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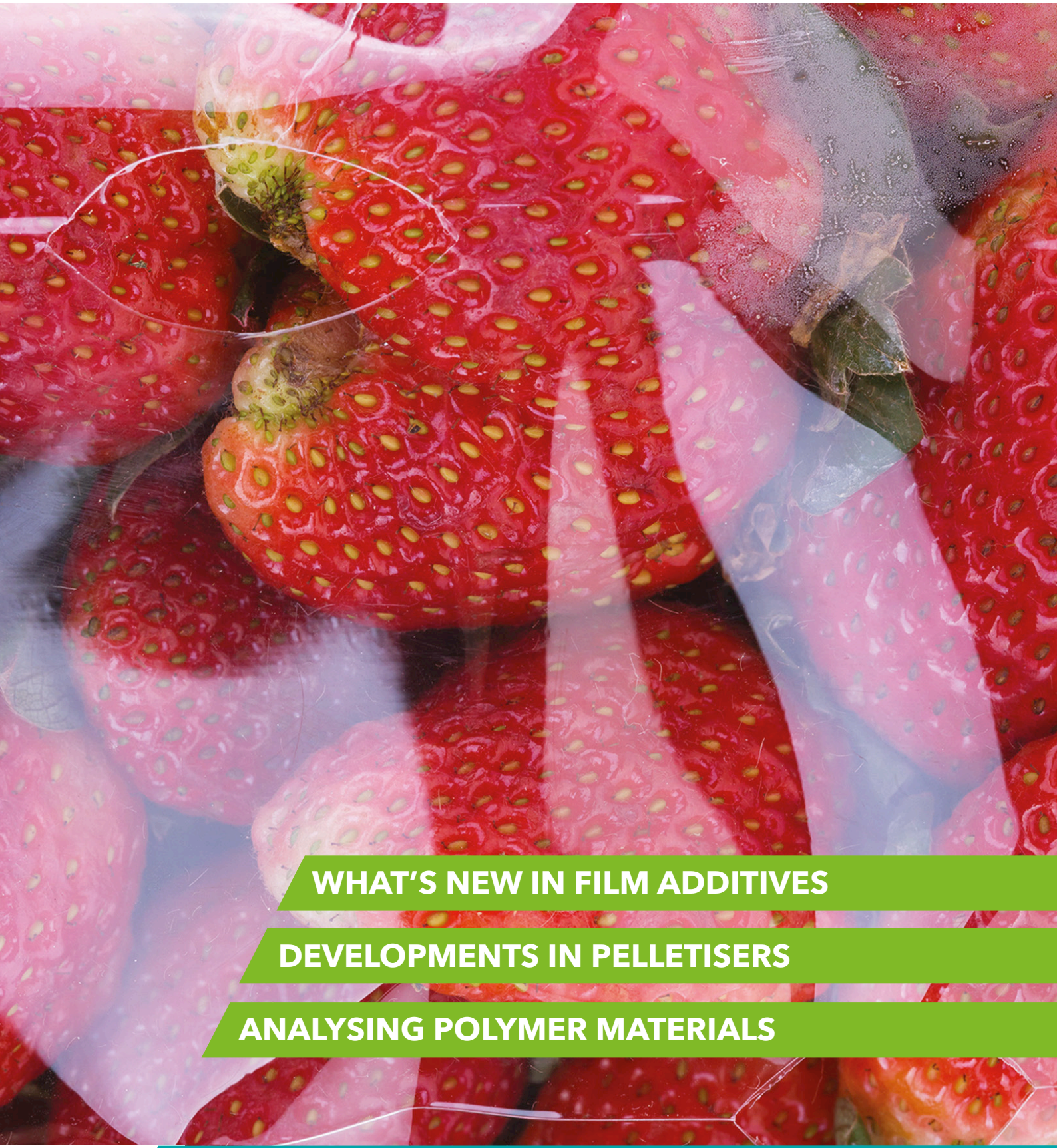

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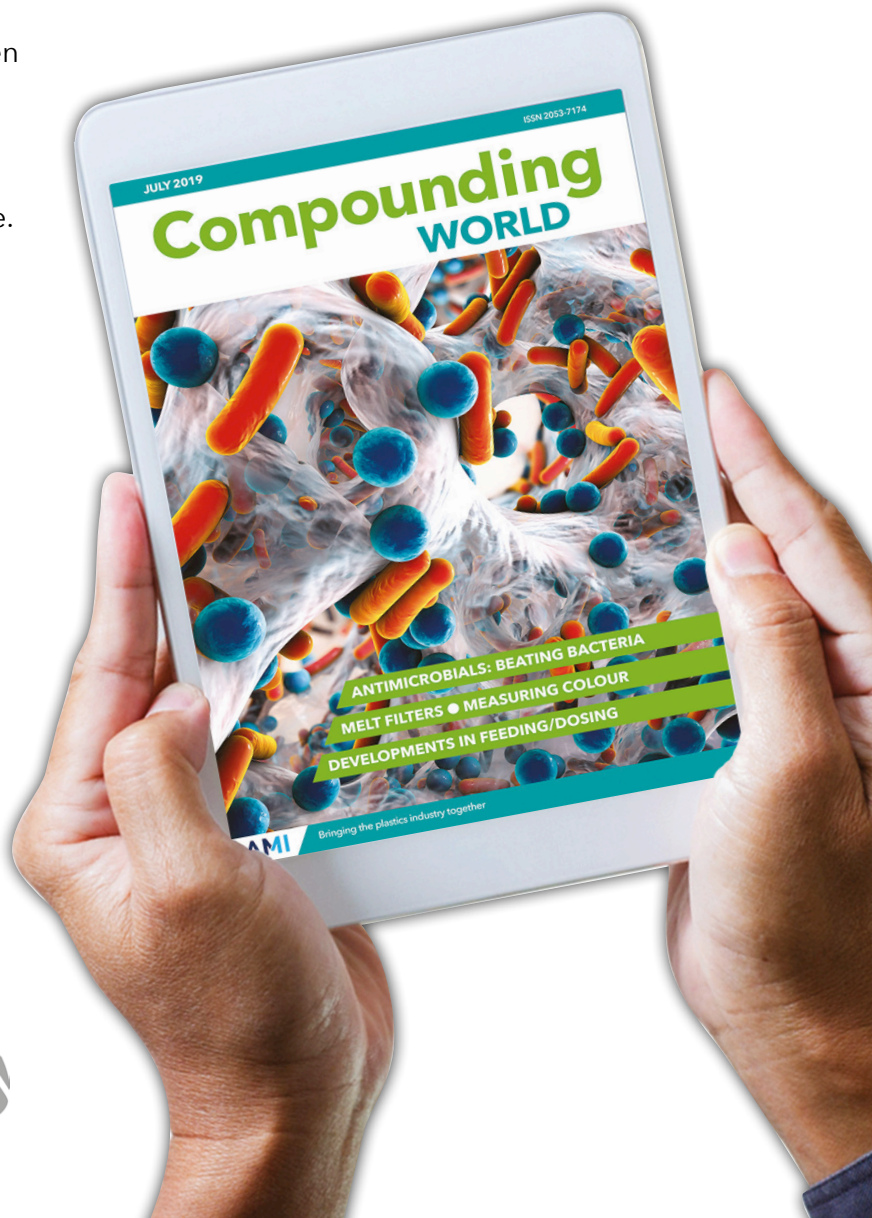

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Third Floor, One Brunswick Square,
Bristol, BS2 8PE, United Kingdom
Tel:+44 (0)117 924 9442
Fax:+44 (0)117 311 1534
www.ami.international
www.twitter.com/plasticsworld
Registered in England No: 2140318

EDITORIAL

Editor-in-Chief: Chris Smith
chris.smith@ami.international

Technology editor: Peter Mapleston
editorial@compoundingworld.com

Contributing editor (USA): Jennifer Markarian
editorial@compoundingworld.com

Contributing editor (UK): Mark Holmes
editorial@compoundingworld.com

ADVERTISING

Advertisement manager: Claire Bishop
claire.bishop@ami.international +44 (0)1732 682948

Sales & commercial manager: Levent Tounjer
levent.tounjer@ami.international +44 (0)117 924 9442

Sales manager (China): Jenny Zhou
jenny.zhou@ami.international +86 13651 985526

Events and magazines director: Andy Beevers
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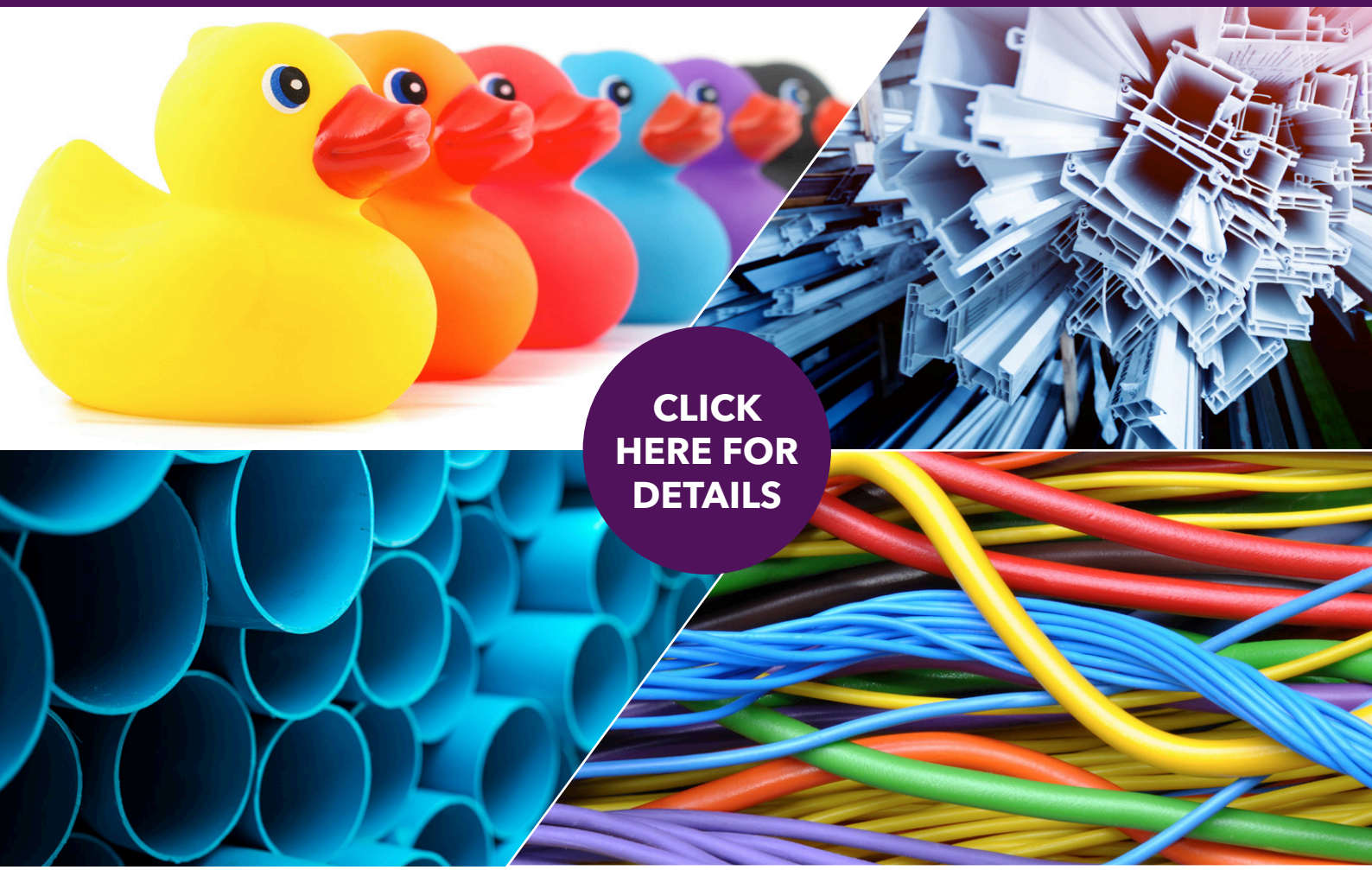

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PolyOne to buy Clariant masterbatch business

PolyOne is to buy Clariant's global colour and additive masterbatch business including, as part of a separate transaction, the Swiss firm's 51% stake in Clariant Chemicals India. The deal is expected to close before Q3 2021.

The Clariant business manufactures colour and additive masterbatch and has 46 manufacturing operations and technology centres in 29 countries with some 3,600 employees. Sales amounted to $1.15bn for the last 12 months. The business will become part of PolyOne's Colour, Additives & Inks segment.

The agreed combined net purchase price amounts to $1.45bn (equivalent to 11.1 times EBITDA for the past 12 months). Synergies of around $60m are expected, according to PolyOne, which said the acquisition will be financed through cash at hand, an issue of senior unsecured notes and $450m of equity.

IMAGE: POLYONE

PolyOne Chairman, President and CEO Robert M Patterson

According to PolyOne, the acquisition will create "a premier provider of sustainable solutions, with over 85% of adjusted EBITDA from speciality formulations." Factoring in the recent divestiture of its Performance Products & Solutions segment and previous changes to the PolyOne portfolio, the resulting entity will have annual sales of about $4bn, as well as a broader geographical presence.

In a statement, PolyOne said both businesses have leading portfolios of materials that are aligned with the megatrends of the future. "The early synergies and EPS accretion certainly underpin the transaction and its initial value financially, but what I am most excited about is the additional upside from the innovation opportunities of our combined businesses," said PolyOne Chairman, President and CEO Robert M Patterson.

Clariant Executive Chairman Hariolf Kottmann, said the deal is "a significant milestone on our path to focussing on businesses with above-market growth, higher profitability and stronger cash generation". The company also plans to sell its pigments business in 2020.

› **www.polyone.com**
› **www.clariant.com**

European chemicals decline

The European Chemical Industry Council (CEFIC) said in December it expects chemical production in the EU to have declined by 1% from 2018 to 2019, which it attributed to slower global economic growth, political uncertainty around Brexit and ongoing trade conflicts.

Demand was said to be notably lower in the automotive and electrical appliances markets but 2.5% up in the construction industry.

Production is expected to stay at the same level in 2020. "While rising real incomes should keep demand in manufactured goods stable, the continuous political uncertainty and hostile trade environment are unlikely to promote significant growth," the association said.

