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# Compounding WORLD

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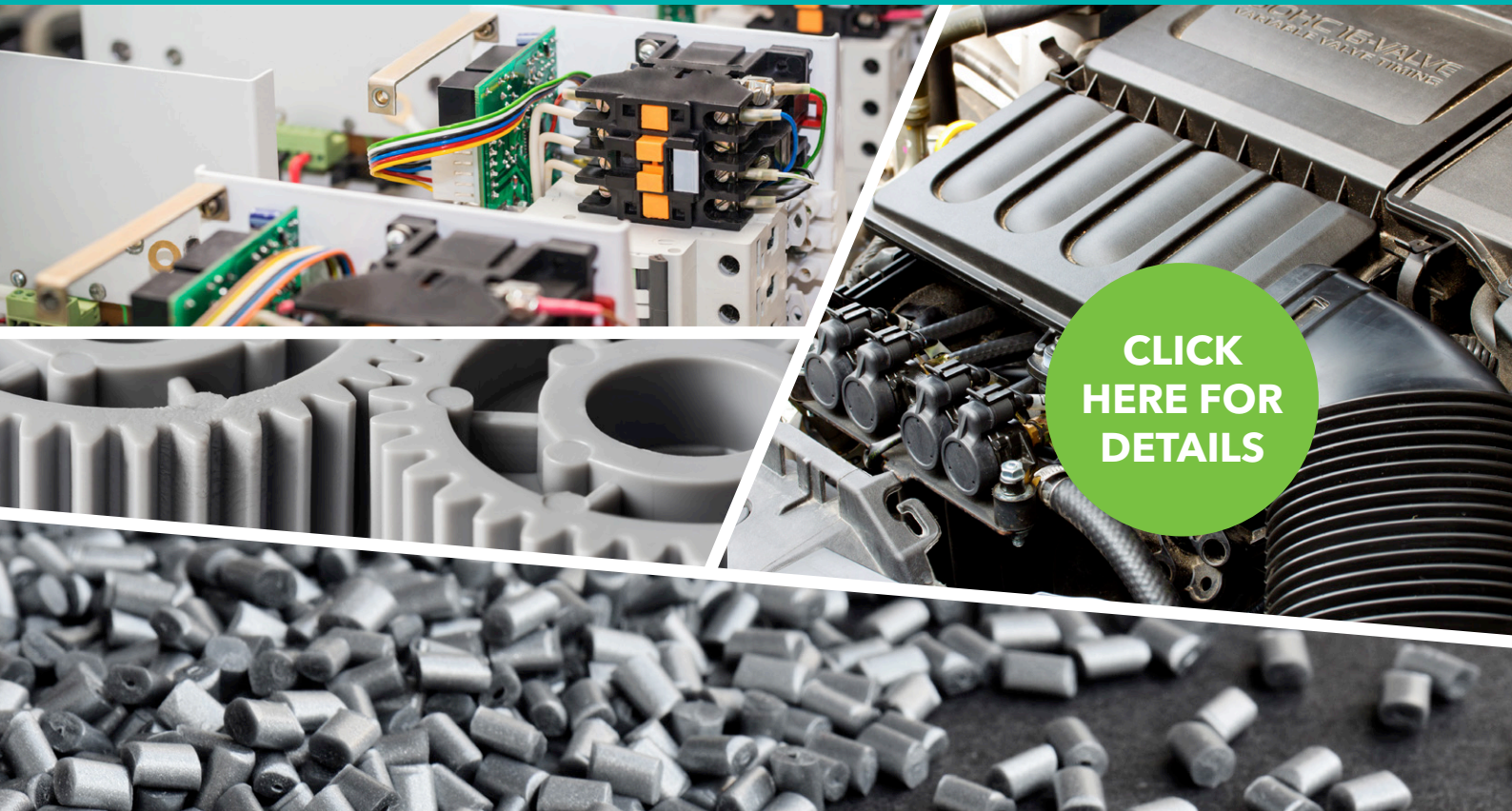
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# Celanese buys Next Polymers; expands POM production

Celanese has signed a definitive agreement to acquire Next Polymers, one of India's largest domestic compounders of engineering thermoplastics (ETPs), from the JP Group. The company produces some 20,000 tonnes/year of custom compounds at its facility at Silvassa, including an increasing proportion of post-industrial content. The deal, for which terms were not disclosed, should close in Q1 2019.

"Next Polymers complements our rapidly growing India business to further establish Celanese as a leader in the Indian ETP market by broadening our ability to serve nylon and other engineered materials customers in a high-growth region," said Celanese COO



Next Polymers production operation at Silvassa in India

Scott Sutton. He said the move will also enable the company to support customers in a market growing at 15%/year and will provide a useful regional export base.

Next Polymers compounds PA 6 and 6,6, PP, ABS, PC and PMMA for various industrial, automotive, electrical and electronic

and consumer applications. Celanese will continue to operate the Next Polymers brand.

In a separate move, Celanese has announced a debottlenecking project at its POM production unit at the Industriepark Höchst (IPH) facility in Frankfurt, Germany. This will add 20,000 tonnes/year of

capacity, making it the world's largest and most efficient POM production plant, the company claimed. The work will take place over the next 18-24 months. No financial details of the project were disclosed.

Celanese has also begun implementing "sales control measures" for POM in the European, Americas and Asia regions. The move covers all grades and specifications and is driven by a number of factors, including the very low water levels on the River Rhine (which are restricting supply of key raw materials into the IPH plant) and a series of required turnarounds at Celanese-owned and co-supplier units.

> [www.celanese.com](http://www.celanese.com)  
> <http://nextpolymers.co.in/>

## PolyOne starts Indian TPE line

PolyOne has started up a new TPE production line at its facility at Pune in India, which it says is the first dedicated line for production of its GLS brand of TPEs in the country. It has also opened a new technology centre at the site.

PolyOne originally opened the Pune site in 2014, focusing on colorant and additive concentrates.

> [www.polyone.com](http://www.polyone.com)

## Buss steps up presence in China

Swiss co-kneader extruder maker Buss officially opened its new wholly-owned operation in China last month—Buss Compounding Solutions (Shanghai).

The company has had a sales presence in China since 1987 but took the decision earlier this year to step up its presence by establishing a wholly-owned sales and service subsidiary. The Shanghai operation is headed up by General Manager Rongbao Gao, who has 20 years of compounding industry experience.

Speaking at the tradition-



Buss Chairman Stephan Mayer (left) and CEO Dr Philip Nising "dot the eyes" at the official opening

al opening ceremony, Dr Philip Nising, President and CEO of Buss, said the new facility in the Songjiang district of Shanghai would

form the base for the "future success and the growth we are striving for in Asia and the Asia-Pacific region."

> [www.busscorp.com](http://www.busscorp.com)

# Domo invests in Germany

Domo Engineering Plastics is to expand capacity for PA6 and PA66 at its Premnitz site in Germany by 20,000 tonnes/yr. The expansion should be operational by mid-2019 and follows the company's recent opening of an innovation centre at Mumbai in India.

"The [Premnitz] investment is also a milestone in the company's production and logistics digitalisation," said Plant Manager Marcel Müller. "The new lean manufacturing structure will lead to higher service quality, flexibility and transparency for our clients."

Domo Engineering Plastics is a global producer of PA-based compounds supplying industries including automotive, electrical and electronics, construction, furniture, machinery, hydraulics and sport and leisure. It said it has seen major growth in volumes and product diversity in the past five years, backed by its upstream PA 6 integration, development of low density materials and composite sheets, as well as its prototyping and simulation services.

> [www.domochemicals.com](http://www.domochemicals.com)

# Borealis takes stake in DYM

Borealis is to acquire a controlling stake in South Korean specialist compounder DYM Solution Co, which is based at Cheonan and provides compounds for the global wire and cable industry.

DYM was founded in 1992 and specialises in semi-conductive, halogen-free flame retardant (HFFR), rubber and silane cured compounds for cable applications. The agreement and transaction are subject to all required regulatory approvals.

Borealis said the deal will extend the global Wire & Cable industry asset



**DYM Solutions specialises in cable compounds**

footprint it has together with Borouge. "Having access to an Asian manufacturing base would significantly expand our ability to foster continuing organic growth for Borealis and Borouge

and enable us to meet the requirements of our wire and cable customers even better," said Borealis Chief Executive Alfred Stern.

> [www.borealisgroup.com](http://www.borealisgroup.com)

> <http://en.dymsolution.co.kr>

PHOTO: DYM SOLUTIONS

# Perstorp doubles on Pevalen

Sweden's Perstorp has sealed a long-term production agreement with Italy-based Alcoplast that will double capacity for its Pevalen brand of non-phthalate polyester plasticiser to 50,000 tonnes/year.

Production will begin in 2019 and is said to be a response to a projected global demand increase of about 100,000 tonnes/year for non-phthalate plasticisers, according to Perstorp.

Based on pentaerythritol tetravalerate (PETV), Pevalen is targeted at sensitive applications and products that come into direct human contact, such as toys and childcare products, automotive interiors, and indoor applications such as furniture, floors and wall coverings. Perstorp claims it has "a unique performance ... with high plasticising efficiency in combination with low migration and volatility."

> [www.perstorp.com](http://www.perstorp.com)

# BASF-Solvay PA deal is edging forward

To address European Commission concerns arising from its proposed acquisition of Solvay's PA business, BASF has offered to refrain from acquiring certain European parts, including innovation capabilities and manufacturing assets from the intermediate and engineering plastics business. Europe is one of two jurisdictions in which the deal has still to be approved.

The European Commission is now examining this proposal and submitting it for market testing before completing its review procedure, which is expected to take place in early 2019. Originally the two firms aimed to complete the €1.6bn deal in Q3 2018, following receipt of required regulatory approvals and the formal consent of a joint venture partner.

