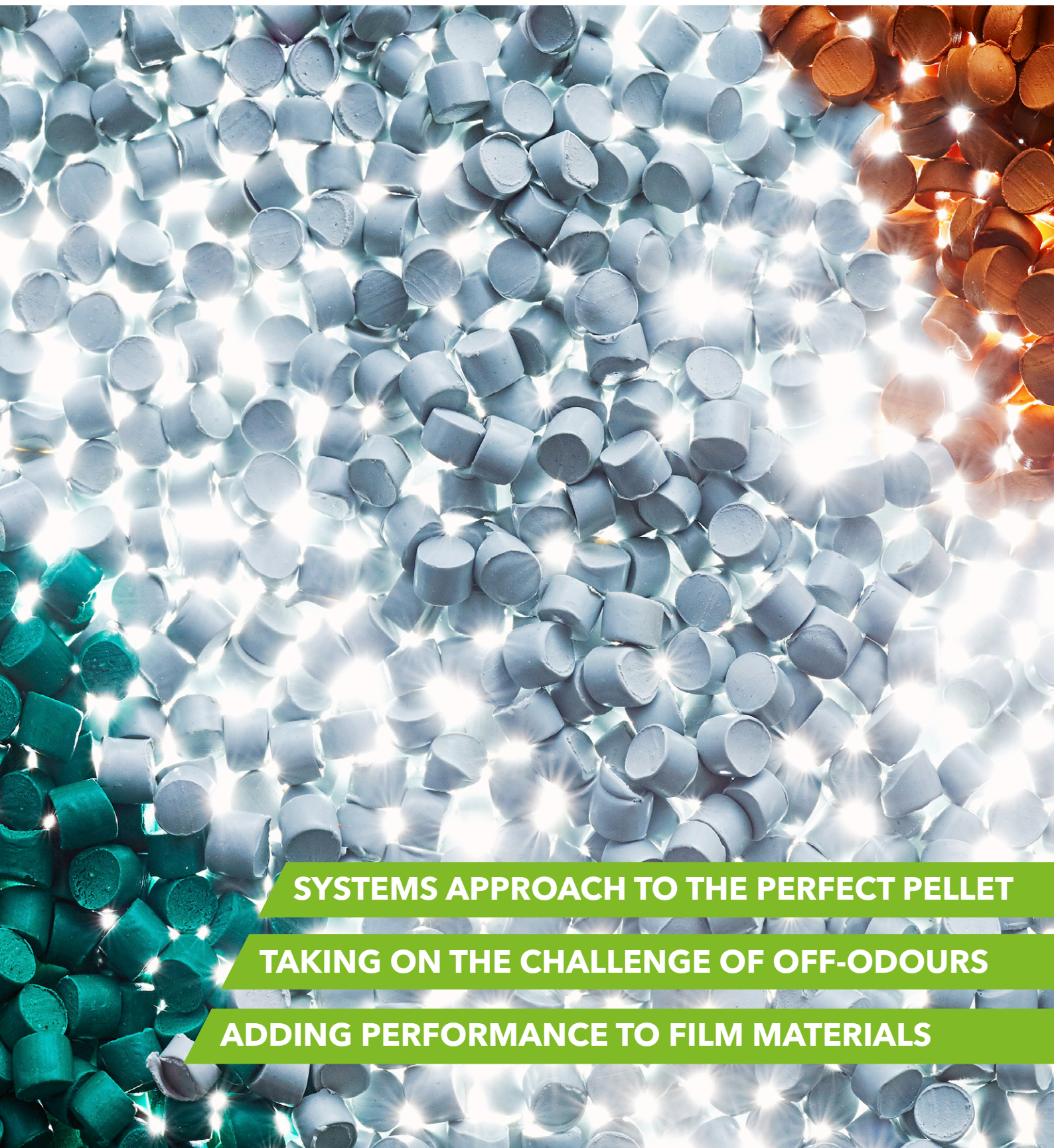


Compounding WORLD



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Compounding WORLD

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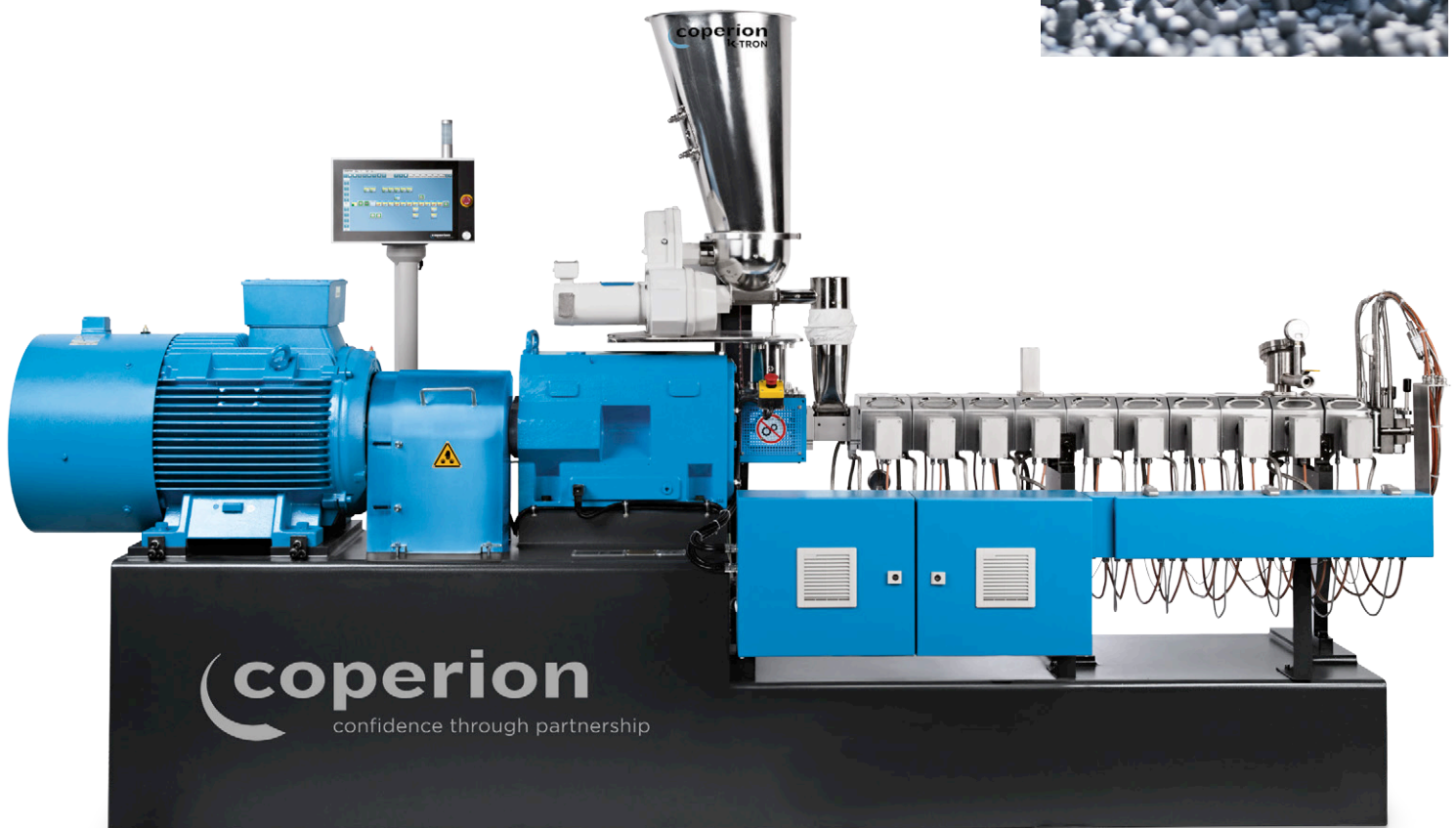
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All set for a packed 2018

Time flies when you are having fun. *Compounding World* still feels like an exciting new venture for us at AMI, so it's hard to believe that it will reach its 10th birthday later this year. And we will be celebrating that landmark in style with our busiest year ever.

One of the undoubted highlights for us in 2018 will be our Compounding World Expo, the first ever focused exhibition for the plastics compounding industry. We have a great show lined up for you at Messe Essen in Germany on 27-28 June. More than 80% of the stands have already been booked and the rest are selling fast - there will be well over 120 leading suppliers for you to visit.

It's more than a show, though. The Compounding World Expo also includes a packed conference programme running across two separate theatres and we already have an impressive line-up of speakers to cover the latest technology, business and market developments. What's more, admission to both the exhibition and conferences is completely free-of-charge. We have more information on the event and how to [register](#) for your free place on page 14 of this issue.

For our readers in the Americas, we also want to share the exciting news that we will be bringing the Compounding World Expo to Cleveland, Ohio, in May 2019. Booths went on sale for that last month and are already being snapped up by leading suppliers. Read more about our plans for our new US event on page 10.

And over in Asia, we are moving our Compounding World Asia conference to Bangkok in

Thailand for the first time this year and look forward to seeing many of our Asian readers there on 27-28 September. Full details, including the call-for-papers, can be found at <http://bit.ly/CWAsia18>.

2018 is also a busy year for major plastics exhibitions and we will be exhibiting along with our sister magazines and AMI colleagues at NPE in Orlando, Chinaplas in Shanghai, and Fakuma in Friedrichshafen. So please drop by our stands to say hello if you're at any of these events.

Compounding World will publish previews and reviews of these three exhibitions, plus Milan's Plast show, bringing you all the relevant news from around the world. Our full-line up of features and reports for 2018 is included in the new *Compounding World* media pack, which also includes details of our growing global readership and can be downloaded at <http://bit.ly/CWMP2018>.

We are proud of what we - with your support - have achieved at *Compounding World* in our first 10 years and pleased to be able to share our plans for the future with you. We sincerely hope you will want to continue to play a part in them and look forward to delivering the essential information and network-building opportunities you will need to make your business a success, whether that is via our digital magazine, conferences or exhibitions.

Chris Smith
Editor-in-Chief,
AMI Magazines
chris.smith@ami.international



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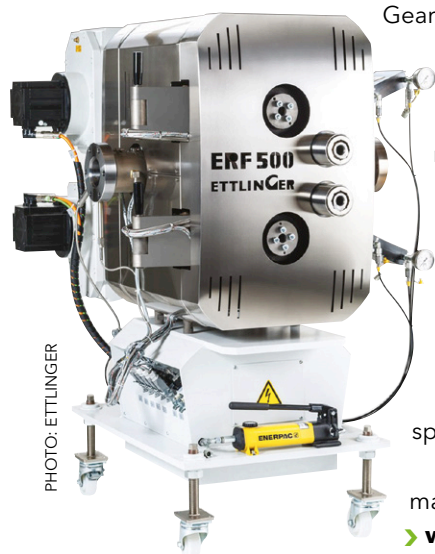
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Maag Group bolts on Ettlinger



Gear pump, pelletising and filtration systems maker Maag Group has acquired Ettlinger Kunststoffmaschinen, a German manufacturer of filtration systems and low pressure moulding machinery.

Swiss-headquartered Maag said the Ettlinger filter business, that until now was majority-owned by its CEO Volker Neuber, complements its existing activities - which include the Maag gear pump, Automatik Scheer and Gala Automatik pelletising systems, and Reduction pulverising products.

The two firms will continue to operate under their existing brand names. "This expansion is an exciting idea. Bundling the products and strengths of Maag and Ettlinger will deliver a new breadth of custom solutions for plastic filtration," said Maag Group President Ueli Thuerig.

The move also takes Maag Group into a new business area through Ettlinger's specialist machinery for low pressure injection moulding of large parts.

Maag Group has production sites in its home base of Switzerland as well as Germany, Italy, the US and China. Ettlinger manufactures in Germany.

➤ www.maag.com

Expansions completed at Orion

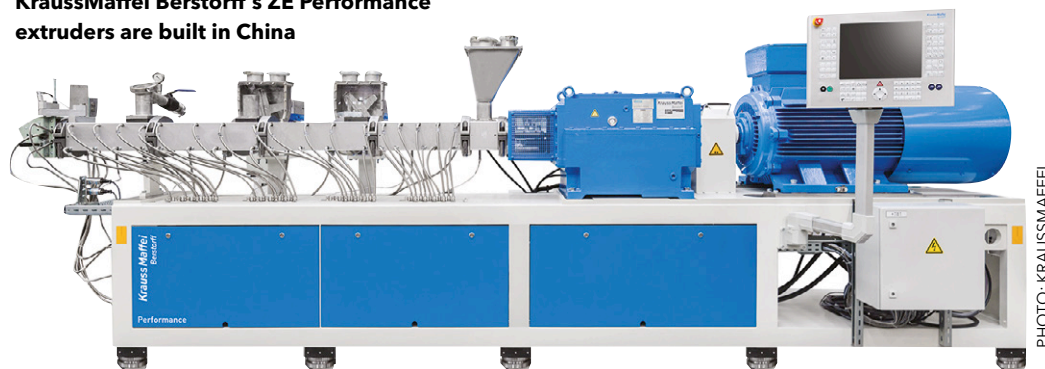
Carbon black producer Orion Engineered Carbons has completed construction of a new production line at its plant in Yeosu, South Korea, and has begun commercial sales. The line will make premium grades of speciality carbon black for applications such as automotive coatings, engineered plastics and sealants.

The Yeosu Plant has also just completed a major upgrade to a technical rubber carbon black production line. This line is also now back in commercial production.

The company described both projects as major components of the consolidation of its Bupyeong plant into Yeosu, a process which is due to be completed by July.

➤ www.orioncarbons.com

KraussMaffei Berstorff's ZE Performance extruders are built in China



KraussMaffei to list in Shanghai

ChemChina is seeking to list its KraussMaffei subsidiary onto a stock exchange in China. The company said the move will enable KM to accelerate its growth through access to the Chinese capital market. ChemChina will retain majority control.

The plan is to bring KraussMaffei into the Qingdao Tianhua Institute of Chemistry Engineering, another ChemChina subsidiary that is already listed on the Shanghai stock exchange. Three tyre and rubber sites will also be brought into the new operation, although

KraussMaffei would constitute about 85% of the total business. The proposals are subject to regulatory approval.

"Through a future listing on the Shanghai stock exchange, the perception of KraussMaffei will significantly increase in the Chinese market. Chinese investors appreciate German industrial workmanship as well as management competency," said Jianxin Ren, chairman of ChemChina.

KraussMaffei will remain headquartered in Munich and its German codetermination rights, the legal form

of the company, as well as all employee and union agreements will remain unchanged.

KM employee representatives and the IG Metall union said that they welcomed the step, which they believe will secure growth and jobs in Germany.

KM increased its revenues by 5% to €1.27bn in 2016. The company said it expects to generate sales of more than €1.3bn in fiscal 2017 and to add 350 new jobs, having crossed the 5,000-employee mark in August 2017.

➤ www.kraussmaffei.com

Croda buys IDP firm IonPhase

Speciality chemicals firm Croda has acquired IonPhase, a Finnish supplier of static electricity protection products based on inherently dissipative polymers (IDPs). Terms were not disclosed.

Croda said the acquisition supports its growth strategy within high technology, consumer-driven markets and will be a natural extension to its existing range in terms of both R&D and marketing.

IonPhase's anti-static products are used to control static electricity and thus

prevent damage to electrical components, increase product safety, and improve long-term appearance. Applications are found in



IonPhase IDPs are used in applications such as chemical packaging

the electronics and semi-conductors, chemicals, food, automotive, and consumer appliances markets.

Last year, IonPhase commissioned a new compounding plant at its Tampere facility in Finland. The turnkey installation was supplied by Coperion.

■ Croda will be explaining functional mechanisms and applications of IDPs at AMI's upcoming Conductive Plastics conference in Pittsburgh, US, on 20-21 March. Find out more [HERE](#)

> www.croda.com

> www.ionphase.fi

Feddersen boosts Elix offering

Engineering plastics distributor KD Feddersen has expanded its agreement with Spanish ABS specialist Elix Polymers to include high-heat products that, it is claimed, "demonstrate improved flow properties and significantly lower emissions than previous types."

The Elix ABS HH 3105, HH 3110 and HH 3114 high heat grades meet various automotive industry standards, including the VDA 277 and 278 emissions standards.

The company will also distribute some new high heat, low emission electroplatable grades. These include Elix ABS HH P2MC, which has a Vicat softening temperature of 105°C, and Elix ABS Ultra HH 4115 PG, a PC-modified ABS.

Feddersen distributes for Elix throughout Germany and, via sister companies in the Feddersen Group, in Austria, France, the UK, Ireland and the Nordic countries.

> www.kdfeddersen.com

> www.elix-polymers.com

Michelman teams up with Mafic

Surface treatment specialist Michelman has entered an "innovation and product development partnership" with Mafic, a specialist in production of advanced basalt fibres. The alliance will focus on improving the performance and surface characteristics of basalt fibres and developing their application in composites.

"Both companies recognise that by working closely together they can accelerate the pace of new and advanced product

innovations for a broad array of end use applications," Michelman said.

■ Separately, Michelman has also become a member of the University of Delaware's Centre for Composite Materials Industry Consortium. It will sponsor a research project to evaluate the sizing options of carbon and glass fibre for their compatibility with thermoplastic and thermoset resins, identifying combinations that will enhance properties such as

increased heat, impact and fatigue resistance for automotive, aerospace and electronics applications.

> www.michelman.com

> www.maficbasalt.com

Basalt fibres from Mafic



Kartell buys into bioplastics maker Bio-On

Felofin, the parent company of Italian furniture, home-ware and lighting design giant Kartell, has invested €10m to take a 2% stake in Bio-On, an Italian-based supplier of renewable plastics.

The two companies are already working together on R&D with the broad aim to "accelerate the development of organic electronics based on Bio-On's technologies in order to gain a leadership position in this

new sector". The first results of this cooperation are expected within the next 12 months, the companies said.

Founded in 2015, Bio-On develops polyhydroxyalkanoates (PHAs) from agricultural waste, including

molasses and sugar cane and sugar beet syrups. In many areas of application, the company says, PHAs can deliver similar performance as conventional plastics.

> www.bio-on.it

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Compounding World to launch exhibition in US

AMI and *Compounding World* magazine have announced plans to hold the second Compounding World Expo in Cleveland in Ohio, US, on 8-9 May 2019. The free-to-attend exhibition will follow on from the first Compounding World Expo, which is taking place in Essen, Germany on 27-28 June 2018.

The US exhibition will be held at the state-of-the-art Huntington Convention Center in downtown Cleveland and will feature free-to-attend conference sessions, plus a networking party for attendees and exhibitors at the iconic Rock and Roll Hall of Fame on the evening of 8 May.

