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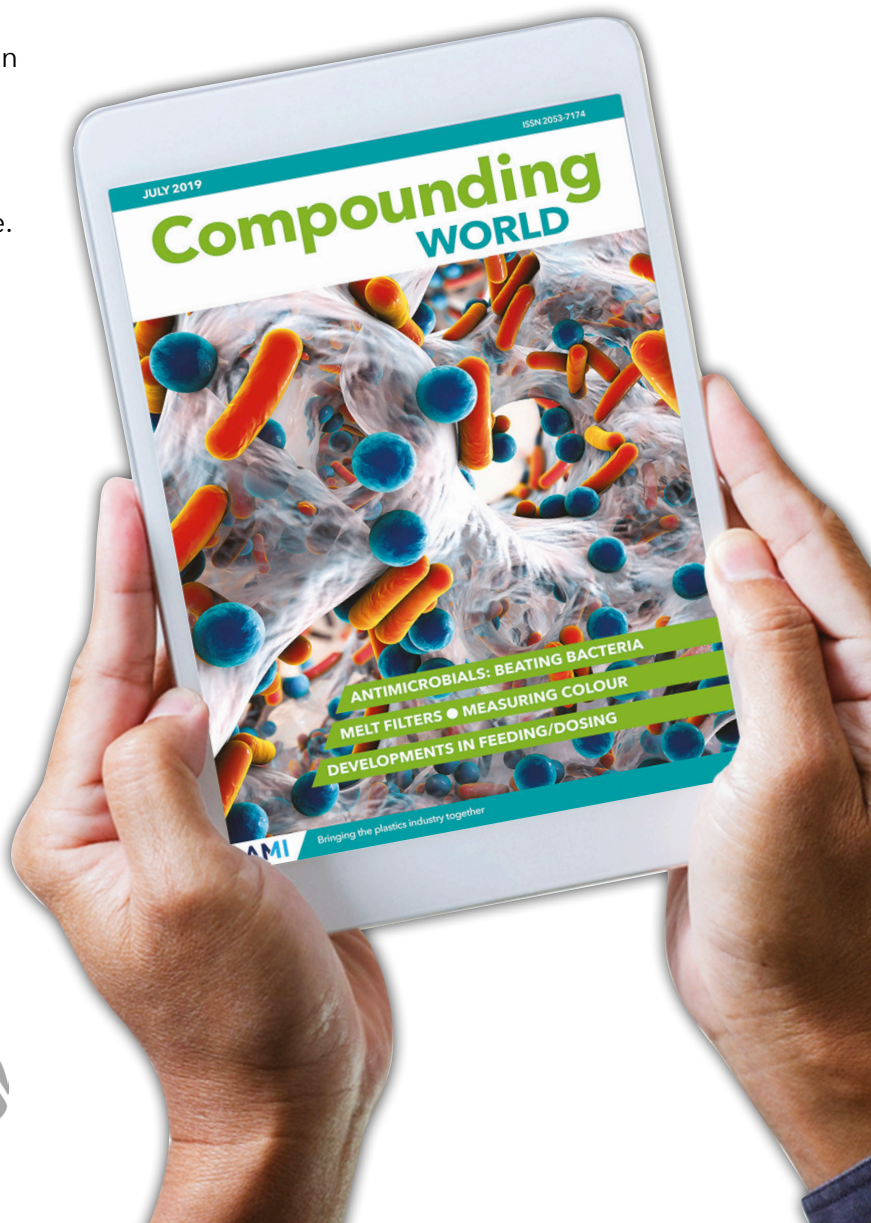
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5 News

15 Getting more from pigments

Producers of pigments are meeting tighter regulatory requirements while addressing wider sustainability issues.

25 Building better bioplastics

Pricing and performance issues mean bioplastics are not yet drop-in replacements for traditional polymers. Compounding and additive developments aim to change that.

35 Low shear mixing of PLA

Natureworks has been working with Farrel Pomini to develop low-shear compounding options for its PLA bioplastics.

39 Sustainable waxes for bioplastics

Clariant's Licocare range of rice bran-derived ester waxes provide a renewable processing aid option.

43 K2019 Preview: Materials and additives

We take a look at some of the material and additive innovations that will be on display for compounders at next month's K exhibition in Dusseldorf, Germany.

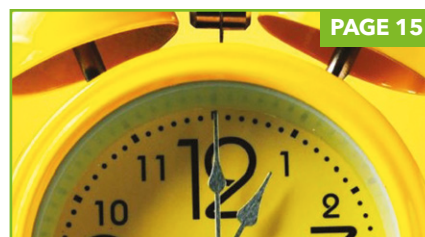
69 Purge your cleaning problems

Specialised purging compounds tailored to the compounding task can provide significant benefits in uptime and efficiency.

83 Pushing the limits in stabilisation

Antioxidant producers are enhancing their products to meet new challenges.

102 Diary



PAGE 15



PAGE 25



PAGE 43



PAGE 69



PAGE 83

COMING NEXT ISSUE

› TiO₂ › 3D print › Alternative compounders › Recycling additives › K2019 Preview: Machinery

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Oxoplast.com/en/plasticizers/adoflex

GRUPA
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Domo to acquire Solvay's PA business in Europe

Domo Chemicals is to buy the European part of Solvay's Performance Polyamides business. The move satisfies the European Commission's requirements for approval of BASF's acquisition of Solvay's global PA business, originally announced back in 2017, leaving it able to move ahead with activities outside of Europe. The deals are expected to close by the end of 2019.

The European business to be acquired by Domo, for about €300m, includes engineering plastics operations in France and Poland, a high performance fibres operation in France, and polymers and intermediates operations in France, Spain and Poland. The move will increase Domo's annual turnover from about €900m to €1.6bn, with capabilities in both PA6 and PA66.

PHOTO: DOMO CHEMICALS



Domo's move allows BASF/Solvay PA deal to go ahead

The business being acquired by BASF, for about €1.3bn, includes eight production sites in Germany, France, China, India, South Korea, Brazil and Mexico, three R&D centres in South Korea, China and Brazil, and six technical consultation centres in Asia and the Americas, plus Solvay's 50% share in Butachimie's production of adiponitrile (ADN) raw material. It will also enter into joint venture in adipic

acid with Domo in France.

BASF plans to integrate the businesses into its Monomers and Performance Materials divisions. The company said it will gain improved access to markets in Asia and South America, enhance its product pipeline and gain backward integration into ADN, which is a key component in the PA 66 value chain.

- > www.domochemicals.com
- > www.solvay.com
- > www.basf.com

Clarifying regulation of biocides

In our antimicrobials feature in July (**The battle to beat bacteria, page 15**) we quoted Tom Ellefsen, CEO of Life Material Technologies saying: "Some companies are considering antimicrobials in food packaging as a solution to extending the shelf-life of food."

We also said that the company's LIFE DJ/AM-00-1A had been shown to exhibit both antimicrobial and adsorbent properties, implying potential active packaging application. LIFE DJ/AM-00-1A is not approved as a food additive under EC Regulation 1333/200, which would be required for use as an active food contact material in the EU. It is, however, approved for use as an antimicrobial additive in food contact applications in both the EU and US.

Milliken to invest in plant in Singapore

Milliken is to build a new chemical manufacturing plant and knowledge centre in Singapore, where it already has an applications lab and technical service and sales operations.

The new plant is expected to begin operation in Q1 2021 and will manufacture several Milliken plastic additives, including Hyperform nucleating agents for polyolefins. It will also make speciality colorants for applications including home and laundry care, personal care, industrial and institutional cleaners, and polyurethane foams.

"This new manufacturing facility strategically positions us to better serve our customers throughout Asia," said Zhaolin Zhou, Asia-Pacific Vice President of Milliken's Chemical division. "Localised production capabilities and increased technical expertise will allow us to rapidly customise our solutions to meet the evolving and diverse needs of the Asia market."

- > www.milliken.com



New plant will produce Hyperform nucleators for PE/PP

PolyOne sells US compound unit



**PolyOne President and CEO
Robert M Patterson**

PolyOne is to sell its Performance Products and Solutions (PP&S) compounding business to SK Capital Partners for \$775m. The company says it expects to record a pre-tax gain of around \$600m when the deal closes in Q4.

The PP&S business, which generates sales of around \$700m, provides PVC and PP-based compounds and contract compounding services and is primarily focused on the North American construction and

automotive markets. It includes the Geon PVC compounds brands.

PolyOne Chairman, President and CEO, Robert M Patterson said the sale will allow it to accelerate growth in specialty products. "In the short term, proceeds from the sale will be used to pay down debt," he said.

"Longer term, we can further refine our focus on investing in and growing our three remaining segments: Specialty Engineered Materials; Colour, Additives,

and Inks; and Distribution."

The company, which recorded 2018 sales of \$3.5bn, said it expects full year 2019 adjusted EPS from continuing operations to grow 6-8% over the prior year. "We continue to benefit from recent investments made in composites and other sustainable solutions which is helping us to deliver adjusted EPS growth in an otherwise challenging environment," Patterson said.

➤ www.polyone.com

Chromaflo buys Liquid Colours

US-based colorant firm Chromaflo Technologies is to buy the colorant dispersion division of South Africa's Liquid Colours, including its pigment dispersions and colourant technologies for decorative paint, in-plant systems, industrial coatings and other applications.

The operations will be

integrated into Chromaflo's new plant in Johannesburg. Product lines, technology and personnel will transition there over the next twelve months, the company said in a statement.

Chromaflo Technologies South Africa will be headed by Lyle Peters, formerly General Manager of Liquid Colours. The site is part of

Chromaflo's APAC regional business, which is headquartered in Australia.

Chromaflo has production facilities at its headquarters in Ashtabula in Ohio, US, as well as Canada, the Netherlands, Finland, Australia, China, India, Malaysia, Mexico and South Africa.

➤ www.chromaflo.com

Canadian polyolefin planning

Newly-incorporated West Coast Olefins plans to build a \$5.6bn petrochemical facility on a 160 hectare site at Prince George in British Columbia, Canada. The project will include a world-scale ethylene plant and PE facility, with most of the PE targeting the Asian market.

Following the formal regulatory approval process, the company expects to make a final investment decision by the end of 2020.

West Coast Olefins expects construction to take three years to full commercial operation, including public engagement and consultation processes. Once fully operational, the facility will create up to 1,000 permanent jobs.

➤ www.westcoastolefins.com

RTP bolts on Zeotherm

US compounder RTP Company has acquired the entire Zeotherm TPV product line from Japan's Zeon Chemicals.

Zeotherm TPV products are available in hardnesses ranging from 70A to 40D. They offer continuous use performance at up to 150°C while withstanding long-term exposure to engine oils and lubricant greases. They also bond well to PA substrates in overmoulding applications.

RTP Company General Manager TPEs, Todd Gummersbach, described the move as "the latest step in our rapidly expanding TPEs business". The company's range in this field already includes compounds based on SEBS, TPV, TPU, POE, COPE and COPA.

➤ www.rtpcompany.com

**RTP has acquired the
Zeotherm TPE business**



PHOTO: RTP COMPANY

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NEWS
IN BRIEF...

Toray Advanced Composites has signed a manufacturing and supply agreement with **BASF** focused on production of continuous fibre-reinforced thermo-plastic (CFRT) tapes for the automotive and industrial markets. Toray will make the tapes using BASF's Ultramid PA resins, which it will reinforce with either glass fibre or carbon fibre.

www.toraytac.com
www.basf.com

MBA Polymers has taken over a 16,000 m² production site at Mauna, near Dresden in Germany. It is being operated by its MBA Polymers Germany subsidiary and is the fifth to use its patented waste electric and electronic equipment (WEEE) recycling processes. It will process 17,500 tonnes/yr of WEEE annually.

www.mbapolymers.com

Burgsmüller commits to new plant in Germany

KraussMaffei Group subsidiary Burgsmüller, which manufactures screws, screw elements, barrels and other machinery components, is building a new factory at Einbeck in Germany. The company aims to relocate operations from its current site at Kreiensen to the new 7,200m² facility in the second quarter of next year.

Burgsmüller manufactures some 40,000 extrusion screw elements, screw shafts and barrels annually. It supplies to its parent company and to other extrusion machinery OEMs. The company also offers spare parts for more than 180 different twin screw extruders from multiple manufacturers, as well as supplying its own range of whirling and milling machines.

The new Einbeck plant



PHOTO: KRAUSSMAFFEI GROUP

Burgsmüller's new plant at Einbeck in Germany

will employ around 125 people. According to the company, it will offer an expanded production capacity and will use the latest manufacturing technologies for production of high wear parts for plastics processing equipment.

The site will be designed to operate as a smart factory and will follow Industry 4.0 standards. Production machinery will be net-

worked to allow real-time data processing, visualisation and analysis, allowing the company to reduce leadtimes.

"The move from our original location in Kreiensen to the new production hall in Einbeck is an important milestone in the development of our company," said Burgsmüller Managing Director Jens Biel.

➤ www.burgsmueller.de

DIC to acquire BASF's pigments business



PHOTO: BASF

Japanese firm DIC, which owns Sun Chemical and has a portfolio of pigments in its Colour & Display segment, is to acquire BASF's global pigments business – BASF Colours & Effects (BCE) – for €1.15bn. The transaction should close in Q4 2020, subject to regulatory approval.

DIC aims to increase its total sales from €6.8bn in 2018 to €8bn by 2025; BASF's pigments business had sales of about €1bn in 2018 and employs around 2,600 people. "In this context, BASF's pigments portfolio is an important strategic addition in meeting our goals more expeditiously," said Kaoru Ino, President and CEO of DIC.

The move will also broaden DIC's pigments range, including those for electronic displays, cosmetics, coatings, plastics, inks and speciality applications. It will mean DIC will have more than 30 pigment production facilities worldwide, and will be able to offer broader product categories related to effect pigments, inorganic pigments, organic pigments, speciality dyes and pigment preparations.

➤ www.basf.com ➤ www.sunchemical.com

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Hyosung invests €750m in carbon fibre sector

Korean company Hyosung has announced plans for a more than 10-fold increase in carbon fibre production capacity to 24,000 tonnes by 2028.

The KRW1tr (€750m) investment at its plant at Jeoniu will make it the world's biggest single-site carbon fibre production facility and is intended to put Hyosung among the top three carbon fibre producers globally with a market share of 10% (up from 2% today).

Hyosung currently operates one production line at the Jeoniu site with a capacity of 2,000 tonnes. Work has already commenced on a second line,

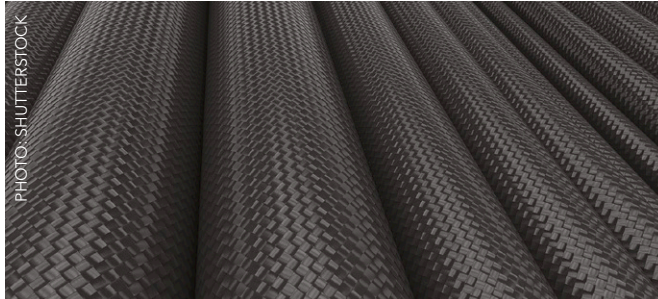


PHOTO: SHUTTERSTOCK
Hyosung plans to join global carbon fibre top three

which is expected to begin full production in February next year.

The company first entered the carbon fibre market in 2013 with its Tansome products, which are produced using a proprietary technology developed together with the Korea Institute of Carbon Convergence

Technology.

Hyosung describes carbon fibre as "a staple of future industries," citing hydrogen fuel tanks as a key potential market. It forecasts growth in hydrogen-powered cars to rise from 1,800 units in 2018 to around 6.2 million by 2040.

➤ www.hyosungchemical.com

Formosa in major PVC expansion

Formosa Plastics Corporation, Louisiana (FPC) is to invest \$332m to expand PVC resin production by around 136,000 tonnes/yr at its site at Baton Rouge, Louisiana, US.

The project will include new machinery and equipment for the PVC resin unit, according to Louisiana Economic Development, as well as the upgrade of a halogenated acid unit for internal production of vinyl chloride monomer and utilities for the new operations. These should be launched in late 2021 or early 2022.

➤ www.fpcusa.com

Montefibre precursor promises lower costs

Spanish specialty fibre manufacturer Montefibre Carbon is to launch an 80k polyacrylonitrile (PAN) precursor fibre, which it says will allow production of non-aerospace, standard modulus carbon fibres for applications such as injection moulding compounds at more competitive cost than current 50k types (k refers to the number of fibres).

The first production line for the 80k fibre will begin production in mid-2020 and will have a capacity of around 3,000 tonnes. A further two lines are planned for 2012, taking capacity to 11,000 tonnes (sufficient to produce around 5,000 tonnes of carbon fibre). All lines will produce the company's M500 and M600 precursors.

➤ www.montefibre.es



PHOTO: MONTEFIBRE

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PlasticsEurope loses BPA SVHC challenge

PlasticsEurope has lost a legal challenge to the European Chemical Agency (ECHA) decision to add bisphenol-A (BPA) to the REACH Candidate List for Substances of Very High Concern (SVHC).

The trade association had argued that BPA's use as an intermediate in the production of polycarbonate exempted it from Authorisation under the REACH chemical regulatory system, so including it in the REACH

Candidate list was "disproportionate".

In a **decision** in July, the General Court of the EU Court of Justice ruled that the ECHA had correctly applied EU law, pointing out that the Candidate List inclusion is "consistent with the objective of sharing information on substances of very high concern within the supply chain and with consumers." It also ruled that ECHA had not breached the principle of

proportionality or committed an error by failing to consider information on the intermediate uses of BPA.

PlasticsEurope said: "The Court's conclusion is in clear contradiction to the express provisions of the REACH Regulation, it misapplies and misinterprets the concept of 'intermediates' - which, as argued, are substances and not mere 'uses' of a substance - and it wrongly considers that the Candidate Listing has an end in itself (information sharing) instead of being a first step towards Authorisation." It said it is still considering appeal options.

PlasticsEurope points out that identification of BPA as an SVHC within REACH does not prevent use as an intermediate.

> www.echa.europa.eu
> www.plasticseurope.org

China XD increases Q2 sales

China XD Plastics Company, which makes polymer composite materials primarily for automotive applications, achieved revenues of \$463.1m and net income of \$40.1m in Q2, 46.0% and 47.4% up on the same period of 2018 respectively.

Jie Han, China XD Chairman and CEO, said that China's automotive industry has seen "weakness in both production and sales" for the past 12 months. However, he added that larger companies like China XD have benefited from the fact that small and medium-sized competitors have been struggling to fulfil orders "due to reasons such as changing financial conditions and tougher environmental policies".

> <http://chinaxd.irpass.com>



European Court of Justice has upheld ECHA's SVHC decision on BPA

Epsan opens up sales operation in France

Turkish technical compounding company Epsan has opened a sales and technical service centre in Lyon in France. The new unit, which started operations this month, is being run by Richard Quentin, who has more than 15-years of experience in the French market for PBT, PA and PPA compounds.

"The new office [in France] shows our commitment to grow our business in Europe with the automotive and electrical and

electronic (E & E) industries with direct communication, technical support and sales," said a spokesperson for the company.

Epsan manufactures an extensive range of engi-

neering compounds based on PA6, PA66, PBT, PET and PPA at its two plants in Bursa, Turkey. It has a production capacity of around 45,000 tonnes/yr and is on course to reach

sales of around €55m for 2019. Some 65% of its production is exported.

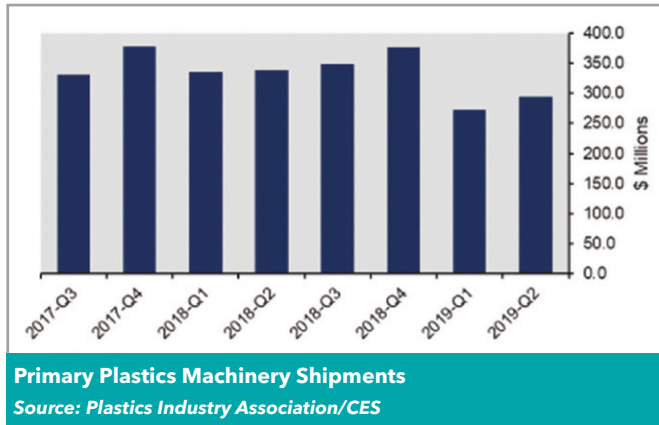
The company is currently evaluating a €10m investment in a production site in Serbia, which is part of its plan to grow sales to more than €120m by 2022.

"We are in a good position with the new projects we have gained that will start in 2020-21. We should be able to reach our target," said Managing Partner Arda Efe.

> www.epsan.com.tr



Automotive is a key target market for Epsan



US machinery activity looks "encouraging"

Deliveries of primary plastics machinery (extrusion and injection moulding equipment) in North America improved in Q2 of this year, according to the Plastics Industry Association's Committee on Equipment Statistics (CES), up by 8% on Q1 to a preliminary estimate of \$295m.

The result represents a 13% year-on-year decline on Q2 2018, following a 27% year-on-year fall in Q1.

"The second quarter numbers are encouraging, but machinery shipments remain comparatively lower than the previous quarters," said Perc Pineda, Chief Economist at the association.

"What's happening is not surprising, judging from the macroeconomic environment. Real business investment spending in the second quarter fell, and investment spending in industrial equipment

flattened in the second quarter," said Pineda.

Q2 shipments of twin screw extruders were down 29.5% in value on 2018.

US machinery exports were up by 4.3% on Q1, with Mexico, Canada and Germany the largest export markets accounting for 53% of the total. However, the US-China trade war appears to be having an impact, with exports to China in Q2 down by 37% on the same period in 2018.

Pineda said ongoing trade issues needed to be resolved.

"Mexico has ratified the US-Mexico-Canada Agreement (USMCA), but the US and Canada have yet to sign off on this trade pact. Unless that is resolved, the uncertainty from the ongoing US-China trade dispute will continue to run high and will negatively impact not only the plastics industry but the global economy," he said.

> www.plasticsindustry.org

www.compoundingworld.com

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Getting more from pigments

Producers of pigments are ensuring their products meet ever tighter regulatory requirements while also addressing wider sustainability issues, writes Jennifer Markarian

Aside from aesthetics, sustainability issues are among the top concerns for both users and producers of pigments. However, sustainability in terms of pigments for plastic compound formulation has many facets including, but not necessarily limited to, responsible raw material sourcing; sustainable production methods and health and safety profiles.

There is also a growing awareness of the environmental impact of pigments. Grades that disperse well can help reduce energy consumption during processing. Heat-reflecting pigments can play a key role in sustainable building material design. Durable performance pigments can help plastic parts to last longer during use. And, with the increasing focus on the circular economy, pigments that enhance recyclability of plastic parts are very much a development priority.

Pigment producers are well aware of these new demands. "Improved recyclability and sustainability are no longer trends but needs for our industry," says Scott Heitzman, Business Development Manager Plastics at **Sun Chemical** Performance Pigments (Sun Chemical is a division of Japan-based DIC, which last month agreed to buy the BASF Colors & Effects business of BASF for around

€1.15bn. That move is covered in detail in this month's news section).

One of the latest pigment introductions from Sun Chemical is intended to improve dispersion and so reduce energy use. L28-P280 Predisol PV 19 provides higher throughput, better dispersion and allows higher loadings compared to some other small particle-size, high-performance pigments, says Heitzman.

Lightweighting of plastic parts is another aspect of sustainability. In some lightweighted packaging applications, for example, balancing the desired opacity while allowing enough transmitted light to achieve the target appearance can be difficult. Sun Chemical's new SpectraFlex Illusion C88-0103 light diffusing pigment solves this problem and allows a frosted glass effect without the need to modify the mould, according to Heitzman.

Sustainable chemistry

Pigment chemistries continue to come under regulatory pressure, based on their chemical composition and physical forms as well as challenges from non-governmental organisations. "We continue to push the edge of currently used chemistry to find new pigments that address new

Main image: Dispersion, durability, high temperature resistance and tolerance of recycling are all high on the list of demands for today's pigment users

Right: Spectra-Flex Illusion light diffusing pigment from Sun Chemical creates a frosted glass effect without need for mould surface treatment

regulatory pressures,” says Mark Ryan, Marketing Manager at **Shepherd Color**.

One example of this push is the company’s removal of nickel from the composition of its CI Pigment Green 50 (PG50), due in part at least to concerns in the EU. Pigment Green 50 is often used in place of green chromium oxide (PG17) because it is more chromatic and does not contain chromium. Shepherd Color’s Green 10G603 is free of both nickel and chromium and is literally “greener”. “It has an increased negative a* value that denotes how green in colour a pigment is,” explains Ryan.

The company has also introduced several new pigment chemistries. Cobalt blue pigments are highly durable but have an absorption band in the infrared (IR) range that reduces their effectiveness in applications like “cool roofs”. An alternative developed by Oregon State University is yttrium, indium and manganese oxide; this “YInMn” Blue pigment has been commercialised as Blue 10G513 by Shepherd Color. Because the new pigment chemistry does not have an absorption band in the IR range, dark blue-coloured durable building materials can be produced that stay cooler when exposed to sunlight, says Ryan.