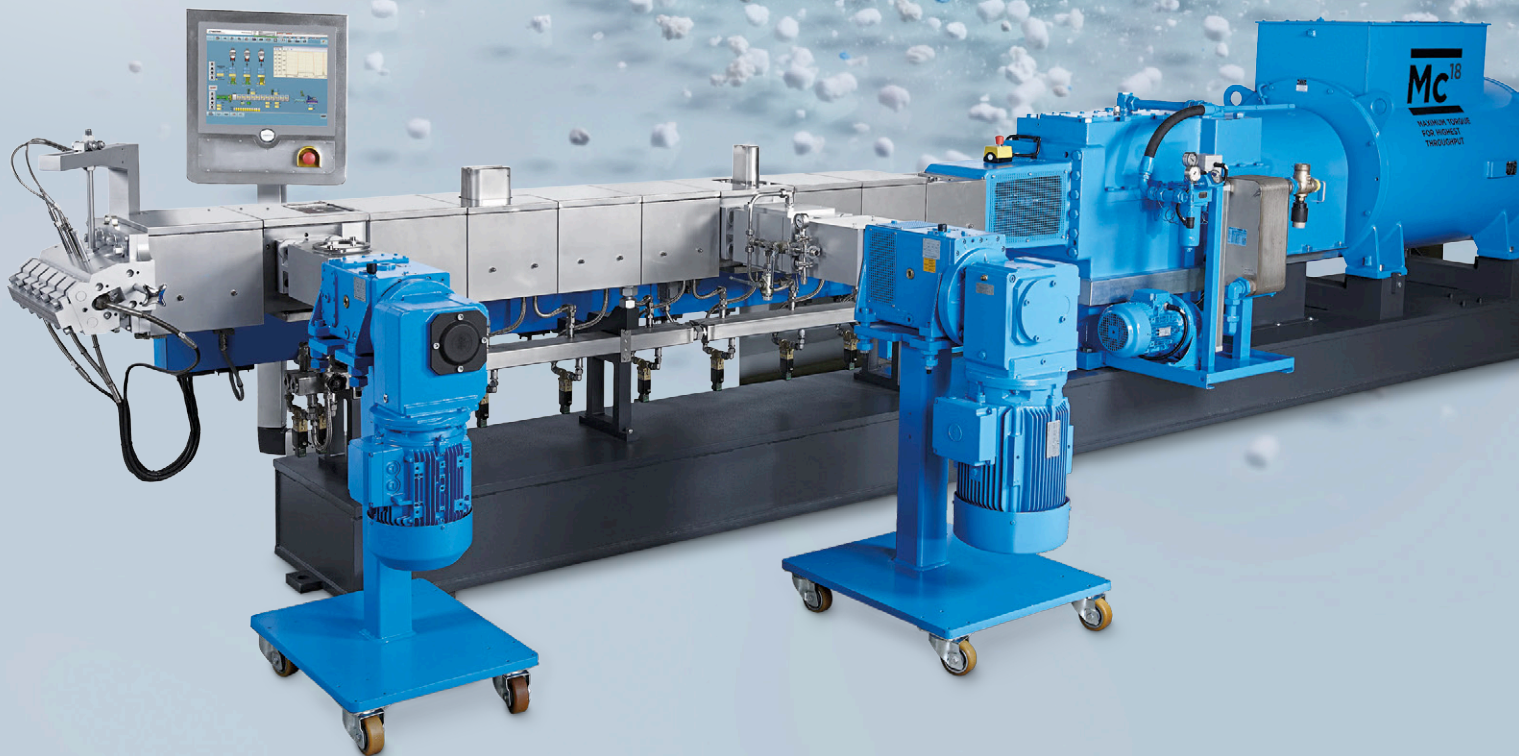
BASF said back in 2017, when the

deal was first announced, that the acquisition would complement its engineering plastics portfolio and expand its position as a solution provider. It said it would also improve its access to key growth markets in Asia and South America and strengthen its PA 6 value chain through increased polymerisation capacity and backward integration into adiponitrile.

> [www.basf.com](http://www.basf.com)

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## NEWS IN BRIEF...

**Baerlocher Group**, has sold Baerlocher France SASU, a subsidiary specialised in producing waxes for the cosmetics, pharmaceuticals and other industries, to the SER Group, a specialist in the field with plants in Italy, France, UK and Spain. The company said the operation, which was acquired as part of La Cérésine in 1987, was regarded as non-core to its business.

[www.baerlocher.com](http://www.baerlocher.com)

The UK's Chemical Industries Association (**CIA**) and European chemicals industry association **CEFIC** have published a **Brexit** briefing document to inform UK and EU chemical users and traders how their business may be impacted by the UK outside of the **REACH** regulation. The eight-page document provides a snapshot of potential future regulatory structures and presents a "roadmap" for preparatory planning.

<https://t.co/8rW2ovcS1A>

**Nouryon**—the newly named **AkzoNobel Specialty Chemicals** business—has announced a new dibenzoyl peroxide, Perkadox GB-50, to replace its dicyclohexyl phthalate (DCHP) desensitised CH-50 grade (DCHP is now classified as a category 1B reproductive toxin). The new grade will be available in the first half of 2019.

[www.nouryon.com](http://www.nouryon.com)

# PA66 shortages bite hard

Early last month the French association of plastics part makers Groupement Plasturgie Automobile (GPA) warned that the shortage of PA66 is now so severe that assembly line stoppages are becoming a real risk.

"Today, only 55% of Europe's PA66 production capacity is available," said GPA Managing Director Armelle Dumont. "These shortages of materials mean that supplies to certain members of the GPA will dry up at the start of 2019, a situation that could put the complete production chain in peril."

Dumont said Tier One and Tier Two producers have seen PA66 prices rise by €1,500 per tonne over the past 18 months.

At the heart of the problem is a global shortage of adiponitrile (ADN), a key precursor for PA66. Only four companies make ADN in volume - Asahi Kasei, Ascend, Butachimie (a JV between Solvay and Invista), and Invista—across just five plants in the Japan, the US and Europe.

ADN capacity expansions have struggled to keep pace

PHOTO: SHUTTERSTOCK



**Suppliers to the French car industry warn of plant stoppages**

with growing demand while some sites have suffered outages due to unplanned events such as last year's Hurricane Harvey in the US.

Capacity expansions are in the pipeline. Ascend said last month that its 40,000 tonne/yr ADN expansion at Pensacola in the US is near complete and work is underway to add a further 180,000 tonnes by 2022.

Invista announced in the summer it is to build a new 300,000 tonnes/yr ADN plant in China for a 2023 start-up.

For the immediate future, however, many processors will be looking to the growing number of PA66 alternatives, with heat stabilised PA6 and PBT grades prime contenders. "This particular round of

shortages is going to drive change," said Philip Krahn, CEO of distributor and compounder Albis. "There are some applications where we can't replace PA66 but there are some where we can and we have already done that."

However, making the switch is not easy. "In my experience, it is difficult to replace PA66 with PA6 in existing tools," said Erico Spini, Marketing and Application Development Director at Radici Plastics. "And when you replace a part you have to go through a lot of tests, so for existing parts it is not easy to change. But for new applications we can try PA6 or, in some cases, we can propose PBT."

## Hexpol secures stake in Mesgo

Hexpol has acquired 80% of the shares of Mesgo Group, an Italian compounder of high-performance fluorocarbon and silicone elastomers, from CEO Francesco Caldara and other co-owners in a €168m deal.

Hexpol said the deal marks a strategic move into an area where Mesgo has cutting-edge expertise, bringing it new customers and broadening its European presence.

Aside from its fluorocarbon and silicones expertise, Mesgo also supplies rubber compounds and thermoplastics for applications in consumer products, transportation, automotive and general industry sectors. It has annual sales of about €100m and employs 180 at six sites in Italy, Poland and Turkey.

➤ [www.hexpol.com](http://www.hexpol.com)

➤ [www.mesgo.it/en](http://www.mesgo.it/en)



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# European Parliament seeks ban on single-use plastics

The European Parliament has voted to adopt draft plans to ban the use of single-use plastic items, such as plates, cutlery, straws, balloon sticks and cotton buds, across the EU from 2021. The move is driven by concern over marine litter, which MEPs said is comprised of 80% plastic.

The draft plans also include a ban on products made from oxo-degradable plastics and EPS fast food containers. Member states will have to reduce consumption of other items for which no alternatives currently exist by least 25% by 2025 (including single-use burger boxes, sandwich boxes, and containers for fruit, vegetables, desserts and ice creams). They will also be asked to draft national plans to encourage the use of products for multiple use, re-use and recycling.

Other plastics, such as



PHOTO: SHUTTERSTOCK

**European vote targets plastics drinking straws and oxo-degradables**

beverage bottles, will have to be collected separately and recycled at a rate of 90% by 2025. Waste from plastic cigarette filters will have to be reduced by 50% by 2025 and 80% by 2030, while member states must also ensure that at least 50% of lost or abandoned plastic fishing gear is collected each year, with a recycling target of at least 15% by 2025. Cigarette filters and fishing gear are two of the most common elements of marine pollution.

"We have adopted the most ambitious legislation against single-use plastics. It is essential in order to protect the marine environment and reduce the costs of environmental damage attributed to plastic pollution in Europe, estimated at €22bn by 2030," said rapporteur Frédérique Ries, MEP.

Plastic packaging association European said it supports "measures that address the problem of plastic pollution effectively,

that are harmonised and implementable by member states and industry". However, it repeated its concerns that certain elements of the resolution "have not been adequately examined and might not achieve [their] objectives".

In particular, European Managing Director Virginia Janssens, expressed concern over the proposed removal of internal market safeguards for measures that cover packaging items. "This will weaken policy coherence with other EU rules on waste and packaging. The Packaging & Packaging Waste Directive, with its harmonised essential requirements, should remain the sole appropriate legislation governing design and marking requirements applicable to all packaging," she said.

> [www.europarl.europa.eu](http://www.europarl.europa.eu)  
> [www.europen-packaging.eu](http://www.europen-packaging.eu)

## Lehvoss expands capacity worldwide

Germany's Lehvoss Group said it is further expanding global capacity for its Luvocom brand of compounds in respond to growing demand. Following the start-up of a new line for high-temperature compounds in Germany last month, it said it will install a second line in China in January, with a second line to follow at Pawcatuck, in Connecticut in the US.

"These investments are just another consistent step within the framework of our long-term growth strategy. Additional extensive investments in the expansion of our plastics business are currently the subject of detailed planning and are set to follow shortly", said Dr Thomas Öhmichen, Managing Partner at parent company, Lehmann&Voss&Co.

A new laboratory and innovation centre is also currently under construction at Lehvoss's site at Hamburg in Germany. Due to be completed at the end of the year, this will accommodate plastics testing and a customer-specific applications technology facility that will also contain a laboratory for 3D printing technology.

> [www.lehvoss.de](http://www.lehvoss.de)

**Company reports growing global demand for its Luvocom compounds**

[www.compoundingworld.com](http://www.compoundingworld.com)



PHOTO: LEHVOS

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## NEWS IN BRIEF...

**Kraiburg TPE** has introduced what it describes as a new class of thermoplastic elastomer hybrids (TEHs). The new materials are said to feature application-specific combination and modifiability that is superior to classic thermoplastic vulcanisates (TPVs). It says the compounds provide "unprecedented" performance, including high hardness, temperature resistance and chemical stability.