Andy Beevers, Director of Events and Magazines at AMI, said: "We've been delighted by the very positive industry response to the first focused exhibition for the compounding industry, which we are holding in Germany this June, and it has led to numerous requests for a similar event in North America. We selected Cleveland as the ideal location for the exhibition because of its easy accessibility for huge numbers of compounders, as well as the excellent convention facilities, hotels, restaurants and entertainment options in the city's revitalised downtown."

AMI announced its plans for the US exhibition at the Compounding World Forum



Cleveland's Huntington Convention Center in the US will host the second Compounding World Expo in 2019

in Florida in December. Companies that have already reserved booths include CPM Extrusion Group, Omya, Entek, Kaneka, NFM, Toyota Tsusho, JSW, Vertellus, Mixaco, M Holland, TPEI, Shamrock, Econ, Zoltek, B&P Littleford, Welset, Brabender, OCSiAl, Dr Collin, Modern Dispersions (MDI), Piovan, Cathay Industries, Zeppelin, Sikora, Fortune International Technology, Entex and Perry Videx.

"The reaction to our announcement to hold a free-to-attend compounding exhibition in the USA has been incredible," said Kelly DeFino, Events Team Manager at AMI's US office. "America's leading producers of twin-screw extruders all signed up instantly and we already have a broad selection of suppliers of polymers, additives and compounding equipment on the expo floorplan with lots of interest in the remaining booths."

The Compounding World Expo 2019 will run alongside two complementary

exhibitions - Extrusion Expo 2019 and the Plastics Recycling World Expo 2019. These will be supported by AMI's extrusion and recycling magazines: *Film and Sheet Extrusion*; *Pipe and Profile Extrusion*; and *Plastics Recycling World*.

AMI has extensive experience of running successful conferences for the compounding and extrusion industries in North America and these attract thousands of delegates each year. They include: Compounding World Forum; Thermoplastics Concentrates; Fire Retardants in Plastics; Polymers in Cables; Performance Polyamides; PVC Formulation; Conductive Plastics; Polymer Foam; Profiles; Medical Tubing; Polyethylene Films; Multilayer Flexible Packaging; Stretch and Shrink Film; Thin Wall Packaging; Polymers in Flooring; and Medical Fluid Bags.

For more information on exhibiting at the Compounding World Expo 2019, visit <https://compoundingworldexpo.com/na/>

NEWS IN BRIEF...

German toll compounder **PolyComp** has expanded warehousing at its site at Norderstedt on the outskirts of Hamburg. The company, part of the Feddersen Group, said it can now store, commission and prepare for pick-up 25% more items than before. The new climate-controlled building meets the latest energy saving standards and has improved vehicle access.

www.polycomp.de

Clariant has unveiled its Additive Manufacturing business, which will be dedicated to the premium and customised 3D printer filaments sector. The company said the new business will draw on its experience in developing polymers in conjunction with pigments, additives and masterbatches for high end applications.

www.clariant.com

The European Chemicals Agency (**ECHA**) has updated the entry for bisphenol-A (BPA) in the Candidate List of substances of very high concern (SVHCs). BPA was already included in the list but an additional reason for inclusion has now been added: endocrine properties causing adverse effects to the environment. Inclusion of a substance on the Candidate List imposes additional responsibilities on users, producers and importers.

www.echa.europa.eu

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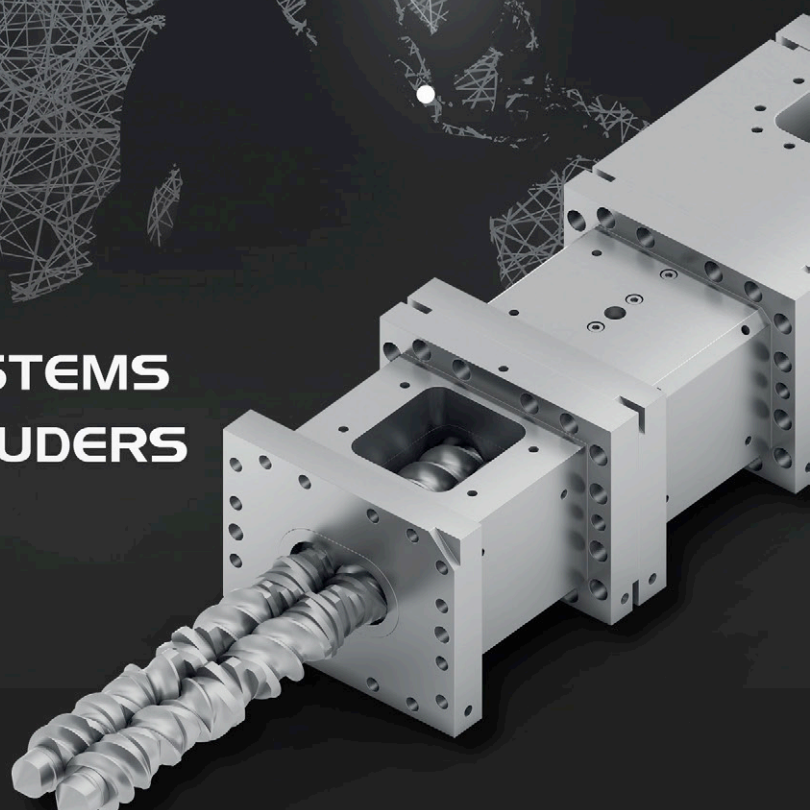
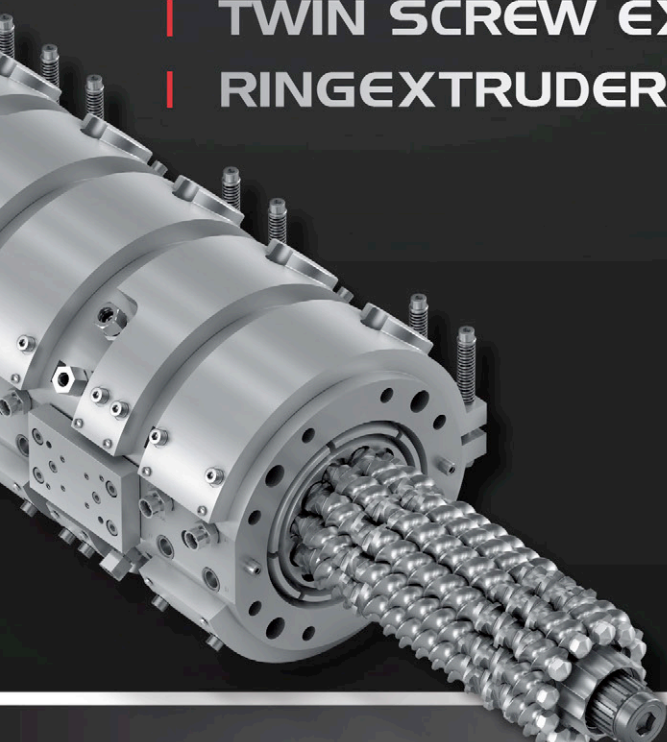


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PolyOne buys IQAP of Spain

PolyOne has acquired IQAP Masterbatch Group, a privately-owned producer of speciality colorants and additives based in Spain. IQAP generates sales of around €40m and employs 160 people at two sites in Spain and the Czech Republic. It has a capacity of 15,500 tonnes/year.

"The end markets that IQAP serves are perfectly aligned with areas PolyOne knows very well, and together we will advance the possibilities for our

European customers," said PolyOne Chairman, President and CEO Robert Patterson.

IQAP founder Xavier Rovira said PolyOne "was the clear choice that best aligns with our vision and ideals for world-class innovation and customer service".

IQAP supplies colour and additive masterbatches to multiple industries, including automotive, packaging, consumer, wire and cable, and textiles. Shortly before

the deal was announced, it added 1,000 m² of new laboratory and pilot plant facilities at its Spanish plant.

IQAP was founded near Barcelona in 1979 and moved to its current main site at Vic in 1996. Over the years, it acquired three other Spanish firms: Colorpoint, Alcolor, Paint Desarrollos and ADES. The company established its Czech production unit in 2005.

> www.polyone.com

> www.iqapgroup.com



PHOTO: POLYONE

**PolyOne President and CEO
Robert Patterson**

SABIC starts up Geleen PP extrusion facility

PHOTO: SABIC



SABIC has started up its new PP extrusion facility at Geleen

SABIC has started its new PP extrusion facility at Geleen in the Netherlands, which is located next to its existing full-scale polymerisation plant and global technology centre for Europe.

SABIC described the new facility as "an important step in growing and developing the company's capabilities in the region, where Sabic has solid expertise in polyolefin developments from all aspects: catalyst, process, material and application".

The new facility will particularly address demand for lighter materials and help customers to reduce energy consumption by lowering processing temperatures and shortening cycle times.

> www.sabic.com

Celanese expands with Omni Plastics

Celanese is to acquire US-based Omni Plastics and its subsidiaries, including the distributor Resinal de Mexico, as part of its plans to add compounding capacity to its global asset base. It said it plans complete the deal in this quarter and will integrate Omni's portfolio and production capabilities into its own engineered materials business.

Omni Plastics operates a compounding facility at Evansville in Indiana, US and has additional offices in Mexico City. The company specialises in custom compounding of engineered thermoplastics for multiple end use markets. Its main brands include OmniLon PA, OmniPro PP and OmniCarb PC compounds, as well as its

OmniTech custom-developed products.

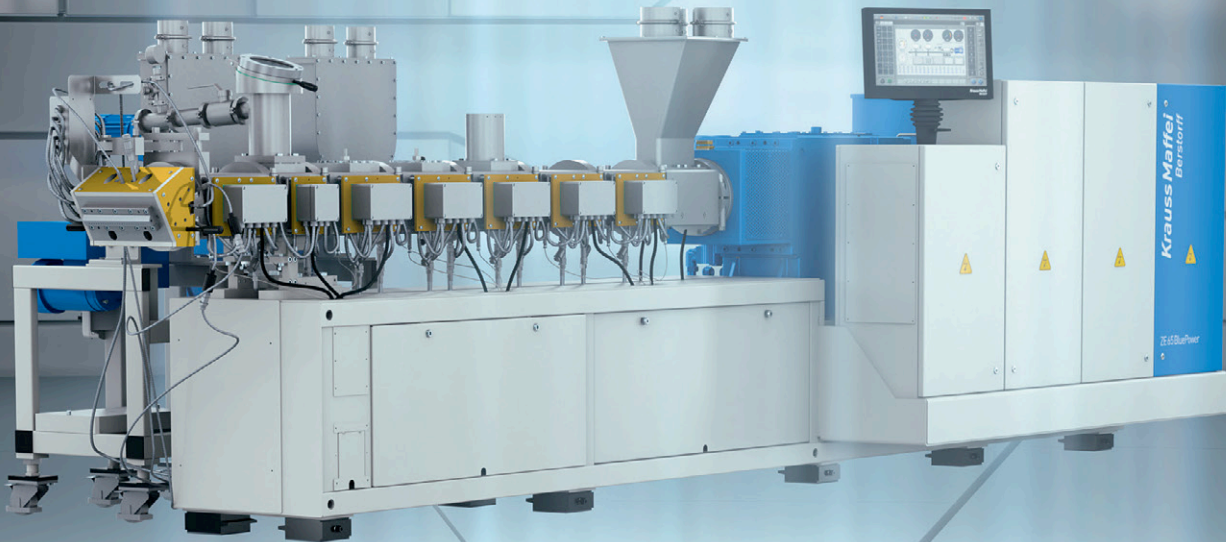
The OmniTech product line includes PBT and ABS formulations for applications with specific functional requirements, including flame retardant, conductive, wear-and-friction and improved optical clarity.

The acquisition follows Celanese's decision in the autumn of last year to

expand its global compounding capacity by up to 60,000 tpa with the installation of a total of five compounding lines across its Engineered Materials business units in China, the US, and Europe. It also announced a new line for its Celstran LFT business at Winona in the US.

> www.celanese.com

> www.omniplastics.com



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Engineering Value

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Berstorff

Free registration now open for Essen show and conferences

Free on-line registration has now opened for the first Compounding World Expo, which will take place on 27-28 June 2018 at Messe Essen in Germany. By registering in advance, visitors will receive free admission to the exhibition, featuring more than 120 leading suppliers, plus free entry to two conference theatres hosting technical presentations, educational seminars and business debates.

Attendees will also have free access to the adjacent Plastics Recycling World Exhibition and its conference sessions, plus a networking party for exhibitors and visitors, which will be held on the evening of 27 June at the Messe Essen beer garden.

"The event will provide visitors with a great opportunity to meet and compare suppliers from around the world, as well as giving them the chance to learn from business leaders and technical experts in the



PHOTO: MESSE ESSEN
Visitors can now register for free admission to the Compounding World Expo in Essen

conference theatres," said Rita Andrews, Head of Exhibitions at AMI.

Speakers lined up for the conferences include influential representatives from leading compounders and masterbatch makers such as A Schulman, Albis, Ampacet, Automotive Compounding Industry, Clariant, Ensinger, InnoComp, Kingfa, Lifocolor Farben, PolyOne, R&P Polyplastic, Sirmax, and Washington Penn.

Topics being covered in the free technical presenta-

tions at Essen will include: functional fillers; thermal conductivity; flame retardants; the production of highly-filled compounds; screw element optimisation; nanotechnology; carrier resins; pelletising options; reactive extrusion; online monitoring; compatibilisers; and electrical conductivity. The practical training seminars will address topics such as: REACH legislation; computer modelling; the psychology of colour; process scale-up; screw optimisation; and machine

selection.

The exhibition, which will occupy the whole of Hall One at Messe Essen, will feature a wide array of leading manufacturers of extrusion machinery and equipment, plus suppliers of a huge variety of polymers and additives.

More than 120 companies have already booked over 80% of the available stands, with more exhibitors signing up each week. The exhibitor line-up currently includes companies such as Azo, BASF, Biesterfeld, Borealis, Brabender, Brenntag, Buss, Comac, Coperion, Dow Corning, Econ, Evonik, Farrel Pomini, Feddem, Fraunhofer LBF, HPF, ICMA San Giorgio, JSW, KraussMaffei Berstorff, Imerys, Leistritz, LKAB, Maag, Mixaco, MPI Chemie, Omya, Polyplastic Compounds, Schenck Process, Solvay, Unipetrol, Velox, Zeppelin and many more.

To book your free ticket for the event, visit:

> <https://compoundingworldexpo.com/eu/>

Nexam acquires Plasticolor of Sweden

Plastics technology firm Nexam Chemical has paid €11.7m to acquire Plasticolor Sweden, which makes plastics masterbatch and generated sales of around SEK 86m (€8.7m) last year.

Nexam said the move gives it access to new production capacity and technology that will enable it to expand its product portfolio and accelerate growth.

The company said the deal will also

facilitate the introduction of its Nexamite Multifunctional Masterbatch (NMMB) to the market. This packages a number of different additives together in a single masterbatch and is said to provide performance and cost benefits.

Nexam has, coincidentally, just received its first trial order of NMMB from KWI Polymers of Canada. The two firms had jointly developed the NMMB system, which will be used in the

production of PE pipes.

According to KWI's Yves Laroche the combination of Nexamite with its own nano-carbon reinforcement in a masterbatch "offers not only ultimate mechanical properties, but also opens new opportunities by obtaining new physical property behaviour in the material".

> www.nexamchemical.com

> www.kwipolymers.com

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EU unveils strategy for plastics

The European Commission has unveiled its new **Plastics Strategy** to tackle plastics pollution, setting a target of making all plastics packaging "recyclable" by 2030.

The strategy includes a commitment to define design for recyclability. It also proposes measures to tackle marine waste from shipping and fishing, as well as land-generated pollution such as micro-beads.

While the prime focus is on single-use plastics products designed, produced, used and recycled in the EU, the strategy also commits to supporting environmental projects in developing countries.

Plasgran invests in more compounding capacity

UK-based plastics recycler Plasgran is to install a new twin screw compounding line at its plant at Wimblington near Cambridge, adding an additional 10,000 tonnes of capacity.

The company said its original Erema Intarema line, which was installed in 2016, has been near capacity for some time. The installation of the MAS 93K 400 twin screw compounding system with laser melt filtration from Austrian machinery maker Maschinen und Anlagenbau Schulz will provide extra capacity and allow it to offer a broader product range.

"This new line is designed for compounding and dispersion and will

allow us to produce filled PP materials up to 40% loaded, and its unique conical screw design means we are not restricted by bulk density on our input materials," said Plasgran Managing Director Mark Roberts.

"The CDF filter system is designed for recycled materials and is capable of filtration down to 90 microns without loss of throughput, and the secondary cascade extruder provides maximum de-gassing and removal of volatiles and moisture, meaning we can achieve even the most stringent of specifications," he said.

The new compounding line is the latest in a series of investments by Plasgran,

which increased sales by 30% to £22m in the 2016-17 financial year. Last summer, the company installed a 30,000 tonnes/year washing and separation facility at its plant at Newcastle-upon-Tyne as part of a joint development with Monarch Recycling. The line is focused on washing and separation of post-consumer HDPE bottles, and PP pots, tubs and trays.

It also recently invested £40,000 in a differential scanning calorimeter. The Mettler Toledo DSC 3+ unit is used to characterise and understand the composition and morphology of polymers and post-consumer blends.

➤ www.plasgranltd.co.uk

Evonik adds PMMA compound line in US

Evonik is to add an additional line for production of its Acrylite brand of PMMA moulding compounds at its Methacrylates business unit located at Osceola in Arkansas, US. The investment will nearly double capacity and is expected to start operation in Q1 2019.

The move is "the next logical step in our efforts to implement our global strategy for speciality moulding compounds," according to Siamak Djafarian, who heads the Moulding Compounds product line within Evonik's Performance Materials segment. The move will allow the company, which claims to be the only



Evonik is investing in PMMA compounding capacity in US

integrated MMA-PMMA producer with downstream compounding in the Americas, Europe and Asia, to offer locally made speciality moulding compound products in each region.

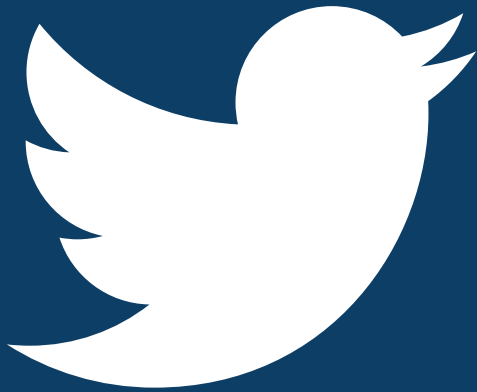
Evonik said the investment will also address growing demand in the North and South American markets for PMMA compounds. It cites construction, lighting, and automotive

applications among the key growth markets.

