-Blend Compatibilizer Jiangsu** recently teamed up with Min Qi Xin from Shanghai Kumhosunny Plastics to study the effect of different compatibilisers on the properties of PC/ABS alloys. The two evaluated two compatibilisers consisting of a styrene-acrylonitrile-glycidyl methacrylate (SAG) terpolymer with different contents of glycidyl methacrylate (GMA) – SAG-001 and SAG-005 – and styrene-acrylonitrile-maleic anhydride terpolymer (SAM) – SAM-002 – in a 70/30 PC/ABS alloy. They measured effects on mechanical properties, thermal stability and phase morphology.

The tensile strength of SAG-modified and SAM-modified alloy samples (1/8-inch thick) were all higher than an unmodified PC/ABS blend, but there was little difference between them (Figure 1). Impact strength was also higher for the compatibilised blends, with the type and concentration of compatibiliser having a more noticeable influence – the impact strength of SAG modified blends was higher than the SAM-modified blend at the same addition level (Figure 2). In addition, the researchers found that SAG reduced melt flow, implying that the molecular weight of the system increased.

Below: Compatibiliser selection can play a part in improving performance and processing of PC/ABS blends


PHOTO: SHUTTERSTOCK

The HDT (heat distortion temperature) also improved with the SAG-modified system (Table 1).

Moreover, the phase morphology of the SAG-modified PC/ABS alloys was much better than that of the SAM-modified system. "As a consequence, SAG compatibilised PC/ABS alloy showed better properties than those of SAM modified system, suggesting that the reaction between carboxylic or epoxy groups in SAG and terminal carboxyl group in PC would be the main factor to bring the enhancement in the mechanical, thermal and morphological properties of the PC/ABS alloy," the researchers say.

Polycarbonate was sourced from Honam Petrochemical Company of Korea and ABS was purchased from Sinopec in China. The two styrene-acrylonitrile-glycidyl methacrylate (SAG) terpolymers, with GMA contents of 1% and 5% respectively, are products of Fine-Blend itself. The styrene-acrylonitrile-maleic anhydride (SAM) terpolymer (2% of MAH content) was also a Fine-Blend product.

The researchers found that the tensile strength of compatibilised PC/ABS alloy slightly increased, but the two compatibilisers barely affected the flexural strength of the system. They concluded that the reactivity between the GMA in SAG and the terminal carboxyl group of polycarbonate was the main factor for not only improving the mechanical and thermal property, but also enhancing the phase morphology of PC/ABS alloys. The full technical paper can be downloaded **HERE**.

Engineering solutions

The engineering plastics landscape contains a variety of polymers, each with its own characteristics. "Over the last decade the landscape has more or less settled and product developers nowadays are looking to upgrade or combine the current product offering," says Ardy Doelen, Sales & Business

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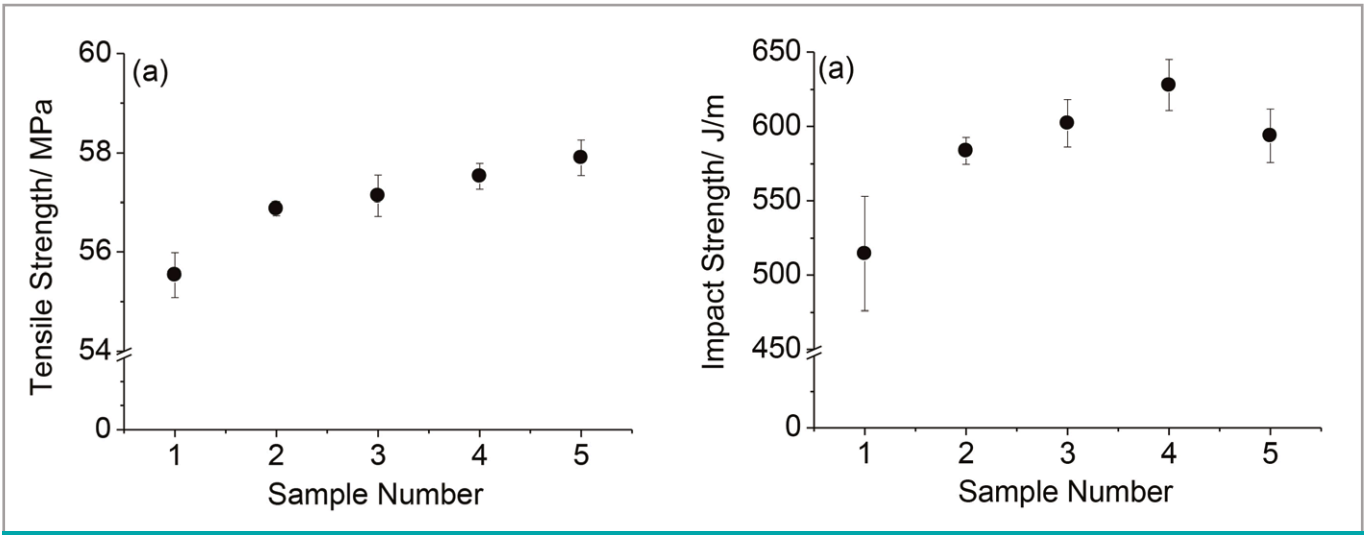

Figures 1 and 2: Measured tensile and impact strength of PC/ABS blends produced using different compatibilisers (1/8-inch thick sample). Sample 1 contains no compatibliser, sample 2 0.03phr SAG,001, sample 3 0.5phr SAG-001, sample 4 0.5phr SAG-005, and sample 5 0.5phr SAM-002 ***Source: Fine Blend***

Development Manager at **Polyscope**. He says his company "is eager to support the industry with fresh thinking by supplying state-of-the-art additives, which can offer optimised blend properties."