[www.kraiburg-tpe.com](http://www.kraiburg-tpe.com)

**Euromap** has published a draft version of its Euro-map 84 interface specification for extrusion equipment. The document is intended to standardise information and control models to enable simple and effective networking of extrusion equipment, production lines and central computers and MES software. Euromap said extrusion needs special attention because proven injection moulding management models cannot be applied.

[www.euromap.org/euromap84](http://www.euromap.org/euromap84)

# More companies sign up for free US trade shows

More than 140 companies have now booked booths for the major new free-to-attend plastics industry exhibition that will take place at Huntington Convention Center in downtown Cleveland, Ohio, US, on May 8-9, 2019. Organised by AMI, the event will include three focused tradeshow - the Compounding World Expo, the Plastics Extrusion World Expo and the Plastics Recycling World Expo.

The latest companies to join the growing list of exhibitors include Alpha Marathon, Bekaert, Cloeren, Gneuss, Heritage Plastics, Heubach, KraussMaffei Berstorff, Lanier Color, Maag, Maguire, Oden Technologies, Omipa, Pallmann, Paramount Colors, Schenck, Thermo Fisher Scientific and Vecoplan.

They join an impressive list of existing exhibitors including Addex, Advanced



**The Huntington Centre will host the free-to-attend plastics shows expos in 2019**

PHOTO: HUNTINGTON CONVENTION CENTER

Blending Solutions, Azo, B&P Littleford, Beier, Brabender, Buss, Cabot, Chemours, Clariant, Coperion, CPM Extrusion, Cumberland, Davis-Standard, Dr Collin, Dover Chemicals, Entek, Farrel Pomini, Ferro, JSW, Konica Minolta, Leistritz, Macchi, Milliken, Mixaco, Modern Dispersions, NFM, NGR, Nordson, Omya, PTI, Reifenhäuser, Starlinger, Struktol, Toyota Tsusho, Wacker, Windmüller & Hölscher, Zeppelin, Zoltek and many more.

The Cleveland expos will also feature five free-to-attend conference theatres. Online registration for tickets will go live on November 26, and you can register your interest in advance at the website below.

Exhibitor prices start at \$3,400 for a 100 sqft booth, including unlimited exhibitor passes and free international publicity before the show. Complete stand packages including furniture and electrics start at \$3,800 for 100 sqft.

For more information on exhibiting at the Compounding World Expo 2019, the Plastics Extrusion World Expo 2019 and the Plastics Recycling World Expo 2019, please visit: <https://www.ami.international/exhibitions>

## Sinochem buys ABS producer Elix Polymers

**Elix Polymers manufacturing plant at Tarragona in Spain**



PHOTO: ELIX POLYMERS

Sun European Partners is to sell Elix Polymers, the Spanish manufacturer of ABS resins and derivatives, to Sinochem International (Overseas) for an enterprise value of €195m. The deal is subject to customary regulatory approvals.

Based at Tarragona, Spain, Elix makes pre-coloured ABS resins, derivatives and tailor-made specialities used for use in sectors including healthcare, automotive, consumer and others.

Elix Polymers was acquired by an affiliate of Sun European in 2012, following the merger of the BASF and Ineos styrenics businesses.

➤ [www.elix-polymers.com](http://www.elix-polymers.com)

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# Fakuma 2018 delivers numbers and compounding innovation

**The Friedrichshafen showground hosted the 26<sup>th</sup> Fakuma fair last month**



PHOTO: AMI

The 26<sup>th</sup> Fakuma trade fair closed its doors at the Friedrichshafen exhibition centre in Germany last month having welcomed 47,650 visitors, according to data from organiser PE Schall. That number was a little down on last year's 48,375 but still placed 2018 as the show's second best attended.

Fakuma 2018 attracted 1,933 exhibitors from 40 countries. And while the show draws in, perhaps unsurprisingly as it is located in one of Germany's key high tech manufacturing areas, a huge number of home companies, the organisers point to its continuing internationalisation. More than 42% of exhibitors came from outside of Germany this year.

Part of the success of the Fakuma has to be its clear-cut positioning as a show for plastics processing, together with its focus on enabling technologies. "Practice-oriented alignment to the process sequence for plastics processing" is how the organisers described the strategy in their post-show statement.

The next Fakuma show takes place on 13-17 October 2020.

## Albis planning further investments

Albis CEO Philip Krahn said 2019 will see the company continue to invest in its compounding operation, with some €10m earmarked for new compounding capacity worldwide.

While he said it is too early to be specific on these plans they are likely to extend to all three of its operating regions. "Last year and this year we have invested globally," Krahn said.

Key projects over the past 18 months include an increase in capacity in China to 35,000 tonnes, expanding compounding capacity at its site at Zülpich near Cologne in Germany by 9,000 tonnes to 60,000 tonnes, and the start-up of two medical lines at Hamburg with a capacity of around 5,000 tonnes. The company has also resumed manufacturing in the US with the start-up of its facility at Duncan in South Carolina

in the early summer.

Krahn expects medical to be a key future growth sector for the company. "We have been a provider of technical medical materials for a long time," he said. "It is clear requests [for these applications] in Europe and the US are growing and there is a demand for custom products."

Albis already distributes a broad portfolio of medical plastics for partners such as BASF, Covestro and Lyondell-Basell (distribution accounts for around 80% of the company's annual sales of around €1bn, compounds 20% and tolling 10%). Krahn sees its own medical compounding business allowing it "to fill the gaps."

The Hamburg plant meets ISO13485 requirements and all materials will be supplied with the two or three-year guarantees of notice standard for the



PHOTO: ALBIS

**Albis CEO Philip Krahn is planning €10m of compounding investments**

medical sector. "We are not involving ourselves with high risk products—implants—but everything else is in our targets," Krahn said.

Albis is also stepping up its activities in the recycling area. The company currently produces and supplies its own recycled compounds under the Altech Eco brand, which it claims offer near-to-virgin performance, in all three geographical regions. Its acquisition of Wipag in

2017 gave it access to closed loop recycling of automotive bumpers and a pilot scale technology for recycling carbon fibre (a 4,000 tonne/yr production scale compounding line for carbon fibre products was installed at its facility at Neuburg in June).

Krahn said that from October, it was also starting to distribute Moplen PP and Hostalen PE products from Quality Circular Plastics (QCP), a joint venture between LyondellBasell and waste group Suez. "It is a different market to Wipag. QCP is more consumer focused—they take PCR and clean it so they can reuse it in packaging," he said. Example applications include crates, boxes and bottles. "This year has been about positioning it in our organisation; now it is about pushing it into the marketplace."

➤ [www.albis.com](http://www.albis.com)

# Coperion looks to “upcycling”

Coperion is planning to step up its activity in the plastics recycling sector, building on the experience it has gained through its six-year-long Corema “upcycling systems” partnership with Austrian recycling machinery maker Erema.

The Corema system combines Erema’s single screw recycling extruder and associated equipment with a Coperion twin screw extruder to allow a direct route from plastics scrap to a high quality compounded pellet.

Coperion General Manager for the Engineering Plastics and Special Applications Business Unit, Peter von Hoffmann says the company expects to see considerable growth in demand for compounding technology from the recycling sector.

“Working with Erema has taught us that their customers are really different from our compounders. But some of them are now big enough to do more with their products,” von Hoffmann said. “I think 5-10% of Erema’s custom-

ers are ready to take that next step.”

He said the decision to target recyclers will not put Coperion in competition with Erema as the technologies are very different. “Erema’s machines can do things ours can’t do and ours can do stuff theirs can’t. If the material is dirty or fluffy, our twin screws can’t do that. But upcycling—where you want less odour and less smell—that’s where the twin screw can help,” he said.

➤ [www.coperion.com](http://www.coperion.com)

## Noris aims for faster changes

German compounding machinery maker Noris Plastic showed its ZSC34 extruder, a fast changeover model designed for masterbatch and short run work, and previewed a new version of its ZSC25 lab extruder.

General Manager Ralf T Tenner said the ZSC34 machine has been in production with a number of customers for around one year and has proven to be a good “crossover” model, capable of running pilot trials as well as small lot production. It features a modular design for fast cleaning or reconfiguration.

Tenner said the first of the new generation of ZSC25 lab machines is currently being commissioned. It uses a new PLC control offering more flexibility for compound development work.

➤ [www.norisplastic.de](http://www.norisplastic.de)

## Dow extends food contact slip options for FFS films

Dow Performance Silicones introduced a new version of its silicone-based slip enhancing masterbatch for PE FFS film applications that offers full compliance with food contact regulations in Europe, the US and China.

Offering a product for FFS applications that carries only US and European is no longer acceptable for globally active film producers, explained Dow Corning Global Segment Leader Plastic Additives Christophe Paulo. “In the past, as long as you were food approved in the US and Europe that was OK. But the Chinese government recently changed that – this has been pending for some time but it has been a foggy kind of transition,” he said.

To develop the new MB25-235 grade, Paulo said the company reviewed all the materials with registered CAS numbers that had full food approval to come up with a solution that offered



PHOTO: DOW CORNING

### MB 25-235 has FFS food contact approval globally

the same or better performance. That meant offering stable and long-lasting slip performance with no migration of the additive to the film surface.

The absence of migration means the additive only needs to be included in the surface layer, so it can match or undercut the cost of traditional alternatives such as erucamide and minimises the impact on downstream operations such as printing

or metallization. Low addition levels of 2-4 wt% means haze is also minimal.

Paulo said the company is further developing this line of products, with the introduction of a new variant with both antiblock and antislip properties expected early next year. “We aimed to launch it at Fakuma but we still have some validation to do. It will be ready for Chinaplas,” he said.

➤ [www.dowcorning.com](http://www.dowcorning.com)





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**Krauss Maffei**  
**Berstorff**

# Kärcher puts PA under pressure



Solvay unveiled a new application for its Technyl 4earth recycled PA66 compound with cleaning equipment manufacturer Kärcher.

Technyl 4earth is produced from PA66 recycled from automotive airbag production scrap. Solvay removes the silicone coating from the PA textile offcuts at a plant at Gorzow in Poland before reprocessing into a range of engineering compounds that match performance of virgin grades. It currently offers products with up to 50% glass reinforcement.

Solvay's Engineering Plastics Business Unit Director for Performance Polyamides Dr Bertrand Lousteau revealed at Fakuma that Kärcher has been using a 30% glass reinforced Technyl 4earth grade for some time to produce injection moulded spray lances and has to date manufactured more than 1m units.