■ In a separate move, Evonik has launched a new high-temperature PPA-based addition to its Vestamid HTplus range. The new grade can withstand mechanical stress up to 135°C, has a glass transition temperature of 155°C, and loses only 15% of its modulus of elasticity at 120°C, which the company said compares to about 80% for standard products. The new PPA grade also offers high crystallinity, which results in good chemical resistance and dimensional stability, and easy processing.

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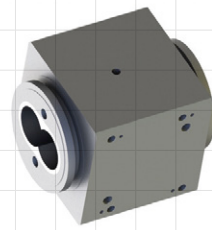
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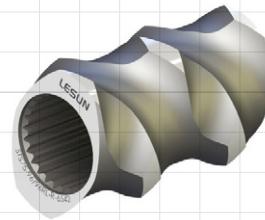
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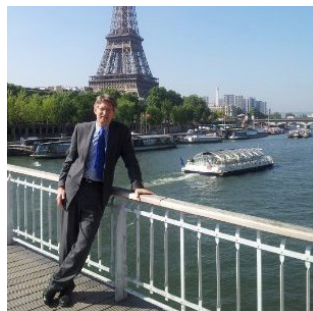


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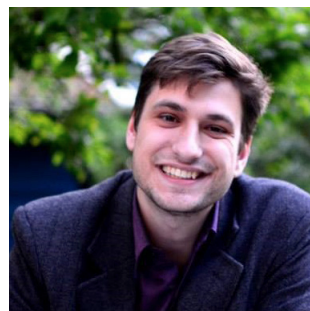
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PHOTO: BAY PLASTICS MACHINERY



Pelletising machinery makers are working to deliver optimised yet flexible production systems backed with higher levels of pre- and post-purchase support. Peter Mapleston finds out how

Pelletiser producers respond to new customer demands

Suppliers of pelletising equipment are going the extra distance to give producers of compounds and masterbatches equipment solutions that meet their exact needs. As a result, today's pelletising systems are being tailored more than ever according to material type and output levels, while not overlooking the fact that flexibility is still needed in case of changing needs over time. Equipment suppliers are also upping their game in terms of customer service and support, with several players having recently invested in extended testing and trial facilities.

Maag can certainly be considered a powerhouse in pelletising technology, having acquired Gala Industries and Reduction Engineering Scheer in late 2015 to sit alongside Automatik Plastics Machinery, which was previously merged into Maag in 2010. The product line-up now includes underwater and both wet and dry cut strand pelletisers.

Maag's dry cut strand pelletisers are now branded Automatik Scheer and the latest addition to the equipment line is the SG-M series, which

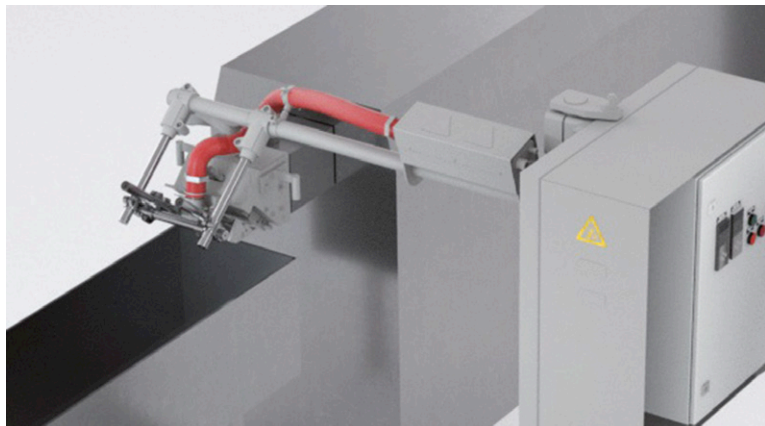
features integrated mesh filters for quick cleaning and faster material changeovers. The new units also incorporate what Alexander Helm, Product Manager at Maag Automatik, describes as innovative HAK (Hot Air Knife) die cleaning technology, which works together with all kinds of Automatik Scheer strand pelletising equipment.

"Automatik Scheer strand dies in the SG-M series provide fast changeovers towards colour changes that will support the potential for completing colour changeovers in 10 to 15 minutes" Helm says. "This is achieved by easy clean pivot design of the die head and a new quick connection system for die plates, which enables an exchange by loosening two socket screws only." The SG-M die head series is said to be suitable for all kinds of single or twin-screw extruders, including lines running with melt pumps (of which Maag is a major supplier) through an integrated melt adapter connection.

Helm says that even small amounts of fillers such as pigments or glass fibres will almost invariably cause out-gassing and/or create melt residues

Main image:
Micro pellets produced on the new AXM12 pelletiser from Bay Plastics Machinery. The coin measures 18mm in diameter

PHOTO: MAAG



Above: The Automatik Scheer HAK uses heated pressurised air to minimise interruptions caused by build-up at the die plate

around the die holes of the die plate when producing strands for pelletising. These remains will degrade and burn due to the high temperatures of the die plate and accumulate over time. "With excess build-up comes the risk that the burnt remains may be collected by the strands themselves and thus contaminate the end product," he says. "Such occurrences will most likely cause complaints from the end user and in worst case result in return of material."

Cutting interruptions

Helm says while many companies have introduced solutions to circumvent the problems created by deposit build-up on the die plate - by way of mechanical cleaning or burning off with an open flame, for example - these require halting production. The new Automatik Scheer solution uses heated and pressurised air to eliminate most of the deposits immediately. "That avoids the build-up of such deposits that are causing contamination and allows its customers to conduct operations safely but also increase the profitability of the plant without the need to interrupt production," he claims. "The HAK has been specially designed to reduce the deposits to an absolute minimum."

The HAK series can be placed completely independently from the strand die on its own movable telescopic stand with its air nozzle directly at the die plate to clean up any drool. It is suitable for die head sizes from 100 mm up to 900 mm and can be run by a standalone control system. "This means maximum flexibility regardless of the type of die head or other downstream equipment," Helm says. Trials under production conditions at customers are said to have shown that risk of product contamination can be reduced by 90%.

US-based **Bay Plastics Machinery (BPM)** says it saw record growth in new machine and system sales last year, which it attributes to the strong economy in North America, progress in establishing a customer base in Asia, and a better-than-

expected launch into the European market. According to the company's Vice President of Manufacturing, A G Fath, it has been expanding technical resources to support this growth. New developments from the company include the CXP large capacity pelletiser, the AXM12 micro pelletiser, and a new pellet evacuation system (launched last summer).

The expansion of BPM's large capacity pelletising line to include 600, 800 and 1000mm units is now complete. These large capacity systems are not only offered for standard pelletising, but also for highly demanding long fibre thermoplastics (LFTs). "This pelletiser's rotor shaft is mounted to an isolation coupler which not only helps eliminate deflection from motor vibrations, but also creates a nearly zero gap between the rotor and bed knife," says Jim Forgash, Vice President of Sales at the company.

Micro developments

Having successfully completed beta testing at several customer sites, the AXM12 (300mm) micro pelletiser is now available to the market. "Initial tests resulted in an increase of over 40% in overall yield," says Forgash. He explains that the key factor in this new pelletiser's effectiveness is the reduced distance from the feed rolls to the cutting edge, which creates greater strand control. "Another advantage over the other so-called micro pelletisers is that this machine will accommodate a much higher line speed while still producing quality pellets," he says. BPM will be running the micro pelletiser and the new pellet evacuation system in one line at its booth at the NPE plastics trade fair in Orlando in the US in May.

BPM has also introduced a redesign of its AXP16 (400mm) pelletiser. "This modified medium-production machine has added robust features for customers that are not able to take the next step to the large capacity BX series, which is typically more expensive," says Forgash. ➤

Right: Close-up of BPM's new AXM12 micro pelletiser cutter. The company says yield is increased by 40% without loss of pellet quality

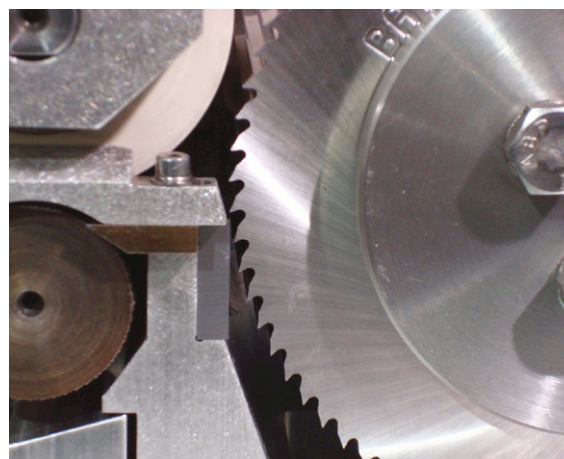


PHOTO: BAY PLASTICS MACHINERY

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TEK-MHS Series of SMP are the most advanced model with the performance of high speed and torque. Also, these are particularly suitable for engineering plastic requiring filling, reinforcing and alloying operations as well as commodity plastics requiring dispersion of additive and master batch.



TEK-Series Twin Screw Extruder

In addition, the company has updated the design of its cantilever 100 and 200mm wide pelletisers to offer a more cost-effective option. "This new design gives nothing up in the way of performance," Forgash says. "In fact the reduced gap between the feed rolls and cutting surface allows for better pellet production from the previous design."

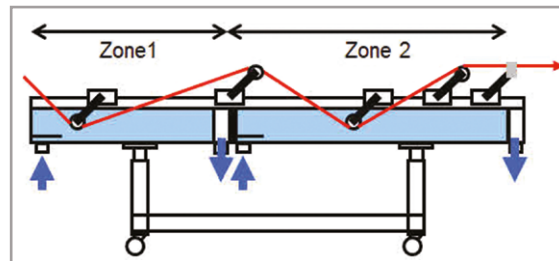
Optimised cooling

Coperion has its own operation for creating individual customer solutions based on strand pelletising, Coperion Pelletizing Technology. One of its core areas of process know-how is its cooling trough design, says Raphael Strehle, Head of Sales. To ensure optimal cooling of the strands, the Type CT version can support multiple temperature zone water baths. The basic working principle is to draw the strands through the trough via rotating grooved guide rolls. Each zone is fed with temperature-controlled process water, which flows with the strand movement direction. A weir is used to maintain the water level and cooled strands are wiped using a stripper brush system.

Strehle says the main benefit of this arrangement is to "allow more flexibility by different temperature profiles, show a higher gentle treatment of the strands, and improve the final product quality, such as removal of air pockets and an improved rectangular cutting result. The number of strands and the cooling length are individually adapted to the product. Strand guide rolls are available in different materials."

Underwater solution

Coperion teamed up with **Nordson BKG** for a recent turnkey compounding project that required an underwater pelletising system. The fellow German company provided a complete package of downstream components custom-engineered (as



This schematic shows the working principle of Coperion Pelletizing Technology's strand pelletiser cooling trough. The company says the use of multiple independently controlled zones allows a custom temperature profile to be developed to optimise pellet quality

Source: Coperion

were the Coperion elements) for production of inherently dissipative polymers - IDPs - at Finnish company IonPhasE. IDPs are polymer additives offering permanent antistatic properties.

The IonPhasE compounding plant encompasses all phases of production, including drying, conveying, and feeding of raw materials, twin-screw extrusion, pelletising, and bagging. The pelletising segment contributed by Nordson is an integrated package of various BKG products, comprising gear pump, screen changer, polymer diverter valve, underwater pelletiser, and tempered water system with centrifugal pellet dryer.

Steffen Bader, Head of Compounding Plant sales for Coperion, says that Nordson optimised the flow channels of the BKG components to ensure constant product flow and gentle handling of the material at the full required throughput range. The design output of the plant is up to 500 kg/h.

Nordson considers itself unusual as a supplier of pelletisers in that it also produces a full range of downstream melt delivery components, according to Frank Asmuss, Global Product Manager for BKG pelletising systems. "Our single-sourcing capability is especially important for customers like IonPhasE, whose unique products have complex formulations and must meet critical end-use requirements," he says. "Based on tests of the customer's materials at our technology centre in Münster, we can optimise the performance of all of our components in accordance with the melt properties of those materials, even taking into account the many possible recipe variations anticipated by the customer."

As an example of the interaction of the BKG system components, Asmuss highlights the role of the melt pump, which generates the pressure needed for the screen changer and pelletiser without creating too much shear or excessively high melt temperatures.

PHOTO: COPERION



Above: This turnkey compounding line was supplied to Finnish conductive polymer producer IonPhasE. It uses an underwater pelletiser supplied by Nordson BKG



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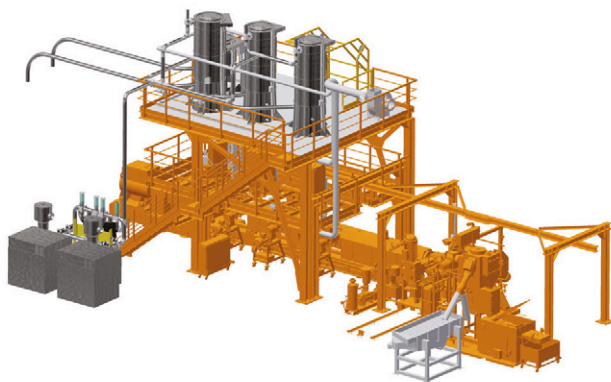
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Right: A Maag Pearlo underwater pelletiser. The largest version in the range can handle throughputs of up to 36 tonnes per hour; this model is sized for up to 300 kg

The spherical option

Maag, meanwhile, highlights experience gained with the Pearlo underwater pelletiser range since its launch at K 2016. The pelletiser – marketed under the Gala Automatik brand – is designed to process spherical pellets at low and high capacities and can handle throughputs of up to 36 tonnes/h. “Within compounding, we typically go up to 12 tonnes/h and have actual project going beyond that,” says Michael Eloo, Managing Director of Maag’s Gala Kunststoff- und Kautschukmaschinen subsidiary.

Cited operational benefits of the Pearlo include proven die plate designs and wear-resistant surface materials with narrow face widths, along with a turbine-style flexible cutter hub and blade design with a single-sided long blade. Models are available in top-mounted and rail-type configurations and with automated and manual blade-advance capabilities. Maag says they can be easily upgraded for automation.

The Pearlo also serves as the basis for Maag’s PearloFlex System. “This is an entire system allowing colour and material change freedom for the entire downstream part: melt pump, screen-changer, pelletiser and also the water system and drying,” says Eloo. “We limited the rate as of now to 500 kg/h as we expect the biggest interest in such an output area [but] we have similar options available for larger capacities as well.”

Investing for trials

Last September, Filtec opened a new test laboratory close to its headquarters in Badia Polesine, north-east Italy, equipped with a complete extrusion line including extruder, screen changer, gear



pump and underwater pelletiser.

The company describes the lab as a demonstration, research and information centre where it can plan with customers all the tests necessary to find the best solution suitable for the different production needs.

Filtec’s flagship product is its UW-Dep underwater pelletiser, which the company says is versatile, reliable, simple to operate and facilitates production of quality pellets with a perfect shape without agglomerates. It is said to be suitable for high throughput of plastic materials with different melt flow rates. Synchronisation of molten polymer and water arrival in the granulation chamber is supported by an integrated system comprising a diverter valve for the molten polymer and a by-pass piping for water.

UW-Dep underwater pelletisers feature a die plate heated electrically or by oil to support processing of difficult and thermosensitive materials. Some advantages highlighted by Filtec include: the ability to maintain a very low temperature in the plate without the risk of cooling of molten polymer in the die holes; prevention of charring of the molten polymer in the die holes during machine stops; and reduced extrusion pressure. The latter is attributed to the design’s ability to accommodate a greater number of die holes in the plate and the avoidance of overheating of the molten polymer. Lower extrusion pressure and a greater number of die holes also means that the cutter blades can rotate at a lower speed, reducing wear of both blades and die plate, according to the company.

Filtec also highlights the automatic water-filtering and cooling employed on UW-Dep units. Water coming from the centrifugal dryer of the pelletiser pours onto the built-in device and is drained on the filtering surface of a continuous non-woven material. When build-up of impurities on the filter causes the level of the water to rise in the draining

Below: Filtec’s flagship UW pelletiser (left in the image) is designed for high throughput applications. The company also produces a water ring design, visible in the background

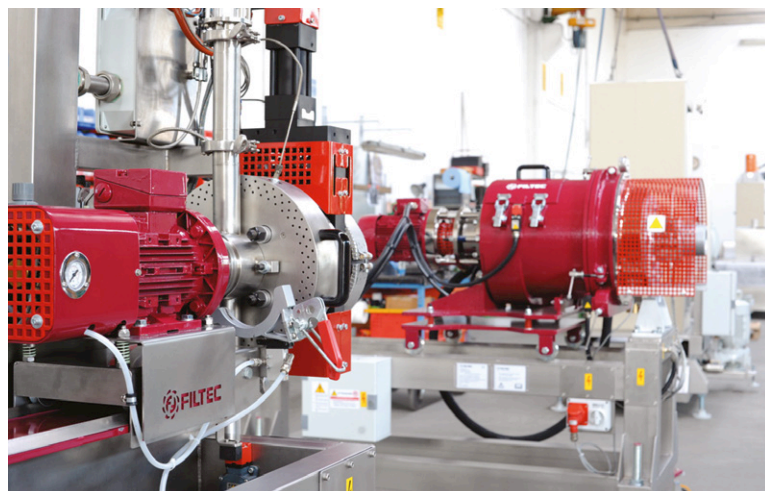


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Right: Erema's latest factory expansion includes optimised workplace areas that cut production lead times for specific assembly groups, including pelletiser components

area, a sensor sends an impulse to a drive to replace the clogged filter with a new one. Filtered water pours into the collecting tank below where it is sucked by a pump and sent to a heat exchanger to be cooled reintroduction into the underwater pelletiser.

Development support

Germany-based **ips Intelligent Pelletizing Solutions** has also recently expanded the trial capabilities at its technical centre in Niedernberg. In addition to an underwater pelletising system ips-UWG 75 S and several conventional strand pelletising lines, the company now also has an automatic strand pelletising system ips-SGA 220/2 available for internal development trials and customer trials.

"This allows us, under conditions which come very close to those in actual production, to individually develop the optimum layout of a strand pelletising system for our customers, on the one hand, and to further develop our systems in an ideal test environment, on the other," says ips Managing Partner, Gerald Weis. "In addition, our customers have the opportunity to experience the system not only virtually as a computer simulation, but actually live."

He says the ips-SGA/2 system is deployed in particular in the compounding and recycling industry for processing filled and/or reinforced technical thermoplastics at rates of up to 4 t/h, depending on the application and the dimensions of the pellets. "It is an attractive alternative to conventional strand pelletising lines and is characterised by simple operation and a high standard of process reliability," he claims.