Shepherd Color also added a new yellow - NTP Yellow 10G155 - to its ultra-high performance NTP Yellow pigment line earlier this year. In the yellow colour space, lead chromates are being phased out of some formulas due to regulatory pressure. The company says it is quite a challenge to balance the opacity, durability, chromaticity, and economics they provided with other chemistries. The new NTP Yellow (PY 227), however, offers a bright chromatic colour, high opacity and durability. “The new yellow is closer to redder shades of bismuth vanadate (PY 184), but with higher temperature stability and resistance,” Ryan says.

Shepherd Color has also improved its RTZ Orange (PY 216) pigment to complement the NTP

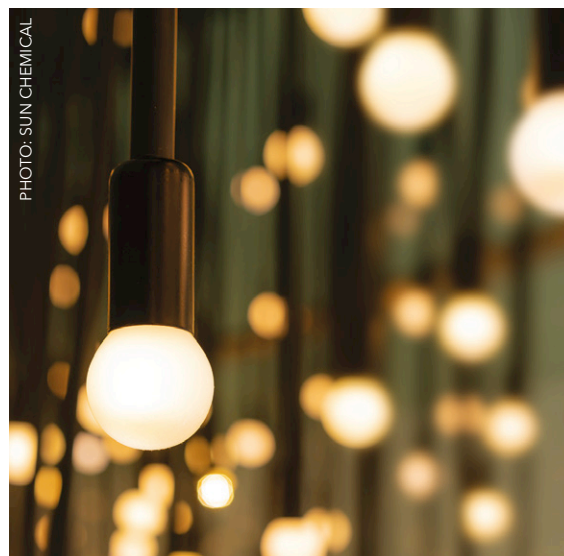


PHOTO: SUN CHEMICAL

Yellow. According to the company, Orange 10P340 displays a true orange colour by itself but can also be used to add redness (a* value) to colour matches without decreasing weatherability or heat stability.

Food considerations

Pigment chemistries must also consider consumer safety and comfort, especially for food-contact packaging or toys, while displaying low odour and low volatile organic compounds (VOCs) is important in automotive interior and textile applications, says Marc Dumont, Industry Manager Pigments for Plastics at **BASF**. “More stringent regulations around the world, such as the Plastics Regulations EU 10/2011 and China GB 9685.2016, require additional assessment for NIAS [non-intentionally added substances] and their behaviour during plastics processing,” he says.

BASF recently launched Irgazin Red K 3840 UP, a new addition to its diketo-pyrrolo-pyrrole organic pigment family, which offers high fastness to heat, light, chemicals and solvents. The product was developed by conducting a risk assessment for NIAS and implementing improved specifications to meet requirements for off-flavour in critical applications such as water bottle caps.

Along with sustainability, BASF sees demanding performance requirements and increasing colour brilliance as key trends. “The increasing use of decoration films in building and automotive industries will also add to the higher demand for high performance pigments and dyes. Additionally, the lightweighting and e-mobility trends [use] high heat engineering plastics that require durable pigments,” says Dumont.

The company added two pigments to the Lumina Royal family for use in applications includ-

Below: The shift to electric vehicles will push demand for orange pigments capable of extended exposure to high temperatures

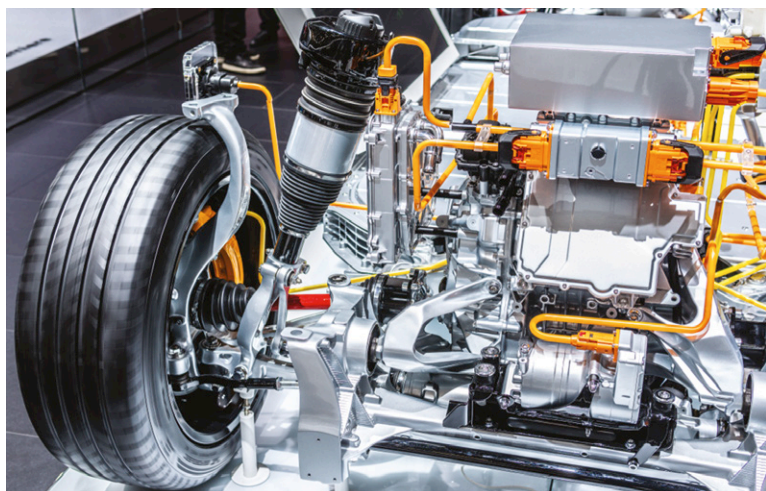
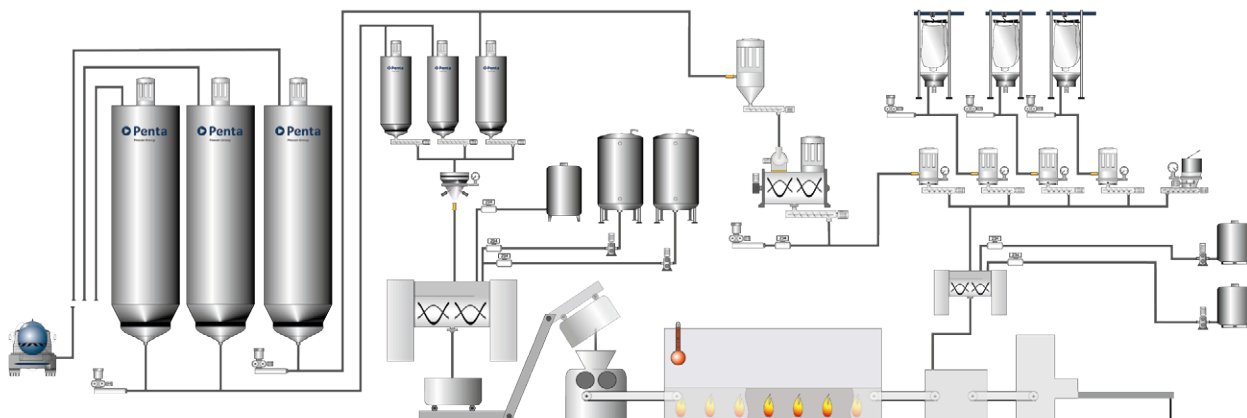


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Above:
Microlen Piano
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ing high-end packaging. Lumina Royal Russet 9S590D enables high-chroma red shades and provides greater formulation flexibility while Lumina Royal Amber 9S290D creates a strong sparkle for bronze, orange, golden and red effect shades. Both effect pigments meet broad, global food compliance standards and are compatible with commodity resins and a broad range of engineering plastics, says Dumont.

Several other new pigments from BASF extend the durable colour space for high temperature polymers. Sicopal Red K 3050, Turquoise K 8215 and Green K 9615, Cinquasia Rubine K 4370 and Paliogen Blue K 6500 offer high temperature and chemical stability. "The selected pigments can withstand the extreme high processing temperatures that are needed for high temperature polymers, such as PA, PPA, PSU or PPS, and for engineering plastics that are used in extremely demanding applications such as electrical parts, chemical plants or power tools," Dumont says.

BASF's new Microlen Piano Black 0077 MCN enables a deep and enduring black colour for high-end plastic design. "Using a unique dispersion technology, the carbon black pigments are so finely dispersed that the jetness is much better

developed. This preserves better mechanical properties in the final compound. It also avoids the need for adding other coloured pigments (for example, phthalocyanine, quinacridone or ultramarine pigments) as shading partners to achieve a deeper black, which makes formulations less complex and more economical." says Dumont.

Exceeding requirements

Ferro has developed a new FCP range of complex inorganic colour pigments (CICP) designed to meet and exceed regulatory requirements for food and cosmetics packaging. It implemented processes to ensure that raw materials met product specifications and that there could be no cross contamination during production, according to Daniel Lladó, Marketing Manager for Plastics at the company.

The new Lysopac Yellow 6614B is a bismuth vanadate pigment that Ferro says offers good heat, light and weather-fastness as well as providing a high tinting strength. The pigment offers good dispersibility (FPV) for fibre and film applications and can be used in food contact applications (EU10/2011 regulation). An improved encapsulation technology achieves dense and uniform layers of coating on the pigment, providing enhanced performance, says Lladó.

The latest bismuth vanadate pigment from **Dominion Colour Corporation** - DCC Yellow RMXS - provides very good dispersion and opacity together with fast colour development, according to the company's Global Product Marketing Manager Bruce Howie. Process innovations allowed the company to create a yellow that is 20-30% stronger in polyolefins than comparable pigments, he claims.

"When customers formulate with DCC Yellow RMXS, they can use less pigment to obtain a similar colour strength to conventional grades of PY 184 [conventional bismuth vanadate pigment yellow]. Or they can take advantage of the higher colour



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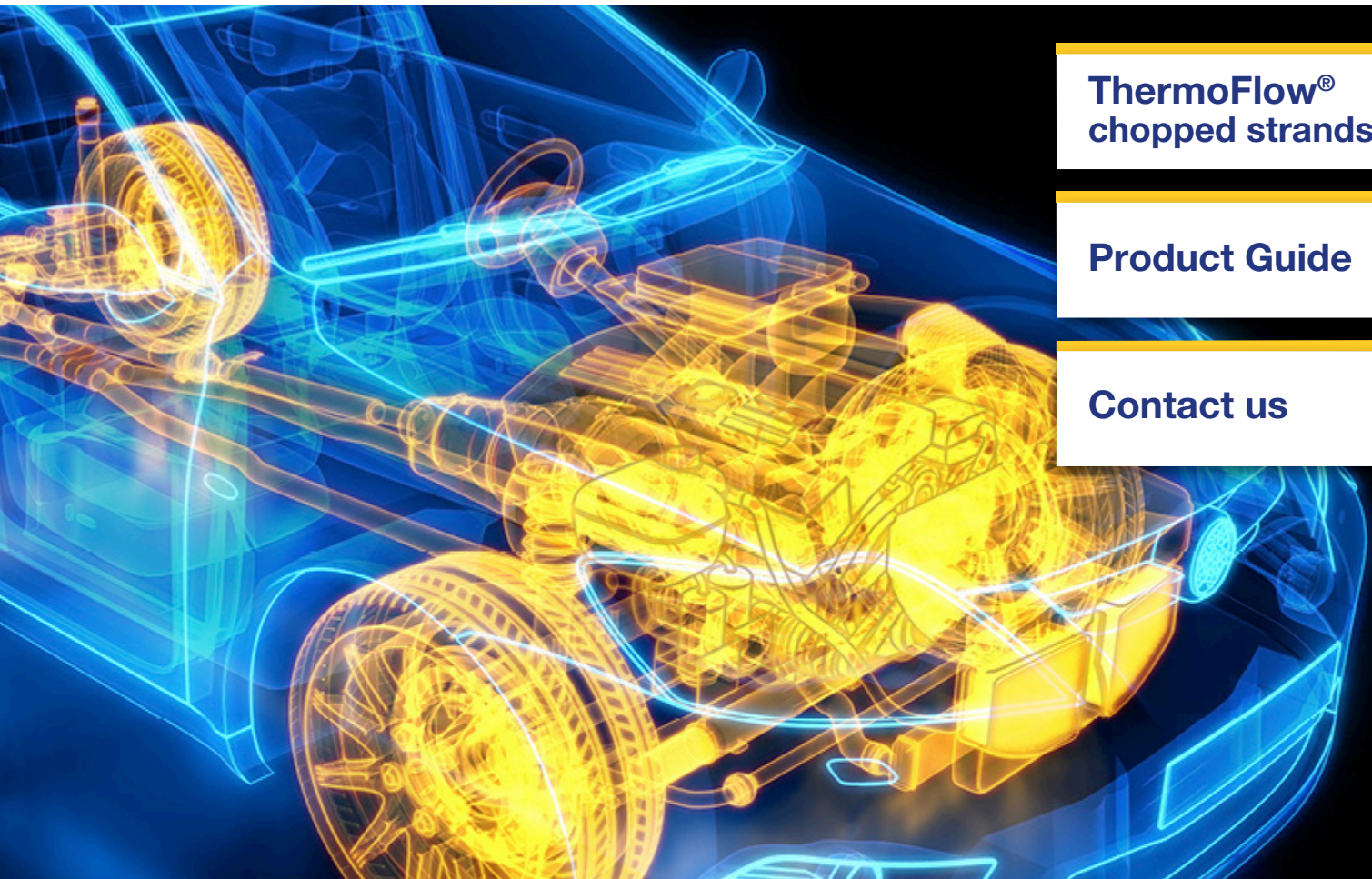
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Above:
Dominion
Colour claims
its Yellow
RMXS bismuth
vanadate
pigment
creates a 20-
30% stronger
yellow in
polyolefins

strength and improved dispersion and generate a masterbatch with higher pigment loading, which would mean that their downstream customer could use less masterbatch to achieve the desired end shade," Howie says.

Dominion Colour is also currently expanding its manufacturing footprint in Canada, adding 1000 tonnes/yr of medium to high-performance organic pigment capacity. The expansion is expected to come online by the end of the third quarter.

Back to black

Carbon black, which is commonly used for pig-menting black plastics, interferes with NIR sensor

technology used in the sorting equipment at recycling facilities. New and existing black pig-ments that do not absorb in the IR range, however, provide a solution that is increasingly in demand. Stable pigments that can withstand multiple recycling steps are also important.

Both voluntary measures and regulations, particularly in the EU, are driving rapid improve-ments of waste collection rates and subsequent recycling, says BASF's Dumont. In addition, brand owners intend to increase the use of recycled materials in packaging articles. "In this context the replacement of carbon black to better enable sorting and recycling of black coloured waste is gaining momentum, especially for the packaging industry," he says.

BASF will introduce two pigments at K2019 that are designed for recyclability. Sicopal Black K 0095 is NIR-reflective and allows reliable detection even at high pigment concentrations. It has been tested in sorting equipment with polymers such as PET and PP. Sicopal Red K 3050 FK is a new pigment chemistry that extends the durable red colour space with NIR-reflectivity that allows NIR-sorting. It can also be used in heat-management applications. The

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Right: Black packaging for Henkel using NIR detectable pigments from Ampacet

red pigment has high light and weather-fastness at low concentrations, which makes it useful in durable goods, while its high temperature and processing stability means it can be used in engineering plastics.

Dark-coloured Shepherd Color Arctic IR Reflective pigments have a low absorbance and high reflectance in the IR range, which allows IR sensors to sort the plastics, the company claims. These pigments have long been used in energy saving, cool-roof applications but are now said to be finding use in making black plastics that can be recycled.

Clariant has developed new carbon black-free colorants for plastics - including polyolefins, PET, and PA - that can be identified by NIR sorting devices. The development of the CESA-IR masterbatches included extensive testing by Tomra Systems, a developer of NIR sorting technology got the plastics recycling sector.

PolyOne's offering in this sector is OnColor Infrared Sortable Black. The company has a range of eight shades which are available in both liquid and solid forms. It can also provide custom colour shades. **Gabriel-Chemie's** NIR-reflective masterbatch is said to carry food contact approval and to have minimal impact on mechanical performance. **Ampacet's** REC-NIR-BLACK masterbatch is being used to produce black packaging for consumer goods firm Henkel.

Meeting demand

Citing increasing demand, **Lanxess** completed a debottlenecking of its Krefeld-Uerdingen site in Germany this year, expanding annual capacity for its Bayferrox and Colortherm micronised red pigments by more than 5,000 tonnes. The company also expanded its technical center at the site and added automated testing to meet an expected increased testing requirement. "The facility is now

Below: Automated pigment stability testing in the Lanxess technical centre at Krefeld-Uerdingen



PHOTO: HENKEL

equipped to carry out automated measurements of thermal stability in customer-specific plastics applications. From sample-loading to colorimetric analysis, all the necessary modules can be actuated via automated processes," says Stefano Bartolucci, Global Market Segment Manager for Plastics in the Lanxess Inorganic Pigments business unit.

Automated processes improve testing accuracy as well as speed, according to the company, which says the lab can carry out application testing of pigments in a wide range of plastics. It also has equipment to test pigments for colouring of filaments for 3D printing. Pigments for these filament applications need to be easy to disperse and fast to achieve colour strength. Inorganic pigments provide high temperature and weather stability compared to organic pigments in filament formulations, says Bartolucci, while iron oxides can be used to partially reduce organic pigment content.

Among the latest additions to the Lanxess pigment range is Bayferrox 303T black, which is said to reflect 20% more NIR radiation than conventional products and is intended for use in plastic roofs and façade elements to reduce heat buildup due to solar radiation. It can also be used in automotive interiors to reduce heat development in the passenger compartment.

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PHOTO: LANXESS

Addiplast Group: Performance compounds on a global scale

With a dedicated and well-equipped R&D centre and two complementary compounding technologies, French independent compounder Addiplast Group is able to take on the most demanding compound development and production projects.

Established in 1986, the family-owned firm today operates two production sites at Saint Pal de Mons, south of Lyon in France, with a combined capacity of around 30,000 tonnes/yr. The Addiplast site is equipped with twin screw compounding extruders; the Addikem facility operates Buss co-kneaders. Both are IATF 16949 & ISO 14001 certified.

The company's recent investments in co-kneader extrusion technology are designed to enable production of highly-filled polyolefin compounds (with filler contents of up to 80%) and for production of temperature-sensitive technical compounds, including but not restricted to fluoropolymers.

The two production sites are supported by the company's Addiscience research and development centre, which produces around 350 new formulations each year. It is equipped with an extensive range of polymer characterisation equipment and the same production extrusion technologies as the manufacturing locations, allowing new formulations to be scaled up to industrial production quickly and efficiently.

Coloured compounds and masterbatches, flame retardant compounds, mineral-filled and glass reinforced formulations, natural fibres and fillers, and biocides are all part of the company's know-how.

French compounder Addiplast group combines flexible production technologies with expert R&D capabilities to deliver innovative compounds for global clients

The product portfolio includes Addibatch masterbatches for polyolefins, Addiperf masterbatches for engineering plastics, Additec semi-conductive and ESD compounds, Addiflam flame retardant compounds, Addinyl polyamide and Addilene polyolefin compounds, as well as the Addibio Renew range of sustainable and renewable materials. All are available in Europe, Africa, USA and China.

"Tailor made compounds for automotive, cosmetics, medical, the electrical and electronics industries, and tolling production under NDAs for end-users or big players such as petrochemical firms. That's been the DNA of Addiplast for more than 30 years," says Addiplast Group CEO Denis Chantegraille.

Find out more at www.addiplast-group.com

K 2019 - Creating tomorrow's products together

Addiplast Group will be exhibiting at the K Show in Dusseldorf, Germany in October. On its stand in Hall 5, Stand D04-13, it will present its latest innovations, including new flame retardant grades for electric vehicles, lightweighting solutions for structural and aesthetic parts based on natural fibre reinforced PP compounds, carbon fibre reinforced PP and PA compounds, and its new PPS and PPO compounds for applications requiring outstanding mechanical performance.

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Building better bioplastics

Pricing and performance issues mean bio-based plastics are not yet drop-in replacements for traditional polymers. Peter Mapleston finds compounding and additive developments are addressing the problem

Bioplastics will only become a true alternative to traditional polymers made from non-renewable sources when their performance reaches the same level - and for many applications that is still not the case. However, important progress is being made, not only with bioplastic polymers themselves but also in the additives and compounding technologies that help improve and expand their property profiles. This article takes a look at some of the latest developments in biopolymer modification at technology suppliers and users.

Poly lactide (PLA) - more often described less accurately as polylactic acid - is now the most well-established of the commercially available modern bioplastics. The bio-based and biodegradable polyester is increasingly used in food packaging and a wide variety of other more niche applications. But despite its favourable performance attributes, significant improvement in performance is still required to make it fully competitive with conventional polymers during processing, according to speciality ester producer **Condensia Quimica**.

Based in Barcelona, Spain, Condensia Quimica counts itself among the growing number of additive manufacturers working to develop solutions to overcome some of the limitations of PLA, as well as other biopolymers. Technical Manager Stefano Fiori says these include poor thermal stability and their susceptibility to degradation as well as loss of properties during processing and reprocessing. "Biologically-based polymers and blends have less flexibility in polymer design than copolymers," he says. "PLA is rigid and brittle with low plastic deformation capacity below the glass transition temperature (T_g is 50-60°C), and it is necessary to plasticise PLA in order to produce flexible films."

Existing plasticisers have limited compatibility with PLA. In addition, their non-degradable nature is a clear disadvantage in many PLA applications. "The combination of these circumstances means that the plastics industry cannot currently offer thin, flexible PLA films to the food industry," Fiori says. That could soon change, however. Fiori and two colleagues have patented a method for plasticising

Main image:
Bioplastic compounding technology is closing the performance gap. Italian PHA producer Bio-On made these bricks to demonstrate the resins's dimension stability

PLA using mixtures of lactic acid oligomers (OLAs). These can have either a terminal carboxyl group or free hydroxyl group, with one or both being blocked by esterification. Fiori says the torque curve - which reflects the plasticising power of the product - for different PLAs plasticised with different OLAs (branded Glyplast by the company) are very similar to those obtained with PLA plasticised with a polyadipate or diethylhexyl adipate.

Films containing 20% Glyplast OLA have a glass transition temperature (Tg) that is suitable for commercial use, Fiori says. "The thin, flexible PLA films obtained, in addition to offering notable advantages in the food industry, show mechanical characteristics similar to those of flexible thin films of PVC or polyethylene, but with the ecological advantage that it is degradable in the same or at a higher speed than that of soft plant tissue under equal conditions."

Currently, Condensia offers a series of additives obtained from bio-renewable raw materials and that are fully biodegradable and compostable (ISO 20200). When used in mixtures with PLA, they make it possible to obtain stretch films with good mechanical properties (Figure 1) without loss of transparency. Furthermore, the company says they can be used as impact strength modifiers, chain extenders, and nucleating agents.

PBS benefits

Thailand's **PTT MCC Biochem**, which is partly owned by Mitsubishi Chemical Corp, claims to be the only manufacturer of bio-based polybutylene succinate. The company says a key differentiator for its BioPBS product is its good biodegradability. It sees applications in single-use products, stationery, toys, and other products. It can also be used in compounding, where it can be combined with other bioplastics to improve biodegradability, as well as to enhance flow, flexibility and impact strength (Figure 2), heat stability and cycle time.

The company says BioPBS is already used in unreinforced form in coffee capsules and disposable tableware. PTT MCC Biochem has also been working with Arctic Biomaterials on development of long and short-fibre reinforced compounds incorporating the Finnish company's ABMcomposite technology, which is based on bioresorbable glass fibres. The fibres were originally developed for medical applications, but **Arctic Biomaterials** has since moved into technical applications as well.

Arctic Biomaterials' first venture into bio-based compounds involved the use of PLA. It has succeeded in creating compounds with HDTs of around 155°C and modulus of well over 10,000 MPa. Sales and Marketing Director Tomi Kangas says the company has been involved in around 50 customer projects, some with major global brands. It also manufactures compounds based on other biopolymers, both reinforced and unreinforced and containing a number of bio-based additives.

PTT MCC Biochem says its most recent success is the development of PLA-based compounds (that also contain PBS) that can resist temperatures of

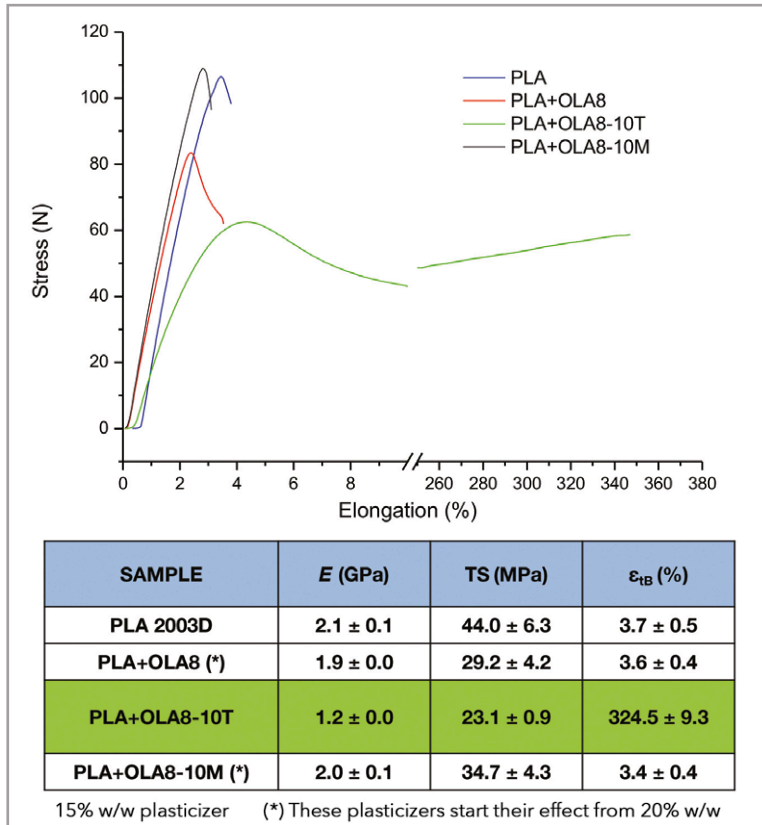


Figure 1: Stress-strain curves and sample mechanical properties of various PLA/OLA mixtures
Source: Condensia Quimica

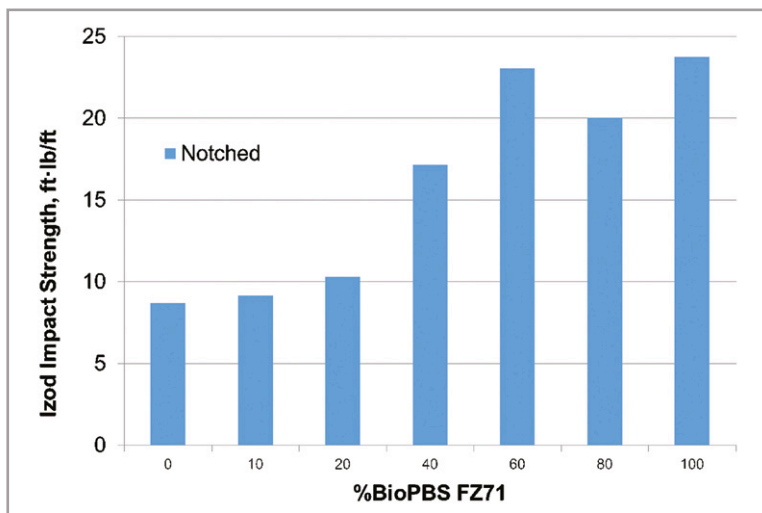


Figure 2: Effect on impact strength of addition of BioPBS to PLA
Source: PTT MCC Biochem

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Right: The ORNL team, led by Amit Naskar, at work



around 100°C but which do not require the parts to be crystallised either by annealing in the mould or in a post-moulding operation (this is typically a requirement to reach such performance with PLA compounds), enabling injection moulding with reduced cycle times (Figure 3).