Polyscope set out as a supplier of styrene maleic anhydride (SMA) but Doelen says it is now expanding its portfolio in recognition of the growing need to optimise polymers. The first step was the introduction of styrenics with GMA, part of the Xibond family. The Xibond portfolio consists of products that will affect blend morphology or surface characteristics. It encompasses 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, Doelen says.

Xibond can also act as a coupling agent for fillers. "The functional groups in the Xibond coupling agent range can interact with the reactive groups, such as –OH and –NH_2, present in the filler," says Doelen. The interaction between the polymer matrix and the filler is dependent on the sizing or the end groups of the filler.

Doelen says PolyScope is also addressing issues of compatibility on a larger scale. "The surface properties of plastics are critical for many secondary operations, such as painting, gluing and over-moulding," he says. "The addition of Xibond can modify the surface properties of polymer matrices by incorporating functional groups on the surface. These functional groups will increase the surface tension and will lead to increased adhesion properties that can be beneficial for specific secondary operations."

The company's principal focus is on TPE/PA over-moulding for soft touch applications. "When 2K-injection moulding is applied, the PA substrate is still hot when the SEBS soft-touch layer is injected. Consequently, it is relatively easy to get good adhesion with the aid of the typical adhesion promotors such as MA-grafted SEBS or MA-grafted PP," Doelen says.

"However, in the case of sequential over-moulding, the PA substrate is at ambient temperature when the soft touch SEBS layer is injected onto the substrate. In this case, typical adhesion promotors cannot provide sufficient adhesion and stronger reactivity is required to get the desired level of adhesion between the PA substrate and the SEBS. But Xibond 180 delivers the required reactivity

Table 1: Mechanical and thermal properties of PC/ABS blends produced using different compatibilisers (all based on a 70/30 blend of PC/ABS)

Property	Value				
Sample No	1	2	3	4	5
No Compatibiliser					
SAG-001		0.3 phr			
SAG-001			0.5 phr		
SAG-005				0.5 phr	
SAM-002					0.5 phr
Tensile strength	56	57	57	58	58
Flexural strength	82	83	82	83	82
Impact strength (1/8")	514	584	602	628	594
Impact strength (1/4")	180	286	301	309	227
Melt Index	29	24	24	23	25
HDT	118	121	121	122	120

Source: Fine Blend

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PHOTO: SHUTTERSTOCK

Right: Coupling agents can improve adhesion in PA/TPE overmoulding applications, according to Polyscope

between PA substrate and the over-moulded material, leading to an excellent adhesion and a high quality final part," he says.

Doelen cites the example of one PolyScope customer that was using a PP-g-MA type polymer to increase the adhesion between TPE and PA, explaining that by using Xibond180 at a 5% addition even better adhesion was achieved.

Bio branches out

Also branching out into new areas is **Yparex**, previously part of DSM and now part of the Dutch holding The Compound Company. It has been known for some considerable time for its extrudable adhesives (polyolefins modified with maleic anhydride), which are used for multilayer barrier food packaging as well as multilayer pipes. For the last few years, however, the company has also been offering polyolefin-based coupling agents and compatibilisers with extremely low amounts of residual maleic anhydride.

"A high level of residual maleic anhydride causes worries for the injection moulders regarding the surface quality of the moulds," says Frank Huijnen, Business Development Manager at Yparex. "In addition, the trend towards more sustainable compatibilisers is noticeable. Yparex was the first to offer bio-based products. We expect to also have biodegradable compatibilisers available within a few months. Furthermore, there is a trend towards compatibilisers for new material combinations like PE-PC."

WPC options

Clariant has developed a range of maleic anhydride (MAH)-grafted metallocene waxes, branded Licocene, and one target application is polyolefin-based wood-plastic composites (WPCs). The maleic anhydride is grafted onto an olefin backbone. The MAH-grafted moiety is free to react, or couple with, the cellulose (wood), while the long chain end of the wax entangles itself with the olefin base polymer (be it LDPE, LLDPE, HDPE or PP) of the WPC. AS a result, the strength of the composite is improved and, as the two materials now flow as one, the flow is more lamellar and the flow rate increased. Extrudates are also said to have a smoother surface and show improved water repellency.

Below: Properties of WPCs can be enhanced significantly using Clariant's functionalised Licocene waxes

PHOTO: CLARIANT

Clariant says common structural reinforcers and fillers like calcium carbonates, glass, talc and chalk are also better coupled to the host polymer when using MAH-grafted Licocene waxes. "Of course, with glass fibres and certain mineral fillers, the bonding is more centred around coupling with the surface treatments, such as the amino group of aminosilanes often used with glass fibres, or the organic acid treatment of certain minerals," says Frank Neuber, Regional Technical Segment Manager, Clariant Plastics and Coatings, Business Line Advanced Surface Solutions.