› **www.cefic.org**

ADN capacity on the up

Announcements by Butachimie and Ascend Performance Materials indicate potential future easing in supply of adiponitrile (ADN), a critical feedstock for PA66 production that has seen the polymer in short supply for the past 18 months or so.

Butachimie has restarted its ADN facility at Chalampé, France, after a two-month shutdown during which it implemented a €250m maintenance and upgrade programme. The company said the move has upped capacity by about 20%, as well as reducing energy consumption and increasing process reliability.

IMAGE: ASCEND PERFORMANCE MATERIALS

PA66 is used in applications such as automotive thermostat housings

Meanwhile, Ascend Performance Materials said it has finalised an agreement with the state of Alabama, Morgan County Economic Development Association and the City of Decatur in the US covering economic incentives for the construction of cogeneration units and expansion of ADN capacity at its site at Decatur. Ascend said construction on the $175m project will will begin in Q2 2020 and end in late 2021.

› **www.butachimie.eu**
› **www.ascendmaterials.com**

Victrex to make PEEK in China

UK-based performance polymer maker Victrex is to set up a manufacturing JV with Yingkou Xingfu Chemical Company to produce PEEK polymer at a site at Liaoning in China. It will be its first PEEK resin production capacity outside of the UK.

Victrex will hold a 75% stake in the JV and will invest around £32m into the project. It already has an established relationship with Yingkou Xingfu Chemical Company through its monomer supply chain and expects to benefit from its expertise in developing and operating chemical plant in China.

The new plant will be commissioned in early 2022 and will eventually be capable of producing up to 1,500 tonnes of polymer annually. Victrex will oversee the management of process know-how and intellectual property during development of the polymerisation process.

Victrex said setting up a plant in China is in line with its strategy of investing in capacity ahead of demand.

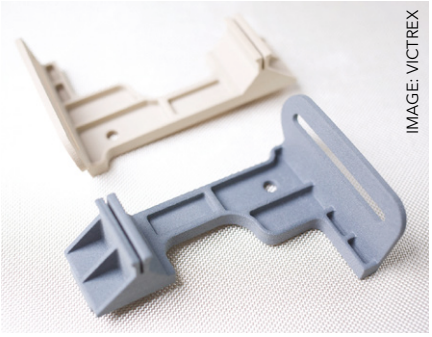


IMAGE: VICTREX

Aerospace brackets 3D printed in Victrex PEEK

It said it expects to see significant long term growth opportunities across several markets in China as well as a move to domestically-produced resin to meet the country's "Made in China 2025" initiative.

Jakob Sigurdsson, Chief Executive of Victrex, said: "This investment is in line with our record of not only investing ahead of demand, but in complementing and further differentiating our range of PEEK and PAEK grades, as well as setting the stage for specific geographic growth, whereby we can capitalise on the significant opportunities in China and the Asia Pacific region by having a competitive manufacturing presence there.

"Alongside the Made in China 2025 initiative, some of our increasingly diverse application areas mean our customers require a quality and differentiated PEEK offering," he said. "Whilst we already manufacture a range of PEEK and PAEK grades, this will enhance our portfolio, making us even better positioned in a region where we have seen strong growth in recent years and continue to see attractive opportunities, aligned to our know-how and strong technical and application development capabilities."

The move follows the initiation of a debottlenecking project at the company's main Hillhouse UK production facility, which will add up to 1,000 tonnes of annual capacity.

› **www.victrex.com**

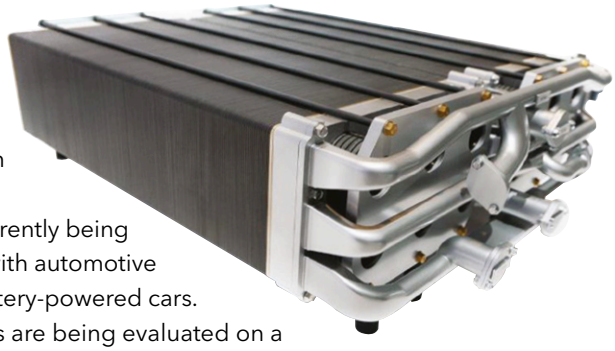
WEEE Forum wants to see no "watering down"

The Waste Electronic & Electrical Equipment (WEEE) Forum has responded to the European Commission's ongoing discussions about preparation implementing acts to lay down minimum quality standards for WEEE treatment, saying it is "strongly of the view that it is absolutely crucial to do so in strict accordance with the European standards for WEEE."

It said that Member States and the European Commission should acknowledge the importance of strictly implementing all requirements of EN 50625 and EN 50614, the suite of CENELEC standards covering collection, transport, re-use and treatment of WEEE, and avoid any "watering down".

› **https://weee-forum.org**

Albis aims for fuel cells to meet EV demands



Germany's Albis says it has developed a number of plastic compounds for use in fuel cell applications in cooling and air supply systems, which are currently being validated in projects with automotive OEMs developing battery-powered cars.

Further compounds are being evaluated on a specially-installed test set-up at Albis's laboratory in Hamburg.

"Hybrid solutions which combine battery and fuel cell are a promising solution," said Ian Mills, Albis management board member and head of its compounding business.

Among the materials under evaluation are: Altech PP compounds with 20, 40 and 50% glass fibres; Alfater XL TPVs with Shore A hardnesses of 60 and 70; Tedur L PPS compounds with 30 and 40% glass fibre plus a 15% PTFE grade for plain bearings; and several Alcom grades.

› **www.albis.com**

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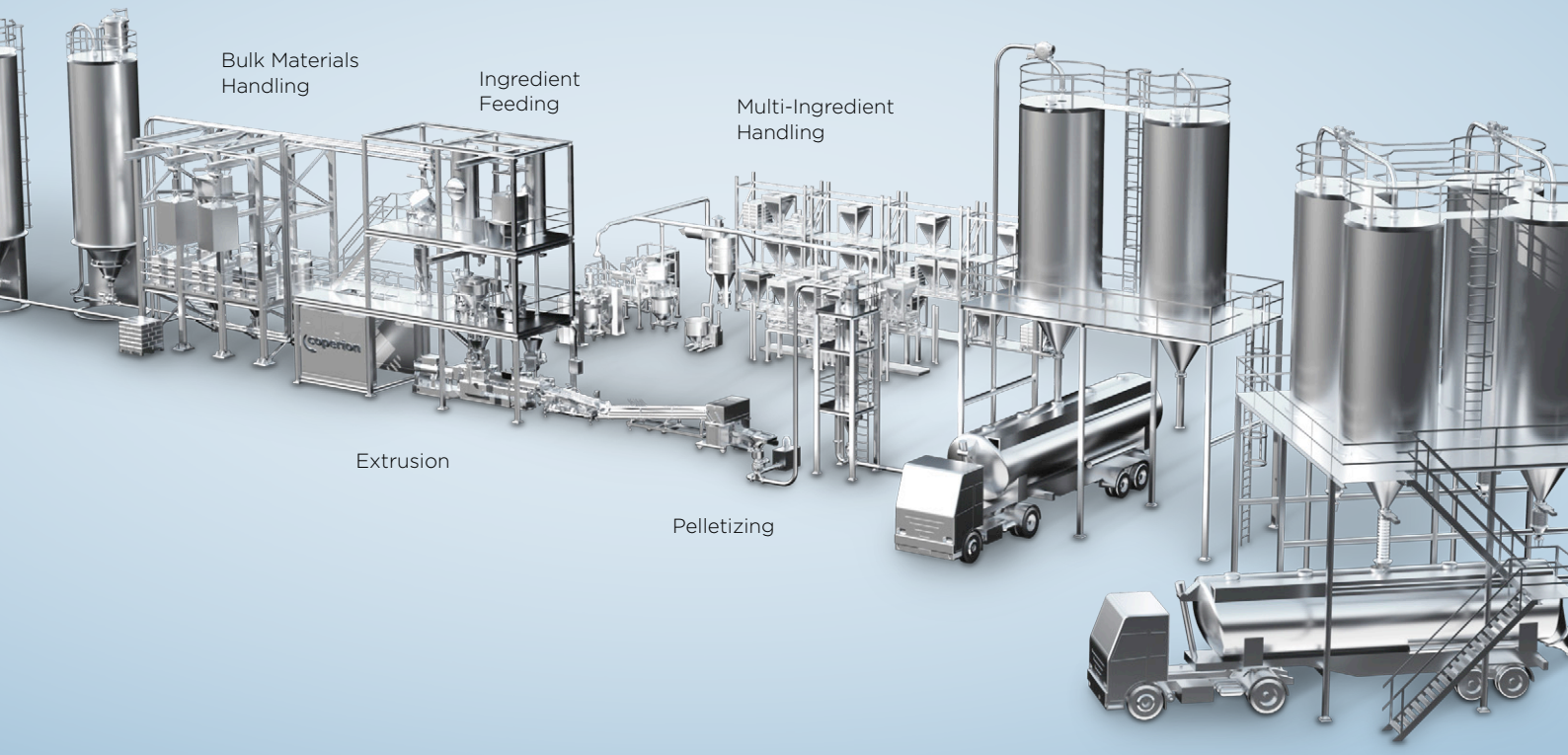

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Brüggemann aims for polyolefin recycling

German additive producer Brüggemann is developing a new line of performance stabilisers for recycled polyolefins based on technology developed at Fraunhofer LBF.

According to the company, the new stabilisers both protect the polymer from further thermal and photo degradation as well as repairing some of the damage that has already taken place. The technology paves the way for production of recyclate with processing properties and long-term heat stability that is similar to virgin polyolefin materials, it claims.

Fraunhofer developed the stabiliser technology; Brüggemann's role in the project is to adapt the technology to the market, develop production processes and support market introduction. "We know it works and now we are adapting it to the market," said a spokesperson for the additive maker.

Brüggemann already produces a number of stabilisers and modifiers to support processing of virgin and recycled polyamides. This development marks a first significant move for the company into the polyolefins market. "Ultimately, our goal is to significantly improve the quality of recyclates with the help of innovative additives, thereby making an important contribution to the upcycling of plastic waste," said Dr Klaus Bergmann, Head of Polymer Additives at Brüggemann.

The additives will be manufactured at its plant at Heilbronn, which has undergone a €25m upgrade over the past 18 months.

› **www.brueggemann.com**
› **www.lbf.fraunhofer.de**

Incroslip gets US approval

Croda has announced that the US EPA has determined that its Incroslip SL slip additive is not likely to present unreasonable risk to health or the environment. The decision, in accordance with TSCA Section 5(a)(3)(C), will allow compounders to capitalise on its performance benefits, according to the company.

Incroslip SL is a high slip additive developed for applications where traditional slip products, such as erucamide and oleamide, oxidise.

› **www.croda.com**

IMAGE: TEKNOR APEX

Teknor Apex is targeting wearables with new TPEs

New TPEs for PC wearables

Teknor Apex has launched a new series of Medalist medical-grade TPE compounds designed to provide strong adhesion to medical grade PC and PC alloys during overmoulding. The new range also includes formulations suitable for wearable applications.

"Medalist TPEs are excellent alternatives to liquid silicones used in over-moulding because they do not require the use of a primer, have a shorter cycle time and can be processed on conventional injection moulding equipment," said Ross van Royen, senior market manager.

The MD-34900 compounds are available in 50, 60, and 70 Shore A grades for general medical overmoulding applications; MD-36975 is a 75 Shore A TPE specifically for overmoulding in wearable devices.

› **www.teknorapex.com**

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Songwon teams up with Uniwel

South Korea's Songwon Industrial has announced a strategic co-operation agreement with JiangSu Uniwel Chemistry to develop and manufacture PVC stabilisers for sale under their respective brand names.

Philippe Schlaepfer, Executive Vice President of Songwon's Performance Chemicals division, said the alliance will give the company "immediate access to state-of-the-art production of liquid and solid mixed-metal stabilisers and competitive Chinese raw materials".

IMAGE: SONGWON

Uniwel stabiliser deal gives Songwon better access to Chinese market

Songwon will retain its PVC stabiliser production in South Korea, which it says will be needed to meet rising demand in South-East and South Asia.

Uniwel produces a broad range of PVC heat stabilisers for a wide variety of end products, including window profiles, pipes and fittings, indoor decoration boards, rigid foam boards, stone-plastic-composite floorings, films, leathers, wires & cables.

› **www.songwon.com**

NEWS IN BRIEF...

European ABS and butadiene styrene producer **ELIX Polymers** has joined **Styrenics Circular Solutions** (SCS), which aims to develop chemical recycling technologies for styrenic plastics waste. Existing members of SCS include COEXPAN, INEOS Styrolution, Repsol, Total, Trinseo and Versalis (Eni).
www.elix-polymers.com
www.styrenics-circular-solutions.com

Celanese recorded a reserve of $88m in Q4 2019 following an update by the European Commission into a competition law investigation, opened in 2017, into past ethylene purchases made by a number of its subsidiaries. It said it continues to cooperate with the Commission.
www.celanese.com

Ineos Styrolution to build 600kt world-scale ABS plant in China

Ineos Styrolution is to build a world-scale, 600,000 tonnes/year ABS plant at Ningbo in China.

The facility will be placed on a greenfield site adjacent to an existing polystyrene plant, one of two in China Ineos Styrolution acquired under a year ago. Construction is planned to start in 2020 and be completed in 2023.

The new plant will produce material for customers in China, which is the world's largest ABS market, but will also supply across the Asia-Pacific region.

Separately, Ineos Styrolution has announced that it and Agilyx, which converts post-consumer plastics to low-carbon fuels, chemicals and plastics, are to move forward with engineering and design of a recycling facility for PS in Channahon, Illinois, US.

The decision follows a successful development programme that qualified Agilyx's chemical recycling technology, which breaks PS down to its base monomers, can meet Ineos Styrolution's specifications. The facility will convert up to 100 tonnes/day of post-consumer PS into "styrene product."

› **www.ineos-styrolution.com**
› **www.agilyx.com**

Birla Carbon looks to nano

Carbon black producer Birla Carbon and ChasmAdvanced Materials, a US-based specialist in printed electronics materials and battery materials, have agreed to develop and manufacture hybrid nanomaterials based on carbon substrates and carbon nanotubes. These will be targeted at multiple market segments.

"The combination of Chasm's expertise in nanotube enhancement and our deep knowledge of carbon substrates and applications offers us the chance to rapidly advance our understanding of these high-performance, scalable nanomaterials," said Birla Carbon CEO Dr Santrupt B Misra

Chasm acquired Southwest NanoTechnologies in 2015.