Options in PHA

Polyhydroxyalkanoates (PHAs) are offered by several suppliers and volumes are on the rise. One major innovator in the field, **Bio-on**, has in recent months announced a series of initiatives involving its technology that will take its Minerv PHAs - which include polyhydroxybutyrate (PHB) - into areas well beyond traditional plastics processing, including slow-release capsules for fertilisers, micro-powders for cosmetics, fashion products, and even electronics. It is also developing new ways to make PHAs, extending potential raw materials beyond biomass to cooking oils and carbon dioxide.

Making use of biomass waste

Scientists at the US Department of Energy's Oak Ridge National Laboratory (ORNL) have created a recipe for a renewable 3D printing feedstock they hope could spur a profitable use for the biorefinery by-product lignin. In the journal *Science Advances*, a research team led by Amit Naskar explain how they combined a melt-stable hardwood lignin with a low-melting conventional polyamide and carbon fibre to create a composite suitable for Fused Filament Fabrication (FFF) 3D print technology.

Lignin natural polymers char easily and prolonged exposure to heat dramatically increases viscosity, making it difficult to extrude them during the FFF process. However, when the ORNL researchers combined the melt-stable hardwood lignin with a polyamide they found that the composite's room temperature stiffness increased while its melt viscosity decreased. The material displayed a tensile strength similar to the pure polyamide and a lower viscosity than the conventional ABS often used in FFF.

Analysis of the composite's molecular structure indicated that the combination of lignin and PA "appeared to have almost a lubrication or plasticising effect on the composite," says Naskar.

The ORNL team were able to mix in a high percentage of lignin – 40 to 50% by weight – and added 4-16% carbon fibre. The new composite heats up easily, flows faster for speedier printing, and results in a stronger final part structure. Work is ongoing to refine the material and find other ways to process it.

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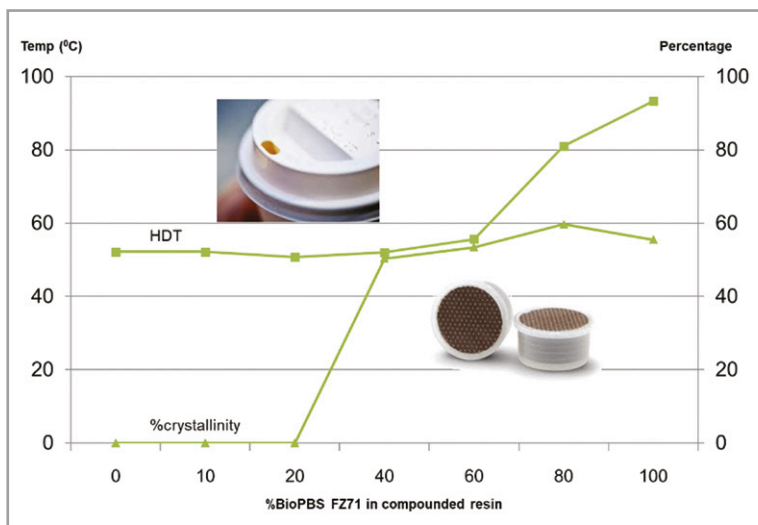
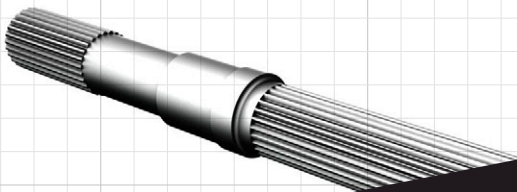
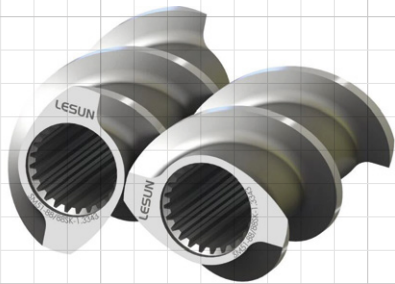
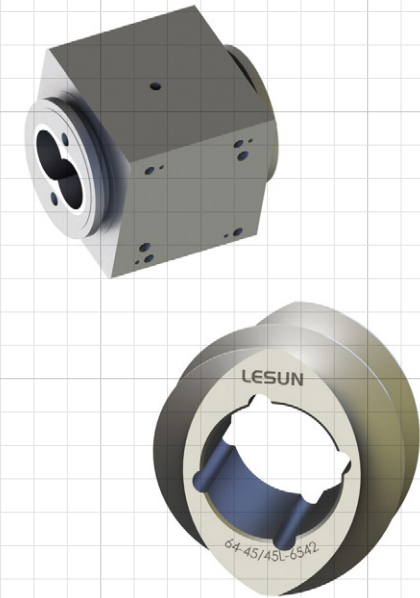


Figure 3: Crystallinity of PLA/PBS blends increases rapidly when PBS content exceeds 20%. Above a PBS content of 60% the HDT increases to almost 100°C

Source: PTT MCC Biochem

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Flexing renewability in PVC compounds

PVC may not immediately spring to mind when considering renewable plastics but the introduction of bio-based plasticisers could change that. Perstorp is the latest to launch into the renewable plasticiser fray - its recently introduced Pevalen Pro renewable polyol ester (non-phthalate) plasticiser is claimed to give PVC an environmental boost and provide superior performance.

"Brand owners and consumers are searching for new plastics and materials with a sustainable profile and low carbon footprint," says Jenny Klevås, Perstorp Global Marketing and



PHOTO: PERSTORP

Product Manager for the polyol ester plasticiser platform. "We believe that flexible PVC with Pevalen Pro is the perfect combination as it offers precisely what they are looking for, that being a high-performance

product with a significantly better environmental footprint."

Perstorp launched its original Pevalen non-phthalate plasticiser in 2014 as a premium performance alternative to phthalates for applications where health concerns are a main focus. Pevalen Pro is an addition to that product line. It will be initially available with up to 40% renewable content, with the long-term potential of becoming fully renewable. Perstorp foresees application in coated fabrics, artificial leather, flooring, wall covering and automotive interiors.

> www.perstorp.com

Another company active in this area is **Biomer** of Germany. Company President Urs Hänggi says PHB has "unique (hidden) properties" that can be exploited to great advantage by those with an understanding of how to compound and process it. He explains that the PHB chain is highly regular, with only C4 sub-units, and absolutely isotactic, both of which facilitate crystallisation. The chains are also highly linear and have no branches, so they do not entangle. The glass transition temperature of PHB is at 0°C or below. "This means that polymer chains keep on moving and crystallising even at room temperature. Such a combination of properties is unknown in any synthetic thermoplastic."

Hänggi says the regularity of the polymer yields hard, creep resistant parts while the linearity of the polymer chains allows adjustment of melt viscosity on the machine. In addition, the glass transition temperature results in stable parts.

Below: Parts produced in a copolymer of hydroxybutyrate with hydroxyhexanoate from Kaneka

The PHA family of polymers is broad and versatile. Japanese company **Kaneka** produces a copolymer of hydroxybutyrate with hydroxyhexanoate (PHBH) that can be processed by extrusion and injection moulding methods. The company recently said it would expand its manufacturing facility at Takasago to around 5,000 tonnes/yr. The expanded capacity is set to begin operation in December.

Compounding success

Among the compounders experiencing success with PHB (and other biopolymers) is **MAIP** in Italy. It has supplied one of its lamNature compounds for the Etik frames used in the Mylos range of wiring accessories produced by ABB. They replace frames made in traditional thermoplastics (PC/ABS for example). lamNature is said to be strong and durable, resistant to heat and light, and water resistant. MAIP managing director Eligio Martini says that the compound, which was developed specifically for the application, also has exceptional scratch resistance.

MAIP uses an extensive range of biopolymers: The Bios series are biodegradable and made from renewables; Kios is also made from renewables but is non-biodegradable; and Orios are biodegradable but fossil-sourced. The company's main focus to date has been on the Bios family, which includes PLA, PHAs, and other polymers derived from biomass.

The lamNature compounds use polymers from the Bios family (predominantly PHAs) together with vegetable-based and mineral fillers, and natural colours. MAIP has developed over 100 different formulations, all of them compostable. Some have



PHOTO: KANEKA

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also been tested to show that they degrade in sea water. "IamNature degrades just like wood," Martini says. "If I leave an ABB cover on the wall, it will last for years and years. But if it ends up in the soil or a stream, it will rot as microorganisms attack it. The great advantage of PHB over PLA and PBS is that it degrades in sea water and also in anaerobic conditions."

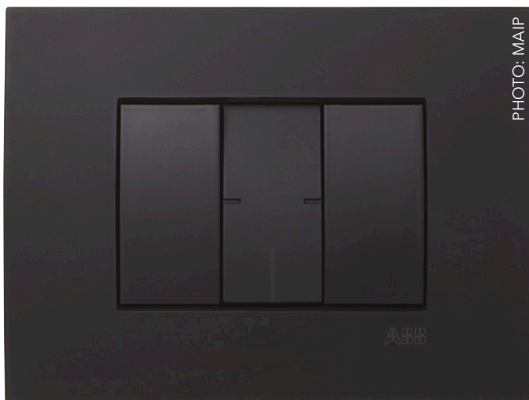
Turkish compounding company **Tisan** also reports a growing interest in sustainable and renewable plastics. The company's research and development specialist Binnaz Kavuşturan says it is the responsibility of compounders to respond to that demand. It has offered a range of compounds with recycled content under the EcoStar brand name for some time - recycled compounds account for around 5,000 tonnes of its 35,000 tonne annual capacity. It is now extending its sustainable offering with the development of a family of materials based on renewable polymers.

BioStar grades are being developed around PLA and bio-based PA polymers reinforced with glass fibres, high bio-content fillers and additives. The range will include grades modified with halogen-free flame retardants. Tisan is currently in the process of developing specifications and achieving appropriate certifications for the compounds.

Kavuşturan says the renewable content of the products will range from 20% to 90% depending on the specific combination of polymer, reinforcement and other additives. Some of the compounds will be formulated to include biodegradability as a characteristic. However, its key target market of automotive is more likely to focus on renewable content and reduced lifetime emissions.

Bio-Fed, a branch of Feddersen Group company Akro-Plastic, produces biodegradable and biobased compounds under the brand name M-Vera. The level of renewables in the biocompounds ranges from 30 to 100%. Application areas being targeted include coffee capsules, drinking straws and disposable cutlery; home-compostable films for starch-based bags for fruit and vegetables; and biodegradable films for agricultural applications such as mulch films. All M-Vera compounds can be coloured using AF-Eco biopolymer-based masterbatches, which are certified by TÜV Austria in accordance with EN 13432.

Right: The durable frames for this ABB switch are moulded in MAIP's PHB-based IamNature compound



Bio-based TPEs

Following its acquisition of Italian compounding company API in 2017, **Trinseo** now offers a number of bioplastic thermoplastic elastomers (TPEs) alongside more traditional types. It cites several challenges that have had to be overcome, including ensuring that the additives and colorants maintain the bio nature of the material.

The company is a major supplier to the luxury footwear industry where using bio-based materials is an important trend. At present, Trinseo's Aylon 52 Bio thermoplastic polyurethane (TPU) and its customised bio TPU colour masterbatches are being widely used by major premium brands. The company has more recently also begun targeting its expertise to other industries such as consumer electronics.

At **Hexpol TPE Group**, Global R&D Manager Klas Dannäs says interest in bio-based materials in the automotive industry has accelerated over the last few years. "It's an upward trend. Our Dryflex Green TPEs are being adopted for several applications previously using conventional TPE compounds, both as a drop-in substitution,

without the need for mould or tool modification, and also for new developments."

Dannäs says that, since most bio-based raw materials in the market are quite hard, a major challenge has been to develop compounds with high renewable content offering low hardness values while at the same time maintaining mechanical properties at acceptable levels. "With grades from 15 Shore A, Dryflex Green TPEs differ from other soft thermoplastic materials on the market by also including soft materials with high levels of renewable content," he says.

CLICK ON THE LINKS FOR MORE INFORMATION:

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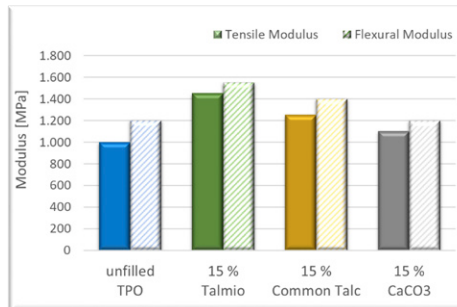
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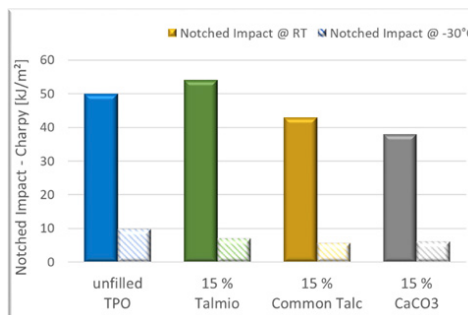
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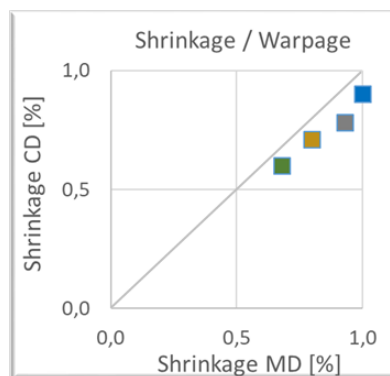
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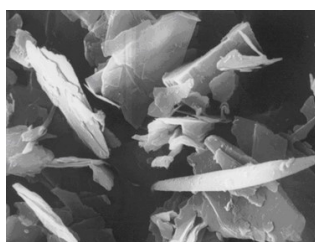
Reinforcement with 2 microns Talc in TPO



Impact strength with 2 microns Talc in TPO



Example: anisotropic shrinkage in TPO



Highly delaminated Talc

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Natureworks has been working with Farrel Pomini to develop low-shear compounding options for its PLA bioplastics. Peter Mapleston takes a look at the findings



PHOTO: FARREL POMINI

Low shear mixing of PLA

Many compostable bioplastics are polyesters and are shear-sensitive by nature so low-shear processing is required to help maintain polymer integrity and achieve optimal physical properties. Major PLA producer NatureWorks has been working with Farrel Pomini, which makes the Farrel Continuous Mixer (FCM), in a joint research program to compare the processing of its Ingeo compounds on a twin-screw extruder (TSE) and the FCM. The objective of the study was to evaluate the effects on molecular weight loss in PLA while adding a talc mineral filler.

"PLA is often compounded with mineral fillers and/or additives to improve physical properties. The benefits of the FCM would allow for lower processing costs, higher mineral fill levels and improved physical properties relative to twin screw extruders," says Farrel Pomini. It has published the results of the research in a White Paper written by Patrick

Lahmann from Farrel Pomini and Nicholas Knowlton from NatureWorks. This article reviews some of the key findings.

The FCM uses a non-intermeshing, counter rotating twin rotor design which imparts controlled levels of shear on the polymer blend, making it a good technology for handling shear and temperature sensitive materials such as PLA. For the purposes of the study, Farrel Pomini used a Compact Processor (CP Series II), which is a combination of an FCM that hot-feeds an extruder used to create the pressure necessary to produce pellets for analysis. Variables studied included molecular weight (Mw) retention, melt temperature, dispersion of the talc (measured by the Filter Pressure Value or FPV), and specific energy (SE).

Figure 1, showing molecular weight retention vs talc filler levels, indicates that with the CP mixing

Main image:
A study by Natureworks and Farrel Pomini finds continuous mixers a good choice for processing shear sensitive PLA resins

Summary of missing trials showing molecular weight retention of different PLA compounds processed on twin screw and continuous compounding equipment

Sample ID	Process Method	Mw Retention	% Filler	Melt Temp C	FPV	SE kW-hr/kg
926-29-01	TSE	93%	0%	222		
926-29-02	TSE	82%	20%	223	0.39	0.346
926-29-03	TSE	63%	40%	226	2.93	0.308
926-29-04	TSE	60%	50%	228	2.50	0.308
926-29-05	TSE	37%	60%	235	0.84	0.231
Processed at NatureWorks on 40mm TSE						
16-A	CP	99%	20%	178	0.38	0.127
17-A	CP	97%	40%	188	0.54	0.144
18-A	CP	95%	50%	202	0.54	0.166
24-A	CP	88%	60%	212	0.81	0.181

Processed at Farrel on CPeX Compact Processor

Source: Natureworks/Farrel

Figure 1: The effect of talc filler level on Mw retention

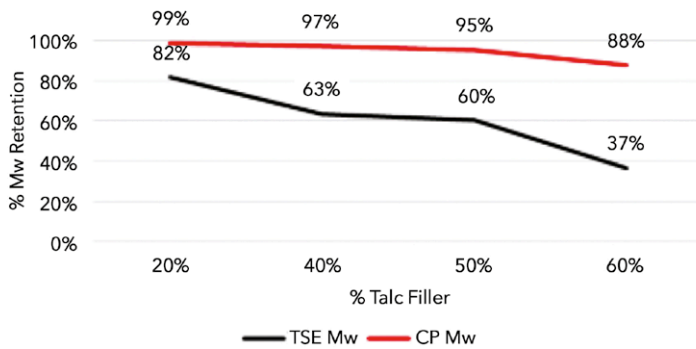


Figure 2: The effect of talc filler level on melt temperature

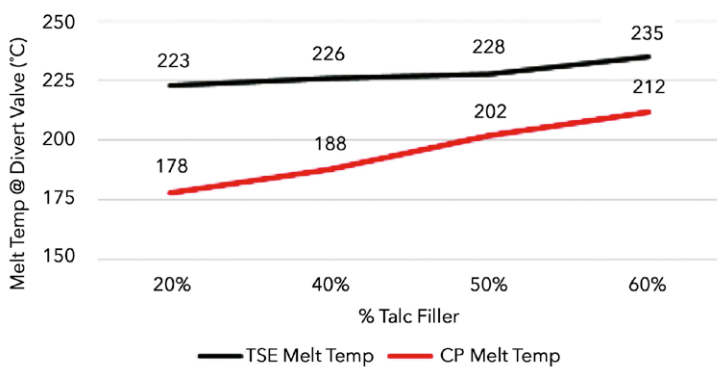
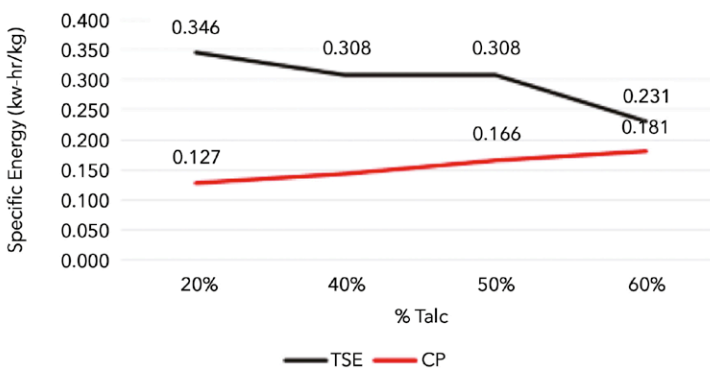


Figure 3: Specific energy vs talc filler level



Source: Natureworks/Farrel Pomini

technology the Mw retention was at least 95% up to the 50% fill rate with a drop to 88% at 60% fill. When compared with the TSE samples, a significant improvement in Mw retention was seen. This was attributed to the combination of lower melt temperatures, shorter residence time, and the more efficient shear imparted in the CP relative to the TSE. Higher fill levels are believed to be possible, say the authors. It is also possible to use process aids where the application permits, which could further increase fill levels while potentially preserving Mw.

Lower processing temperatures directly impacts Mw retention in PLA-based compounds. Comparing the data in Figure 1 and Figure 2, there appears to be a correlation between lower processing temperatures and improved Mw retention in the CP. Similar results are anticipated as these studies are expanded to larger machines.

Figure 3 shows the specific energy (SEI) required per kilogram expressed in kW-h/kg. When evaluating the CP curve, a gradual increase in SEI is seen as filler level is increased. In the TSE curve, a decrease in SEI is observed, which can be explained by noting the change in Mw in the TSE samples. This is attributed to the lower loss in Mw reducing energy requirements when filler levels are increased. The authors postulate that an equivalent Mw between the two processes would result in similar slopes and separation on both lines as filler levels are increased. Formulating with process aids may have further benefit in increasing the amount of filler used when considering creation of masterbatches.

Natureworks and Farrel Pomini intend to run further studies on larger production size machines to validate the findings remain consistent with the results of the study. However, they say that these initial indications show the FCM is very well suited to processing PLA and mineral filled PLA compounds.

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Dedicated sessions will feature hot topics such as wear-resistant plastics, conductive compounds, light-weight solutions for metal replacement, polymers for the car of the future, and materials for 3D printing.

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Clariant's Licocare range of rice bran-derived ester waxes provide a renewable processing aid option for formulators of bioplastic compounds

Sustainable waxes for bioplastics

Consumer demand for sustainable products has grown rapidly in the past few years. However, in terms of plastics, realising such a major change has not been easy. Achieving 100% sustainability even with fully renewable-sourced polymers such as polylactic acid (PLA) and polyhydroxybutyrate (PHB) has been limited by availability of bio-based additives – lubricants, dispersion aids, process aids, etc – to support conversion to usable goods, according to Frank Neuber, Regional Technical Segment Manager in the Additives Business Unit at Clariant Corporation in the US. What sustainable additives existed were often a cause of discoloration and higher cost, he says.

Neuber says the use of renewables is important to improve resource consumption. Clariant developed its Licocare rice bran ester waxes to take on the challenge. The materials are based on crude natural waxes extracted from bran husk discarded during the processing of rice. These crude, or underivatised, waxes do not provide the tempera-

ture stability and the colour specifications required for certain plastics applications. However, they contain the raw materials to make a sustainable wax with a structure based on the premium montan waxes that Clariant has produced for many years.

Established science

Using established separation science, esterification techniques and reactors, Clariant developed a process to separate the underivatised bran wax into its aliphatic acids and polyols, and then to re-esterify these into high-temperature processing aids, mould releases and dispersion agents analogous to its existing montan ester waxes. According to Neuber, this processing results in ester structures with more fully-saturated aliphatic acid chains, reducing the requirement for costly bleaching and resulting in reduced colour contribution.

The rice bran wax products show good organic pigment dispersion results, improved mould release properties, and high heat stability in PLA as

Main image:
Natural waxes from rice husk form the basis for Clariant's Licocare range of renewable processing aids

FILTER PRESSURE VALUE

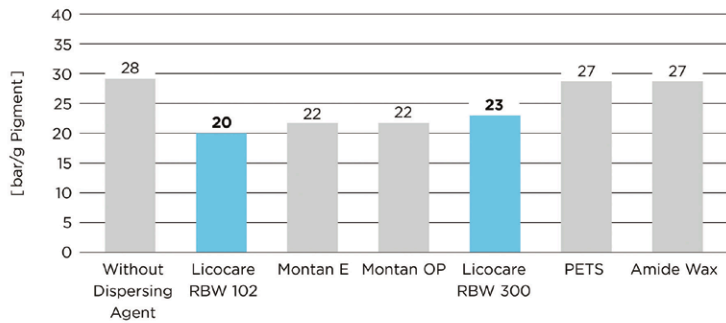


Figure 1: Filter pressure values while processing a PLA masterbatch comprising 30% PV Fast Blue BG pigment in Natureworks Ingeo 3001 D PLA and 0.3% addition of a variety of different waxes. Test carried out to DIN EN 13900-5; PZ 14um / ISO 9044.