Lousteau said the Kärcher project, together with a number of other demanding applications in predominantly E&E markets, mean that the pilot Technyl 4earth recycling facility—which has a capacity of around 2,500 tonnes/yr—is now highly

utilised. "We are working now on expanding it," he said. "We need to work on the process and are doing that already. And we have to work on the supply chain. I would say two or three years—we are considering a much larger capacity than we have today but it depends on supply."

Currently, the plant uses only production airbag offcuts. Lousteau said trials have shown that material recycled from scrapped cars can also be reprocessed, providing the bag has not fired (which results in contamination of the textile).

## PPS additions

Solvay also unveiled a three-strong line of Ryton PPS materials for extrusion of parts such as automotive cooling lines. All three are unreinforced elastomer modified products offering high melt strength, chemical resistance and thermal stability up to peaks of 220°C.

"Under-the-hood temperatures are pushing existing cooling line design and material solutions to their limits, narrowing the safety margin," said Andreas Lutz, European Area Development Manager for

Solvay's Specialty Polymers global business unit. Drivers include the increasing use of turbocharged engines and EGR emission systems, as well as the expected move to alternative power technologies.

Lutz also said new electric drive technologies can place greater demands on cooling system components.

"If you talk about hybrid and electrical vehicles, the cooling system can be in use when the car is stopped to keep the batteries cool so lifetime is increasing from 2-3,000 hours to 5-6,000 hours, he said.

The new grades can be extruded with a high quality internal and external surface finish, can be post-formed into complex shapes, and can be combined with PPS injection moulding grades to create over-moulded fittings and brackets.

Lutz said the company has expanded its application development lab at Bollate in Italy to develop applications for the new materials. The investment includes a new extrusion line as well as post-extrusion forming equipment to allow potential customers to trial project designs..

> [www.solvay.com](http://www.solvay.com)

**Kärcher is using PA66 from airbag scrap to produce its pressure washer lances**

## NEWS IN BRIEF...

**Lanxess** said it is developing a new PA6 product range—Durethan Performance—offering improved resistance to fatigue under pulsating loads than standard products with the same glass fibre content. The first products in the range are thermally stabilised Durethan grades with glass contents of 30, 35, and 40%. An impact modified version is also available with 30% glass.

[www.lanxess.com](http://www.lanxess.com)

**KraussMaffei** CEO Dr Frank Steiler said owner ChemChina's plan to list the company is moving ahead. We are in the final stage," he said. "All necessary applications have been accepted and we are now waiting for regulatory approval. We are confident that we will obtain the approval for the listing by the end of the year." KraussMaffei posted a 1.6% increase in sales for the first nine months of 2018 to €973m.

[www.kraussmaffei.com](http://www.kraussmaffei.com)

**BASF** added a new group of polyphthamide (PPA) resins. Ultramid Advanced T1000 compounds are based on PA 6T/6I technology and offer stable properties at temperatures of up to 120°C (dry) and up to 80°C (conditioned). Due to its partially aromatic chemical structure, the polymers offer high resistance to humidity and aggressive chemicals.

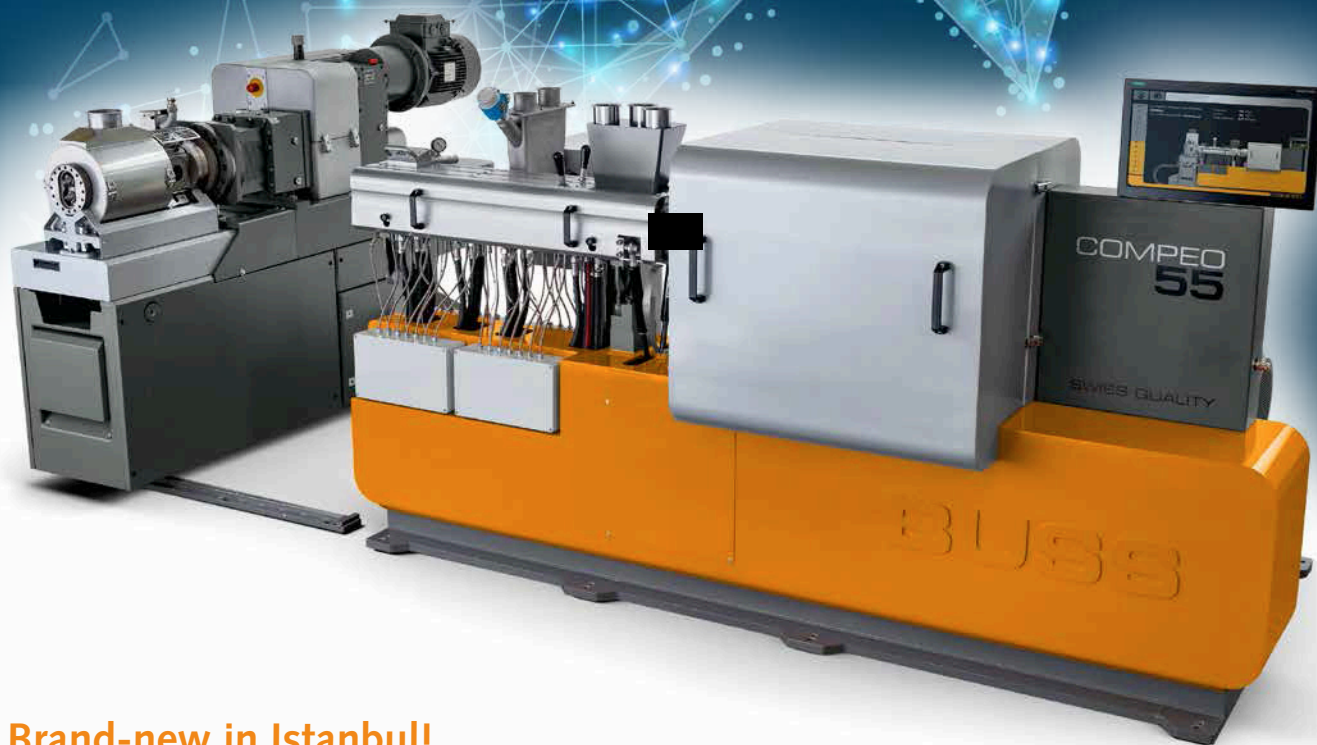
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# JM reinforces its fibre options

Glass fibre maker Johns Manville presented its latest products for PP and PA compounds, including its recently introduced ThermoFlow 636 and 675 chopped strands.

ThermoFlow 636 chopped strands are designed for production of PP compounds and are said to offer better flow in feeding systems, allowing glass content to be more accurately controlled. That helps improve consistency in the final compound, according to the company.

ThermoFlow 675 is intended for use in PA automotive compounds where hydrolysis and fatigue resistance is required, showing very good tensile strength in PA6 after aging for more than 2,000 hours at 190°C, for example.

"ThermoFlow 675 short-glass fibres outperform benchmarking fibres in PA6 and PA66 during fatigue testing with more than 10% and 50%, respectively," according to Karin Demez, Global Marketing and Portfolio Manager in the company's Engineered Products Global Fibres business.

> [www.jm.com](http://www.jm.com)



PHOTO: JM

**JM showed its latest  
ThermoFlow 636 and 675 grades**

## Cabot ABS aimed at ESD trays

Cabot introduced a new electrically conductive ABS compound for production of thermoformed trays for ESD applications.

The new Cabelec CA6483 grade has been developed to meet growing demand for ABS in the electronics manufacturing sector, where it offers improved thermal stability over current PS options as well as "warmer" haptics. The grade offers a surface resistivity of around 8,000 ohm/sq.

It is not easy to make a conductive ABS because of the dispersed rubber component, according to Damien Even, Technical Sales and Development Support Manager at Cabot Performance Materials Belgium. "You have to use a special carbon black and have the right formulation."

> [www.cabotcorp.com](http://www.cabotcorp.com)

## Golden Compound aims to green coffee capsules

German compounder Golden Compound—a subsidiary of SPC Sunflower Plastic Compound that has its roots in the furniture and bakery industry—showed what it claimed to be the world's first first home-compostable coffee capsule.

The capsules are injection moulded by Alpla for the Austrian specialist coffee brand Amann Kaffee. They are produced in a compound based on an undisclosed compostable resin reinforced with sunflower seed husk fibre.

Golden Compound Managing Director Reinhard Trumme said the capsule obtained the OK Home Compost certification, which requires 90% biodegradation within six months in a home composting environment, at the beginning of October. He said the material is mostly bio-based and can also be recycled.

Golden Compound was founded in 2014 as a joint venture between SPC Sunflower Plastic Compound and agricultural products group Cargill. It was established to find applications for sunflower seed husk fibre, which is a by-product of sunflower oil



PHOTO: GOLDEN COMPOUND

**Amann Kaffee's home  
compostable capsules are  
produced in a sunflower seed  
fibre reinforced compound**

production, as a filler and reinforcement for plastics. Since 2016 it has been 100% owned by SPC.

The capsule material is compounded at Golden Compound's plant at Ladbergen in Germany, where it has a pilot line with an annual capacity of around 2,500 tonnes/year. It currently

offers two product lines: Golden Compound Green (home compostable) and Golden Compound Pro (durable). Both product lines contains up to 70% sunflower fibre.

Compounding of sunflower fibre requires some special considerations. Screw geometry has to be optimised and special attention has to be paid to venting and fibre handling. Compatibilisers and impact modifiers are typically required. Process parameters also need to be modified to avoid thermal damage of the fibre material.

Compounds can be processed by injection moulding or extrusion but they process at lower temperatures than traditional alternatives, which can result in energy savings for producers of up to 20%.