› **www.birlacarbon.com**

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Growing plastics shows return to Cleveland in US in 2020

Three free-to-attend exhibitions focused on compounding, plastics recycling and extrusion will return to the Huntington Convention Center in Cleveland, Ohio, US, on 4-5 November 2020, where they will be joined by a new expo focused on polymer testing and analysis.

The Compounding World Expo, Plastics Recycling World Expo and Plastics Extrusion World Expo, which are organised by *Compounding World* publisher AMI, made highly successful US debuts in Cleveland in May 2019, attracting a total of 261 exhibitors and 4,375 visitors. The three expo events are set to grow in size for this year.

The Polymer Testing World Expo is a new focused exhibition and conference for scientists, laboratory staff and researchers who develop, test and analyse new polymer materials, formulations and products. It will benefit from considerable crossover with the other exhibitions –1,091 of the visitors to the other three expos in 2019 said they were involved in R&D and materials testing.

IMAGE: AMI

Some of the 4,375 visitors to the 2019 show in Cleveland

The exhibitions see the return of the five free conference theatres for 2020. These proved highly popular last year, attracting large crowds for their series of technical papers, market forecasts, practical training seminars, and lively business debates.

"We were absolutely delighted with the response to our first US exhibitions, which were very well supported by the North American plastics extrusion, recycling and compounding industries" said AMI's Head of Exhibitions, Rita Andrews. "We've had extremely positive feedback about the Cleveland shows from exhibitors and visitors alike."

More than 200 companies have already booked their booths for the four focused expos in Cleveland in 2020. They include Amut, Atlas, BYK, Clariant, Coperion, Cumberland, Davis Standard, Dover Chemical, Entek, Erema, Farrel Pomini, Gneuss, Heritage Plastics, Konica Minolta, KraussMaffei Extrusion, Leistritz, Maag, Maguire, Matsui, Milliken, Netzsch, NFM, NGR, Nordson, Omya, Piovan, PolyOne, PTi, Q-Lab, Reifenhauser, Struktol, Thermo Fisher, Vecoplan, Wacker, Windmöller & Hölscher, Zoltek and many more.

Booths at the exhibitions start at less than $4,000. For more information, download the brochure **here**, or contact AMI's exhibition team at **exhibition_sales@ami.international**

PET project targets chemical recycling

A new consortium of companies from across the PET packaging value chain has been established with the aim of accelerating commercialisation of the BP Infinia chemical recycling technology.

As well as BP itself, members include packaging and recycling specialist Alpla; food, beverage and consumer goods producers Britvic, Danone and Unilever; and waste management and recycling specialist Remondis.

Packaging group Alpla has joined BP's chemical recycling consortium

IMAGE: ALPLA

The partners said they believe that together they can "speed up the commercialisation of the technology, infrastructure and demand needed to process billions of opaque and difficult-to-recycle PET bottles and food trays … including those that are difficult to recycle by current conventional recycling methods."

› **www.alpla.com**

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Poor year for Italian machinery

Trade data for the first three quarters of 2019, generated by the Italian National Statistical Institute and analysed by the sector trade association Amaplast, indicates a negative year-end result for the Italian plastics and rubber processing machinery industry.

Amaplast attributes the poor result to "many issues and unknowns characterising the current world economic climate, compounded by the announced, but as yet poorly defined, legislative and fiscal measures aiming at reducing the use of plastics".

Both exports and imports were down on the same period in 2018. The former fell by 8.5% to €2.16bn; the latter 13.1% down to €645m. The trade balance fell by 6% but remains positive at €1.5bn, according to the association.

Italian market for plastics and rubber machinery, equipment and moulds (Forecast Δ% 2019/2018)

Production	-9
Exports	-8
Imports	-15
Domestic market	-12
Trade balance	-5

Source: Amaplast

"I note a certain amount of concern deriving from the less than encouraging prospects for both the domestic and foreign markets," said Amaplast president Dario Previero. "However, we must not overlook the fact that this slump – whose first signs were seen in the year-end results for 2018 – comes after a long period of growth. With the sole exception of 2013, we have witnessed seven years with a plus sign."

Germany remains the top export market, though sales there were 19.9% down at €270m and its share of the total fell from 14.3% to 12.5%. Most other European export markets were also weak. However, Italy's second biggest market, the US, bucked the trend with sales 15.0% up to €224m, taking its share of the total to 10.4%.

Some of the sharpest declines were in Turkey (-30%), Austria (-28%) and Switzerland (-24%). South Korea also saw a decline (-31%). However, positive growth was seen in other Asian markets, notably Thailand (+24%), Indonesia (+39%), China (+14%) and Japan (+33%).

› **www.amaplast.org**

Grupa Azoty starts 50ktpa PA compounding facility

Grupa Azoty has started up a 50,000 tonnes/yr PA compounding operation at its plant at Tarnów in Poland. It has invested PLN100m (€24m) in the project, which has been supported by German compounder Akro-Plastic.

Grupa Azoty is a leading European producer of PA6 with an annual capacity of around 170,000 tonnes.

According to Dr Wojciech Wardacki, President of the Management Board of Grupa Azoty, the investment continues the company's strategy of moving to higher value products.

"We have been consistently implementing the strategy of extending the product chain and ensuring the highest quality at every stage, from caprolactam produced in Tarnów and Puławy, converted to polyamide 6 in the full viscosity range in Tarnów and Guben in Germany, to various advanced modified materials with the addition of glass or carbon fibres," he said.

› **www.grupaazoty.com**

Parx wins Pepsico

Anitmicrobial polymer producer **Parx Plastics** said it has signed a Master Service Agreement with PepsiCo to develop a system to provide high level microbiological reduction in high performance plastics. It said the companies have been working together since 2016.

› **www.parxmaterials.com**

Asahi Kasei targets auto "Big Three" in US

Asahi Kasei America has opened an office in Novi, Michigan, US, as part of an effort to strengthen its presence in the North American automotive market.

It supplies compounds, battery separator materials and electronic components to the industry in the region, which is still a major base for the 'Big Three' automotive makers.

"This new office will give us a place to connect and collaborate with our different automotive businesses in North America, OEMs and Tier Ones", said John W Moyer, Senior Executive Officer of Asahi Kasei Corp and Chief Strategic Officer of Asahi Kasei America.

› **www.asahi-kasei.co.jp**

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IMAGE: MAAG

Pelletisers are a critical part of any compounding line and manufacturers are working to improve operation and uptime while optimising performance. ***Peter Mapleston*** *finds out more*

Pelletisers make progress

It is a simple fact that a compounding line is nothing without a pelletiser. And just like for a compounding extruder, there is no "one size fits all" solution in terms of pelletiser selection – the polymer being processed, the compound additives, the speed of the line, and the performance requirements of the finished product are just some of the factors that need to be considered and that will have an impact on the features needed in a pelletiser.

So, it should be no surprise that pelletiser producers are increasing and tuning the options available on their offerings to ensure they meet customer needs ever more precisely. Major players are putting extra emphasis on customer service aspects, while smaller suppliers are emphasising their flexibility in providing special features for niche applications. This article takes a quick look at some of the latest developments and explains how they are being used in practice.

Coperion Pelletizing Technology used the K2019 show in Dusseldorf, Germany, to display its improved dual-bearing strand pelletisers in public for the first time. It says the equipment has been extensively re-engineered to incorporate field experience and latest market demands. "The SP140, SP240 and SP340 models incorporate various enhanced features for easy, rapid handling and optimised pellet quality," the company says.

Coperion has also developed a new proprietary technology for adjustment of the cutting gap, which it says has already impressed users with increased comfort and speed compared to classic systems. "Conventional solutions like eccentric screws or compression-tensioning screws present disadvantages such as non-linear movements, potential dirt pockets on the product, several setting steps or subsequent shifting from additional locking mechanisms," the company says.

It claims its new solution offers faster and more comfortable adjustment. Fine adjustment is also said to be more precise and simpler, as it can be done by hand without the need for tools. Likewise, integrated spring pre-tensioning eliminates the free clearance of the screws, which markedly reduces machine setup times.

Interior design

As well as making the overall design of the pelletisers more compact and integrating the operating panel into the machine, Coperion has reworked the interior space. The cutting tools have been installed closer to one another, enabling a shorter unguided strand length in the pelletiser and enhancing possible cutting results with soft materials in particular.

"This new construction results in less dead space in the interior which, together with optimised

Main image: TPE pellets in production on a Maag Pearlo underwater pelletiser at Hexpol TPE in Germany

edges and fewer free surfaces, provides improved cleanability," says a company spokesperson. "Furthermore, the new quick-change cutting chamber system really impresses users. The complete cutting area is accessible without tools and the cutting unit can be exchanged quickly and easily. This quick change minimises machine servicing times and downtimes."

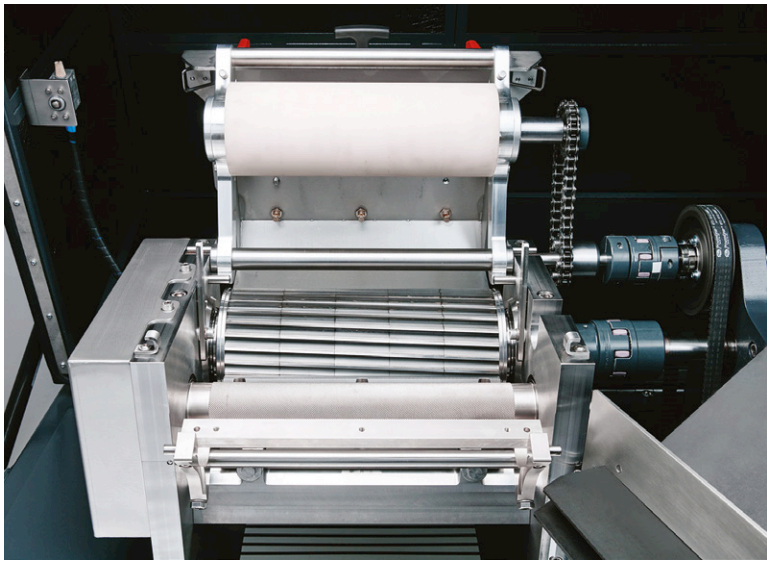
The intake area has been reworked, too. The previous conical construction has been replaced by a straight intake, which Coperion says allows strands to be optimally side fed into the pelletiser. Strands are now fed directly into the pelletiser without deflection while side panels on the intake roller prevent individual strands from breaking free, so strand tears and bevel are avoided during intake.

Coperion has also increased the operating width by 20mm so that higher throughputs are now possible. And it has also addressed noise. Along with the more compact interior cutting space and the resulting smaller sound chamber, all motors are now housed under the base plate, where they are noise insulated.

Coperion says the revised strand pelletisers offer an optimal mix of new developments and proven technology. In the latter area, it cites the pellet outlet chute with soundproof cladding, a frequency-controlled drive, and pneumatic control for feed roll pressure. The baseplate is mounted on vibration-insulating rubber pads and the pelletiser is installed on lockable rollers for greater flexibility. The pelletisers are also equipped with a safety device (a Haake system) in place of the classic retarding spindle.

Optional features available for the new Coperion models include a high temperature-resistant upper feed roll for longer service life as well as wear-protected or corrosion-protected cutting rotors for handling highly filled or reinforced materials. Increased drive power for high processing demands is available in a dual drive option with a driven upper feed roll for improved intake. There is also optional cooling for the feed roll and the cutting head to allow cooling of the entire cutting chamber. Control cabinet climate control is available for especially demanding environmental conditions.

IMAGE: COPERION



Above: Coperion Pelletizing Technology's strand pelletiser cutting chamber. The company says the new quick-change cutting chamber system has impressed users

Underwater TPE

Maag, now that it owns the Gala, Reduction Engineering Scheer and Automatik brands, is one of the biggest names in pelletising technology. Its Pearlo underwater pelletising system, which integrates features originating in Gala and Automatik designs, was shown for the first time at K2016 and Maag says that one of the first compounders to indicate an interest in the technology was Hexpol TPE.

Hexpol TPE is one of the best-known producers of thermoplastic elastomers globally. It strives to invest in future-proof technologies, which Maag says can be clearly seen in one of its latest production lines at its plant at Lichtenfels in Germany. A key component of that line is an underwater pelletising system from Maag, which the supplier says both works extremely efficiently and enables the flexibility required for production of new material formulations.

Total capacity at the Lichtenfels site is 40,000 tonnes/yr and Maag pelletising systems are in use on this latest and six of the other lines. Hexpol TPE says it is crucial to its business that Maag be a pioneer in terms of technology. "Companies that break new ground are important to us because this is the only way we can develop innovations ourselves," says Dominik Fehn, Head of Process Engineering at Hexpol TPE's Lichtenfels site.

Hexpol TPE's engineers arranged for TPE trial runs to be conducted at Maag's pilot plant very soon after first seeing the Pearlo system back at K2016. That led to the decision to deploy the pelletising system on the newly designed line that went into operation in mid 2018. "Thanks to the use of Pearlo, the new line – in combination with the other system components such as the extruder and in particular its worm gear geometry, the screen changer with special flow channel, and the mixing and metering technology – is extremely efficient and flexible," says Maag.

The Pearlo underwater pelletiser is designed to

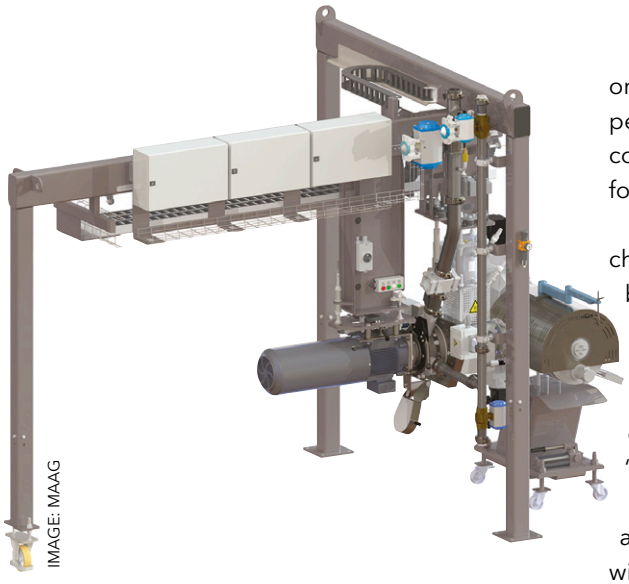


IMAGE: MAAG

Left: Maag's Pearlo Underwater pelletiser is designed to process a wide range of polymers at high output rates

process a wide range of polymers at high rates, according to Maag. It is used, for example, in production of raw materials, compounds and masterbatches, wood/polymer composites, elastomers, and hot-melt adhesives, including recycling lines.