Source: Clariant

RELEASE FORCE

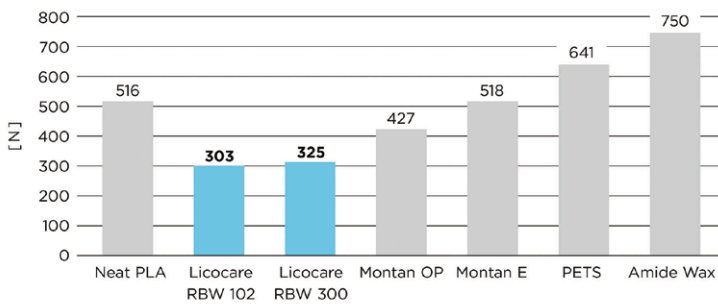


Figure 2: Measured demoulding force during injection moulding of Ingeo 3001 D PLA resin containing 0.3% of various waxes. Tested to Clariant's cylinder pull test method

Source: Clariant

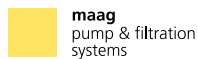
well as engineering polymers such as polyamides, polyesters, polycarbonates, and urethanes, Clariant claims. The company says they are a competitive choice for masterbatching and compounding of functional polymers.

Performance data

Neuber says a comparison the company carried out looking at filter pressure values achieved while processing PLA masterbatches with a variety of different waxes at a 0.3% addition showed its Licocare RBW 102 grade achieved the lowest filter pressure (Figure 1). The test was carried out to DIN EN 13900-5; PZ 14um / ISO 9044 and involved cold mix masterbatches with 30% PV Fast Blue BG pigment in Ingeo 3001 D PLA from Natureworks. Neuber says the lower filter pressure means better pigment dispersion and internal lubrication of the polymer and results in less heat build-up and subsequently less shear of the polymer, minimising the risk of degradation.

Injection moulding trials using Clariant's own internal test method (based on a standard cylinder pull test via a tensiometer fixed on a robotic arm) showed that the RBW 102 grade also achieved the lowest demoulding force of the products tested (Figure 2). The trials were performed using the same Natureworks Ingeo grade with a 0.3% addition of various waxes. Neuber says the reduced drag on the part containing Licocare RBW 102 offers the potential to reduce scrap due to formation of surface blemishes or deformation of the part during ejection. It could also be possible to reduce cycle time, he says.

> <http://www.clariant.com/additives>



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*Linda Campbell,
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The compounders' guide to 2019

Part 1: Polymers and additives

The world's biggest and most international plastics trade fair opens in Dusseldorf in Germany next month. K2019 is the place to see the latest innovations in plastics materials and processing but it is a big event that's best approached with a plan - our pre-event coverage aims to help you get the most from your time there.

This month we take a look at some of the planned polymer and additive introductions likely to be of interest to compounders. Over the next 24 pages we provide details on some of the newest developments in resins, compounds, flame retardants, plasticisers and pigments. Next month our spotlight turns to machinery and equipment.

K2019 will be a big show. The previous event in 2016 attracted 3,285 exhibitors and set a new attendance record of 232,053 (up by 5.5% on the 2013 number). The mood among visitors back then was really positive - the plastics industry had been going through a seven-year investment boom.

The economic picture for 2019 is quite different - global markets are slowing, protectionist economic policies are emerging, the impact of the UK's departure from the EU remains unclear, the automotive industry is facing a technological upheaval, plastics are finding themselves in the environmental firing line.

Against such a background, it is no surprise that machinery makers have dialled down their expectations - the VDMA (which represents German machinery manufacturers) is forecasting at least a 10% decline in production value across its members for this year reversing a decade of growth. That said, the K show has always been a shop window for the very latest technologies and a place where business is done, whatever the prevailing market conditions. And that is likely to remain the case for K2019.

If you are planning to attend the show but are yet to finalise your travel and accommodation, it is not too late. But you should act fast. There are some useful weblinks at the foot of this page and plenty more in the "First Look" article in our August edition that may prove helpful <http://bit.ly/2TsqtM>

The *Compounding World* and AMI Magazines team will be at the show for the full eight days and will be gathering information for our post-event coverage in the November and December editions. We will also be reporting on the biggest news and innovations as they happen via our @PlasticsWorld feed on Twitter. If you want to be sure you keep in touch with developments join the more than 20,000 people already following us.

You may also be able to catch up with our editors and sales team on the AMI stand at the show - you can find us on Stand C11 in Hall 7. We will have information about our magazines, conferences, databases, consulting services and our new North American and European Expos available. Some of our industry experts will also be giving daily presentations covering compounding, masterbatch and recycling. You can learn more about those here https://go.ami.international/book_ami_k2019demo/

Dates: 16-23 October 2019

Venue: Messe Dusseldorf, Dusseldorf, Germany

Hours: 10:00-18:30 daily

Tickets: One-day €75, three-day €155 (€49/€108 online).
All include free local transport and on-site wifi

Organiser: Messe Dusseldorf

Website: www.k-online.com

Use the following links to go direct to essential show information:

K2019 hotel booking - <http://bit.ly/k2019hotel>

K2019 online ticket purchase - <http://bit.ly/K2019tickets>

K2019 exhibitor search - <http://bit.ly/K2019exhibitorsearch>

K2019 iOS/Android apps - <http://bit.ly/K2019mobile>

Addiplast Group will present a number of new Adiflam flame retardant grades targeting the special performance requirements of the electric vehicle sector and will introduce a range of PPS and PPO compounds for demanding engineering applications. It will also present its latest products for lightweighting, including a range of natural fibre reinforced PP Addibio grades suitable for use in both structural and visible parts, plus a collection of carbon fibre reinforced PP and PA compounds.

In addition to its latest compounds and master-batches, Addiplast will also be promoting the capabilities of its Addiscience R&D division and its extensive toll compounding capabilities.

> www.addiplast-group.com

Akro-Plastic, part of the Feddersen Group of companies, will present its latest product developments. The company has extended its portfolio of PPA compounds based on PA6T copolymers to include new grades based on the homopolymer PA9T (marketed under the brand name Akromid T9). These are characterised by a lower water absorption (less than half that of PA6T alternatives), which means more consistent mechanical performance. Initial tests also show better flow and faster crystallisation behaviour during injection moulding, which can be carried out at a slightly lower temperature of 300°C.

For transport applications, the company has extended and improved its halogen-free flame-retardant compounds. For example, its Akromid C28 GF 25 FRT is claimed to be the first glass reinforced PA to meet the requirements of rail industry standard EN 45545-0 R1 HL2, R6 HL2 AND R7 HL2 as well as the US NFPA 130 regulation. For the aerospace sector it has developed Akromid PA K17 FR black (5762), a 35% glass reinforced polyimide compound that meets FAR 25.853 requirements.

Akro-Plastic has worked closely with machinery maker Feddem (also a Feddersen Group company)

to develop compounding systems that handle high levels of fibre reinforcement with minimal fibre breakage. It recently extended that partnership to long fibre reinforced compounds, which it says can provide 2-3 times higher tenacity than short fibre reinforced compounds with improved ageing and creep properties. It cites the example of Akromid B28 LGF 40 1 L, a chemically-coupled blend of PA6 and PP that flows better than a PA6 with 40% short glass fibre reinforcement yet offers conditioned strengths higher than a 50% short fibre reinforced PA6.

PA66/PA6I/6T blends also show significant advantages in long fibre formulations, the company says. For example, its Akroloy PA LGF 50 natural (5504) achieves a strength of 290MPa (10% higher than the short fibre equivalent) and retains 200MPa after 5,000 h of heat ageing at 150°C. At 265MPa, conditioned values are only slightly below the dry-as-moulded values.

Akro-Plastic will be exhibiting alongside Feddersen Group companies including plastics distributor KD Feddersen, toll compounder PolyComp, bio-based and biodegradable compound producer Bio-Fed, colour and additive masterbatch maker AF-Color, compounding machinery producer Feddem and engineering service provider M.TEC, the most recent addition to the group.

> www.akro-plastic.com

Albis will be presenting its latest own brand compounds - including its Altech Eco recycled and Alcom Med healthcare grades - alongside products from its long-term distribution partners such as BASF, Covestro, Ineos Styrolution and LyondellBasell. The Altech Eco line of technical compounds contain up to 100% recycled content (sourced from applications such as post-industrial fibres). Alcom Med products are formulated for production of healthcare products such as diagnostics and pharma packaging. Products are available in a wide range of

Discover our wide range of sustainable technical fibres

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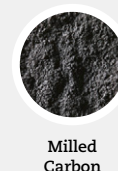
- easy dosing/dispersion
- ideal for compounding
- improved tribology
- increased wear resistance
- extra sizing: better adhesion to the matrix
- increased mechanical reinforcement



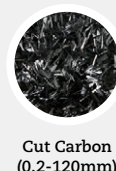
CARBON:

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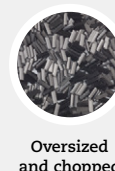
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polymers and meet all of the essential requirements of the medical sector, including regulatory compliance, consistent formulation and dedicated change management.

The company will also show examples of carbon fibre reinforced compounds produced by its Wipag subsidiary. The WIC-PP and WIC-PA compounds use carbon fibres recovered from offcuts from the composite manufacturing industry, allowing the company to offer more cost effective short fibre reinforced materials for production of high performance lightweight components.

> www.albis.com

AMI, publisher of *Compounding World*, will launch its new data services at K2019. Over more than 30 years, the company has assembled a global database containing individually verified information for more than 20,000 named plastics processing sites.

At the show, it will introduce a new data subscription service and demonstrate a suite of enhanced software tools that will give subscribers better access to critical information. The company says a number of its larger clients are already taking advantage of the new web-based search and analysis tools; it has now rolled out options for smaller clients that may require more targeted access to data.

Visitors to the AMI stand will also be able to find out more about the company's digital magazines, conferences and international exhibitions. In addition, they will be able to take part in a number of daily speaker sessions, where some of the company's experts will cover topics such as recycling, compounding and masterbatch.

> www.ami.international

Below: BASF will introduce high melt strength Ultradur PBT grades targeted at extrusion processing



PHOTO: BASF



Ascend sees big potential for PA66 compounds in automotive EV applications

Ascend Performance Materials

has developed a number of new PA66 resins and compounds that it will show, including high-heat and long-chain grades and additional flame-retardant versions of its Vydne PA66. It will also show a number of PA66 resins with recycled content. The company says it already has five PA grades available with some recycled content and it is aiming to increase the number by at least another four grades. It sees considerable opportunity for PA66 in electric vehicle applications, for example battery trays and housings, connectors and sensors.

> www.ascendmaterials.com

BASF will present new additions to its Colors & Effects pigment range as well as a new Microlen black and two Sicopal introductions optimised for demanding resin and recycling applications. It will also highlight new additions to its stabiliser and engineering plastics portfolio.

The new Colors & Effects products are Lumina Royal Russet and Lumina Royal Amber. The Royal Russet pigment is said to provide a vibrant high-chroma red shade and provides extended formulation flexibility, while Royal Amber delivers a strong sparkle for appealing bronze, orange, golden and red effects. Both effect pigments meet global food compliance standards.

The company is also launching a new black pigment intended to meet demands for deeper and darker shades. Microlen Piano Black is said to offer unmatched jetness and outstanding dispersion, which means very good mechanical properties. The new introductions to the Sicopal family include Sicopal Red K 3050 FK, a durable red that provides the high temperature and chemical stability required for use in engineering plastics, and Sicopal Black. The latter is said to offer very good near-infrared (NIR) reflective properties to enable sorting at materials recycling facilities.

The latest stabiliser addition to the BASF range - Tinuvin NOR 356 - is aimed at the agricultural sector. The new grade is said to extend the lifetime of agricultural films exposed to high levels of UV radiation, heat and crop treatments that use elemental sulphur.

In the engineering plastics sector, BASF's big news is the introduction of two new Ultradur PBT

ADEKA

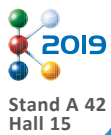


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Photo : the first reactor pot used in 1917 (exhibited in the headquarter showroom)



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Right: Bieglo will show its range of food contact approved PEEK compounds

grades that provide the high melt strength required for extrusion and thermoforming applications. Both new grades offer the high melting point, low water absorption, high dimensional stability and good barrier properties expected of PBT. Ultradur B6551 LNI is suitable for production of pipes, profiles and mandrels while Ultradur B6560 M2 FC TF is optimised for extrusion of films and thermoforming of packaging or technical parts.

> www.basf.com

Bieglo will display a selection of high temperature PEEK compounds, including a full range carrying FDA and EU food contact approvals. With its resistance to alkaline cleaning products and high temperature steam cleaning, PEEK is a popular choice for food processing machinery applications. Bieglo offers self-lubricating versions for bearings and gears, as well as coloured and detectable grades. The company can also offer PPSU options for food processing. These grades are translucent, sterilisable and can withstand continuous operating temperatures of up to 160°C.

> www.bieglo.com

Borealis will be exhibiting together with sister companies **Borouge** and **Nova Chemicals** at K2019, where the emphasis will be on its efforts to develop more sustainable “circular” products. These include its move into mechanical recycling through its investments in MTM Plastics and Ecoplast.

The show will see the launch of the company's Borcycle technology for reprocessing waste polyolefin to high quality plastic compounds. The first commercial example is Borcycle MF1981SY, which is developed for production of visible black



PHOTO: BIEGLO

appliance parts and contains 80% recycled content. The 10% talc-filled grade is said to provide a good balance of stiffness and impact resistance while offering a 30% reduction in CO₂ emissions compared to a virgin equivalent.

Borealis will also introduce improved versions of its Purpolen recycled grades.

Purpolen PP Y40 is a recycled PP with a MFR of 40 suitable for production of pails, thin wall packaging and appliance parts; Purpolen PE FF is a fine-

filtered PE with a low gel level; and Purpolen PE Y01 is a 100% post-consumer recycled grade with a low MFR suitable for pipe and large bottle production.

> www.borealisgroup.com

Brüggemann will present its full range of additives for enhancing the performance of polyamide resins, including new flow enhancers and heat stabilisers as well as products specifically formulated for “upcycling” recycled resins.

Flow enhancing products include Brüggemann TP-P1810, which the company claims is the first additive of its type that shows a significant flow improvement with polyphthalamide (PPA) resins, such as PA6T, PA6T/6I and PA6T/66, without compromising mechanical property characteristics. The ability to significantly widen the processing window makes it possible to process compounds with fibre contents of up to 60%, the company claims. The additive will be displayed alongside the company's TP-P1507 grade, which was introduced at the previous K fair for use with aliphatic polyamides such as PA6, PA66 and PA12.

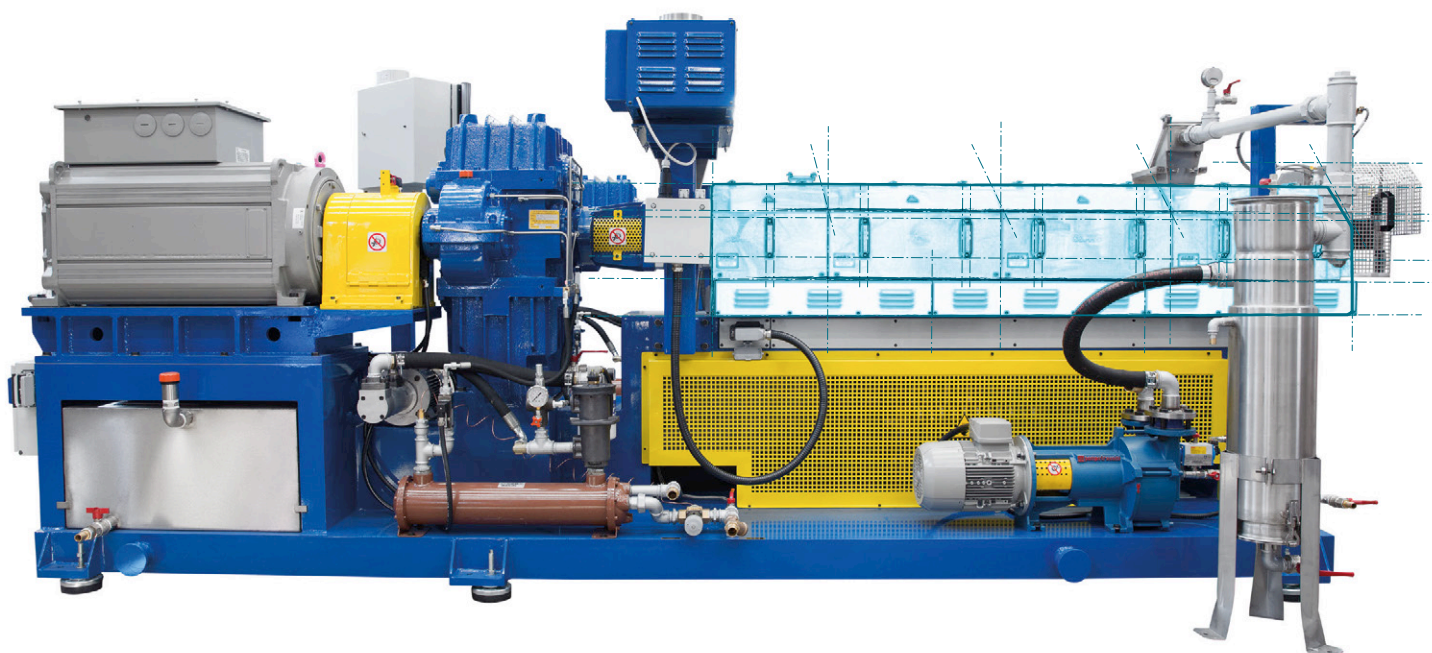
Three new heat stabilisers will be introduced at K2019. Phenolic Plus TP-H1803 is said to fill the price/performance gap between current phenolic and copper-based stabiliser blends, extending the temperature range to peaks of 180°C. Brüggolen TP-H1607 is a copper iodide-based stabiliser that can provide long term performance at up to 180°C at low addition levels. Brüggolen TP-H1805 is formulated to stabilise fibre-reinforced aliphatic polyamides for long-term application at temperatures up to 200°C for PA6 or up to 230°C for PA66 without separate activation. The company says the new product will allow PA compounders to produce grades suitable for applications currently served by PPA or PPS materials.

In the recycling area, Brüggemann will introduce two new reactive chain modifiers, which allow

Below: Recycled polyolefins from MTM Plastics feature among the Borealis display



PHOTO: MTM PLASTICS



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Hall 16/D42



PHOTO: BYK

Above: Flame retardance performance of a PA compound with (left) and without BYK-Max CT 4260 additive showing reduced dripping

molecular weight and viscosity to be adjusted to suit the needs of any particular application. Bruggolen M1251 compensates for molecular weight decline through linear chain lengthening. Bruggolen TP-M1417 shortens excessively long molecular chains from high-viscosity polyamide scrap from fibre or cast polyamide processing.

> www.brueggemann.com

Byk will exhibit the latest additions to its Byk-Max line of thermoplastics additives. Byk-Max CT4260 is

an organophilic sheet silicate intended for use in thermoplastics such as polyamides. It is said to be especially suitable for use in halogen-free flame retardant thermoplastic compounds, where it can improve flame retardance while also reducing dripping and encouraging char formation. The company says this means the amount of aluminum or magnesium hydroxide filler can be reduced leading to measurable improvements in processing behaviour and physical properties and a reduction in density. Byk-Max CT 4260 can also enhance barrier to oxygen, water vapour, and hydrocarbon.

The company will also present Byk-Max CT 4270. This organo-modified phyllosilicate functional filler is designed to provide reinforcement in polypropylenes at lower dosage levels than standard fillers, leading to significant density reductions and lower final part weight.

> www.byk.com/k

Cabot will present its full range of specialty carbon blacks, black masterbatches, and conductive compounds and concentrates, with the latter category bringing together its expertise in graphenes and carbon nanostructures. In the engi-

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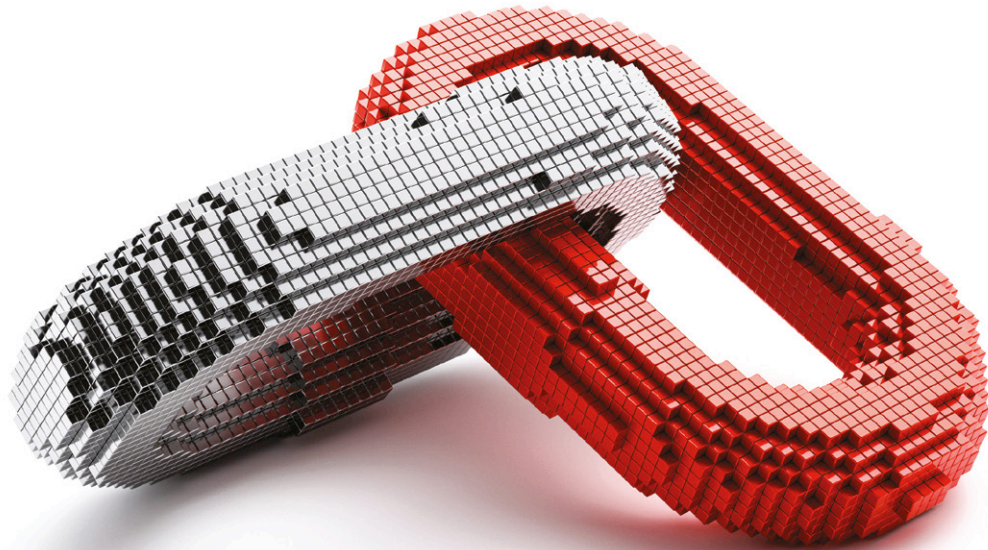
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- Recycling

www.olebond.com.tr

Registered trademark by Tisan



Right: Evonik will mark 40 years of Vestamid PA12 elastomer with some new grade introductions

neering sector, it will show its Cabelec conductive compounds, Vulcan conductive carbon blacks and Plasblack line of black masterbatches for engineering plastics. The company will also introduce a new black masterbatch range formulated to provide enhanced covering power to over-colour mixed recycled plastics.
 > www.cabotcorp.com

Clariant will be putting the focus on products designed to simplify recycling of plastics. These include a new range of black colorants that are compliant with the near-infrared (NIR) scanning and sorting systems used in current automated recycling plant. The CESA-IR pigments have been developed to enable IR-detectability of black HDPE and LDPE in injection and extrusion blow-moulded products, black polypropylene (PP) in films and injection-moulded products, and black PET and CPET in sheets and film.

The company will also launch a new oxygen scavenger masterbatch for production of PET food and beverage packaging that uses a new chemistry that the company claims allows it to outperform existing options. The idea is to eliminate the need for barrier packaging in some applications, which could result in easier recycling of the used packages. Clariant says that initial customer trials have gone well.
 > www.clariant.com

Constab, part of the Kafrit group, will exhibit its extensive range of additive masterbatch products. Key focus areas will include its Ecocell endothermic chemical foaming agent (CFA), which can be used to reduce polymer consumption and save energy, so reducing carbon footprint. Grades are available to suit a range of polymers. The company will also feature its new line of Conbio masterbatches, which are based on renewable PE carrier materials.
 > www.constab.com

Croda Smart Materials, which includes the Croda Polymer Additives amides business and recently acquired IonPhase anti-static additives operation, will be a new name at this year's K show. On the amides side, the company will present its established polymer additives lines, including its Crodamide slip and anti-blocks, Incroslip high stability slip and torque release agents, and IncoMold release and anti-scratch additives. It will also be highlighting its £27m investment in a new amide manufacturing facility in the UK. This will commence operation next year and will double capacity at the site.



PHOTO: EVONIK

The Ionphase permanent anti-static additives will be displayed for the first time at K as part of the Croda business (the company acquired the Finnish company at the end of 2017). The Ionphase business has developed a range of inherently dissipative polymers that provide an immediate and permanent static management effect that is independent of humidity. The additives are suitable for production of compounds for injection and extrusion processing and are said to allow compliance with key industry standards for EPA and EX areas. Grades are available to suit many polymers, including polyolefins, styrenics and PC blends.
 > www.croda.com

Evonik's display at K2019 includes the latest additions to its polymer and additive ranges. In the high performance polymer sector, the company will mark the 40th anniversary of its Vestamid PA12 elastomer (PEBA) with the introduction of a new grade offering considerably improved levels of transparency and gloss. The additive display includes the Tegomer range of additives, as well as the Accurel family of porous carriers that permit liquid additives to be easily handled in compound formulations. Latest additions to the additive product line include flame retardants and odour absorbers.
 > www.evonik.com

ExxonMobil will be showing several examples where its high performance polyolefins can be used to enhance the value and performance of recycled resins. The Patagonian Atando Cabos project, for example, is using the company's Vistamaxx resins as a compatibiliser to recycle fishing ropes recovered from the sea. More than 1,000 tonnes of ropes have been recovered and recycled to date. ExxonMobil will also demonstrate



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PHOTO: IMERY'S

Above: HAR talcs can enable wall thickness reductions and improve CLTE in automotive panel and bumper applications, says Imerys

how its Exxtral TPOs are being used in automotive interiors to extend colour options for PP beyond today's black and neutrals.

> www.exxonmobilchemical.com

Gabriel-Chemie will present its latest colour forecast - Colour Vision No.20 - as well as its latest masterbatch developments designed to provide enhanced brand security and apply permanent marking. New in the Colour Vision series is the Sustainability range, which uses post-consumer and post-industrial carrier resins and additives optimised for easy identification using near-infrared sorting systems in the recycling stream.

The company's Taggant Technology series allows plastic parts to be "marked" with a unique identity that carries through all stages of the product lifecycle, from production to end-of-life sorting. A number of applications will be shown on the company's stand while production and sorting using the TagTec masterbatches will be demonstrated on the Wittmann Battenfeld stand in partnership with Alpla. Gabriel-Chemie will also display the latest applications for its laser marking additives, where it is working in cooperation with BeLaser.