PHOTO: EREMA

Weiss points to the easy start-up of the pelletising process, automatic re-threading after strand breakages, integrated strand drying for low residual moisture, and the variable cooling section for the polymer strands prior to cutting. "It can be integrated simply and flexibly into existing production lines and, compared to conventional strand pelletising, offers higher manufacturing yield with lower staff costs," he says. The modular ips-SGA/2 is available for working widths and cutting widths from 120 to 420 mm.

Meanwhile, recycling technology specialist **Erema** says the opening of the new assembly shop 4 at its Ansfelden, Austria, location last April allowed it to adopt a production process which is better geared towards future customer requirements. It says this new approach enables shorter production lead times for the individual assembly groups, such as melt filters and pelletisers, while at the same time increasing product quality.

"Customers benefit from lead times being significantly reduced, increased delivery reliability and a further increase in quality standards," says CEO Manfred Hackl. "The expansion of our production capacities was a logical next step due to the increased demand for our technology. In doing so we made a conscious decision to optimise the production processes at the same time."

CLICK ON THE LINKS FOR MORE INFORMATION:

- > www.maag.com
- > www.bayplasticsmachinery.com
- > www.coperion.com
- > www.nordsonpolymerprocessing.com
- > www.filtec.it
- > www.pelletizing.de (ips)
- > www.erima.at

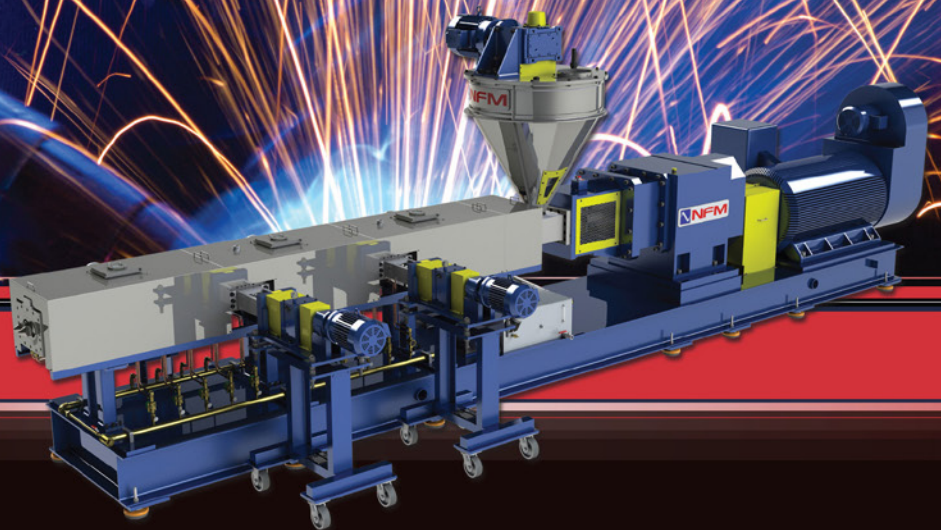
PHOTO: IPS INTELLIGENT PELLETIZING SOLUTIONS



Right: ips Intelligent Pelletizing Solutions now has an ips-SGA 220/2 automatic strand pelletising system available for internal development and customer trials at its German technical centre



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PVC Formulation 2018: 10 years in the making



PHOTO: SHUTTERSTOCK

The 10th anniversary of AMI's European PVC Formulation conference takes place in Cologne, Germany, in April. Sean Manson takes a look at what's in store for this leading industry event

AMI's European *PVC Formulation* conference marks its 10th anniversary this year. Running from 10 - 12 April 2018 at the Maritim Hotel in Cologne, Germany, this now well-established international event presents a high level programme of expert speakers covering the key market and technical issues impacting on the PVC processing industry. Conference sessions focus on global trends in PVC trade and technology, as well as detailing the latest advances in PVC additives such as plasticisers, stabilisers, lubricants, impact modifiers, functional fillers, pigments, blowing agents and antimicrobials.

PVC Formulation attracts a large international audience, which makes it an ideal meeting place for anyone wanting to explore the industry's latest

technical and business trends. Industry stakeholders use the event as a forum to discuss optimisation of rigid, flexible and foamed PVC formulations for a wide variety of applications. They also address key issues regarding sustainability, recycling, regulatory developments and improving the perception of PVC. This article previews the event, taking a closer look at the line-up of expert speakers.

A decade of innovation

PVC Formulation 2018 kicks off with a presentation by **Roger Mottram**, Head of Communications and Advocacy at **Inovyn** in Belgium, who will run through a decade of innovation and developments in PVC, with the focus on how these changes are

Main image:
AMI's 10th PVC Formulation conference brings together leading European experts to explore a wide range of technical and additive developments

helping to shape the future of the industry. He will be followed by **Thomas Hülsmann**, Managing Director of the **AGPU Working Group PVC and Environment** in Germany, who will review progress in the PVC industry over the same period and assess what needs to be done over the coming years to move it forward.

The third presentation in the opening session of the conference will focus on an example where PVC is being used to improve safety in the medical and food industries. **Christoph Zell**, Product Manager Trovidur at **Röchling Engineering Plastics** in Germany, will detail the development of an antibacterial and scratch-resistant wall covering.

Plasticiser advances

The second session will be opened by **Dr Hinnerk Gordon Becker**, Head of Market Segment Plasticisers, Performance Intermediates at **Evonik Performance Materials** in Germany, who will explore the outlook for PVC plasticisers, assessing the regulatory and economic challenges as well as discussing innovative products for the future. He will be followed by **Rogério Marques**, Technical Service Manager at **CIRES / Shin-Etsu Group** in Portugal, who will present the latest understanding of plasticiser absorption in PVC resins.

Anders Magnusson, Technical Market Development Manager at **Perstorp** in Sweden, will explain how to optimise flexible PVC formulations based on polyol ester plasticisers. Then **Dr Nikola Kocić**, Scientific Employee at **SKZ - KFE** in Germany, will discuss the development of bio-based plasticisers for use as an alternative to DINP.

Ensuring stability

The conference will then move on to discuss ways to ensure the long-term stability of rigid and flexible PVC compounds. **Dr Peter Frenkel**, Vice President of Technology at **Galata Chemicals** in

Germany, will look at present and future status of octyl tin stabilisers. He will be followed by **Dr Axel Grimm**, Technical Marketing Manager Plasticisers at **BASF** in Germany, who will review improvements in long-term stabilisation of plasticised PVC.

The final session of the first day of the conference will be opened by **Kate Irvin**, R&D Lab Manager at **Mexichem Speciality Compounds** (formerly Vinyl Compounds) in the UK, who will explain her work to create a predictive model for PVC formulations using spectroscopic techniques. She will be followed by **Dr Kálmán Marossy**, a Professor at the **University of Miskolc/Borsodchem** in Hungary, who will look at testing of different formulations of polymer-modified plasticised PVC. The final paper of the day will be given by **Dr Harald Braun**, Technical Director at **Kaneka** in Belgium, who will detail testing of a new polymeric acrylic plasticiser for PVC, comparing its performance to existing options.

Adding value to PVC

Day Two of *PVC Formulation 2018* focuses on enhancing the performance and processing of PVC compounds. It will be opened by **Karine Cavalier**, Global Business Unit Research and Innovation Manager at **Solvay** in Belgium, who will deliver a presentation looking at the use of a new generation of blowing agents for efficient and sustainable foaming of PVC polymers. She will be followed by **Dr Francis Loncar**, Senior Product Development Specialist at **3M** in the US, who discuss the addition of pigments to durable vinyl films. Then **Dr Peter Loggenberg**, President at **Trecora Chemical** in the US, will detail some developments and new applications for internal and external lubricants in PVC.

Moving on the agenda, **Dr Michael Schiller**, Founder and Owner of **HMS Concept** in Austria, will explore the influence of plasticiser, filler and stabiliser selection on the performance of plasti-



About PVC Formulation 2018

Taking place in Cologne in Germany on 10-12 April 2018, AMI's European PVC Formulation conference is the learning and networking event for anyone involved in the development of PVC recipes. This year's 10th anniversary event opens with a networking drinks reception, followed by two days of technical and market related presentations. Delegates can also join a conference dinner on the evening of 11 April where they can meet and discuss conference topics with speakers and industry peers.

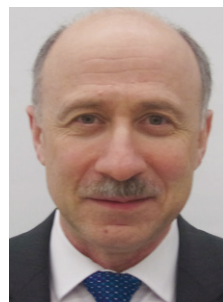
For more information about PVC Formulation 2018 and to book your place, visit the [conference website](#) or contact conference organiser Giulia Esposito. Tel: +44 (0) 117 314 8111; Email: giulia.esposito@ami.international

cised PVC products. Then **Henrik Petersen**, Researcher at **RISE Research Institutes of Sweden**, will present an analysis of plasticised PVC nanocomposites and the effect of montmorillonite treatment and processing conditions on material properties.

The challenges and opportunities presented by antimicrobial additives in protection of flexible PVC materials will be explored by **Christine Niklas**, Product Manager at **Sanitized** in Switzerland. Then **Dr Radouane Sellak**, R&D Project Leader at **IVY Group** in France, will discuss the development of self-adhesive flexible PVC formulations.

Optimising production

The final session of the conference will turn the spotlight on to production efficiency. **Dr Michael Große-Aschhoff**, General Manager at **Polymer Trading** in Germany, will get it underway with an examination of cost saving options for PVC window profile formulations. And the conference will be brought to a close by **Thomas Stegmeier**, Head of Sales at **AZO** in Germany, who will present an "Industry 4.0" smart manufacturing system for production of PVC-based fibre compounds.



Expert speakers at PVC Formulation 2018 include (from left, top row) Solvay Global Business Unit Research and Innovation Manager Karine Cavalier, Galata Chemicals Vice President of Technology Dr Peter Frenkel, BASF Technical Marketing Manager Plasticisers Dr Axel Grimm, (bottom row) SKZ-KFE Scientific Employee Dr Nikola Kocić, Perstorp Technical Market Development Manager Anders Magnusson, and Sanitized Product Manager Christine Niklas

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Increasingly demanding end user expectations in industries from packaging to automotive are pushing odour and emission control up the priority list. Mark Holmes looks at how additive and masterbatch producers are responding



PHOTO: SHUTTERSTOCK

Taking control of odour

Preventing - or managing - odours and emissions in plastics is critical in applications ranging from packaging to automotive. It is a top priority, for instance, in the packaging of sensitive beverages such as mineral waters, where premium brand owners demand packaging materials that are free of all potential impairments to the flavour or odour of their products. And for good reason, as any 'off-taste' can lead to customer complaints, product recalls and serious damage to the manufacturer's reputation or brand image, according to Mark Hannah, Marketing Director at Austrian masterbatch specialist **Gabriel-Chemie**.

"Customers are increasingly demanding higher transparency within the value chain and the confidence that no materials being used can cause flavour impairment or off-taste," Hannah says. "A few companies have recognised this trend and are starting to react to this and offer different services to avoid any impairments in the product."

Shared responsibility

The big challenge is that whenever a problem of odour or flavour tainting is identified in production it is typically very hard to know in which part of the

value chain the problem has occurred. "The impairment can be caused by raw materials such as polymers, pigments or additives, as well as during masterbatch production, incorrect storage or transport conditions or at the converter and filling process stage," Hannah explains. "A single point solution is not going to be effective, so the supply chain is going to have to work closer together and share more information about the products. For example, if we prevent issues in the masterbatch but the converter runs the masterbatch at a temperature that is too high, then off-taste may occur at the processing stage."

EU regulation 10/2011 governs the materials and objects made of plastics that are intended for food contact. All raw materials that are used in the manufacture of plastic objects and packaging may contain some chemical compound impurities that are present in the material but have not been deliberately added for a technical reason during the production process. These impurities are classified as NIAS - non-intentionally added substances - and approved substances are included in the Union List published by the EU.

"Their presence is generally not known by the

Main image: Bad odour is not just a problem in the lab. It can damage brand reputation and be a potential health hazard in plastics products

PHOTO: GABRIEL-CHEMIE



Above: Gas chromatography is one element in Gabriel-Chemie's PURE service package for clients wanting maximum odour security

converter or customer," Hannah says. "NIAS may originate from break-down products, impurities of raw materials, and unwanted side-products, for example. We focus our efforts on detecting and identifying volatile NIAS in the plastics that could have an impact on the sensory properties. We do this by screening the raw materials with gas chromatography and then testing the finished masterbatch with sensory blind tasting tests.

"As a result of intensive communication with plastics converters and leading brands within the food and beverage industry, Gabriel-Chemie has developed PURE - an additional service package that provides complete transparency within the value chain for masterbatch customers and an industry benchmark for organoleptic and food safety issues," he says.

The company launched the package at the Fakuma show in Germany last year. "PURE is based on two test methods for incoming and outgoing products," Hannah says. "The customer receives a complete set of documentation based on the three modules of PURE - NIAS analysis of raw materials using gas chromatography, organoleptic expert analysis and an SML concentration estimate. As well as food packaging, PURE is also suitable for use by converters of medical products and toys."

Gabriel-Chemie is using gas chromatography for in-house analysis of raw materials to test for the existence of NIAS that may cause sensory issues, such as an off-taste. If unknown substances are found in the chromatogram, they are analysed in detail using mass spectroscopy in close cooperation with the Fraunhofer Institute for Process Engineering and Packaging IVV in Germany. If the detected substances pose a potential sensory risk, the raw material is blocked. Otherwise, when raw materials have been approved and released, production can start and a certificate including a detailed evaluation of the raw materials is issued.

Right: The human nose remains one of the most effective detectors of off-smells and flavours

The human experience

Gabriel-Chemie says that the human sensory organs are also highly sensitive and serve as a reliable measuring instrument for organoleptic evaluation, which comprises the second module of PURE. After successfully passing the NIAS evaluation, the approved raw materials are used to manufacture masterbatch in the test laboratory, from which injection moulded parts are produced. The samples are then stored and treated in selected reference liquids, such as still water from a standardised brand, and the liquids are then blind tested for flavour deviations.

A specially trained sensory panel examines and assesses the smell and flavour of the liquids in a complex organoleptic evaluation process lasting several hours. As a result, plastics converters receive a detailed test report and profile in which the organoleptic approval of the products is documented. The combination of professional initial sensory training, regular refresher training and a panel size of approximately ten participants mean that the test is recognised by the market as being statistically significant, adds the company.

EU regulation 10/2011 also requires producers of plastics that come into contact with foodstuffs to control the quantity of ingredients that can migrate into food. Specific migration limits (SML) must be complied with for many of these substances. Gabriel-Chemie says it endeavours to keep the number of substances with an SML in its products as low as possible. However, their presence cannot always be avoided. So to create a rough overview of the quantities to be expected, it establishes an estimate of concentrations of SML-regulated additives in its products in cooperation with suppliers. The supplied concentration information goes beyond legal obligations and facilitates an easier analysis for customers, which can save both time and money. ➤



PHOTO: GABRIEL-CHEMIE

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PHOTO: SHUTTERSTOCK



Above: Bottle water producers are among those with the greatest concern over unwanted odours

Putting a cap on odour

Other players in the masterbatch market are also recognising the challenge of odour and off-flavours. At the end of last year **Clariant** launched its SenseAction line of colour masterbatches intended for use in the production of caps and closures used on bottled water packaging. The company says that SenseAction masterbatches, which are available in a wide range of colours, are specially formulated, processed, tested and certified to be free of detectable negative organoleptic effects.

The new line was developed to meet the demands of bottled water producers and the processors who supply them with caps and closures, which are typically made of HDPE or PP. "With the SenseAction product line, Clariant has decided to increase the attention on controlling issues caused by odours in plastics used in beverages, and more specifically mineral water applications," says Alessandro Dulli, Head of Segment Packaging at Clariant Plastics & Coatings, BU Masterbatches.

"This industry is more exposed to the risk of unpleasant organoleptic experiences due to the 'neutral' taste and odour of mineral water. The average consumer can detect minute traces of substances, which cause off-taste and/or smell. 360 degree customer experience is a key buying factor in the beverage industry, involving all senses. Any

off-taste or off-smell experience for the consumer, especially in the sensitive application of mineral water, can lead to claims and recall actions, potentially damaging a brand's reputation," he says. "We notice that attention towards organoleptic sensitive applications is increasing and believe in the value of a qualified supply chain, where all contribute with different expertise. For this reason, we encourage our partners to use colour concentrates that prevent off-taste and odour to protect their brand image."

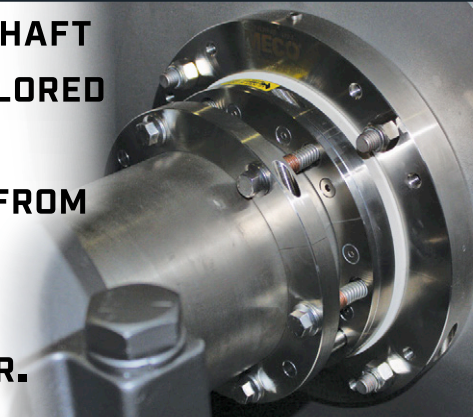
Dulli adds that the increasing complexity of the supply chain requires increased focus to prevent the occurrence of off-taste and/or smell in organoleptic sensitive beverages, together with the need to be able trace back the cause of it. He says every participant has to take the measures necessary to limit organoleptic influences on sensitive products and increase safeguards along the supply chain. SenseAction masterbatch is Clariant's contribution and is designed to ensure that the products will not impart any detectable deviation to the original taste or odour due to the colouration of the caps and closures.

Positive perceptions

The company says the SenseAction product range will help brand owners make good looking HDPE and PP plastic caps and closures that reflect positively on their brand, free of undesirable organoleptic influences. The new masterbatch brand is built around three elements - material selection, a dedicated manufacturing process, and a testing/certification process prior to sale.

SenseAction colour masterbatches start with raw materials that are food-contact compliant, including pigments and carrier resins that are carefully selected for use in sensitive organoleptic applications. Manufacturing takes place using dedicated processes and special equipment at a dedicated masterbatch site. When manufacturing is complete, each lot of SenseAction masterbatch undergoes

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Right: The Fraunhofer Institute has initiated a project to identify irritants and off-odours in children's toys and clothing

exposure in water, which then is tested according to DIN 10995 at an independent external laboratory. A panel of professional testers, specially selected for their acute sense of taste and smell, evaluate the samples for adverse organoleptic effects.

Test results are included in the certificate of analysis. According to Dulli, this is especially important, because sensitive applications such as mineral water require superior organoleptic care compare to a standard food contact approved masterbatch. Clariant intends to extend the SenseAction organoleptic concept to other sensitive applications where odour and/or taste are an issue for the consumer and therefore the brand owners, he says.

