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AkzoNobel exits from specialty chemicals

AkzoNobel is to sell its Specialty Chemicals business to the Carlyle Group and GIC – Carlyle's investment partner – in a deal that values the business at around €10.1bn (representing a cash payment of around €8.9bn). The sale is expected to close before the end of the year, subject to regulatory approvals and consultations.

The disposal completes a long-planned move by Akzo Nobel to focus on paints and coatings. The company said that Carlyle Group "has a global presence and the financial capacity to enable the Specialty Chemicals business to achieve its full potential." It also highlighted its extensive experience of investing in chemicals.

PHOTO: AKZO NOBEL

Akzo Nobel is selling it speciality chemicals business

AkzoNobel Specialty Chemicals is, through its Polymer Chemistry business, active in many areas of plastics additives and processing aids. Its products include: Antistatic additives, superconductive carbon blacks, flame retardant and other specialty additives used in the production and processing of polymers, masterbatches and other compounds; cross-linking organic peroxide initiators, organometallics and reactor additives for production of thermoplastics, such as Perkadox, Trigonox and Laurox; Butanox methyl ethyl ketone peroxides for curing thermoset resins and coatings; Kayabrid coupling agents for composites; and single-site catalysts, metallocenes and other speciality chemicals for polyolefin production.

› **www.akzonobel.com**

Mitsubishi buys Dutch Filaments

Mitsubishi Chemical has acquired Dutch Filaments, a major European maker of 3D printing filaments.

MCPP Europe president Ralph Meier said: "We see the demand from customers of various industries increasing and, with the acquisition of Dutch Filaments, we are able to not only fulfil their needs but to actively participate in the future of 3D printing development."

› **www.mcpp-global.com**

› **www.dutchfilaments.com**

Sukano/ Omya work on voiding

Two Swiss firms, masterbatch maker Sukano and industrial minerals giant Omya, have worked together to create new high performance calcium carbonate voiding agent masterbatches for biaxially-oriented PET and PLA (BOPET, BOPLA) films.

The new masterbatches are said to "provide benefits in functionality and productivity, enhancing the overall profitability and value of the films". While $CaCO_3$ is widely used as a voiding agent in BOPP films, it has not been applicable to BOPET and BOPLA due to issues such as dispersibility and discolouration. Barium sulphate is more commonly used.

According to the development partners, the $CaCO_3$ products can improve opacity during film orientation and stretching. In addition, BOPET and BOPLA films voided with $CaCO_3$ are said to exhibit less gloss.

› **www.omya.com**

› **www.sukano.com**

PHOTO: TOTAL CORBION

Total Corbion starts Thai pilot

Total Corbion PLA started production of polylactic acid (PLA) at its 1,000 tonnes/year pilot plant at Rayong in Thailand in December and has since produced a wide range of its Luminy resins for customer sampling.

The plant is being used to train operators and adapt to product certifications and regulatory needs. In time, it will also be used for product development.

Total Corbion is currently expanding its lactides and PLA polymerisation plants at the same site to 100,000 and 75,000 tonnes/yr respectively. The latter should deliver its first commercial volumes in 2H 2018.

› **www.total-corbion.com**

Polykemi to add capacity at Ystad

Swedish compounder Polykemi is to install three new extrusion lines at its plant at Ystad during this year to keep pace with increasing demand for reinforced PP and technical compounds based on PA, PC/ABS and PC/PBT.

The company said that one of the lines will replace an existing older installation, the other two are additional and will increase capacity at the site from 65,000 to 73,000 tonnes/year.

The investment follows the installation of two new lines at the facility during 2017. This saw a 7,000 tonne capacity increase and took the total number at the Ystad plant to 25 (33 across the Polykemi Group). Polykemi also upgraded its laboratory and offices last year.


PHOTO: POLYKEMI

Left: Polykemi is to expand capacity at its site at Ystad in Sweden


PHOTO: POLYKEMI

Right: Polykemi Sales Manager Mattias Persson

Polykemi Group Sales Manager Mattias Persson said the company had commercialised many new projects during 2017, which helped it push sales up 20% to SEK1.2bn (€116m). "I predict that the strong international market will persist and we expect further growth with increasing volumes during this year," he said.

› **www.polykemi.com**

Borealis inks Kazakhstan PO deal

Borealis and United Chemical Company (UCC) of Kazakhstan have signed a joint development agreement (JDA) for a two-unit Borstar PE plant with total capacity of 1.25m tonnes/yr and an integrated ethane cracker.

The agreement follows a recently concluded pre-feasibility study. The next phase of that is likely to run to Q1 2019, following which a local JV with UCC could be signed. A final investment decision would take place in 2020.

The two companies have also signed a memorandum of understanding to work together on a 500,000 tonnes/yr PP project.

› **www.borealisgroup.com**

Distribution event set for Barcelona

AMI's Polymer Sourcing & Distribution conference moves from Hamburg in Germany to Barcelona in Spain for its 13th edition, which takes place from 15-17 May 2018.

Already an established meeting point for polymer suppliers and traders, as well as distributors, this year's event includes a special Engineering Polymers focus, with contributions from Ineos Styrolution Head of Product Management Standard ABS Dr Eike Jahnke, Covestro Head of PCS Industrial Marketing EMLA Jochen Hardt, Radici Performance Plastics Global R&D Manager Nicolangelo Peduto, and Aspen Global Solutions Founding Partner Pojhan Vahabi.

Other expert presentations cover European, North American, African and Indian market analysis, 3D printing, and sustainable product design and the circular economy. Sustainability issues will also be explored in a discussion session including Ford Motor Advanced Materials & Processes Specialist Maira Magnani and Bruj International Managing Director Johan Vanhees.

To find out more about Polymer Sourcing & Distribution 2018 visit the conference **website** or contact Maud Holbrook. Email: **maud.holbrook@ami.international**; Tel: +44 (0)117 314 811;

Lomon Billions buys Sichuan Anning

Chinese TiO_2 giant Lomon Billions has announced its intention to purchase Sichuan Anning Iron and Titanium, also based in China, in a deal valued at $710-790m.

Lomon Billions, which is the largest TiO_2 supplier in Asia and the fourth largest in the world, said it is making the move "to satisfy essentially all its sulphate pigment feedstock requirements". Based in Panzhihua, Anning produces around 480,000 tonnes/yr of ilmenite and 2.3m tonnes/yr of iron ore concentrate annually.

› **www.lomonbillions.com**

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NEWS IN BRIEF...

ExxonMobil has started detailed engineering work on a potential project to expand polypropylene manufacturing capacity by up to 450,000 tonnes/year on the US Gulf Coast. A final decision on the investment, which is intended to make advanced PP products for automotive, appliance, and packaging applications, is expected later this year.
www.exxonmobil.com

Borealis and its **Borouge** subsidiary officially opened a newly expanded high voltage electrical testing facility at the Borealis Innovation Centre in Stenungsund, Sweden, last month. Around €4m has been invested at the centre, which offers AC and DC simulation testing for commercial cable materials in the medium, high and extra-high voltage ranges.
www.borealisgroup.com

The US Federal Trade Commission has granted **LyondellBasell** early termination of the waiting period under the Hart-Scott-Rodino Antitrust Improvements Act with respect to its pending $2.25bn acquisition of **A Schulman**, announced on 15 February. This satisfies a condition for closing, which remains subject to approval by Schulman shareholders and other regulatory clearances. It is expected to close in 2H 2018.
www.lyondellbasell.com
www.aschulman.com

Huber invests to expand Martinal ATH capacity

The Fire Retardant Additives (FRA) business unit of Huber Engineered Materials (HEM) is expanding capacity for its Martinal LEO range of fine precipitated alumina trihydrate (ATH) at the Martinswerk plant in Bergheim, Germany. The move is the single largest investment at the site in 40 years and will increase capacity by 20%.

PHOTO: HUBER MATERIALS

The Huber Martinswerk plant at Bergheim in Germany

Martin Schulting, Managing Director of the FRA business unit in the EMEA region, said the expansion will support growing demand in Europe and Asia for halogen-free flame retardants. The first capacity will become available in 2H 2019, with completion in early 2020.

The company is currently expanding fine precipitated ATH capacity at its facility at Bauxite, in Arkansas in the US. This new capacity is due online in Q3.

› **www.hubermaterials.com**

Luxus launches recyclability test

Luxus, a UK-based technical plastics recycling and compounding company, has launched a rapid analysis service for coloured plastics that tests for 'end-of-life' recyclability.

The test service, the company said, "enables producers to discover for the first time if the plastic packaging or products they make can be detected via near-infrared (NIR) sorting". NIR cannot detect black and many coloured plastics because the pigments strongly absorb infrared radiation.

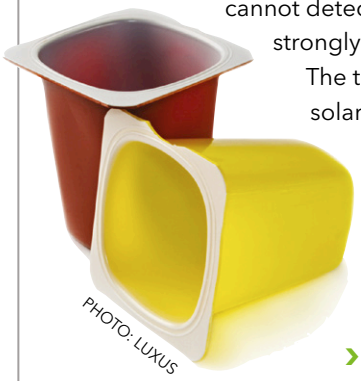

PHOTO: LUXUS

The test relies on a new spectrophotometer capable of reading solar reflectance in the NIR spectrum. The machine is also being used in the €1.47m two-year NIRsort project, which is funded by the European Union's Horizon 2020 programme. Luxus and its partners, Polykemi of Sweden and Ireland's One51, aim to develop a new range of infra-red reflecting (IRR) colourants that will be adapted beyond packaging to applications in electrical appliances and automotive.

› **www.luxus.co.uk**

DINP avoids EU reprotoxic label

The Risk Assessment Committee (RAC) of the European Chemicals Agency (ECHA) has ruled that di-isononyl phthalate (DINP) does not warrant classification for Category 1B or 2 reprotoxic effects to either fertility or development under the EU's Classification, Labelling and Packaging (CLP) regulation.

Denmark originally proposed the classification to ECHA in 2015. Following a stringent hazard assessment, the RAC has concluded that there is no need for classification due to lack of evidence of adverse effects.

› **http://echa.europa.eu**
› **www.europeanplasticisers.eu**

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Lanxess invests €7m in compounds

PHOTO: LANXESS

Lanxess is adding compounding capacity at its Krefeld-Ürdingen site in Germany

Lanxess has commissioned a €7m production line for speciality engineering plastic compounds at its Krefeld-Ürdingen site in Germany.

With a capacity of 10,000 tonnes/yr, the new line complements its existing compounding lines for Durethan PA compounds and Pocan PBT compounds, the company said. It is optimised for production of Lanxess's glass fibre-reinforced PAs, compounds with high mineral content, and flame-retardant compounds.

"With this investment, we are responding in particular to the development of new forms of mobility such as electromobility, but also to trends in the electrical and electronic industry such as the Industry 4.0, which are leading to a growing demand for complex thermoplastic compounds," said Dr Michael Zobel, Head of the High Performance Materials business unit.

› **www.lanxess.com**

Xenia to sell carbon fibre reinforced PVDF

Italian compounding firm Xenia has announced plans to market a new series of short carbon-fibre filled PVDF thermoplastic composite grades for injection and extrusion processes under the Xecarb 45 brand.

The new products have been developed with Arkema, previously Xenia's partner in long chain polyamides and Pebax elastomers. They offer elastic modulus of up to 15,000 MPa and very good resistance to a very wide range of aggressive chemicals, according to Xenia.

Parts and pieces made from the new compounds can be welded and shaped using typical fabrication methods for standard Kynar PVDF grades. They are aimed at speciality applications in the chemical processing industry requiring extreme durability and longevity.

› **www.xeniamaterials.com**

PHOTO: XENIA

Carbon fibre reinforced PVDF from Xenia

NJC adds free-flow PP clarifier

New Japan Chemical subsidiary **NJC Europe** has announced availability of a free flowing version of its DMBDS PP clarifier. Rikafast DXG is a micro-granular product that uses the company's Low Melt technology to provide a 96% DMBDS product offering high clarity and no white spotting. Typical additions are 0.18-4.0%.

www.njceurope.com

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EuMBC screening tool targets regulatory risk

EuMBC – the EuPC sector group for masterbatch makers and compounders – has developed a rapid screening tool intended to help members identify and prepare for future regulatory change that may impact on material availability.

A number of substances it describes as "critical for the plastics industry" have come under regulatory pressure in recent years – it cites the ADAC blowing agent and TiO_2 as examples – and suddenly facing restrictions can have a serious financial implication for companies.

In theory, all such developments can be anticipated. But EuMBC said information is included among hundreds of other substances in dozens of lists on the ECHA website and reviewing all these lists is not feasible for the typical company.

The group's new tool is designed to allow rapid screening of all raw materials purchased by a company in order to identify any substance that could come under scrutiny in the future. It says it will enable EuMBC members to anticipate future changes years ahead.

"Such strategic insight can offer not only a means to anticipate strategic threats, but can also be used to turn them into opportunities," according to an EuMBC spokesperson. "If a company knows, for example, five years in advance that a substance is going to be phased out, this gives valuable time to produce an alternative that the market will then be clamoring for."

The EuMBC screening tool will be demonstrated in Essen, Germany, at the Compounding World Expo on 27-28 June.

› **www.compounders.eu**

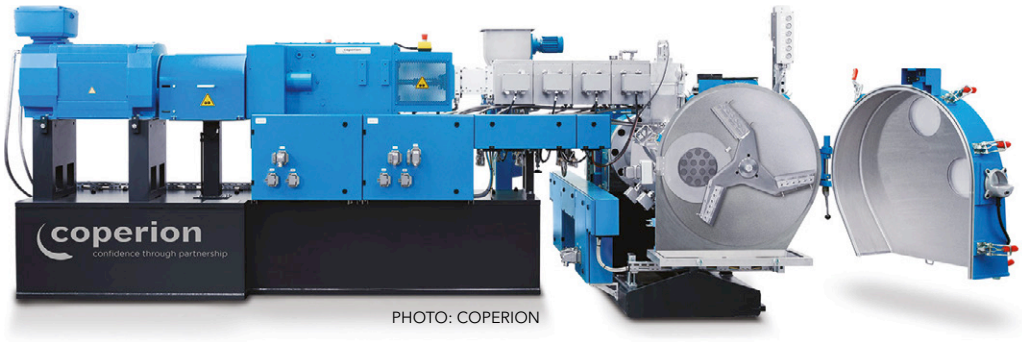

PHOTO: COPERION

Coperion has developed a dust-free pelletising option for PVC cable compounds

Dust-free pelletising for PVC

Coperion has developed a new type of knife rotor for its EGR eccentric pelletising systems, which, the company claims, makes it possible to produce extremely low-dust PVC pellets for cable manufacture.

In the new design, the pelletiser rotor rotates directly on the die plate of the EGR and carries knives optimised for cutting temperature and shear-sensitive PVC. Both rotor and knives are made from a special metal alloy, with the knife mounting system ensuring even contact with the die plate during operation.

The company claims that in tests the modifications have reduced the level of fines in the pellets "down to the detection limit across the whole spectrum of throughput rates and cutting speeds." Customer pilot trials are ongoing and the device will be shown for the first time at the Wire 2018 show in Düsseldorf this month.

› **www.coperion.com**

NEWS IN BRIEF...

Screen changer supplier **Cofit International** has added a size 130 single-screw extruder to its in-house testing laboratory at the site at Cerro Maggiore near Milan in Italy. The move will allow the company to take on more R&D on-site; it previously carried out testing of products such as its Gorilla Belt automatic screen changer at customer facilities. The investment follows the opening of a US facility in San Diego last year.
www.cofit.com

Foster Corporation is to distribute **Repsol**'s range of healthcare polyolefins in the North American market. The company will offer all 27 grades in the range, which includes PP, PE and EVA materials for applications from syringe barrels through to fluid bags. All grades are meet USP Class VI and ISO 10993 requirements.
www.fosterpolymers.com
www.repsol.com

KraussMaffei Group posted a record result for 2017 with sales up 8% to €1.37bn. CEO Dr Frank Steiler said the company had beaten its previous record for 2016 in both sales and new orders (up by 6%), an achievement he attributed in large part due to the improved access it had gained to the Chinese market since its acquisition by ChemChina.
www.kraussmaffei.com

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Mitsui to make TPOs in US

Mitsui Chemicals is to set up a new facility for its Milastomer brand of thermoplastic olefin elastomers at the plant of its majority-owned US subsidiary, Advanced Composites, in Ohio in the US. It will have a capacity of 6,000 tonnes/yr and should commence production in October.

Milastomer combines low density, light weight and good mouldability, according to Mitsui Chemicals, which markets them as an alternative to PVC and vulcanised rubber. Applications include automotive, weather strips, air bag covers and steering bellows, as well as toothbrushes and golf club grips.

Advanced Composites, in which Mitsui Chemical has a 58.9% stake, will handle production of the Milastomer products, with Mitsui Chemicals America taking charge of sales.

› **www.mitsuichemicals.com**

Italy sets machinery record

Amaplast, the trade association for Italian manufacturers of plastics and rubber processing machinery, equipment and moulds, has announced a record 2017 result for the industry.

Production for the year rose by 10% to €4.67bn, while exports were 12% up to €3.31bn, imports were 14% up to €970m and the trade balance improved by 11% to €2.34bn, it said.

"The order portfolio horizon for Italian manufacturers has been considerably extended," said Amaplast president, Alessandro Grassi. "Many companies are able to plan production at least to the end of the year and there are quite a few that are actually having difficulty keeping up with customer requests."

Top 10 export markets for Italian machinery (%)

Country	2017 sales (€m)	Rise/fall (%)	% of total
Germany	481	+19.7	14.5
USA	276	+20.4	8.3
France	160	+21.5	4.8
Poland	159	-3.7	4.8
Spain	148	+8.1	4.5
Mexico	143	-16.7	4.3
China	134	-2.5	4.1
Czech Republic	127	+25.9	3.8
UK	119	+1.1	3.6
Romania	96	+68.6	2.9
Others	1,467	+11.8	44.4

Source: Amaplast

Among the strongest growing export markets were Germany and France, which were both 20% up on 2016. Romania saw explosive growth and moved into the top ten export markets. Asia was less impressive, however, with modest growth in the Middle East, India and China alike.

Sales to the US were 30% up but Mexico fell back by 20% after a similar-scale boom in 2016. Brazilian sales were 40% up.

› **www.amaplast.org.it/**

Masterbatchers mark 20 years

Germany's masterbatch industry association (**Masterbatch Verband**) marked its 20th anniversary on 6 March in Frankfurt with a special meeting at which invited speakers – including association chairman Martin Fabian, Prof Dr-Ing Martin Bastian from SKZ and Dr Andreas Weber from Alpla Werke – spoke about the history and future outlook for masterbatch and the plastics industry. The association now comprises 22 member companies.

› **www.masterbatchverband.de**

Consent Plastic installs MRS extrusion line

PHOTO: GNEUSS/CONSENT PLASTIC

Dubai-based Consent Plastic, a producer of strapping tapes, has installed a new line based around a Gneuss MRS (Multi Rotation System) extruder for manufacturing PET strapping tapes from 100% non-dried post-consumer bottle, preform and trapping flake.

The company said the investment was spurred by its desire to avoid time and energy-intensive drying and crystallisation of PET flake. The new line reduces energy use by 25%. It also produces better quality tape.

The MRS extruder features a large central screw located in a cylinder with eight smaller satellite screws. These are driven by a ring gear and rotate in the opposite direction and around the central screw. This arrangement is said to provide a high surface exchange area, making it particularly effective for removing volatile contamination.

› **www.gneuss.de**

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Compounding and recycling expos attract 2,000 plus registrations

More than 2,000 people have already registered to attend the Compounding World Expo and the Plastics Recycling World Exhibition, which will take place on 27-28 June 2018 at Messe Essen in Germany. Registrations received so far have come from industry professionals in more than 50 different countries.

"We have been delighted by the early response to our new focused exhibitions for the international plastics industry," said Claudia Effra-Hume, Head of Marketing at AMI, organiser of the events. "Registrations passed 2,000 with three months still to go to the big event in Essen."

Registrations have already been received from a wide variety of leading compounders and masterbatch makers. These include A Schulman, Albis, Ampacet, Anwil, API, Basell, BASF, Cabot, Celanese, Clariant, Constab, Covestro, Domo, DSM, Ensinger, Ercros, Eurotec, GM Color, Grafe, Holland Colours, Ineos, Inno-Comp, Kingfa, Lanxess, Lati, Lehmann & Voss, Lifocolor Farben, Lotte, MCPP, Melos, Nevicolor, Polykemi, PolyOne, Polytechs, Premix, Renolit, Romira, RTP, Sabic, Sirmax, Sitraplas, Sumika, Treffert, Wandaa, Washington Penn, Wells Plastics, and many more.

In addition, a large number of leading plastics recyclers and waste management companies have registered to attend the Plastics Recycling World Exhibition, which will run in its own adjacent hall at Messe Essen. They include Aage Vestergaard Larsen, Acteco, Alrek, APK, ARN, Attero, Axion, Galloo, Interseroh, Kolthoff, Lankhorst Recycling Products, Müller-Guttenbrunn, Ravago, Remo Milieubeheer, RSH Polymere, Sobernheimer Rohstoff-Kontor, Suez, Tivaco, TM Recycling, Tönsmeier, Veolia, Wipag, and many others.

Compounding WORLD EXPO 2018

Plastics Recycling WORLD EXHIBITION 2018

The shows are also attracting registrations from plastics processors, end-users and brand owners. These include Amtico, Bischof + Klein, Coca-Cola, Electrolux, Heineken, Johnson & Johnson, Kraft Heinz, Lego, Logoplaste, Mars Petcare, Mauser, McBride, Metro, P&G, PepsiCo, Reckitt Benckiser, Rehau, Renault, RPC, Schur Flexibles, Tarkett, Tetra Pak, and Unilever.

"The Compounding World Expo and the Plastics Recycling World Exhibition will feature more than 180 exhibitors, plus we will have three lecture theatres hosting technical presentations, business debates and training seminars," said AMI's Head of Exhibitions, Rita Andrews. "This mix is attracting lots of interest from plastics compounders, recyclers and processors, not only from across Europe, but also from Asia, the Americas and the Middle East. These exhibitions are going to be truly international."

A very limited number of exhibition stands are still currently available in the Compounding World Expo and the Plastics Recycling World Exhibition.

If you would like to find out more please contact Matt Wherlock at **matthew.wherlock@ami.international** or phone +44 117 924 9442.

If you would like to attend the Compounding World Expo, then **REGISTER NOW** for your free ticket. This will give you free admission to the exhibition and conference theatres. It will also ensure free entry to the Plastics Recycling World Exhibition and its focused conference sessions. In addition, there will be a an after-show networking party for visitors and exhibitors on 27 June.

For more information on the Compounding World Expo, including the current exhibitor list, stand booking details, conference programmes and online registration, please visit

› **www.compoundingworldexpo.com/eu/**

Lubrizol commissions new line in China

Lubrizol's Engineered Polymers business held a ribbon-cutting ceremony shortly before Chinese New Year to unveil its new compounding line in Songjiang in China.

The new line is part of a strategic global capacity expansion programme and will be used to produce functional thermoplastic polyurethanes (TPUs) under the company's Estane brand, as well as elastomer compounds. The move means capacity at the Songjiang site will rise by nearly 40%, enabling Lubrizol to meet rapidly growing regional demand, at least in the short term.

This is the fourth major expansion in China since Lubrizol became the first foreign company to invest in local TPU production in the country in the early 2000s. It is also currently adding to its TPU and related compounding capacities at sites in Ohio in the US, as well as Belgium and Spain in Europe, and is planning further expansion in 2019.