> www.gabriel-chemie.com

Grupa Azoty will highlight its two latest non-phthalate specialty plasticisers. The Polish chemical firm is introducing the Adoflex and Oxovilen plasticisers alongside its existing Oxoviflex products, launched in 2015.

The two additions to the company's plasticiser portfolio are manufactured in a new 10,000 tonnes/yr multifunctional plant at Kędzierzyn-Koźle. Adoflex is a bis(2-ethylhexyl) adipate that is said to provide very good plasticising properties and is recommended for production of food-contact materials due to its good toxicological profile. It maintains its properties at low temperatures and can be used as a main or functional plasticiser along with Oxoviflex. Oxovilen is a di(n-butyl) terephthalate that is said to offer fast polymerisation and low migration. A key target market for the product is flexible PVC liners, where it can be used as a functional plasticiser with Oxoviflex.

Both of the new plasticisers comply with the requirements of the EU REACH regulation. According to Grupa Azoty, they are not subject to any restrictions nor authorisation while their safe profile means they are not subject to CLP classification.

> www.grupazoty.com

Huntsman will introduce a range of polyurethane-based 3D print material systems aimed at prototyping and custom production applications in the footwear and sports and leisure sectors. The Iroprint materials are soft, flexible formulations available in systems suitable for all three main 3D print technologies - stereolithography (SLA), high speed sintering (HSS) and fused filament fabrication (FFF).

> www.huntsman.com

Imerys will show its full range of functional mineral fillers, with a key focus on examples of lightweighting and recycling applications. In the automotive sector, for instance, its high aspect ratio (HAR) talc products can increase stiffness and reduce coefficient of linear thermal expansion (CLTE) without loss of impact

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Right: Kraiburg TPE will show new grades for low VOC and decorative automotive interior applications

performance, making it possible to achieve tighter panel gaps and to reduce wall thickness. The company will also present its Nyglos family of surface treated high aspect wollastonites. These can be used in a variety of plastics formulations to replace or supplement milled and short glass fibres, where they can raise stiffness and improve thermo-mechanical properties such as HDT. They are said to be particularly effective in PA compounds.

For recycling applications, the company has developed its ImerLink technology. Based on proprietary recipes and its mineral additives, this technology allows mixed olefin waste streams to be compatibilised to deliver performance similar to virgin material. The ImerSorb range of absorbant mineral fillers can also play a part in the recycling industry, as well as other demanding end-use markets, by absorbing volatile organic compounds (VOCs) to minimise odour.

Imerys will also feature its FilmLink and FibreLink calcium carbonates, which are designed to improve throughput and enhance downgauging potential in production of technical films such as BOPP, and the InFusion line of mineral fillers for achieving high loadings in PVC.

Meanwhile, Imerys Graphite and Carbon will show its Ensaco line of high structure carbon blacks for enhancing electrical conductivity in polymer compounds, as well as the Timrex range of graphites, which can be used to provide self-lubricating properties and to impart electrical and thermal conductivity.

> www.imerys.com

> www.imerys-graphite-and-carbon.com

Below: Bayferrox 303T black pigment from Lanxess is claimed to reflect 20% more NIR radiation than alternatives

IMI Fabi will present its latest talc fillers, including new grades developed to allow weight savings in parts for applications such as automotive. These include HVTextra, which is described as a highly engineered talc, and HVTultraC, an ultrafine grade. Both can be used to create lighter and stiffer formulations allowing weight savings and downgauging. It will also present its NSultraC ultra fine



PHOTO: LANXESS



PHOTO: KRAIBURG-TPE

grade, which exploits the nucleating capability of talc to generate better structures and improved performance in foamed parts. In addition, the company will detail how its materials can be used as functional additives in both traditional and bioplastic compounds. Visitors can also take a VR tour of the company's mine on the stand.

> www.imifabi.com

Kraiburg TPE will place the main focus of its display on low emission thermoplastic elastomers. Two new compound series will be shown for applications where low migration is a top priority, such as valves and seals for closures for food and beverage applications coming into direct contact with fat. The company will also present examples from its ultra-low VOC emission range of TPEs for interior automotive use, as well as its custom-engineered thermoplastic hybrid products, which offer enhanced chemical and thermal resistance and are claimed to close the gap between TPEs and traditional elastomers. It will also introduce a line of UV-resistant TPEs for exterior automotive applications that provide adhesion to ASA, PMMA and EPDM.

> www.kraiburg-tpe.com

Lanxess will demonstrate it is ready for the electric vehicle revolution by showing a full range of orange PA and PBT compounds formulated to meet the need for long term colour stability for high voltage connectors. The company can already offer an RAL 2003 colour option with a new orange variant close to commercialisation. Both are to be provided in standard and thermally stabilised versions. Standard versions offer colour stability for 1,000 hours at 130°C; thermally stabilised versions 1,000 hours at 150°C.

According to the company, the idea behind the compounds is to eliminate the need for processors to colour material locally and to gain UL certification, which can add to their costs. The first com-

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Right:
Milliken's
display will
include its
KeyPlast line of
colorants

pounds to use the new colour are glass-fibre reinforced halogen-free flame-retardant PA6 grades Durethan BKV20FN01, BKV30FN04 and BKV45FN04. The hydrolysis-stabilised glass-fibre-reinforced PBT Pocan BF4232HR PBT is also part of the new product series.

The company will also focus attention on its Bayferrox 303T black pigment, which it claims reflects 20% more of the sun's near-infrared radiation than competing pigments, allowing it to help manage thermal build-up and to extend service life of parts. The company claims that the temperature of plastic containing the pigment exposed to the sun is as much as 8°C lower than a formulation using a conventional black pigment.

While the PA66 supply situation has eased a little in recent months, the potential to cut both cost and weight by switching to alternatives will be demonstrated in a steering column switch housing produced by Leopold Kostal for the Ford Fiesta, Focus and Eco Plus cars. Lanxess says the company switched from a glass fibre reinforced PA66 to foamed Durethan BKV30H3.0 30% glass reinforced PA6, which is processed in the same tooling with no modifications. The use of foaming technology allowed a 10% weight saving while improving dimensional stability and reducing cycle time. It also reduced part cost. The project was run within the Lanxess HiAnt material selection programme.

➤ www.lanxess.com

Milliken will show its range of additives for improving the clarity, performance and colour of plastics, including its Millad NX 8000 clarifier for PP. The company claims the product is used in close to 80% of global clear PP applications and it is currently building a new production plant at Blacksburg in South Carolina in the US that will expand its capacity by around 50%.

According to Milliken, Millad NX 8000 not only enhances clarity in PP but also helps towards sustainable manufacturing goals by allowing

Below:
Perstorp's
Pevalen
plasticisers are
suitable for
applications
such as food
processing



PHOTO: PERSTORP

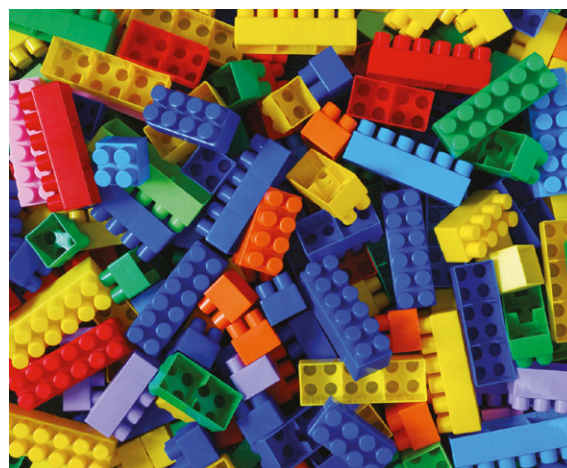


PHOTO: MILLIKEN

processors to operate at lower temperatures to cut cycle times and energy consumption. These benefits can be gained in injection moulding, thermoforming and blow moulding applications.

Performance modifying additives on display will include the latest addition to the company's established Hyperform HPN nucleating agents for PP and PE. Hyperform HPN 715 is said to provide an optimised balance of performance and a higher HDT than alternative PP nucleators, opening up opportunities for PP to replace more costly engineering resins in applications such as microwaveable containers, appliance parts and under-hood automotive components.

Milliken will also show its recently launched Deltamax performance modifiers for PP. Its DeltaMax melt-flow modifier can raise melt flow by as much as five times while maintaining impact and stiffness properties, allowing processors to increase operating efficiency and create more innovative part designs. The DeltaMax technology is also effective in modifying post-consumer and post-industrial recycled resins to bring impact strength and melt flow to match or exceed that of virgin resin. This is said to enable compounders to incorporate up to 100% recycled PP without sacrificing performance or processing.

Other products to feature at the show include the ClearShield UV Absorber line, which provides UV protection for items packaged in PET, and the KeyPlast and ClearTint colorants. KeyPlast colorants can be used by liquid and solid masterbatch producers and are suitable for use with a wide range of polymers, including PET, PS, PC, PMMA and PSU.

➤ www.milliken.com

Perstorp will introduce its Pevalen Pro renewable polyol ester plasticiser, the latest addition to its Pevalen line of non-phthalate plasticisers for flexible PVC that are said to offer both a good sustainable profile and an improved carbon



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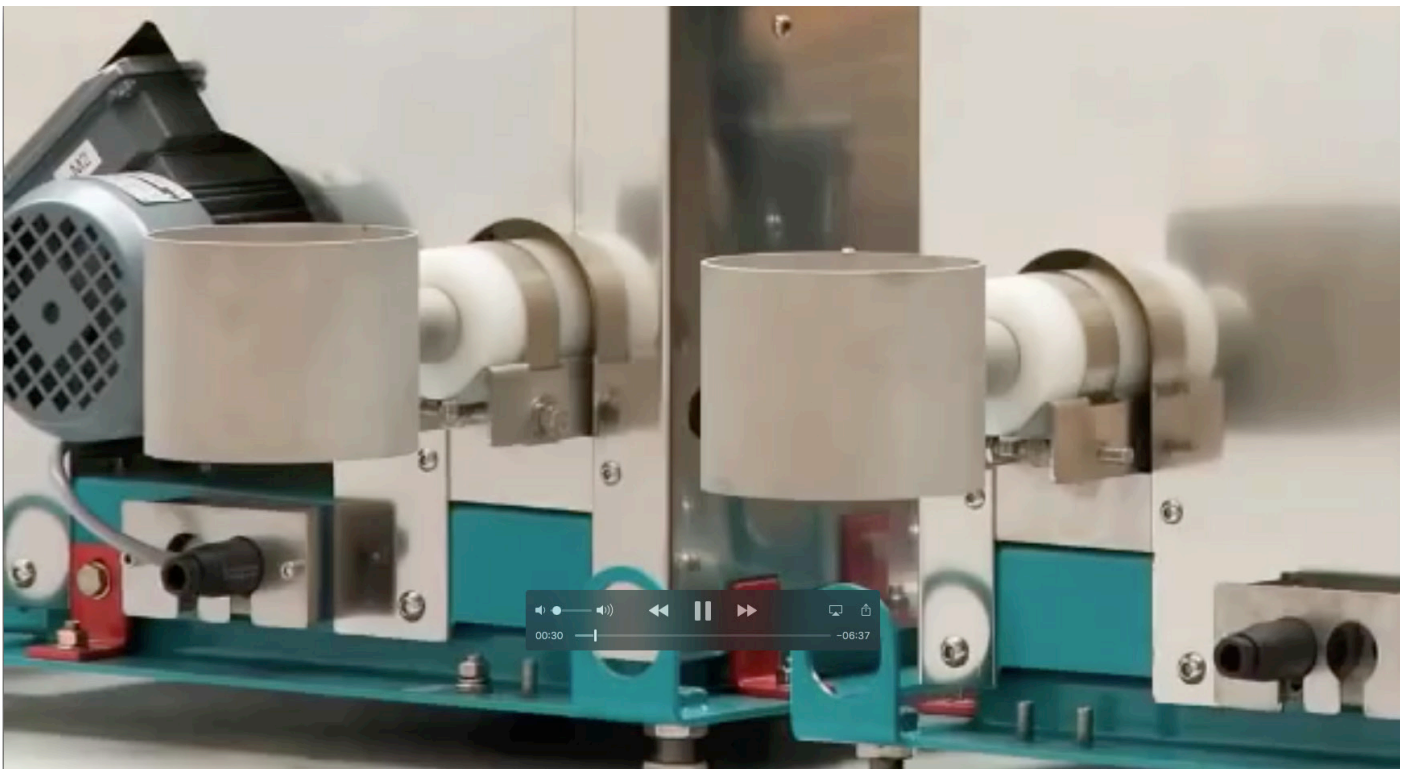




PHOTO: POLYPLASTICS

Above:
Polyplastics
will show new
engineering
compounds for
automotive
and E&E
applications

footprint. The original Pevalen pentaerythritol tetravalerate (PETV) plasticisers, launched in 2014, are said to offer high plasticising efficiency, faster processing, low volatility, high UV stability, and achieve very good softness. They are particularly suitable for applications in contact with people or foodstuffs (it gained FDA approval for repeated food contact use earlier this year). The new Pevalen Pro plasticisers can be used as a direct replacement for the original Pevalen grades. The first

products in the line contain up to 40% renewable content but the company says the aim is to eventually offer 100% renewable versions.

➤ www.perstorp.com

Polyplastics will be exhibiting together with its **TOPAS Advanced Polymers** subsidiary and showing the latest additions to its range of engineering plastics and cyclic olefin copolymers (COCs). These include a new high flow and high rigidity Duracon POM grade aimed at automotive applications such as injection moulded fuel system components. With a melt flow rate (MFR) of around 14, this new material is said to be suitable for a wide range of moulding conditions.

The company will also display developments in its Durafide PPS, Duranex PBT, and Laperos LCP product lines. These include Duranex PBT grades aimed at electric vehicle applications and Durafide products for engine peripheral parts such as power control units (PCUs). The latter are said to provide very good insulation and low water absorption while withstanding operating temperatures from -40°C to 150°C and humidity levels up to 95%.

TOPAS Advanced Polymers will display examples

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Right: SABIC's display at K2019 will put circular economy and waste issues in the spotlight

of healthcare and diagnostics components produced using its TOPAS COC polymers. These include drug delivery and blisters and microfluidic parts. Key attributes of the polymers in such applications include drug compatibility, transparency, biocompatibility, and dimensional stability.

- > www.polyplastics-global.com/en
- > www.topas.com

Polytechs will be presenting its full range of performance compounds and additive masterbatches, including its PW series of masterbatches developed as tackifiers for stretch film applications, as well as its Clean Xpress line of purging compounds. It will also show its latest additive developments in the areas of smart packaging, its recycled and biodegradable offerings, plus compounds for the pipe, cable and automotive industries.

- > www.polytechs.fr

Procotex will be showing its range of recycled chopped and milled carbon and para-aramid fibres, which provide compounders with a high performance and sustainable reinforcement option. Carbon fibre grades extend from 0.5m-120mm in length and can be supplied with different sizings and in chopped fibre or granulate form. Performance is said to match virgin product. Aramid products are available in lengths from 0.25-120mm.

- > www.procotex.com

R&P Polyplastic will present its latest developments and preview the results of some of its close-to-commercialisation projects. The Russian compounder has added a number of degradable products to its line-up, including biodegradable and oxodegradable types. It will also shortly introduce its first LFT PP compounds, which will be produced on a new pilot line being installed at its facility in Moscow, and is in the process of developing a range of thermally conductive compounds based on PP, PA6 and PBT resins.

www.polyplastic.ru

Radical Materials is the new name for SteriTouch, originally known for its antimicrobial products but now offering a full range of additive masterbatches. The most recent of these is the Konduct range of thermally conductive masterbatches and compounds, which are designed for use in applications such as LED luminaires and heat sinks. The company also offers a line of detectable additives for the food processing industry under the Scopic name.

- > www.radicalmaterials.com



Repsol's main features at K2019 will focus on its sustainability activities, including the first products from its Reciclex line of olefins with recycled content and its Zero chemical recycling initiative. Repsol 50RX2805 is an LDPE containing 50% post-consumer waste that is formulated for production of films for secondary packaging applications such as collation. The Zero project aims to use pyrolysis oils obtained by chemical recycling of plastic waste. The company says it has incorporated these products into its petrochemical plant at Puertollano in Spain on an experimental scale.

- > www.repsol.com

Rowa Group will be showing the versatility of its Rowasol liquid colorants in a demonstration of a live colour-managed compounding system. The exhibit forms part of the Circular Economy section of KraussMaffei's stand at the show and comprises a KM ZE28 BluePower compounding extruder fitted with a colorant dosing system from OPM Mechatronic and UV-VIS inline colour spectrophotometer from ColVisTec.

PP buckets moulded on a KM injection moulding machine will be regranulated and the material fed into the ZE28 extruder, where a talc filler and liquid colour will be added. Three Rowasol liquid colorants will be used - red, yellow and blue - allowing the colour of the compound to be adjusted to a standard using the RGB principle. The compound's colour is measured just after the liquid colour injection point and adjusted in real time. The final compound will be used to mould an automotive A-pillar cover.

- > www.rowasol.de

SABIC will present its certified circular polymers, resins that match the performance of current existing grades but are produced using a pyrolysis oil feedstock chemically recycled from mixed plastic waste. The feedstock has been introduced into the company's Chemelot production site at Geleen in

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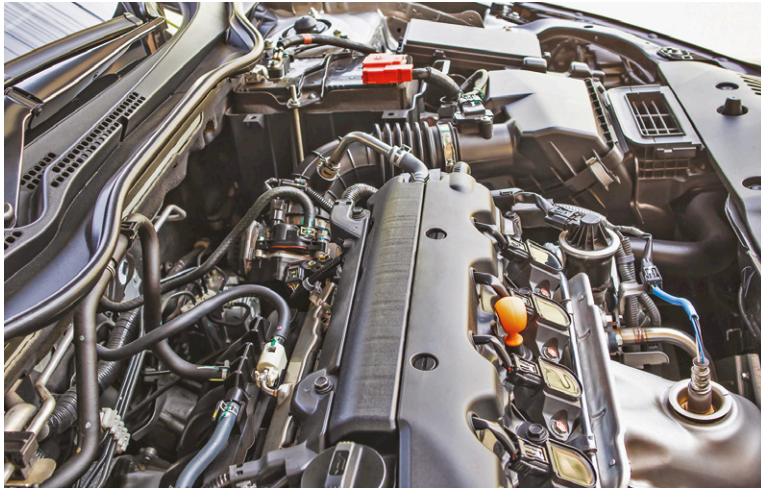
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AMI

PHOTO: TEKNOR APEX



Above: New Teknor Apex Creamid P PA6 grades are targeted at demanding automotive and structural applications

the Netherlands and the polymers produced are certified through the International Sustainability and Carbon Certification (ISCC+) scheme, which uses mass balance principles to allocate a renewability content based on the amount of renewable feedstock fed into the cracker. The company plans to have a semi-commercial plant refining and upgrading pyrolysis oil feedstocks by 2021.

> www.sabic.com

Right: Cable is a key market for the latest ADINS flame retardant additives from Tolsa

Solvay will introduce a new high temperature PEEK resin at K2019 as well as exhibiting its latest line of LFT products, which includes a recently developed grade capable of forming a high quality surface. In the additives sector, it will highlight its Cyasorb and Cyasorb Cyxtra UV stabilisers, which are formulated for applications ranging from polyolefin agricultural films and automotive components through to TPO and PET photovoltaic backsheet films.

> www.solvay.com

Songwon will introduce a new family of flame retardant synergists at the show. The products use a proprietary manufacturing technology and have been developed with performance, safety and sustainability in mind, Songwon says. The company will also feature the latest hindered amine light stabiliser (HALS) introduction from SABO, with which it has a long term collaboration agreement. SaboStab UV216 has been developed for demanding agricultural film applications.

> www.songwon.com

Teknor Apex will unveil two new additions to its Creamid P Series family of low moisture absorption

PA6 compounds offering glass reinforcement levels of 30 and 50%. According to the company, the new grades provide an 80% reduction in water uptake over 24 hours in the dry as moulded state and a 30% reduction on saturation compared to standard PA6 alternatives.

In the conditioned state the Creamid P2H7G6 and P3H2G10 grades show higher tensile elastic modulus and strength at break while spiral flow tests show a higher flow than comparable PA6 grades but similar levels of mould shrinkage, allowing use on existing processing machinery and moulds. The company says the Creamid P grades are available globally.

> www.teknorapex.com

Tolsa will display its expanded line of ADINS clay synergist flame retardant additives for use with PP, PVC and silicones. The technology is based on sepiolite clays, which the company modifies to enhance char creation, reduce dripping and to improve mechanical properties in halogen-free systems.

The extended product portfolio includes a new grade that uses titanium dioxide to improve the performance of intumescent systems for PP and coatings. This new ADINS Clay grade demonstrates further stabilisation of the char in intumescent systems at dosages of around 1-2%. In

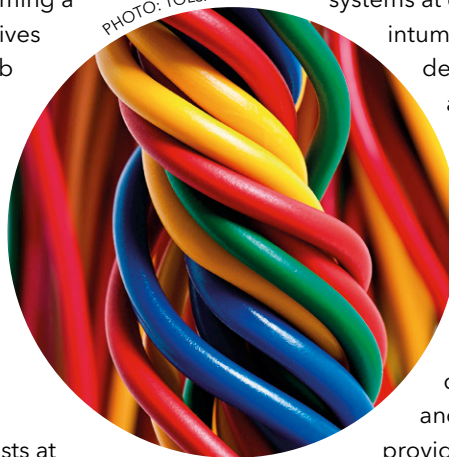
intumescent systems, it decreases and delays the peak heat release rate and acts as a smoke suppressor. Key end-use applications include transportation, pipe, coatings, and wire and cable.

Tolsa has also introduced ADINS Clay Sil1, which is intended for use in silicones and PVC formulations where it delivers reduced heat release and smoke suppression. It is said to provide an effective alternative to antimony trioxide (ATO). Another new grade, ADINS Clay G1, contains boron glass and functions as a ceramifying additive to improve mechanical performance of the char. It is based on an activated natural silicate with boron compounds and is targeted at applications such as cable and rubber compounds for transportation.

> www.tolsa.com

Total Corbion will show examples of current applications for its Luminy series of PLA bioplastics. A key focus of the display will be its high heat resistant grades, which it will be demonstrating by

PHOTO: TOLSA





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K 2019, Duesseldorf, Germany
October 16 – 23, hall 5, booth #E17

Advanced Composites Driven by inspiration

High-performance composites promote automotive development in lightweight construction. As one of the world's leading providers of coating and plastic additives, BYK is gaining momentum in the composites sector with its varied portfolio. BYK additives improve, for example, the processability of carbon fibers, therefore enabling optimum technical solutions for state-of-the-art vehicle body structures. Key advantages are considerable weight saving in lightweight structures, improvement of the mechanical properties and considerable reduction in pollutant emissions.

www.byk.com

Right: Total Corbion will be serving coffee in these heat resistant PLA cups from Pacovis

serving coffee – or tea – in thermoformed Naturesse cups produced by Pacovis. Other exhibits include PLA-based Nespresso coffee capsules from ATI, thermoformed packaging items from Pack & Proper, Danone and Cuki Professional, and PLA-coated paper cups and drinking straws from EcNow Tech and Shanghai Xinxin. Durable applications include a computer mouse by Nager-IT.

> www.total-corbion.com

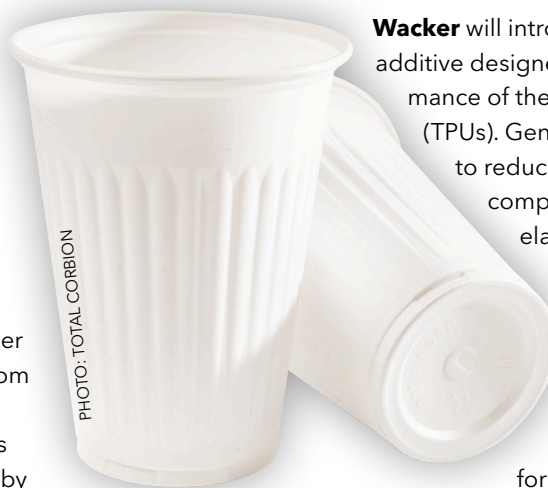
Trexel will be presenting its TecoCell range of chemical foaming agents. Offered alongside the company's established MuCell physical foaming system for injection moulded parts, the TecoCell products are claimed to offer premium chemical foaming performance at a low price. The company claims the patented foam processing technology, which uses nano-sized (<0.08 micron) CaCO₃ particles, produces a fine cell size foam with considerably higher surface quality than can be achieved with alternative conventional chemical foaming agents.

> www.trexel.com

Below: Wacker's Genioplast Pellet 345 is designed to enhance the performance of TPUs and other TPE compounds

Vertellus will introduce a new developmental product at the show that is intended to upgrade fibre reinforcements to enhance the performance of reinforced thermoplastic compounds and composites. It will also highlight a number of other recent introductions to its product line, which includes a variety of performance enhancing additives for use with polyolefins, polyesters, polyamides and PVC.