Focused on children

The Bavarian State Ministry for the Environment and Consumer Protection (STMUV) in Germany has recently funded a two-year project at the **Fraunhofer Institute for Process Engineering and Packaging IVV** to identify irritants and off-odours in children's toys and clothing. There is a need to minimise material odours and other negative impressions in these applications to minimise the harm caused by increasingly prevalent physiological conditions in children, including allergies, multiple chemical sensitivity (MCS) and stressor effects. Relevant substances and their effects have, until now, not been thoroughly researched, according to the institute.

Dr Erika Zardin, Business Development Manager, Product Performance at Fraunhofer IVV, says that in order to acquire a better understanding of this issue, children's products with off-odours were first of all subjected to sensory evaluation. More than 50 toy products were evaluated in this way and those that resulted in more offensive odours were subject to further analysis. For example, inflatable swimming aids (armbands, swimming rings and beach



PHOTO: SHUTTERSTOCK

balls) were among the most powerfully odorous items, as well as common toys such as plastic swords and children's costume accessories.

Instrumental analytical techniques were employed, including gas chromatography-olfactometry coupled to mass spectrometry, to identify the chemicals responsible for the characteristic odours. The studies showed that a large number of compounds in plastic products can lead to unpleasant off-odours and/or nasal irritation (trigeminal response), as well as headaches. Some of these were identified for the first time in this project and found to be listed among physiologically harmful substances. Some toys with strong odours also contained harmful, non-odorous substances.

According to Fraunhofer IVV, the results demonstrated that the typical odours associated with toys and inflatables could be not just unpleasant, but potentially harmful. In addition, the assumption that a particular odour is unavoidably linked to the plastic material was challenged. The study, for example, showed that the odour-active substances can be unnecessary, being contaminants such as non-intentionally added substances and residues from the manufacturing process, or breakdown products of the constituent polymers or additives.

Correlation of the sensory evaluation with the chemical analysis allowed marker substances to be identified which could be used for future quality monitoring. The studies also formed the basis for determining the sources of contamination and for identifying reaction pathways leading to the formation of undesirable substances. Follow-up studies will evaluate the physiological and toxicological properties of these substances. Particular focus will be put on the exposure to these substances to consumers, workers in the manufacturing process, and people involved in sales and

Below: Imerys says odour and VOC reduction is now a major issue in the automotive plastics market



PHOTO: IMERYS

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Right: An SEM image of Imerys's ImerSorb mineral, which can absorb troublesome VOCs during processing

retail. Fraunhofer IVV adds that it is continuing to identify and quantify potentially harmful odorants in more children's toys, as well as in a range of everyday consumer products and packaging.

Automotive solutions

Minerals specialist **Imerys** supplies a range of additives to compounders that service Tier 1 producers, automotive converters and OEMs in the automotive sector. Its talc, mica and wollastonite products are primarily supplied as reinforcements for PP, but its additive solutions are also now required to meet demanding odour and emission limits.

"Odour and VOC reduction is a major issue in the automotive plastics market," says Gilles Meli, Technical Market Manager Polymer & Rubber at Imerys Performance Additives. "Sources are numerous and temperature and moisture in a vehicle can lead to emissions and VOCs causing fogging. There is growing demand for automotive plastics and new regulations are being introduced that the industry needs to meet, particularly for the important expanding Chinese market. There is also a need to protect workers in compounding plants and car manufacturing factories from exposure to volatile materials."

Meli highlights the need to understand the origins of volatiles. High shear mixing can give rise to small molecules being produced due to partial decomposition of the plastic. Vacuum during production can assist in the removal of these, but is not generally sufficient. Selection of the right materials, including antioxidants, is also important. However, compounding talc into PP requires sufficient shear mixing to achieve good dispersion in the polymer.

The Performance Additives Division of Imerys has developed surface modification technology for talc to improve its ability to control odours and emissions. Commercialised under the brand Steagreen, these products minimise interaction

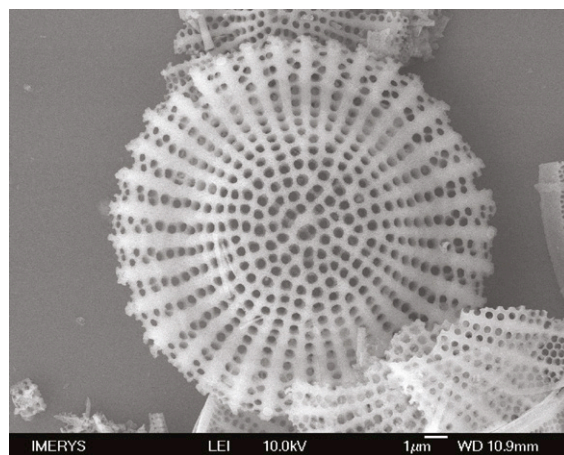


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between the filler and the polymer and reduce VOCs in the final compound, he says.

"We are able to offer a large mineral portfolio that can provide compounds with fillers with high surface areas and absorbing powers," Gilles Meli says. "Our approach is to develop minerals to improve absorption of gases during production and in the application. We have developed a range of products - ImerSorb - in particular for applications in the automotive and building industries where VOC reduction is needed. The additive is also of great use in plastics recycling and natural fibre-reinforced plastics." Imerys says it is working with external specialised laboratories - providers of test and chemical analysis services - on a number of new projects.

Tackling emissions

Reducing odours and VOCs is becoming increasingly important as consumer awareness focuses on indoor air quality, according to Gabriele Fenoglio, Global Sales Manager at **Zeochem AG**. "Many new plastic products smell and their odours can just be unpleasant or sometimes merely a source of irritation, but in some cases also a health hazard," he says. "As a result, industries such as automotive, construction, consumer care, packaging and textiles are actively looking to reduce odours in new plastic products."

Fenoglio says the complexity of odour in different compounds and their interactions is not an easy task to solve, but if consumers prefer odour neutral products it is a challenge the industry has to meet. "As plastics are increasingly replacing other materials such as metals in many applications, a solution is required," he says.

"During processing, additives used to improve product features can degrade generating further odours. So new additives have to be tested to maintain low odour and VOC levels. Indoor air quality is driving the development of new low emission products, such as for car interiors (static

Below: The AIMPLAS technical centre in Spain is now accredited to perform odour testing for the automotive industry



PHOTO: AIMPLAS

adsorption), or products that are able to actively adsorb odours and VOCs from external sources (active adsorption), such as new building and construction products,” he says.

Zeochem has developed its ZEOflair range of products to scavenge residual ppm/ppb VOCs, responsible for the generation of bad smells. ZEOflair products are white powders that are chemically inert. However, they have a large adsorption capacity able to scavenge residual molecules of odours at low concentrations.

The company claims that a typical loading of 0.5-1.0 wt% of ZEOflair can reduce the smell or VOC emissions of plastic products by at least 50% or can adsorb external VOCs for several years. Key applications include automotive parts and building and construction materials, where ZEOflair products are being employed to actively adsorb external odours generated by human activities, including kitchen odours and tobacco. Future developments could include its use in bioplastics, where they are currently being tested for 3D printing and automotive applications.

Meanwhile, **AIMPLAS** became the first Spanish laboratory accredited for odour tests for the automo-

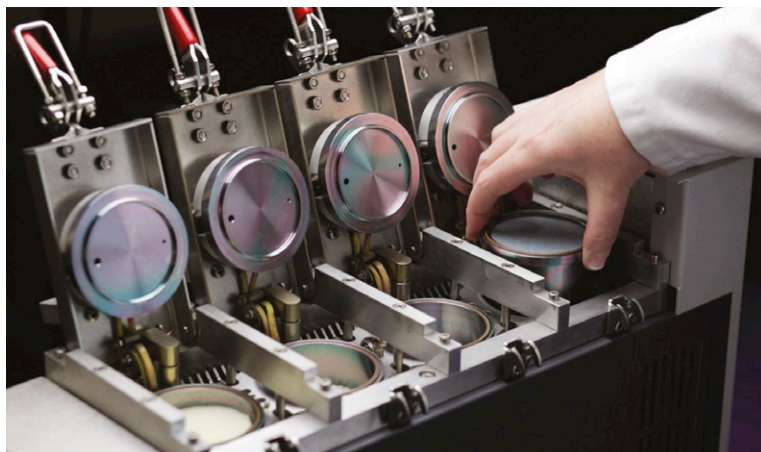


PHOTO: MARKES INTERNATIONAL

tive sector. An audit conducted by ENAC (National Accreditation Body) last year extended the accreditation scope of the technology centre with new tests on odour emissions, formaldehyde emissions, fogging and TVOC. According to Rosalía Guerra, Head of the Automotive Laboratory at AIMPLAS, these tests are in high demand from companies in the automotive sector for evaluating emissions in vehicle interiors to comply with highly restrictive legislation. Until now, Spanish producers had to contract these tests out to foreign laboratories.

Above: Markes says its µ-CTE sampling device enables fast screening of plastic samples and feedstocks



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Markes International manufactures analytical equipment that extracts and detects chemicals in a variety of sample types (solid, liquid and gas) for manufacturers needing to comply with regulations on chemical emissions from construction materials used indoors, car trim and consumer goods. Its latest product development is a sampling device, the Micro-Chamber/Thermal Extractor (μ -CTE), which samples chemicals onto sorbent-packed tubes for subsequent analysis by thermal desorption (TD) with GC-MS. The company says it is particularly attractive to plastics industry users because it allows quick, routine screening of raw materials/feedstocks - streamlining R&D and quality control processes.

The μ -CTE requires minimal sample preparation and is simple to operate. The sample is placed inside one of the chambers, which can accommodate four to six samples depending on the model, and the lid is closed. A flow of gas (air or nitrogen) is then applied and the temperature selected - from ambient up to 120°C or 250°C depending on the model of μ -CTE chosen. A sampling tube is attached to the outlet of each chamber and vapour from the sample is swept onto it. The sorbent packing can be optimised for the analytes of interest.

Analysis of sorbent tubes for VOCs and SVOCs uses TD with GC-MS. Alternatively, for analysis of formaldehyde, vapours can be swept onto DNPH cartridges, which are analysed by HPLC.

With three modes of operation, the μ -CTE can be used for a variety of investigations. Bulk emissions testing is useful for profiling odours and emissions and for testing of raw materials. Surface emissions testing is suitable for determining area-specific emission rates from flat samples, while permeation testing allows measurement of volatiles permeating through a thin layer of material.

Below: Erema's ReFresher odour elimination system integrated with an Intarema TVEplus recycling line



Recycling ideas

Post-consumer material, particularly household packaging waste, is considered to be difficult to recycle due to impurities and fluctuating degrees of contamination. These contaminants can cause unpleasant odours in the recyclate that severely limit the scope of end-use products. Minimising this negative effect is a key goal of recycling systems developers.

Erema says its ReFresher technology eliminates odours caused by residues left on the plastic materials such as food scraps, cleaner/detergent residues and cosmetics as well as contaminants such as wood and paper. Designed for operation in combination with the company's proven Intarema TVEplus technology, the ReFresher is integrated downstream of the extrusion process and maintains the recyclate at the appropriate temperature to allow volatile materials to be discharged.

ReFresher systems are claimed to produce filtered, degassed and odourless recyclate even when handling highly contaminated packaging waste. In conventional processing, for example, cellulose from wood or paper in the feed can burn during processing and transfer an unpleasant smell to the final plastic. The combination of pre-conditioning unit, Airflush technology, low melt temperature, efficient filtration and several degassing steps ensures that cellulose particles and breakdown products are removed from the plastic. Erema has a mobile ReFresher system available for on-site trials.

Meanwhile, **Starlinger** has developed a three-step procedure - material preparation, degassing, and post-treatment - for its plastics recycling lines that it claims can eliminate even deeply embedded odours. Material is prepared in a SMART feeder that heats and homogenises it to the ideal operating point to allow highly volatile odours to be extracted before the extruder. Then a C-VAC degassing module positioned after the extruder increases the melt surface by 300% to enable efficient removal of deeply embedded odours. Finally an odour extraction unit at the end of the process deals with any remaining persistent odours.

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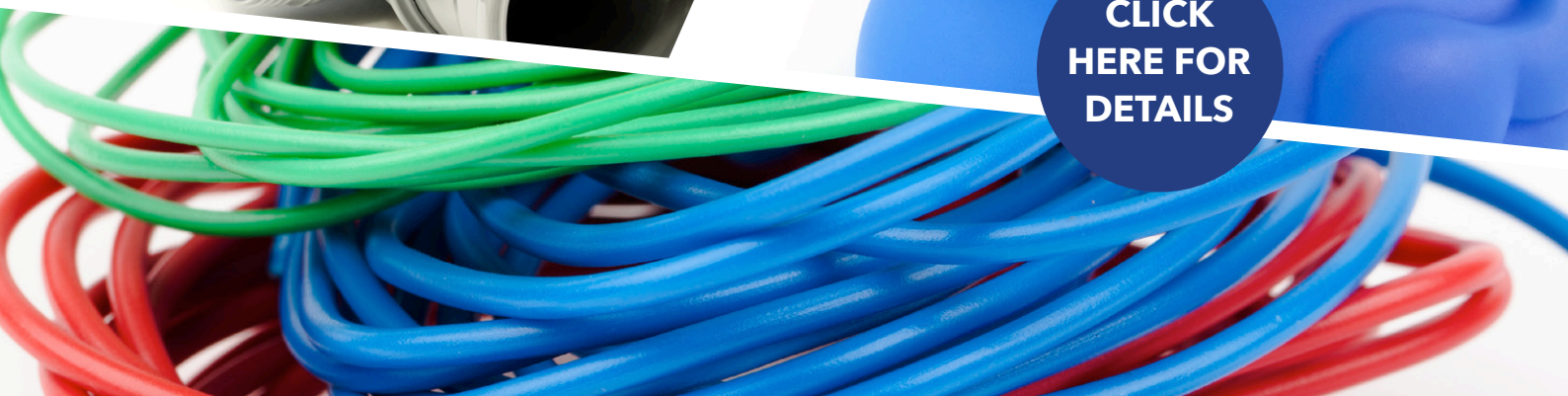
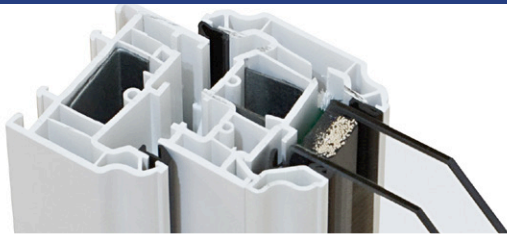
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Inside the regulatory machine

AMI's second Plastics Regulations conference takes place in Cologne, Germany on 14 - 15 March 2018, providing an insider view of legislation impacting on the polymer industry. This year's event also introduces a co-located food contact workshop

With the final REACH registration deadline for existing chemicals approaching fast and EU regulation of food contact plastics materials continuing to evolve, keeping up to date with the latest developments in European legislation is essential for plastics processors, materials producers and end-users. Taking place in Cologne in Germany on 14-15 March 2018, AMI's second Plastics Regulations 2018 conference provides a well-timed opportunity to do just that, presenting impartial and well-informed guidance focused specifically on the needs of the plastics industry.

Plastics Regulations 2018 provides advice on a range of legal and compliance issues that potentially impact on polymer producers, compounders, processors and end-users. This year's event also introduces a one-day food contact materials

workshop - Food Contact Materials 101 EU and US: What you need to know - that will be run by members of the transatlantic Food Contact Materials and Food Safety Practice team at specialist law firm **Stephoe & Johnson** on 13 March. This article previews expert speakers and topics featured in the conference and workshop programme.

Plastics Regulations 2018 will open with a close-up review of the current regulatory landscape and some of the challenges likely to affect those working in the plastics industry. It will be kicked off by **Simon Tilling**, Partner at **Burges Salmon** in the UK, who will discuss the UK's Brexit decision and the possible legal implications for chemicals regulation. He will be followed by **Dr Frank Freidel**, Senior Regulatory Manager REACH at **TSGE Consulting** in the UK, who will explore the

Main image:
Plastics Regulations 2018 will provide a one-stop opportunity to update on regulations impacting on plastics producers and users



Expert speakers at Plastics Regulations 2018 include Steptoe & Johnson Director EHS Regulatory Dr Anna Gergely, Henkel Corporation Scientific Fellow Dr Grant B Kenion, EXPRA Managing Director Joachim Quoden, and Burges Salmon Partner Simon Tilling

challenge of staying ahead of changes in regulatory affairs after the REACH 2018 deadline.

The conference will then move on to discuss regulation and innovation. Dr Ana Vesperinas, Patent Advisor at Barker Brettell in the UK, will consider how plastics firms can ensure innovation and regulation work together to achieve a “best of both worlds” end result.

REACH compliance

The conference focus will turn to polymer and chemical compliance in the next session. Marcus

Navin-Jones, Partner at Keller and Heckman in Belgium, will look at polymer impurities and degradation of products as one of the current issues regarding REACH. He will be followed by Dr Rolf Wittlinger, Manager Product Stewardship Plastic Additives at BASF in Germany, who will present a paper on managing the registration and evaluation of phenolic benzotriazole UV absorbers under REACH. The third presentation in this session focuses on the challenges and opportunities of nanomaterials regulation and will be given by Dr Anna Gergely, Director EHS Regulatory at Steptoe & Johnson in Belgium.

The REACH focus will continue with a presentation by Claudio Mereu, Joint Managing Partner at Fieldfisher in Belgium, who will discuss the interplay between REACH and RoHS and medical device manufacturing. Then Caroline Raine, Consultancy Lead at the National Chemical Emergency Centre (NCEC) in the UK, will explore the real-world implications of placing a chemical product on the market in an EU member state and the European poison centre harmonisation in relation to REACH.

Data sharing is a key element in the REACH process and this will be covered in a presentation

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by **Eléonore Mullier**, Senior Associate at **Step toe and Johnson** in Belgium. She will be followed by **Alfred Voskian** and **Jytte Syska**, Partners at **Syska Voskian Consulting** in Denmark, who will discuss EU REACH and CLP (Classification, Labelling and Package) regulations and their impact on European plastic compounding operations.

Additive regulation

The final session of Day One will see **Daniel Friedrich**, Scientific Project Manager and Lecturer at **Lucerne University of Applied Sciences - Engineering and Architecture** in Switzerland, explain the process of self-regulation in the bio fibre-reinforced plastics industry and the power behind the use of eco-labels. And the first day programme will be brought to a close by **Michael Scherzinger**, Solution Specialist at **Adjuvo KFT** in Hungary, who will update attendees on European moves to regulate packaging inks and detail some key national-level legislation.

Circular economy

Day Two of Plastics Regulations 2018 will be opened by **Joachim Quoden**, Managing Director, **EXPRA - Extended Producer Responsibility Alliance** in Belgium, who will discuss the current status of the Circular Economy Package initiative for packaging and the outcome of the EU Plastics Strategy. The focus then turns to food contact. **Dr Grant B Kenion**, Scientific Fellow at **Henkel Corporation** in the US, will explore the US FDA food contact notification system and discuss the case for harmonised acceptance in the EU. This will be followed with an explanation of Chinese food contact materials and articles regulatory compliance from **Cathy Yu**, Head of Food and Food Contact Regulatory Affairs Department at **Hangzhou CIRS** in China.