Maag says a key feature of the Pearlo unit is that it produces very uniform spherical pellets. "This not only results in an excellent appearance, which clearly distinguishes the pellets from other products on the market; the uniformity and shape of the pellets also ensure they have a lower moisture content," it claims. This, it says, eliminates the need for time-consuming post-drying of the product.

The system also has very good handling characteristics. The cutting chamber is designed to be opened and closed quickly and safely with one hand. Cleaning, assembly and commissioning requires minimal effort, so the product can be changed rapidly. The long life of the cutting tools is also claimed to be unique. "Thanks to the innovative design of the knife head, knives and cutting chamber, fast agglomerate-free start-up is possible within a very wide processing window," says Maag. "The longer process length of the knives results in a long service life, and drastically reduces the downtime as well as the number of blade changes required."

Engineering decision

According to Maag, Hexpol TPE's choice of Pearlo was mainly based on process engineering reasons and particularly those connected with pellet quality and process stability. It says start-up on changing product takes considerably less time compared to

IMAGE: MAAG

Right: TPE pellets produced at Hexpol's plant at Lichtenfels in Germany with Maag's Pearlo Underwater pelletising system

the existing lines, significantly reducing material consumption. Pearlo also makes cleaning the machine very easy. "This is a key criterion for Hexpol TPE because the bulk material is used, among other things, for the manufacture of children's toys, as well as for consumer products such as seals in the caps of mineral water bottles. Contamination must be avoided at all costs in such applications," Maag says.

Meanwhile, Hexpol TPE Managing Director Dr Peter Ryzko says: "The investment in the new extruder line equipped with Pearlo is also paying off in terms of the development of new materials." The plant allows the production of pellets with consistent quality properties in the finished product thanks to stable temperature control, efficient degassing of the plastic melt, and exact setting of the grain sizes.

Maag says that Hexpol TPE's positive experience with the Pearlo underwater pelletising system has led to another line being retrofitted with Pearlo (and also a new screen changer system). A plant modernisation is also in planning for other lines at the Lichtenfels site.

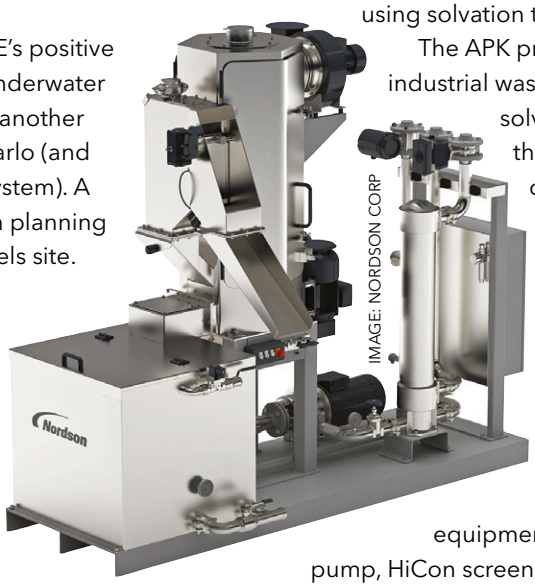


IMAGE: NORDSON CORP

Right: APK is using a BKG Master-Line underwater pelletiser to produce its Mersamid recycled PA resins

Profit from waste

At the APK plant at Mereseburg, Germany, a complete downstream melt processing and pelletising system from **Nordson Corporation** has been deployed in an innovative recycling process the company has christened "Newcycling." According to APK, the process "carries out the dictates of the circular economy by transforming mixed and multi-layer waste into purified polymer with properties close to virgin resin."

IMAGE: NORDSON CORP

Above: APK's Newcycling plant at Merseburg in Germany recycles multi-layer post-industrial film using Nordson BKG pelletising technology

This first Newcycling plant, which has a capacity of 8000 tonnes/yr, commenced commercial operation in June 2019. It is used for separating polyethylene and polyamide in a mixed feedstream of post-industrial multi-layer packaging film waste using solvation technology.

The APK process takes the post-industrial waste, shreds it, then employs solvents to selectively dissolve the polymers. Liquid and solid components are separated, which purifies the polymers, and the solvent removed for reuse in the process. An extruder delivers the recovered polyamide to the BKG melt delivery and pelletising components from Nordson. The BKG equipment includes a BlueFlow gear pump, HiCon screen changer, polymer diverter valve, underwater pelletiser and Master-Line process water / pellet dryer system.

The polyamide polymer is sold by APK under the name Mersamid. "Our Mersamid products are intended for demanding technical applications as alternatives to virgin plastics," says Florian Riedl, Director of Business Development for APK. "Nordson's BKG pelletising and melt delivery equipment contributes to meeting our requirement for high-quality granulates with homogeneous properties. In addition, these systems help us achieve a level of production efficiency that is consistent with our sustainability approach."

APK says it plans to build a second plant, with a capacity of 20,000 tonnes, for processing of post-consumer mixed film waste in the future.

Customer-driven

Bay Plastics Machinery points to a substantial market expansion in Europe and Asia, while it continues to support its domestic customer base in

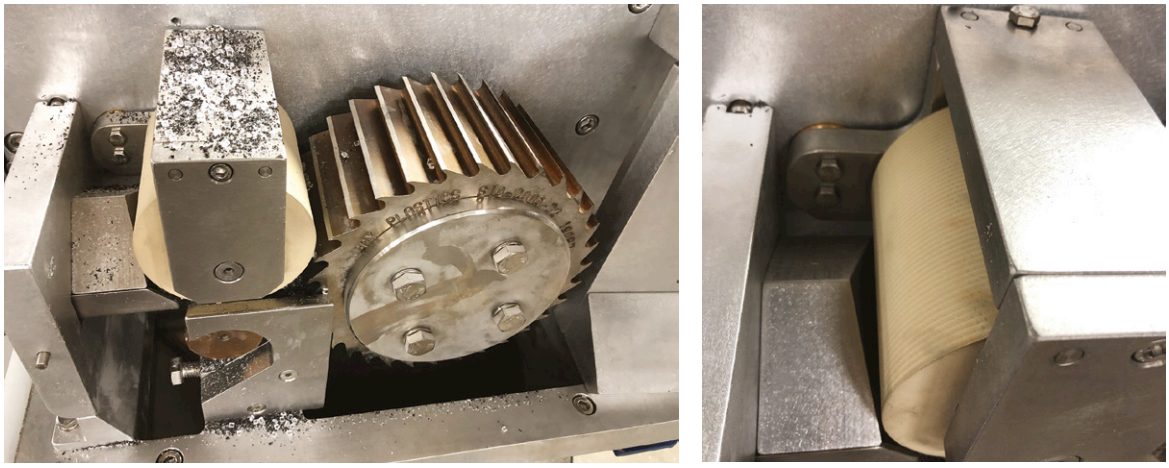


IMAGE:S BAY PLASTICS MACHINERY

Right: Cutting chamber images taken before (left) and after using the new cleaning assist option on a Bay Plastics Machinery pelletiser

North America, as reason for recent significant growth. "Through extensive conversations with our customers we determine market directions and what technology developments are important to the end-users," says Jim Forgash, Vice President of Sales at the company.

Forgash says the company continues to make minor but effective improvements to increase the cost-effectiveness of its equipment, particularly as it attempts to move into more markets around the world. He cites examples such as a new diamond bed knife, fine-tuning of Bay's micro-pelletising system, and a cleaning assist option in the pelletiser cutting chamber.

"We offer a standard platform of pelletisers, but everything is tailored to each customer's requirements," he says. "Every machine has a different infeed height, discharge height, discharge chute…that's how we differentiate ourselves from our competitors."

Based on conversations with customers, the company has also continued to develop its Micro Pelletizing line. This allows customers to process products with pellet sizes down to 0.1 mm and with extremely consistent results, Forgash says. "We will also be introducing new technology that integrates a cleaning assist option to the cutting chamber of the pelletiser to reduce dust and fines in our cantilevered style pelletisers."

Below: Polimer Teknik's Poex G400 pelletiser supports a wide range of options to handle custom projects

IMAGE: POLIMER TEKNIK

Forgash says this new cleaning assist function was requested by a European compounder that was unable to get its regular pelletiser supplier to develop a solution that met its needs.

Development work and tests on a prototype were carried out over several months last year and the feature will now be incorporated as a standard feature on future lines for all customers.

The development combines an air nozzle system and a patent-pending vacuum technology to aid in cleaning the cutting chamber, reducing the amount of down time between material changeovers. The clean assist system can be added to existing pelletisers through the addition of the air components and a standalone PLC, or it can be used in conjunction with the company's Digital Pellet Length control and can easily be programmed to change cleaning sequences as needed.

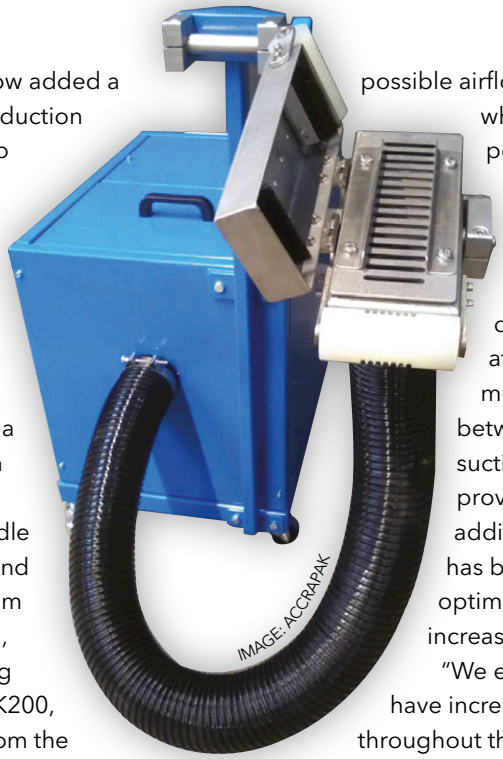
Simple operation

At **Polimer Teknik** in Turkey, Sales and Marketing Director Reha Yelken says the company has achieved some good results with its Poex G Series strand pelletisers. It, too, aims to create individual customer solutions for lines processing a wide range of polymers and, to that end, Yelken says it offers many options. "Wear resistant and corrosion resistant designs exist depending on process demands. Also, Poex strand pelletisers provide easy operating and easy maintenance with their unique structures," he says.

Polimer Teknik offers six models in its Poex G Series range, with operating widths ranging from 60 to 600mm and in versions capable of handling up to 150 strands. All run at line speeds between 30 and 70 m/min. Yelken says the units are very energy-efficient. They also provide easy operation and maintenance, with a design that allows simple access to the inside of the cutting chamber. In addition, the double drive design enables production of a wide range of different materials, he says.

Suction drying

UK-based **Accrapak** now has a full range of dryers suitable for pelletising lines from 1to 60 strands. "We can offer a suction dryer for all the pelletisers in our production range," says Technical Engineer



Right: The AK400 strand dryer from Accrapak is suitable for 40-60 strand production

Steven Critchley. "We have now added a small suction dryer to our production range. Our AK50 will dry up to seven strands of extruded polymer ensuring a dry cut when strand pelletising." The dryer can be used on seven-strand lines at a rate of up to 200kg/h.

Further up the scale, the company has also developed a larger machine for production lines running at between 1-2 tonnes/h. The AK400 can handle 60 strands at 3mm diameter and features a feed width of 400mm and a powerful centrifugal fan, according to Critchley. Existing suction dryers – the AK100, AK200, and AK300 – are benefiting from the new developments, too. "When designing our new suction dryers we have also incorporated the new features throughout the range," Critchley says.

These include a redesigned drying chamber with a longer suction head, giving strands more time in the drying chamber. "The extra slot ensures more suction hits before being fed into the strand pelletiser, Critchley says.

The suction head has been pressure tested to obtain the maximum amount of suction vacuum for each machine and extra suction slots have been added to obtain the maximum amount of hits, ensuring the best possible drying of each extruded strand. The slots are adjusted to give the maximum possible airflow through the suction plate, which is then locked into position with the correct suction slot gap for each individual machine.

All the machines are now also fitted with an inverter drive as standard to run the fan at 60Hz, which provides 20% more suction, while the adapter between the filling head and the suction tube is now conical provide maximum air flow. In addition, the fan unit orientation has been modified to allow optimise the exhaust, further increasing suction power.

"We estimate that the modifications have increased the suction power throughout the range by more than 25% to an already proven design," Critchley says. "We are now in the process of designing a new model which recirculates the air flow from the suction head back into the drying chamber. This will blow air down onto the extruded strands as they pass over the suction plate without blowing water into the working area."

CLICK ON THE LINKS FOR MORE INFORMATION:

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Beyond easing processing and boosting performance, additives for film production are increasingly helping to enhance product and system sustainability. Mark Holmes reports

IMAGE: POLYONE

Formulating better films

Additives and additive masterbatches have long played a big role in production of films for both packaging and industrial applications, acting as processing aids to boost slip, providing antiblocking and antistatic properties, enhancing antifog, or improving light stability. However, the need to simultaneously meet circular economy targets and improve film recyclability is climbing up the priority list for all solution providers.

The current market for film additives and masterbatches presents many opportunities, especially in the area of sustainability, according to **Ampacet**. The company says that additive masterbatches will continue to have a significant role to play in enabling new and innovative solutions that support sustainability goals. The drive towards a more circular economy is well underway in plastics and Ampacet believes it has a number of valuable contributions to make in this area.

"Vibrant economic conditions in the United States currently are supporting demand growth in many film markets. The growing demand for on-the-go convenience and shelf appeal continues to drive significant growth in smaller, easier-to-handle packages. This is why, for example, Stand Up Pouches (SUP) are growing faster than just about any other packaging format. They are easier to 'grab-n-go' and offer the bonus of providing sustainability advantages, significantly increasing the product-to-package ratio," says Jim Morrison, Strategic Business Manager, Flexible at the company.

"While we talk about the consumer preference for on-the-go convenience favouring SUPs and flexible packaging, the conflicting consumer preference is for more sustainable solutions. Whereas films certainly offer product-to-package ratio advantages, there are more challenges when it comes to the collection, sorting and recycling of films at materials recovery facilities (MRF). We support the recent passage of the RECOVER Act in the United States that provides funding to support state and local recycling infrastructure. There is much work to do with respect to these challenges," he says.