"The new interfacial boundary is now more complex and deeper than just a surface bond, which improves adhesion and can augment impact results, as the [now] more complex and deeper interface dissipates force better. This can be seen in structural profiles, 3D printing stock and injection moulded heavy-duty articles."

Laboratory data has confirmed that the coupling effect seen with the high percentage (6-7% MAH) grafted PE-MAH and PP-MAH Licocene waxes greatly improves the tensile strength, E-modulus and impact strength of the filled olefin compounds, so allowing more durable products which replace traditional wood or metal applications.

Melt blending

US-based **PolyGroup**, a marketer of specialty thermoplastic polymer products, points to two grades made by Two H Chem in Korea. Novacom and Novacom-P are specifically designed to

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PHOTO: SHUTTERSTOCK

Above: Compatibilisers and coupling agents can improve the performance of compounds from mixed polyolefin waste streams

provide compatibility and to act as coupling agents for melt blends of polyethylene and polypropylene with inorganic fillers or additives, glass fibre, wood flour, natural fibres, and other materials.

"These maleic anhydride grafted thermoplastic copolymers provide a very effective means to alter the dissimilar phases and enhance the physical, thermal and optical properties of the polymer blend," says Paul Jackson at PolyGroup. "Novacom and Novacom-P have very high levels of graft content and available in both pellet and fine powder form. Pellet form products are most often used in compounding."

Branching out

Meanwhile, at **Nexam Chemical**, Chief Marketing Officer Lars Öhrn highlights grades in its Nexamite range that act as chain extenders or allow branching in different types of polymers. Two recently launched products, Nexamite M480502 and M480504, are available in masterbatch form for use in linear polyethylenes. These multifunctional products improve processability by forming long chain branches and enhance melt strength at dosages around 1%. The effect can be employed in pipe extrusion to avoid sagging and in film extrusion to improve productivity and performance. "Trials on pipes shows improved long-term performance in pressure tests," Öhrn says.

Recycling ideas

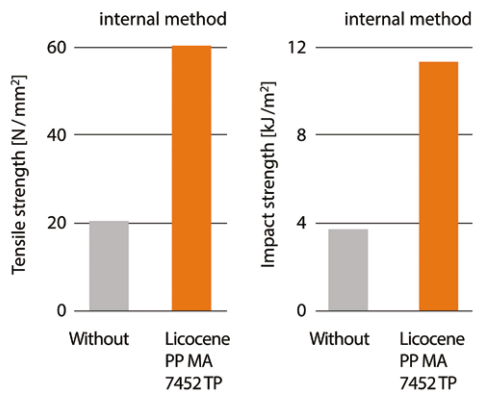
Nexam also offers Nexamite products to improve processability and properties of PET for films and foams, as well as specific grades for recycling applications. "For recycling of polyethylene, we have two new masterbatches, PE0180 and PE0191," Öhrn says. "They enhance the properties during extrusion to allow more recycled material to be used."

Struktol Company has also been expanding its line of additives for reused and recycled plastics and for polymer compounds that contain recycled content. Mike Fulmer, Vice President - Plastics and WPC, says these work in a slightly different way from traditional compatibilisation products. "These are what we call mechanical compatibilisers, there is no chemical reaction involved," he says. "It's almost like putting a hot-melt adhesive into a plastics compound."

Because the products work well when the percentage of post-industrial and post-consumer recyclate is very high (up to 100%), the additives allow recyclers to use streams they might otherwise shy away from, Fulmer claims. "They can be used in streams with multiple polymers that have not been washed or well separated. These are relatively low-cost streams where putting in an additive can still make financial sense."

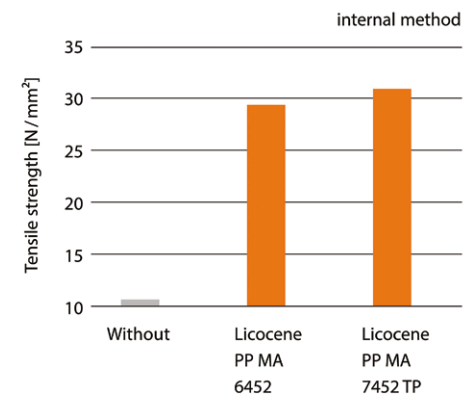
For streams containing predominantly engineering plastics, Struktol offers products that combine a compatibiliser with lubricants to create a combina-

Figure 3: Effect of incorporation of Licocene functionalised wax on tensile strength and impact strength of a PP-based wood-plastic composite



Source: Clariant

Figure 4: Effect of incorporation of Licocene functionalised wax on tensile strength of a chalk-filled PP compound