> www.vertellus.com



Wacker will introduce a new silicone additive designed to enhance the performance of thermoplastics polyurethanes (TPUs). Genioplast Pellet 345 is claimed to reduce the hardness of TPU compounds, increase their elasticity and improve resistance to surface scratching and abrasion. While optimised for use with TPUs, the company says it can also provide beneficial effects in other TPE formulations.

Part of the Wacker line of silicone compounding additives, Genioplast Pellet 345 is a pellet-form silicone copolymer that processes as a thermoplastic and disperses finely and homogeneously throughout the polyurethane matrix. It can be dosed on conventional compounding feeding equipment.

Additions of 3-5% are said to enhance the smoothness of the TPU, improve scratch and abrasion resistance, and make the surface more resistant to contamination by foodstuffs and cosmetics. Additions of 10% or more make the compound softer and more elastic. According to Wacker, every 10% increase in addition level achieves drop in Shore A hardness of approximately five points.

While the addition of the Pellet 345 additive results in some loss of mechanical strength, the company claims this is less pronounced than with alternative silicone-based additives. It does not have a negative impact on adhesion properties, so is a good choice for TPUs intended for hard/soft overmoulding applications. In addition, as the copolymer physically bonds to the matrix, it will not migrate (it is authorised for food contact applications in the EU).

The company sees the additive finding application in development of durable TPU compounds for production of items such as watch straps, smartphone covers and grips for sports equipment or hand tools.

Wacker will also show the latest version of its ACEO 3D printing system. The ACEO Imagine Series K2 printer can handle up to four different silicone materials (or three silicones and a support material) allowing production of parts in multiple colours or in different hardness combinations. It also incorporates a new auto-control technology that measures each layer and applies any necessary corrections to maintain compliance with the original CAD model.

> www.wacker.com



A focus on the future of the plastics industry

Brabender and Brabender Messtechnik provide individual solutions for extrusion and rheology on a lab scale

“Our Focus on your future” - this is the motto under which Brabender and Brabender Messtechnik will showcase their products and services at the K 2019. The two Duisburg companies are setting the course for the future with their solutions for quality testing and development of sustainable plastic products and formulations.

As ideal partners of the worldwide plastics industry, Brabender and Brabender Messtechnik offer individual and modular solutions with different application-specific equipment. These include torque rheometers with measuring mixers or measuring extruders as well as devices for particular measuring tasks that are used worldwide in all areas of research, development and industrial production.

The use of Brabender laboratory equipment has significant advantages over trials on machines that are otherwise used in ongoing production, since only a fraction of the raw material quantity is used compared to tests on production plants.

Expert advice on quality control

How does the product behave during the process, at certain temperature, speed or pressure conditions? How does the product react with other materials? How can one check whether the raw material supplied meets the requirements? What is the best way to adapt the processing conditions of the raw material to different products and tasks?

Brabender and Brabender Messtechnik will be giving answers to these and other questions to interested visitors at booth A22 in hall 10 of Messe Düsseldorf. There, the two companies will present a selection of their diverse product range for testing the properties of a wide variety of materials used in the plastics and rubber industries, among others.

The joint booth of the two Brabender companies will focus on a running laboratory film extrusion line consisting of the Stand-Alone Extruder KE 19 and a blown film take-off unit as a downstream unit in a new, user-friendly design. Various types of polymers are thus processed into films during the exhibition.



Also new in Brabender's product portfolio is the MetaStation 4E. The torque rheometer as a drive unit for various measuring mixer and extruder attachments can be seen for the first time at a K show. The Measuring Mixer 50 and a further development of the Measuring Mixer 350 S, specially designed for rubber applications, will also be on display at the booth.

Brabender will also be presenting the TwinLab-C 20/40 for the first time - a stand-alone twin-screw extruder with a modular design that can be used for a wide variety of applications. Both solutions are equipped with the web-based MetaBridge software. This ensures optimum ease of operation via a touch screen and enables, among other things, the simultaneous retrieval of measurement results via various desktop and mobile devices, regardless of location.

Specific measurement tasks

The water content is an important parameter for the quality of the manufactured product in the processing of high-quality engineering plastics. For the residual moisture analysis of plastics, Brabender Messtechnik therefore



This new blown film take-off will be running with a KE19 stand-alone extruder and die-head throughout the show

offers the AQUATRAC station, which can determine the water content very precisely with a capacitive water-selective dew point sensor. The precise water content of a sample can thus be determined with the AQUATRAC station without chemicals or consumables. In addition, the proven AQUATRAC with new features will also be available at the booth. Since April 2019, the measuring method of the AQUATRAC-3E is described as method E - Determination of water content by the calcium hydride method, in ISO 15512:2019 "Plastics - Determination of water content". This means that anyone can now determine the water content in the usual way in accordance with the standard.

Technology and service

Together, the two Brabender companies stand for high-performance and future-oriented technology that meets the highest quality standards - unique, compact and state-of-the-art. Brabender's comprehensive customer service rounds off the product range. The Brabender 5-Star Service strives for long-term customer satisfaction and guarantees the full performance of equipment and software over the entire product life cycle.

The Brabender experts will be ready to advise you about quality control at the K 2019 exhibition

The MetaStation 4E is the latest generation of Brabender's torque rheometer



Brabender and Brabender Messtechnik are looking forward to numerous interested K-fair visitors at booth A22 in hall 10

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Specialised purging compounds for specific applications can provide significant performance benefits in the overall compounding process. Mark Holmes finds out more

Purge your compounding cleaning problems

The ongoing trend to shorter production runs, with the consequential need for faster job changeovers, and the development of ever more demanding resins and additives can present compounders with some challenging cleaning issues. Purging compounds can simplify that process, saving downtime and ultimately preventing material waste, but they must be carefully selected and appropriately used.

Experience at **Dyna-Purge** is that compounders are continuously challenged to keep their processing equipment in top shape, hit peak production rates, minimise wasted resin and down-time and reduce lost time to changeovers and product conversions. "This is no easy job, especially if you do not have a top performing commercial purge compound (CPC) and a standard operating procedure (SOP) to match," says Bob Grzegorek, Global Technical Service Manager. "Today's advanced polymers are not making things any easier. They

contain numerous components to add performance and value to the resin, such as pigments, dyes, UV stabilisers, antioxidants, flame retardants, antistatic agents, plasticisers, fillers, lubricants and mould release agents, to name a few."

Grzegorek says combining and integrating these additives and ingredients into the base resin, then extruding and pelletising into the final compound, is a challenging task. He says the additives often tend to try to escape from the polymer, leading over time to a build-up of residuals on the screw and barrel, as well as other process surfaces.

"To best maintain your extruders, you will need a regular preventative maintenance programme that includes planned purging between runs and during shut-down and start-up in order to minimise losses and maintain high efficiencies. Without a regular purging programme, many of the additives can be expected to build up, stain, degrade, or in

Main image: Purpose designed purging compounds can help compounders reduce downtime and save on scrap

Right: Dyna-Purge's compounds can very effectively remove black specks from processing machines

some cases lead to carbon deposits, often a result of excessive oxidation," he says.

"As an example, many black or blue pigments are carbon-based. They tend to stain and molecular bonding can take place. Without regular purging, these pigments can build up on metal process surfaces, eventually breaking loose leading to product contamination," Grzegorek explains.

"Allowing oxygen to enter the process system is frequently the cause of carbon formation. Whenever you have extended down time, it is best to purge the system entirely, leaving the purge compound to insulate the screw and barrel," he says. "A non-chemical acting, heat stable purge compound allows the extruder to fully seal the entire process from feed throat to die, minimising oxygen risk to the system. This reduces the risk of polymer oxidation which leads to the formation of carbon deposits."

Home or custom

The next decision that needs to be taken, according to Grzegorek, is whether to use a homemade purge, or one of the pre-formulated, engineered grades of commercial purging compounds (CPCs). "As a provider of such compounds, we see the value of using a commercially designed purge over a homemade solution," he says. "In the vast majority of trials, CPCs outperform homemade purge or a simple resin used for purging. The overall cost of using a commercial compound versus other methods is by far more cost-effective. CPCs require less volume to be effective and work faster as well."

Ultimately, the best approach is to carry out a cost comparison. Grzegorek says this can be done using calculation models hosted on CPC suppliers' websites. These will capture downtime and scrap, as well as raw material costs, labour and resin use, allowing a decision to be made on which method is the best value option.

"It is best to do your research, and work closely with your provider of choice. They will work with you to recommend the best CPC for your specific process, resin and application. Follow that up with proper trials and document your results. Finally, there will be opportunities for the provider to suggest fine tuning and optimising your purging process to enable you to achieve optimised results. Heat settings, RPMs, pressures and torque can all be considered for this," he says.

A CPC supplier will also likely be able to suggest process tips that may enhance purging performance, such as varying the screw RPM to allow the purge to loosen and grab a hold of the residue



build-up from the screw and barrel. This will help it to be flushed out. The final step is to post-purge to remove the purging compound and ensure the system is clean and ready for the next production run. "Professional commercial purge suppliers can provide the resources and support to assist with all the steps necessary to improve your production performance," Grzegorek says.

Tackling small runs

Technology advances in both resins and additives have influenced how compounders run their materials, as well as run size, according to Joseph T Serell, President of **RapidPurge**. "Many compounders are being asked to accommodate smaller runs so that their customers - injection moulders and extruders - can address the needs of their customers. This advancement and specialisation has meant that many compounders are faced with more frequent changeovers," he says. The result is a more urgent need to quickly remove resin and additives from the previous run in order to begin the next one. He says the need for a high quality purging compound becomes even more a priority as many of the latest additives and resins can be more difficult to remove than their predecessors.

Serell explains that purging a compounding machine, in particular a twin-screw extruder, can be much more difficult than purging an injection moulding machine. "In response to our many compounding customers, we have just introduced a product that has three-pronged approach to cleaning these machines. Firstly, a proprietary mineral blend is used that is tough enough to remove most resin or contamination, including black specs and brown streaks, while not being as aggressive on the metals of the machine as glass fibre is. A customised expanding agent is also



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Right:
Preparing a
batch of
purging
compound for
dispatch at
RapidPurge



employed that forces the cleaning of all the metal surfaces, even behind screw flights. Finally, a proprietary compatible resin is used that is stiff enough to remove resident resin, but easily removed by the next production resin."

Compounding purging developments are continuing, he says. RapidPurge will be introducing a new compounding specific grade within the next 12 months that will work in a way said to be different to anything currently on the market. "Unlike most purging compounds, it is being patented," Serell says. "This grade will work rapidly with no abrasive elements. The engineering of this product is a technical challenge, but we have passed all the biggest hurdles already. It will safely and effectively break down resins so that they can be flushed very easily."

In a recent RapidPurge customer application, a large multinational compounder that works primarily with engineering resins was experiencing great difficulty removing some of the high temperature resins from both its single screw and twin screw compounding lines. It was finding that removal of the layers of resin that had built up on the screw typically required extensive tear-downs and up to eight hours of manual labour.

Chemical purges

RapidPurge says it supplied one of its chemical purge compounds - PM5540 - that was employed prior to machine tear-down. Around 10-20lbs (4.5-9kg) of material was required per clean-down, depending on the application. A soak period of 10-15 minutes was used to allow the purge compound to penetrate the layers of built-up material. The purge compound "soaked" down to the metal and, when the screw was pulled, easily peeled away from the screw. During that peeling process, the purge compound lifted the resins and degradation that had softened during the soak cycle. The whole process, including the screw pull, takes less than one hour, says Serell, who adds that in many cases the use of RapidPurge PM5540 was saving the compounder more than \$500 per purge.

Serell says the RapidPurge definition of a chemical purge compound differs from some other suppliers of purge compounds. "Many suppliers refer to their products as chemical purges," he says. "This is because they utilise foaming agents that react chemically when exposed to heat to form water or carbon dioxide. What RapidPurge calls chemical purge is very different. Our purge

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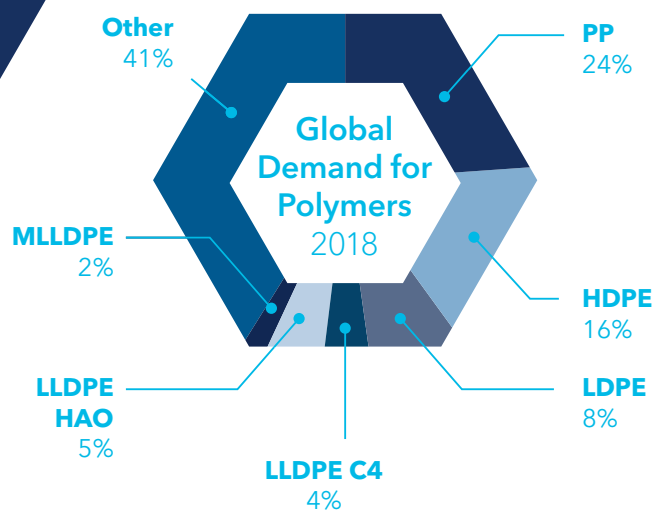


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Right: One of Asaclean Sun Plastech's range of purging compounds

compounds actually de-polymerise the residual resin in the machine. Our chemical reaction is the breaking down of the materials being removed, not the foaming of foaming agents. For this reason, RapidPurge materials are particularly well suited for compounding applications."

Reducing plastic scrap and waste is certainly the main driving force for new developments in purging and cleaning compounds for the plastics compounding and masterbatch industry, according to **Asaclean Sun Plastech**. "It is a hot button issue right now in the plastics industry and reducing scrap is better for processors, customers, the environment and their bottom line," says Jarred Packard, Project Engineer.

"Processors are focusing on doing their part to take care of the world's pollution problem, and that is a good thing. Engineers are looking for stronger and lighter plastics that have heightened resistance to harsh environments, such as chemicals, pressure, and extreme temperatures. The introduction of more speciality resins operating at higher temperatures is an issue. As more specialised and high temperature resins are developed, the purging compound industry needs to evolve to meet these new requirements too," he says.

Temperature challenges

Packard highlights other issues the industry is working on, including the need to develop grades that can clean at very low and very high operating temperatures. "We are also continuing to serve several markets using a combination of high performance mechanical purging compounds and industry-leading chemical purges that are optimised for low-flow and low-pressure environments," he says. "We also have several grades, like UF2, that can be used for specific 'on the fly' purging scenarios so that the downstream equipment does not need to be shut down."

Asaclean Sun Plastech has recently launched an 'introduction-to-purging' one-day programme to

Below: Purging compounds can dramatically ease cleaning of screws and screw components



PHOTO: ASACLEAN SUN PLASTECH

educate people new to the industry. "Depending on the need we either do webinars or fly out and give a demonstration and presentation in person," says Packard. "We can customise the presentation and demonstration for specific needs to enable effective training."

French manufacturer of purging compounds **Polytechs** has recently renamed CleanX, its purging compound range for extrusion and injection moulding, as Clean Xpress. "The major driving force for Polytechs in developing new purging compounds is to reduce downtime," says Maarten Bloem, Sales Director. Alongside the new name, the company has launched a new Clean Xpress website that provides technical information and videos on purging issues, product grades and applications.

Collaborative approaches

"We are working with OEMs on the purging step and collaborating with polymer equipment manufacturers. One partnership involves an OEM producing blown film and cast film lines in Germany who worked with Polytechs on a common issue in the film market - cleaning between continuous production of barrier films. Polytechs has been involved in developing solutions through Clean Xpress upgrades. We are able to clean extruders producing different layers of LDPE, LLDPE, tie layer, EVOH and PA6/PA66, which have an adhesion to metal affinity. This caused the barrier film producer a lot of issues in terms of cleaning times, impacting negatively on productivity, but is something we have solved with new Clean Xpress grades," Bloem says.

"Further new developments will be presented at K2019 for purging engineering plastics such as PA 66, BOPET films and extruders with low diameter and expensive filters, as well as new purging developments for the automotive injection mould-

PHOTO: ASACLEAN SUN PLASTECH

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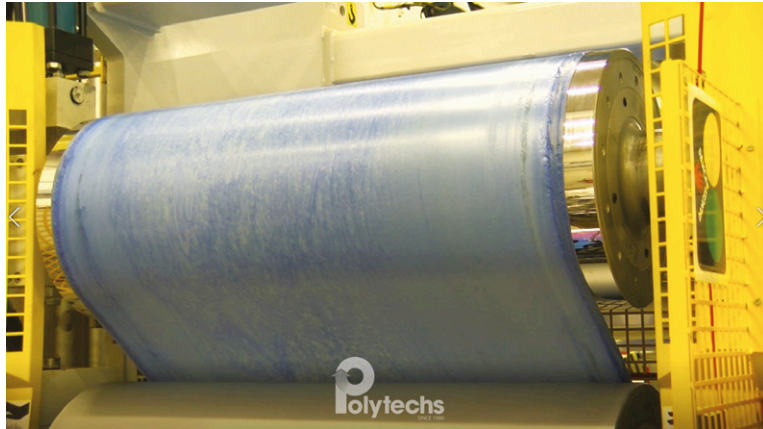
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PHOTO: POLYTECHS



Above: Image showing use of a Polytechs purge compound on a cast film line

ing market,” according to Bloem.

He says the company recently developed a Clean Xpress grade for cleaning extrusion lines running biopolymers. The grade is said to purge effectively at low temperatures from 80°C. Recyclability and sustainability are other issues that will be addressed at Polytechs in the development of new purging Clean Xpress grades.

Chem-Trend has developed Chem-Trend Lusin MC1718, a highly active general cleaner that is claimed to be especially applicable for removing tenacious polymer and other residues from metal surfaces. Available in aerosol and bulk forms, Lusin MC1718 is a cleaning agent primarily used for cleaning dirty moulds and dissolving polymer residues, for example PVC, POM, polyamides and acrylates. It is also effective at dissolving adhesives, glues, oil, wax, and grease residues.

Single solutions

The company has also developed Ultra Purge C6090 thermoplastics purging compound.

Primarily used in the manufacturing process of automotive headlamp and rear-lamp lenses, Chem-Trend says that this product offers customers a single purging agent that minimises quality issues and creates a more consistent, simple, and efficient process. “For customers using one machine to manufacture both headlamp and rear-lamp lenses, this product allows for one complete purging agent,” says Antje Scholl, Business Development Director – Thermoplastics, Chem-Trend. “Ultra Purge C6090 can greatly improve the quality of final products and will contribute to overall waste reduction. Plus, the need for one purging compound versus two will improve process efficiencies and upstream resources.”

The company adds that this flexible Ultra Purge C6090 solution also overcomes common industry issues associated with colour change in polycarbonate, or processing polycarbonate at high temperatures and switching to PMMA at low temperatures. The product allows for a smooth transition between the polycarbonate processing temperature of 280-320°C (536- 608°F) and 190-270°C (374-518°F) for PMMA. It prevents issues related to either freezing polycarbonate at PMMA processing temperatures or burning PMMA at polycarbonate processing temperatures with the consequence of black specks.

CLICK ON THE LINKS FOR MORE INFORMATION:

- > www.dynapurge.com
- > www.rapidpurge.com
- > www.asaclean.com
- > www.cleanxpress-polytechs.com
- > www.chemtrend.com

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AMI's Polymer Foam conference takes place in Hamburg in November, bringing together leading specialists to explore the challenges and benefits of foaming technology

PHOTO: SHUTTERSTOCK

Exploring opportunities for foamed polymers

Foamed polymers offer a whole raft of potential benefits, ranging from weight, material and energy savings to improved performance and cost effectiveness. But maximising the gains means understanding and successfully implementing the very best technologies. AMI's seventh European Polymer Foam conference brings together key technical experts and decision makers from end-users, foam manufacturers, testing companies and universities, as well as leading materials and technology providers, to discuss and explore the latest innovations and end-use applications involving polymer foam.

Taking place in Hamburg, Germany, on 26-27 November, the Polymer Foam conference will explore new opportunities for polymer foams in end-use markets, will examine regulatory developments and how they may impact on the use of foamed materials and blowing agents, and will identify end-use requirements, innovative production techniques and new material combinations. Covering all foaming solutions, a key attraction of this well-established event is the opportunity it

provides attendees to find out more about their own business sector as well as learning from ideas being successfully applied in other foaming areas. This article previews the event and takes a look at the line-up of expert speakers.

Aerospace ideas

Polymer Foam will be opened by **Ingo Roth**, who is responsible for Research & Technology Cabin and Cargo Interior and Materials at **Airbus** in Germany. He will explain how foam is being used to reduce weight and increase functional integration in aerospace applications. He will be followed by **Norbert Hessenberger**, Head of Innovation & Development at **Greiner Aerospace** in Austria, who will detail some innovative foam solutions for aircraft interior and seating applications.

The focus will then turn to processing innovations. **Yuxiao Zhang**, Research Associate at the **Institute for Plastics Processing (IKV)** at **RWTH Aachen University** in Germany, will take a detailed look at available foam injection moulding processes for packaging applications. Then

Main image:
The newest foam production and development innovations will be discussed at AMI's seventh European Polymer Foam conference in Hamburg in November



Expert speakers at the seventh European Polymer Foam conference include (from left) Cellmat Technologies Manager New Products and R&D Dr Cristina Saiz-Arroyo, University of Toronto Professor Chul B Park, and Tramaco Technical Sales Manager Dr Thomas Mergenhagen

Dr Cristina Saiz-Arroyo, Manager New Products and R&D at **Cellmat Technologies** in Spain, will examine how foaming mechanisms can be controlled to successfully optimise the production of advanced polymeric foam structures. And **Prof Dr Volker Altstädt**, Professor at the **University Bayreuth** in Germany, will explore some high-performance flame-retardant foams based on thermoplastic PET and thermoset epoxy resins.

Nano innovation

A full session has been allocated to the topic of nano-fibrillated materials. **Han Goossens**, Chief Scientist, Technology Management & New Offerings, and **Sunamita Anunciacao**, Specifications Specialist, at **SABIC** in the Netherlands will kick off the discussion with a joint presentation identifying new possibilities for PET foaming using nano-fibrillated masterbatches. Then **Prof Chul B Park**, Professor at the **University of Toronto** in Canada, will follow on with details of an investigation into foamability of impact modified polypropylene using nano-fibrillated EPDM rubber.

The final session on the first day will give attendees the opportunity to find out about technical and regulatory developments impacting on chemical

foaming agents. **Dr Thomas Mergenhagen**, Technical Sales Manager/Quality Manager at **Tramaco** in Germany, will review the basics and highlight some new developments in chemical foaming agents, including some key regulatory changes within the EU. Then **Dr Theresa Wassmer**, Technical Sales Manager Polymers at **Chemische Fabrik Budenheim** in Germany, will focus on the sustainability theme by exploring innovations in eco-friendly, endothermic foaming agents for thermoplastics.

Progress in PU

The second day of the conference will open with a look at the polyurethane foam industry. **Dr Aleksander Prociak**, Prof of CUT, Deputy Manager of Department of Chemistry and Technology of Polymers at the **Cracow University of Technology** in Poland, will present some new research on bio-based PU foams for thermal insulating applications. His presentation will also look at the effects of selected bio-components in this application. Next up is **Dr Guillaume Francois**, Scientific Software Developer at **Transvalor** in France, who will explain how in situ industrial PU foaming and filling can be modelled using numerical simulation. And **Dr Jan-Pleun Lens**, Vice President Research and Applications at **FRX Polymers** in the US, will speak about graphite-free and halogen-free flame-retardant flexible PU foams for automotive applications.

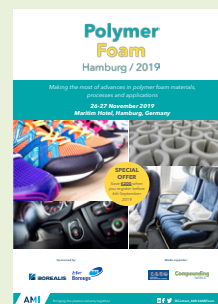
The final session of the conference is focused on extrusion processing. **Robert Breuer**, Research Associate at the **Institute for Plastics Processing (IKV)** in Germany, will look at the production of polypropylene foam sheet using blowing agent mixtures based on CO₂. And **Hilmar Heithorst**, Product Management CoC Flat Products at **Kraussmaffe Technologies** in Germany, will explore some of the newest extrusion technologies for PET foams.

About Polymer Foam EU 2019

Polymer Foam EU takes place at the Maritim Hotel in Hamburg, Germany, on 26-27 November 2019. The event brings together expert speakers from foam end users, manufacturers, testing companies and universities, as well as materials and technology providers. Over its previous six editions, the conference has established itself as the place to learn about foam market opportunities, end use requirements, regulatory developments, novel production techniques, and innovative material combinations.

Aside from the formal programme, the informal lunches and refreshment breaks and the complimentary cocktail reception at the end of the first day provide plenty of opportunity for discussion and networking. To find out more, visit the Polymer Foam [conference website](#) or contact Conference Organiser Katie Edwards.

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PHOTO: SABO

Pushing the limits in polymer stabilisation

Antioxidant producers are enhancing their products to meet new challenges, such as tougher recycling targets and aggressive agricultural techniques. Peter Mapleston reports on the latest developments

With the growing need to reduce, re-use and recycle plastics, especially polyolefins, the call for better ways to extend the lifetimes of products through multiple lives gets louder every day. Producers of stabilisers and antioxidant (AO) solutions are responding to that call with a whole range of new introductions based on both current and new chemistries.

SI Group - which now includes what used to be Addivant - says it has developed an innovative antioxidant technology based on a proprietary patent-pending invention that enables "previously unmatched reduction of colour formation in polypropylene and polyethylene with existing antioxidant chemistries." Named Ultrinox LC, the new product is suitable for food-contact applications and was discussed by Warren Ebenezer, SI Group's Research Manager for Polymer Applications, at the Performance Polypropylene 2019 conference organised by *Compounding World*

publisher AMI in Cologne earlier this year.