> [www.golden-compound.com](http://www.golden-compound.com)

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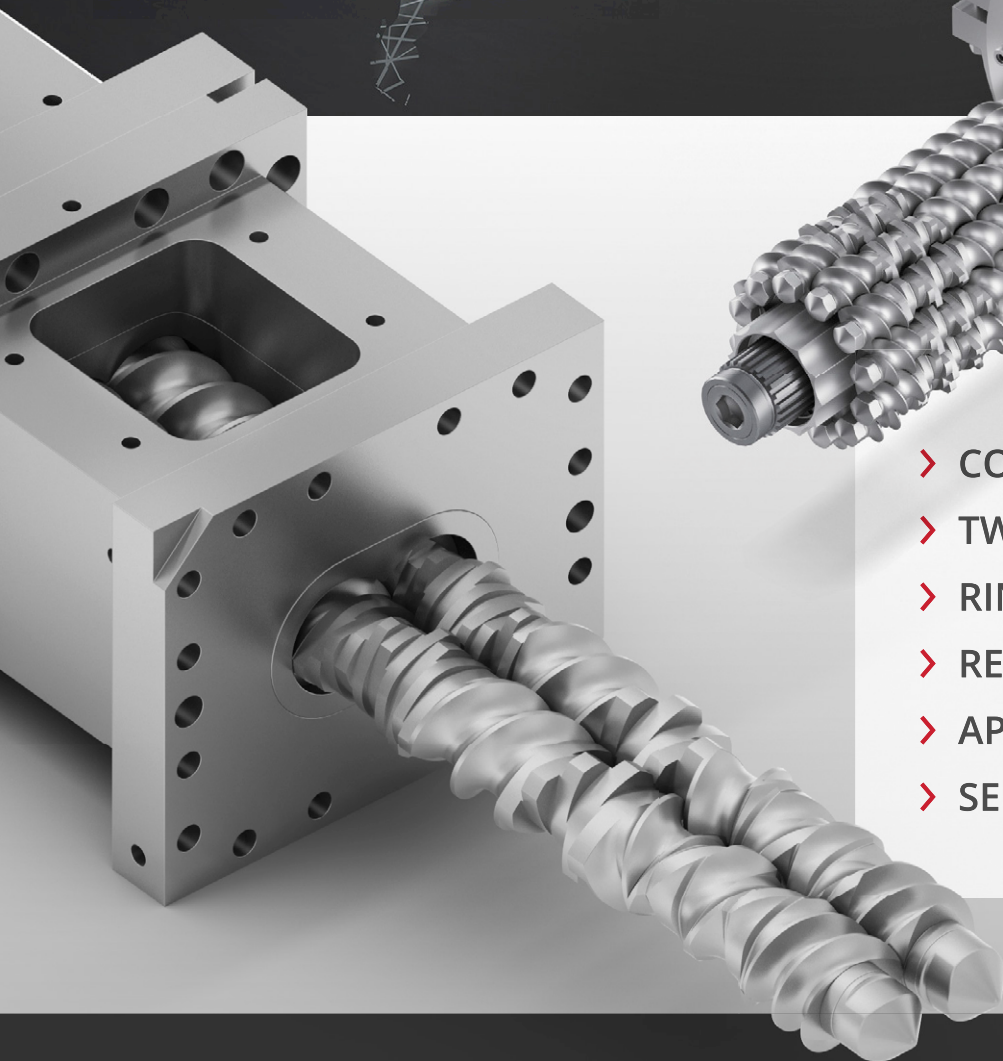
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# Leistritz concept has it covered

Leistritz presented a true eye-catcher in Friedrichshafen. The company's FleXXcover design study—demonstrated on a new ZSE40iMAXX compounding extruder—replaces traditional stainless steel machine covers with a reinforced textile alternative in its signature orange colour.

The company explained the thinking behind the new cover concept is flexibility. Managing Director Sven Wolf said many of its customers are working with shorter runs and face making more frequent clean-downs and job changes, which means they need

**FleXXcover from Leistritz is a design study aimed to speed job changeovers**

covers that can be more easily removed and more affordably updated to new process requirements.

The FleXXcover is manufactured in a glass fibre reinforced PTFE-coated textile and is designed in four parts: two half-covers above the process section and two above the drive unit. They are attached to the base frame by plug-in connecting bars and fixed in place using pneumatic tensioning elements. A single operator can remove each of the four parts without any tools and the removed cover can easily be rolled up, stored and exchanged.

"Costs are much lower than our metal covers and often, when you change the process, the metal covers will no longer fit; FleXX-covers can be easily adapted," said Wolf. "And it's much safer because of the lower thermal capacity—it's an extra protection for the people working on the line."

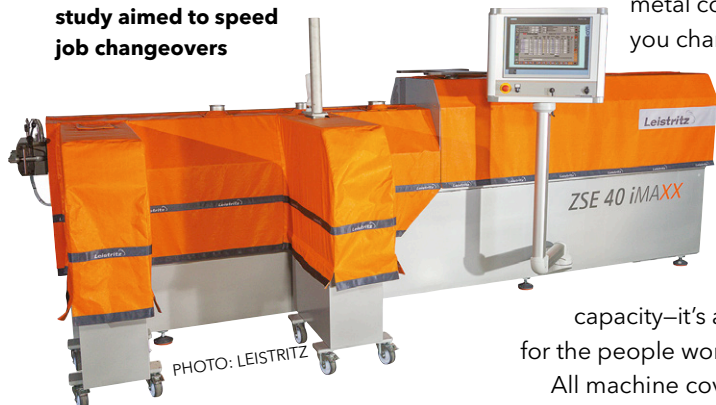
All machine covers trap air and so

improve the energy efficiency of the machine, Wolf said. However, the FleXXcover material incorporates a reflective inner layer that helps further reduce heat losses compared to steel. Additional insulation can also be provided if required.

The FleXXcover concept was demonstrated on a new ZSE 40 iMAXX extruder, a 40mm diameter extension to the current line's 27 and 35m models. Offering a large OD/ID of 1.66 and a throughput of up to 700 kg/h, the machine is intended for medium batch size production and shares the same basic features as its smaller sisters. The heating/cooling system and the heating elements are fully integrated in the frame or processing unit for good accessibility.

The ZSE 40 iMAXX is also equipped with an energy-efficient synchronous AC motor for the main drive and most of the electrical components are housed in a separate control cabinet. Torque measurement can be installed as an option.

> [www.leistritz.com](http://www.leistritz.com)



# Lati puts thermal plastics in the spotlight

Italian compounder Lati showed two of the latest applications for its thermally conductive PA compounds.

Romanian lighting producer Electromagnetica selected the company's Laticonther 62 GR/70 material, a PA6 with 70% graphite, to produce the heat sink for its high power 8,000 lumen Castor 2 COB (chip on board) industrial projector light. The compound offers a thermal conductivity of 10 Wm/K, which together with the use of a thin aluminium spreader allows it to meet the thermal dissipation require-

ments without the need for forced air flow.

Unusually for a polymer heat sink application, Electromagnetica chose to paint the heat sink. "We checked the performance and there is no effect on thermal performance," said

Lati Germany Business Development Manager Tobias Harscher. The company is about to introduce a larger four-LED version of the Castor design.

Italian luminaire designer Artemide developed Ameluna for Mercedes Benz

for use in its showrooms globally. The design features a large round ring that houses the LEDs and forms the structural element that allows the lamp to be suspended from the ceiling. It is produced in a single piece in Laticonther 62 CEG/500-V0HF1. This PA6-based compound uses ceramic fillers to provide a thermal conductivity of 4 Wm/K and is both electrically insulating and flame retardant.

Harscher said the company is seeing increasing demand for thermally conductive compounds.

> [www.lati.com](http://www.lati.com)



**Electromagnetica's 8,000 lumen COB LED lamp uses a polymer heat sink from Lati**

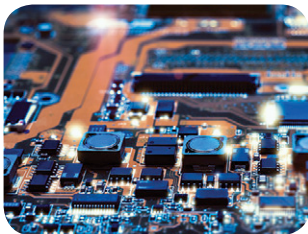


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*AMI's Polymer Distribution in Europe 2018 study shows growth, M&A and new entrants to be key features of the market, writes the report's author **Elena Mozzato** of AMI Consulting*

# Consolidation drives European polymer distribution market

Polymer distribution plays an increasingly important role within the polymer industry supply chain providing opportunities for polymer producers to cut costs, improve efficiencies and deliver better service and support to the plastics processor. For converters, distributors enable them to purchase small lots of material and gain invaluable expertise and technical assistance in the journey from concept development to product delivery with its own customers. However, in an industry notorious for its slim margins and in a low growth economy, the successful distributor needs to be rigorous in understanding the cost-to-serve and the value gained from its customers in order to ensure its survival and growth.

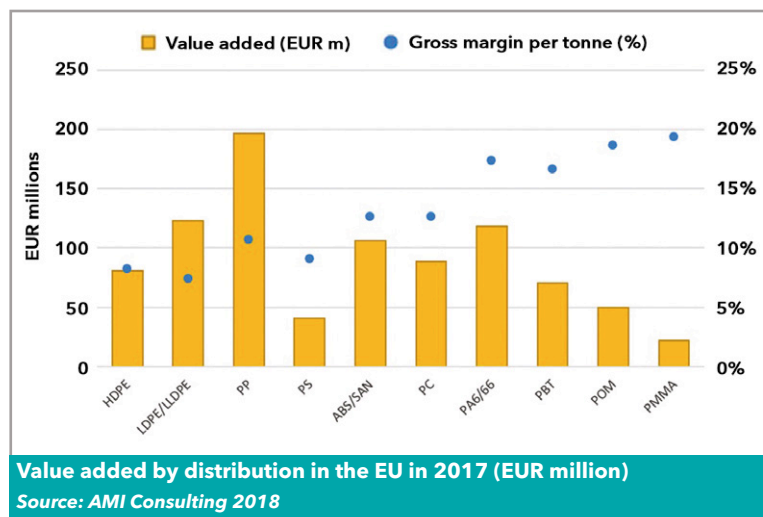
Following challenging periods of resin price volatility and times of extreme resin shortages, distributors have managed to enhance profitability and margins by offering much needed reliable supplies of material, technical support and new services to customers. Innovative strategies and

inventive customer dialogue have also been key elements in the strategy of successful companies in the industry.

The 2018 edition of AMI's Polymer Distribution in Europe report revises and updates the status and position of distributors across Europe. It builds on its earlier research to consider the newest trends influencing the industry, such as: the EU Strategy for Plastics in a Circular Economy; investments in bioplastics, recycled resins and 3D printing; a strong focus on plastics in pharma and medical sectors; digitalisation as a new competitive strategy; and Brexit's influence on the political and economic situation.

## **Continuing growth**

Approximately 13% of polymer materials sold in Europe in 2018 were supplied through the distribution channel. This proportion is predicted to increase in the future as polymer suppliers move



higher volumes through distribution to save costs and optimise sales networks. However, these benefits are likely to accrue to the larger, pan-European groups, presenting challenges to smaller distributors or groups.

In 2017, the volume of polymers distributed in Europe surpassed 4.0m tonnes, proving that this is a healthy business in which specialties are becoming increasingly important, as they add a competitive edge. Polymer distribution accounted for revenues of above €8.2bn, with polyethylene, polypropylene and polyamide being the largest contributors to an added value of nearly €950m.

The pattern of distribution sales and country ranking by sales volumes confirms Germany and Italy as the top two countries in Europe. These are now followed by the Benelux countries, which have seen distribution sales increasing substantially as local players who used to operate as traders have recently embraced the official distribution model. Spain ranks fourth, which corroborates the positive economic outlook the country has been recently enjoying.