Source: Clariant

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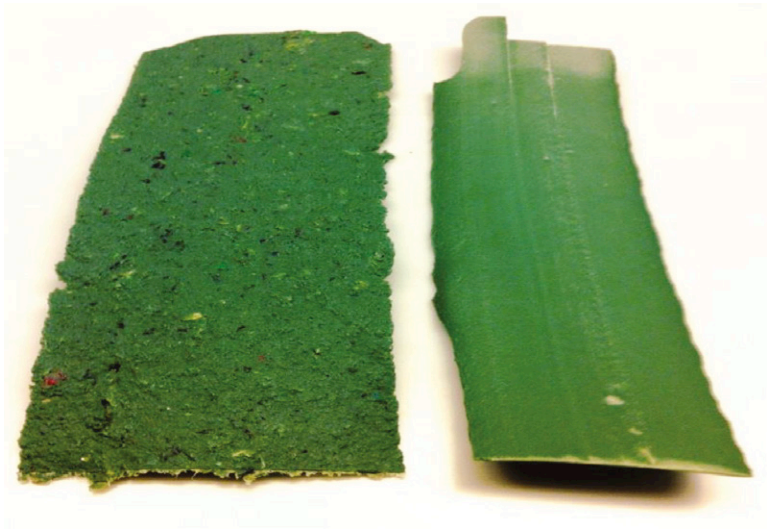

Above: Two samples of recycled waste streams containing PET contaminated with other plastics. The one on the left has no compatibiliser. The one on the right, produced under the same process conditions, contains Struktol TR 219

tion product that aids in the incorporation of fillers (mineral or glass) by improving mixing and flow properties as well as mould release. These products result in better processing, improved surface quality, and in some cases, better physical properties.

One recently introduced example is Struktol TR 229, designed for use in both polycarbonate (PC) and PC/acrylonitrile-butadiene-styrene (ABS) blends as well as polyamide 6 and 66 compounds. It can be used in FDA-approved applications and is also ideal for use in recycled applications. Struktol also offers Struktol TR 219 for use in PA6 and 66 compounds. It has been found to be effective in polyester (PET and PBT)-based compounds too, Fulmer says.

Struktol TR 052, which Fulmer says is the company's most robust compatibiliser, is said to be highly beneficial, even at low addition rates, for incorporation of regrind/recycled product in a wide range of polymers. "Processors can realise improved physical properties and overall improved processability of compounds requiring some level of recycled content," he says.

Catalyst approach

Kenrich Petrochemicals takes a completely different approach to compatibilisation of post-consumer recyclate, although again the aim is to be able to handle unseparated streams. Company President Salvatore Monte says the end product is suitable for consumer and automotive products.

Common packaging polymers, such as HDPE, PP, and PET, are intrinsically incompatible with each other and even small amounts of contamination can cause processing and quality issues in finished parts, Monte says. "For example, although HDPE and PP are polyolefins and classified as addition polymers, more than 5% PP blended into HDPE will cause delamination issues when injection moulding the blend. PET, PBT, PC, and PA are condensation polymers and are incompatible with addition polymers."

While maleated polymers are often used to compatibilise two dissimilar polymers, problems arise when there are more than two polymers, which frequently occurs in non-segregated PCR streams. "For example, if the stream contains PET, PBT, PC, PA and other condensation polymers, maleic anhydride will depolymerise them, reducing mechanical properties," Monte says.

Simpler segregation

A small amount of Kenrich's Ken-React CAPS KPR 12/L, however, acts as a Z-N/metallocene catalyst in the melt to compatibilise the non-segregated resins, as well as the fillers in the resins. "The product can catalyse both addition and condensation polymers and at the same time couple and disperse fillers such as calcium carbonate and carbon black. Doing so significantly reduces segregation requirements to a practical level as filler levels can be in the 20 to 40% loading range without detracting from stress/strain properties," Monte claims.

The new CAPS KPR 12/L product is based partly on a neoalkoxy titanate coupling agent, which is a known repolymerisation catalyst for unfilled polymers. It allows the extruder to act as a polymerisation reactor.

However, solving the technical challenge still leaves two major PCR market obstacles, says Monte. "The first is economics: the additives add costs in a market suppressed by low shale-oil resin prices and China's recent restrictions on baled recyclables. The other is processing savvy: the PCR stream must be granulated and melt processed so that the polymer catalysis and filler coupling chemistry of the additive can go to work in the extruder melt."