Ebenezer described Ultrinox LC as a "fully formulated solution in a non-dusting solid form that provides a best-in-class colour protection in polypropylene homo- and co-polymers with state-of-the-art consumer safety." Antioxidants sacrificially protect polymer integrity, he said, and phenolics cause discolouration via the formation of highly unsaturated quinonoid chemical species. With Ultrinox LC, colour change (as measured by Yellowness Index, YI) is 67% less than with an existing stearate-free AO after one pass and 47% less after five passes (Figure 1).

Ultrinox LC is intended to be exclusively included in additive blends or non-dusting blend solutions produced by SI Group, Ebenezer said. It will not to be marketed separately as a single component.

Ebenezer says the new LC technology is being investigated throughout the polymer arena and is

Main image:
Agriculture is one of many applications stretching the limits of current stabiliser technology, prompting SABO to commercialise its SABOSTAB UV 216 UV grade

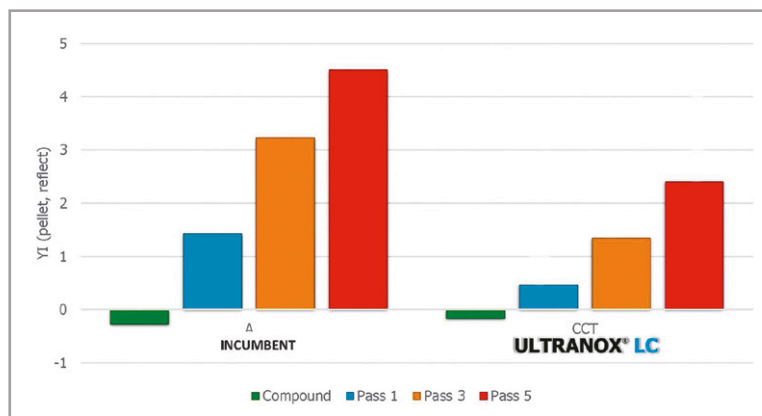


Figure 1: Ultranox LC shows less colour change (as measured by Yellowness Index) than a competitive stearate-free alternative after multiple passes. Test were carried out on an MFR4 polypropylene homopolymer compounded at 230°C in an inert atmosphere; multi-pass extrusions were run at 260°C in air.

Source: SI Group

showing promise in polyethylene as well as polypropylene, and also in engineering polymers and elastomers. “We believe that this concept will reset the baseline performance demanded by polymer compounders and OEMs,” he says.

SI Group also recently announced its phosphite antioxidant Ultranox 626 has been granted an extension of existing approvals by the US Food & Drug Administration (FDA) for use as a food contact substance in polypropylene homopolymers and copolymers under Conditions of Use A through H as listed in FCN 1988 (the approval is specific to the material manufactured at SI Group’s Morgantown facility in the US).

Ultranox 626 is a high-performance organophosphite antioxidant designed for demanding applications in propylene and ethylene homopolymers and copolymers, as well as for elastomers and engineering compounds. It is particularly aimed at applications where excellent colour stability is required. The recent extension permits the use of Ultranox 626 in a wide range of polypropylene food packaging and other food-contact applications.

Dover Chemical Corporation continues to obtain food contact approvals for Doverphos LGP-11, its high molecular weight phosphite that is said to be suitable as an alternative to TNPP or any other phosphite additive for polyolefin applications. It has already received broad FDA approvals for food contact applications in various thermoplastics, while in the EU it now has approval for use in HIPS that comes into contact with food.

Protecting films

Several companies have, in recent months, announced new developments in additives designed

to protect agricultural films against degradation. This issue has been aggravated in recent years by continuing growth in the use of sulphur as a fumigant. **BASF** says it is expanding its NOR technology to help farmers balance the need for greater yields of fruit and vegetables, while simultaneously meeting the ever-stringent environmental protection requirements of organic food production.

NOR refers to the molecular structure of the additives: N for Nitrogen, O for Oxygen, and R for alkyl. In general, BASF says, NOR HALS has improved resistance to chemicals, notably acids.

“Plasticulture - the use of plastic materials in agricultural applications - contributes significantly to producing more and better food all year,” the company says. Prominent examples include greenhouse covers to keep uniform temperature and humidity for continued food production; mulch films and irrigation pipes that reduce water consumption; and silage films that store livestock food in a cost-effective way.

“The development of Tinuvin NOR 356 is the result of BASF’s extensive competency in light and thermal stabilisation combined with our deep knowledge of agricultural market requirements,” says Volker Bach, Head of BASF’s Global Competence Centre Plastics Additives. Tinuvin NOR 356 protects and extends the lifetime of agricultural films that are exposed to very high levels of UV radiation, heat and crop treatments such as elemental sulphur, and the compounds approved in certified organic farming to prevent plants diseases and fertilise the soil.

Tinuvin NOR light stabilisers neutralise the

Right: Growing use of sulphur-based fumigation techniques is placing an additional demand on polymer stabilisation



PHOTO: BASF/CLISOL

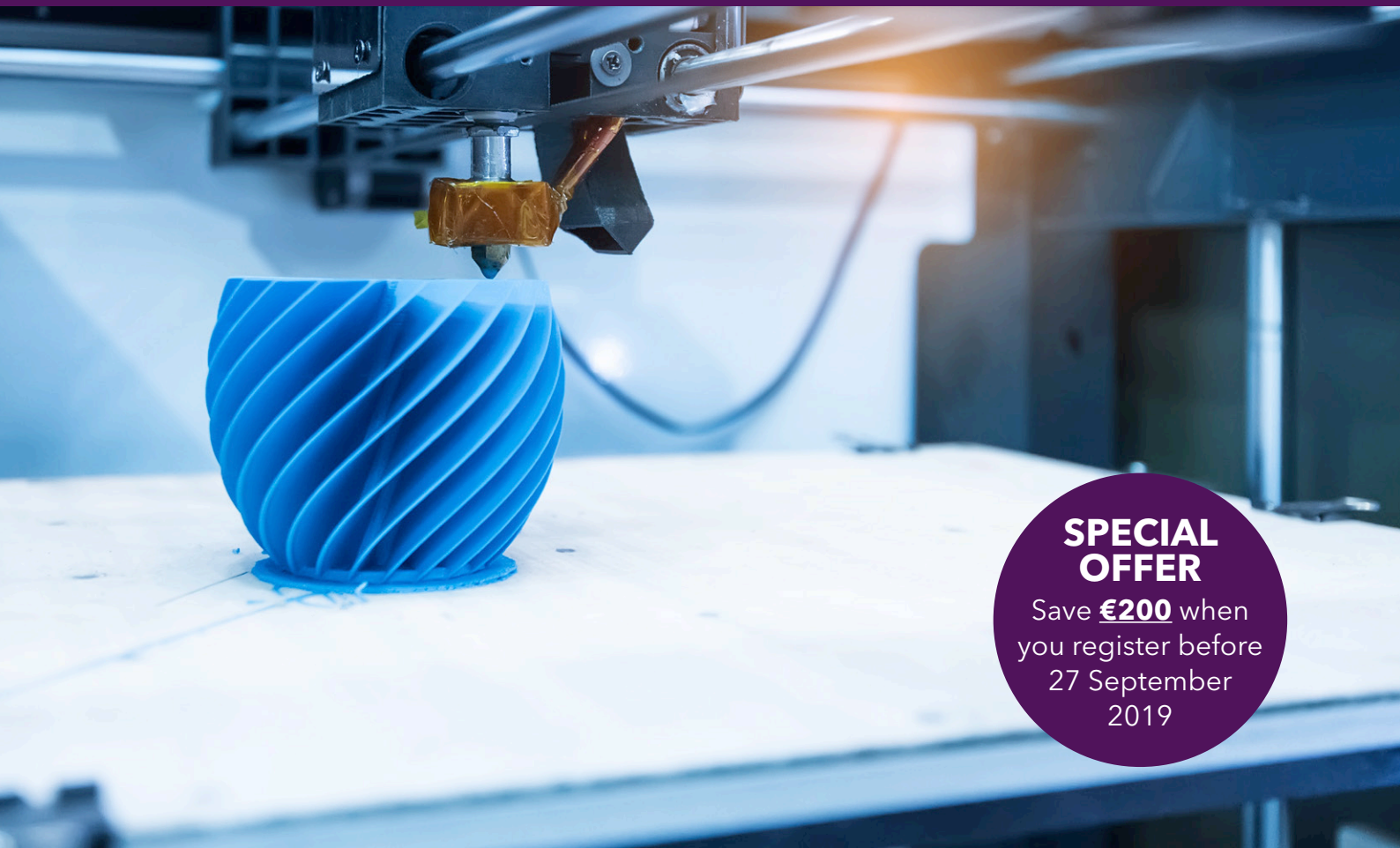
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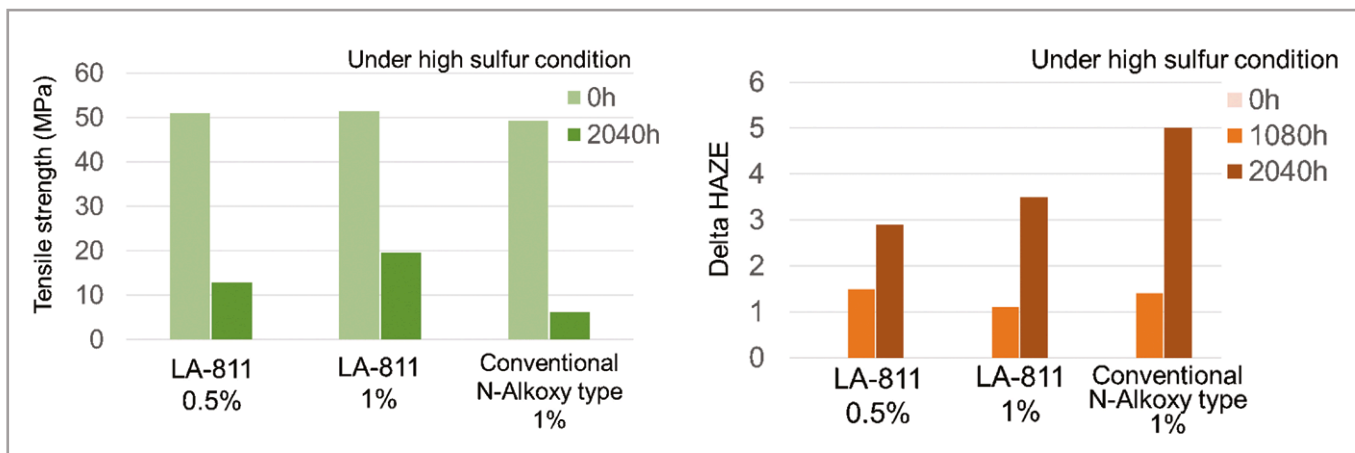


Figure 2: Tensile strength and haze performance of Adeka's LA-811 stabilisation technology in PE films after high sulphur fumigation exposure Source: Adeka

complex chain reactions that lead to polymer degradation caused by UV radiation, and disrupt the reaction cascade. "Standard light stabilisation solutions are not effective under these challenging conditions due to their limited resistance to agrochemicals, elemental sulphur and disinfection products," Bach says.

Agricultural challenge

Italian additives supplier **SABO** has put considerable effort into developing new light stabilisation solutions for films. This March, it reported that, after six years of development including accelerated weathering tests and extended field trials in Southern Italy and Northern Africa, it has now added SABO STAB UV 216 to its portfolio of light stabilisers. The company says SABO STAB UV 216 has been shown to provide "outstanding" thermal and UV protection to greenhouse films with proven resistance to agrochemicals, ensuring two or more years lifetime even in the presence of high concentrations of sulphur. "SABO STAB UV 216 exceeds the pesticide resistance achieved by SABO STAB UV 119, the well-known HALS broadly used to

stabilise PE-based greenhouse covers," says the company.

Korean company **Songwon**, which has a long-term collaboration with SABO, says that under a distribution agreement it will promote SAB-OSTAB UV 216 "by building on the unique combination of SABO expertise and strong in-the-field support from Songwon's Technical Service, Global Application Community and highly experienced sales team." Alberto Vischetti, Global Head of SABO's Plastic Additives BU, says the additive "takes us a further step forward in our journey to establish a global presence for light stabilisers."

Adeka has also been tackling the sulphur problem, which it says has become more urgent in recent years as the concentration of sulphur fumigation has increased. Noting that the acidic nature of the sulphur species absorbed in the film interacts with the basic amine stabiliser, effectively neutralising the function of the additive through salt formation, it says it has developed and launched ADK Stab LA-811 as a solution. The product is said to provide high weatherability even under high sulphur fumigation conditions.

"For sulphur-resistance, typically low-basicity N-Alkoxy HALS are used as these practically do not form salts with acidic species arising from sulphur fumigation," a company spokesperson says. "To cope with the increase of the concentration of sulphur, it is necessary to increase the amount of N-Alkoxy HALS added in order to maintain sufficient weatherability, but this can lead to issues of migration of the HALS. ADK Stab LA-811 can demonstrate high performance at low concentration even under high-sulphur fumigation. In particular, it is possible to maintain physical properties and transparency at this low loading after exposure and is superior to conventional light stabiliser solutions."

Below:
AddWorks
PKG 906 Circle stabiliser is intended to ease recycling in polyolefin film manufacturing



PHOTO: CLARIANT

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Recycling ideas

Several companies report successes in development of new solutions to the important issue of film recycling. **Clariant** has developed an additive solution that allows packaging film producers to increase the recycled content of their raw materials beyond current levels. The company says that while it was engaged in a project to help a global producer of plastic films optimise the antistatic properties of a manufacturing process for flexible packaging, experts from its Additives business unit noticed the high amounts of scrap generated during production. They used a polymer stabiliser from Clariant's AddWorks range to solve the issue.

AddWorks PKG 906 Circle allows reintroduction of reground scrap at a rate of 20% and higher into virgin resins without loss in quality or process efficiency, creating considerable benefits in polypropylene (PP) and polyethylene (PE) film production, Clariant claims.

According to the company, the additive is particularly well-suited for BOPP manufacturing but also applicable to cast and blown film processes. It can be used for enhancing the recyclability of a wide range of scrap materials, from trim or slit waste to leftovers from start-ups and shutdowns to off-spec from changeovers.

Consisting of free-flowing, food contact-approved white granules without carrier resin, the product is easy to feed into existing processes and can be fully adapted to varying parameters, such as base resin and recyclate quality, film type, and amount of recyclate added.

AddWorks PKG 906 Circle ensures that there is no loss of transparency or additional yellowing during film manufacturing. "It significantly reduces the formation of gels and black spots and enables maximum line speeds without increased risk of film breakage," says Diederik Goyvaerts, Global Segment Manager Processors at Clariant.

In tests, the easy-to-dose additive reduced gel

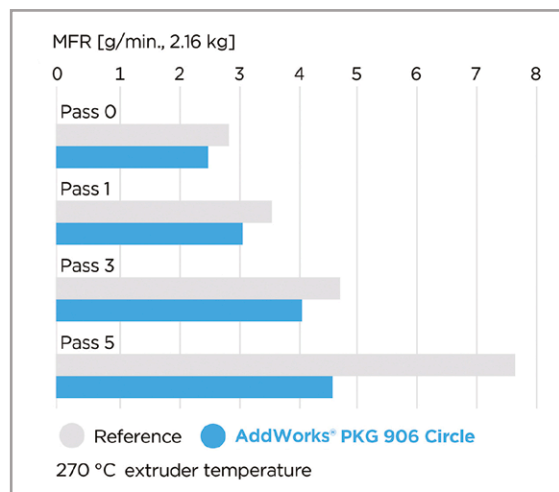


Figure 3: MFR degradation after multiple passes comparing AddWorks PKG 906 Circle against a reference additive

Image: Clariant

formation in films containing 30% recyclate by 10-25%, depending on the concentration added. "It also proved clearly superior to the reference system in stabilising the typical BOPP resin grade melt flow rate while passing through multiple extrusion stages," Goyvaerts says. "AddWorks PKG 906 Circle allows substantial improvement in the economic and ecological profile of packaging film production."

Adding capacity

Solvay, meanwhile, is building capacity with recycling and the circular economy in mind. It says the first phase of an expansion program at its new high molecular weight (HMW) hindered amine light stabiliser (HALS) production facility in Willow Island, West Virginia, US, should be completed this autumn. When complete in 2021, the expansion will double current capacity.

The company says the core HMW HALS products currently produced at the site are the foundation for its Cynergy and Cyxtra polymer additive product families. It adds that the Willow Island site "will play a key role in helping Solvay, in partnership with customers, realise its ambition to develop and deliver products and technologies that extend the lifetime and durability of recycled polyolefin plastics."

Solvay also says that it is working with several partners on projects focused on the circular economy, and is seeking additional collaborations. "We aim to facilitate the upcycling of recycled feedstock to support the application of recycled resins in high-value end markets that require a high degree of durability - such as automotive and building and construction," says Andrea Landuzzi,

Below: Solvay is adding capacity for HMW HALS at Willow Island, West Virginia



PHOTO: SOLVAY

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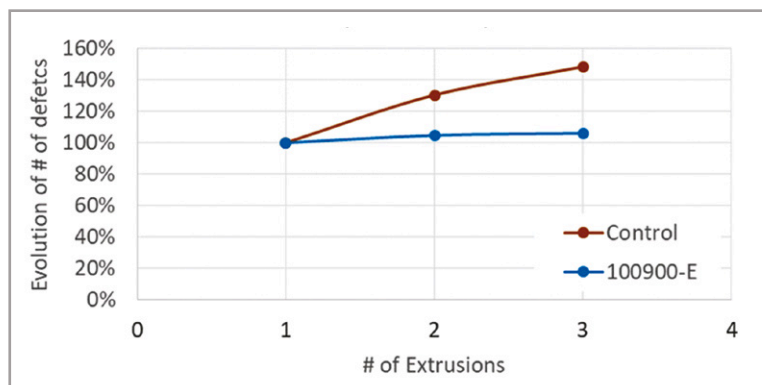


Figure 4: Gel count analysis comparing Ampacet’s Antioxidant 1900900-E masterbatch against a typical alternative after multiple passes

Source: Ampacet

Global Marketing Director for Solvay’s Polymer Additives business.

Ampacet’s Antioxidant 1900900-E is a specialty stabiliser masterbatch designed to protect recycled polyolefin from excessive degradation induced by heat such as yellowing and to minimise gel formation due to multiple extrusions. The company says it preserves the aesthetics and mechanical properties of packaging and allows manufacturers to use higher amounts of post-industrial and post-consumer recycled resins.

“Stabiliser 1000404-EA is a highly efficient complex stabilising grade for high-quality geomembranes designed to comply with strict design standards such as GRI, GM13, SKZ,” the company says.

Baerlocher continues to expand its Resin Stabilisation Technology (RST) platform, which acts synergistically with traditional antioxidants. Baeropol RST, in its pure form, is aimed at polymer producers and formulators who can use it to expand the performance window of existing stabiliser formulations or mitigate shortcomings of certain components: formulations limited by solubility or cost constraints, for example. It is supplied in the form of low-dust sprayed prills to help ensure a safe working environment and facilitate dosing.

The company also offers fully formulated antioxidant packages under the Baeropol T-Blend brand. These are available as granules or dust-free pastilles, and so can take advantage of the RST-technology at compounders and recyclers as well as at processors such as pipe and film producers. Baerlocher says it intends to expand the Baeropol T-Blend range to offer more tailored solutions for specific customer problems, in the use of both virgin and recycled materials. It says it aims to reveal results from some of these stabilisation development efforts at K 2019.

Right: New additives from Brüggemann could allow polyamide compounders to exceed previous performance limits

Processing focus

At **Byk**, the emphasis is on improving processability of compounds containing stabilisers. Products in Byk’s Byk-Max portfolio help reduce friction between the polymer melt and the internal metal surfaces of processing equipment without negatively affecting the mechanical properties of the final product, says Dan Berg, Global End Use Manager - Transportation, Thermoplastics Additives and Solutions.

When film producers employ UV stabilisers, material handling is complicated due to the dusty or sticky nature of these substances, Berg says. “Our Byk-Max LS concentrates provide a highly effective alternative to improve the life cycle of plastic film, fibres, and other extruded items,” he says. “Thanks to their excellent feeding characteristics, the granules or pellets can be dosed accurately and reliably. More importantly, they support a uniform and reproducible manufacturing process. We also offer grades, such as the Byk-Max LS 4122, that are suited for food applications.”

Berg says that in extrusion processes and in solid masterbatches, BYK-P and Byk-Max P additives provide excellent wetting of pigments and fillers together with less compacting and low melt viscosity. “This leads to improved particle dispersion and lower filter pressure value (FPV). As a result, the throughput increases. Contrary to expectations, the finished part’s mechanical qualities benefit, too.”

Polyamide options

Not all advances in stabilisation systems are for polyolefins. At K2019, **Brüggemann** will present its latest additive developments for virgin and recycled polyamides. The company says innovations include new heat stabilisers for medium to very high temperatures. “Phenolic Plus Brüggolen TP-H1803 fills the price and performance gap between existing phenolic-based and copper-



PHOTO: BRÜGGE MANN

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BASF antioxidants make light work – on water

BASF says its light stabilisers are helping pontoons for floating solar panel systems last longer under intense sunlight in projects by Shanghai Qihua Water Photovoltaic Engineering in China, which is using Chimassorb and Tinuvin additives to make the high density polyethylene (HDPE) mountings that allow the panels to float in service.

Blow moulded in HDPE, the pontoons are precision-engineered mountings that support the panels on lakes and reservoirs.

The compounds use UV-absorbers to prevent degradation and discoloration of the polymer and light stabilisers to provide the required durability in the demanding outdoor applications.

“The combination of the Tinuvin UV absorber with Chimassorb HALS provides synergistic effects and can meet the design criteria for enhanced service life of pontoons,” says Hermann Althoff, Senior Vice President Performance Chemicals Asia Pacific at BASF.

Shanghai Qihua has already embarked on several projects with the



Pontoons for floating solar panel systems in China are blow moulded in HDPE containing light stabilisers from BASF

panels in China, including a 55MW scheme in a coal mining subsidence area of Huainan and Huaibei province, a 30MW project in Jiangsu Yancheng, and a 200MW project in Vietnam. Company Chairman Kong Fei says BASF’s plastic additive package provides the confidence to offer 25-year warranties. “This helps us to expand our business to overseas markets,” he says.

Floating systems can be up to 18%

more expensive than land-based alternatives due to the need for floats and more resilient electrical components. However, the projects avoid use of forest and farming land while the water can be used to cool the panels, increasing the efficiency by as much as 10%.

Floating solar power systems are also said to be comparatively easy to install and decommission.

> www.basf.com

based stabiliser blends,” the company says. “It improves long-term heat aging stabilisation compared to conventional phenolic systems, extending the temperature range to reach peaks of 180°C, something not possible with standard phenolics.”

Elevated performance

The new Bruggolen TP-H1607, meanwhile, is described as a high-performance and cost-effective copper iodide-based stabiliser for where long-term resistance at elevated temperatures up to 180°C is a priority.

“Its effectiveness significantly exceeds that of the traditional copper iodide/potassium iodide stabilisers without making any compromises in terms of material properties,” the supplier says. “As a result, the required thermal protection is reached with very low concentrations – a particular advantage in E+E applications.”

A third new addition, Bruggolen TP-H1805,

stabilises fibre-reinforced aliphatic polyamides for long-term use at temperatures up to 200°C for PA6 or up to 230°C for PA66. Brüggemann says this enables compounders to tailor-make products for applications in borderline areas that were until now the preserve of polyphthalamides or other high-performance polymers such as PPS. According to the company, separate activation of the stabiliser system is not needed.

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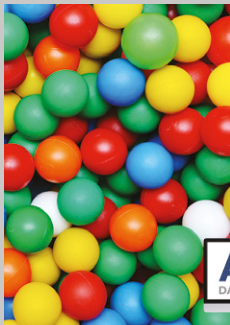
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POLYMERS IN FLOORING USA



The third North American Polymers in Flooring conference takes place on 17-18 September in Atlanta, GA, USA, providing a forum to explore the latest market trends and new developments in product design and production technology.

[CLICK HERE TO DOWNLOAD](#)

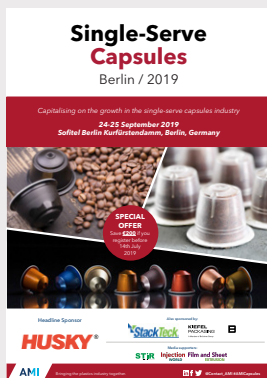
POLYMER TESTING & ANALYSIS



The 4th edition of the Polymer Testing & Analysis conference, taking place on 18-19 September 2019 in Düsseldorf, Germany, will gather together laboratory staff, researchers and R&D professionals who develop, test and analyse new polymer materials.

[CLICK HERE TO DOWNLOAD](#)

SINGLE-SERVE CAPSULES



The 3rd edition of AMI's international Single-Serve Capsules conference will take place on 24-25 September 2019 in Berlin, Germany. The urgent need to review the materials used for capsules in search of sustainable options will be a key topic of discussion.