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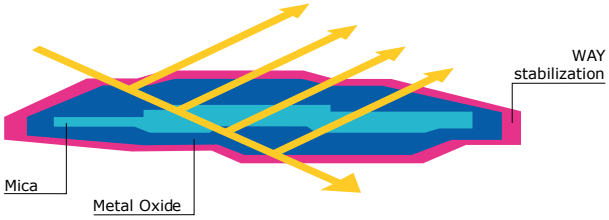

Schematic structure of a WAY coating in effect pigment

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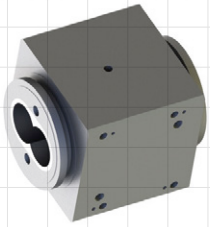

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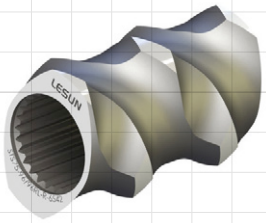

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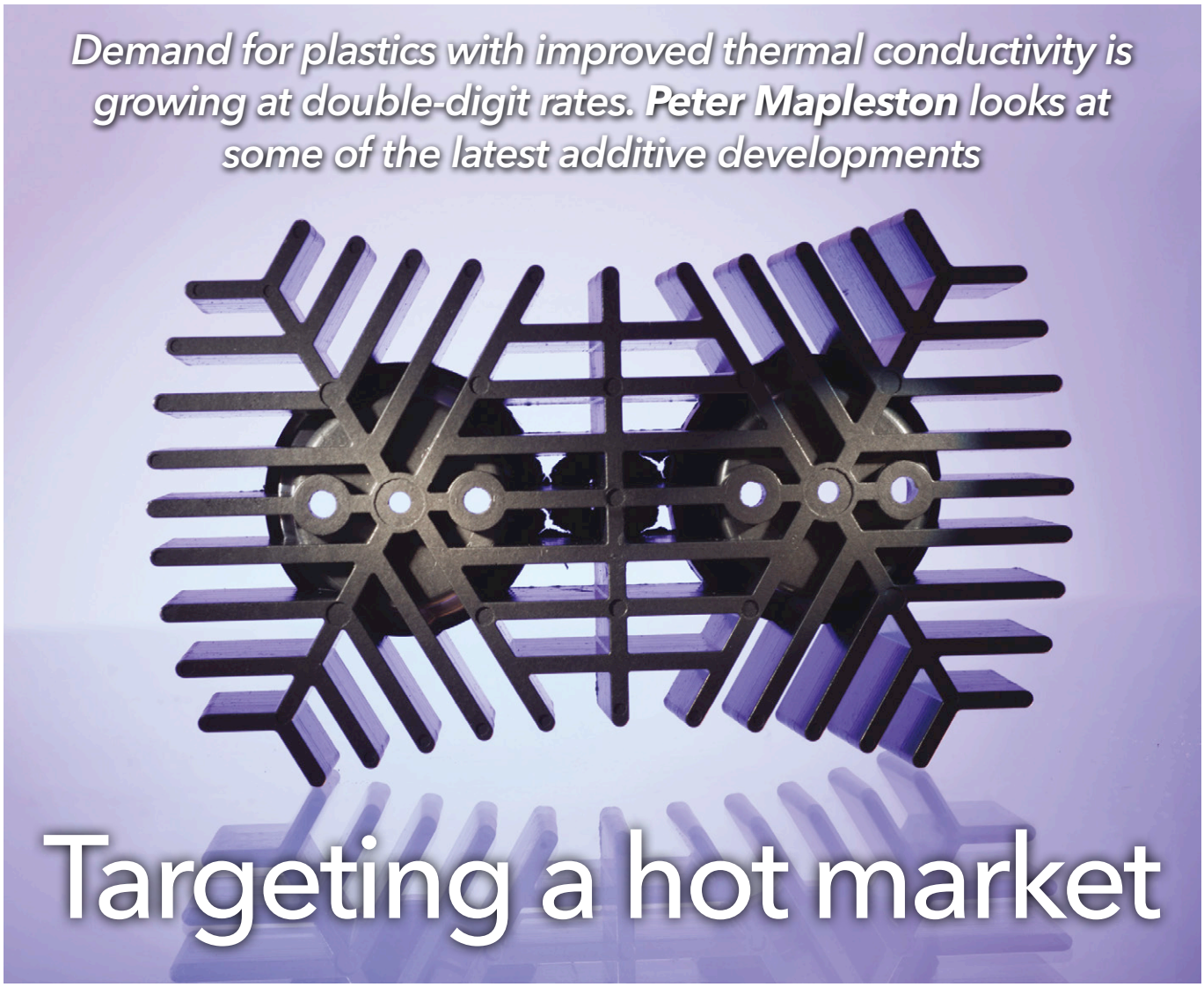

PHOTO: COVESTRO

*Demand for plastics with improved thermal conductivity is growing at double-digit rates. **Peter Mapleston** looks at some of the latest additive developments*

Targeting a hot market

With the global market for thermally conductive plastics showing double-digit growth that is likely to be sustained well into the next decade, additive and compound technology suppliers are upping their game to secure their place. And there is plenty of potential: their products can be used in applications that range through the most obvious markets such as heat sinks for LEDs and luminaires and all sorts of electronics, through to heat exchange systems and items with optimised haptics.

Martijn Mies, Manager of R&D and Customer Technical Service for Fire Retardant Additives and Specialty Products at **Huber Martinswerk**, discussed the advantages of using Martoxid TM aluminium oxides as thermally conductive (TC) fillers at the Conductive Plastics 2018 conference organised by *Compounding World* publisher AMI in Pittsburgh in the US in March. He took a detailed look at Martoxid TM-4250, from Huber's 4000-series designed for polyamides, and compared performance against an aluminosilicate reference.

Mies said some customers have expressed anxieties about abrasion in their processing equipment when using mineral-based TC additives. This is no surprise given that additive levels can be as high as 75%. At such levels, TM-4250 raises conductivity in a PA66 from around 0.25 W/m.K up to 2.5 W/m.K (in-plane). He said that despite the high loading, good elongation at break and impact strength is preserved.

All TM-4000 products are described as soft calcined products with no sharp crystal edges. Tests carried out at Fraunhofer LBF in Darmstadt, Germany, on PA6 compounds measured material loss on platelets through a special slit die. They showed that TM-4250 is much less abrasive than many fillers that have lower Mohs hardness, such as aluminosilicate (Table 1, page 21). Extrusion of the compound was also found to require around 30% less energy.

Targeting abrasion

Dr Carsten Ihmels, who is Head of R&D/Technical Service in Adsorption & Catalysis at functional filler producer **Nabaltec**, says aluminium oxide is a

Main image: Heat sinks are a key potential market for thermally conductive compounds

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good thermal conductivity enhancer for medium conductivity levels (1-3 W/m.K) but adds that ATH can also be a cost-effective alternative that is completely free of abrasion problems.

Its applicability is, in part, due to better understanding of component design. Not that long ago, Ihmels says potential users were seeking compounds with very high thermal conductivity values in the range of 5-15 W/m.K or even more. Today much lower values are required, which he attributes to smarter design of the final parts. "1-3 W/m.K is often requested today," he says.

There are also TC applications emerging in the field of electric vehicles – housings and gap fillers in battery packs and modules for example – where flame retardancy requirements are also being discussed. "The challenge is to offer both properties, flame retardancy and thermal conductivity, in a single formulation," he says.

Among mainstream TC fillers, only metal hydrates provide a flame retardancy effect, according to Ihmels. When other fillers are used to generate TC, he says additional FR additives must be included and this can lead to negative effects due to very high filling levels. Furthermore, he points out that additives such as magnesium oxide (MgO), silica and especially aluminium oxide (Al_2O_3) show high abrasion on tooling, MgO and aluminium nitride are moisture-sensitive (AlN can decompose to release ammonia), and boron nitride (BN) is costly, difficult to process and provides highly anisotropic thermal conductivity.

In a presentation prepared by Ihmels and given by his colleague Kerry Smith (Product Manager – Americas) at Conductive Plastics 2018, Ihmels

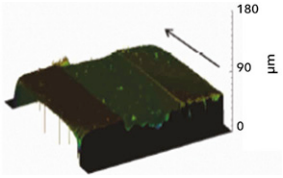
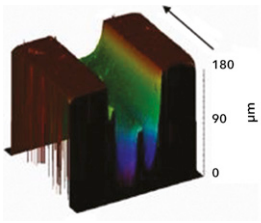
Formulation	Material removal rate (µm/h)	Visualization (arrows show flow direction)
PA6/ Martoxid TM-4250	5.6	
PA6 / Al2SiO5	42.8	

Table 1: Comparison of slit die wear for two different formulations of TC PA6 containing aluminium oxide and aluminosilicate fillers. Visualisations were created via chromatic confocal microscopy (3-D surface screening) ***Source: Huber***

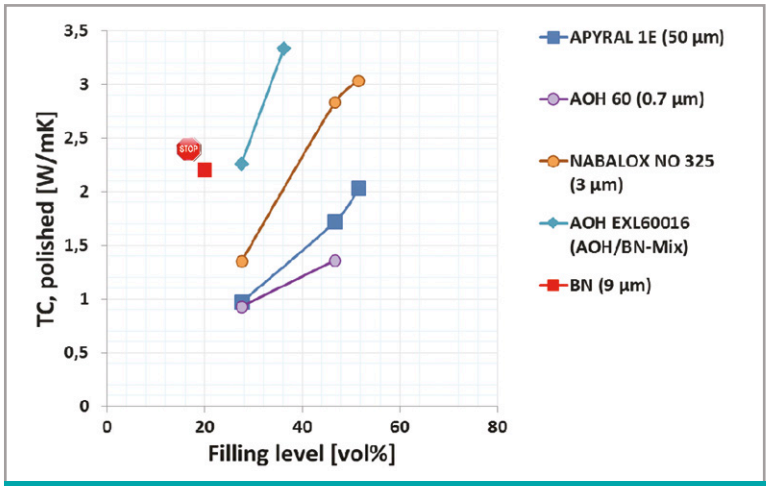


Figure 1: Effect on thermal conductivity of an HDPE (TC 0.5 W/m.K) of various fillers (Apyral is an $Al(OH)_3$, Nabalox NO 325 is an $Al2O_3$.) ***Source: Nabaltec***

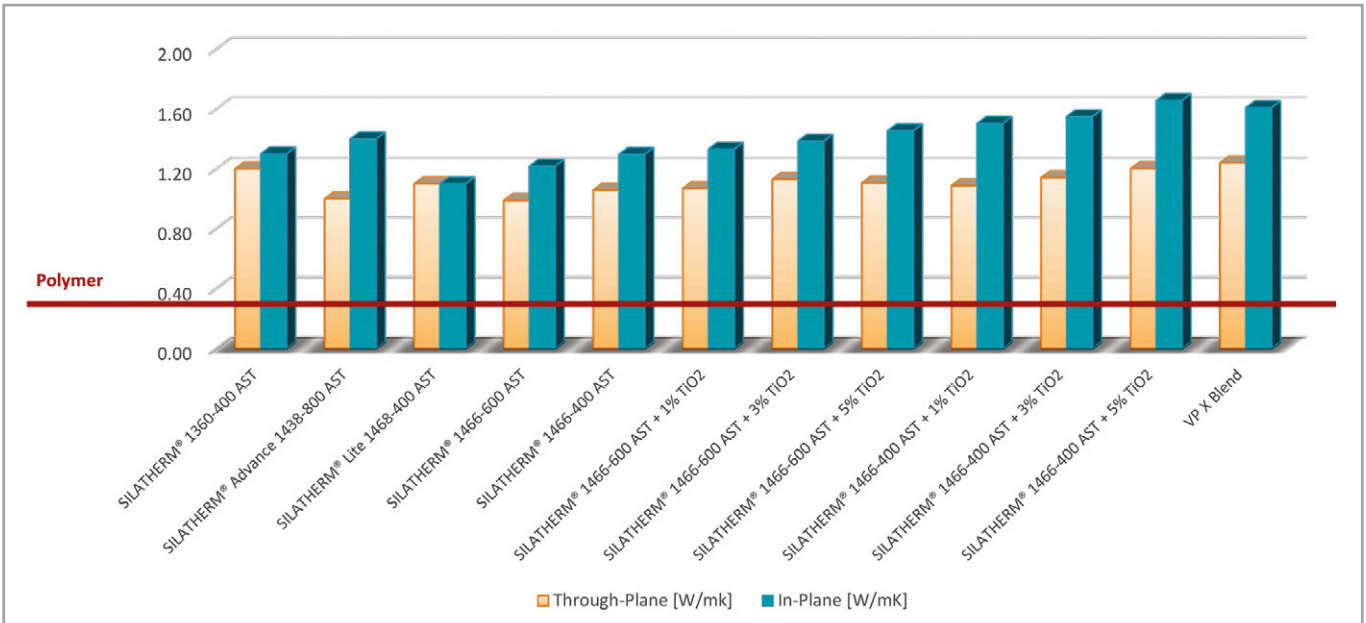


Figure 2: Comparison of thermal conductivity of PA6 compounds containing various Silatherm grades (filler loading 65% by weight)
Source: HPF/Quarzwerke

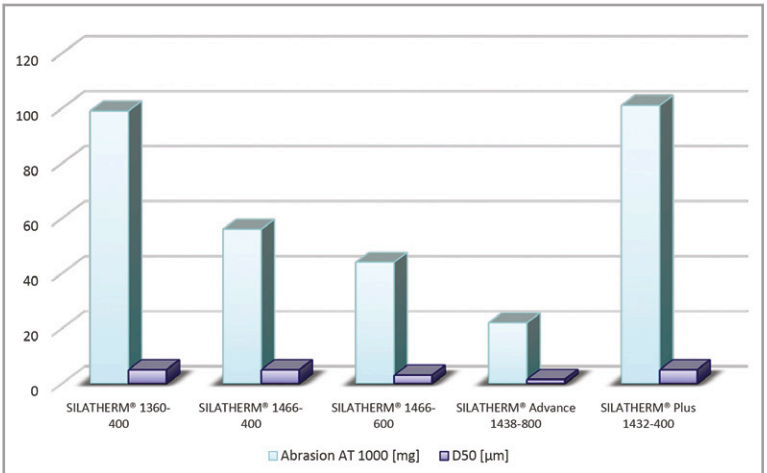


Figure 3: Comparison of abrasive properties of PA6 compounds containing various Silatherm grades (filler loading 65% by weight)
Source: HPF/Quarzwerke

discussed results of tests with various TC additives in thermoplastics. It demonstrated how abrasion is higher when particles are smaller, but smaller particles lead to more issues with viscosity and filling levels.

"To overcome this abrasion problem, we combined BN and AOH [aluminium oxide hydroxide]," he says, pointing out that AOH has sufficient high temperature stability to be used in compounding of polymers such as polyamides. Of all the additive systems tested, this combination achieved the highest TC, at moderate filling levels (36% vol) and caused no abrasion (Figure 1, page 21).

Ihmels concludes that for many applications where moderate thermal conductivity is required can be served either by ATH at high loadings (especially in thermosets), by Al_2O_3 when abrasion is not decisive, or by combinations with high performance fillers such as BN when low addition rates are important. "Nabaltec and other raw material suppliers work intensively on solutions for higher conductivity which are processable and affordable," he says.

Colour counts

HPF, which is a division of **Quarzwerke**, produces aluminosilicate TC additives under the Silatherm brand. At the AMI conference, Péter Sebö, Head of Marketing & Market Development, discussed development work the company has been engaged in relating to products for white and colourable compounds. Silatherm 1466 is brighter than the company's standard Silatherm 1360 but has the same – or in some cases better – technical characteristics due to a slightly different chemical composition.

"We can go even lower with the grain size," Sebö says (D50 for the 1466 grade is three microns versus five microns). "This allows better overall properties of the end compound and the customer can realise white or colourable compounds."

Sebö says HPF has quite a wide range of minerals that it can play with when it comes to making a TC blend. One of its latest results from this blending capability is Silatherm VP X, an experimental grade, which has a high degree of whiteness and very good technical properties as well as good isotropic thermal conductivity (Figures 2 and 3). "With Silatherm Advance, we already had an interesting white grade, but with the

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Right: Automotive LED lighting is expected to be a major market for TC plastics in the future

Silatherm 1466 and probably with Silatherm VP X, we can now fill the gap, technically and in price, between Silatherm 1360 and Silatherm Advance," he says. "Applications would be mainly thermoplastics compounds for LEDs, e-mobility, electronics, medical devices."

Heat management of automotive LED lighting systems is proving to be a major technical challenge, he says. "A 10°C temperature increase leads to a reduction in the lifetime of electrical components of around 50%."

BN developments

Germany-headquartered **Grolman Group** handles European distribution of TC additives for a number of companies. Bastian Müller, Technical Sales Manager, Additives & Resins, highlights the latest developments in **Momentive Performance Materials**' broad range of boron nitride powders. "Boron nitride is an established way to boost the thermal conductivity from around 0.2 W/m.K up to 10 W/m.K," he says.

Momentive's CoolFlow highly crystalline, high purity powders have a mean particle size of around 12-16 microns, depending on the grade, which makes them highly suitable for thin film applications. CoolFlow 500 and 600 are a mix of platelets and agglomerates. The mixture can improve flow compared to platelets in extrusion processing, Müller says. "CF600's agglomerates can also improve through-plane thermal conductivity over platelet grades, assuming agglomerates are maintained during processing. The softness of the products with a Mohs hardness of only 1.6 ensure that extrusion lines and metal tooling are not damaged during processing."

Momentive´s CoolFX grades represent a new generation of fillers with higher bulk density, which may lead to easier handling and feeding, Müller says. "Powder flow properties can be improved and the use of a coupling agent improves wetting to enhance the bond between polymer and BN. This results in better mechanical performance and thermal conductivity."

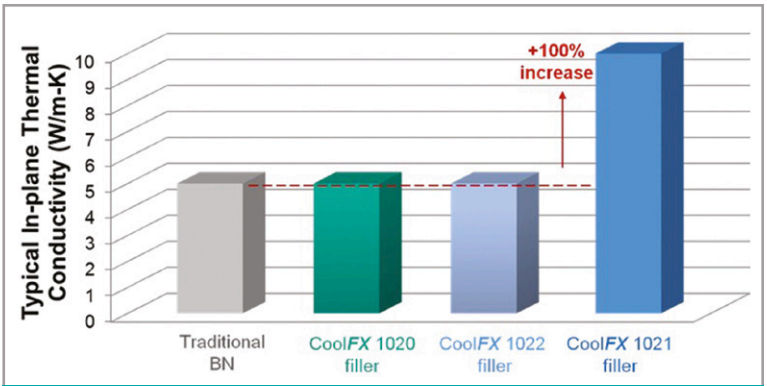


Figure 4: Thermal conductivity of CoolFX 1020, 1021 and 1022
Source: Grolman/Momentive

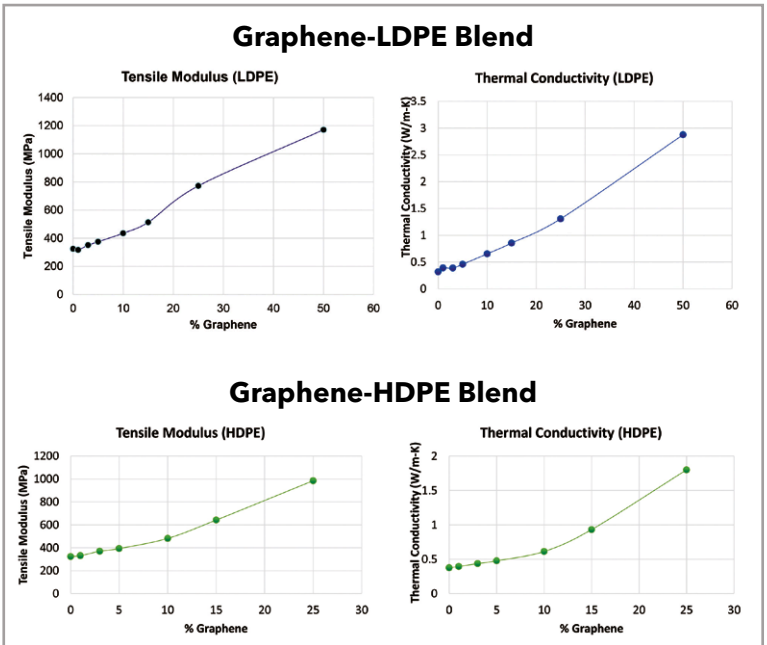
The coupling agent increases the tensile strength and modulus as well as impact strength of highly filled thermally conductive compounds. CoolFX filled compounds will achieve the same thermal conductivity as standard BN (Figure 4). Typical new applications are said to include housings for boxes used for glass fibre cable signal distribution to TV, telephone and internet, where the small size of the devices requires good heat management.

Graphene opportunity

Grolman also acts as European distributor for high performance graphene products produced by Angstron Materials, part of **Global Graphene Group** (G3). Although the US company maintains a low profile, it is one of the world's largest producers of graphene nanomaterials. One of its co-founders, Dr Bor Jang, filed the world's first patent applications on nano graphene and G3 has in-house production capacity of over 300 tonnes/yr. According to executive vice president Edward Chan, significant additional capacity is operated by licensees that meet G3 quality standards.

Chan says this production capacity facilitates the use of graphene in high-volume applications; he cites heat dissipation in various types of electronic devices and LED lighting. He says prices are lower than carbon nanotubes, for example (which he notes have very different morphologies and produce different combinations of thermal, electrical and mechanical properties in compounds), but precise numbers are not publicly available.

Chan emphasises that graphene is not a single entity, but is produced with variations of physical and chemical properties according to customer requirements. G3 can modify its functionality in



Figures 5 (top) and 6: Graphene can improve thermal conductivity and modulus in LDPE and HDPE compounds. Blending behaviour is different in the two polymers, however, due to differences in crystallinity
Source: Global Graphene Group

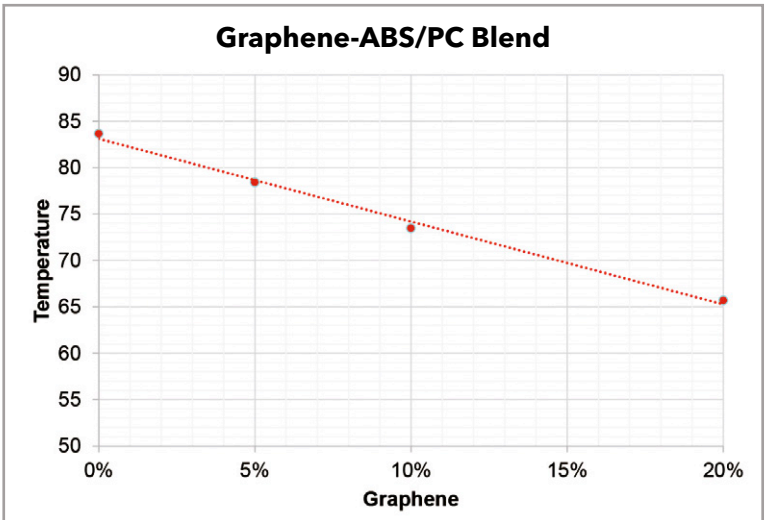


Figure 7: Data from tests on films of PC/ABS filled with different amounts of graphene show how heat dissipation increases with filler loading (the film is heated from below and a steady-state temperature measured at a fixed distance above it)
Source: Global Graphene Group

various ways: for example, to improve its compatibility with the matrices it is intended to be used in.

Speaking at Conductive Plastics USA, Chan pointed out that it is possible to achieve high loadings of graphene in thermoplastics – as high as 50% and possibly higher – creating materials with thermal conductivities several times higher than the unfilled polymer (Figures 5 and 6). Compounds with such high loadings would normally be used as masterbatches.

G3 has its own in-house melt-blending expertise and has already produced compounds based on various polymers, including PP, LDPE, HDPE, LLDPE, ABS, PLA, polyamides, and TPEs as well as PC/ABS films (Figure 7).

Effective dispersion

Avanzare Innovacion Tecnologica describes its avanThermal Conductive 770 as a graphene-related black designed for effective dispersion in a broad range of thermoplastics. It is said to be easy to integrate in different formulae; recommended dosage ranges from 1 to 12% depending on the matrix and thermal conductivity target. The average particle size is about 70 microns and thickness less than 8 nm. Oxygen content is said to be very low (less than 1%) as is the level of defects.

"It is important to highlight the influence on the results, not only of the matrix particularities itself, but also the processing method and conditions," Avanzare says. Used in polypropylene, avanThermal Conductive 770 raised thermal conductivity by about 200% over the unfilled PP grade (also enhancing electrical conductivity over 1 S/m). Injection moulded PA6 specimens showed an increase in thermal conductivity of about ten times (Figure 8, page 28). Avanzare says even higher thermal conductivity (more than 3 W/m.K) can be achieved using a specially modified avanThermal Conductive 770.

Illustrating the influence of the matrix resin on the results obtained, the effect of addition of avanThermal Conductive770 on thermal conductivity of PEEK is rather different (Figure 9, page 28).

Staying with carbon, but in another of its many variants, nanodiamond manufacturer **Carbodeon** has teamed up with Dutch 3D printing specialist **Tiamet 3D** to launch nanodiamond-enhanced filaments. They are based on a jointly-patented technology which is said to significantly improve the mechanical and thermal properties of 3D printed items.

"We've already developed filaments with a 100% increase in tensile strength, improved printability, and better thermal properties," says Reid Larson, CEO of Tiamet 3D. "Printing also runs more quickly and more reliably."

The two partners say 3D printing using improved-performance thermoplastics has potential in almost all manufacturing environments, but especially in electronics, automotive and aerospace industries. They say that as well as improving thermal management, conductivity and tensile strength of the base polymer, nanodiamonds can increase the glass transition temperature of the end

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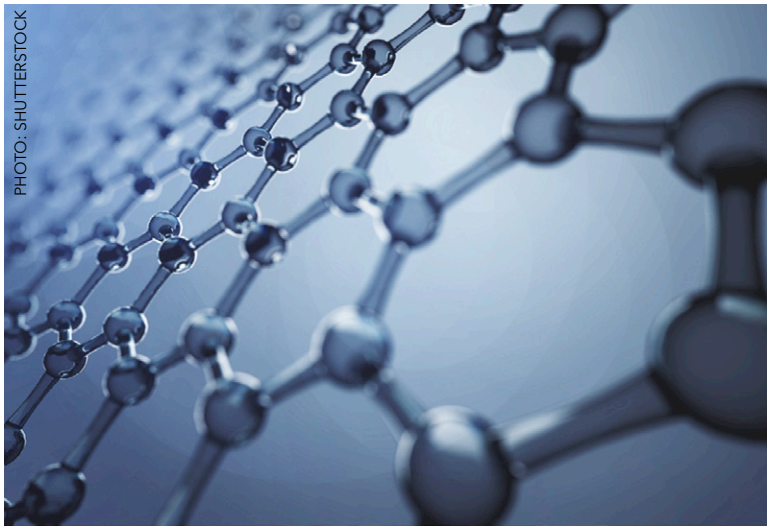

PHOTO: SHUTTERSTOCK

Above: Graphene developers see the material having potential in compounds requiring improved thermal conductivity

product or component to achieve more robust and reliable polymer products, suitable for more challenging environments.