Resinex remains the leading distributor in Europe, while other familiar names such as Biester-

feld and Ultrapolymers Group maintain a strong position in the market. The entrance into the official distribution market by historical traders such as Vinmar International, Bamberger Polymers and NCT Holland, represents the biggest disruption that the distribution sector has experienced over the last three years. Their presence is often seen as a threat by smaller local distributors who operate in markets where customer size varies enormously and where most clients buy small quantities. However, despite the lower prices these traders-turned-distributors offer and the disruption they may cause, they may often find it difficult to sell with success due to a lack of knowledge of local networks.

Despite the difficulties intrinsic to polymer distribution – including demanding customer service and tight margins – this is still a growing market, and so is attractive to many companies. The structural changes brought by recent M&A activities portray a lively business environment offering opportunities to those who are ready to grab them. During the last couple of years, industry news has been inundated by reports of strategic corporate moves. In the most remarkable deal of this year, LyondellBasell gave the industry much to talk about with its acquisition of compounder and distributor A. Schulman. While in September Univar announced the acquisition of Nexeo Solutions in a transaction worth \$2bn.

**Diverging directions**

Consolidation and rationalisation activities have certainly posed a degree of uncertainty for smaller distributors who have seen their contracts with suppliers ended in favour of larger pan-European groups. This trend has been pushing some of the smaller players in the opposite direction and, now free from the impediments of exclusivity and binding contracts, they are moving towards more fluid distribution agreements. Overall, the big

# Polymer Distribution in Europe 2018

Polymer Distribution in Europe 2018 is a new detailed market report from AMI Consulting published in September 2018. The report identifies the trends and dynamics characterising the distribution industry, while profiling the leading suppliers and polymer distributors in the region as well as their impact on industry dynamics.

Over the seven editions, this study

has evolved into the most comprehensive analysis of polymer distribution currently available on the market and represents an essential guide for industry players as they optimise business activities and plan future investments. For further information please contact Elena Mozzato, [elena.mozzato@ami.international](mailto:elena.mozzato@ami.international), tel: +44 (0)117 924 9442.

In addition to its consultancy work,

AMI organises annual conferences including Polymer Sourcing & Distribution 2019, which will be held in Barcelona, Spain on 13-15 May 2019 and is specifically created for companies involved at every stage of the European polymer supply chain. For more information on the event please contact Maud Holbrook, [maud.holbrook@ami.international](mailto:maud.holbrook@ami.international), +44 (0)117 314 8111.

distributors are getting bigger, and the smaller ones are surviving by focusing on niche activities and the provision of unrivalled technical knowledge and customer support.

Over the next five years, polymer distribution sales are expected to continue growing above polymer demand as distributors take advantage of promising opportunities. On the one hand, the impending new polymer production capacity coming from the US, Middle East and Asia is forecast to be partly absorbed by existing distributors. On the other hand, the trend of traders embracing the official distribution model will become increasingly important as official agreements have proved beneficial, particularly in times of material shortage.

### Engineering plastics

Engineering plastics are expected to continue driving the demand growth, with producers consistently investing in research and development activities to offer innovative products for new applications. Environmental sustainability and compliance with regulations will continue to be key elements in their R&D programmes and will



PHOTO: MANCHESTER PLASTICS

stimulate manufacturers to expand and refine their product portfolio to gain competitive advantage.

Distribution markets of Central and Eastern Europe and Poland will continue experiencing the strongest growth as networks in this region are still growing and there is a greater opportunity to export to markets further east. Western Europe is forecast to grow at a slower pace as rationalisation activities have stabilised and suppliers are monitoring the outcomes of consolidation strategies.

**CONTRIBUTING TO THE FUTURE OF PLASTICS, FROM CONCEPT TO CONCEPTION...**

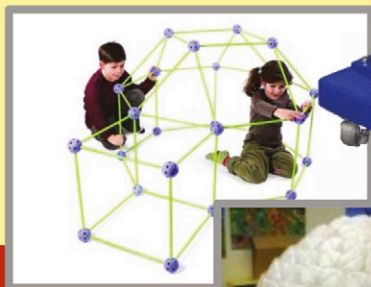
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PHOTO: COPERION

*Mixing technology providers are aiming to improve throughput and cut cost without sacrificing dispersion or quality. Mark Holmes reviews the latest developments*

## Ensuring the right mix

Mixing systems for the compounding industry come in a wide variety of sizes, formats and technologies that meet mixing duties that range from niche to high volume. But this is far from a static market—equipment manufacturers are responding to compounding industry changes with the development of continuous and batch mixing solutions that offer versatility in application together with optimal blending and dispersion.

Flexibility in recipe adaption, smaller production cycles and lots, as well as a compact layout, are high among the list of requirements for mixers in new compounding and masterbatch plants, according to Jürgen Rumschick, Sales Manager Bulk Materials Plants, Plastics Processors & Compounding at **Coperion**, which recently introduced its Mix-A-Lot mechanical bulk material mixer. “As an optional addition to compounding plants, the unit ensures particularly efficient, high speed and gentle homogenisation of the fed material. The readily accessible and easy to clean Mix-A-Lot is available in four sizes for throughput rates up to 5 tonnes/hour. There is also an ATEX version and other options available,” he says.

“The combination of an outstanding mixing effect and extremely short mixing time is due to the optimised design of the mixing rotor,” Rumschick claims. “Its low circumferential velocities and the optimum design of the gap to the housing, permit gentle handling without particle destruction or heating of the product. The large inspection door on the front of the Mix-A-Lot provides easy access to the entire process chamber. An additional opening at the discharge flap also facilitates inspection and cleaning of this section.”

Rumschick says general practice in mixing technology has been to feed each individual component to the extruder through a separate differential loss-in-weight feeder with a buffer hopper. The Mix-A-Lot takes a different approach, producing the specific pellet mixture first so one single loss-in-weight feeder is sufficient. “The weighing function of the mixer ensures accurate recording of the weight of each component fed in, to guarantee correct dosing according to the recipe. As the Mix-A-Lot is of vacuum and pressure-resistant design, direct pneumatic feeding is possible without the need for a separate reception bin for pneumatic conveying,” he says.

“This simplified plant concept allows the reduction of investment and maintenance costs compared to conventional systems. Furthermore, much less space is required above the extruder. The cleaning effort during changes of product has been greatly reduced. Higher flexibility, much easier and faster recipe adaptations, higher plant availability and the increase of production capacity lead to much higher profit.”

Coperion says it is seeing increasing interest in this type of mixer from global players in compounding and masterbatch production. “It offers significant advantages for powder mixtures or premix solutions that have now been common for many years,” Rumschick says.

“The preparation of this premix is done off-line in a stand-alone mixer unit. For feeding the premix into the extruder just one loss-in-weight (LIW) feeder is needed. In addition, with Mix-A-Lot a premix of pellets can also be handled with just one LIW feeder,” he adds.

**Main image: More compact solutions that offer lot size and formulation flexibility such as the Mix-A-Lot system are in demand for new mixing projects, according to Coperion**

**Right:**  
Coperion claims its Mix-A-Lot mixer can cut investment and maintenance costs

**Custom trends**

Greater throughput and better dispersion and quality of the final product are current trends driving new developments in mixers for the compounding and masterbatch industries, along with customisation of mixing plants due to the large variety of customer mixing requirements at present, according to Marco Marinello, President of **Promixon**. "In addition, one of the main problems that our customers refer to us is the need for quick cleaning of mixing plants," he says. "This is particularly the case in masterbatch production and where there are frequent colour switches between batches. Production needs to be safe and avoid the risk of material contamination from one cycle to another. For this reason, we provide tanks with interior surfaces and mixing blades that are mirror polished, which guarantee no material deposit and contamination between batches, together with a significant reduction in machine downtime."



PHOTO: COPERION

Due to the complete automation of the mixing phase, the risk of non-compliant material due to human error is now significantly reduced and continuous output from production lines is guaranteed," he says.

Italy-based Promixon says its recent product developments have focused on new process technology and mixing tools designed to improve efficiency and reliability, increase output, and reduce costs and energy consumption. These developments have included larger

diameter Turbomixer XM and Horizontal Cooler XC discharge valves, which speed up the material outflow and increase productivity in terms of batches per hour.

Marinello says the company has also engineered a new design and configuration of mixing tool that achieves optimal powder mixing in the vessel. This is achieved through an increase in the angle of incidence of the lower blade and thickening of all the blades, which improves the lift of the product to the upper stage and creates an improved mixing vortex. An additional benefit is the ability to mix at lower speeds, which provides savings in energy consumption together with a significant reduction in wear and tear on the vessel.

Other developments include an extended range of mixing tools for the XM High Speed Turbomixer and FX Container Mixer designed to mix difficult materials, reduce contamination risk, and cut mixing and cleaning times. And a new water circulation system for the XC Horizontal Cooler cooling jacket improves thermal exchange and efficiency of heat dissipation.

Promixon adds that it was recently selected by a major Italian company to supply three High Speed Container Mixers—Model FX-2500. Through a

**Below:**  
Promixon's XC horizontal cooler now has a larger discharge valve arrangement

Marinello also reports increasing requests from customers for smarter and automatic production controls in mixing processes. "This is required to speed up throughput, reduce the risk of non-compliant output and eliminate machine downtime.