Dr Jürgen Towara, Head of Food Contact Compliance EU at **Intertek** in Germany, will then

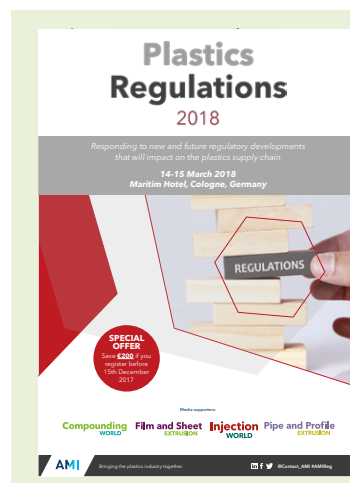
discuss food contact approaches in the ASEAN Union, Japan and Korea. And **Tjoena Siere**, Consultant at **AdFoPack** in the Netherlands, will complete the food contact regulatory coverage with a discussion of regulation on food contact materials in the Netherlands.

The final session of the conference opens with a brand owner's perspective on understanding and demonstrating compliance with food contact material legislation by **Dr Stamatios Stamenitis**, Principal Scientist Scientific and Regulatory Affairs at **Wrigley** in Germany. He will be followed by **Siobhan Murphy**, Senior Regulatory Scientist at **The REACH Centre** in the UK, who will detail a way forward for biocides in plastic food contact materials. And the conference will be brought to a close by **Dr Sarah Saminadin Peter**, Food Contact Expert - Health, Environmental & Regulatory Services (HERS) at **Intertek** in Germany, who will explore the process of European compliance for materials in contact with drinking water.

Food contact workshop

Plastics Regulations 2018 will be preceded by a one-day workshop. Run by the transatlantic food contact and food safety practice team at law firm **Step toe and Johnson**, Food Contact Materials 101 EU and US: What You Need to Know is targeted at legal and regulatory compliance officers wanting to acquire a solid understanding of all current aspects of EU and US food contact compliance.

The workshop will be a one-stop-shop opportunity for participants of Plastics Regulations 2018 to get a comprehensive overview of requirements for EU and US food contact compliance. It will be delivered by **Dr Mitch Cheeseman**, Managing Director at **Step toe and Johnson** in the US, and **Gyöngyi David** and **Dr Anna Gergely**, Associate and Director EHS Regulatory respectively at **Step toe & Johnson** in Belgium.



About Plastics Regulations 2018

Scheduled for 14-15 March 2018 at the Maritim Hotel in Cologne, Germany, Plastics Regulations 2018 will provide expert analysis and guidance on a wide range of international legislative and regulatory issues that impact on polymer producers, compounders, processors and end users, including REACH, Food contact regulation, and the potential impacts of Brexit.

The event will be preceded by a Food Contact Materials workshop run by international law firm **Step toe & Johnson**. This event, which is optional, will cover all the essentials of food contact plastics regulation in the EU and US markets.

To find out more about the conference and/or the pre-conference workshop and to book your place visit the [conference website](#) or contact Conference Organiser Jasmine Coles. Email: jasmine.Coles@ami.international Tel: +44 (0) 117 314 8111

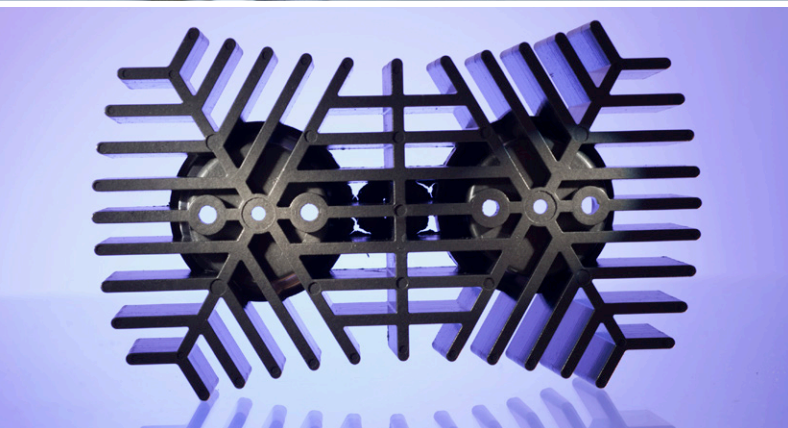
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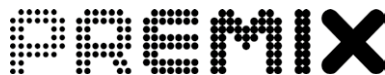


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PHOTO: SHUTTERSTOCK

Adding performance to films

Additive manufacturers have introduced a number of new products that can lift performance and productivity in the films sector. Peter Mapleston finds out more

Plastic films is a highly competitive market where performance counts and small improvements in production efficiency can really add up. In recent months, leading additive suppliers have taken some interesting and unusual steps forward in helping compounders and converters improve film product quality and processability. These developments include a better way to create slip in BOPP films, a highly-efficient means to improve barrier while enhancing optics, a step-up in stabilisation performance, and some novel anti-fog additives, as well as several new processing aids.

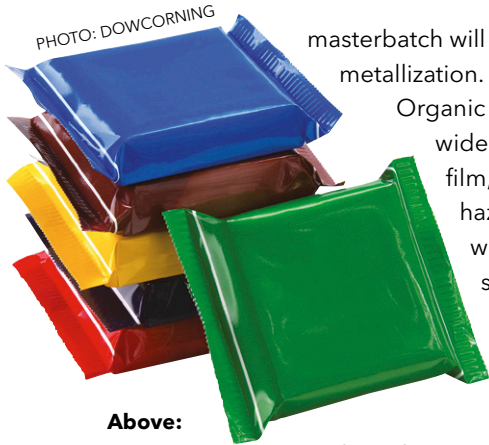
Dow Performance Silicones (previously Dow Corning) introduced its HMB-6301 Masterbatch for biaxially oriented polypropylene (BOPP) film at the Fakuma plastics processing show last October. The company says the product, a pelletised formulation

containing 25% ultra-high molecular weight siloxane polymer reacted with a polypropylene homopolymer, provides a low dynamic coefficient of friction (COF) at low loadings - for example 0.2 to 0.3 film-on-film at an addition rate of 2-5 wt% (Figure 1). It is also said to deliver stable, long-term slip performance without migration. HMB-6301 complies with EU 10-2011 food contact regulation and FDA approval is currently being obtained. Dow envisages applications in films for food bags, wrappers, packages and pouches.

Christophe Paulo, Global Segment Leader Plastic Additives at the company, says HMB-6301's advanced technology addresses key drawbacks of standard slip agents, including continuous migration from the film surface and degradation over time and under elevated temperatures. He says the

Main image:
Film barrier,
optics,
oxidative
stability, slip
and fogging
can all be
improved using
the latest
additive
technologies

PHOTO: DOWCORNING



Above: BOPP for candy wrappers is one target application for Dow Performance Silicones' new silicone-based additive

Right: Tosaf's AFT380PE anti-fog additive improves clarity of films for prepared food dishes

masterbatch will enable superior printing and metallization.

Organic waxes such as erucamide are widely used as slip agents in BOPP film, but their migration can increase haze in clear products. In addition, when the additive transfers from the slip-treated face to the corona-treated face during film winding and storage, printability can suffer. The Dow Corning HMB-6301 Masterbatch is added

only to the outer layer of the BOPP film and, because it is non-migrating, there is no transfer from the silicone-treated face to the corona-treated face. The masterbatch can also be used in cast PP film.

"Friction is a recurring problem in packaging production using BOPP film (for example, form-fill-seal operations) because it can negatively affect the film's appearance, cause deformations and even rupture, which interrupts throughput," says Paulo. "This masterbatch not only addresses these issues, but can free customers from storage time and temperature constraints and relieve worries about additive migration, enabling them to maximise quality, consistency and productivity."

Several other companies have also been developing alternatives to erucamides for slip agents. These include Croda, with its Incroslip SL, and Ampacet with its Lamslip 754 product. **Croda's** Incroslip SL has been covered previously in *Compounding World*. It is a food approved product offering good slip, colour, organoleptic

performance and oxidative stability.

Ampacet says its Lamslip 754 masterbatch is designed to provide high and consistent slip properties in laminated film structures for conversion and packing operations for food and non-food applications. The supplier says that, compared to conventional slip masterbatches, Lamslip 754 maintains a low and consistent COF even after adhesive lamination and avoids transfer of slip additive on the opposite side of the laminate. "Being highly efficient at low addition rate, it limits converting and packing problems typically linked to fluctuating slip properties of the packaging film and prevents efficiency losses during automatic packaging process," says the supplier.

Tackling film fogging

New from **Tosaf** is AF7380PE anti-fog masterbatch. "Anti-fog additives for plain polyethylene (PE) films are well-known and widely used," the company says. "However, as film structure



PHOTO: TOSAF

becomes more complex and film producers require the same anti-fog masterbatch for a variety of production processes, demand has grown for new solutions and more sophisticated formulations." It describes

AF7380PE as a novel third generation anti-fog that "combines the company's

broad experience working with the most sophisticated anti-fog materials with its profound understanding of the market's needs."

According to Tosaf's Film Additives R&D Manager, Dr Evgeni Zelikman, the benefits of AF7380PE lie in its "combination of excellent anti-fog activity and superb optical properties." The new masterbatch is suitable for a wide range of production processes, from laminated polyethylene films, multi-layer co-ex barrier films produced by blown and cast extrusion, and oriented films produced by double- and triple-bubble production technology.

Ampacet also has new antifogs, but the latest grades are targeted at agricultural film producers. A typical problem in greenhouses and low tunnels is linked to fogging phenomena, the company claims, so it has broadened its existing AgrocLEAR range to include AgrocLEAR 752 for one-to-two season greenhouses, low tunnels and early harvest crop protection films. Even at very low addition rates, it is said to provide what the supplier describes as "outstanding and consistent" antifog properties. "It maintains an excellent film transpar-

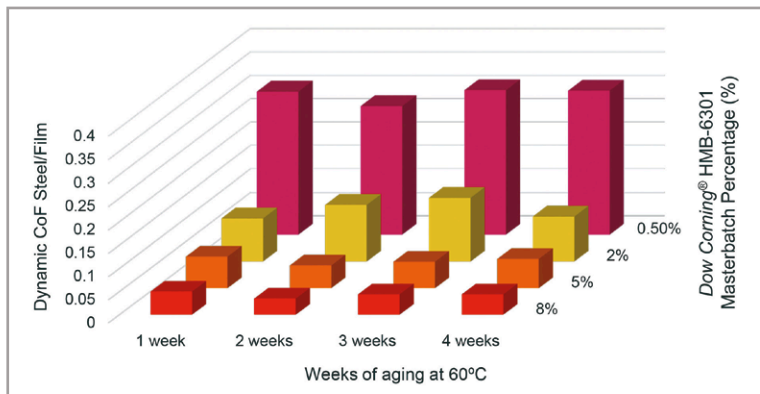


Figure 1: Dynamic coefficient of friction (film/steel) of low-SIT skin layer of BOPP film versus amount of Dow Corning HMB-6301 Masterbatch over time at 60°C

Source: Dow Performance Silicones

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PHOTO: AMPACET



Above: Agroclear additives from Ampacet reduce fogging in agricultural films, contributing to improved yields

Right: Ampacet's UVBlock 347 PP helps prevent degradation of food products in PP pouches

ency, avoids problems linked to fog formation (light transmission reduction and plant damages), optimises plant growth and supports crop yield," Ampacet claims.

Finally, the company has developed what it claims is a highly effective range of masterbatches for food shelf-life extension, including the UVBlock 347 and UVBlock 347 PP offerings. These products, for PE and PP films (BOPP and cast PP) respectively provide a high barrier to UV radiation in thin clear films used in food and non-food packaging structures. The supplier says the masterbatches allow the films to retain their transparency and do not generate the blooming problems it describes as inherent with some conventional migratory chemistries.

Improved hydrolytic stability

In recent years, numerous additive suppliers have been upping their game in stabilisation systems for film-grade polyolefins. *Compounding World* has

recently covered developments from companies including Addivant, BASF, Cytec (now Solvay), Songwon and BASF, which introduced its Tinuvin XT 55 light stabiliser in the run-up to K 2016. Tinuvin XT 55 is primarily aimed at artificial turf and technical textiles, but can also be used in films.

Another key player in this area is **Clariant**, which introduced AddWorks LXR 568 as one of its latest additive solutions at K 2016. This is a high-performance phosphorus-based process stabiliser (a secondary antioxidant) that combines outstanding colour and melt flow protection with a good resistance to hydrolysis (Figure 2). The product's hydrolytic stability helps processors to prevent degradation of plastic resins used to produce a wide range of end-use applications including packaging films, ensuring that consistent product performance is maintained.

At the Flexible Packaging Middle East conference organised by *Compounding World* publisher AMI in Dubai in December last year, Hartmut Sibert,



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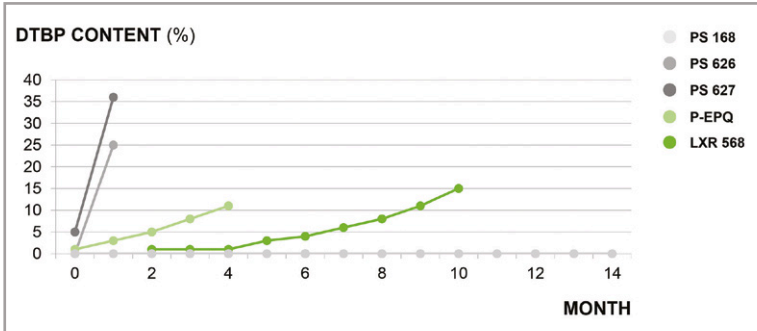


Figure 2: Hydrolysis stability in PE zip bags using LXR 568 and other phosphorus-containing stabilisers. Level of free DTBP (di-ter-butyl peroxide) is a measure of level of hydrolysis
 Source: Clariant

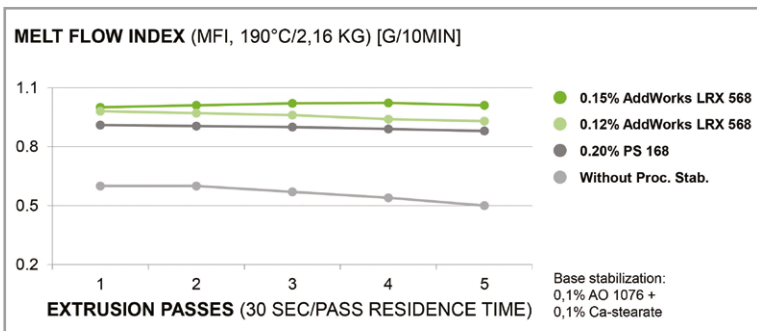


Figure 3: Effect of multiple extrusion passes at 240°C on MFI of LLDPE (0.918 density) containing different stabilisation packages
 Source: Clariant

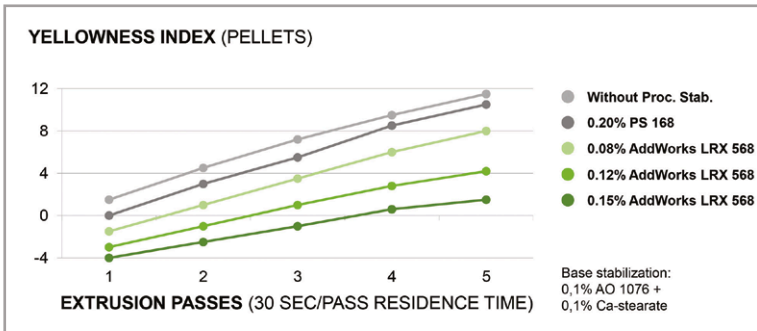


Figure 4: Effect of multiple extrusion passes at 240°C on yellowness index of LLDPE (0.918 density) containing different stabilisation packages
 Source: Clariant

Business Development Manager for Polyolefin Additives, went into a detail about the advantages of using AddWorks LXR 568 in polyethylene and polypropylene films. He said that the additive has a much lower melting point than single phosphite stabilisers (around 90°C against 180°C or so), which contributes to superior melt homogeneity and an efficient reduction of gels in films.

Sibert went on to discuss the advantages of the new additive in production of BOPP and LLDPE films. In BOPP film production, he said AddWorks LXR 568 gives 44% better MFR protection than PS 168, as well as 68% better colour protection and a two thirds reduction in the number of gels. When processing LLDPE, stabilisation solutions based on AddWorks LXR 568 provide superior retention of melt flow during multiple passes, as well as better resistance to yellowing (Figures 3 and 4).

Better barrier

Milliken has adopted a more hands-on approach in recent months in advancing the use of an additive system based on its established nucleating technology that can significantly improve not only the optics of polyethylene films but barrier properties too. Optics are improved because the additives provide more nucleation sites and so smaller crystals, while barrier is improved by changes the additives induce in crystal orientation.

The company has offered its Hyperform HPN nucleating agents for several years. Last year, it launched a family of masterbatches containing the additives under the UltraGuard banner. "By producing masterbatches, we can tailor our solutions per industry and class," says Cliff Bynum, Leader UltraGuard Technical Team. The new masterbatches, which are available in pellet form and can also contain additives such as process aids and pigments, are being targeted predominantly at film converters, but also at compounders.

The additives modify the crystalline structure of polyolefins, creating networks that considerably increase barrier to oxygen and water vapour as



Above: AddWorks LXR 568 is available as free-flowing dust-free micro-pellets

PHOTO: CLARIANT

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Right: UltraGuard nucleated HDPE bag-in-box film for packaging dry foods provides improved barrier, gloss and clarity

well as the larger molecules that are found, for example, in aromas. The improvements can range from 30% up to around 60%, depending on the host polymer.

“Some polymers are less favourable to the solution than others and working out where it works best has been a hard nut to crack,” says Bynum. “But we’ve come a long way. We have developed lots of very effective screening techniques so we can now predict outcomes quite well.” He says the expertise required in using the additives has seen Milliken change the way it interfaces with the market for this type of product.

Bynum points out that UltraGuard may produce greater improvements in polymers that have lower inherent barrier than higher-barrier polymers. Factors that need to be taken into consideration include density, melt flow index and molecular weight distribution. UltraGuard also changes the role that film thickness plays (Figure 5) and results in improved optics.

Processing aids

Polyfil Corp has developed a high-performance line of polymer processing aid (PPA) concentrates based on what it says are superior chemistries together with optimised particle size dispersion. “This combination brings previously unattainable performance and efficiency to the extrusion industry allowing processors to improve yields and productivity,” it says. “A unique interfacial agent and the most advanced fluoroelastomer technology combine to make these PPAs the most



PHOTO: MILLIKEN

versatile in the industry today.”