Morrison adds that multi-layered barrier films contribute significantly to sustainability by protecting products and extending shelf life, but

Main image: Film additive demands are changing as producers look towards mono-layer and more homogenous structural components to meet sustainability targets

IMAGE: PALSGAARD

Above: Palsgaard is developing plant-based and food grade additives to provide good antistatic and antifog performance in films

multi-layered films are challenging to recycle, even if collected. As a result, there is a trend towards developing mono-material solutions. In turn, this is driving developments for increasing the oxygen barrier in stretched PE films, for example. He says Ampacet is active in research and development on new solutions to satisfy the unmet needs of film processors in this area.

Improved recycling

One recent development is the ReVive compatibiliser product line, a blend of functional additives that enable barrier film scrap to be recycled back into a polyethylene layer. The company says it has been rigorously tested internally against industry protocols for film recycling and found to effectively homogenise EVOH and PA with PE. Ampacet is also developing compatibilisers for other mixed resin streams.

"Given that PE recycle streams are more developed than PP, there are on-going efforts in the industry to replace BOPP with BOPE in more applications," says Morrison. "This requires additives tuned specifically for BOPE. As a leading supplier of masterbatch additives for oriented films, Ampacet is active in this area."

As well as ReVive, Ampacet also has new products in its R3 Sustainable Solutions portfolio. "We recently launched a REC-NIR Black that enables black plastics to be detected by near-infrared sorting equipment critical for materials recovery facilities. In the same vein, we also have a new masterbatch that enables films to be detectable by metal detectors. In order to improve the appearance of plastics that have been slightly discoloured through the incorporation of recyclate, we have developed BlueEdge and GreenEdge masterbatches," adds Morrison.

"Future developments will include a portfolio of odour scavengers developed for multiple applications, including incorporation of various types of recyclate. However, as more recyclate is used from disparate sources we anticipate requests to neutralise new odours that will require further solutions," he says.

Optimised additives

Danish company **Palsgaard A/S** is seeing a steady increase in film additive and masterbatch market activity as the standard of living increases worldwide, leading to increased demand for many consumer products. "As legislation tightens, and the demand for recyclability grows, the polymer additive industry faces the challenge of making optimised and safe additives and masterbatch solutions," says Christina Normann Christensen, Product and Application Manager, Non-Food.

"In particular, unhealthy additives and additives based on chemistry of increasing concern need to be replaced to offer the end consumer a safer solution. For Palsgaard, this means developing plant-based and food grade additives which match or surpass the performance of conventional additives with antistatic and antifogging effects," she says.

"Two of our developments stand out as they are highly efficient antistatic agents, Einar 411 and Einar 601. Both products, like the rest in the Einar series, are plant-based, food grade and produced in carbon dioxide neutral facilities," she says. Einar 411 gives both short and long-term antistatic effects and is said to be effective in challenging applications, such as impact copolymer polypropylene and BOPP film. Einar 601 is said to perform well across a broad range of PE applications at low loading levels and in low humidity conditions.

As a result of tightening legislation, Palsgaard cites the example of a customer that wanted to replace ethoxylated amines in food packaging but had been struggling to find an alternative with comparable performance. "After testing and validation of Einar 411, the customer approved it and has now completely replaced ethoxylated amines in critical applications and eliminated any safety concerns," says Christensen. "The main applications for Einar products are in polyolefins, polyethylene and polypropylene, as they are predominantly migratory. However, we are also starting to look at a broader range of polymers, both in masterbatches but also as coatings for PET and EPS."

According to **BASF**, film applications continue to experience solid growth globally as they offer an economical and sustainable solution to protect goods of much higher value and increase their service life. "Additives and masterbatches are

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Right: BASF's Tinuvin NOR 356 HALS stabiliser delivers good results in agricultural film exposed to high levels of UV and heat

essential for the retention of a polymer's physical properties in the initial high temperature processing when films are produced," says Sebastien Villeneuve, Head of Marketing Europe, Plastics Additives. "They also provide superior resistance to further stresses, for instance thermal or UV light exposure, to which the polymeric materials will be exposed in the end use application. Additives and masterbatches are also tailored to provide additional functions, such as barrier, antistatic and antifogging properties."

Application matters

When discussing factors driving market demand, Villeneuve adds that there is a need to distinguish between films involving packaging, typically of consumer items and largely dominated by food packaging, and industrial films, such as agricultural films and films used in construction or heavy-duty packaging. For packaging, additives and masterbatches are essentially providing physical and aesthetic property retention in the polymers at the processing stage, while not impairing compliance with stringent food contact requirements, organoleptic properties and management of migrating species, including non-intentionally added substances (NIAS). Hence, the user can claim a visible success with an invisible contribution. For industrial films, while ease of polymer processing for increasing throughput is also essential, the market continues to require resistance to ageing for extended service life expectations.

For both food packaging and industrial films, Villeneuve sees a significant trend to ensure a material's performance while downgauging the structure and improving raw material utilisation and the product's overall sustainability profile. This can be achieved by modifying a polymer's architecture, in conjunction with optimisation of the additives package.

"Regulatory and safety elements are also guiding new developments from different angles," adds Villeneuve. "For example, in films for food packaging applications, LLDPE grades are soon going to be reformulated globally without TNPP (tris nonylphenyl phosphite) after a transition period. Another example is in construction films, where flame retardant solutions are optimised in order to improve 'escape time' and smoke density, as well as long-term availability, due to the time and difficulty to get material approvals."

Villeneuve says BASF sees a variety of problem areas requiring new additive solutions. "An interesting example is the development of

IMAGE: BASF

solutions for long-lasting greenhouse covers used to cultivate vegetables in the Mediterranean or similar areas with good growing climates," he says. "Consumers are now demanding healthier food and this is influencing the rapid development of organic farming. However, organic practices are very demanding on the service life of film covers as it changes the type of crop treatments used during cultivation. In order to cope with this, new additives and masterbatches used to protect polyethylene multilayer films have been further developed."

At K2019, for example, BASF introduced Tinuvin NOR 356. This is the latest generation of hindered-amine light stabilisers (HALS) for films and other thin section agricultural plastics exposed to high levels of UV light, heat and contaminants. The company says that Tinuvin NOR 356 is recommended for any PE-based agricultural applications in extensive horticulture exposed to strong UV radiation, heat and agro-chemicals, including sulphur-based compounds and disinfection chemicals. It is based on BASF's NOR technology – a stabilisation system featuring low chemical interaction.

While long lasting performance is a constant focus for best use of greenhouse cover films, BASF adds that its NOR technology has also been studied in an agronomic institute to monitor film performance with regards to crop yield and quality. Both were shown to be improved for crops cultivated under films stabilised with the NOR technology.

Future developments in film additives at BASF will include stabilisation of very high viscosity resins, which are particularly challenging during processing on larger scale converting lines. ›

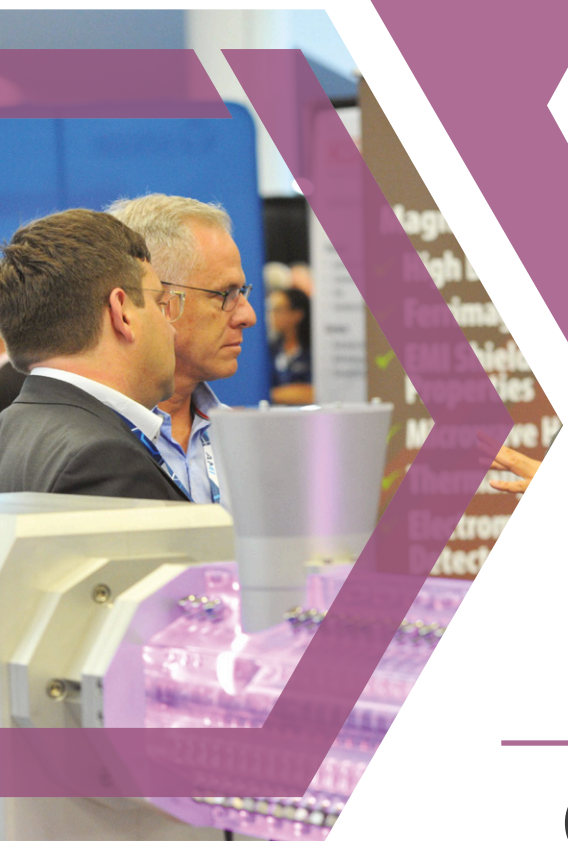

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IMAGE: POLYONE

Right: Additives are enabling mono-layer structures to deliver extended shelf-life and low vapour transmission performance for sensitive products

Long-term thermal and UV resistance will also continue to remain a major focus of development, adapting to ever changing conditions of exposure and environmental contaminants. The company will also support downgauging, closed loop recycling opportunities and regulatory trends.

Switching structures

PolyOne is observing a significant upward trend in the current market for film additives and masterbatches as components used in film production become more homogeneous. "Producers are switching from multilayer films to fewer layers and single materials to facilitate recycling. The recycling stream cannot manage materials such as polyamide in the middle of a multilayer film, so we are seeing producers working on improving the performance of polyolefins and seeking additive solutions to make that happen. They need to change the vapour transmission rates, odour control, meet longer shelf life expectations for fresh packaged meats, filter UV, and a variety of other requirements. Additives are making these goals possible," says William Reynolds, Senior Industry Manager.

"In addition, commitments to the circular economy are now being made by brand owners and OEMs. These commitments require more recycled content in their products. For example, Walmart has created a scoring system for its suppliers' packaging that gives higher scores for recycled materials and reduction of materials. As a result, there is a demand for more recycled materials that perform similarly to virgin resin. We are also evaluating the components in our additives to make sure we are not contaminating the downstream recycling path of the final product," he says.

"The European Union has a good model for recycling, while the US is evaluating what future steps to incorporate to allow for increased recyclability in a period of lower recycling activity. However, there is still no economic incentive or direction around recycling in the US. OEMs are not being penalised, but instead they are stepping up and saying that we need to do something," Reynolds says.

On the technical front, he says that downgauging of plastic films is happening and that additives are required to ensure they perform the same as thicker multilayer films with the same properties for outgassing, odour control and sealing capabilities, all of which is required at a cost that is the same or lower than thicker films.

Marked improvement

Clariant is collaborating with pigment supplier **Merck** and resin producer **SABIC** to develop laser-marking technology and materials to ease the recycling process for flexible polyethylene (LDPE, LLDPE) packaging film. "There is growing demand for clean, high-quality recycled PE," says Chun-Yip Pang, Clariant's Global Product Manager Additive Masterbatches – Laser. "While recycling rates for PE films continues to increase, there are still a number of challenges that need to be overcome. This collaboration is focused on eliminating the printing ink used for tracking, shelf-life, bar codes and other variable information that must be placed on almost any package on the market. Less ink means less contamination when it comes to recycling."

The companies say their collaboration demonstrates a complete supply-chain solution for laser-marking of films. SABIC contributes the polymer technology that delivers the properties required in the film packaging (and can supply circular-certified polymers), laser-sensitive Iriotec pigments and marking expertise is provided by Merck, while Clariant developed the additive masterbatch formulations. Most plastics are transparent to the radiation used in the laser-marking process, so additives are needed to achieve a visible reaction in the film. The visible marks are permanent and resistant to water, oil, grease or fatty foods. They can be applied to the surface of a mono-layer film or to a laser-sensitive

IMAGE: CLARIANT

Right: Clariant has partnered with Merck and SABIC to improve laser marking of flexible packaging materials

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IMAGE: CLARIANT

Above: Clariant's AddWorks PKG 906 Circle supports recycling of polyolefin film manufacturing waste without compromising quality or efficiency

layer placed beneath a laser-transparent surface layer. The additives provide good contrast and allow high-speed marking.

Clariant has also developed AddWorks PKG 906 Circle to improve recycling of polyolefin films. The company says that the addition of this polymer stabiliser allows producers to significantly increase reuse of waste materials in PP and PE films, recycling their own reground scrap without loss of performance or processing efficiency. It is particularly well-suited to BOPP manufacturing but is also applicable to cast and blown film processes.

Using Clariant's Circle additive, the reuse content of post-production waste in the final film can be increased by up to 30%. The additive also protects the resin so that film quality remains excellent with significant reduction of gel formation and prevention of additional yellowing at high line speeds. Clariant adds this polymer stabiliser is its first product to carry the 'Circle' designator, which it introduced to highlight solutions that have been specifically designed to deliver significant benefits to the re-use or recycle process.

Synergistic additions

DuPont Transportation & Advanced Polymers has developed Dow Corning AMB-12235 masterbatch for PE blown film, combining an antiblock agent with a compatible slip additive to improve film processing and improve consistency of quality. The combination is said to provide a synergistic effect that delivers a low coefficient of friction (COF) over an extended period of time. It is also said to help prevent migration to the film surface, which can affect downstream operations, and reduce film blocking at cost-effective low loadings. The masterbatch is approved for food contact in Europe, the US and China.

"This new technology advancement demonstrates our strong commitment to the success of the packaging industry by supplying innovative, silicone-based solutions that help customers achieve seamless throughput, high productivity and consistent quality," says Christophe Paulo, Industrial and Consumer Strategic Marketer EMEA at DuPont. "It helps film makers avoid spending time and effort to calculate the right ratio of antiblock and slip additives by trial and error. It also streamlines handling, storage and management of additive inventories."

DuPont adds that its silicone-based slip additive helps lower the COF of blown film to reduce its resistance to sliding over itself or manufacturing rollers. This improved slip performance – which is stable over time and under high temperatures – contributes to increased production speed, uninterrupted throughput and uniform film quality.

The masterbatch was formulated to ensure compatibility between the antiblocking and slip additives and provide the best ratio of active ingredients. This fine-tuned formulation frees customers from determining which individual additives work well together, and at what loadings. The masterbatch is claimed to be highly efficient at low loadings of 4-6 wt%.

Kafrit has developed antistatic additives with active ingredients from plant-derived ingredients. The new additives include AT 00U11 LD, which is a short or long-term antistatic masterbatch and is active at low humidity levels. AT 04139 LD and AT 04139 PP are also short and long-term antistatic masterbatches that function with PE and PP compatibility respectively.