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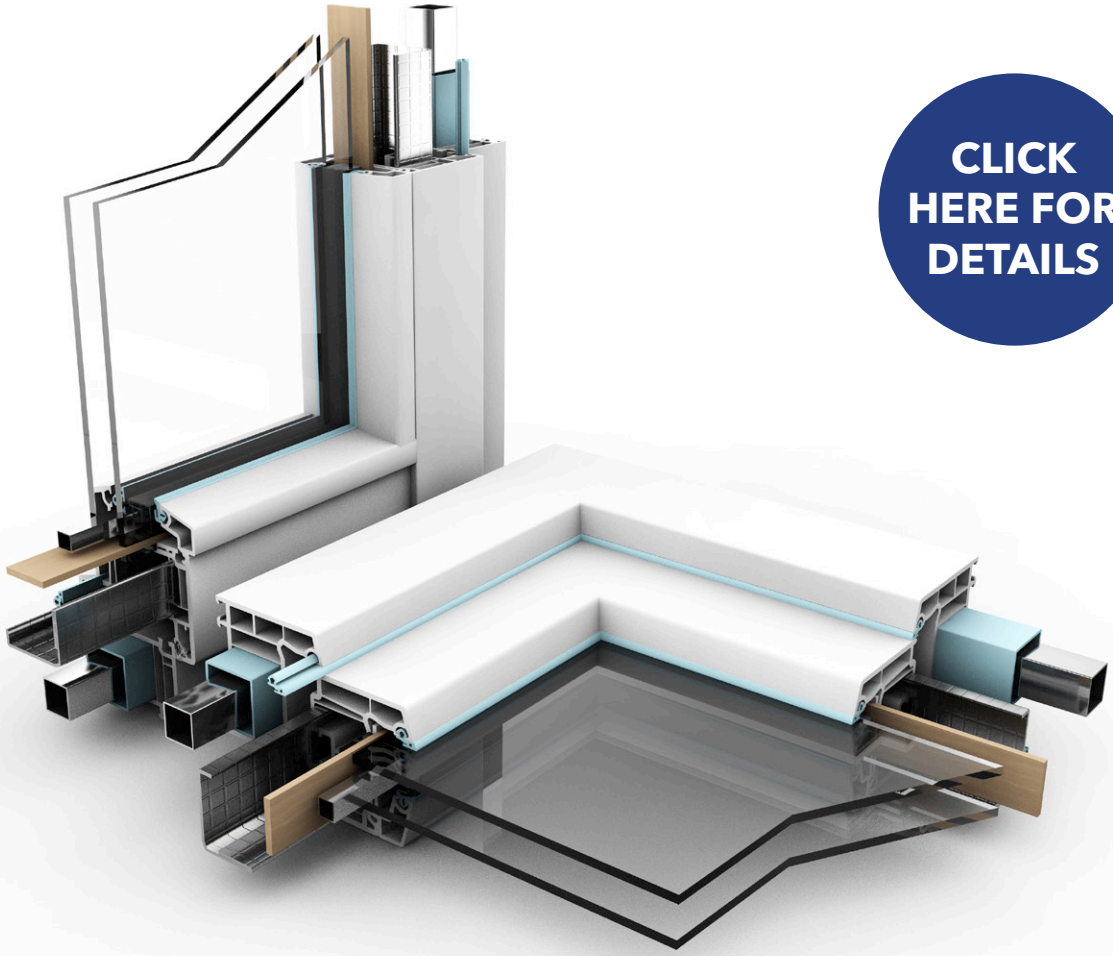

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Testing times for processors

Experts in polymer testing will share their knowledge at AMI's conference in Pittsburgh in September

With polymer testing and analysis underpinning all stages of successful plastics processing, we preview the second annual *Polymer Testing & Analysis* conference for the US market, taking place in Pittsburgh, PA this September.

This two-day event, which takes place on September 11-12, is now established as an important meeting place for scientists, laboratory staff, researchers and R&D professionals who develop, test and analyse new polymer materials, formulations and products. It provides a unique opportunity to discover and debate the latest innovations in testing, characterisation and analysis techniques specifically for plastics materials and products.

Leading experts will gather at *Polymer Testing & Analysis US 2018* to discuss advances in analysis and understanding of polymer performance. Speakers will evaluate the modification of polymers, gain insights into melt behaviour and predict performance in demanding applications. In addition, the conference covers advances in polymer testing techniques for stress cracking and weathering.

Ahead of the event, we take a closer look at the line-up of expert speakers.

Characterisation and analysis

The opening session of *Polymer Testing & Analysis US 2018* kicks off with a paper on how size and shape matter with regards to the challenges and strategies for difficult molecular weight and polymer architecture analysis from **Adam Kozak**, Senior Research Scientist at **Cambridge Polymer Group** in the US. **Sarah Fezzey**, Senior Scientist at **L&L Products** in the US, then looks at the utilisation of pyrolysis-gas chromatography - mass spectroscopy for material characterisation and failure analysis. How to simplify the identification of DSC curves is then addressed by **Dr Yanxi Zhang**, Technical Sales Support at **Netzsch Instruments North America** in the US.

The next session takes a closer look at the modification of polymers and **Elizabeth Kidd**, R&D Chemist at **BTG Labs** in the US, showcases how to utilise water contact angle measurements to validate surface modification of polymers. This is followed by a talk which evaluates the effectiveness of polymer additives from **Paul Kinosian**, Laboratory Technician II at **SI Group** in the US.

Performance and melt

The conference's third session provides an opportunity for delegates to find out how to understand PE-based blends by leveraging multiple analytical techniques from **Dr Menas Vratsanos**, Chief Scientist at **Intertek Chemicals and Materials Allentown** in the US. A paper focusing on electrical testing of high-performance engineering plastics is then presented by **Dr Mithun Bhattacharya**,

Speakers at Polymer Testing & Analysis US include – top row, from left: Sarah Fezzey, Senior Scientist at L&L Products; Adam Kozak, Senior Research Scientist at Cambridge Polymer Group; Dr Liang Fang, Principal Scientist at West Pharmaceutical Services. Bottom row, from left: Dr Ilias Ali, Research Engineer, Printpack; Dr Mark Pothecary, Separations Product Manager – Americas at Malvern Panalytical; Matt McGreer, Senior Product Manager at Atlas Material Testing Technology

Scientist & Lean Six Sigma Green Belt, Advanced Technology Group at **Greene, Tweed & Co** in the US. **Dr Ilias Ali**, Research Engineer, **Printpack** in the US, closes the session by focusing on advanced characterization tools and techniques for high barrier PP/PS multilayer food packaging materials.