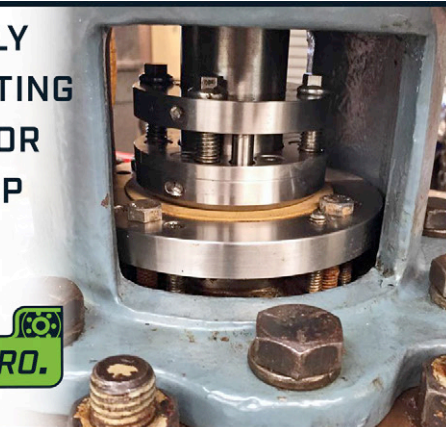


PHOTO: PROMIXON

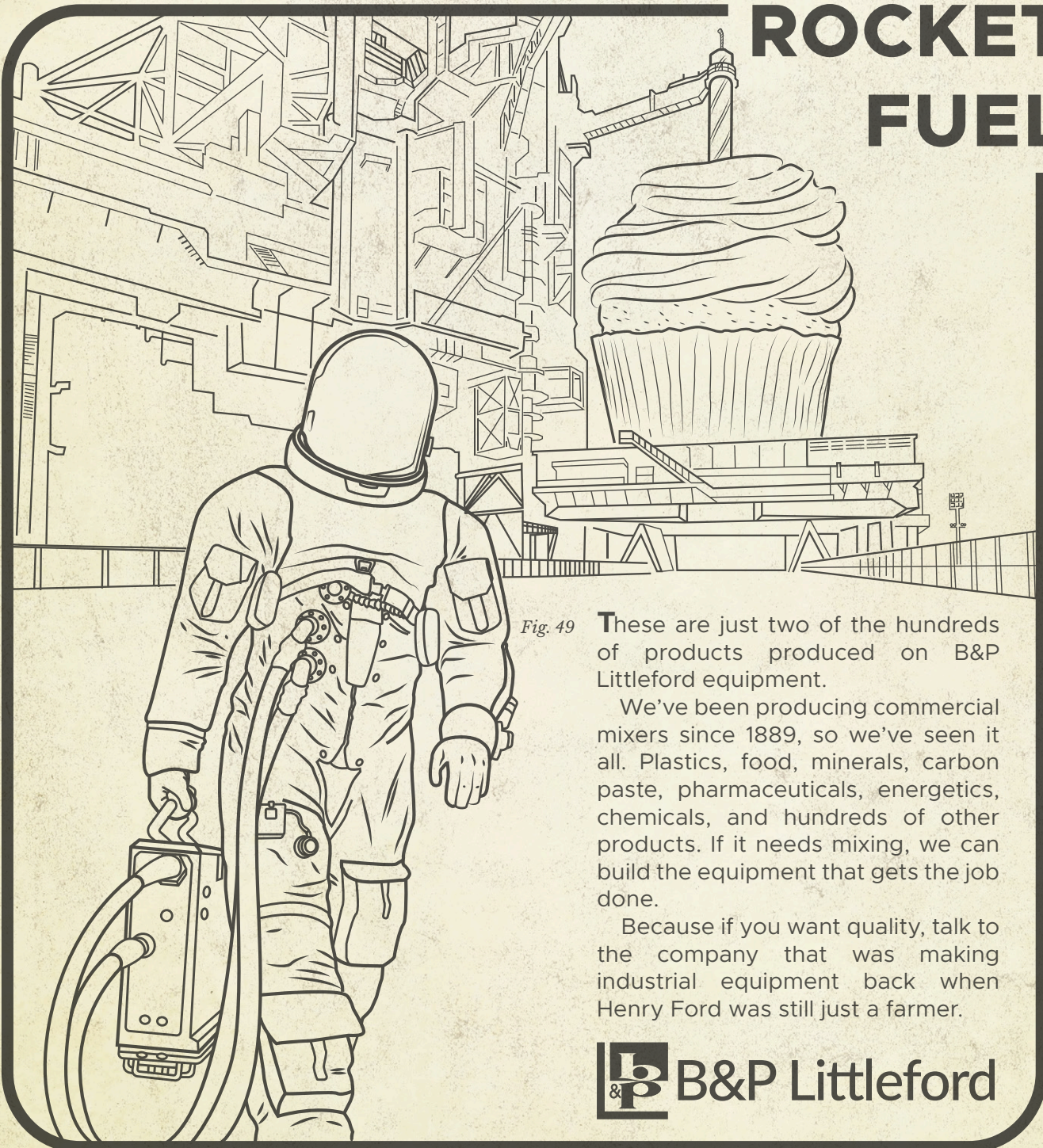
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# CUPCAKES AND ROCKET FUEL



*Fig. 49*

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 **B&P Littleford**

**Right: The FX Series container mixer from Promixon now has new tool options for difficult materials**

partnership with TraceToo Company, Promixon says that it has created intelligent cones that use RFID readers to provide batch traceability and eliminate manual operations.

**Growing complexity**

Compounding industry developments are moving towards ever more complex mixing programmes with an increasing number of individual working steps, according to **MTI Mischtechnik**. “Where for ‘traditional’ PVC-U mixing processes the application of aspiration systems and a tendency to feed inorganic components like TiO<sub>2</sub> and CaCO<sub>3</sub> into the heating mixer at a later stage have increased the number of working steps, this is even more the case for natural fibre compounds (NFC) and demanding PVC-P mixtures with high plasticiser content, such as cables in the automotive sector,” says Michael Kaiser, Area Sales Manager.

“For such applications modern complex mixing programmes, optimised to the individual recipe, utilise all the advantages of modern frequency-controlled AC-drive systems. The heating mixer can be operated at varying speeds to meet the requirements of the individual stages of the mixing process. In addition to high-performance aspiration systems, such as the MTI Vent tec, newly developed working steps such as torque and temperature control of the mixing process can smoothly extend the mixing process if required to achieve, high-quality, dry, free-flowing dryblend,” he says.

Kaiser adds that with this greater complexity of the mixing process comes the increasing need for interconnection of machines and systems - Industry 4.0. An increasing amount of data from all machines within a production line is made available, collected and analysed for a predictive

production process. He says that from a design of the equipment perspective, MTI has also recently seen a sharp rise in interest in ATEX-compliant systems, even outside Europe.

Among the more recent MTI equipment introductions is the heating/cooling mixer combination MTI Flex-line type M2000/K8000. This provides 8,000

litres of cooling vessel capacity and measures 7m in length and close to 5m in height. The company recently supplied a machine of this type to Northern Pipe Products, a major manufacturer of PVC pipe serving the mid-western US and Canada.

Through the installation of the system, mixing capacity at the customer’s site has near doubled.

According to MTI, the M2000/K8000 heating/cooling mixer combination is rated for a typical batch volume of 950 kg (2,100 lbs) and can provide more than 7,500 kg (16,600 lbs) of mixed material per hour.

Designed on a modular principle, the company says the mixers can be put to use in virtually any application because sizes, drive units and equipment options can be individually configured to the task.

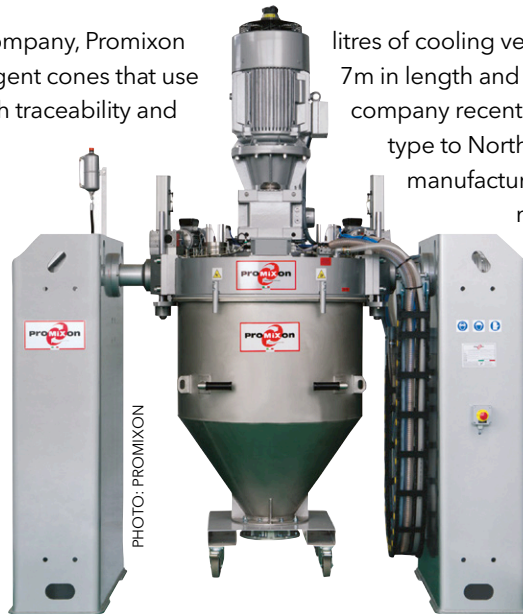
Italian mixing equipment maker **Plas Mec** recently supplied a 2,500 litre capacity mixing system from its TRG line to a major producer of TPEs. These formulations typically combine hard and soft thermoplastic components together with plasticisers and fillers. External heating is frequently required as part of the mixing process.

Plas Mec says this is the largest machine it has supplied for TPE production to date. The machine provides a usable vessel capacity of 2,000 litres and can take a batch weighing up to 800kg (depending on the specific recipe). It is equipped with a two-stage, three wing mixing rotor powered by a 315kw variable speed motor. The company says the mixer also includes features to speed up cleaning between batches. The cover can be swiveled by 90° after opening, for example, while the discharge housing is equipped with a rapid-clamping and removal arrangement.

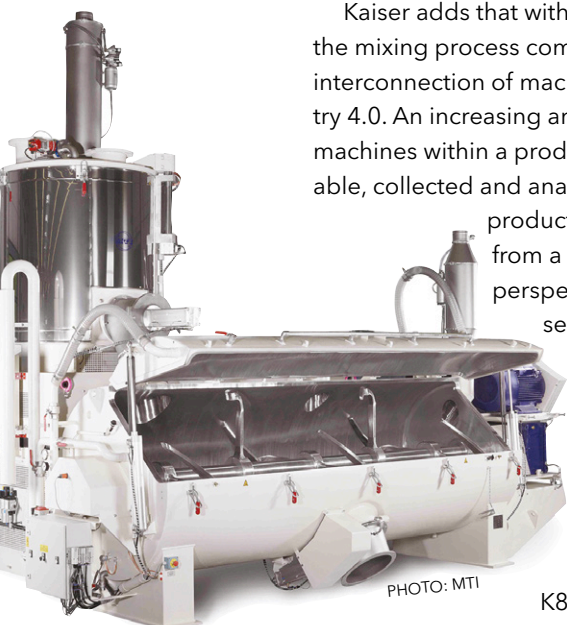
**Updating formulations**

A developing trend in the mixing sector is to re-examine and improve processing of formulations that may have been in production for decades. “Companies are either looking to cut costs by substituting less expensive materials or substitute materials in order to comply with regulatory changes,” says Alan Malott, Global Product Manager, Continuous Mixing Systems at US-based **B&P Littleford**. “In addition, there is a demand for increased production while floor space remains limited.”

In particular, Malott says the company is carrying out a growing volume of work in its pilot laboratory



**Below: MTI's Flex Line heating/cooling mixer technology is installed at Canada's Northern Pipe Products**





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**Right: Plas Mec has supplied a TRG 2500 mixer to an undisclosed TPE producer**

for customers looking to substitute bio-based or renewable materials. "This could be a biopolymer, additives or fillers such as hemp fibre. These customers either cannot process these on their current equipment due to process requirements, such as shear sensitivity of the material or dispersive ability of the compounder, or they just do not have a pilot to run new formulations to generate samples for testing," he explains.

Among its mixing equipment products, B&P Littleford offers the TriVolution continuous kneader. This is based on an operating principle that has been around for over 60 years but has been completely updated to meet current processing demands. "One of the benefits of the TriVolution compared to previous kneader technology is its mixing versatility," says Malott.

"The segmented elements, which vary from 8-flighted to 24-flighted, are designed to allow for a quick changeover from low shear to increasingly higher shear mixing based on the formulation being run. This versatility is designed to allow researchers and operators to be able to switch from low shear, low temperature materials such as PVC, to a highly filled, less shear sensitive polyolefin formulation by switching out the screw elements," he says.

"In addition to the versatile mixing elements, the barrel sections are designed to be modular. This allows for total re-arrangement of the feed barrels along the length of the shaft. The feed sections were also designed to rotate, allowing a top feed location to become a side feed location easily."

Mallot says liquid components can be added through an injection pin placed in any of the pin locations along the barrel. Melt temperature thermocouples can also be placed in any of the pins, allowing temperatures to be monitored in the melt itself rather than at the edge of the barrel.