IMAGE: DUPONT

Right: A candy wrapper manufactured using DuPont Dow Corning AMB-12235 combined slip and antiblock additive masterbatch

The additives are dual use in food products and have no hazardous substance indication. In addition, the additives have good organoleptic properties, without after-odours, so are suitable for packaging odour absorbing food such as milk powder. Dosage in the sheet is not limited by food contact certifications and can be adjusted until the desired result is obtained, the company says. Film applications include preventing dust accumulation in films and air distribution systems, shrink wrap packaging, twist film packaging, and easy handling and

opening of rolls, especially in thin films.

The company has also developed new high-performance antiblock additives for BOPE films. Kafrit says that these 'next generation' films are produced from PE without the need for additional polymer layers. They allow a significant reduction in thickness compared to unstretched film – from 100 to 40 microns – without loss of mechanical properties. The new additives provide the film with improved properties, including a coefficient of friction of less than 0.25 (for a 20 micron thickness) and turbidity (haze) of less than 3%.

In addition, Kafrit has developed antifogging additives for PETG films. These are claimed to provide immediate good results in both cold and hot antifogging tests. Applications include sheets and films used either for agricultural purposes or for food packaging. In agriculture, the additive allows maximum penetration of light into a greenhouse by keeping the sheet transparent and preventing water from dripping from the greenhouse roof onto the plants, which can cause crops to heat and burn when sunlight passes through the water droplets that function as optical lenses. In food applications, the coating serves mostly an aesthetic purpose, allowing the customer a better view of the product by keeping the film transparent or reducing condensation.

Antifogging solutions for polyamide and biodegradable films have also been developed. Kafrit says a new masterbatch has shown good results in layers of PA6 and/or PA copolymer 6/66. The product was developed in collaboration with a leading European polyamide manufacturer. It is approved for food applications and is used for packaging fruit and vegetables, as well as for multi-layer food packaging. A 6% addition level is required. An antifogging masterbatch for biodegradable films is also commercially available. It is suitable for a variety of biodegradable polymers and its recommended usage percentage is 10-15%.

Mineral moves

HPF The Mineral Engineers, a division of Quarzwerke Group, has developed a number of mineral raw material additives for influencing various properties of plastic films and has recently undertaken studies on packaging films requiring good antiblocking and optical properties, as well as agricultural films with high requirements for high

Table 1: Dynamic coefficient of friction (μD) of 50 micron blown packaging film comprised of 0.75MFI PE with 3000ppm of different mineral antiblock additives

Product	Inside against itself	Outside against itself	Inside against stainless steel	Outside against stainless steel
Unfilled	0.48	0.42	0.45	0.40
Trefil 1313-400	0.46	0.45	0.32	0.34
Trefil 1313-600	0.43	0.37	0.22	0.24
Sikron SF 4000	0.46	0.43	0.27	0.31
Microspar 1380-600	0.38	0.38	0.28	0.30
Microspar 1379-300	0.48	0.46	0.28	0.31
Microspar 1379-350	0.46	0.44	0.28	0.29
Microspar 1379-400	0.47	0.40	0.26	0.26
Microspar 1379-600	0.39	0.38	0.32	0.32

Source: HPF The Mineral Engineers

Table 2: IR transmission measurements of 50 micron blown agricultural greenhouse film comprised of 0.75MFI PE with 10% of different mineral additives

Product	Transmission [%]
Unfilled	83.3
Microspar 1380-60	36.0
Microspar 1379-300	37.8
Microspar 1379-350	36.5
Microspar 1379-400	39.7
Microspar 1379-600	34.2

Source: HPF The Mineral Engineers

UV transmission and IR absorption. The additives used are characterised by a refractive index that is almost identical to that of the polyethylene films, resulting in good optical properties. Different particle size distributions also play an important role, especially with antiblocking films.

Trefil 1313-400 and Trefil 1313-600 are finely ground and processed natural anhydrite minerals belonging to the anhydrous sulphates group. Anhydrite has a tabular structure, density of 3.0 g/cm^3, Mohs hardness of 3.5, high whiteness (Y=89) and good transparency.

Sikron SF 4000 is a cristabolite that is synthetically-produced from pure silica at around 1,500°C in a rotary kiln (cristabolite rarely occurs in nature). During this process the lattice structure is widened, which reduces the density and results in a high degree of whiteness. Like silica, cristobalite is chemically inert. It has a blocky structure, density of 2.35 g/cm^3, Mohs hardness of 6.5, high whiteness (Y>94), high chemical resistance and a coefficient of thermal expansion of 54×10^{-6}/K (at 20-300°C).

Microspar 1380 and 1379 feldspars are chemically resistant tectosilicates with thick, plate-like grain morphologies. Using mainly potash feldspar, HPF processes, separates, classifies and finely grinds this material. Properties include a thick tabular structure, density of 2.6 g/cm^3, Mohs hardness of 6, high whiteness (Y>90), high chemical resistance, low refractive index and it behaves transparently in many binder systems.

HPF says that in its study, a 60% polyethylene masterbatch with an MFI of 2.0g/10 min was produced using the different additives. 50 micron thick blown films were produced with an additive concentration of 3000ppm for the antiblocking films and 10% for the agricultural films. The base film polymer was an 0.75 g/10 min MFI (190°C/2.16 kg) grade. Dynamic COF results for the antiblocking films are shown in Table 1. Table 2 shows IR transmission results for the agricultural films, demonstrating improved thermal properties that will reduce energy costs in greenhouse applications. Total transmission in the visible wavelength range is only slightly influenced by the use of the additives, says HPF. However, too much direct light can have a harmful influence on plant growth so a higher proportion of diffused light is a positive, says the company.

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IMAGE: SPECTRO

Polymer analysis adapts to a changing world

New certification requirements, tougher environmental and regulatory regimes, and the growth of Cloud-based data are just some factors playing out in the area of polymer analysis, writes Jennifer Markarian

The plastics industry is changing and so is the world of polymer analysis. The use of more recycled polymers, the growing application of in-line measurement, the emergence of artificial intelligence and predictive analytics, ever increasing levels of testing to assure regulatory compliance and the expanding use of laboratory automation along with digitalisation and the shift to paperless and Cloud-based systems are just a few of the trends to watch. With an eye on these changes, analytical equipment suppliers are harnessing the availability of increased data analysis computing power, connectivity and user-friendly "apps" to introduce new and more effective solutions for polymer analysis.

With compounding and use of recycled materials growing, and these re-engineered materials being applied in ever more demanding applications, producers in this segment of the market increasingly need to measure properties and provide certificates of analysis (CoAs). "Consumer product companies using more recyclate want better quality and more data ensuring quality," according to Bill Desrosiers, Vice-President of Business Development at sensor and polymer testing group **Dynisco**. "Recyclers should measure the melt flow rate or intrinsic viscosity (IV) of their polymers."

In part a consequence of this trend, Desrosiers says the company is seeing "a demographic shift in the industry, with an influx of processors who are not familiar with polymer testing." In response, it has aimed to make its advanced melt testing equipment more accessible, with calculations performed in the background and simple

Main image: Analysis technology companies such as Spectro are placing a lot of emphasis on development of software to simplify operation and streamline workflows

IMAGE: AGILENT TECHNOLOGIES

Right: The new Agilent 5800 and 5900 systems provide a range of smart capabilities to simplify analysis of samples, processes, and operational status

interfaces that look similar to traditional, basic lab equipment. Familiar features enhance the comfort level for new users, Desrosiers explains.

In-line measurement systems also benefit compounders using regrind or post-consumer recyclate, which can vary significantly. Dynisco offers several instruments for in-line and on-line melt-flow measurement, for example. "On-line measurement data gives a full picture and allows you to make process decisions in real-time," says Desrosiers.

Intelligent instruments

"Intelligent" instruments can guide users through an analysis, reducing the level of expertise needed. For example, **Agilent Technologies**' latest generation ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometer) systems for elemental analysis incorporate sensors linked to software tools, such as the IntelliQuant feature that collects data from the entire wavelength range, identifies spectral interferences and provides recommendations to the analyst.

Other smart algorithms available in the 5800 and 5900 ICP-OES systems include tools for background correction and curve-fitting and that use data analytics to automate troubleshooting and to assist with method development. In addition, the instruments incorporate sensors and software that track instrument health and alert users when maintenance is required. For example, a Neb Alert feature continuously monitors the nebulizer and alerts the operator when it needs cleaning or is leaking. In the polymers industry, ICP-OES can be used for effectively quantifying and identifying trace elements (for example metals such as zinc that may be components of additives in compounds).

Below: Agilent's HT-ELSD detector for high-temperature GPC is said to provide reliable polymer molecular weight characterisation

IMAGE: AGILENT TECHNOLOGIES

Together with molecular weight (MW), molecular weight distribution is a critical polymer property that can affect processability and end-use properties. MWD can be measured using gel-permeation chromatography (GPC) and size exclusion chromatography (SEC). Agilent's High Temperature Evaporative Light-scattering Detector (HT-ELSD) for high-temperature GPC does not depend on MW and is now linear as a function of concentration; its signal is not dependent on MWD or the type of polymer, so the benefits of increased sensitivity can be used to generate reliable molecular weight characterisations for a range of high temperature soluble polymers, the company says.

The system provides a fast set-up time of one hour, compared to several hours for a typical conventional differential refractive index detector (DRI). Initial tests of the ELSD show a higher signal to noise compared to DRI, which allows for better reproducibility of MWD. This is especially useful for analysis of ultra-high density polyethylene (UHDPE), where sensitivity is problematic using conventional detectors. In addition, the system offers greater flexibility in solvent selection. And solvent gradients can be run at elevated temperatures, enabling the detector to be used for more advanced techniques.

Familiar looks

Spectro's ICP Analyzer Pro software, introduced in 2018 for the company's latest ICP-OES models, features a familiar interface that is claimed to simplify use for inexperienced operators. Features include displays that show only essential information and require minimal mouse movements. Workflows are streamlined, but data processing is even faster than in previous versions, the company claims.

An X-ray fluorescence (XRF) spectrometer is a suitable instrument for identification of materials and detection of additives ranging from large quantities down to trace levels. Instruments are available as handheld, portable, and benchtop units and are suitable for both screening and process control. In polymer compounding processes, a typical application for XRF could be to measure fillers, pigments, flame retardants, and stabilisers, according to Dirk Wissmann, Senior Product

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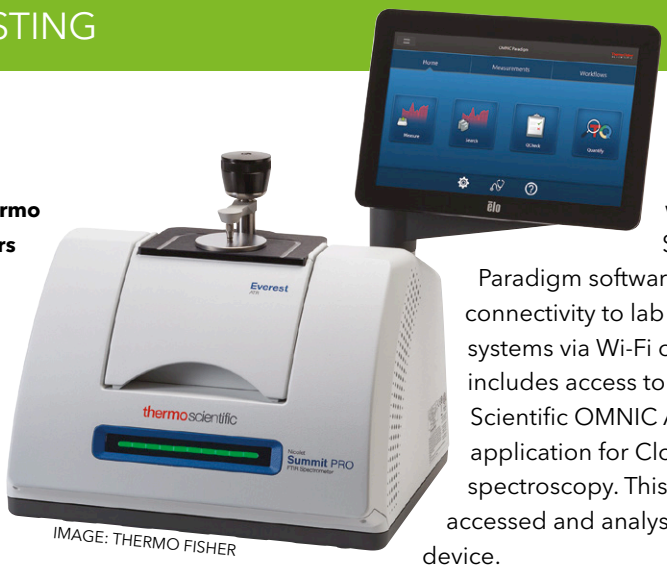

IMAGE: THERMO FISHER

Right: The Nicolet Summit iS50 FTIR from Thermo Fisher, shown with optional touchscreen, offers enhanced software tools and improved connectivity

Manager at Spectro Analytical Instruments, which is part of Ametek's Materials Analysis Division.

XRF can also be used to test materials for compliance with regulatory requirements—it can be used to identify and quantify heavy metals, such as lead, chromium, and cadmium, for example. Wissmann says the technique can also be used to identify and analyse particles on a polymer surface for troubleshooting investigations.

Material identification

Identifying materials and components in materials is important for quality control, product development, and troubleshooting or failure analysis. Fourier transform infrared (FTIR) spectroscopy is commonly used for material identification and analysing materials in blends. "FTIR is useful partly because it is fast—no sample preparation is needed, just put a piece of material on an ATR crystal of the analyser and you can have an analysis in less than a minute," says Michael Bradley, **Thermo Fisher** Product Manager for Nicolet iS50 and FT-IR Microscopes. He says that for polymer compounds and blends, FTIR can provide both qualitative results (identifying polymers and additives) and, once calibrated, quantitative results.

The latest Fisher Scientific Nicolet Summit iS50 FTIR spectrometer provides tools not available on the previous iS5 version, the company claims. The new instrument includes an integrated computer with Thermo Scientific OMNIC Paradigm software that provides connectivity to lab data management systems via Wi-Fi or Ethernet. It also includes access to the Thermo Scientific OMNIC Anywhere application for Cloud-based spectroscopy. This allows data to be accessed and analysed securely on any device.

"Users are looking for the ability to analyse data in the Cloud and even, in some cases, operate the instrument from the Cloud," says Bradley. As an example, he says a central lab may perform method development for global sites and use Cloud access to allow them to manage instruments more efficiently. In addition, service providers can access instruments remotely to undertake troubleshooting or software updates.

The OMNIC software allows users to build workflows easily by dragging and dropping workflow tiles, while an optional touchscreen simplifies the execution of workflows. A dashboard on the interface allows users to create libraries, automate background collection and perform multi-component searching. "Because labs are running increasingly lean, instruments need to be able to be quickly embedded into a workflow and be operated by scientists who are not spectroscopists. There is still a need for expertise in spectroscopy, but the trend is to move to automated pattern recognition for common analyses," says Bradley. Pre-programmed workflows can be designed, for example, to run a method to identify and quantify plasticiser concentration.

Another new feature is a built-in, multi-coloured LED LightBar that gives users immediate visual feedback on instrument status and sample pass/fail results. Having multiple signals, such as this visual indicator in addition to the data on the screen, is a best practice in graphical user interfaces, says Bradley.

Raman spectroscopy offers a complementary technique to FTIR for polymer compound analysis, according to Bradley. Because it is more complex, it is more typically used for qualitative analysis for research and development purposes, rather than quality control. Thermo Fisher has introduced a next-generation family of Raman analysis instruments that includes the Thermo Scientific DXR3xi Raman Imaging Microscope, the Thermo Scientific DXR3 Raman Microscope and the Thermo Scientific DXR3 SmartRaman Spectrometer.