The first Carbodeon/Tiamet 3D filaments will be PLA (polylactic acid) based, with further development focused on higher-performance thermoplastics.

Carbodeon's uDiamond filler material combines a small amount of diamond with boron nitride or alumina. The additive is claimed to provide gains in thermal conductivity of 100% or more without compromising electrical or mechanical properties. The performance improvement is attributed to the high thermal conductivity of the diamond material (more than 2,000 W/m.K), the small particle size and the active surface chemistry.

Compound options

Major suppliers of thermally conductive compounds are using the benefits of additive advances to extend their portfolios. **Lanxess**, for example, is adding to its Durethan TC polyamide product line. "The compounds are specifically designed with additional properties depending on their area of use which benefit the respective applications," says Application Development Expert Christof Boden.

One highlight is a new PA6 that combines high thermal conductivity with high reflectivity, flame retardancy, and tracking resistance. Thermal conductivity is direction-dependent due to the mineral filler particles; in the flow direction it is 2.5 W/m.K. The trial product is halogen-free flame retarded, offering a UL94 V-0 rating at 0.75mm. It also achieves the best possible classification (0.75mm) in the GWFI (Glow Wire Flammability Index) test at 960 °C. CTI (Comparative Tracking Index) is 600V.

Lanxess says that TC compounds do not need to provide the levels of thermal conductivity offered by metals to be effective in heat sink applications. Given an appropriate design, even a slight increase can be enough to prevent heat accumulating in a part and damaging sensitive electronics. The company says that, as thermal conductivity increases, the role of convection in heat sink operation becomes more significant (Figure 10, page 30).

Darin Grinsteinner, a Product Developer at **Celanese Engineered Materials**, discussed a new addition to the company's CoolPoly range, a toughened PA6 called CoolPoly E3629 for heat sinks, brackets and housings, at the Conductive Plastics conference in the US. Toughness is said to be twice as high as the existing grade and it has added UV stability for outdoor use, but thermal conductivity remains the same (Figure 11, page 30).

Also speaking at the Conductive Plastics conference, **Covestro** Principal Engineer/FTR Manager Terry Davis explained how an integrated LED lamp concept incorporating components in TC

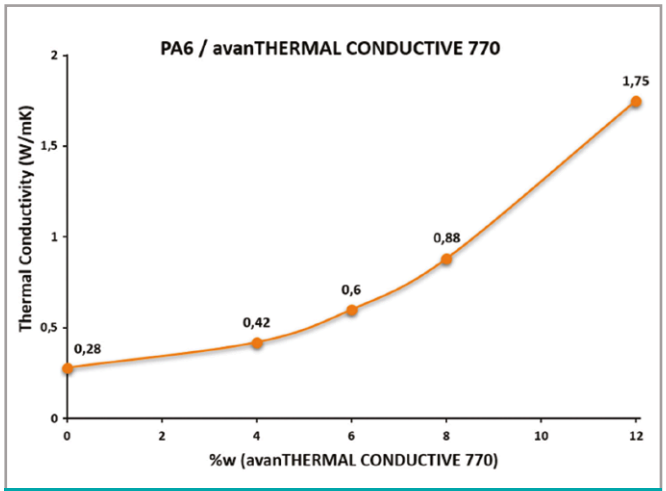

Figure 8: Thermal conductivity of PA6 containing avanThermal Conductive770 at different loadings
Source: Avanzare Innovacion Tecnologica

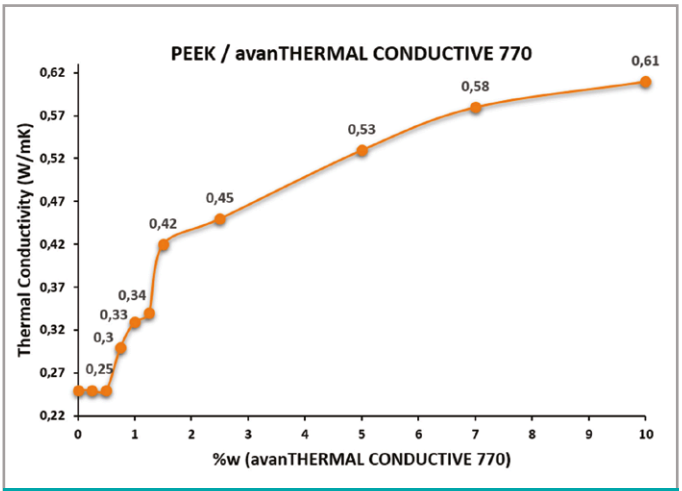

Figure 9: Thermal conductivity of PEEK containing avanThermal Conductive770 at different loadings
Source: Avanzare Innovacion Tecnologica

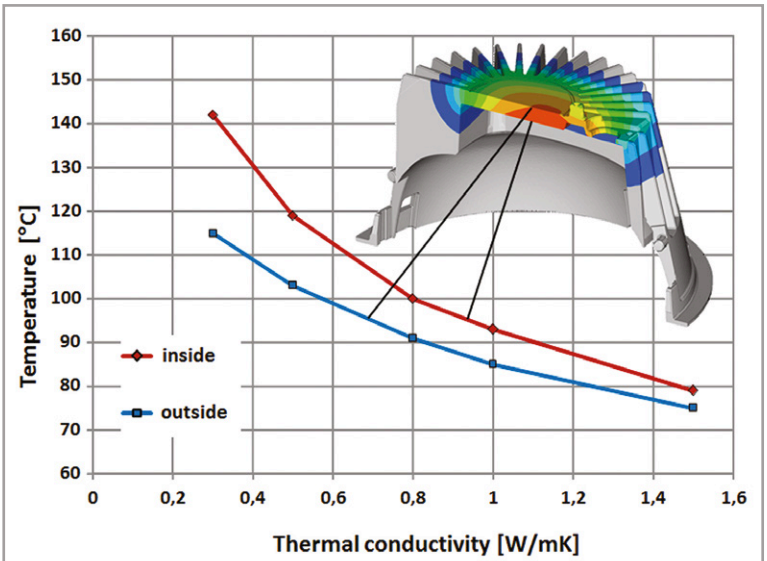

Figure 10: Variation of inside and outside temperature with thermal conductivity for a simple polymer heat sink component showing that even small improvements can have a significant impact
Source: Lanxess

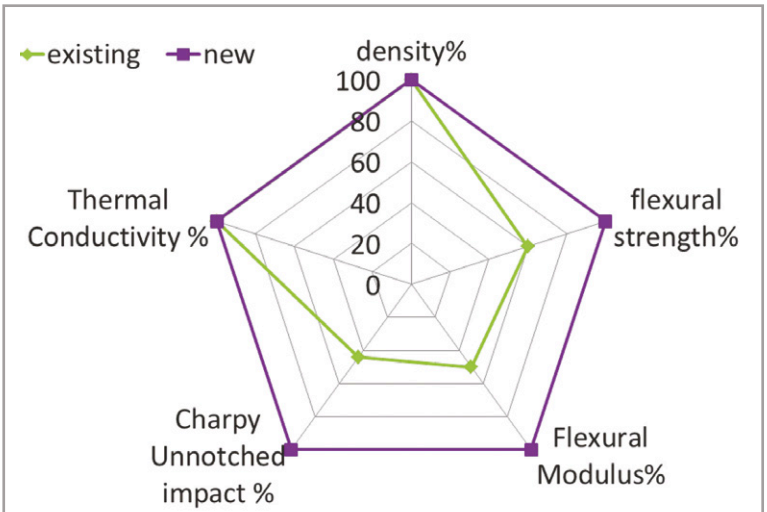

Figure 11: Star chart comparing the performance of CoolPoly E3629 PA6 compared to its predecessor
Source: Celanese Engineered Materials

grades of its Makrolon polycarbonate can improve performance, reduce weight by over 40%, reduce the number of assembly operations, and cut costs by as much as 20%, in comparison with designs that use aluminium heat sinks.

Sensitivity required

Meanwhile, at Swiss independent compounder **Polycompound**, Business Development Manager Jan Schweizer says it is crucial to have the right equipment to produce TC compounds "as many of the used additives are sensitive and are to be handled carefully in the compounding process."

Polycompound has been involved in the production and development of thermally conductive compounds from a very early stage, he says. The company has been involved in the development of various projects and has proven to have the right machinery using co-kneader-technology for such compounds. "The products produced for partners have not only shown great thermally conductive values on the development lines but Polycompound was also able to reproduce the same values when scaling-up the production quantity to several tonnes in recent months," Schweizer says.

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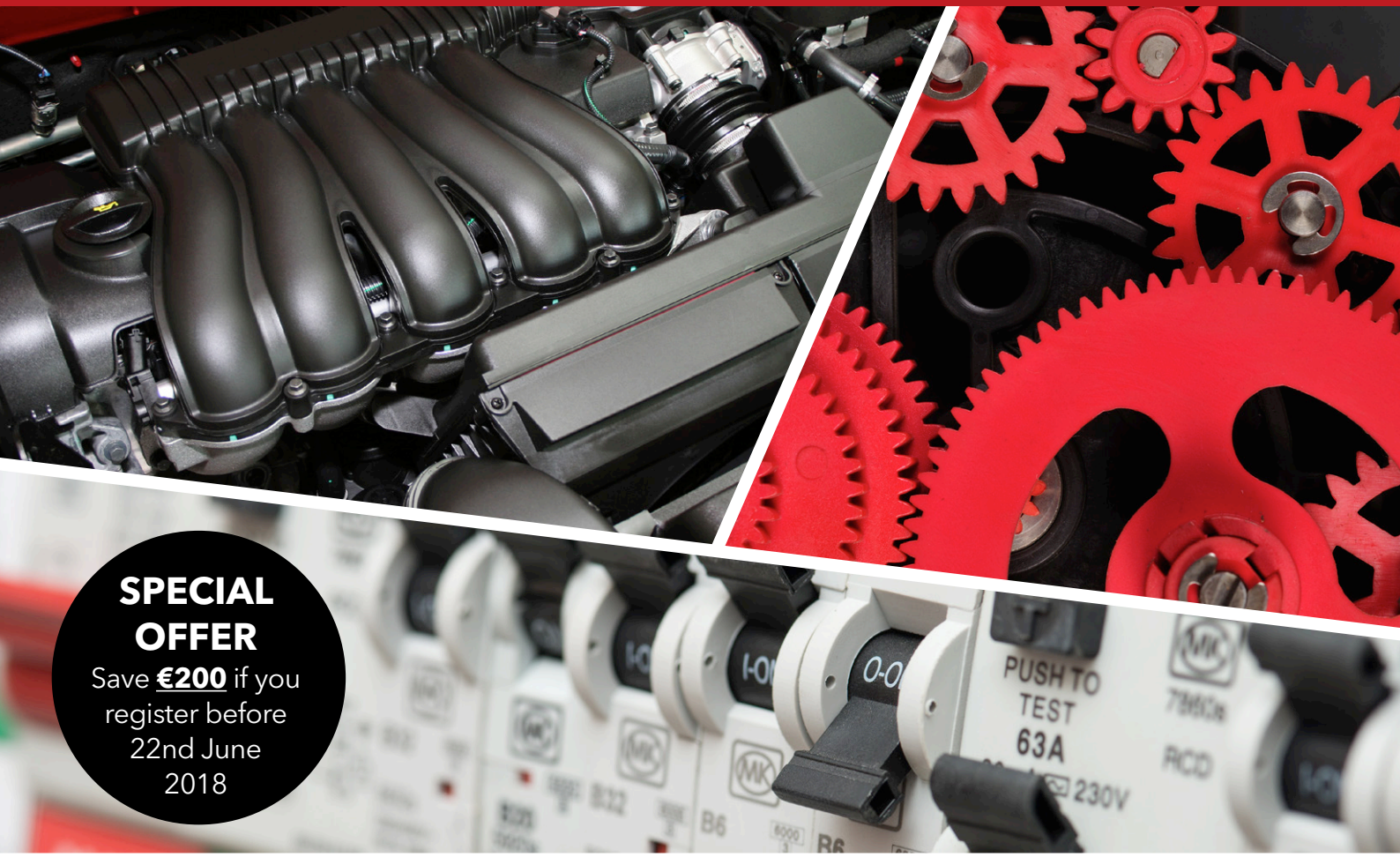

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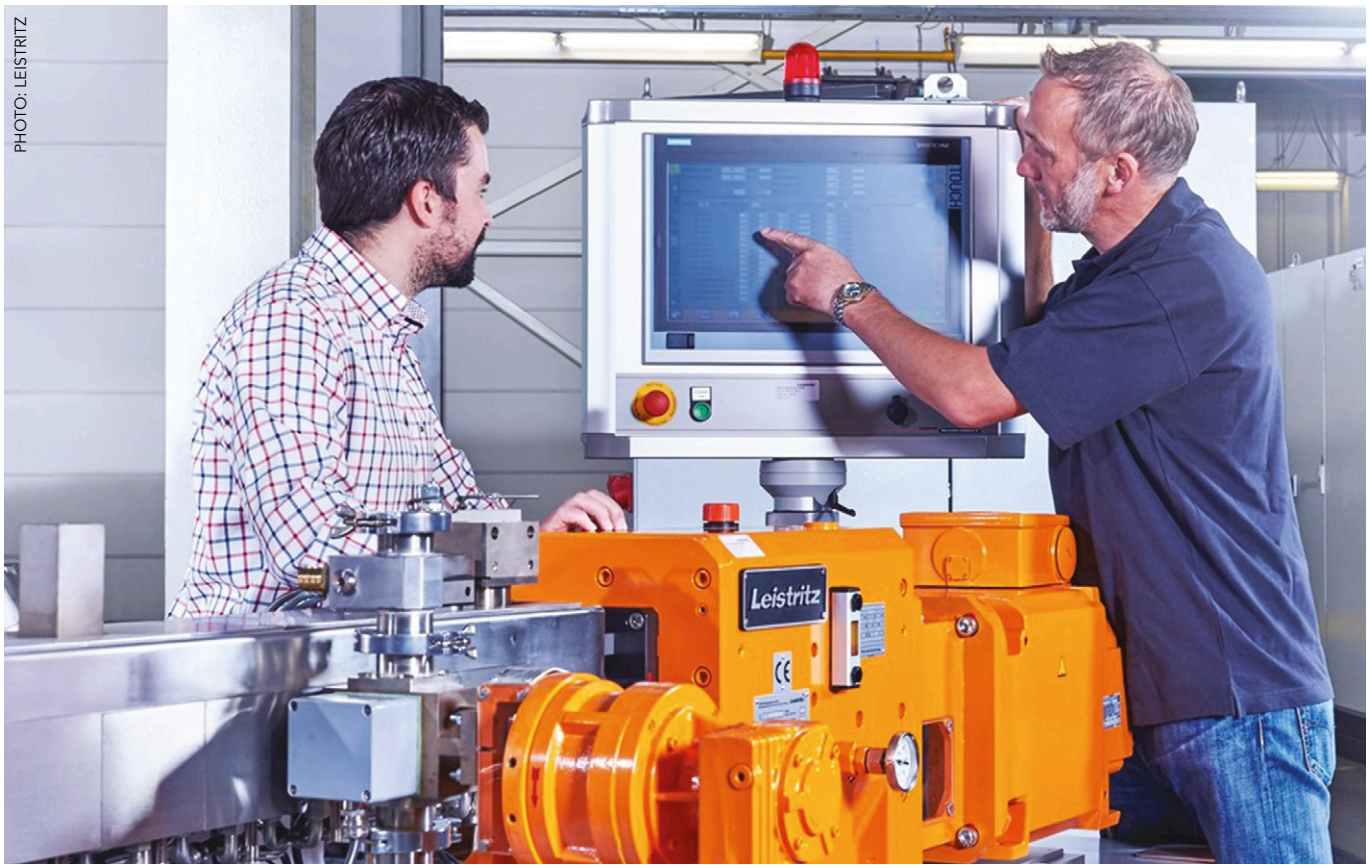


PHOTO: LEISTRITZ

Maintaining effective production equipment

*If your extruders are not producing compound, then you are not making money. **Mark Holmes** examines some options for streamlining extruder maintenance*

Minimising expensive extruder downtime is an essential part of a cost-effective and profitable compounding operation today. Extruder manufacturers and suppliers of condition monitoring systems are developing an increasing number of products and services to help keep compounders producing. Meanwhile, development of predictive technologies is allowing maintenance to be scheduled to improve plant efficiency, ensuring that consumables and spare parts are available when required.

ServiceBox is an integrated system from **Coperion** for online monitoring and logging of faults in plants and components designed to ensure trouble-free compounding and stable product quality. With active start-up assistance and rapid expert support for economic production with effective quality control, the system is claimed to provide a number of benefits to users. According to Jörn Matzke, Head of Business Unit Service Compounding and Extrusion at the company, these include making use of existing data network infrastructure for comprehensive, successful and remote online diagnosis as well as reliable data back-up. Automated online fault reporting to Coperion also facilitates rapid support.

The ServiceBox monitors a number of plant and system components through standardised interfaces and simply integrated condition monitoring modules. It offers compliance with defined response times to reduce plant downtime effectively. Software

Main image: Planned maintenance is essential in keeping compounding plant running at its most effective

PHOTO: COPERION

Right: ServiceBox is an integrated system from Coperion for online monitoring and fault logging of plant and components

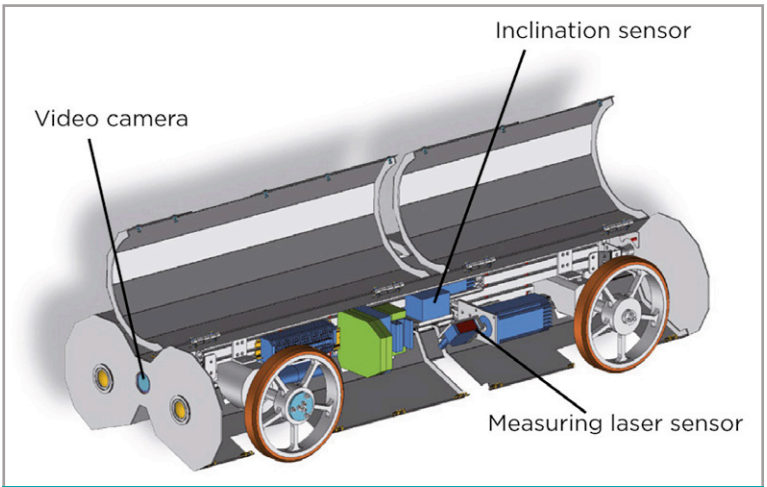
updates are simply transmitted, control parameters can be adapted online and there is a general reduction in costly on-site deployments.

The company has also developed MyCoperion, which provides an online platform providing a fast and convenient way to keep customers up-to-date on the progress of their spare parts enquiries and orders. In addition, it allows customers access to a digital spare parts catalogue and specific machine documentation, making handling of service orders transparent and convenient.

"This private area of the Coperion website offers customers a quick and easy way of checking the status of offers and existing service orders, rapidly identifying and requesting spare parts from a digital catalogue and downloading operating manuals," says Matzke. "This online service is divided into four modules and can be accessed from the Coperion home page with just one click. The service portal allows customers to communicate efficiently with Coperion service staff, because both parties have access to the same database. At present, customers of Coperion's Stuttgart and Weingarten Germany offices in Germany can use the service portal, while additional locations are under development."

Barrel diagnosis

Coperion has also introduced measures for preventive maintenance, including the Cobra and GBM Barrel Bore Measurement System. "With the Cobra LG wear diagnosis system, it is possible to obtain rapid, comprehensive and relevant information on the actual state of wear of the inner walls of the barrels of extruding and compounding systems in the size range from ZSK 240 to ZSK 380," Matzke says. "The system comprises a high-resolution video camera and a laser-guided surface measuring device, both of which are mounted on a carriage that travels along the inside of the extruder barrel. All that is necessary in order to use the Cobra LG is to remove the screw shaft assembly from the extruder barrels. Dismantling the extruder barrels is not necessary."



Schematic showing the key components of Coperion's Cobra LG barrel wear diagnosis tool
Source: Coperion

From a cost and time saving aspect, the wear diagnosis is best performed during one of Coperion's routine servicing programmes. For smaller compounding systems, such as the company's models ZSK 40 to 133, Matzke says the GBM barrel bore measurement system has proven to be an ideal means of diagnosing barrel wear.

As well as preventive maintenance, Matzke highlights big data monitoring, direct links to machine history and documentation via QR (Quick Response) code, self-maintaining systems, and intelligent crash preventing systems among other important issues influencing extruder maintenance. He also predicts further development in high capacity compounding solutions with 24/7 remote expert support.

Janik Bessinger, Engineering Manager at **CPM Century Extrusion** (part of the CPM Extrusion Group), also believes that predictive maintenance of machinery is important for customers wanting to know the condition of their machines and to plan ahead for maintenance issues. "However, there is a never ending challenge with extruders," he explains, pointing out the continual trade-off between a maintenance-friendly machine, where all areas are easily accessible, and a 'clean' machine, where surfaces can easily be cleaned and are not obstructed by instruments and piping.

"Our process section audits continue to grow with more customers wanting a bi-annual audit of their barrels and screw elements to enable them to determine whether they need to replace certain wear parts immediately, as well as starting to build historic trends of which sections of the machine wear more than others. This further enables

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PHOTO: CPM EXTRICOM EXTRUSION

Above: CPM Extricom's latest CXE45 sHO extruder is designed with integrated "smart" monitoring technology

customers to determine when they need to order spare parts, making this service a predictive maintenance tool," Bessinger says.

"As the gearbox is the heart of any extruder it is extremely important to know the condition of it to predict any future issues. We offer monitoring which is fully integrated with the gearbox to enable maintenance personnel to check its status. It measures an array of properties, such as oil temperature, acceleration and speed, from which it then deduces the condition of the entire gearbox. There is a visual interface that can be loaded on mobile devices, which then enables maintenance personnel to view trends and current operating conditions," he says.

Working at the limit

Bessinger's colleague Adam Dreiblatt, Director Process Technology at CPM, adds that some machines with higher outputs are also being constantly pushed to the limits to maximise production rates. "This leaves little or no time for preventive maintenance where there is a 'run to fail' mentality and the machine is kept running until something breaks and then requires fixing," he says.

Right: Designed to suit JIT production demands, quick screw change is a standard feature on Entek's QC³ models

"When something does need to be fixed or repaired, it should have easy access. This means that the machine design needs to allow for easy replacement and removal of barrels, dies and side feeders, for example. Quick-change designs are available – for example, by using cooling hoses with quick-connect fittings, as well as heaters with plugs instead of being hard-wired," Dreiblatt says, adding that such features add to the machine price.

Dreiblatt also highlights the occasional conflict between efficiency and access. "Good barrel cover design with energy efficient insulation that also provides ease of access remains a conflict for designers. The maintenance department may remove the covers for repair work, which often do not get re-installed."

Thomas Bauer, Managing Director at CPM subsidiary CPM Extricom Extrusion, says the company's CXE45 sHO was designed to provide a compromise between these requirements and allows easy access to frequently maintained sections of the machine. "With our new series we make installation as easy as possible and for customers with high safety requirements we offer proximity switches which detect the installation of safe guard covers," he says. "The CXE45 sHO offers high output, unmatched productivity, 'Smart' performance and monitoring technology."

In future developments, Bauer says high torque machines at high screw speeds will increasingly require more continuous monitoring of the torque and power introduced through each shaft into the process. The simple aggregate monitoring commonly used today does not mitigate the risk of extreme machine crashes caused by over-torque resulting from foreign particles blocking the screws. The company's optional single shaft torque measurement tool monitors and reacts to uneven torque and effectively contributes to risk mitigation of major crashes, he says.