The company says that to make these concentrates even more potent, it employs specialised compounding methods that ensure the fluoroelastomer particles are dispersed for optimised performance at the film extrusion stage. “Polyfil’s PPAs more than pay for themselves by allowing extruders to reduce start-up waste, increase production rates, and improve extrusion line utility,” the company claims. “On blown film lines, excellent flatness is achieved while melt fracture and port lines are easily eliminated twice as fast using only half as much additive compared to conventional processing aids.

“Perhaps the greatest advantage of this new technology, however, is its ability to be used in higher temperature applications. Cast film extruders and extrusion coaters are able to utilise these new PPA grades at temperatures as high as 300°C, unlike most other PPAs on the market which cannot be used effectively above 240°C,” the company claims.

Time between die-lip cleanings due to build-up are said to be greatly extended due to combination of additive performance and thermal stability. Polyfil says a recent study showed it was able to extend the time between die cleanings by 400% for a multilayer extrusion customer using a 1% loading of its PAC-0001-21LL concentrate.

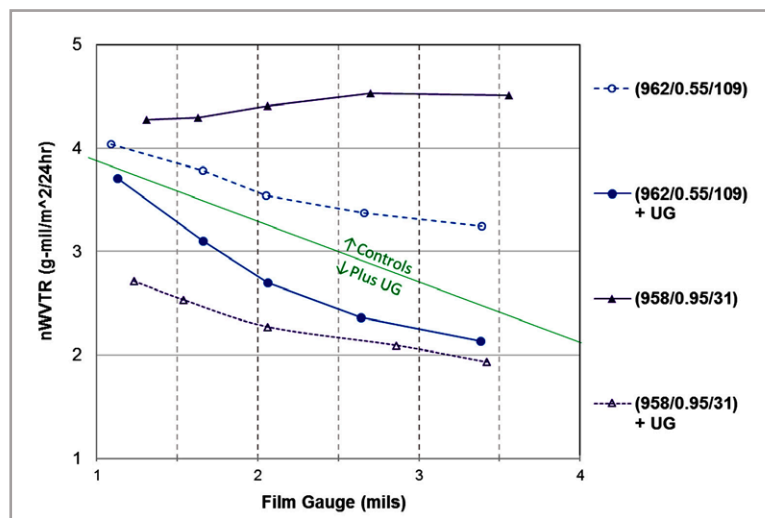


Figure 5: Effect of UltraGuard and film thickness on water vapour transmission rate of two different grades of PE. Grades differ in density, melt index, and ratio of indices at high (21.6 kg) and standard (2.16 kg) loads - a measure of molecular weight distribution.

Source: Milliken

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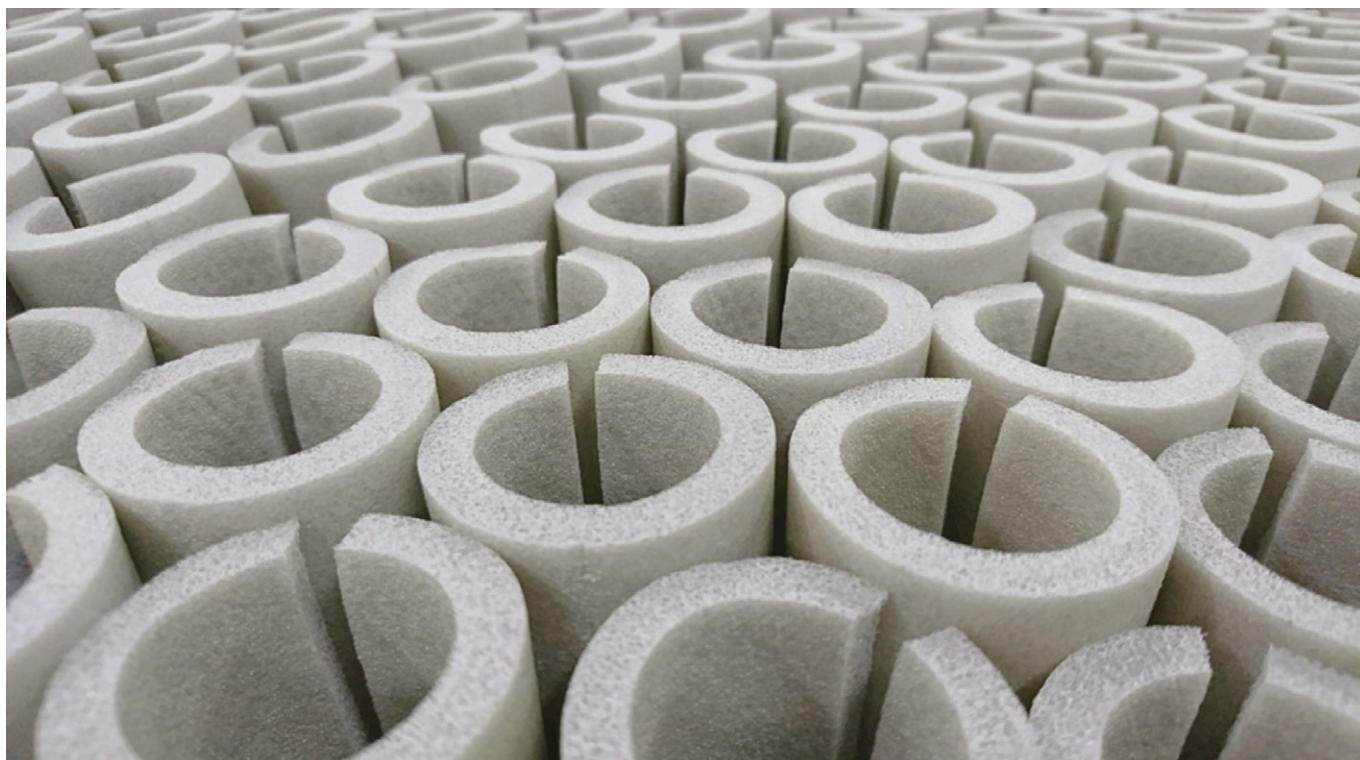


PHOTO: SHUTTERSTOCK

Developments in polymer foams

Polymer foaming provides weight saving and performance enhancing opportunities for polymer processors. Mark Holmes explores some of the latest foaming additive and polymer developments

Foamed polymers enable end users in a wide variety of industries to meet increasing demands for lighter weight parts or to add performance attributes such as rigidity and insulation. There is already a broad range of polymer foaming technologies, both physical and chemical, available to plastics processors allowing solutions to be optimised for an expanding range of applications. The latest introductions include both blowing agents and polymer resins that are better optimised to support a cellular structure.

According to Peter Schroeck, President of **Reedy Chemical Foam**, the latest developments in polymer foam technologies and blowing agents are in the area of new high melt strength polypropylenes (HMS PP). "Borealis has supplied an excellent

HMS PP for years. However, now Braskem, SABIC, and Lyondell Basell are all in various stages of introducing new technology. Compounders such as Asahi Kasei have also created foam-friendly PP compounds. This helps the performance of foamed PP in food packaging and automotive, in particular. High melt strength polymers are necessary to maximise weight reduction and retention of physical properties in the finished part," he says.

"Chemical foaming agents in general are showing tremendous ease of use in precision processes for automotive moulding, medical device moulding, food packaging and blow moulded bottles. For automotive markets, density reduction is a priority. However, injection moulded parts for all markets can see cycle time improvements of 25% with no

**Main image:
Foamed
polymers save
weight and
material while
adding
performance
functions such
as rigidity and
improved
thermal
insulation**

negative effect on physical properties," Schroeck says. "Azodicarbonamide (ADC) chemical foaming agents are being de-emphasised in most markets that deal with food or children's products due to toxicity concerns, as well as REACH. Carbonate-based chemical foaming agents are usually food, medical and toy approved. They are an acceptable substitute in most rigid applications but there are limitations in elastomeric products. For compound-



Above: Foamed trays produced using SABIC's latest ultra-high melt strength PP

Right: Foamed PS profile produced using Safoam RAZ-70

ers, carbonate foams can be more difficult to compound due to shear-sensitivity."

Reedy Chemical Foam has developed its Safoam P and Safoam HT chemical foaming agent powders for easier compounding and to more closely match the gas decomposition points and process points of ADC foaming agents. The company says that the new chemical foaming agent powders create carbon dioxide in-situ, which results in a finer cellular structure in the finished part. Safoam P powder and Safoam RAZ-70 pellets are a hybrid of carbonate and ADC foaming agents. The combination is said to provide the robust gas release of ADC with the cooling gas created by the carbonate foaming agent.

A recent project Reedy Chemical Foam has been involved with involved polystyrene extruded with the Safoam RAZ-70 hybrid blowing agent. No physical gas is used in this application - the density reduction and cell quality created only by the chemical foaming agent. Markets for this type of foamed polystyrene extrusion include picture and mirror frames and point-of-purchase displays. The cellular structure was created using Safoam RAZ-70, dosed at 0.35% with the polystyrene resin. Properties are shown in Table 1.

Future developments Reedy Chemical Foam is looking to address with its blowing agents include improving the melt strength of PET and bio-polymers, such as PLA and PHA, that will allow for improved density reductions and easier processing.

SABIC has added an ultra-melt strength polypropylene resin to its foam range for a wide variety of industrial applications. The company says that SABIC PP-UMS has a melt strength of more than 65cN and good foamability. It can be used by all industry segments as a building block to develop new foaming solutions that enable lightweighting.

"Looking to the future of lightweighting, we see that foaming is a key technology to push the boundaries and create even more down gauging

Table 1: Properties of polystyrene dosed with 0.35% Safoam RAZ-70

Non-foamed density	1.035
Foamed density	0.608
Density reduction	48%
Average cell size	114 microns

Source: Reedy Chemical Foam

opportunities in the industry. For this reason, our global teams are busy developing the next generation of foamable resin solutions for the market. These solutions can be used in many processing technologies to best meet the unmet needs of the value chain," says Frank de Vries, SABIC's Global Foam and Lightweight Leader.

According to the company, the new SABIC PP-UMS material can be used to enhance lightweighting in the automotive, packaging and building and construction markets. The resin was evaluated and optimised for foaming at SABIC's Foam Innovation Centre (FIC) in The Netherlands, which is equipped with wide variety of foaming production technologies as well as analytical equipment.

Consistent production

Sustainability is identified as a strategic issue for **Clariant** and lightweighting of plastic articles is one of the areas that it believes it can contribute to that with its Hydrocerol range of chemical foaming agents. "Major trends in polymer foaming technology include dosing accuracy, good dispersion, as well as fast and complete decomposition of chemical foaming agent masterbatches for consistent production," says Micro Groeseling, Global New Business Development Manager.

"The finest cell structures combined with high mechanical properties of the end-use plastic articles is a must," he says. "Our newest generation of Hydrocerol endothermic chemical foaming

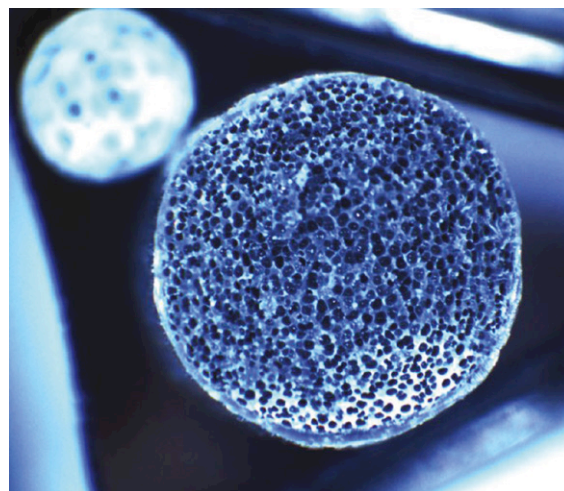


PHOTO: REEDY CHEMICAL FOAM

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Right: Polymer foaming requires accurately dosed additives, good dispersion, and fast and complete decomposition

agents come in liquid form. We see benefits in processes that require highly accurate distribution, early decomposition and the finest cell sizes and distribution. The liquid carrier system allows a faster decomposition of the active ingredients, which can lead to lighter foam structures. As we primarily address customers in the food packaging market, our liquid chemical foaming agents have food contact approval."

Delivery of the foaming additives is also a key element in the delivery of a foaming solution, according to Groeseling. "For liquid chemical foaming agents we use the full service package that is already established in our colour business. This includes pump technology, dosing equipment and technical service. Due to ease of handling and implementation in existing process technology, it has been successfully applied in sheet extrusion lines. With this technology, we see significant improvements in cell size, distribution and mechanical performance of thermoformed end-use articles."

While a Europe-wide ban on azodicarbonamide (ADC) is currently on hold it still represents a threat for the industry, according to Jan-Erik Wegner, Product Manager Additives Europe, BU Masterbatches at Clariant. He says that the company is prepared, however, and can already offer a portfolio of endothermic chemical foaming agents for ADC replacement in various applications, including plastisols, cables and profiles.

Speaking at AMI's Polymer Foam conference in November 2017, **Dow Europe** Associate Technical Service and Development Manager Przemek

Olszynski highlighted advances in polyethylene foams for applications such as cushioning and protection, moisture insulation, thermal insulation, wrapping and sound dampening. The company has introduced three new high melt strength products to its Agility LDPE foam range, with targeted foam densities from 0.916-0.919. The new materials

are claimed to offer improved cell stability compared with incumbent tubular LDPEs.

Specific advantages include: good processability; thicker and lower density foams; good foam quality after minimum optimisation time; good recoverability after long term testing under load; smooth surface finish and higher gloss; good emission values according to VDA 278 (VOC/FOG) test; and reduced corrugation (EC7000).

Arkema reported on developments in low

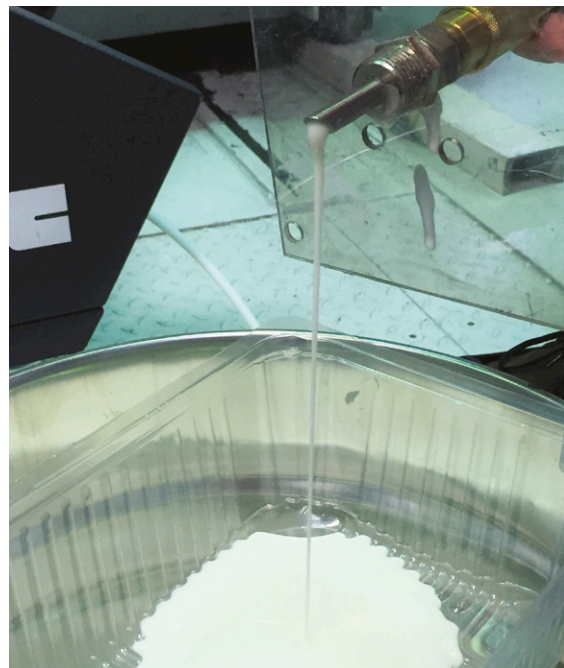


PHOTO: CLARIANT

density Pebax foam at the same event. Research engineer Clio Cocquet explained that the structure of Pebax leads to a better energy return than some other thermoplastic elastomers (ELF divided by 2-4). Other performance benefits include flexibility at low temperature, tuneable mechanical properties and the availability of bio-based options with renewable contents ranging from 28-97%. All Pebax grades are foamable by injection moulding using supercritical nitrogen (density of 0.2) to give a weight reduction of 80%.

Sebastian Heitkamp, Marketing Manager at **Cabot** in Switzerland, described developments in conductive foam through use of functionalisation and enhanced properties provided by conductive masterbatches based on carbon black. The company has recently introduced Cabelec XS6455A electrically conductive concentrate, which is made from speciality conductive carbon black dispersed in a specific carrier suitable for crosslinked foam. The carbon black provides cost effective electrical and thermal conductivity in the final compound, the company says.

Heitkamp highlighted the growing need for functionalisation of foams to ensure they deliver the performance required in more demanding applications, in particular to meet safety requirements. The Cabelec XS6455A masterbatch can be used in different polymer types and can be customised for foam density and hardness. A potential dilution rate up to 40% is possible, depending on process and requirements.

CellMat Technologies and the CellMat Laboratory at the University of Valladolid in Spain described developments in production of multifunc-



PHOTO: SABIC

Above: Rigid packaging is a market where foaming can deliver environmental benefits

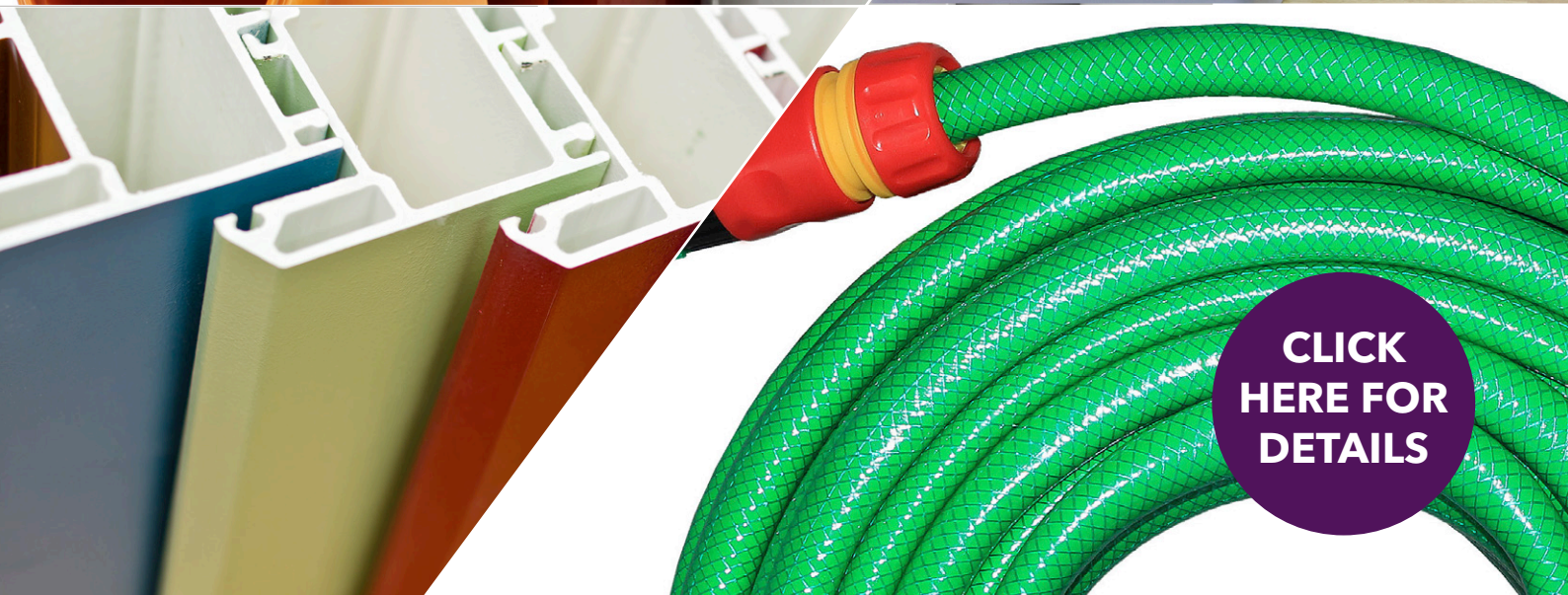
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Schaumplast takes balanced approach

German particle foam moulder **Schaumplast** is offering expanded polystyrene (EPS) packaging produced using BASF's biomass-balanced Styropor MB, which is manufactured under a biomass "offset" scheme certified by TÜV SÜD.