The fourth and final session of the day features **Professor Joao Maia** from **Case Western Reserve University** in the US who talks about new developments in real-time on-line rheological and chemical characterisation in extrusion-based processes. **Dr Bhattacharya** from **Greene, Tweed & Co.** again takes to the podium to focus on the rheology of high temperature elastomers. To close the day **Tim Haake**, General Manager at **Goettfert** in the US discusses how to get the most from your rheometers and other measurement instruments.

To round off the day's proceedings, a networking drinks reception is held in the exhibition area, where delegates and speakers debate the conference so far and attendees have the opportunity to network with industry peers.

Demanding applications

Day two of *Polymer Testing & Analysis US 2018* is opened by **Dr Liang Fang**, Principal Scientist at **West Pharmaceutical Services** in the US, who looks to predict the stress cracking of polymers. A paper on developments in the reliable measurement of the weld strength in thermoplastics is then delivered by **Ken Holt**, Senior Applications Engineer at **Dukane** in the US. **Matt McGreer**, Senior Product Manager at **Atlas Material Testing Technology** in the US, then questions whether the laboratory weathering testing you're doing is wrong.

After the morning refreshment break and networking session, **Jiraporn Nomai**, Assistant Researcher at Chair of Composite Engineering (CCe) at the **Technische Universität Kaiserslautern (TUK)** in Germany, discusses the efficient analysis and determination of environmental stress cracking of polymers in different environments. This paper is co-authored by Professor Alois Schlarb, Chair of Composite Engineering (CCe) at the Technische Universität Kaiserslautern (TUK).

The third and final session of the day features **Dr Nikhil Gupta**, Associate Professor, Mechanical and Aerospace Engineering at **New York University, Tandon School of Engineering** in the US, who debates the testing of polymers across time, temperature and strain rates. **Bill Tobin**, Senior Weathering and Corrosion Technical Marketing Specialist at **Q-Lab Corporation** in the US, then looks to understand the relationship between chamber set points and specimen temperatures during accelerated weathering. A focus on new concepts in powder rheology testing is then presented by **Mark Lavach**, Manager, Analytical and Systems Research, **Arkema** in the US. Closing the conference will be **Dr Mark Pothecary**, Separations Product Manager – Americas at **Malvern Panalytical** in the US, with a paper on correlating early and late stage polymer testing with advanced GPC and rheological measurements.

About Polymer Testing & Analysis US 2018

Don't miss this opportunity to learn from the experts. AMI's 2nd *Polymer Testing & Analysis US* conference takes place on September 11-12 at the Pittsburgh Marriott City Center hotel in Pittsburgh, PA. It provides the perfect forum to discover new ways for testing of raw materials and products for quality assurance. For further information about attending the event, taking a table top exhibition space or sponsoring the conference with one of our unique marketing packages, please contact the organiser Kelly DeFino, Senior Conference Coordinator at **kelly.defino@ami.international** or call +1 610 478 0800 for more details about attending this event. Visit the **conference website**.

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Italy prepares a global welcome

Italy's 18th Plast trade fair takes place at the FieraMilano exhibition ground in the Rho-Pero district of Milan from 29 May to 1 June 2018, bringing together more than 1,100 exhibitors across some 52,000m² of floorspace.

Traditionally a showcase for Italy's plastics processing machinery sector, the event follows a record year for the industry; Italian plastics and rubber machinery, equipment and mould manufacturers saw sales hit an all-time record of €4.67bn in 2017 and trade association Amaplast says order books are "considerable extended."

The previous Plast show in 2015 attracted just over 50,000 visitors, 18,000 of which came from outside of Italy. Around 70% of overseas visitors came from other European countries, but African, Middle Eastern and American countries (North and South) were also well represented, according to statistics from show organiser Promaplast.

For more information about the show visit the Plast 2018 **website** or click **here** to pre-register.

Maag puts its focus on pelletisers

The Maag display at Plast will include a Pearlo Underwater Pelletiser, EBG Belt Conveyor Pelletising System and an Extrex X6 Gear Pump.

Pearlo is a flexible, small footprint underwater pelletiser that can be configured for through-puts of up to 36 tonne/hr. It incorporates a number of features, such as the EAC knife feed, that are claimed to ensure high pellet quality is main-tained over long periods with minimal interruptions.

The ENG conveyor pelletiser is designed to handle water sensitive and highly filled and brittle compounds. Meanwhile, the new Extrex x6 gear pump is claimed to deliver volumetric efficiency at the highest counter pressures and with low shear stress.

› **www.maag.com**

PHOTO: COPERION

Coperion's new EGR knife minimises fine generation. Pellets produced on the new system (right) shown compared to current technology

Coperion targets PVC fines

Coperion will present a new knife rotor for its EGR series of eccentric pelletisers that is claimed to dramatically reduce the amount of fines generated when handling PVC cable compounds.

The new rotor and knives use specially developed steel alloys and a thermally-optimised design that allows the blades to remain in contact with the die plate during operation, reducing fine generation down close to detection limits, the company claims.