[CLICK HERE TO DOWNLOAD](#)

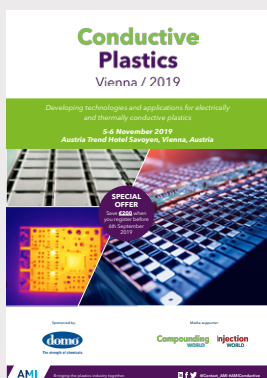
COMPOUNDING WORLD ASIA



Find out more about the dynamics and developing technical and market demands of the Asian compounding industry at AMI's fifth Compounding World Asia conference. The event takes place in Bangkok, Thailand on 25-26 September.

[CLICK HERE TO DOWNLOAD](#)

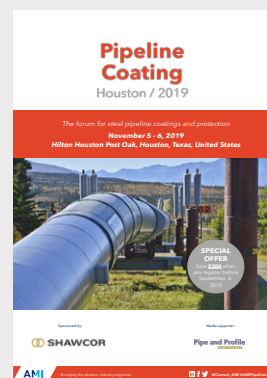
CONDUCTIVE PLASTICS 2019



AMI's Conductive Plastics conference takes place for the fourth time in Europe on 5-6 November 2019. It is the place to learn about formulation, processing and application of both electrically and thermally conductive thermoplastics. The event takes place in Vienna.

[CLICK HERE TO DOWNLOAD](#)

PIPELINE COATING HOUSTON 2019



AMI's fourth Pipeline Coating Houston conference takes place on 5-6 November 2019. It will bring together North American pipeline operators, contractors, pipe coaters, researchers and specifiers to discuss the latest sector trends and technologies.

[CLICK HERE TO DOWNLOAD](#)

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

POLYOLEFIN ADDITIVES 2019



Taking place in Vienna in Austria on 12-14 November, attendees at Polyolefin Additives will learn more about the latest additive technology trends in the polyolefin resins market, including vital steps to implementing the circular economy.

[CLICK HERE TO DOWNLOAD](#)

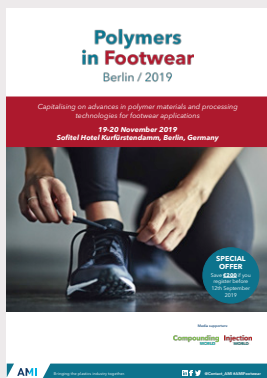
PROFILES



Taking place in Cologne in Germany on 12-13 November 2019, AMI's Profiles conference brings together the entire industry value chain to discuss the latest developments in construction standards, materials and production technologies.

[CLICK HERE TO DOWNLOAD](#)

POLYMERS IN FOOTWEAR



The third edition of Polymers in Footwear will be held in Berlin in Germany on 19-20 November 2019. The event brings brand owners together with designers and manufacturers to explore the latest developments in footwear innovation.

[CLICK HERE TO DOWNLOAD](#)

POLYMER FOAM 2019



The seventh Polymer Foam conference will be held in Hamburg in Germany on 26-27 November, bringing together an international audience to learn more about the latest chemical, physical and particle foaming technologies.

[CLICK HERE TO DOWNLOAD](#)

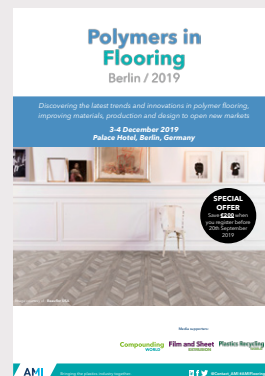
FIRE RESISTANCE IN PLASTICS



Now in its 14th year, AMI's Fire Resistance in Plastics conference is the place to discuss the latest regulatory developments and technical innovations in the area of polymer flame retardants. It runs in Cologne in Germany on 3-5 December.

[CLICK HERE TO DOWNLOAD](#)

POLYMERS IN FLOORING EU



Now in its fourth edition, AMI's European Polymers in Flooring conference is the place to learn about the latest market, material, technology and processing developments. The event takes place in Berlin in Germany on 3-4 December 2019.

[CLICK HERE TO DOWNLOAD](#)

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

Benvic Europe

Head office location:	Chevigny St Sauveur, France
President of the Board:	Luc G M Mertens
Ownership:	Société par actions simplifiée (Limited liability company)
No. of employees:	220
Sales 2018:	€93m (estimate)
Production 2018:	140,000 tonnes
Plant locations:	France, Spain, Italy, Poland
Profile:	With a track record of more than 50 years in the PVC compounds industry, Benvic holds a firm place within the European market and beyond - it supplies to 60 countries globally. The strategic acquisition of Alfa PVC in Poland in 2018 marked a further step in its growth plan and highlighted Central Europe as a priority growth area for the business.
Product line:	Benvic is a producer of PVC compounds, PVC powders, thermoplastic alloys and one-pack stabilisers. Its compounds are targeted at multiple end use applications across a broad range of industries, including building and construction, cable manufacturing, technical profiles, automotive and food packaging. Its one-pack stabilisers include calcium-zinc and calcium-organic types while its second generation PVC alloys extend the scope of the resin in to challenging applications requiring higher thermal resistance.
Product strengths:	Benvic offers standard formulations as well as custom recipes designed to meet individual customer needs. Sustainability has become an increasing focus area for the company and many of its PVC formulations incorporate PVC recycle.

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

Compounding FORTHCOMING FEATURES WORLD

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

October

White pigments ● Recycling additives
Compounding for 3D printers
Alternative compounders
K2019 show preview part 2

November

Carbon black ● Active additives
Polymer reinforcements
Continuous/batch mixers
K2019 show news

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

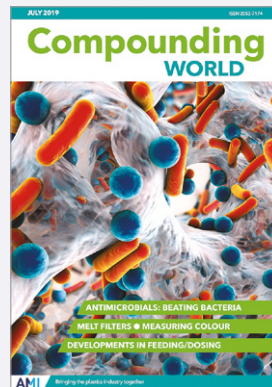
AMI publishes five process-specific FREE plastics industry magazines. Simply click on the cover below to read each magazine. Or download the issue in the relevant Apple or Android app



Compounding World August 2019

The August edition of Compounding World looks at the latest technical and regulatory developments in PVC plasticisers. Other technologies in this month's spotlight include reactive compounding, wear resistant machine parts and WPCs.

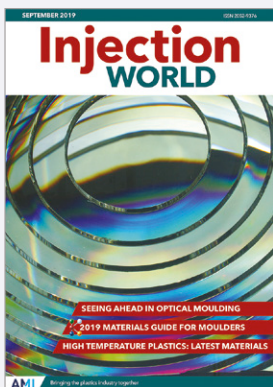
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Compounding World July 2019

The July edition of Compounding World takes a look at the development and application of antimicrobial additives. It also reviews the latest innovations in melt filters, colour measurement and feeding technology.

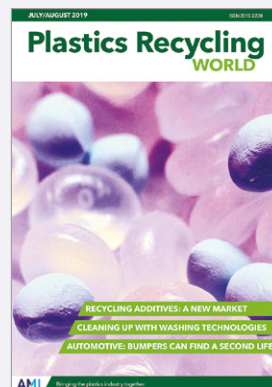
[> CLICK HERE TO VIEW](#)



Injection World September 2019

The September edition of Injection World magazine takes a look at the latest in optical and medical moulding. It also reviews developments in high temperature plastics, plus a preview of the material innovations that will feature at K2019.

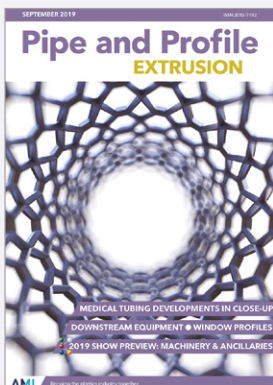
[> CLICK HERE TO VIEW](#)



Plastics Recycling World July/August 2019

The July/August edition of Plastics Recycling World takes a detailed look at the growing range of additives available to plastics recyclers. It also explores new developments in washing equipment and reviews a major US car bumper recycling project.

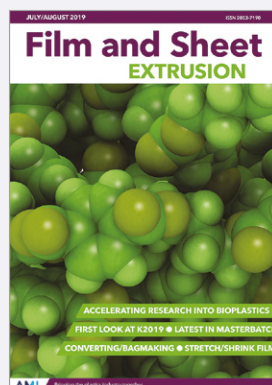
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Pipe and Profile Extrusion September 2019

The September issue of Pipe and Profile Extrusion magazine explores the latest developments in medical tubing, window profiles and downstream cutting systems. Plus, a preview of the innovations in store for extruders at K2019.

[> CLICK HERE TO VIEW](#)



Film and Sheet Extrusion July/August 2019

The July-August edition of Film and Sheet Extrusion looks at the accelerating research into bioplastics applications, plus stretch and shrink film, masterbatches, bag-making machinery and a Visitor Guide to K2019.

[> CLICK HERE TO VIEW](#)

Take out your own FREE subscriptions to any of the magazines. Click on the logos below to simply register on-line.

Compounding
WORLD

Film and Sheet
EXTRUSION

Pipe and Profile
EXTRUSION

Injection
WORLD

Plastics Recycling
WORLD

GLOBAL EXHIBITION GUIDE

2019	18-21 September	T-Plas / Tiprex, Bangkok, Thailand	www.tplas.com
	16-23 October	K 2019, Dusseldorf, Germany	www.k-online.com
	17-19 October	Plastics, Printing & Packaging, Dar-es-Salaam, Tanzania	www.expogr.com/tanzania/pppexpo
	25-28 November	Plastivision Arabia, Sharjah	www.plastivision.ae
	27-29 November	Plastics & Rubber Vietnam	www.plasticsvietnam.com
2020	13-16 January	Saudi Plastics & Petrochem, Riyadh	www.saudipp.com
	16-20 January	Plastivision India, Mumbai, India	www.plastivision.org
	21-23 January	Swiss Plastics, Lucerne, Switzerland	www.swissplastics-expo.ch
	28-31 January	Interplastica, Moscow, Russia	www.interplastica.de
	24-26 February	Plastics, Printing & Packaging, Addis Ababa, Ethiopia	www.expogr.com/ethiopia/pppexpo
	11-13 March	Expo Plasticos, Guadalajara, Mexico	www.expoplasticos.com.mx
	26-28 March	MECCSPE, Parma, Italy	www.mecspe.com
	7-13 May	Interpack, Dusseldorf, Germany	www.interpack.com
	3-4 June	Compounding World Expo Europe, Essen, Germany	www.compoundingworldexpo.com/eu/
	8-11 June	Argenplas, Buenos Aires, Argentina	www.argenplas.com.ar
21-25 September	Colombiaplast, Bogota, Colombia	www.colombiaplast.org	
13-17 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de	

AMI CONFERENCES

17-18 Sept 2019	Polymers in Flooring USA, Atlanta, GA, USA
18-19 Sept 2109	Polymer Testing & Analysis, Dusseldorf, Germany
25-26 Sept 2019	Compounding World Asia, Bangkok, Thailand
5-6 November 2019	Medical Tubing, Minneapolis, MN, USA
5-6 November 2019	Conductive Plastics, Vienna, Austria
12-13 November	Profiles, Cologne, Germany
12-14 November	Polyolefin Additives, Vienna, Austria
26-27 November	Polymer Foam, Hamburg, Germany

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

PLASTICS RECYCLING
WORLD EXPO

POLYMER TESTING
WORLD EXPO

3 - 4 June, 2020
ESSEN, GERMANY

PLASTICS EXTRUSION
WORLD EXPO

COMPOUNDING
WORLD EXPO

4 - 5 November, 2020
CLEVELAND, OHIO

www.ami.international/exhibitions

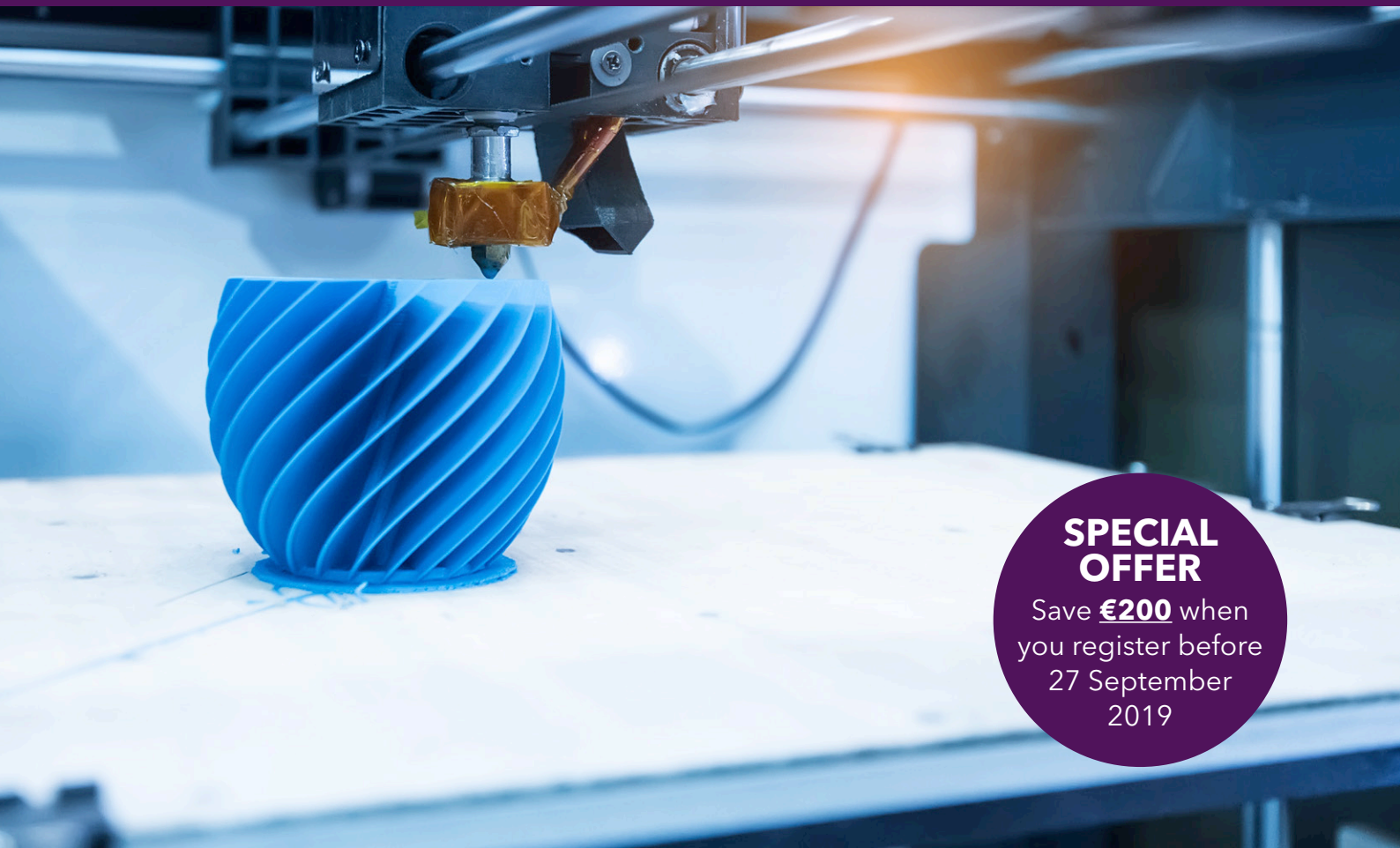
Polymers for 3D Printing

Düsseldorf / 2019

*Developing polymers and filaments for
optimised 3D printing applications*

11 - 12 December 2019

Meliá Düsseldorf, Düsseldorf, Germany



SPECIAL OFFER

Save **€200** when
you register before
27 September
2019

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Compounding **Injection**
WORLD WORLD

AMI

Bringing the plastics industry together.



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Polymers for 3D Printing

Düsseldorf / 2019

Polymers for 3D Printing is a two-day conference from AMI exploring the development, production and application of innovative polymers and compounds for 3D printing and other rapid manufacturing technologies. The event will be held at the Meliá Hotel in Düsseldorf, Germany on 11-12 December 2019.

3D printing is growing globally with increasingly customised materials being used to fulfil the expanding scope of applications. The technology is being utilised in the design, prototyping and production of industrial and consumer goods, with diverse applications ranging from household appliances, healthcare and mechanical parts to building & construction and transportation.

Expert speakers will cover the latest developments in plastics resins and compounds for a variety of 3D printing and rapid manufacturing methods to accelerate product development and production.

The event will examine incumbent materials, including ABS, PLA and PETG, together with new high-performance polymers and compounds with added functionality. These are helping to improve productivity, boost performance, add value, meet sustainability requirements and open up new markets.

The event will provide excellent networking opportunities during the refreshment breaks and evening drinks reception, which will take place in a dedicated exhibition area.

”

*AMI is up to date for
my target market and
interest*

Technical Director, JSP



Five good reasons to attend:

- **Identify new and emerging market opportunities for polymers and compounds for 3D printing**
- **Hear experts address new processing and real-world application opportunities**
- **Discover new ways to optimise production and to add value in this rapidly evolving market**
- **Listen to your customers' views on their future needs**
- **Build focused, professional networks with key industry stakeholders**

Ways to get involved:

ATTEND

Register before 27 September 2019 and pay €1040* saving €200 on the full price of €1240*. There are additional discounts for group bookings. The registration fee includes attendance at all conference sessions, the Networking Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

SPONSOR

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

EXHIBIT

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

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

*VAT may apply

CONFERENCE HOTLINE

Contact: Harriet White, Conference Organiser
Tel: +44 (0) 117 314 8111
Email: harriet.white@ami.international

SAVE €200

Register before
27th September
2019

Wednesday 11 December 2019

- 08:30 Registration and welcome coffee
09:30 Opening announcements

SESSION 1 - MARKET OVERVIEW

- 09:40 **Design for additive manufacture**
Dr. Connor Myant, Assistant Professor in Design Engineering,
DYSON SCHOOL OF DESIGN ENGINEERING,
IMPERIAL COLLEGE LONDON, United Kingdom

SESSION 2 - 3D PRINTING POLYMER DEVELOPMENTS

- 10:10 **How tailored ABS based resins add value to FDM 3D printing**
Mr. Luca Chiochia, Business Development Manager,
ELIX POLYMERS, Spain
- 10:40 **Rapid prototyping made easy through 3D printed LDS materials**
Dr. Mark Berix, Product Development Specialist,
MITSUBISHI ENGINEERING PLASTICS EUROPE, Netherlands
- 11:10 Coffee Break
- 11:50 **High performance powders for functional applications in powder bed fusion**
Mr. Stefan Josupeit, Product Manager Powder Bed Fusion,
BASF 3D PRINTING SOLUTIONS GmbH, Germany
- 12:20 **Innovative flexible 3D printing TPU solutions from prototyping to mass production**
Mr. David Pascual, Global 3DP Marketing Manager,
LUBRIZOL ADVANCED MATERIALS INC., Spain
- 12:50 **Development of novel daylight-curable photopolymer resins for functional applications**
Dr. Sarah Karmel, Head of R&D, Chemistry,
PHOTOCENTRIC LTD, United Kingdom
- 13:20 Lunch
- 14:50 **Latest trends in 3D printing of PEEK and polyimides**
Mr. John Biesterfeld, CEO,
BIEGLO GmbH, Germany
- 15:20 **High throughput screening for 3D printable antimicrobial polymer**
Ms. Ling Xin Yong, Postgraduate Researcher,
UNIVERSITY OF NOTTINGHAM, United Kingdom

SESSION 3 - DEVELOPMENTS IN CONTINUOUS FIBRES

- 15:50 **New technology: 3D printed continuous fibres, enabling composite parts robust enough to replace machined metal**
Mr. Joachim Kasemann, Owner and VP Sales,
MARK3D GmbH, Germany
- 16:20 Coffee Break
- 17:00 **Continuous fibre additive manufacturing, 3D printing large composite parts for the industry sectors**
Mr. Lucas Janssen, Operations Director,
CEAD, The Netherlands
- 17:30 **New developments in embedding unique functionalities in composites by continuous fibre printing**
Mr. Andrea Gasperini, Scientist Additive Manufacturing,
BRIGHTLANDS MATERIALS CENTER, Netherlands
- 18:00 Networking Cocktail Reception

Thursday 12 December 2019

- 08:00 Welcome coffee
09:00 Opening announcements

SESSION 4 - APPLICATIONS

- 09:10 **We print to drive: 3D printing at Deutsche Bahn**
Dr. Tina Schlingmann, AM Technology Scout and Material Expert,
DEUTSCHE BAHN AG, Germany
- 09:40 **AM materials development geared by applications**
Dr. Harold van Melick, R&D Director,
DSM ADDITIVE MANUFACTURING, Netherlands
- 10:10 **Latest 3D printing applications driven by high performance polymers**
Ms. Gülay Bozoklu, Senior Project Application Engineer EMEA,
STRATASYS GmbH, Germany
- 10:40 Coffee Break

SESSION 5 - PROCESS DEVELOPMENTS

- 11:20 **How desktop SLS can be used in hospitals**
Mr. Konrad Glowacki, Co-Founder and Chief Business Development Officer,
SINTERIT, Poland
- 11:50 **Expandable FFF materials, a new dimension in 3D Printing**
Mr. Ruud Rouleaux, Company Owner and CEO,
COLORFABB BV, The Netherlands
- 12:10 **Series production with laser sintering requiring process development, new materials and automation**
Mr. Stefan de Groot, Technology Manager and Project Leader Additive Manufacturing,
PROTIQ GmbH, Germany
- 12:50 Lunch
- 14:20 **SLA 3D printing for engineering: innovative materials and applications**
Ms. Klaudia Kantarowska, Additive Manufacturing Engineer,
FORMLABS Germany
- 14:50 **3D printing of CNT-based electrically conductive nanocomposites by fused deposition molding**
Dr. Nadir Kchit, Industrial and Composites Project Leader,
Technical Service & Development,
NANOCYL, Belgium
- 15:20 **The trash printer: developments in accessible and sustainable larger scale additive manufacturing**
Mr. Jeric Bautista, Additive Manufacturing and Product Engineer,
RE:3D, INC., United States
- 15:50 Conference ends

AMI reserves the right to alter the programme without notice. The latest programme, including any new speakers, changes to the schedule, and any amendments to pricing and terms and conditions can be viewed on our website: www.ami.international

REGISTRATION FORM

Register online

PLEASE COMPLETE IN BLOCK CAPITALS

Company: _____
Address: _____

Country: _____
Tel: _____ Fax: _____
VAT no.: _____
(Must be completed by all EU Companies)
Company activity: _____
Purchase order no. (if applicable): _____
Invoice address (if different from above): _____

DELEGATE/EXHIBITOR DETAILS

Title: Mr/Mrs/Dr/Other: _____
First name: _____
Surname: _____
Position: _____
Email: _____
Special dietary requirements: _____
Signature: _____ Date: _____

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

Yes No

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

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

PARTICIPATION

	Price	VAT	Total
<input type="checkbox"/> Early Booking Delegate Admission Fee ¹ : (until 27 September 2019)	€1,040.00	19%	€1,237.60
<input type="checkbox"/> Delegate Admission Fee ¹ : (from 28 September 2019)	€1,240.00	19%	€1,475.60
<input type="checkbox"/> Exhibition Space: (UK Companies) ³	€1,825.00	20%	€2,190.00
<input type="checkbox"/> Exhibition Space: (Non-UK Companies) ⁴	€1,825.00	0%	€1,825.00
Total:			_____

¹ Subject to German VAT at 19%. ² Reverse Charge. ³ Subject to UK VAT at 20%. ⁴ Reverse Charge for companies from other EU countries, 0% for Non-EU companies.

METHOD OF PAYMENT

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

Pay by credit card by registering online:

We accept: Visa / Mastercard
Alternatively, please provide your contact details and we will send you a link to a secure payment gateway via email.
Name: _____
Email: _____

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

To: National Westminster Bank Plc.
Thornbury Branch, 16 the Plain, Thornbury, Bristol, BS99 5HD
Account number: 06814077 Bank no. 556138
IBAN: GB63 NWBK 6072 0306 8140 77 SWIFT: NWBKGB2L

POLYMERS FOR 3D PRINTING 2019 CONFERENCE INFORMATION

11-12 December 2019
Meliá Düsseldorf
Inselstraße 2
40479 Düsseldorf
Germany
Tel: +49 30 2238 5762

HOTEL ACCOMMODATION

Delegates are responsible for booking their own accommodation. AMI has negotiated a limited number of rooms at the rate of €169.00 for single use and €194.00 for double use (breakfast and Wi-Fi included) at the Meliá Düsseldorf until 11th October 2019.

To book, contact the Reservations Department directly, please call +49 30 2238 5762 and quote 'AMI's Polymers for 3D Printing'.

PARTICIPATION OPPORTUNITIES

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

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

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

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

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

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

Networking Cocktail Reception

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

CANCELLATIONS

Full refunds, less a cancellation charge of €300 will only be made on cancellations received prior to 11th October 2019. Thereafter we regret that no refunds can be made. Delegates may be substituted at any time. Please note that refunds will not be given on exhibition upgrades or sponsorship packages.

CONFERENCE HOTLINE

HARRIET WHITE, CONFERENCE ORGANISER

AMI
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Registered in England No: 2140318
Tel: +44 (0) 117 314 8111
Email: harriet.white@ami.international

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