The move means EPS packaging manufacturers and end users can meet their sustainability goals without losing tried-and-tested technical attributes, according to Bernhard Hauck, Managing Director of Rellingen, Germany-based Schaumplast. One of the first to make use of the biomass-balanced Styropor packaging is German ice cream start-up IceGuerrilla.



EPS foam packaging produced by Schaumplast using biomass-balanced Styropor PS

The biomass balance method incorporates renewable resources into the existing BASF production process. For example, biogas or

bio-naphtha from certified sustainable production can be used instead of fossil resources at the start of the value chain and later allocated to respective sales in a defined way.

"At BASF we look at products across their full life cycle. Sustainably produced raw materials therefore play a major role for us. Styropor packaging also offers the advantage that it is 98% air and fully recyclable – consumers can simply dispose of it in their recycling bin," says Dr Klaus Ries, Vice President Global Business Management Styrenic Foams at BASF.

> www.schaumplast.com

> www.basf.com/biomassbalance

tional open cell flexible foams. Open cell polyolefin foams can be produced using a two-step compression moulding process, with the open cell content and tortuosity able to be fine-tuned by adjusting chemical composition and processing, as well as post-processing parameters.

Prof Dr Miguel Ángel Rodríguez-Pérez explained that multifunctional open cell materials can provide a wide variety of key properties, including good sound absorption capabilities where the high open cell content and low tortuosity offer a performance benefit. Their strain-rate dependent behaviour also means they can offer both comfort and impact protection. Finally, open cell polyolefin foams have the potential for dealing with oil spills through their high oil absorption capability combined with adjustable performance and re-usability.

Physical foaming

Trexel and **GK Concept** have launched a new joint venture - 2LIMIT - which combines know-how and intensifies their cooperation in part design and tooling engineering for injection moulded micro-cellular lightweight components based on Trexel's MuCell physical foaming technology. 2LIMIT will offer full-service engineering, supporting customers from an initial idea right through to a finished MuCell product. The company is offering a range of service packages so that customers can select services to match their requirements. According to Brian Bechard, CEO and President of Trexel, establishing the joint venture provides the opportunity to take engineering for physical foaming to

an entirely new level.

2LIMIT combines Trexel's expertise in physical foaming with GK Concept's know-how in materials, products and product design, and tooling design and manufacture. "Our customers can call on any or all of our five core competences – part design, part redesign, injection moulding simulation, tooling design and engineering and tool procurement," says Roman Hofer, 2LIMIT General Manager. "Alternatively customers can configure their own package of services. Our aim is to ensure that customers can exploit the potential of MuCell technology to the limit."

Roger Kaufmann, CEO of GK Concept, says that it is important not to rely simply on foaming to deliver all the weight savings in a project. Designing the part to make the most of the MuCell process can reduce weight by an additional 10-20% and in the very best case, where the changed profile of the part allows it, it is possible to achieve an extra 30% weight reduction. Overall, achieving 30-40% lighter components is possible.

CLICK ON THE LINKS FOR MORE INFORMATION:

> www.reedyintl.com

> www.sabic.com

> www.clariant.com

> www.dow.com

> www.arkema.com

> www.cabotcorp.com

> www.cellmattechnologies.com

> www.trexel.com

> www.gkconcept.de

LSR Innovations 2018

The international conference on the fast developing market for liquid silicone rubber (LSR) components

14-15 March 2018
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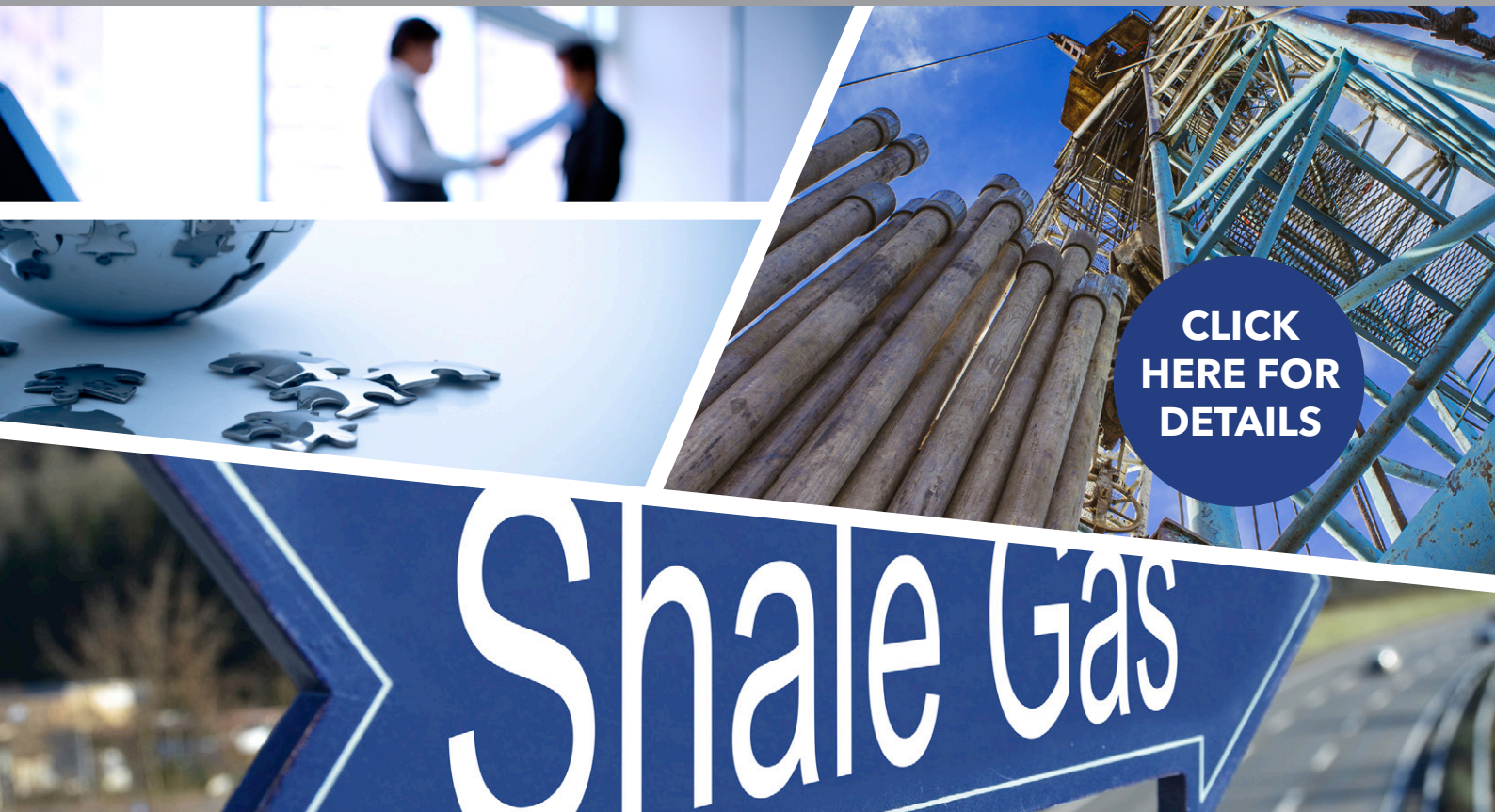
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Additive and colour masterbatch production places specific demands on compounding equipment. This 16-page brochure from Leistrizt explains how its ZSE 35 iMAXX masterbatch twin screw extruder rises to the challenge.

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The Pelletizing technology division of Coperion manufactures a full range of strand pelletizing systems ranging in capacity from 2-6,300 kg/hr. Explore the key system features and benefits in this eight-page brochure.

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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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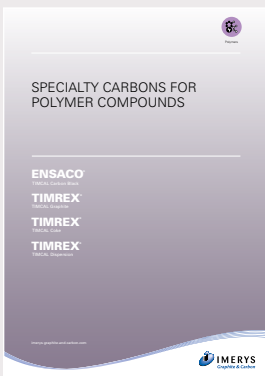
BAY PLASTICS: STRAND PELLETISERS



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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IMERYS: SPECIALITY CARBONS



This 24-page brochure details the full range of specialty carbon products available from Imerys Graphite & Carbon for polymer compounding applications, including recommendations for thermal and electrical conductivity modification.

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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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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

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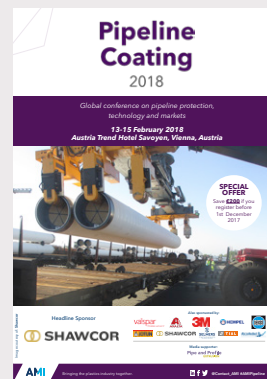
POLYETHYLENE FILMS USA



AMI's 16th Polyethylene Films USA conference takes place in Fort Lauderdale, Florida, on 30 January to 1 February 2018. This leading event for the North American PE film industry takes a close-up look at market trends and processing developments.

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PIPELINE COATING 2018



The Austrian city of Vienna hosts the 10th anniversary edition of the Pipeline Coating conference. Taking place on 13-15 February 2018, this leading event explores pipeline market trends and the latest innovations in coating materials and application.

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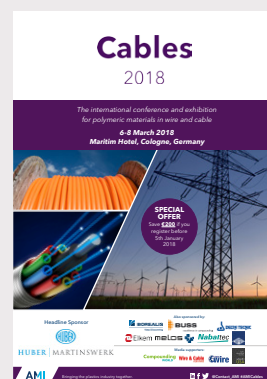
PVC FORMULATION USA



AMI's successful PVC Formulation conference takes place for the first time in North America on 27-28 February 2018 in Pittsburgh, PA, USA. The event covers business issues, market trends, sustainability, technology developments and materials innovations.

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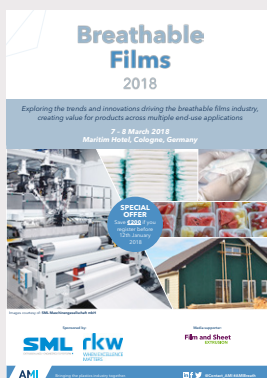
CABLES 2018



Now in its 18th year, AMI's international conference for the cable industry takes place on 6-8 March 2018 in Cologne, Germany. This high level event explores industry issues such as regulation, performance and technological developments.

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BREATHABLE FILMS 2018



Taking place in Cologne, Germany, on 7-8 March 2018, Breathable Films is a new conference from AMI focused on the developing area of micro-porous films. It will address emerging application areas as well as new material and processing developments.

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MASTERBATCH ASIA 2018



The 14th Masterbatch Asia conference will run on 8-9 March 2018 in Bangkok in Thailand. This established event from AMI examines the latest trends and developments in the regional Asian marketplace for colour and additive masterbatches.

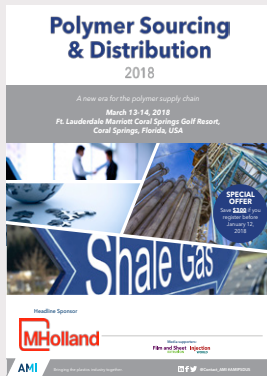
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POLYMER SOURCING & DISTRIBUTION



Focused on the North American plastics distribution sector, Polymer Sourcing & Distribution USA takes place in Coral Springs, FL, USA on 13-14 March 2018 and will discuss sourcing and distribution options for commodity polymers and ETPs.

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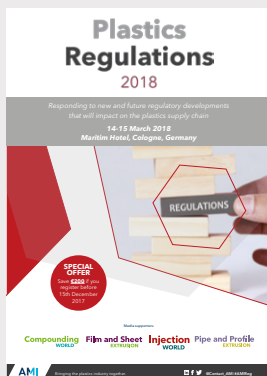
SPECIALITY PACKAGING FILMS ASIA



AMI's fifth conference focused on the Asia-Pacific packaging films market will convene in Bangkok, Thailand, on 13-14 March 2018. Its expert speaker line up will address the latest application trends and materials innovations, including high barrier.

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PLASTICS REGULATIONS 2018



AMI's second Plastics Regulations conference takes place in Cologne, Germany, on 14-15 March 2018, bringing together expert speakers to deliver critical advice on REACH, biocides, nanomaterials, the circular economy, printing inks and food contact polymers.

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LSR INNOVATIONS 2018



Running in Cologne in Germany on 14-15 March 2018, LSR Innovations is a brand new event from AMI focused on the growing LSR market. It will explore the latest material and processing developments driving uptake of these versatile flexible polymers.

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CONDUCTIVE PLASTICS USA 2018



Taking place in Pittsburgh, PA, USA, on 20-21 March 2018, the second North American Conductive Plastics conference focuses on additives and technologies for tailoring the electrical and/or thermal properties of polymer compounds.

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GRASS YARN & TUFTERS FORUM



Established as the meeting point for the international synthetic turf manufacturing industry, AMI's 13th Grass Yarn & Tufters Forum takes place in Barcelona, Spain, on 9-11 April 2018. Topics on the agenda include growth prospects and technical innovations.

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Lati Thermoplastic Industries SpA

Head office location:	Vedano Olona (VA), Italy
Date founded:	1945
President	Prof Francesco Conterno
Ownership:	Privately owned
No. of employees:	245
Sales 2016:	€128m
Production 2017:	30,000 tonnes
Plant locations:	Vedana Olona, Italy
Profile:	Lati was officially founded in 1945 to produce cellulose acetate compounds. It enjoyed rapid growth in the immediate post-war period, becoming one of the first companies in Europe to produce thermoplastic compounds reinforced with both long and short glass fibres during the 1960s. Since then it has gone on to become one of Europe's leading independent engineering thermoplastic compounders.
Product line:	PA6 and PA66 compounds account for the majority of Lati's output, followed by PP, PBT, PC, PPS, POM and PPA. The company offers more than 2,500 formulations, including natural and coloured versions, mineral filled, glass and carbon fibre reinforced, glass bead reinforced, elastomer modified, flame retardant, self-lubricating, antistatic, conductive and EMI shielding grades.
Product strengths:	Flame retardant compounds represent more than 50% of Lati's global business. Other notable recent developments include bioplastic compounds based on PLA and PPA grades with drinking water approval.

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

Compounding FORTHCOMING FEATURES WORLD

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

February

Electrically conductive compounds
Bulk materials handling
Additives for polyamides
Laser marking and welding

March

Twin-screw extruders
Natural fibres and fillers
Special effect pigments
Computer modelling software

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

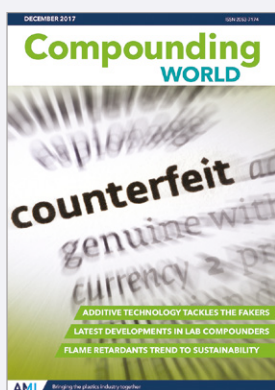
For information on advertising in these issues, please contact:

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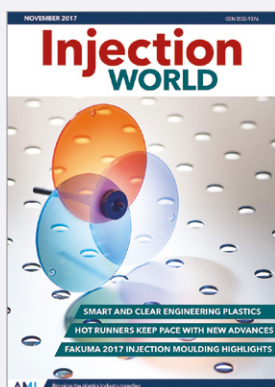
Compounding World December 2017
The December edition of Compounding World takes a look at the use of taggant additives in fighting counterfeiters. It also looks at the latest developments in lab compounders and explores the challenges of accelerated weather testing.

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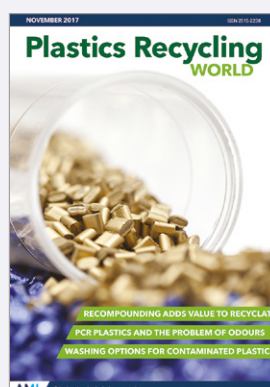
Compounding World November 2017
The November issue of Compounding World discovers how to make the most of mixing technology. The edition also reports on what's new in colour masterbatch and carbon black, new scratch and mar additives and the Fakuma 2017 fair.

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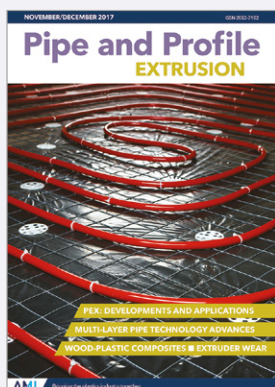
Injection World November/December 2017
The November/December issue of Injection World magazine looks at new developments in engineering plastics. It also reviews the latest injection moulded surface enhancement techniques and details hot runner innovations.

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Plastics Recycling World November 2017
The November issue of AMI's new magazine Plastics Recycling World looks at how recompounding technology allows plastics recyclers to add value to recycle. The edition features other technology developments in washing plant, odour reduction and process monitoring.

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Pipe and Profile Extrusion November/December 2017
The November/December edition of Pipe and Profile Extrusion takes a look at the latest PEX pipe advances. It also explores screw and barrel protection options, multi-layer pipe production, and wood-plastic composite applications.

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Film and Sheet Extrusion December 2017
The December edition of Film and Sheet Extrusion magazine looks at new developments in foamed sheet production. It also reviews the agricultural films market and highlights some innovations in plastics recycling, melt filtration and static management.

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GLOBAL EXHIBITION GUIDE

2018	7-12 February	PlastIndia, Gandhinagar, India	www.plastindia.org
	6-8 March	JEC World, Paris, France	www.jeccomposites.com
	20-22 March	Plastics & Rubber Vietnam, Ho Chi Minh	http://plasticsvietnam.com
	22-24 March	MECCSPE, Parma, Italy	www.mecspe.com
	27-29 March	Plastprintpak Nigeria, Lagos, Nigeria	www.ppp-nigeria.com
	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.plasticsrecyclingworldexpo.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

27-28 February 2018	PVC Formulation, Pittsburgh, PA, USA
6-8 March 2018	Cables 2018, Cologne, Germany
8-9 March 2018	Masterbatch Asia, Bangkok, Thailand
13-14 March 2018	Polymer Sourcing & Distribution, Coral Springs, FL, USA
14-15 March 2018	Plastics Regulations, Cologne, Germany
20-21 March 2018	Conductive Plastics, Pittsburgh, PA, USA

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