› **www.coperion.com**

Smart solutions from Piovan

Piovan will present the latest additions to its Aquatech industrial coolers, including the new Easycool+ line of air cooled chillers and the Easytherm range of temperature controllers. The latter, which will be shown for the first time in Italy, are high performance units offering Industry 4.0 compliant OPC-UA protocol support.

The company will also show the latest additions to its Quantum E line of gravimetric batch blend-ers. Centrepiece will be a medical extrusion installation comprising a Quantum E blender configured with a Pureflo filterless granule receiver and Modula series auto-adaptive dryer.

› **www.piovan.com**

Plasmec mixes up for TPEs

Mixing technology firm Plasmec will highlight its TRG series mixers, high capacity units for handling components for products such as TPEs.

The TRG mixer features a high hardness, thermally insulated stainless steel vessel with inte-grated plasticiser injection valves, tungsten carbide coated stainless steel mixing blades, and stainless steel covers with horizontal swivel opening for ease of cleaning.

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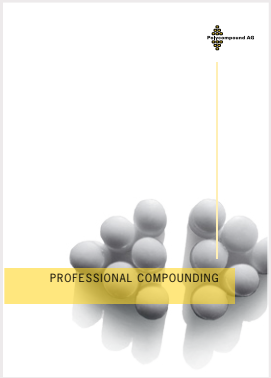

Swiss toll compounder Polycompound marks its 30th anniversary this year. 100%-focused on production of specialty and highly filled compounds, download this brochure to learn about the services the company offers to customers.

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ENTEK: EXTRUSION SOLUTIONS

Find out about the latest developments at twin screw extrusion specialist ENTEK and get a preview of the company's NPE 2018 show display in the April edition of the company's Extrusion Solutions newsletter.

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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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COMAC: COMPOUNDING LINES

Detailing Comac's complete range of twin screw extruders and associated equipment for compounding and masterbatch production, this brochure includes equipment specifications and application examples.

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The STS Mc¹¹ is the latest generation of Coperion's STS twin screw extruder family. With a specific torque of 11.3Nm/cm³, it provides up to 27% increased throughput and better product quality. This 20-page brochure explains how.

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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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POLYMER SOURCING & DISTRIBUTION

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OIL & GAS POLYMER ENGINEERING TEXAS

Taking place in Houston in the USA, AMI's Oil & Gas Polymer Engineering Texas conference brings together a line-up of expert speakers to discuss developments in non-metallic materials used in the demanding oil and gas exploration and distribution sectors.

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PROFILES USA 2018

Now in its 18th year, AMI's North American Profiles conference is the premier learning and networking venue for the polymer window, siding, decking and fencing manufacturing industries. This year's event takes place in Pittsburgh, PA, on 7-8 June 2018.

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POLYMERS IN CABLES USA 2018

The 10th Polymers in Cables conference takes place in Philadelphia, PA, USA, on 19-20 June. The event brings together cable makers and material and equipment suppliers to discuss the latest North American trends and developments.

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AMI's second Medical Tubing conference will be held in Cologne in Germany on 19-20 of June 2018. Topics on the agenda include compliance and regulation, material developments and the latest processing innovations.

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SINGLE-SERVE CAPSULES USA

This brand new North American conference takes place in Chicago on 19-20 of June 2018 and brings together a line-up of industry-elite speakers to deliver expert insight into the fast growing market for single-serve capsules.

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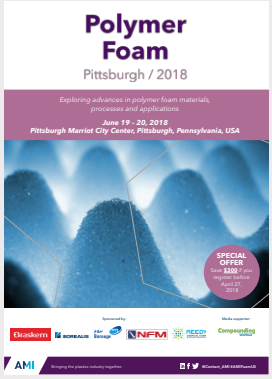
POLYMER FOAM USA 2018



Taking place in Pittsburgh, PA, USA, on 19-20 June, AMI's North American Polymer Foam conference will look at the market, materials and production technologies driving forward innovation in polymer foams.

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AMI's first European Medical Fluid Bags conference takes place in Cologne in Germany on 21-22 June 2018. This high level event looks at the newest innovations in design and production of polymer bags for fluid containment.

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Leading players from across the global masterbatch industry will meet in Barcelona, Spain, on 3-5 September 2018 for the 31st AMI Masterbatch conference, which will explore the latest market and technical trends.

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Avtosanoat-Cepla LLC

Head office location:	Tashkent, Uzbekistan
Date founded:	2012
Ownership:	JV between UzAvtoSanoat Co Ltd and CEPLA Co Ltd
Production 2017:	15,000 tonnes (AMI estimate)
Plant locations:	Tashkent, Uzbekistan
Profile:	Avtosanoat-Cepla was established in 2012 as a joint venture between the Uzbekistan automotive manufacturing group UzAvtoSanoat and the Korean technical compounding specialist CEPLA. The company was the first polypropylene compounder to be established in Uzbekistan and claims to be the largest producer of polypropylene compounds in the country. Avtosanoat-Cepla operates its own laboratory equipped for a wide range of mechanical and thermal tests. It can also carry out accelerated testing to determine long term exposure behaviour.
Product line:	The company currently produces 23 different types of polypropylene compounds, which cater for a wide range of applications in its key application end use markets. It primarily focuses on the automotive industry, but also supplies to the appliance, industrial and construction sectors. Avtosanoat-Cepla also manufactures a range of UV resistant, antistatic and colour masterbatches, which are offered in ABS, PA, PE and other polymer materials.
Product strengths:	Aside from its standard PP compounds, Avtosanoat-Cepla can offer custom products to special order and plans to develop a diversified range of products for domestic and export markets.