Maintenance just-in-time

According to Dean Elliott, Technical Processing Manager, and Tammy Straw, Marketing and Business Development Manager, at **Entek**, key issues influencing developments in extruder maintenance include Just-in-Time (JIT) production and increasingly small-sized production batches, which both create demand for easier maintenance of the equipment. This means quick, easy and safe access is required to electrical and mechanical parts of the extruder to facilitate the greater variety of products being run and the multiple screw layouts used. The critical spare part inventory for

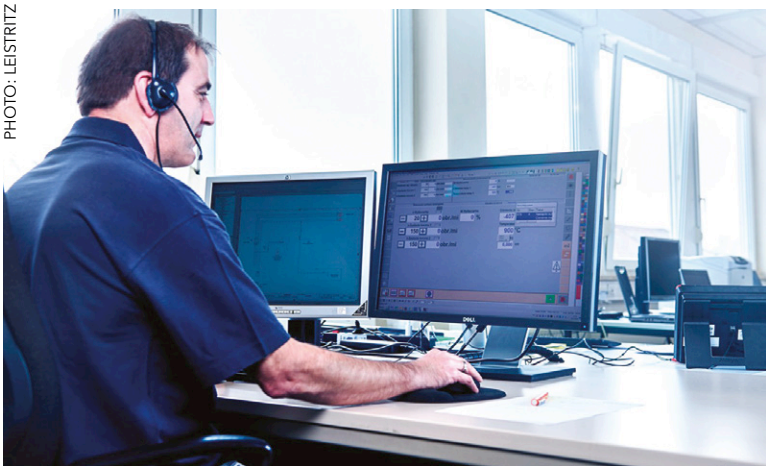
PHOTO: ENTEK

extrusion equipment is also becoming smaller - companies do not wish to keep large stocks so local spare part suppliers must have replacements on the shelf.

Entek developed the QC³ extruder (Quick Change, Quick Clean, Quality Control) with quick change features for screw changes. The company claims QC³ twin-screw extruders are designed to be mistake-proof. Screw elements can only go on the shaft one way, for example, and feature an alignment puck. Processors are said to be able to execute five-minute screw changes. The QC³ is claimed to be particularly cost beneficial in colour compounding applications where compounders are producing numerous, small-sized batches of materials.

Industry 4.0 and profitability are the driving forces when it comes to new developments in the compounding and masterbatch industry, says Jürgen Sauer, Head of Business Unit Service at **Leistritz**. He says that ultimately customers will decide on which developments will be launched as products, but points out that increasingly all-encompassing support programmes are being demanded, aimed at mechanics, electrics, control, process technology and product quality.

PHOTO: LEISTRITZ



Above: Remote servicing will play a vital part in future compounding plant maintenance programmes

"Profitability and system availability must be maximised, with efficiency, quality and reliability determining success in the global market," says Sauer. "These are exactly the reasons why lines must network, quality must be optimised and flexibility enhanced. Even older systems are being partly modernised in terms of technology and control. Spare part availability, as well as preventive maintenance, are becoming increasingly important. Customers want to analyse all their data in-house

to be able to enhance efficiency and quality."

Leistritz has developed a number of comprehensive maintenance programmes for compounders, including the use of smart glasses. "Just recently we have also started to offer online control of the transmission bearing and main drive," adds Jürgen Sauer. "If the customer requests it, we can access the control unit via a safe VPN link and optimise the process or solve problems quickly. We also offer customised training sessions - professional handling of the extrusion line can often enhance profitability."

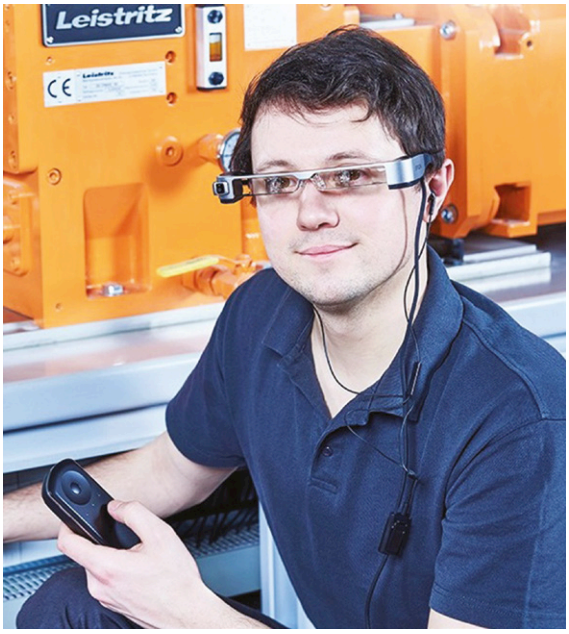


PHOTO: LEISTRITZ

Right: A Leistritz engineer demonstrates the company's augmented reality service support technology

Guaranteed response

Sauer says that an important aspect of the company's maintenance contracts is guarantees on certain reaction times and spare part availability. "We launched a repair centre in order to support customers in the quickest possible way. Worn-out liners can be exchanged within a few days, and detailed reports on wear provided. Cleaning and if necessary re-boring of cooling channels can be undertaken, as well as replacement of screw elements. We are also shortly installing a machine for disassembling screw elements."

As well as remote servicing, where the service technician in an office can directly connect to the customer's control unit via a safe VPN channel to remedy problems, Leistritz has also recently introduced smart glasses to provide augmented reality support. Combined with intelligent software, these present customers with the opportunity to communicate easily and interactively with the Leistritz service team. The glasses comprise a camera for filming and photography, as well as a display that can quickly visualise instruction steps directly in the workplace, for example when standing in front of the machine in the production hall. All knowledge is shared in real time.

Below: Senseye's failure forecasting data can be sent to any internet-connected device

PHOTO: SENSEYE

Leistritz says it is currently working with a number of customers to improve control systems and modernise older extrusion lines to increase efficiency. "Extrusion lines will have to communicate in the future," Sauer says. "This means they have to indicate if maintenance becomes necessary, a problem has arisen, or even if the operation needs optimising to improve quality. By installing sensors, extrusion lines can work in a self-optimising mode. The Leistritz Industry 4.4 concept will implement this. Autonomous quality control will become a major issue and we have developed an inline rheometer to help achieve this."

A number of additional third-party hardware and software tools are also available to help maintenance engineers develop their own monitoring and maintenance systems. **EZmaintain** has developed a range of Industry 4.0/Internet of Things (IoT) sensors to monitor equipment performance through temperature and pressure parameters. "Operational machines provide data that can be analysed using Artificial Intelligence tools to predict machine failure way ahead," says Rick Modi, Founder and Chief Executive Officer of EZmaintain. "Most new machines offer sensor outputs that can be integrated into PLC for data analysis. Smart cloud base software can help to process data faster using multiple sensory inputs at any given time."

EZmaintain offers its computerised maintenance management software (CMMS) along with smart IoT sensors for monitoring extruders and compounding machines, which can also be used for improving preventive maintenance. "For example, companies connect our IoT vibration and temperature sensors to monitor HV electric motors," says Modi. "The sensor sends a signal via WiFi to our cloud software that processes and sends alerts to the user if the vibration of the motor increases, which could be due to bearing, greasing or overloading issues. As well as vibration and temperature, we are building smart IoT sensors in the areas of sound and pressure measurement, which will allow companies to predict failure before it occurs - reducing production losses and saving material waste." ›

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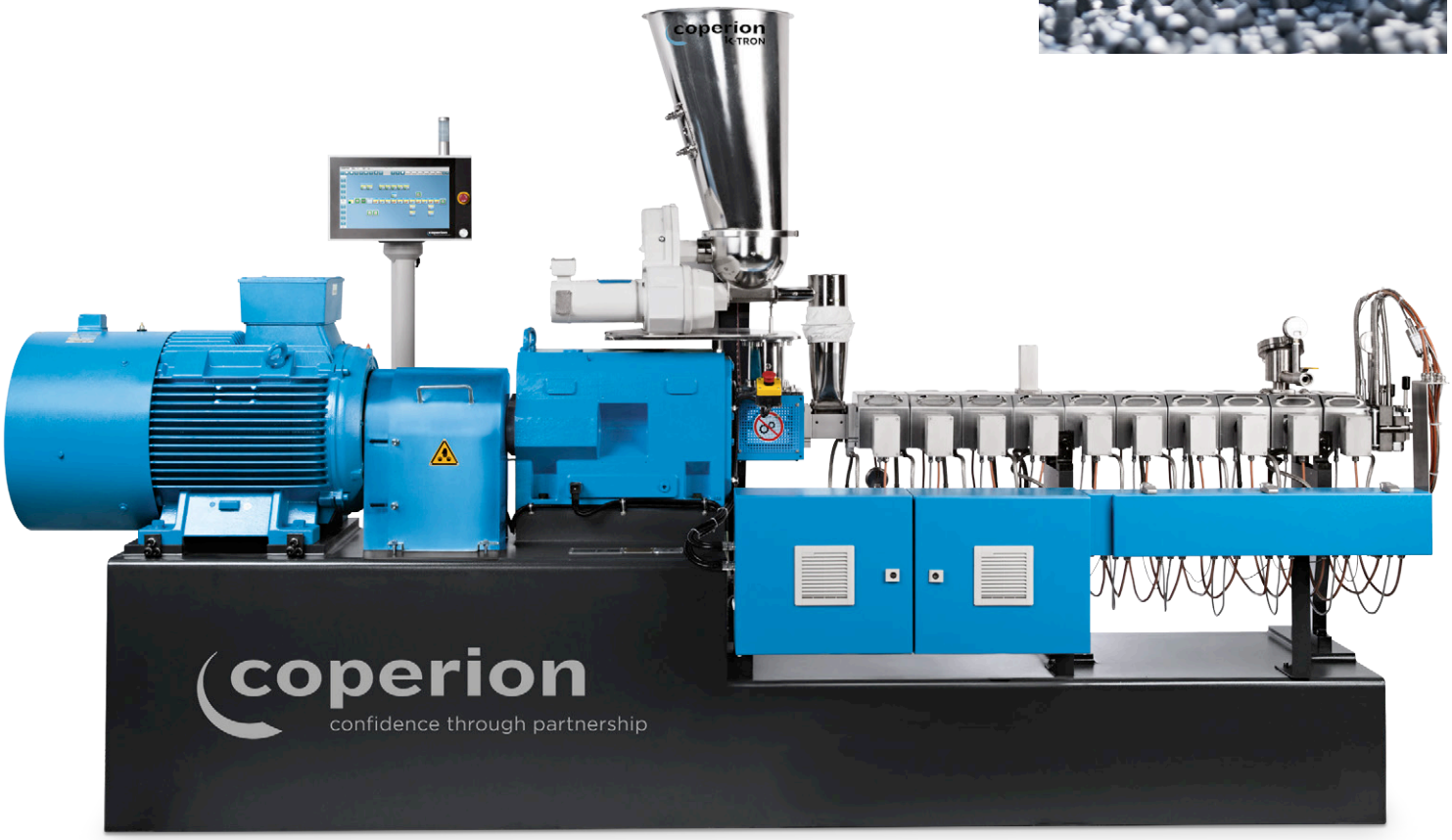

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PHOTO: SCHENK PROCESS

Above: Remote access tools such as Schenck's PROXiQ are becoming the norm in today's compounding plant

Lubrication matters

Swedish company **Asalub** developed WLubeMon for monitoring the lubrication system of machines such as extruders. The company says the new wireless system monitors that the right amount of lubricant is fed at the right time to the bearings. The system works completely independently of the machine control and is capable of monitoring all types of grease lubrication systems, including manual types. While the meter - LubeMon - has been available some time, it required cable transmission. The WLubeMon now comprises a precision grease meter that measures the amount of lubricant fed into the lubrication point. The wireless meter communicates on a regular basis with a control unit and the system has alarms both for high and low lubricant volumes, as well as statistics and log functions. Each control unit can monitor up to 20 individual meters at a distance of 75m.

Brüel & Kjaer Vibro developed the SetPoint product line for condition monitoring. The company says that intelligent analytics is embedded within the SetPoint edge device (vibration monitor) that determines what data needs to be sent to the OSIsoft PI System and what does not. This approach eliminates the need for stand-alone vibration data infrastructure without sacrificing the functionality and data visualisation requirements imposed by rotating machinery engineers and vibration analysts. SetPoint technology can act as both an API 670-compliant machinery protection system and as a condition monitoring device, and the two capabilities can be de-coupled from one another if needed, allowing it to work with an existing machinery protection system.

Senseye has introduced a cloud-based software product for predictive maintenance. The company says that it can help manufacturers avoid downtime and save money by automatically forecasting machine failure without the need for expert manual analysis. Its intelligent machine-learning algorithms allow it to be used on any machine from any manufacturer, taking information from existing industrial IoT sensors and platforms to diagnose failures automatically and provide the remaining useful life of machinery all at scale and in the cloud.

Handling access

Meanwhile, materials handling and automation specialist **Schenck Process** developed the PROXiQ Remote Access System for early identification and rapid response to potential faults that are key to effective, predictive maintenance. It allows its experienced service technicians to access machine controllers from anywhere in the world, 24/7, to provide early diagnosis of any potential faults. "An early intervention significantly drives down support and repair costs," says Manfred Bruckner, Global Director – Plastics at Schenck Process. "Combined with a service contract, the remote access concept behind PROXiQ also reduces or eliminates machine downtime by enabling better predictive maintenance."

Remote access is available to the customer's own service group and, at the customer's discretion, to Schenck Process staff worldwide. With PROXiQ, a robust industrial router is installed in the vicinity of the machine, providing access via a local cable or mobile phone network. VPN software installed on the service technicians' computer establishes an internet connection from both the router and the computer to the service portal server at Schenck Process. Technicians can then access all systems connected to the local network at the router's machine port and use versatile diagnostic tools as though they were directly connected by cable to the machine controller. The company says that PROXiQ is highly secure – access is only granted via certificates issued by the manager of the PROXiQ-Portal while the server is protected behind a firewall to prevent unauthorised access. All communication is encrypted and protected by passwords to ensure the highest possible security.

CLICK ON THE LINKS FOR MORE INFORMATION:

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Top 2018 for FIMIC!

This year the Italian Company FIMIC, manufacturers of automatic and continuous melt filters dedicated to plastic waste recycling, is not only improving its presence in new markets such as Africa and South-East Asia, but it is also widening its marketing actions as well as taking part in more and more exhibitions and conferences.

With over 1.500 followers on Facebook® and almost 100 on LinkedIn®, FIMIC publishes on a weekly basis several postings, not only on trials run at FIMIC with potential customers who need to see first-hand its melt filtration technology and especially the quality of the final product, but also updates on either the company's activities and the forthcoming exhibitions.

All coming-up exhibitions, videos and pictures of FIMIC's presentations as well as updates on the people who make FIMIC an example of mid-small size business success are always online.

Starting from this year's PRC in Nashville, where FIMIC held a presentation on its latest developments, other presentations will be made at PlastKo in Czech Republic, PRW in Germany and finally the Packaging & Recycling conference in Milan, the first recycling conference 100% made in Italy.

FIMIC's whole commercial team will soon reach Amsterdam to attend PRE's Plastic Awards, where FIMIC is a finalist for the "Best Technology Innovation in Plastic Recycling" with its ERA Melt Filter, double filtration in only one machine.

FIMIC is an active friend and part of the communication board of PRE (Plastic Recyclers Europe), the European association of plastic recyclers that is working hard to promote professional plastic recycling and the steps to create a real circular economy.

In America, FIMIC is now part of the APR (Association of Plastic Recyclers) and was chosen in February this year to present its technology as an innovation in the American plastic recycling market. In case you weren't there, you can easily listen to this presentation on FIMIC's social media pages.

FIMIC's American presence this year will also be furtherly improved at the NPE exhibition in May, with its own booth, where a RAS325 Melt Filter will be on display, right in front of ZARS USA (FIMIC's Representative in North America). Two exhibitions on American soil this year for FIMIC!

2018 will also mark the 55th anniversary of FIMIC's creation. At the PLAST Exhibition in Milan, on May 31st, about 200 customers and partners will gather together with FIMIC's team, to celebrate this fantastic result, made possible by three generations of the same family. The whole team will be there and customized invitations were sent to each participant, to guarantee the best possible event planning. Music, food and drinks will be based on Italian-made products, to respect the company's mood and philosophy.

FIMIC's presence in Poland is heavily consolidated since several years, so its participation to the Plastpol exhibition in Kielce (right in between NPE and Plast shows) is always granted!

Finally, FIMIC's participation to both Fakuma and PlastEurasia in Germany and Turkey will also mark the Company's activity in 2018. The first FIMIC Melt Filter will be installed in Germany this year while Turkey re-confirms its position as one of the most successful sales markets (for two years in a row).

Soon FIMIC will release a new promotional video, an essential part of its marketing impact; the Company was able during the last years to transfer its passion and professionalism also thanks to an efficient communications campaign.

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Chinaplas set to break space/visitor records

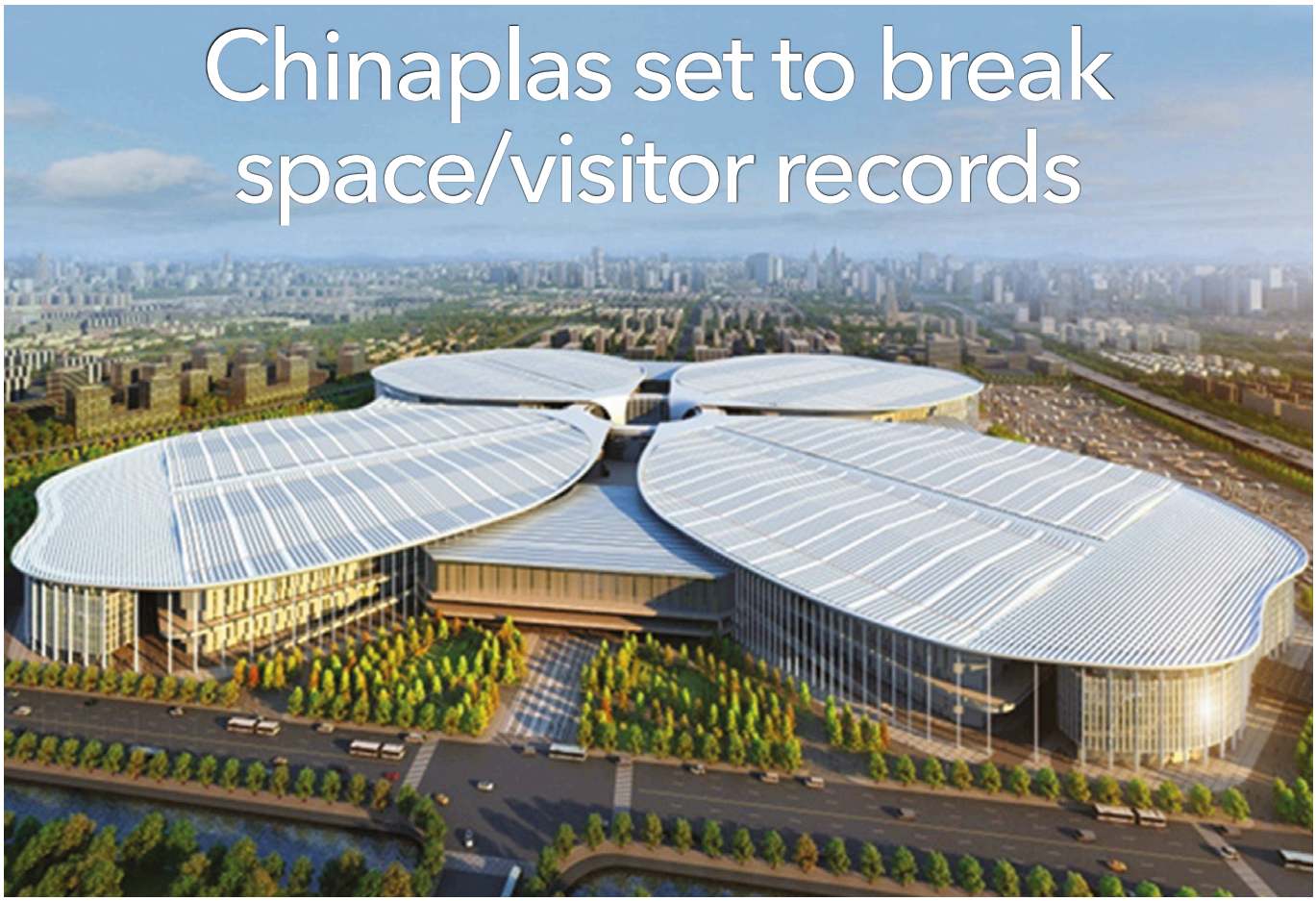


PHOTO: SHANGHAI MUNICIPAL TOURISM ADMINISTRATION

Chinaplas relocates to a new and larger venue in Shanghai for this year. We explain why and take a look at some of the exhibits of interest to compounders

Chinaplas 2018 takes place on April 24-27 in a brand new Shanghai venue – the National Exhibition and Convention Centre (NECC) in the city's Hongqiao district. The annual exhibition, which rotates between the cities of Shanghai and Guangzhou, had faced space shortages at its former Shanghai location (the New International Expo Centre in Pudon district) since 2012 due to the large growth in demand from exhibitors.

"Previously, when we held the show at the Shanghai New International Expo Center in Pudong, we had used up all the indoor exhibition halls," said Ada Leung, General Manager at show organiser Adsale. "By moving to the new venue, NECC, Adsale can fulfill the strong demand for exhibition space immediately. This relocation to the new venue is also good for the long-term development of Chinaplas."

The NECC is huge: with a footprint of 1.47m m² it is claimed to be the largest single-block building and exhibition complex in the world. The design of the NECC is like a "blooming four-leaf clover", centred on a commercial plaza providing numerous catering services. The indoor exhibition area amounts to 400,000 m², comprised of 13 large halls and three small halls.

The total exhibition area set aside for Chinaplas 2018 is 340,000m², a significant increase from the 250,000m² in Guangzhou in 2017 and 240,000 m² at the previous Shanghai venue in 2016. Exhibiting companies are estimated to reach 4,000 this year, compared with 3,465 in 2017. Adsale says it is targeting visitor numbers at around 180,000 at Chinaplas 2018, up from 155,258 in 2017.

The move to the NECC has allowed a rationalisation of technology-themed halls: extrusion technology will be in the eastern part of the NECC, injection moulding in the west, and blow moulding in the south. Adsale is also arranging exhibits from similar categories in close proximity. For example, film technology near plastic packaging machinery and injection moulding technology near smart manufacturing equipment. All European pavilions

Main image: Chinaplas 2018 relocates to the huge NECC in Shanghai's Hongquoi district to meet growing demand for exhibitor space

Right: Clariant will be using augmented reality tools to highlight applications for its materials in electric vehicles

PHOTO: CLARIANT

will be gathered together in Hall 2H.

Even with NECC's larger capacity, Adsale says stands for Chinaplas 2018 were oversubscribed. That prompted the launch of the Young Tech Hall, which will gather together 350 new exhibitors from diverse fields.

A series of conferences and events at Chinaplas 2018 will cover a number of important industry themes: Industry 4.0, Tech Talk, Medical Plastics Connect and CMF Inspiration for Design x Innovation. In addition, more than 80 technical seminars will cover materials and technology in automotive, E&E and other sectors.

Clariant will be using the power of augmented reality to allow visitors to its stand at the show to see how its products can be used in future electric vehicles (EVs). Weight reduction targets, for example, can be met using its Hydrocerol foaming agents. These can deliver weight savings of up to 20%, together with shorter production cycles, in parts such as running boards.

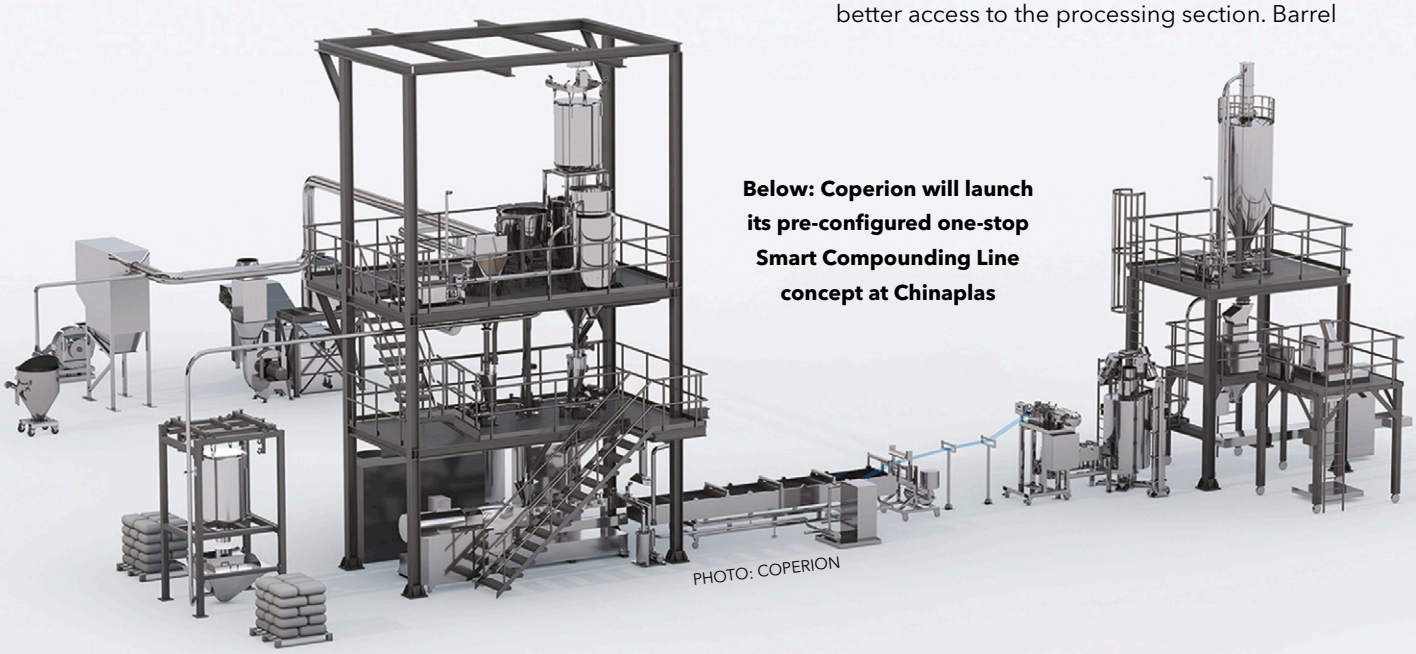
The company says the aesthetics of interior TPO parts can be maintained for longer using its Addworks ATR 146 heat and light shielding additive, which meets the demanding fogging and VOC limits of the automotive industry. And fire safety can be enhanced using its Exolit OP 1400 non-halogenated phosphinate based flame retardant. This is said to provide good processing stability at low dosage levels in polyamides used in electrical and structural parts. It is suitable for applications in hot and humid environments.