While FTIR looks only at the surface, Raman can

Below: Thermo Fisher's latest generation DXR3xi Raman Imaging Microscope in a lab setting

IMAGE: THERMO FISHER

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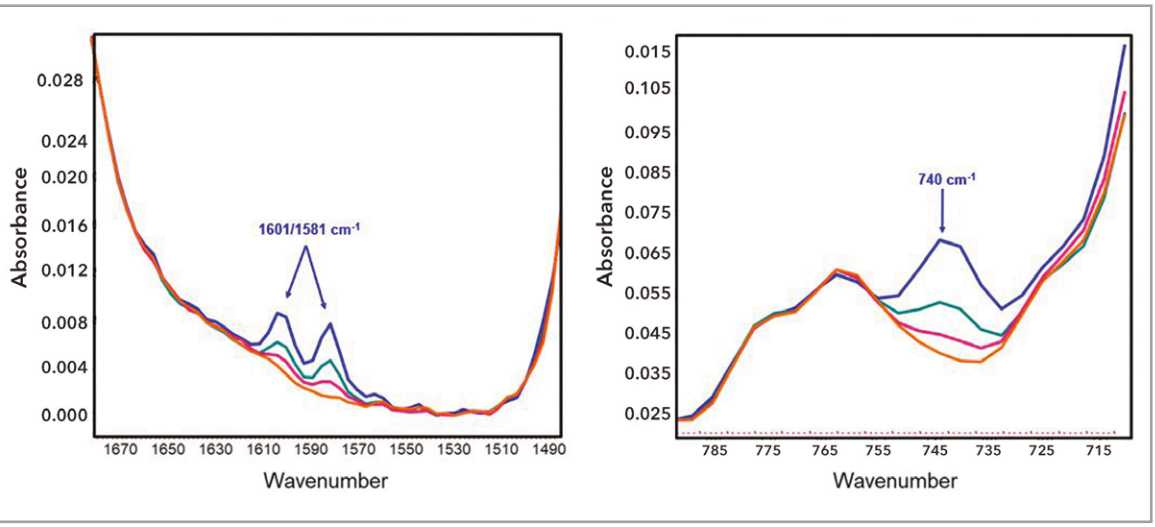

Chemometric analysis of the presence of different plasticisers in PVC using the Agilent 4500 FTIR and method developed by Actus Analytical

Source: Actus Analytical

see deeper inside a polymer material if the material is transparent to the laser. "Using confocal depth profiling, you can take a series of Raman spectra through the material and then visualiae the image in three dimensions," explains Bradley. This technique can be used, for example, to examine fiber or filler dispersion through the bulk polymer.

Phthalate analysis

It is becoming increasingly important today to be able to measure and document the absence of chemicals of concern. Phthalate-based plasticicers, for instance, have been commonly used in flexible PVC but concerns about orthophthalates have led to regulatory restrictions, leading to the need to be able to identify their presence. **Actus Analytical** has developed an FTIR method to screen polymer samples and detect orthophthalate plasticiser down to levels of 0.1% (1000 ppm), according to Michael Gray, CEO of Actus Analytical.

The method is positioned as a quality control tool to allow processors to quickly determine whether or not a sample contains an orthophthalate. FTIR is well suited for such quality control tasks, Gray says, because it is a non-destructive, simple, and inexpensive test that gives immediate results. In addition, the chemometric model allows its use by non-technical personnel. The technique was developed for the Agilent 4500 FTIR, which he says is very well suited to the task due to its power and patented permanent calibration.

"There are approximately 21 orthophthalates, but only 10 of these have ever been made in significant volumes, five to eight of which are banned by various regulations," says Gray. The Actus method takes an FTIR spectrum and looks for characteristic vibrational responses of an orthophthalate within the sample, using chemometric modeling with algorithms that compare the spectra to reference libraries. "Because we can detect below 1000ppm, which is the legal limit in restricted cases, we don't have any 'false negatives'—if no orthophthalate is detected then it contains no orthophthalate," says Gray.

The method can distinguish between orthophthalates and other phthalates (terephthalates or isophthalates, for example) as well as other classes of plasticisers (including adipates and citrates). While FTIR can quantify the level of orthophthalate, it cannot distinguish between different types of orthophthalates (the speciation). However, screening with FTIR allows analysts to determine what samples may need further testing by gas chromatography (GC)-mass spectrometry (MS), if desired, to determine which of the orthophthalates is present and to affirm their concentration.

Paperless laboratories

Digitisation—the move from paper to digital data—takes effort but offers the potential for reduced error, improved data security, automation, and higher efficiency.

Anton Paar has introduced AP Connect, which connects all laboratory devices to one software system that serves as the main data link for transferring lab data to a central database and data management system. The software supports all the company's devices, including viscometers and dynamic-mechanical analysis (DMA) devices, as well as selected third-party devices.

Automated testing equipment is more accurate and efficient than manual methods. For example, robotic testing equipment and software program from **LabsCubed** automatically collects and analyses physical property data from sets of samples. The automated program can be used to speed material development by making testing, data collection, and data analysis more efficient,

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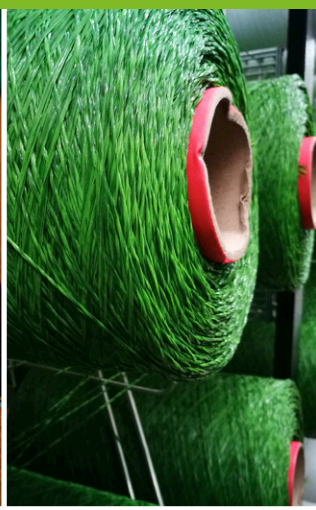

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IMAGE: MALVERN PANALYTICAL

Above: University of Bristol Pro-Vice Chancellor John Iredale (left) and Malvern Panalytical President Paolo Carmassi seal a partnership to explore advanced digital technologies and AI tools

according to Khaled Boqaileh, CEO of LabsCubed, in a presentation given at AMI's 2019 Polymer Testing & Analysis conference.

The company's CubeOne tensile tester uses a robotic arm to automatically load and unload samples, while "smart grips" ensure consistent testing. It claims that testing is four times more accurate and twenty times faster than manual tensile testing methods.

Molecular fingerprints

Raman spectroscopy is a light-based technique that can be used to "fingerprint" materials and to understand chemical bonds and molecular structure. **TA Instruments**, a subsidiary of Waters Corporation, has introduced the Rheo-Raman Accessory for its Discovery Hybrid Rheometer (DHR) product line to enable simultaneous collection of rheology (flow properties) and Raman spectroscopy data. This combination helps to develop "a deeper understanding of how chemical structure drives material properties, and how macroscopic deformations can have implications at the molecular level," says the company.

The Discovery TMA 450 Thermomechanical Analyzer from TA Instruments measures dimensional changes of materials from -150 to 1000°C. Sample configurations allow testing in expansion, compression, flexure and tension modes. The instrument can measure a material's coefficient of linear thermal expansion (CTE), shrinkage, softening, and glass transition temperatures. Test options also include stiffness (modulus), damping properties, and creep and stress relaxation over extended experimental time.

For applications where fatigue resistance is important, TA Instruments has launched two new fatigue-testing instruments that both use a patented, frictionless motor to provide the durability needed for high-cycle testing. Fatigue testing of material specimens or final assemblies uses repetitive stress and strain to determine point of failure. The ElectroForce 3300 Series III offers controlled stress and strain up to 100Hz loading frequency and can be configured with either 1000N or 3000N force capacity. The MSF16 Multi-Specimen Fatigue Instrument can measure 16 samples at a time, which helps to accelerate time-consuming testing.

Atomic force microscopy (AFM) is useful for analysing the structure and properties of polymers. A new instrument from Oxford Instruments' **Asylum Research**, the Jupiter XR AFM, is a large-sample AFM with 200mm sample access and simple software control for R&D duties. The company has also launched the new Ergo software platform for its AFMs. This uses a simplified user interface that is said to make analysis more accessible and uses algorithms to automatically calculate optimal image settings.

Artificial intelligence

The ability to use advanced data analytics and artificial intelligence (AI) to solve problems is advancing rapidly and the polymer analysis equipment of the near future is likely to take advantage of these tools. Uses of predictive analytics could range from predicting analysis equipment health to using large data sets to build models to model behavior of polymer compounds. Last year, **Malvern Panalytical** and the University of Bristol announced a partnership that will focus on areas such as data analytics, machine learning, and AI. Malvern Panalytical also opened its Data Science Hub at Engine Shed, which is an innovation space run by the University. The two partners expect their collaboration to both enhance the future workforce and expand the company's capabilities.

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AMI's Plastics Regulations conference takes place in Cologne in March, covering everything from food contact and chemical regulation through to the single-use plastics directive. We preview the event

IMAGE: SHUTTERSTOCK

Keep in touch with regulation

AMI's fourth Plastics Regulations EU conference takes place on 11-12 March in Cologne, Germany, providing a valuable opportunity to gain focused advice on a range of legal and compliance issues impacting on polymer producers, compounders, processors and end users. Bringing together a wide variety of leading legal experts, the conference presents a cost and time efficient way to future-proof your business by making sure you are aware of changing and developing regulations.

This year's event will be preceded by a standalone pre-conference Brexit workshop that will explain the potential regulatory and trading implications of the UK's departure for UK, EU and non-EU companies. See the box on the following page for more information on the expert speakers and content or click **here**.

Plastics Regulations 2020 will open with a global regulatory update on the plastics economy, which will be presented by **Peter Sellar**, Partner at **FieldFisher** in Belgium. This will be followed by an overview of international economic sanctions presented by **Siegfried Richter**, Policy Officer at the **European Commission**. Then **Bonita Reynolds**, Senior Director Authoring Services at **Verisk 3E** in the US, will speak about the US Toxic Substances Control Act (TSCA) and achieving compliance for plastics.

Recycling issues

It would be difficult to underplay the importance of recycling and waste regulations in today's business environment. **Joachim Quoden**, Lawyer at **Law Firm Joachim Quoden** in Germany, will provide a perspective on the impact of the initiatives and tools being used to build the circular economy. Then **Luke Douglas-Home**, Managing Director of **Clear Public Space** in the UK, will share details of a study highlighting differences in plastic packaging regulations across EU member states (and the UK).

The next session will turn to the topic of REACH. **Marcus Navin-Jones**, a Partner at **Keller and Heckman** in Belgium, will ask whether REACH authorisation is becoming a barrier to recycling and re-use of plastics. **Dr Frank Friedel**, Senior Chemicals and REACH Consultant at **TSG Consulting** in the UK, will give an overview of the Single-Use Plastics Directive and the REACH regulation. And **Filippo Mattioli**, an Associate at **Steptoe & Johnson** in Belgium, will cover

Main image: AMI's fourth European Plastics Regulations conference will update on food contact, packaging and recycling regulations

Thermoplastic Concentrates

2020

Discovering new trends for the thermoplastic concentrate industry

January 28-30, 2020
Ft. Lauderdale Marriott Coral Springs Golf Resort, Coral Springs, Florida, USA

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microplastics and the moves towards REACH restriction.

The final session of the first day looks at sustainability issues. It will be opened by **Dr Gary Ogden**, Technical Manager at **Wells Plastics** in the UK, who will discuss regulations and standards covering oxo-degradable plastics. Regulations applicable to plant-based additives for plastic food contact materials will be explored by **Job Ridderbecks**, Food Contact Technical Specialist at **Intertek** in Germany. Then **Ines Zitterbart**, Senior Regulatory Consultant at **Yordas Group** in Germany will bring the day to a close with an explanation of the challenges and misconceptions relating to biodegradable plastics.

Expert discussions

The second day of Plastics Regulations will open with a panel discussion exploring the outcome of the EU framework review and the implications it holds for the plastics industry. Expert participants will include: **Marcel Bosma**, Regulatory Expert at **SABIC** in the Netherlands; **Dr Peter Oldring**, Manager Regulatory Affairs – Europe at **Sherwin Williams** in the UK; and **Dr Anna Gergely**, Director EHS Regulatory at **Steptoe & Johnson** in Belgium.

The conference then turns to discuss the challenging topic of non-intentionally added substances (NIAS). **Dr Stamatios Stamenitis**, Senior Principal Scientist SRA at **Mars** in Germany, will open the session with an overview of what is happening in Europe in this area. NIAS testing, database implementation and post-run evaluations will be detailed by **Dr Marinella Vitulli**, Technical and General Manager at the **Food Contact Center** in Italy. And **Dr Christian Kirchnawy**, Team Leader at the **OFI Austrian Research Institute** will talk through safety assessment of food contact materials, including the value and limitations of in-vitro bioassays.

Registration of food contact resins and additives in China will be covered by **Ran Liu**, Regulatory Consultant at **CIRS Group** in Ireland. Then **Dr Ralph Derra**, Managing Director of **ISEGA** in Germany, will share some new developments in test methods for plastics in contact with food.

The final session of Plastics Regulations 2020 looks at regulation of specific additives. **Alfred Voskian** and **Jytte Syska**, both Consultants at **Syska Voskian Consulting** and based in the US and Denmark respectively, will outline the current state of play on pigments used in plastics. And **Mark Carpels**, Environment Product safety and CSR at **Campine** in Belgium, will discuss the impact of REACH on antimony and other metals.

Brexit – find out what it will mean for you

The UK's departure from the EU will have far-reaching consequences for many companies. And those consequences are not restricted to EU and UK firms; they will also affect companies from outside the EU that have, until now, used a UK subsidiary or representative to access the European market.

With this in mind, AMI has assembled a special one-day Brexit Workshop that will highlight the legal implications of Brexit and their potential impact on businesses trading from or to the EU, UK and other global locations. Taking place one day before Plastics Regulations 2020 on 10 March 2020, the event will be run by three experts on international trade and regulation: **Paul Ashford**, Managing Director of **Anthesis-Caleb** in the UK; **Simon Tilling**, Partner at **Burges Salmon** in the UK; **Dr Anna Gergely**, Director EHS Regulatory at Steptoe & Johnson in Belgium.

Each host will run a session looking at the impact of Brexit from different perspectives, allowing attendees to build a picture of the potential risks it entails and to formulate a readiness strategy. The workshop will be broken up with round table discussion periods moderated by the workshop hosts.

Find out more and book your place **here**.