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

Compounding WORLD FORTHCOMING FEATURES

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July
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The April edition of Compounding World explores developments in thermally conductive additives. The issue also looks at how to maintain effective compounding equipment and greener alternatives in processing aids.

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Compounding World March 2018
The March edition of Compounding World discusses the continuing success and new technical developments in twin-screw co-rotating extruders. Plus features on modelling software for compounding, natural fibre reinforcement and special effect pigments.

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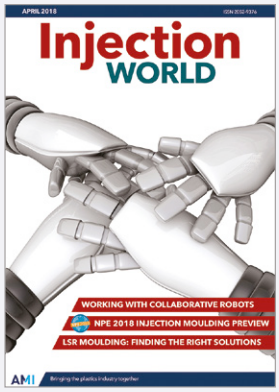

Injection World April 2018
The April 2018 edition of Injection World explores how cobots – collaborative robots – are being used in the mould shop. It also looks at the latest developments in LSR moulding and thin wall packaging. Plus, we preview the US NPE plastics show.

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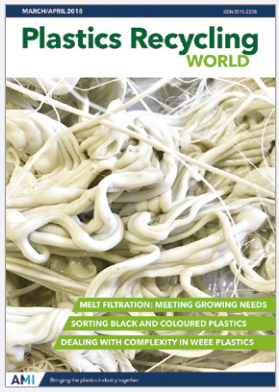

Plastics Recycling World March/April 2018
The March-April edition of Plastics Recycling World finds out about growth in melt filtration products. It also has features on WEEE plastics recycling, label removal and an article on the NIR Sort project.

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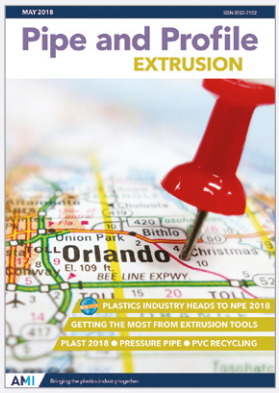

Pipe and Profile May 2018
The May issue of Pipe and Profile Extrusion looks at the latest developments in pressure pipes, testing and PVC recycling. This edition also provides tips on tooling maintenance, as well as our guides to NPE 2018 and Plast 2018

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Film and Sheet April 2018
The April edition of Film & Sheet Extrusion looks at the latest innovations in agricultural film. Also in this issue is an article from Cloeren on how nano-layering can enhance the properties of film and sheet structures.

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Plastics Recycling WORLD

GLOBAL EXHIBITION GUIDE

2018	**9-11 May**	Plastic Japan, Osaka, Japan	www.plas.jp
	15-18 May	Elmia Polymer, Jönköping, Sweden	www.elmia.se
	22-25 May	Plastpol, Kielce, Poland	www.targikielce.pl
	29 May-1 June	Plast, Milan, Italy	www.plastonline.org
	29-31 May	UTech Europe, Maastricht, Netherlands	www.utecheurope.eu
	11-14 June	Argenplas, Buenos Aires, Argentina	www.argenplas.com.ar
	19-20 June	Plastics Design & Moulding, Telford, UK	www.pdmevent.com
	20-23 June	Interplas Thailand, Bangkok	www.interplasthailand.com
	27-28 June	Compounding World Expo, Essen, Germany	www.compoundingworldexpo.com
	27-28 June	Plastics Recycling World Expo, Essen, Germany	www.plasticsrecyclingworldexpo.com
	2-4 August	Plasti & Pack, Lahore, Pakistan	www.plastipacpakistan.com
	15-19 August	Taipei Plas, Tapei, Taiwan	www.taipeiplas.com.tw
	19-22 September	Indoplast, Jakarta, Indonesia	www.indoprintpackplas.com
	24-28 September	ColombiaPlast, Bogota, Columbia	www.columbiaplast.com
	28 Sept – 1 October	Koplas, Seoul, South Korea	www.koplas.com
	14-17 October	Pack Expo, Chicago, USA	www.packexpointernational.com
	16-20 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
	7-9 November	Expo Plasticos, Guadalajara, Mexico	www.expoplasticos.com.mx
	14-16 November	JEC Asia, Seoul, South Korea	www.jeccomposites.com
2019	**8-9 May**	Compounding World Expo, Cleveland, USA	www.compoundingworldexpo.com/na
	16-23 October	K 2019, Dusseldorf, Germany	www.k-online.com

AMI CONFERENCES

15-17 May 2018	Polymer Sourcing & Distribution, Barcelona, Spain
22-24 May 2018	Plastic Closure Innovations, Berlin, Germany
5-6 June 2018	Oil & Gas Polymer Engineering, Houston, Texas, USA
7-8 June 2018	Profiles USA 2018, Pittsburgh, PA, USA
19-20 June 2018	Polymers in Cables 2018, Philadelphia, PA, USA
19-20 June 2018	Polymer Foam USA 2018, Pittsburgh, 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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