Clariant's automotive EV collection will be completed by its PV Fast Orange colorants, part of a range of low halogen pigments suitable for use in EV charging cables, charging stations and connectors, where they deliver good resistance to weathering and heat.

› **www.clariant.com**

Coperion will be promoting its new Smart Compounding Line concept, a range of pre-configured compounding lines optimised for specific plastics applications – such as alloying or incorporation of flame retardants, fibre or mineral reinforcements – and focused on the needs of the Asian market. With throughputs of up to 1,000 kg/h, each comprises raw material handling, feeders, extruders, pelletisers, conveying and bagging components all sourced from the Coperion or Coperion K-Tron product line.

At the heart of the Smart lines is the company's STS Mc^{11} extruder, an example of which will be shown configured for masterbatch production. The STS 35 Mc^{11} machine provides a torque of 11.3 Nm/cm^3 and screw speeds of up to 900 rpm and incorporates a number of new developments to improve handling and cleaning. These include a redesigned base frame with integrated water manifolds and wiring connections and a new easy-clean insulation cover arrangement that offers better access to the processing section. Barrel



Below: Coperion will launch its pre-configured one-stop Smart Compounding Line concept at Chinaplas

PHOTO: COPERION

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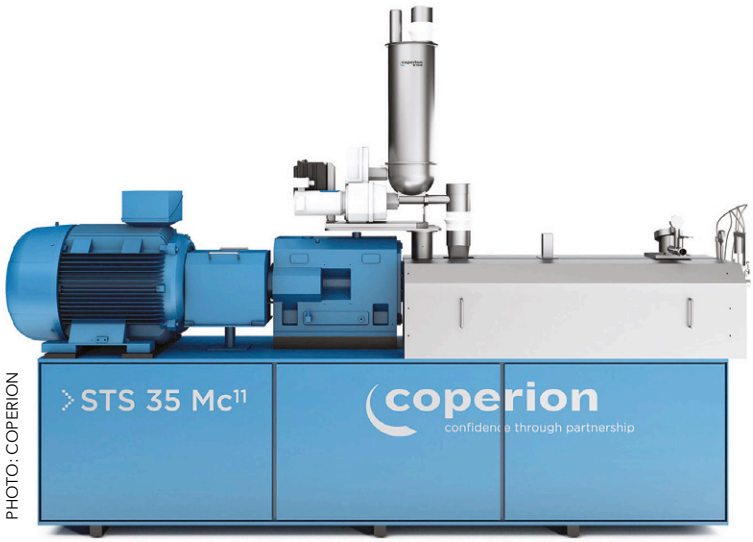

PHOTO: COPERION

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

shells are insulated to reduce the temperatures on the process section surface.

The machine also features a removable sleeve in the barrel opening, which helps save time during job changeovers, while the vent port is now equipped with a tray to catch drips and overflows. Die head updates include a fast-opening die head, again making cleaning between jobs a simpler process. The STS 35 Mc¹¹ will be shown with a Coperion K-Tron T35 volumetric twin screw feeder, which is said to be designed to provide economic and relilable feeding of powder additives.

The company will also exhibit a ZSK 58 Mc¹⁸ extruder with 58mm diameter screw. This high end model is locally assembled and will be shown fitted with two Coperion K-Tron feeders: a K-ML-SFS-KT20 Compact Twin Screw Feeder designed for high accuracy at low feed rates and a K2-ML-D5-S60 Single Screw Feeder for handling free flowing pellets or powders.

The Coperion display will be completed with an SP Treasure strand pelletiser. Assembled at the company's plant at Nanjing, the machine uses a cutting chamber designed and produced by Coperion Pelletising Technology in Germany and is intended to process highly abrasive reinforced materials. It offers a working width of 220mm and can process up to 55 strands at throughput rates of up to 2,500 kg/hr.

› **www.coperion.com**

Coperion K-Tron will present a K2-ML-D5-T35/S60 Quick Change feeder featuring its ActiFlow bulk solids activator and Electronic Pressure Compensation (EPC) technology in combination with a 2400 Series vacuum receiver for refilling.

The T35/S60 Quick Change feeder allows the entire feeding module to be removed, with the screws in place, and replaced with a second unit. This allows cleaning to be taken offline so the feeder can be put straight back to work. It is available with single screw modules for handling free-flowing powders and non-flooding materials such as pellets, or with twin screws for floodable powders and sticky materials.

Designed to work with Coperion K-Tron's full range of gravimetric feeders, Actiflow is a smart bulk solids activator that is said to eliminate bridging and rat-holing. EPC technology provides steady pressure compensation in loss-in-weight hoppers and outlets to improve accuracy and reliability. The electronic system is said to be less costly and easier to install than traditional mechanical alternatives.

The company's display will be completed with a K-ML-BSP-150-S Bulk Solids Pump. Designed for gentle feeding of free flowing granular materials, the unit uses vertical rotating discs that create feeding ducts to reliably move material without the need for screws. Capable of feeding rates of between 34 and 6,700 dm³/h, the units have only one moving part and can be cleaned in seconds, according to the company.

PHOTO: COPERION

Right: Coperion K-Tron's Bulk Solids Pump has just one moving part

› **www.coperion.com**

Covestro will introduce its Makrolon Rx3440 polycarbonate for medical applications to the Chinese market. Pitched at IV connector components, the new grade is said to offer better strength retention and chemical and oncology drug resistance than current alternative options and can be used to produce thinner designs without compromising on safety.

The company developed a special chemical testing apparatus for luer connectors during the development of the Rx3440 grade, which meets ISO 10993-1 biocompatibility and USP Class I standards. The apparatus enables immersion tests to be carried out under real world loadings and allows forces to be adjusted to accelerate results. The company says it can make the test equipment available to potential customers to evaluate luer development projects.

› **www.covestro.com**

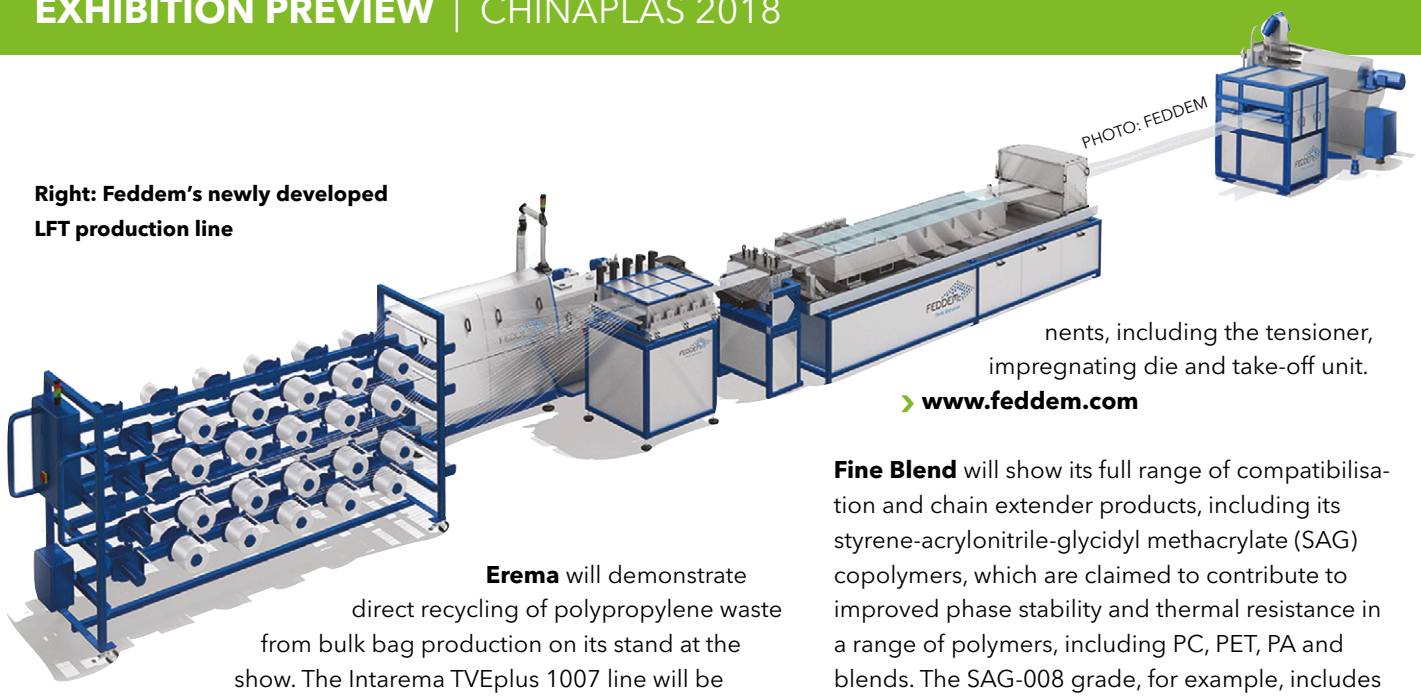

PHOTO: FEDDEM

Right: Feddem's newly developed LFT production line

Erema will demonstrate direct recycling of polypropylene waste from bulk bag production on its stand at the show. The Intarema TVEplus 1007 line will be equipped with a Laserfilter melt filtration unit, which allows direct recycling of even heavily contaminated and printed bag waste with no need for pre-shredding.

The company will also be promoting its Smart Factory concept, which allows lines to be equipped with online quality management tools to continually record MVR and colour values of materials during recycling. This can be integrated with its re360 MES to allow direct transfer of critical production and machine data to a central computer system.

› **www.erema.at**

Feddem will show its pultrusion line concept for manufacturing LFT compounds for the first time in China. The new production concept is based on the company's ICX twin screw extruder technology design, which has been combined with Feddem's own-developed pultrusion technology.

The company says its goal in the LFT line development was to produce a flexible and cost effective production system capable of producing high quality compounds. To that end, it says it has overhauled and optimised all relevant line components, including the tensioner, impregnating die and take-off unit.

› **www.feddem.com**

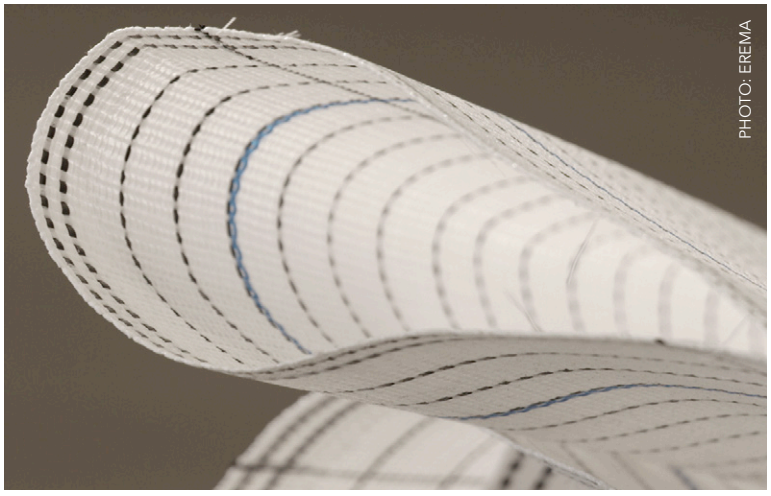

PHOTO: EREMA

Below: Erema will demonstrate direct recycling of PP woven bulk bags at the show

Fine Blend will show its full range of compatibilisation and chain extender products, including its styrene-acrylonitrile-glycidyl methacrylate (SAG) copolymers, which are claimed to contribute to improved phase stability and thermal resistance in a range of polymers, including PC, PET, PA and blends. The SAG-008 grade, for example, includes a high concentration of epoxy groups, which can react with the terminal groups in recycled polyesters to prevent further degradation, increasing melt viscosity and improving processing stability.

The company will also present its EMI series of binary random low molecular weight SAN, which can be used as a flow extender or masterbatch carrier for ABS and PC/ABS blends. Other products on show include the CMG5701 maleic anhydride compatibiliser, which has been developed for use in glass reinforced PP LFT production. It is formulated with lower MAH and other volatile components to provide low odour and VOC emissions.

› **www.fineblend.com.cn**

Glion New Material will present its polyphenylene sulphide (PPS) polymers at Chinaplas. Produced at its 30,000 tonne production unit in the Changshou Economic and Technological Development Zone, the company can supply material in powder or pellet form for a wide range of applications in sectors such as aerospace, automotive, electronics, filtration, and water distribution. Grades are available in both physical formats covering melt flow rates from 120 to 1,200 g/10min. Characteristics include high thermal and chemical and flame resistance, good dimensional stability and electrical performance, and simple processing.

› **www.cqglion.com**

Gneuss will highlight its full range of systems and equipment for polymer recycling with the focus on its Gneuss-Processing Unit (GPU), which comprises the company's Multi Rotation System (MRS) extruder combined with a Rotary Filtration System and Online Viscometer.

The multiple screws in the MRS extruder are claimed to provide very good devolatilisation of the polymer melt. Multiple satellite screws (which rotate in the opposite direction to the main screw)

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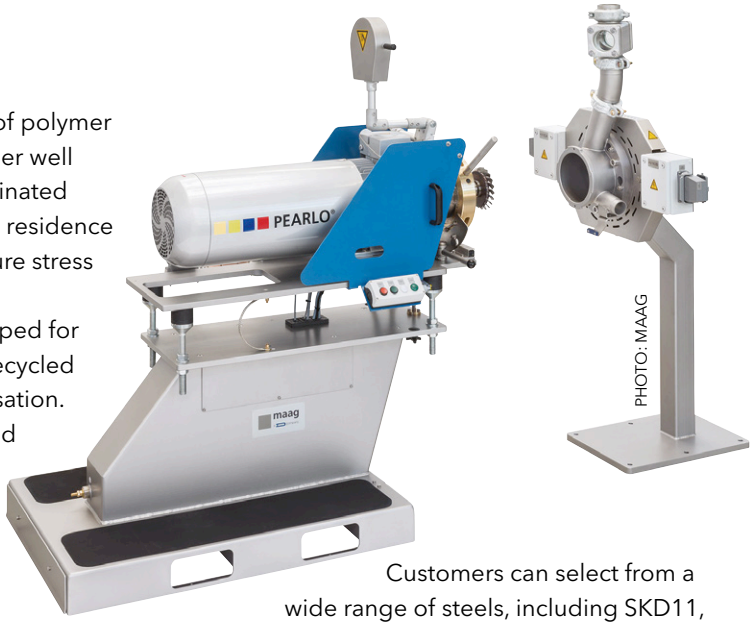

PHOTO: MAAG

Right: Maag will show its high performance Pearlo pelletiser at Chinaplas

ensure a rapid surface area exchange of polymer melt under vacuum, making the extruder well suited to processing of heavily contaminated polymers. Characteristics include short residence time, low shear and minimal temperature stress on the polymer.

GPU systems were originally developed for PET recycling and can process 100% recycled material without pre-drying or crystallisation. Resulting product meets FDA, EFSA and Invima food contact requirements.

› **www.gneuss.de**

KraussMaffei Berstorff will show its latest ZE-CN twin screw extruder in Shanghai, a high performance model aimed specifically at the Chinese compounding market.

The ZE-CN twin-screw extruder generation is claimed to provide 15% higher outputs than previous ZE Performance series models. The company says the new model also offers greater flexibility in process applications. Features of the ZE-CN include state-of-the-art control software that is capable of seamless integration into a digital factory (Internet of Things) environment and is ready for Industry 4.0 implementation.

Based on KraussMaffei Berstorff's proven extrusion technology, ZE-CN series compounding extruders are said to be characterised by excellent product quality, easy operation and uncompromising reliability. The new series is assembled at the company's production facility at Haiyan, which is also the service hub for Chinese and Asian customers.

› **www.kraussmaffeiberstorff.com**

Lesun Screw will display a selection from its wide range of replacement screw element, barrels and shafts for parallel twin screw compounding extruders. The company can supply replacement or custom-designed components for machines from Chinese and most international manufacturers and covers screw diameters from 20 to 30mm.

Customers can select from a wide range of steels, including SKD11, K110 and W6Mo5Cr4V2 tool and SuS18 stainless grades. The company also offers a broad range of heat treatments and wear-resistant powder metallurgy options.

› **www.lesunscrew.com**

Lushan New Materials will promote its range of functional resins and compatibilisers. Products highlighted will include coupling agents for glass and mineral filled PP and PP alloys, impact modifiers for PA compounds, and compatibilisers for use in production of wood plastic composites and HFFR compounds for the wire and cable industry. Lushan also offers a range of functional polymers and adhesives for use in production of multi-layer oxygen barrier and aluminium composite pipes, steel pipe coatings, and solar modules.

› **www.cnlushan.com**

Below: KraussMaffei Berstorff will launch its ZE-CN compounder line, shown in a 52mm variant

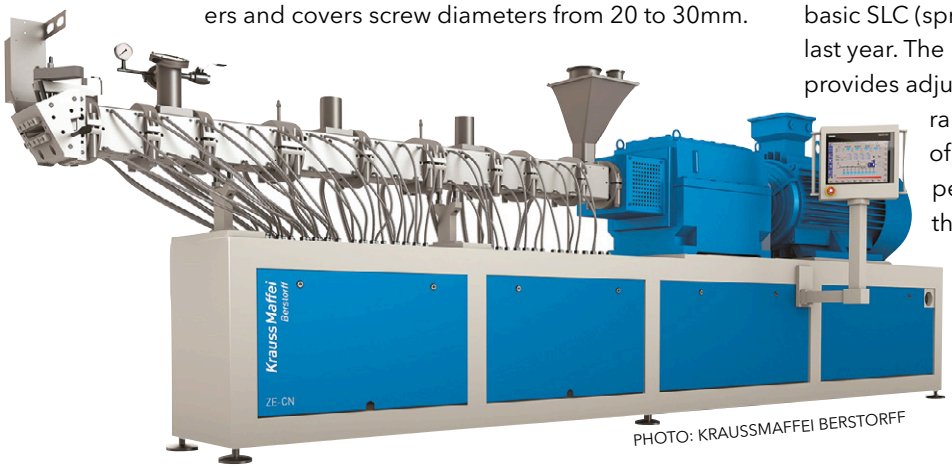

PHOTO: KRAUSSMAFFEI BERSTORFF

Maag's focus for Chinaplas will be on its pelletising systems, including the Zhuli, Pearlo, Baoli and M-USG lines. The show will also be the first opportunity for it to show the Ettlinger melt filter products – Maag acquired Ettlinger at the beginning of this year.

The latest addition to the Zhuli underwater pelletising line is the MAP, which builds on the basic SLC (spring loaded cutter) design launched last year. The MAP (manual adjustable pelletiser) provides adjustable knife pressure to extend the range of application. The Pearlo range of high performance underwater pelletisers combines technologies from the previously independent Gala and Automatik businesses. The machines offer efficient and flexible operation at throughput rates up to 36,000 kg/h. Features include electronically controlled knife feeding.

The company will introduce the

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Right: Sikora's Purity Concept system is designed for lower volume pellet inspection

third generation of its Baoli dry-cut pelletisers. Offering working widths up to 300mm, Baoli units are designed for processing up to 75 polymer strands. The latest version provides a more compact design with better accessibility for cleaning as well as variable height adjustment. The Maag display will be completed with examples from the M-USG underwater strand pelletisers. Offering throughputs up to 20,000 kg/h, the units are said to offer consistent pellet quality and high system availability.

Ettlinger will show its performance-enhanced melt filter type ERF350, which is designed to filter plastic melt with impurity levels up to 18 % with very low losses. The unit offers a maximum throughput of 3,800 kg/h, depending on the type of melt and degree of impurities, and is suitable for commonly used polyolefins and polystyrenes as well as technical plastics such as styrene copolymers, TPE and TPU.

› **www.maag.com**

Below: An LFT production line developed by ProTec

ProTec will present its pultrusion technology for production of long fibre reinforced thermoplastics (LFTs) together with the latest addition to its materials drying range – the RDM-40.

ProTec's pultrusion lines are capable of manufacturing LFT pellets from many fibre-polymer combinations, including challenging process pairings such as carbon fiber and PP. Other reinforcement options include glass, steel, carbon or aramid fibres. Lines provide throughputs of up 1,000 kg/h, depending on the application. The company can provide standard models or custom engineer a solution to suit specific needs.

Suzhou Hechang Polymeric Materials (HCJH), which is based at Suzhou in Jiangsu, has been using a ProTec LFT line since last summer. It is producing PP, PA, ABS and PBT LFTs predominantly in combination with glass fibres. The 64-strand line is equipped with a Somos Gramix gravimetric dosing and mixing system.

ProTec will also be showing its flexible RDM-40 resin dryer. This mobile auxiliary unit features an Industry 4.0-capable controller, and is the latest addition to a range that offers throughputs from 5 to 150 kg/h and drying temperatures from 60°C to 140°C.

› **www.sp-protec.com**

Sikora will show its Purity Scanner Advanced system for online inspection and sorting of plastic material. The system combines X-ray and optical camera systems and is claimed to be the only technology on the market at present that can reliably detect contamination on the surface as well as the inside of plastic pellets. Contaminated pellets are automatically sorted out. ›

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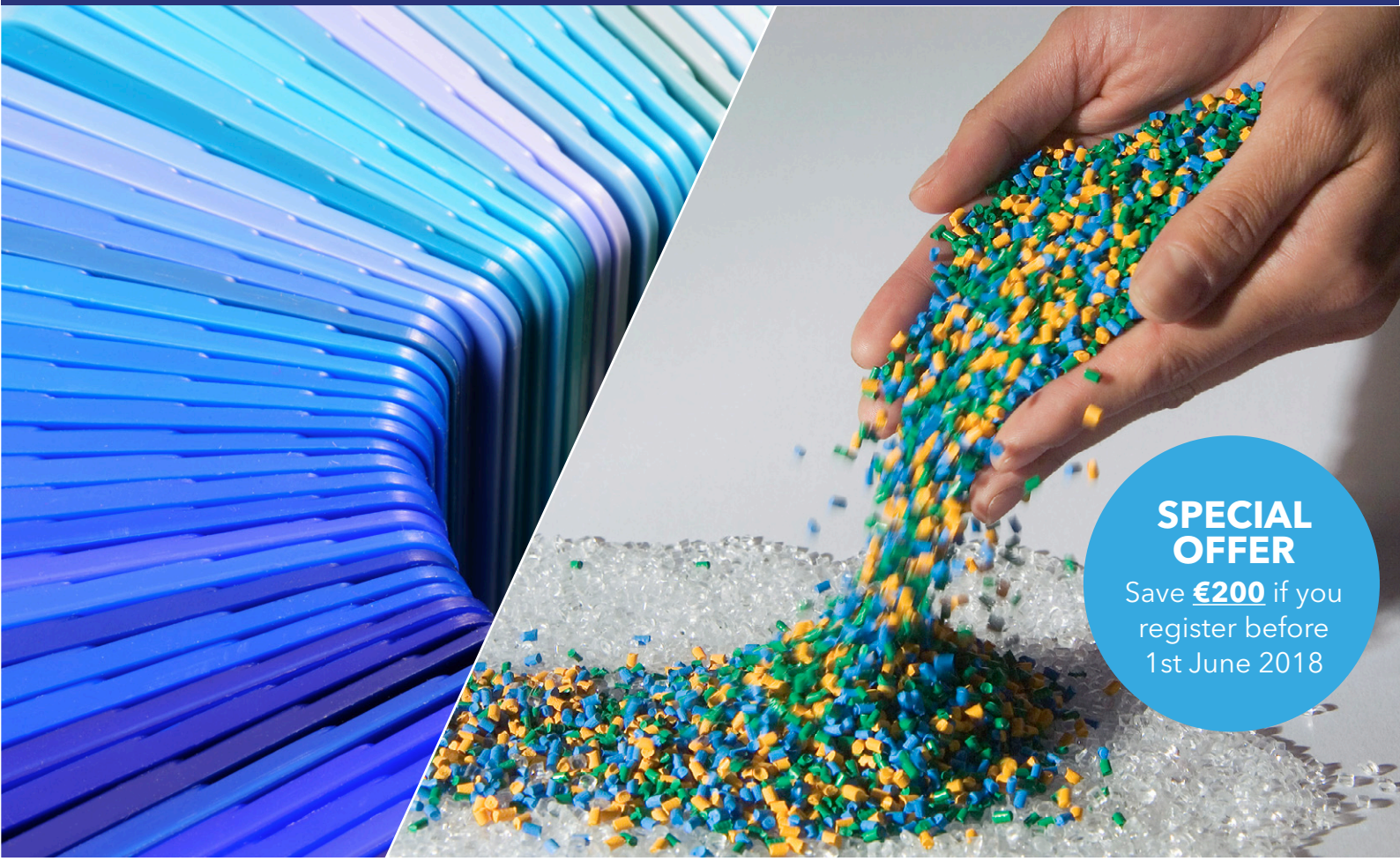

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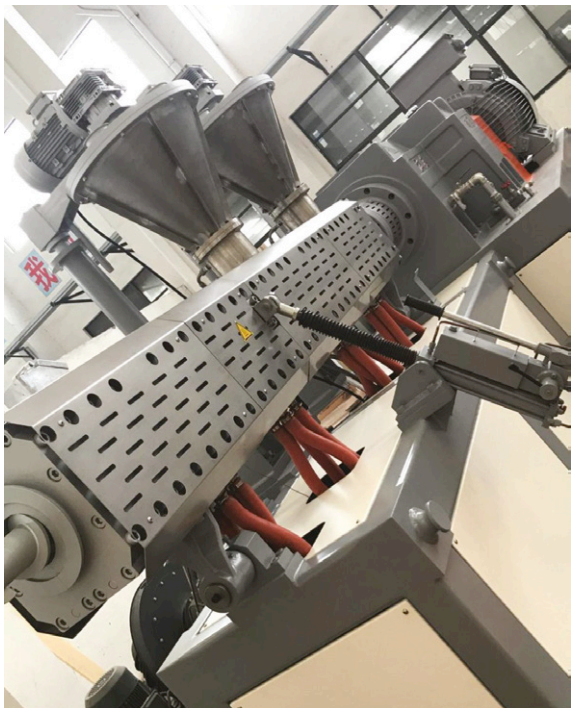

PHOTO: TOTAL-CORBION

Right: A Xinda SJW-140 co-kneader extruder ready for shipping to Brazil for HFFR compound production

For smaller material throughputs or for applications where sampling analysis or incoming goods inspection is sufficient, Sikora offers the its Purity Concept systems. These analysis devices can be equipped with X-ray technology, optical cameras or infrared sensors and can detect contamination in pellets, flakes, films/tapes and crosshead parts.