Learn about Plastics Regulations 2020

AMI's fourth Plastics Regulations Europe takes place on 11-12 March 2020 at the Pullman Cologne Hotel in Cologne, Germany. It will be preceded by a special one-day Brexit Workshop on 10 March 2020 (see the box above or click **here**).

The conference will bring together a selection of expert speakers to detail the latest regulatory developments impacting on the plastics industry, from chemicals and food contact through to recycling and single-use packaging. Aside from the formal presentations, it will provide extensive networking opportunities during the break-out sessions and complimentary cocktail reception.

To find out more, contact the conference organiser, Emily Nicholson. Email: **emily.nicholson@ami.international** *Tel: +44 (0) 117 314 8111*. Or visit the **conference website**

Plastics Regulations 2020 is CPD accredited and will count as 11.5 hours towards your CPD record.

The CPD Standards Office
CPD PROVIDER: 41162
2019-2020
www.cpdstandards.com
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LSR Innovations

Düsseldorf / 2020

Exploring the fast-developing market for LSR components

4 - 5 March 2020
Crowne Plaza, Düsseldorf - Neuss, Germany

Image courtesy of RICO GROUP GmbH

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Injection WORLD

Download these new product brochures

Simply click on the brochure cover or link to download a PDF to your PC or smartphone

KK KOMPOUNDING: COMPOUNDS

This 16-page brochure details the compounding capabilities of India's KK Kompounding Tech Giant (Technovinyl Polymers), which produces a variety of TPEs and TPVs, TPU alloys, engineered PP compounds and halogen-free cable compounds.

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COPERION: PELLETISING SYSTEMS

The Pelletising technology division of Coperion manufactures a full range of strand pelletising 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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BUSS: COMPEO KNEADER

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

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LEISTRITZ: MASTERBATCH SYSTEMS

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

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POLIMER TEKNIK: POEX EXTRUDERS

Polimer Teknik's POEX range of co-rotating twin screw extruders are versatile machines suitable for processing compounds ranging from ETPs to TPEs, as well as colour and additive masterbatches. This brochure details the key features.

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GALOMB: MIX-MOLDER SYSTEM

Mix-Molder is a hand-operated plastics mixing and injection moulding machine from Galomb that allows production of small prototypes and plastic test specimens. Find out more in this six-page brochure.

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

Learn more about AMI's upcoming conferences

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

THERMOPLASTIC CONCENTRATES 2020

Now in its 23rd year, Thermoplastic Concentrates is the learning and networking destination for the North American concentrates (masterbatch) market. The 2020 event takes place in Ft Lauderdale, Florida, USA, on 28-30 January 2020.

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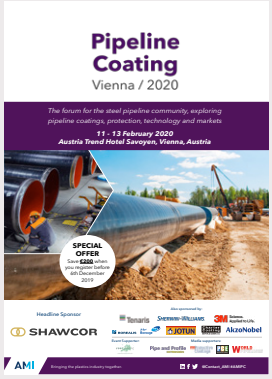
PIPELINE COATING 2020



AMI's 12th Pipeline Coating conference takes place in Vienna in Austria on 11-13 February 2020. This well-established international conference examines the latest developments in pipe coating materials and application technology.

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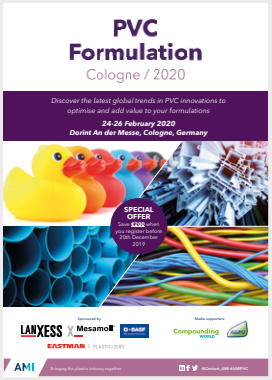
PVC FORMULATION EUROPE



Taking place in Cologne, Germany, on 24-26 February 2020, AMI's 12th PVC Formulation conference will expose the global trends influencing the flexible and rigid PVC industry and explore regulation, additives, materials and processing.

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MASTERBATCH ASIA

The 16th Masterbatch Asia conference takes place in Bangkok in Thailand on 3-5 March 2020. Returning to its three-day format, the conference will examine the challenges and opportunities for the industry in this demanding regional market.

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CABLES 2020

AMI's 20th Cables conference takes place on 3-5 March 2020 in Dusseldorf, Germany, providing a forum to learn about the latest materials, testing procedures, regulatory requirements and cable manufacturing processes and applications.

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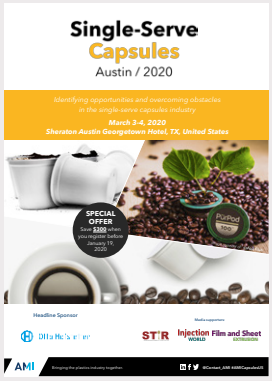
SINGLE-SERVE CAPSULES USA



The 3rd edition of AMI's international Single-Serve Capsules conference in North America, on March 3-4, 2020 in Austin, Texas, brings together industry-elite speakers to evaluate and discuss the trends, challenges and opportunities facing the sector.

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To see our full line-up of more than 50 plastics industry events over the next 12 months, please visit www.ami.international/events

Learn more about AMI's upcoming conferences

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

LSR INNOVATIONS

AMI's LSR Innovations conference returns to Neuss, near Dusseldorf, in Germany on 4-5 March 2020. The event brings together materials and processing technology experts, processors and end-users to explore the latest LSR solutions and trends.

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PLASTICS REGULATIONS EU

The 4th edition of Plastics Regulations provides advice on a range of compliance issues at one event. The event takes place on 11-12 March 2020 in Cologne, Germany. The conference provides an ideal environment for regulatory updates.

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GRASS YARN & TUFTERS FORUM

The 14th edition of AMI's Grass Yarn & Tufters Forum takes place in Barcelona in Spain on 23-25 March 2020. The event examines technical and commercial developments shaping the future for the synthetic turf industry.

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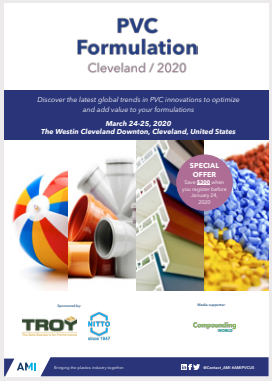
PVC FORMULATION USA



The 2020 edition of AMI's North American PVC Formulation conference will be held in Cleveland, Ohio, USA, on 24-25 March 2020, providing a forum for formulators, compounders and suppliers to identify future material and processing trends.

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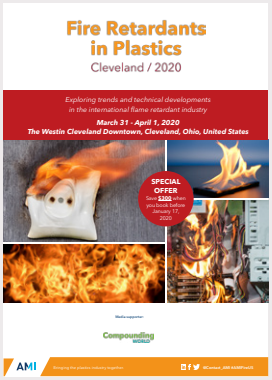
FIRE RETARDANTS IN PLASTICS



The 10th edition of AMI's Fire Retardants in Plastics conference moves to Cleveland, Ohio, USA. Taking place on 31 March-1 April, the event explores the regulatory and technical developments shaping the North American fire retardants market.

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POLYMERS IN FOOTWEAR USA

The second edition of AMI's North American Polymers in Footwear conference takes place in Portland, OR, USA, on 7-8 April 2020, presenting a comprehensive analysis of the latest advances in footwear materials and processing technologies.

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Sumika Polymer Compounds Europe

Head office location:	Havant, UK
Managing Director:	Dr T Kitayama
Ownership:	Sumitomo Chemical Company, Japan
Sales 2018:	€102m
Capacity 2019:	Around 90,000 tonnes
Plant locations:	UK, France, India and Turkey
Profile:	Sumika Polymer Compounds Europe (Sumika) is part of the global Japanese Sumitomo Chemical group of companies. Its production plant at Havant in the UK began manufacturing in the 1950s and its French operation at St Martin de Crau in the 1970s. The two operations were integrated into the Sumika network in 2007. Sumika set up a manufacturing operation in India in 2014 and inJune 2019 moved into the Turkish market with the acquisition of polypropylene compounding group Emaş. With three compounding plants, Emaş holds a strong position in the Turkish compounding market.
Product line:	Sumika offers a wide range of thermoplastic compounds and polyolefin-based elastomers. Applications particularly suited to Sumika compounds are those designed for high performance, specifically in automotive and electrical goods.
Product strengths:	Sumika is a specialist in high performance polypropylene short glass fibre reinforced PP compounds, including the Thermofil line that it introduced in 2012. The latest addition to the Thermofil product line is a number of low emission and low odour grades. The company also offers a range of TPEs under the Espolex name aimed at meeting the aesthetic demands of car makers.

Compounding WORLD FORTHCOMING FEATURES

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

February	**March**
Electrically conductive compounds	Twin-screw extruders
Energy management	Odour and emissions
Additives for polyamides	Long-fibre thermoplastics
Surface modification	Process simulation

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

For information on advertising in these issues, please contact:
Claire Bishop: claire.bishop@ami.international Tel: +44 (0)1732 682948
Levent Tounjer: levent.tounjer@ami.international Tel: +44 (0)117 314 8183

Keep informed: read our latest editions

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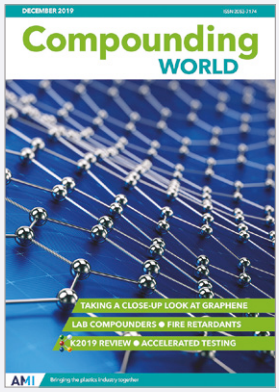

Compounding World December 2019
The December edition of Compounding World looked at the potential opportunities for graphene in plastics. It also reviewed the latest developments in flame retardants, laboratory compounding and weather testing.

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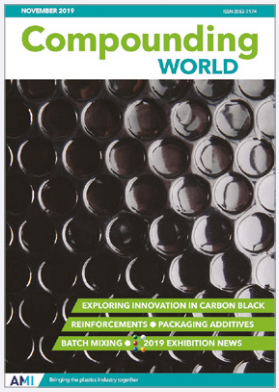

Compounding World November 2019
The November edition of Compounding World looks at the sustainability drive in carbon black production, delves into the world of mixing technology and surveys the latest in polymer reinforcements and packaging additives. Plus: news from K2019.

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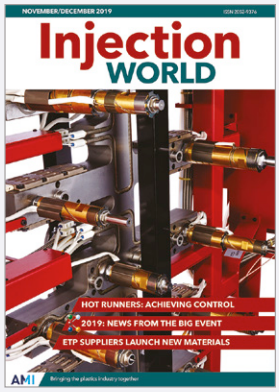

Injection World November/December 2019
The November/December edition of Injection World takes explores new developments in hot runners and engineering thermoplastics. It also examines some of the latest automotive applications and details innovations on show at K2019.

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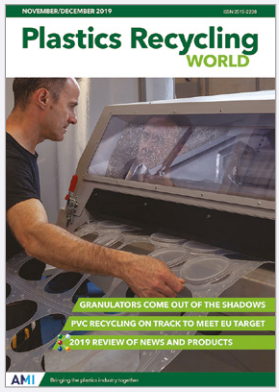

Plastics Recycling World November/December 2019
The November-December issue of Plastics Recycling World explores the growing importance of granulators, updates on PVC recycling and reviews the recycling highlights of the K2019 show.

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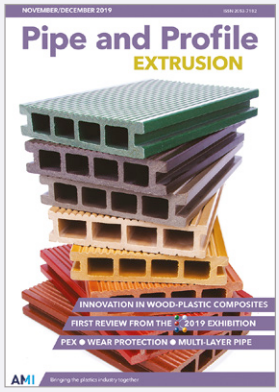

Pipe and Profile November/December 2019
The November issue of Pipe and Profile Extrusion surveys the latest developments in wood-plastic composites, multi-layer pipes and PEX pipes and investigates methods for reducing wear in extruder screws and barrels. Plus news from K2019.

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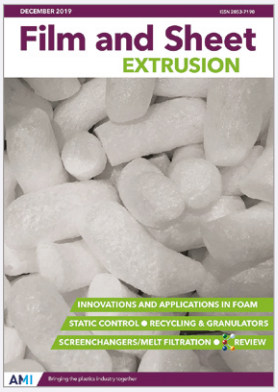

Film and Sheet December 2019
The December 2019 edition of Film and Sheet Extrusion looks at the latest developments in foamed sheet. It also reviews new introductions in melt filtration, static charge control and granulation equipment, plus some of the best from K2019.

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Compounding WORLD
Film and Sheet EXTRUSION
Pipe and Profile EXTRUSION
Injection WORLD
Plastics Recycling WORLD

GLOBAL EXHIBITION GUIDE

2020	**28-31 January**	Interplastica, Moscow, Russia	www.interplastica.de
	3-5 March	JEC World, Paris, France	www.jec-world.events
	9-11 March	Plast Alger, Algiers, Algeria	www.plastalger.com
	11-12 March	PlastExpo Nordic, Helsinki, Finland	www.plastexpo.fi
	11-13 March	Expo Plasticos, Guadalajara, Mexico	www.expoplasticos.com.mx
	21-24 April	Chinaplas, Shanghai, China	www.chinaplasonline.com
	7-13 May	Interpack, Dusseldorf, Germany	www.interpack.com
	19-22 May	Plastpol, Kielce, Poland	www.targikielce.pl
	3-4 June	Compounding World Expo Europe, Essen, Germany	www.compoundingworldexpo.com/eu/
	8-11 June	Argenplas, Buenos Aires, Argentina	www.argenplas.com.ar
	29 Sep-1 Oct	Interplas, Birmingham, UK	www.interplasuk.com
	13-17 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
	4-5 November	Compounding World Expo USA, Cleveland, USA	www.compoundingworldexpo.com/na/
	8-11 November	Pack Expo, Chicago, USA	www.packexpointernational.com
	23-26 November	All4Pack, Paris, France	www.all4pack.com
2021	**4-7 May**	Plast 2021, Milan, Italy	www.plastonline.org/en
	17-21 May	NPE 2021	www.npe.org

AMI CONFERENCES

28-30 January 2020	Thermoplastic Concentrates, Ft Lauderdale, FL, US
11-13 February 2020	Pipeline Coating 2020, Vienna, Austria
24-26 February 2020	PVC Formulation Europe, Cologne, Germany
3-4 March 2020	Single-Serve Capsules USA, Austin, TX, USA
3-5 March 2020	Masterbatch Asia, Bangkok, Thailand
3-5 March 2020	Cables 2020, Dusseldorf, Germany
11-12 March 2020	Plastics Regulations Europe, Cologne, Germany
24-25 March 2020	PVC Formulation USA, Cleveland, OH, USA
31 March-1 April	Fire Retardants in Plastics, Cleveland, OH, USA

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

www.ami.international