› **www.sikora.net**

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 injection moulded speaker housings by Os-Tech and Usher, toys by Genius Toy Taiwan, PLA-lined paper cups from Totempak, coffee capsules from Guanghe, foamed ice cream packaging from Synbra, and non-woven fabrics from Yangtze. The company will be demonstrating the heat resistance of its latest PLA grades by serving visitors with a fresh coffee produced using a single serve PLA capsule and dispensed into a PLA cup.

› **www.total-corbion.com**

PHOTO: XINDA

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

Wittmann will show examples from its Aton range of material drying, Feedmax handling and Gravimax blending equipment at Chinaplas.

Aton dryers use a segmented wheel with multiple chambers each containing a loose fill of desiccant balls, which in combination with the company's 3-save process control enables optimal energy use and consistent low dew point. The company will display a model fitted with an integrated dry air system for use in demanding optical applications.

Wittmann will also show a number of loaders from its Feedmax S 3-net and Feedmax B series as well as a Gravimix G34 gravimetric blender offering a throughput of up to 200 kg/h and a DOSIMAX volumetric blender.

› **www.wittmann-group.com**

Xinda Corp will display examples from its range of co-rotating twin screw and multi-flight co-kneader compounding extruders on its stand at the show, including a PSHJ-35 clamshell barrel twin screw model and SJW-45 and SKW-105 co-kneaders.

Offering solutions for commodity and engineering plastics compounding, masterbatch and cable compound production, Xinda claims to have around 1,800 lines operating worldwide. Its product range includes twin screw compounding extruders from 20 to 90mm diameter offering throughputs from 5 to 1,000 kg/h.

Kneader extruders include the company's long established SJW three-flight models, which cover the range from 45 to 200mm and provide throughputs from 40 to 5,000 kg/h, and the recently introduced SKW four-flight versions. The latter are available in 85, 105 and 125mm diameter variants offering typical throughputs of between 200 and 1,500 kg/h in HFFR and silane XLPE cable compounding applications (150 to 1,200 kg/h for typical masterbatch duties).

› **www.xindacorp.com**

Chinaplas 2018 – Key Information

Dates: April 24-27, 2018 **Opening Hours:** 09:30-17:30 daily **Website:** www.chinaplasonline.com
Venue: National Exhibition and Convention Centre (NECC), Hongqiao, Shanghai, China
Organiser: Adsale Exhibition Services
Admission: 4-day pass costs RMB80 on site or RMB50 online (before 21 April)

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PHOTO: VÖLPKER SPEZIALPRODUKTE

The greening of processing aids

Recent feedstock shortages set some wax producers looking for alternatives and have led to the introduction of bio-based and enhanced performance options, writes Peter Mapleston

Speciality waxes are a staple of plastics compounding that are used both to improve properties such as flow and gloss and for enhancing dispersion of pigments and other additives. There are numerous types available and most are derived from fossil-based raw materials – typically oil for low molecular weight polymer waxes and brown coal (lignite) for montan waxes. With long and successful histories, these products continue to play a vital role in the compounder's toolbox but producers continue, for reasons ranging from supply security to environmental, to look for alternatives.

Manufacture of traditional montanic wax products is based on solvent extraction from lignite. Commercially viable lignite deposits exist in only a few locations, including Germany in Europe, California in the US, and Yunnan and Jilin in China. Global shortages of available raw materials earlier this decade started a search for replacements, some of which have since come to market.

Völpker Spezialprodukte in Germany is a leading producer of montan waxes, which it sells under the Waradur brand name. It increased its offering around three years ago when it acquired BASF's montan wax business. Lutz Matthies, the company's Head of Business Development, says that, due to their special properties, montan waxes have been highly valued in the plastics industry as multifunctional additives for decades. They act as excellent effective viscosity reducers (flow improvers), mould release agents and dispersing aids for pigments and other additives, all at the same time. Montan ester and acid waxes are used in PVC, polyamides (PA), polycarbonate (PC), thermoplastic polyurethane (TPU) and styrene maleic anhydride (SMA).

Main image: Speciality wax additives are a staple of the polymer compounding industry, improving attributes such as processing and dispersion

Matthies says that while Montan wax derivatives are used by preference in the processing of engineering plastics, their benefits can also be taken advantage of in PVC processing, particularly where demands on the quality of the end products are especially high. In terms of chemistry, for example, they are similar to fatty acid esters but benefit from considerably longer carbon chains. As a result, montanic esters display low volatility and this, together with their very good compatibility with PVC, means they exhibit a low tendency to migration. Even at high addition rates in PVC applications, he says they have a very low tendency to form a coating on the finished part.

Release and flow

In PVC, montan waxes function primarily as release agents by providing external lubrication. They also improve the surface quality and smoothness and provide the final product with a superior gloss. Montanic esters are used in injection moulding and other applications where good melt flow is required, as they also reduce the melt viscosity – internal lubrication. In high-speed cable extrusion they exhibit advantageous lubricating properties, especially at the tip of the processing screw.

Völpker says that its Waradur OP grade tends to have a slightly lower external lubrication effect than Waradur E. The latter, on the other hand, lowers the melt viscosity slightly more, which results in lower extrusion pressures (Table 1).

Matthies explains that montan waxes are particularly advantageous in PVC, where their effect on melt viscosity is much greater than that of glycerol monostearate and complex esters (Figure 1). He says this performance advantage is particularly interesting in applications where high shear forces occur, for example in injection moulding or coextrusion of window profiles.

During extrusion of PVC window profiles, montan waxes improve gloss (Figure 2) and can also solve problems such as 'chattering' or 'juddering' if they are used to partially replace primarily external lubricants such as Fischer-Tropsch paraffins or PE waxes, Matthies says. This effect is attributed to the reduction of the polymer melt viscosity. "Experience has shown that the shrinkage of the extrudate during calibration is improved in this way," he says.

Another advantage of montan waxes is their relatively high melting point. This means that they reduce the Vicat softening point in, for example, PVC injection moulding applications by much less than common fatty acid esters, which have significantly lower melting points (Figure 3).

Newly renewed

Velox is the exclusive distributor of Völpker's waxes for plastics applications in various European countries, supplying not only montan waxes but also other types. The distributor highlights Voelpker Wax 4418, an organic ester based on renewable plant waxes, saying that this new product optimally combines the characteristics of a multipurpose plastics additive with the appeal of bio-based raw materials. This makes the grade particularly appropriate for use in thermoplastic polymers derived from renewable resources. The company says Voelpker Wax 4418 contains modified natural long-chain fatty acids. It is

Table 1: Chemical, physical and rheological data of typical Völpker lubricants (==> indicates fusion is delayed; ⇐: fusion is promoted; ⇑: torque or pressure increases; ⇓: torque or pressure decreases ⇔: insignificant influence. Two symbols indicates a more pronounced effect at the same dosage)

Lubricant	Average molecular weight [g/mol]	Drop point range [°C]	Effect on fusion time	Effect on extrusion torque	Effect on extrusion pressure
Waradur S Fatty acids, montan wax	approx. 425	82 – 88	==>==>	⇓⇓	⇓⇓
Waradur E Fatty acids, montan wax, ethylene esters	approx. 900	82 – 88	==>==>	⇓⇓	⇓⇓
Waradur GE Fatty acids, montan wax, glycerol esters	approx. 900	80 – 88	==>==>	⇓⇓	⇓⇓
Waradur OP Fatty acids, montan-wax, 1-methyl-1,3-propanediyl esters	approx. 900	99 – 105	==>	⇓⇓	⇓

Source: Völpker Spezialprodukte

predominantly derived from acids and alcohols in the C26 – C30 range.

Speciality chemicals company **Clariant** is another leading supplier of waxes for enhancing processability of commodity and engineering plastics, offering numerous grades in its line-up. These include montan waxes, metallocene-catalysed low and medium molecular weight non-polar and polar polyolefins, and amide waxes. The company's major brands include Licowax, Licolub, Licocene, and Licomont.

Earlier this year, Clariant introduced a family of high-performance waxes based on a renewable feedstock that are intended for possible use as alternatives to montan waxes. The Licocare RBW multi-purpose additives are based on crude rice bran wax. This is a by-product from the production of rice bran oil, does not compete with the food supply chain, and is available in large quantities. Use and upgrade of the non-edible component of the oil means that its full value can be utilised, Clariant says. The main target applications for Licocare RBW include engineering thermoplastics and epoxies.

Application tests performed by Clariant show that Licocare RBW solutions can achieve higher performance levels compared to alternative solutions on the market. The two grades targeted at plastics applications – Licocare RBW 300 TP and Licocare RBW 102 TP – fulfil the highly demanding requirements set by the transportation and electrical and electronic industries, according to the company.

Clariant has launched the Licocare RBW products for plastics in Japan. "Japan's highly innovative plastics market, with many players in the fields of engineering thermoplastics and epoxy moulded components, is the perfect arena to establish the new solutions," the company says. It plans to roll-out the grades in other selected regions in the future; the products will be launched on the Chinese market at Chinaplas in Shanghai later this month.

Licocare RBW 300 TP is a partially saponified wax, Licocare RBW 102 TP is a medium-polarity wax type. Both Licocare grades are said to be highly effective internal and external lubricants. They also enhance dispersion of fillers and pigments at low concentrations, improve melt flow, lower the amount of force required to release parts from moulds, and ensure more homogeneous distribution of additives.

Clariant also says the new additions "offer an outstanding processing stability at elevated temperatures, due to their superior thermal stability, very low volatility and low metal content. Licocare RBW offers improved shaping flexibility, better mechanical properties and improved surface finish. This results in a reduced rejection rate and more effective dosage."

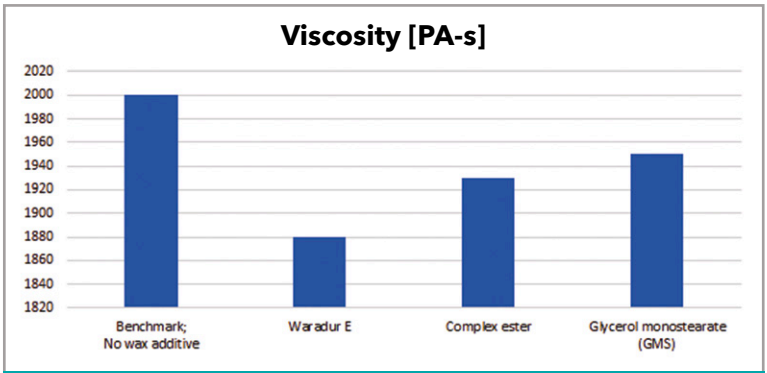

Figure 1: Influence of different waxes on the viscosity of PVC melt
Source: Völpker Spezialprodukte

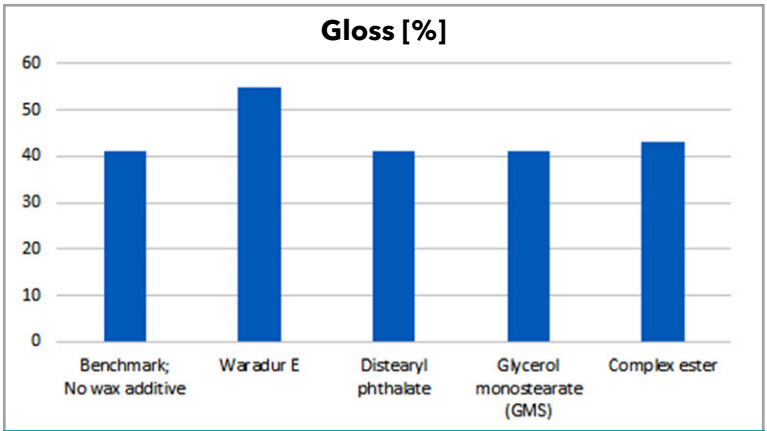

Figure 2: Influence of different waxes on the viscosity of PVC melt
Source: Völpker Spezialprodukte

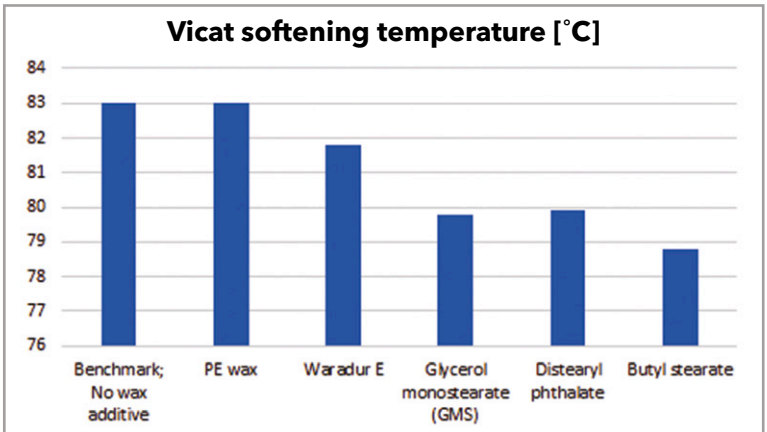

Figure 3: Influence of different waxes on the viscosity of PVC melt
Source: Völpker Spezialprodukte

Building on bio

Emery Oleochemicals is a long established player in the renewables area, boasting more than 60 years of experience in delivering high-performance additives to the plastics processing industry based

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PHOTO: CLARIANT

Above: Clariant's Licocare RBW high performance waxes are derived from rice bran oil by-products

largely – and in some cases fully – on natural fats and oils. The company's portfolio is slanted towards lubricants, plasticisers and surface finish agents and it says it is constantly refining its Green Polymer Additives product portfolio to exceed today's increasingly stringent standards and regulations.

Emery's Loxiol brand was launched in 1957. The long established lubricant products are said to be compatible with various stabilisers. Loxiol G59, for example, improves material flow during extrusion and reduces melt viscosity. It also has food contact approval and is suitable for transparent applications. The grade is compatible with several polymers and is said to reduce the formation of deposits (blooming) on the final article as well as on processing equipment (plate-out). Loxiol G24 is an external lubricant and release agent that is based on 100% renewable resources. It is said to be a suitable replacement for paraffin and Fischer-Tropsch waxes.

The latest developments from Emery include tailored bio-based ester lubricants for processing of chlorinated PVC (C-PVC). Among the claimed advantages for the products are a minor influence on the Vicat softening point and a defined chemical structure similar to the often-used paraffin waxes. The lubricants also enable an exact adjustment of the processing window, according to Dr Harald Klein, Global Platform Head of Emery Oleochemicals' Green Polymer Additives business unit. Other developments include food contact compliant additives that adhere to the respective regulations in all major regions worldwide.

More alternatives

Struktol is also producing alternatives to montan waxes (which it sells but does not manufacture) but its product line is not bio-based. It introduced its Struktol V-Wax E and V-Wax OP additives some while back, describing them as refined, organic wax products designed as substitutes for montan E and OP waxes (respectively ester and partially saponified types). The company says its products provide equivalent processing and performance in a variety of applications, while their chemical composition meets current specifications for montan waxes (Figure 4, page 66).

These alternatives are aimed primarily at calendered PVC sheet for blister packaging. Other applications include lubricants and release agents for polyolefins, polyamides, thermoplastic polyesters, polyurethanes, and thermosets. Struktol says that in calendered, clear rigid PVC applications Struktol V-Wax E and V-Wax OP have been shown to provide identical processing characteristics and metal roll release properties that have historically been provided only by montan waxes. In addition, no noticeable change in clarity is observed.

Supply considerations

Michael Fulmer, Vice President Plastics and WPC at Struktol, says supply issues with montan waxes have eased since the V-Wax products were introduced, but he says a new phase of uncertain availability could be on the horizon. "Companies that have done their due diligence with our alternatives will be well set to take advantage," he says.

More recently, the company has been focusing on a lubrication technology developed in-house to enable production of masterbatches and compounds – mostly but not exclusively based on

PHOTO: EMERY OLEOCHEMICALS

Right: C-PVC pipes are a target application for Emery's latest bio-based ester lubricants

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Figure 4: Example PVC formulations and comparative performance of Struktol's V-Wax E and V-Wax OP against traditional montan waxes

	Control	A	B	C
K58 Resin	100.0	100.0	100.0	100.0
High Tin Stabilizer	2.0	2.0	2.0	2.0
Impact Modifier	10.0	10.0	10.0	10.0
Process Aid	1.4	1.4	1.4	1.4
Montan Wax E	0.5		0.5	
Montan Wax OP	0.5			0.5
Struktol V-Wax E		0.5		0.5
Struktol V-Wax OP		0.5	0.5	
Fusion Time, s	14	12	12	14
Fusion Torque,	55	56	56	52
Equilibrium Torque	24	24	25	26
Equilibrium Temp, °C	192	193	193	192
Degradation Time, min.	>30	>30	>30	>30
Clarity	+++	+++	+++	+++

Source: Struktol

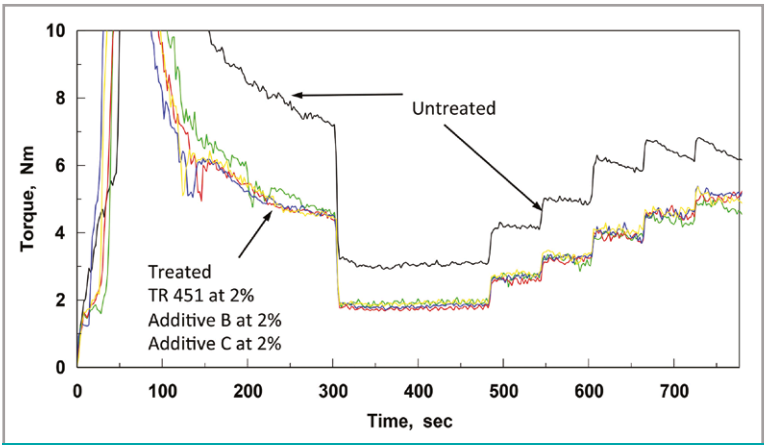

Figure 5: Effect on torque during mixing of addition of Struktol TR 451 to a 5 MFR PP filled with 40% calcium carbonate
Source: Struktol

polyolefins – with very high filler loadings (70-80% talc or calcium carbonate, for example) without significant loss of processability. Fulmer says these products were originally developed for use with untreated fillers and provide a form of *in-situ* treatment (Figure 5). There are two grades available – Struktol TR 451 and TR 055 – which are described respectively as a blend of special oleo chemicals and a blend of fatty acid derivatives and metal soap.

Synthetic options

Poland's **Euroceras** has been producing various types of waxes for more than 30 years. Now part of Keim-Additec, it has developed some synthetic Ceralene polyester waxes that it says show properties comparable to those of montan waxes for use in various application fields. It has also developed oxidised and functionalised polyethylene waxes.

The most recent developments from the company include its Ceralene 691, 693 and 694 grades. They are designed to improve pigment dispersion in colour masterbatches and are said to be compatible with a broad range of thermoplastics. Polarity can be adjusted according to the polymer they are intended to be used with, the company says. The new grades can also can be used in PVC as internal and external lubricants (Figure 6). They are characterised by high melt strength and low volatility (molecular weight is around 2,000).

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- **www.clariant.com**
- **www.emeryoleo.com**
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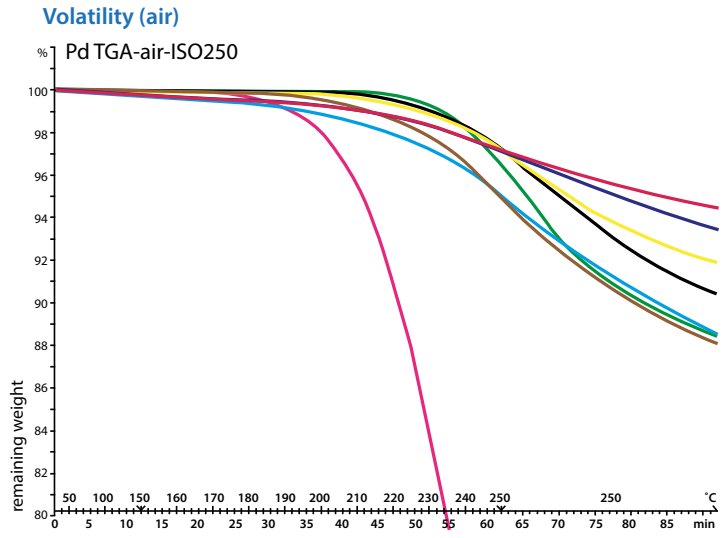
Figure 6: Comparison of volatility of Ceralene 691 and 694 against various alternative processing aids
Source: Euroceras



material	volatility (%)
CERALENE® XP*	5,5
CERALENE® XP*	6,6
CERALENE® 694	8,0
CERALENE® 691	9,5
Montan wax ester	11,4
LDPE wax	11,6
Amide wax	12,0
Erucamide	73,9

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The inside track on polymer foams

The latest innovations in foaming markets and technology will come under the spotlight at Polymer Foam USA in June. We take a look at the event

Main image: Polymer foams can meet the environmental and cost requirements of end users while enhancing processing and performance

Whether for environmental, weight saving, cost reduction or processing gains, polymer foaming technology is attracting plenty of interest. However, achieving optimal results is not straightforward, with a growing range of different technical solutions open to processors. AMI's upcoming North American Polymer Foam conference provides an opportunity to learn more about this fast developing sector.

Taking place on 18-20 June 2018 at the Pittsburgh Marriot City Center, Pittsburgh, Pennsylvania, United States, Polymer Foam 2018 will detail the latest innovations and trends that are driving change in the polymer foam industry. Over two days, expert speakers will explore market and technical trends in thermoplastic and elastomer foam technology and applications. Topics on the agenda will cover suitability of polymer resins, structure control, additive selection, bio-based materials and equipment innovations. This article takes a closer look.

Foam advances

The conference will be opened by Ir **Leo Smit**, Venture Leader at **Low & Bonar** in the Netherlands, discussing 'The future of comfort - a future beyond foam?'. He will be followed by **Barry Cik**, Founder and Technical Director at **Naturepedic Organic Mattresses** in the US, who will present an end user perspective on foam material use in the manufacture of organic mattresses. **Dr Cristina Saiz-Arroyo**, Manager New Products and R&D at **Cellmat Technologies** in Spain, will discuss the challenges involved in producing advanced cellular materials with improved properties. Then **Steven R Sopher**, Technical Director at **JSP International** in the US, will cover innovations in soft bead foam technology, new developments and applications.

The second session of the day looks at cell structure. **Dr Vahid Shaayegan**, Postdoctoral Fellow at the **University of Toronto** in Canada, will present an experimental and theoretical study of the development of cellular structure in foam injection moulding. Then **Dr Peng Guo**, Senior Engineer / Project Leader at the Beijing Research Institute of Chemical Industry, **Sinopec**, in China, will detail the effects of saturation temperature on melting behaviour and cell structure of expanded polypropylene beads.

Attention will then turn to some of the bio-based options available to foam makers. **Dr Denis Rodrigue**, Professor at **Laval University** in Canada, will detail production and characterisation of fully biobased foamed films based on gelatin. **Dr**

From left: Speakers at Polymer Foam USA include Laval University's Dr Denis Rodrigue, Dr Nikhil Gupta from New York University Tandon School of Engineering, Dr Antti Tynys from Borealis Polyolefine, Brett Robb from Total Cray Valley, Peter Schroeck from Reedy Chemical Foam, Dr Marcus Fernando Dal Pizzol from Innova, and Materia's Joshua Dulaney

Kimberly McLoughlin, Product Technology Engineer at **Braskem America** in the US, will speak about performance of foams produced from bio-based PE. And **Dr Yonghoon Yoon**, Project Leader at **LG Hausys** in the Republic of Korea, will speak about heat expandable biopolymers for one-step production of foam core sandwich composites.

The final session of the first day of Polymer Foam will be opened by **Holli Woodard**, Market Development Manager at **BASF** in the US, who will explain how open-cell melamine foam can deliver improved insulation, sound absorption and other benefits in a range of applications. **Dr Nikhil Gupta**, Associate Professor in Mechanical and Aerospace Engineering at **New York University** Tandon School of Engineering in the US, will look at characterisation of materials across time, temperature and strain rates. And the first day of the conference will be brought to a close by **Prof Chul Park**, Professor at the **University of Toronto** in Canada, who will discuss modelling of thermal insulation properties of nanocellular foams.

Foam innovations

The second day of the Polymer Foam conference will be opened by **Dr Antti Tynys**, Application Development Engineer at **Borealis Polyolefine** in Austria, who will deliver a presentation on high melt strength PP in low density foam. **Brett Robb**, Applications Chemist at **Total Cray Valley** in the US, will detail how the melt strength of PP can be enhanced using ionic additives to improve foaming. And **Dr Vassilios Galiatsatos**, who works in Applications Development – Catalloy at **Lyondell-Basell** in the US, will explain the company's work on developing innovative reactor thermoplastic polyolefin foam formulations for lightweight parts.

Chemical foaming agents for producing lightweight PE automotive parts will be covered by **Peter Schroeck**, President at **Reedy Chemical Foam** in the US. **Then Craig Hoppe**, CEO and President of US Operations at **Schmitz Foam Products**, will explore some opportunities for recycling XLPE foam.

Optimised production

The final session of the conference focuses on production technologies. **Dr Marcus Fernando Dal Pizzol**, Technology and Development Manager at **Innova** in Brazil, will open with a look at some innovative properties seen in melt impregnated E-HIPS. **Otto Plettner**, Chemical Engineer and independent consultant in the US, will explore emission control of VOC blowing agents in EPS foam manufacturing facilities. **Sabine Schönfeld**, Sales Manager Engineering Plastics at **Coperion** in Germany, will detail recent advances in production of expandable materials using twin screw extruders. Then the conference will be brought to a close by **Joshua Dulaney**, Applications Engineer at **Materia** in the US, who will examine large castings containing hollow glass microsphere syntactic (HGMS) foam and thermoset norbornene resins.

About Polymer Foam USA

AMI's Polymer Foam USA 2018 conference takes place on 18-20 June 2018 at the Pittsburgh Marriot City Center, Pittsburgh, Pennsylvania, United States. The two-day event – which is sponsored by Braskem, Borealis, Borouge, NFM and Reedy Chemical Foam – brings together international expert speakers to discuss the latest market, material and processing trends impacting in this fast developing market sector.

Aside from its technical content, Polymer Foam 2018 also presents an unrivalled networking opportunity. Delegates can extend their contact network during the informal break-out sessions and at the two relaxed cocktail receptions: the first on the eve of the conference hosted by Braskem at a nearby facility; the second at the end of the first day in the conference exhibition area (note that access to the exhibition area is restricted to conference attendees only).

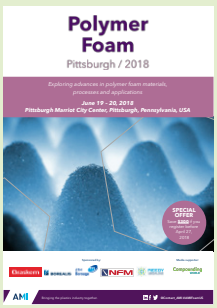

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PHOTO: ZWICK ROELL

Putting materials to the test

Suppliers of materials testing equipment are finding new ways to simplify operation and better integrate procedures into laboratory environments, writes ***Mark Holmes***

A wide variety of tests and procedures are available to compounders to allow them to meet their analytical requirements in polymer characterisation for purposes of research and development, quality control and to provide customers with verifiable data. Some of these involve complex test procedures, and new software is also now available to help process this information more efficiently.

There are several key issues that plastics compounders and masterbatchers need to consider when selecting materials testing and analytical equipment or services. "Method reproducibility and instrument accuracy are a pre-requisite," says Dr Tobias Pflock, Manager Business Field Polymer at **Netzsch**. "Most importantly, the testing equipment manufacturer must make it as easy as possible for the compounder to integrate the instrument operation into the manufacturing process by focusing on software usability, product reliability, comprehensive service and application support. If you build your quality control procedure on an instrument that is not reliable throughout your product lifecycle – you might have to pay twice."

In the digital age Pflock sees data integration as the major trend. "As a result of increasing material complexity, industry will require more testing and not less," he says. "Our instruments deliver a wide variety of valuable information, for example, about melting behaviour and processability (Differential Scanning Colorimetry – DSC), thermal stability and compositional analysis (Thermal Gravimetric Analysis – TGA) and thermo-mechanical behaviour (Thermomechanical Analysis – TMA/Dynamic

Main image: Increasingly demanding material applications means obtaining more material data more quickly, whether it be basic physical properties or complex chemical insight

PHOTO: NETZSCH

Right: The Polyma DSC system from Netzsch is being used by recycler Purus Plastics

Mechanical Analysis - DMA). Comprehensive data interpretation and automated instrument operation will continue to gain in importance."

Pflock highlights a number of technical areas where new developments in materials testing are likely to prove vital. These include the progress of electromobility, which will continue to require new material developments. In some industry areas processors are also calling for continuous characterisation of the material used – meaning full traceability of the compound on a batch-by-batch basis. In addition, skills shortages require sensitive but simplified analysis methods and Netzsch is addressing this by focusing on usability aspects of product and software design.

Specifically, monitoring thermal conductivity of compounds is an area where the company believes it can deliver solutions for efficient characterisation of thermal properties, for example through Laser Flash Analysis (LFA). There is also a growing demand for better characterisation of the processability of compounds for additive manufacturing, where thermal analysis is one of the most important test methods and will assist the development of better compounds for this application.

System approach

Netzsch has developed a holistic measurement approach, starting from sample preparation to instrument operation, and resulting in evaluation that interacts between hardware and software. The company says that its Proteus software platform is designed to allow automation of materials testing while reducing complexity. Proteus products include Netzsch SmartMode – a simplified method-based user interface that allows measurements to start faster. Netzsch AutoEvaluation is an automated result evaluation process for thermal analysis curves that avoids user influence on measurement results from different laboratories. And Netzsch Identify offers database functionality for automated data interpretation of DSC and TGA curves. While this is a common procedure for some other techniques, such as spectroscopy, the company says it is not so widespread for thermal analysis.

Netzsch recently supplied German recycler Purus Plastics with equipment for DSC analysis. The manufacturer and processor of post-consumer waste recyclate – an inhomogeneous mixture of different plastics – was developing products that required better mechanical properties, which needed the more sensitive evaluation of the compound composition that DSC could provide over a simple Melt Flow Index. As a SME, its quality control resources were limited but the DSC Polyma equipment and Proteus software provided an easy to use solution that could add value to the business.

A recent addition to the Netzsch range of TGA and DSC instruments is an auto-sampler that can boost sample throughput in volume routine thermal analysis applications. Two removable trays can be filled with up to 192 crucibles/pans plus 12 samples on a separate calibration strip for calibration and correction purposes. This enables users to get up to 76% faster results compared to an instrument with no autosampler. Users can run tests over a weekend or start a calibration in the evening and have the instrument ready to begin measurements once the work day resumes the following morning. The high-capacity sample trays can be easily archived and are identified by a machine readable 2D code. The company's Proteus software is able to identify the tray and remembers data such as sample type, crucible type and filled positions of the tray.

The automatic sample changer handles different types of crucibles/pans while the SafeTouch

Below: This auto-sampler system is the latest addition to the Netzsch line of TGA/DSC instruments

PHOTO: NETZSCH

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PHOTO: NETZSCH

Right: The Phoenix DSC system from Netzsch is supported by a range of smart software tools to simplify application

gripper always applies the correct contact force depending on the crucible/lid type. The autosampler comes with a RemoveCap feature and optionally pierces lids for measurements on less-stable samples or samples containing volatile solvents. A motorised tray cover protects samples from dust and atmospheric influences and only opens shortly for autosampler gripper access. After automatically closing the cover, the space above the sample pans is purged by branching gas channels integrated into the cover.

"Increasing product complexity will always require reliable testing methods, such as thermal analysis," says Pflock. "Materials testing measurements will continue to provide valuable information that will influence the direction of compounding. Instrument usability and data integration will be the trends for the future."

Thermo-physical

The LFA 500 Light Flash from **Linseis** has been developed to measure thermal diffusivity, thermal conductivity and specific heat values for up to 18 samples at a time. Information on the thermo-physical properties of materials and heat transfer optimisation of final products is becoming increasingly important, says the company, and over the past few decades the flash method has emerged as the most commonly used technique for this application.

The Linseis LFA 500 Light Flash is claimed to be a versatile tool. The sample is positioned on a sample robot, located in a furnace that is maintained at a predetermined temperature. The lower surface of the sample is then irradiated with a programmed energy pulse (flash lamp) which results in a homogeneous temperature rise at the sample upper surface. This resulting temperature rise is measured by a high speed IR detector and thermal diffusivity values are computed from temperature versus time data.

Below: Schematic showing the key elements in the Linseis LFA 500 Light Flash instrument for measuring thermal conductivity

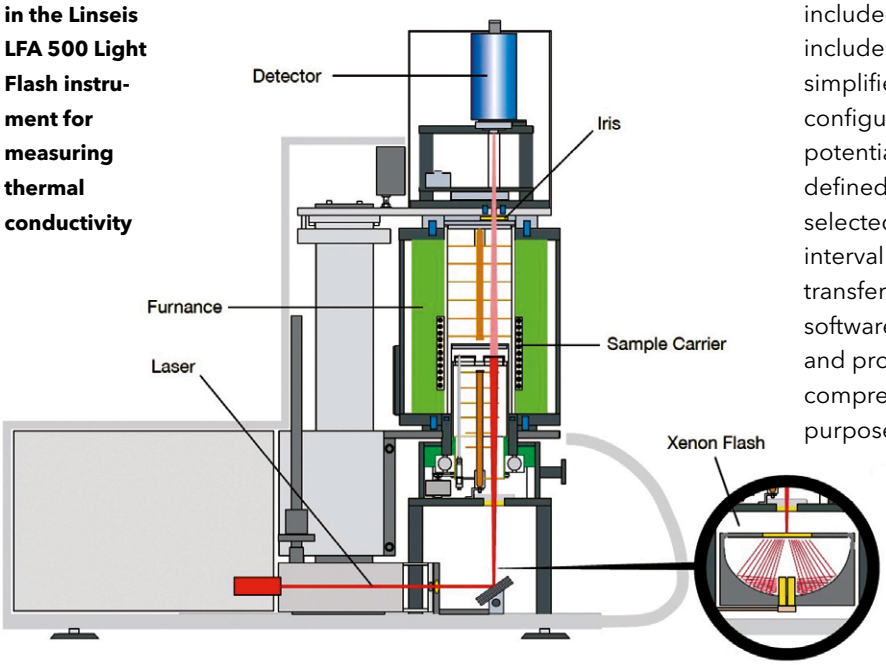

PHOTO: LINSEIS

Hardness testing

Zwick Roell Indentec has launched an updated Rockwell hardness tester, which is suitable for testing a range of hard plastics to internationally recognised standards. The company says the nose-mounted indenter on the new model enables access to and visibility of awkward test points, eliminating the need for time consuming and expensive test sample sectioning. Using closed loop force application, test forces of between 1 kgf and 250 kgf can be employed to cater for both Rockwell and Rockwell Superficial tests on the one machine. Vertical test space is 250mm in standard specification.

The company says the instrument provides a high level of test point repeatability and reproducibility and is also capable of performing Brinell tests, where a certified portable microscope is included to measure the indentation. Features include a colour touchscreen user interface, which simplifies the selection of test methods, test configuration and result output to help eliminate potential operator error. Either manual or user defined automatic cyclic testing functions can be selected, with definition of the test number and interval between tests. Measured values can be transferred to the Industry standard TestXpert III software via a serial port for logging, data archiving and processing. The instrument is supported with a comprehensive range of support anvils and special purpose component holding fixtures.

Polymer characterisation

Waters Corporation recently entered into a co-marketing agreement with **Malvern Panalytical** to extend polymer characterisation options by pairing the

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Waters Acquity Advanced Polymer Chromatography (APC) System with Malvern Panalytical's Omnisec Reveal. The companies say that R&D scientists can now access higher sensitivity, higher resolution data than ever before, giving them better insight into their samples without the need for column calibration.

According to the companies, the emergence of new and increasingly complex polymers with a broad range of structural and compositional diversity has been a driving force in the development of advanced analytical and separation technologies for polymer characterisation. Today, analysts seek innovative techniques that allow them to characterise and understand their highly complex samples better. Combining high efficiency columns with the low overall system dispersion of Waters' APC significantly improves resolution, especially for low molecular weight oligomers. In addition, run times can be up to five times faster than with traditional Gel Permeation Chromatography (GPC), enabling higher sample throughput and more rapid method development.

Use of this high speed, high resolution separation technique has historically seen limited pairing with advanced online detectors, such as light scattering, due to limitations in the dispersion characteristics of these detectors. However, as the advantages of the APC become clearer, both in research and industry, manufacturers have been working to reduce dispersion within their advanced detector options, while maintaining the high resolution of the APC separation. Malvern Panalytical says that it has achieved this with its Omnisec Reveal multidetector module. Coupling the APC System to the Omnisec Reveal offers the ability to calculate absolute molecular weight, intrinsic viscosity and hydrodynamic radius. These parameters can be used to predict polymer behaviours in solutions/product matrices and to give a more comprehensive understanding of polymer structure. This speed of analysis and easy access to more detailed information provides a quicker pathway to the development of more successful and efficient products.

Imaging techniques

Malvern Panalytical has also launched three new systems for materials characterisation. The new Morphologi range of automated static imaging systems for particle characterisation offers rapid, automated component-specific measurement of particle size, shape and chemical composition. They deliver substantial improvements in measurement speed, image definition, and the range of materials that can be successfully analysed.

Zwick makes an impact at MGG

Müller-Guttenbrunn Group subsidiary MGG Polymers has installed a HIT 5.5 pendulum impact tester from Zwick Roell as part of an upgrade of its test laboratory. The company produces 50,000 tonnes of plastic compounds annually, primarily PP, HIPS, ABS and PC/ABS, and uses its testing laboratory to analyse new materials, for incoming goods inspections, and for production-related product inspections. Together with tensile and flexure tests, Charpy impact tests are one of its most frequently performed. The HIT 5.5 is a 5 Joule model supporting all common Charpy (ISO 179-1 and -2, ASTM D6110) and Izod (ISO 180, ASTM D256, ASTM D4508) standards.

› **www.zwick.com**

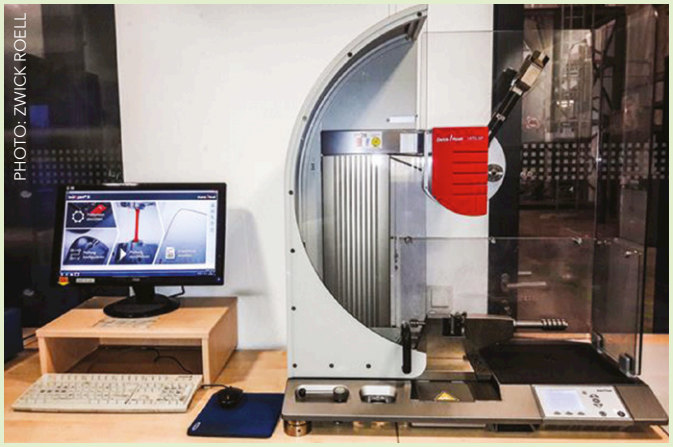

PHOTO: ZWICK ROELL

A HIT 5.5 impact tester in operation at MGG Polymers

Polymers in Building Insulation

2018

Exploring developments in polymeric thermal and acoustic insulation for construction applications

18-19 April 2018
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Right: The Nexsa surface analysis system is designed to be a cost-effective, research-level x-ray photoelectron spectroscopy (XPS) option

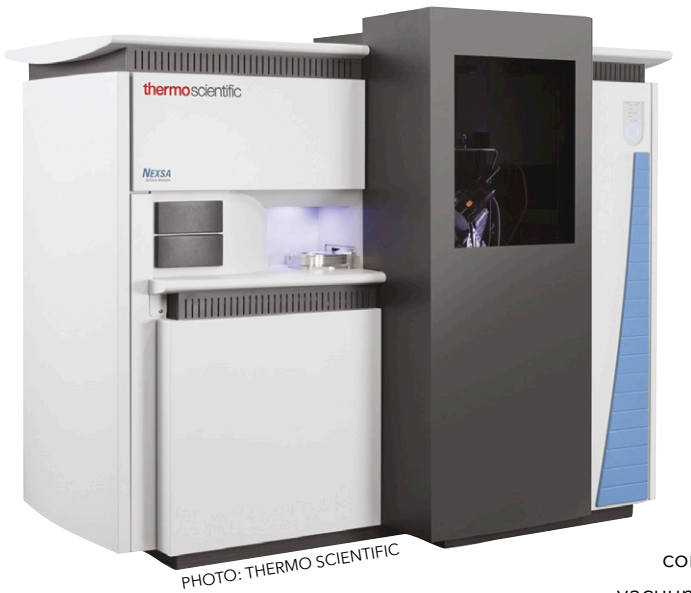

PHOTO: THERMO SCIENTIFIC

Offering sharper and faster particle size and shape measurement, the instruments add value to product development, troubleshooting and quality control, particularly in analytical environments where a deeper understanding of a process and/or sample is required.

Particle characterisation

The Morphologi 4 is a fully automated system for characterising particles ranging in size from less than one micron up to a millimetre and beyond. Compared to its predecessor, it offers quicker measurement – a time saving of around 25% – while delivering simpler, more intuitive method development and greater particle definition. A key feature is Sharp Edge, a new automated segmentation/thresholding algorithm that makes it easier to detect and define particles. Measurement sensitivity is further boosted by the 18 MP camera and by enclosure of the sample during imaging.

The Morphologi 4-ID delivers Morphologically-Directed Raman Spectroscopy (MDRS), integrating the static imaging capabilities of the Morphologi 4 with Raman spectroscopy to enable the component-specific morphological characterisation of different chemical species in a blend. Offering significantly faster spectral acquisition times than the previous model – a time reduction of up to 80% – it also allows acquisition conditions to be customised to the sample. This enhanced control, combined with an extended spectral range, maximises the range of materials that can be identified and/or differentiated within a mixture. The instrument is fully automated and is designed to allow both particle characterisation scientists with limited spectroscopy experience, and more experienced spectroscopists to gain an in-depth understanding of their particulate samples.

The Epsilon 4 is a high-performance benchtop analytical tool for the determination of the chemical composition of all kinds of material. A multi-functional instrument, the Epsilon 4 is claimed to combine the latest advances in excitation and detection technology with mature software and a smart design. The analytical performance of the new benchtop instrument approaches that of more powerful and floor-standing XRF spectrometers. Due to its low infrastructural requirements, Epsilon 4 can be placed next to the production line while its high performance enables most applications to be operated at ambient conditions, reducing costs for helium or vacuum maintenance. The company says that the low-drift metal-ceramic X-ray tube delivers compliant results for years without the need for costly re-calibration. The instrument can automatically process sample batches without the need for operator attention.

Malvern Panalytical has also introduced the Claisse LeDoser-12 automatic dispensing balance for sample preparation by fusion for XRF and ICP analysis. The instrument can automatically weigh the sample and dispense flux with high precision. The automatic dispensing balance has three weighing modes that fulfil all needs in the laboratory (sample-to-flux ratio, catch weight and absolute weight). The system is LIMS ready and can be plugged to a barcode reader. It ensures great connectivity and sample traceability, as well as an easy data transfer. This is key to avoiding sample misidentification and inversion, and it plays an important role in maintaining good productivity.

Surface analysis

Thermo Scientific has developed the Nexsa surface analysis system for cost-effective, research-level x-ray photoelectron spectroscopy (XPS) studies. The system is designed to easily integrate multiple analytical techniques in a single compact, fully-automated surface analysis instrument. The company says that the Nexsa system combines the high throughput and high sensitivity of the Thermo Scientific K-Alpha$^+$ XPS system with the multi-technique capabilities of the Thermo Scientific ESCALAB Xi$^+$ XPS microprobe. Users of the Nexsa system can add complementary techniques, such as Raman spectroscopy, ion scattering spectroscopy (ISS), reflected electron energy loss spectroscopy (REELS) and UV photoelectron spectroscopy (UPS), to generate multiple measurements from the same point on the sample, without repositioning.

›

Integration of multiple analytical techniques is designed to allow users to conduct correlative analysis.

Additional features of the Thermo Scientific Nexsa surface analysis system include: a small spot x-ray source designed to improve the imaging capabilities compared to previous instruments; the ability to transfer air-sensitive materials into the instrument without exposure to the atmosphere either via an optional vacuum transfer module or integration with an external glove box; and optional integration with the Thermo Scientific MAGCIS dual mode ion source to enable depth profiling of soft materials, such as polymers.

Thermo Scientific has also developed the iXR Raman spectrometer, a new multi-modal Raman spectrometer in a compact design that provides simultaneous analysis of a single measurement point using multiple analytical techniques, allowing relationships between molecular composition, surface performance and structural performance to be established. The equipment uses optical interfacing to provide a chemical fingerprint and material structure data simultaneously while gathering elemental or physical information from complementary instrumentation. In addition, with the Thermo Scientific OMNIC Series Software, the iXR Raman spectrometer can capture spectroscopic changes over time, enabling measurement of dynamic processes or changing conditions, such as the crystallisation of a polymer in a rheological study.

Simple FTIR

Also new from the company is the T Nicolet iN5 FTIR microscope, which is designed as a simple, cost-effective solution for particulate identification in the laboratory. The company says the robust iN5 FTIR microscope features an optical setup that allows users to examine a sample and collect chemical information simultaneously. A large field of view is intended to make it easier to locate and target contaminants, and it has the spatial resolution required for accurate chemical analysis. The microscope uses the Thermo Scientific Omnic software which, with its extensive set of libraries, can match samples in real time to enable more confident decisions with minimal user training. It is designed for use with the Thermo Scientific line of infrared spectrometers.

Shimadzu has launched the MALDI-8020 matrix assisted laser desorption ionisation-time of flight (MALDI-TOF) mass spectrometer. The company says it offers the highest level of resolution and sensitivity of a linear benchtop model designed for installation on a laboratory workbench. In comparison to quadrupole and magnetic field systems, MALDI-TOF mass spectrometers offer the advantage of both a wide measurable mass range and high mass resolution. This latest model is also much smaller, measuring just 1m high compared to the more typical 2m height of previous equipment, which provides more flexibility in installation locations.

The new instrument is suitable for determining the molecular weight of polymers. The laser repetition rate has been increased from 50 Hz for existing models to 200 Hz through the introduction of a solid-state laser and sample introduction time has been shortened. In addition, measurement time has been significantly reduced by increasing the speed of the stage and the need for maintenance and inspections has been reduced, lowering running costs.

Performance SPM

Shimadzu has also recently introduced the SPM-8100FM scanning probe microscope (SPM), featuring five times faster data acquisition, four times wider scan in both X and Y-axis directions, and ultra-high resolution performance that is as high in air and liquids as in a vacuum. SPMs scan the surface of a sample using a cantilever fitted with a fine probe – with a tip radius of just a few nanometres – to measure the surface topology and physical properties of a sample. The SPM-8100FM is an atomic force microscope (AFM) type which can be used to analyse polymers and local structure at solid-liquid interfaces.

CLICK ON THE LINKS FOR INFORMATION:

- **www.netzsch.com**
- **www.linseis.com**
- **www.zwick.com**
- **www.waters.com**
- **www.malvernpanalytical.com**
- **www.thermofisher.com/surfaceanalysis**
- **www.shimadzu.com**

PHOTO: SHIMADZU

Below: The MALDI-8020 matrix assisted laser desorption ionisation-time of flight (MALDI-TOF) mass spectrometer from Shimadzu

Increase your market share in Europe

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Download these new product brochures

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COPERION: STS MC¹¹ EXTRUDERS

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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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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BAY PLASTICS: STRAND PELLETISERS

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

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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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If you would like your brochure to be included on this page, please contact Claire Bishop claire.bishop@ami.international. Tel: +44 (0)1732 682948

Learn more about AMI's upcoming conferences

Click on the relevant brochure cover or link to download a PDF of the full conference programme

PLASTIC PIPES IN INFRASTRUCTURE 2018

The sixth Plastics Pipes in Infrastructure conference runs from 17-18 April 2018 in London, UK. Expert speakers will discuss innovative applications ranging from drinking water and sewerage through to gas distribution and electrical cable protection.

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POLYMERS IN BUILDING INSULATION

This new event from AMI takes place in Cologne in Germany on 18-19 April 2018 and takes a look at challenges and opportunities for thermal and acoustic insulation. Topics on the agenda include compliance testing and processing innovations.

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POLYMER SOURCING & DISTRIBUTION

Taking place in Barcelona, Spain, on 15-17 of May 2018, AMI's 13th Polymer Sourcing & Distribution conference brings together polymer producers, distributors, traders and processors to explore critical strategic and market developments.

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PLASTIC CLOSURE INNOVATIONS

AMI's Plastic Closure Innovations is the leading European conference for the plastics caps and closures industry. Taking place in Berlin in Germany on 22-24 May 2018, this sixth annual event brings together expert speakers from brand owners, producers and suppliers.

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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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Learn more about AMI's upcoming conferences

Click on the relevant brochure cover or link to download a PDF of the full conference programme

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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MEDICAL TUBING 2018

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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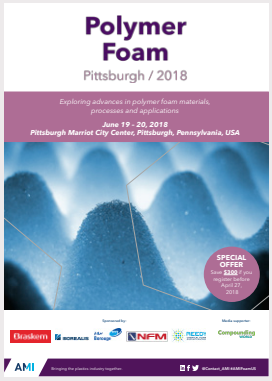
POLYMER FOAM USA 2018



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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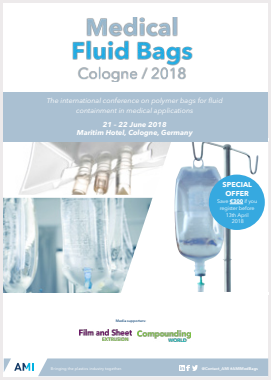
MEDICAL FLUID BAGS 2018



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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MASTERBATCH 2018

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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Duromer Products Pty Ltd

Head office location:	Sydney, Australia
Date founded:	1988
General Manager:	Andrew Stewart
Ownership:	Limited Company
Production 2017:	9,000 tonnes
Plant locations:	Sydney, Australia
Profile:	Duromer Products was established in 1988, originally as a distributor of PA 6 and PET materials and barrier films. In 1995 it began production of PA 6 and PET engineering compounds under a licence from Honeywell. Since then, the company has expanded its product range to include a broad range of commodity and engineering polymers and compounds. To support its continuing growth, Duromer recently moved into a new manufacturing facility at Prestons in Sydney where it operates three twin screw compounding lines.
Product line:	Duromer produces a wide range of products, although the bulk of its production is engineered compounds. Polymers compounded include PA, ABS, POM, PC, PK, PBT and PET, as well as HDPE and PP. The company also compounds recycled polymers. With its Polystruct line, Duromer claims to be Australia's only producer of long fibre reinforced thermoplastic compounds.
Product strengths:	Aside from its standard products, Duromer offers customised thermoplastic solutions formulated to meet customer's specific challenges. For example, it recently expanded its polyketone compound family to include a glass-filled grade that carries US water industry NSF 61 Commercial Hot 82° certification.

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

Compounding WORLD FORTHCOMING FEATURES

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

May	**June**
Wire and cable compounds	PVC additives
Compatibilisers and coupling agents	Long-fibre thermoplastics
Industry 4.0/plant management	TPE compounding
NPE 2018 and Plast 2018 previews	Compounding World Expo preview

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

For information on advertising in these issues, please contact:
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Keep informed: read our latest editions

AMI publishes five process-specific FREE plastics industry magazines. Simply click on the cover below to read each magazine. Or download the issue in the relevant Apple or Android app

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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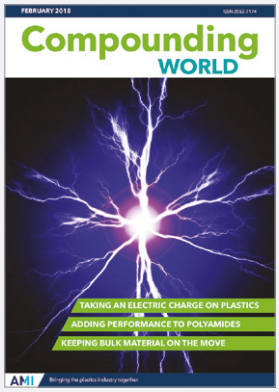

Compounding World February 2018
The February edition of Compounding World looks at companies working on electrically conductive compounds. Other features cover developments in PA, bulk materials handling, and laser decoration.

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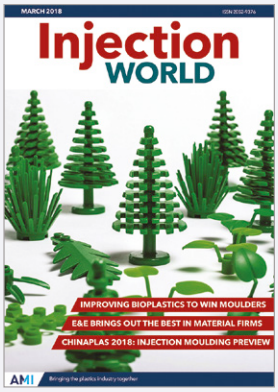

Injection World March 2018
The March edition of Injection World magazine looks at the latest innovations in bioplastics and polymers for E&E applications. This edition also examines developments in resin drying technology. PLUS Chinaplas 2018 preview

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Plastics Recycling World January/February 2018
The January/February edition of AMI's new digital magazine – Plastics Recycling World – takes a detailed look at the latest innovations in recycling of packaging films. It also explores developments in pelletising and material separation technologies.

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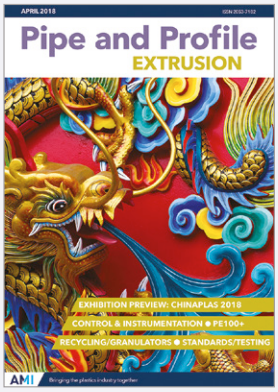

Pipe and Profile April 2018
The April edition of Pipe and Profile Extrusion magazine previews the upcoming Chinaplas exhibition. It also takes a look at the latest developments in pipe testing, PE100 polymers, recycling technology, and extrusion process control.

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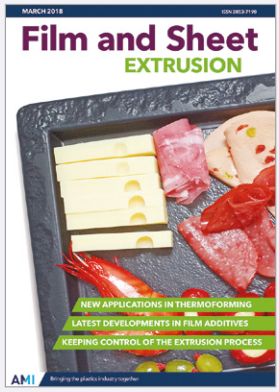

Film and Sheet March 2018
The March 2018 issue of Film & Sheet Extrusion has a feature on the growth of applications in thermoforming. It also covers performance additives for films, plasmonic UV absorbers, control software and screw design.

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Compounding WORLD

Film and Sheet EXTRUSION

Pipe and Profile EXTRUSION

Injection WORLD

Plastics Recycling WORLD

GLOBAL EXHIBITION GUIDE

2018	**24-27 April**	Chinaplas, Shanghai, China	www.chinaplasonline.com
	7-11 May	NPE, Orlando, USA	www.npe.org
	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.prwexhibition.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
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

17-18 April 2018	Plastic Pipes in Infrastructure, London, UK
18-19 April 2018	Polymers in Building Insulation, Cologne, Germany
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

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

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NPE 2018 SPECIAL EDITION

Extrusion Solutions

THE LATEST EXTRUDING NEWS FROM ENTEK

bpc Toll Compounding & Blending CHOOSES ENTEK

Midwest Supplier Poised for Growth; Will Dramatically Increase Capacity with High-Output ENTEK HR^{3TM} 73mm Twin-Screw Extruder

Based in the tiny Midwestern town of Meredosia, Ill. (population 1,044), BPC Toll Compounding & Blending is a young company with state-of-the-art compounding capabilities. BPC produces a wide range of compounds based on polyolefin and engineering polymers.

Originally founded in Houston in 2007 to conduct testing services for major petrochemical companies, BPC moved to Illinois in 2012 and began offering custom compounding services. Since then, business has steadily increased to the point where the company was running at full capacity, and needed to expand by adding new machinery and equipment.

BPC has run numerous materials trials in ENTEK's In-House Pilot Plant, testing a wide variety of fillers and formulations. When the time came to purchase new machinery they chose a new ENTEK high-output HR^3 73mm, 48:1 L/D twin-screw extruder, which will be on display at ENTEK's booth at the upcoming NPE2018 show in Orlando.

In a recent interview Mike Krause, Operations Manager at BPC and Greg Larson, BPC's Vice President-Business Development, discussed their company's growth and their decision to work with ENTEK to expand their operations.

A History of Success

Mike Krause joined BPC as Operations Manager after working for several years at wood-plastic composites major Fiber Composites Inc. (FCI), the makers of Fiberon decking and railing products. While at FCI he had several ENTEK twin-screw extrusion production lines in operation, running "high quality materials with very low downtime".

"Besides their machinery, which is extremely high quality, ENTEK's service was always exceptional," he said. "They were much more than a supplier to us; in fact, their service and support was instrumental in our company's growth. ENTEK has an outstanding group of people that is very responsive to customer needs. I saw this firsthand when I was at FCI and I wanted the same thing for BPC now and going forward."

Like many compounders, BPC does extensive materials trials to perfect each compound they produce for their customers. They take advantage of ENTEK's In-House Pilot Plant for these services, working with ENTEK's team, testing and running numerous formulations until they get it right. "We've run numerous trials at ENTEK's lab at their facility in Oregon," said Mike Krause. "Dean Elliott and his team are second to none when it comes to their professionalism and knowledge."

Toll Compounding

Since BPC began their compounding operations in Meredosia in 2013, they have grown steadily with a focus on toll compounding. "Toll compounding helps our customers increase their compounding capacity without having to invest in new machinery and equipment," said Greg Larson. "We can do the materials production for them and provide a full range of other services, very cost-effectively."

(Continued on page 6)

Looking Forward to Seeing You at NPE2018!

> *These machines are workhorses, helping some of the world's biggest materials compounders produce high outputs for a variety of applications including masterbatch, sheet, profiles, and many more.*

Welcome to the latest issue of *Extrusion Solutions*.

We can't bring all 150 of ENTEK Manufacturing's employees to NPE 2018 (being held from May 7-11 at the Orange County Convention Center, Orlando, Florida) – we will be working to fill the many customer orders ENTEK has received in the first 3 months of 2018 – but our contingent at the show will be plenty big (see related story showing who will be working the ENTEK booth on p. 7). ENTEK's booth staff will include mechanical engineers, controls engineers, process specialists, sales staff, divisional managers, and owners. Our staff will be ready to answer technical questions, understand customer's unique challenges, brainstorm solutions to those challenges, and discuss business.

ENTEK will have...

- 2 extruders on the floor, a QC^3 33mm and HR^3 73mm
- Live, twice a day screw change demonstrations on the QC^3 33mm machine, showing how fast and easy it is to change screws in 5 minutes or less
- Wear parts for a variety of extruder sizes
- Auxiliary equipment to facilitate extrusion
- Staff who design and program ENTEK's extruders ready to answer your questions and discuss solutions to your most challenging issues
- Staff ready to discuss and execute turn-key solutions
- Staff with broad experience in extrusion-based processing ready to discuss your processing challenges
- Decision-makers ready to discuss your business needs

Our show staff is excited to meet you in Orlando. Please stop by booth W5189 and see us and we will do our utmost to make it worth your time.

HR^3 - A New Name for our Larger Twin-Screw Extruders

While our QC^3 line of smaller twin-screw extruders (27mm, 33mm, and 43mm) have received a lot of attention the past few years, we decided to give our larger twin-screw extruders their own name. We've rebranded these machines as the HR^3 line, which stands for High Rate, High Reliability, and High Return. This includes our 53mm, 73mm, 103mm, and 133mm twin-screw extruders.

Over 60% of ENTEK Extruders in the field are HR^3's. These machines are workhorses, helping some of the world's biggest materials compounders produce high outputs for a variety of applications including masterbatch, sheet, profiles, and many more. Contact any of our ENTEK sales staff to learn more about how these machines can help your productivity.

Why ENTEK? Ask Our Customers!

On the wall behind our refreshment area at our NPE booth there will be a large display with this same headline, showing condensed versions of our current ad campaign (see related story on p. 8). We take great pride in working collaboratively with our customers, learning as much as we can about their goals, and then servicing them to the best of our ability to help them meet or exceed those goals. This not only applies to their use of our machinery, but to every aspect of their plant operations.

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

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

Sincerely,

Kirk R. Hanawalt

Dr. Kirk Hanawalt
President, ENTEK Extruders

ENTEK to Feature New Twin-Screw Extruder and Technologies at NPE2018

Company Will Display its New QC³® 33mm Twin-Screw Extruder and Also High-Output HR3™ 73mm Twin-Screw Extruder; Interactive Display Featuring Screw Layout Program Will Also Be Featured

Booth W5189, Orange County Convention Center, Orlando, FL – May 7-11, 2018

ENTEK will feature its newest twin-screw extruders and technologies at NPE2018.

The company will be displaying two machines in its booth: its new QC³ 33mm twin-screw extruder, which was introduced in 2017 and is being shown publicly for the first time; and its high-output HR³ 73mm twin-screw extruder. In addition, ENTEK will feature two interactive work stations at its booth showing the company's unique screw-layout software program. Visitors to the booth will be encouraged to use the program to see how easy and fast it is to input their information and design a screw layout that will work for their compounding needs.

New QC³ 33mm Twin-Screw Extruder Designed for Production of Small Lots of Compounds

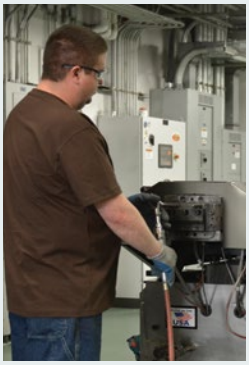
The ENTEK QC³ 33mm co-rotating twin-screw extruder is a size not previously offered by the company. It is designed for small-size lots of compounds and includes all of the company's latest QC³® (Quick-Change, Quick-Clean, and Quality Control) features.

The new QC³ 33mm joins ENTEK's other QC3 models which include its 27mm and 43mm co-rotating twin-screw extruders. ENTEK also manufactures its larger line of HR³ twin-screw extruders including 53mm, 73mm, 103mm, and 133mm models (see separate story on the HR³ line).

ENTEK launched this new twin-screw extruder due to customer demands for this specific sized machine. "Our 27mm twin-screw extruder is excellent for lab environments, and our 43mm is designed for small to medium-sized lots of compounds," said Linda Campbell, Director of Sales at ENTEK Extruders. "We were getting a lot of requests from customers for something in-between – a machine specifically designed for small lots, but with more output than the lab machine."

Twin-Screw Extruder Screw Change in 5 Minutes? **YES!**

SEE IT LIVE AT ENTEK'S BOOTH AT NPE!



There are many unique benefits for compounders with the ENTEK QC³® (Quick Change, Quick Clean, and Quality Control) twin-screw extruders – but perhaps the biggest advantage, and it's a game-changer, is the ability to change screws in 5 minutes or less!

For compounders producing small lots of materials, frequent screw changes are a way of life. What takes hours on most twin-screw extruders now takes minutes on ENTEK extruders – 5 minutes or less!

LIVE AT NPE. . .

We're excited to show you LIVE at NPE our 5-minute screw change procedure. Every day at 11 a.m. and 2:30 p.m. in ENTEK's booth (W5189), our technicians will perform a screw change demonstration. Stop by to see us!

. . . OR, WATCH THE VIDEO

ENTEK has produced a video showing a complete screw change procedure in less than 5 minutes. For those of you who won't be coming to NPE in Orlando, please go to entek.com/extruders to watch the video!

HR³ 73mm Twin-Screw Extruder for High-Output Compounding

Also, featured at ENTEK's booth at NPE2018 will be the company's HR³ 73mm Twin-Screw Extruder for High-Output Custom Compounding. This machine is one of ENTEK's most popular models, used in the field for numerous compounding applications including production of bioresins, wood-plastic composites, large lots of color compounds and many others. The 73mm machine is available with a 600 hp motor and screw speeds up to 900 rpm.

The HR³ 73mm extruder at ENTEK's booth is the actual machine sold to BPC Toll Compounding & Blending (see article on p. 1).

(Continued on page 6)

NPE2018

THE PLASTICS SHOW

Booth #W5189

1. Reception Area
2. QC³ 33 Twin-Screw Extruder with Live Screw Set Quick Change Demonstrations
3. HR³ 73mm twin-screw extruder (purchased by BPC Toll Compounding & Blending)
4. Interactive Screw Layout Program Display
5. Conference Room
6. Hospitality Area

NPE 2018


ENTEK
THEM THERE.
Twin-Screw Extruders
Complete Extrusion Systems
Turnkey Manufacturing Plants
Replacement Wear Parts
Try Our
Screw Layout Program
Here!
Helping Our Customers Find Extrusion Solutions!
EXTRUDERS
HR 133mm
HR 103mm
HR 73mm
HR 53mm
QC 43mm
ENTEK
QC 33MM
TWIN-SCREW EXTRUDER
FEATURING...
5-MINUTE
SCREW CHANGE
ustomers!
1
2

Custom Designed

BPC Chooses ENTEK

(continued from p. 1)

Polypropylene and polyethylene are the main materials processed at BPC, along with a wide range of fillers including talc, mica, calcium carbonate, flame retardants, and cellulose. Natural and white, black, and a full spectrum of colors are produced. Currently TPO and TPE materials are processed on a 70mm 52:1 L/D twin-screw designed to handle rubber-based raw materials and liquid additions.

Under the Radar – But Not Much Longer

The new ENTEK HR^3 73mm twin-screw extruder will be brought online at BPC after the NPE show. Once up and running, the line will allow them to gain more customers and increase their toll compounding capacity dramatically, from 22 million to 60 million lbs./year.

Greg Larson said that BPC has deliberately kept a low profile in the past, but that's about to change.

"We have traditionally stayed under the radar, but our growth has led our owners to invest heavily in our plant," he said. "We've added staff, and are about to launch a new corporate identity. NPE2018 is a big show for us –
while we are not exhibitors, we are proud to show off our new machine at ENTEK's booth."

Greg Larson, Mike Krause, and Robin Fourness, BPC's Vice President, Sales & Marketing, all have many years of plastics industry experience, and they've been brought to BPC to promote and grow the business. "We have a great team in place," said Larson. "We all come from the plastics industry compounding arena and are excited to build the BPC business. I believe a real strength is our independence; we aren't owned by a larger company. We are very lean and we are very successful."

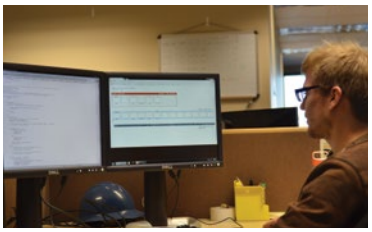
ENTEK NPE Features

(continued from p. 3)

Interactive Display Will Allow Guests to Design Screw & Barrel Layout Design for Their Specific Compounding Applications

ENTEK's unique screw design program will also be featured at its booth. The company will have two interactive work stations at its booth where visitors will be encouraged to see how easy it is to quickly design screw and barrel layouts for their specific applications.

There are several built-in features for this software, including:



- Drag and drop functionality on all components that customers need to specify: barrel sections, screws, metallurgy, etc.
- Automatic calculation of remaining space on the screw shafts
- Safeguards to prevent putting certain elements where they do not belong
- Easier part ordering as complete part numbers are furnished within the program
- Easy save within the program or export to an Excel file options once design is complete

"This new program is something that provides great value to our customers," said Linda Campbell, ENTEK's Director of Sales. "We want them to see first-hand how it can make their lives easier by giving them the ability to specify, and provide a drawing of, exactly what they need for their applications."

ENTEK Hires Dean Elliott as Technical Processing Manager

ENTEK has hired Dean Elliott to the position of Technical Processing Manager. In his new role, Dean will work with key customer accounts to develop and improve their extrusion processes. He will lead the company's Extrusion R&D Team and oversee Pilot Plant trials.

Dean has over 20 years of plastics industry extrusion experience. He rejoins ENTEK after working for the past three years at Interfacial Consultants/REV Materials of Prescott, Wisconsin, where he led equipment installation projects and managed several strategic customer accounts. Prior to this position, he worked for seven years as ENTEK's Extrusion Lab Manager, where he led all customer extrusion lab trials and worked to help customers solve numerous processing challenges.

"We are excited to have Dean back with us here at ENTEK," said Linda Campbell, Director of Sales at ENTEK Extruders. "He is already well-known to many of our customers, and he fills an important role by helping them improve their compounding processes."

See Dean at NPE2018

At NPE2018, Dean and Colt McDaniel will be at ENTEK's booth meeting with customers and performing live 5-minute screw change demonstrations twice a day, and 11 a.m. and 2:30 p.m. If you're coming to NPE please stop by, say hello and see how ENTEK has simplified the screw change process on its QC^3 co-rotating twin-screw extruders!

ENTEK HR^{3}™ Twin-Screw Extruders Ideal for High Output Compounding Applications

HR^{3} (High Rate, High Reliability, High Return) Machines Available in Sizes Ranging from 53mm to 133mm

ENTEK has rebranded its larger, high-output twin-screw extruders. The company's 53mm, 73mm, 103mm, and 133mm machines are now the HR^{3} series, with 'HR' meaning High Rate, High Reliability, and High Return.

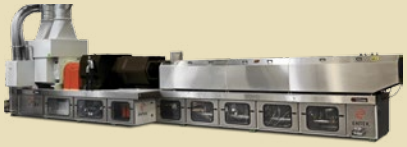
This series of workhorse extruders are used for high-output production of masterbatch, sheet, packaging, food, profiles, and more and make up over 60% of ENTEK extruders in operation today.

"We've put a lot of research and development into our QC^{3} line of smaller twin-screw extruders the past few years, and that continues," said Linda Campbell, ENTEK's Director of Sales. "But we didn't want to lose sight of the fact that our larger machines are a major source of our business and a great option for high-output compounding."

While the QC^{3} line of machines (27mm, 33mm, and 43mm) are for customers who run smaller lots of materials and do frequent material changes, the HR^{3} line is for higher output applications where customers run standard formulations at least 80% of the time.

HR^{3}:
High Rate
High Reliability
High Return

HR^{3}™ 133mm
Masterbatch compounding
1,000hp, 300rpm or 2,000hp, 600rpm



HR^{3}™ 103mm
Masterbatch compounding
700hp, 300rpm or 1,400hp, 600rpm

HR^{3}™ 73mm
Large lot size custom compounding
400hp, 600rpm or 600hp, 900rpm

HR^{3}™ 53mm
Medium lot size custom compounding
150hp, 600rpm or 300hp, 1,200rpm

QC^{3}:
Quick Change
Quick Clean
Quality Control

QC$^{3®}$ 43mm
Medium lot size custom compounding
100hp, 600rpm or 200hp, 1,200rpm

QC$^{3®}$ 33mm
Small lot size custom compounding
50hp, 700rpm or 100hp, 1,400rpm

QC$^{3®}$ 27mm
Ideal lab/low-volume production machine
20hp, 600rpm or 40hp, 1,200rpm

ENTEK Employees at NPE2018

If you're coming to Orlando for NPE2018, stop by ENTEK's booth (W5189) to see our latest products and services. Our friendly staff will include the following ENTEK employees, who will be at the booth ready to discuss your compounding applications. We hope to see you there!


Larry Keith
CEO


Kirk Hanawalt
President


Linda Campbell
Director of Sales


Austin Lindsey
Regional Sales Manager


Bill Petrozelli
Regional Sales Manager


Al Bailey
East Coast Controls Manager


Dean Elliott
Technical Processing Manager


Matt Ramsdell
Technical Customer Service Manager


Tammy Straw
Marketing and Business Development Manager


Kristina Corona
Sales Project Coordinator


Kelsey Dennis
Inside Sales and Customer Service


Jennie Norris
Inside Sales - Internal Accounts


Colt McDaniel
Pilot Plant Technician


Craig Benjamin
Design Engineer


Melissa Jensen-Morgan
Design Engineer


Ryley Jones
Design Engineer


John Burke
Director of Manufacturing

We Are ENTEK

Why ENTEK? Ask Our Customers!

The theme of ENTEK's current ad campaign is customer support and customer satisfaction – two things that we work hard to provide every day. At NPE2018, we will have a large display on the wall behind our refreshment area (see image below) showing condensed versions of five current ads.

Customer service is the ENTEK difference. If you're coming to Orlando stop by our booth (W5189) to talk with us; we will listen to learn your needs and work with you provide a solution. If you're not coming to NPE, contact us anytime to see how we can help you with your compounding applications!

Upcoming Events

See ENTEK at the following upcoming events in 2018:

May 7-11 - NPE2018
Orlando, Booth No. 5189, West Hall

Sept 18-20 – Extrusion 2018,
Cleveland, Booth 215

Sept 23-25 – SPE CAD RETEC
Charleston

Dec 4-5 - AMI Compounding World Forum
Coral Springs, FL

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RAISING EXPECTATIONS. KEEPING THEM THERE.

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