**Right: B&P Littleford's TriVolution is a continuous kneading mixer optimised for flexibility**

PHOTO: B&P LITTLEFORD



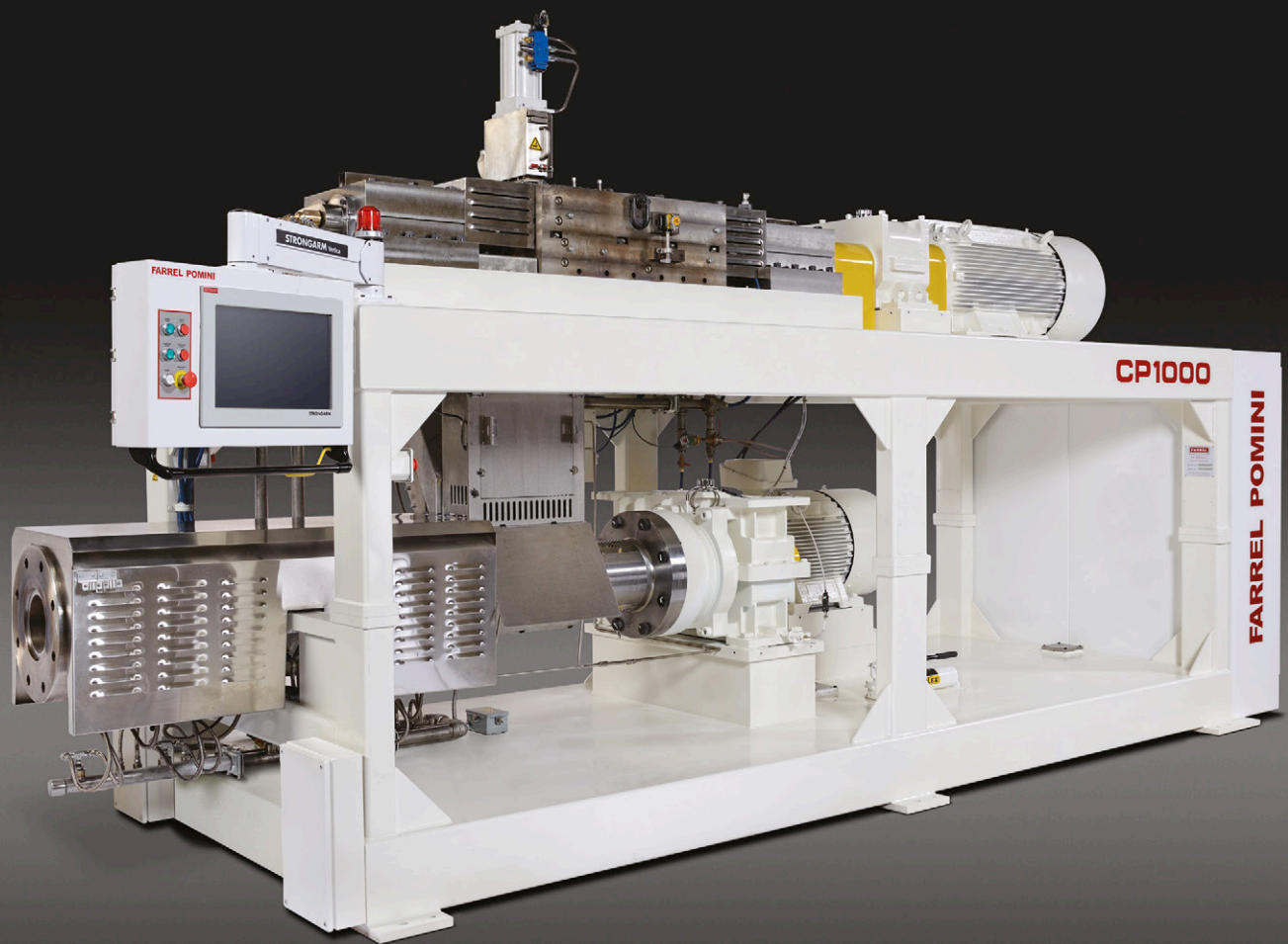
PHOTO: PLAS MEC

### Volume processing

Where high volume processing of dry products, dry products with liquid additions, and granular products is required, B&P Littleford offers a Continuous Plow [Plough] Mixer. This uses the same processing technology as its Batch Plow Mixer, but in a continuous flow format. It is loaded through a port mounted on the topside of the charging end of the mixer and typical working level of the product is nominally 50% of total capacity. The ploughs put the product into 3-D mixing motion, resulting in a good mix over a short retention period. Discharge of product is through an adjustable weir control valve at the opposite end of the charge end, with discharge through a port on the bottom available for sticky or cohesive products.

Germany-based **Lödige Process Technology** also offers mixing systems for preparation of plastic materials, including both horizontal and vertical mixers that operate either continuously or discontinuously. Process-specific solutions are offered for polymerisation, mixing, homogenising, dispersing, compounding, heating/cooling and melting and include the Ploughshare mixer (continuous and batch), continuous CoriMix CM ringlayer mixer, and NOHK wet mixer.

Both the continuous and batch Ploughshare mixers operate on the mechanical generated fluid bed principle. Lödige says its Ploughshare batch mixer offers high quality mixes in short mixing times. Ploughs rotate on the mixer shaft in a horizontal, cylindrical drum, with the size, number, positioning, geometric shape and peripheral speed coordinated to produce three-dimensional movement of the components. The resultant turbulence prevents the formation of dead-spots or low-movement zones in the mixing drum and ensures high speed, precision mixing.



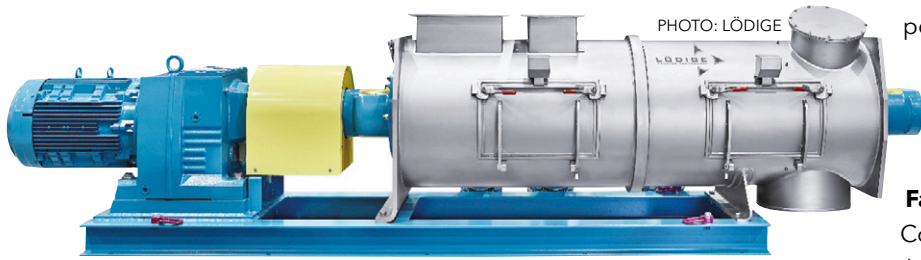
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**Above: Lödige says its continuous Ploughshare mixer KM provides gentle and reproducible mixing**

Lödige says that to prevent particles from being squashed against the drum wall, mixing elements are shaped to lift product within the radial movement of the mix. In some cases additional assistance for the mixing elements is required and separately driven, high-speed choppers can be installed to disperse agglomerations or control granulation.

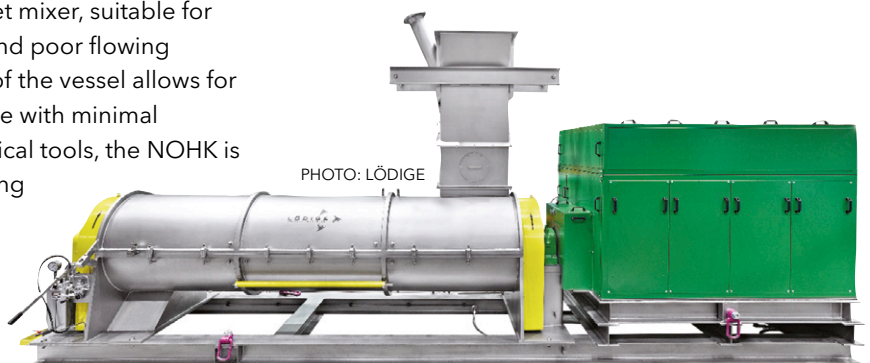
**Gentle treatment**

The continuous Ploughshare mixer KM offers residence/mixing times ranging between 25-60 seconds while granulation processes takes around 3-6 minutes. The company says the mixer provides gentle product treatment, consistent reproducibility, maximum availability and low maintenance. The peripheral speed and geometric shape of the Ploughshare shovels lift the mixing components from the product bed into the open mixing area and scoop material from the wall of the drum. Choppers can again be installed in the mixing drum as optional equipment to disperse agglomerates or to provide controlled granulation. Typical applications include processing of dry bulk materials and liquids.

The CoriMix CM is a high speed, continuous mixer for large throughput quantities, designed particularly for homogeneous intermixing of liquid or paste-like components into dry carrier materials. The system uses the high peripheral speed of the mixing shaft tools of up to 40m/s to form a concentric annular layer of product that is moved through the mixing chamber in a plug-like flow. The residence time is controlled by the degree of filling, the number of revolutions, the geometry and adjustment of the mixing tools, as well as the mixing vessel length and the flow rate.

The NOHK is a vertical wet mixer, suitable for processing viscous pastes and poor flowing products. The conical form of the vessel allows for maximum possible discharge with minimal residues. Equipped with helical tools, the NOHK is also suitable for simple mixing processes. According to the application required, a combination of mixing tools is arranged on the shaft to generate product trans-

**Right: The Lödige CoriMix is a high speed ring-layer mixer designed for high throughputs**



port, dispersion and de-agglomeration. An adjustable deflector is used to divert the product movement.

**Intensive mixing**

Farrel Pomini has developed the FCM (Farrel Continuous Mixer) for continuous mixing applications. The system is based on intensive mixing concepts that are said to enable processing efficiency, extreme versatility, dependability and profitability. The company describes the FCM as an independent mixer that is suitable for a wide range of uses, including polyolefins, polystyrene and PVC based compounds. For post-reactor applications, the FCM can be combined with a FMP (Farrel Melt Pump) and underwater pelletiser.

The FCM is available in a range of sizes and capacities for applications ranging from pilot/laboratory to large scale production. All models share the same basic mechanical features, operating principles and method to control the mixing intensity. All ingredients can be fed into the mixer either separately or as a pre-blend, while liquids can be injected directly into the mixing chamber. Intensive material shear is applied to melt the polymer and to mix all of the ingredients by kneading between the rotors and chamber wall as well as by the rolling action within the material itself. The company says features include counter-rotating, non-intermeshing rotors at synchronous speed, giving a large free volume for material circulation and enabling good distributive dispersion by back mixing. The rotor geometry also enables good dispersive mixing.

Mixing intensity can be selected as a function of rotor speed, working volume, thermal conditions and residence time. A large rotor tip-to-wall clearance minimises the effect of wear, while a large feed opening allows for high filler loadings. A PLC-based controller with touch screen can be expanded to include a supervisory system. Modular components make for easy maintenance. Farrel Pomini says the mixer is energy efficient, which helps keep operating costs down. ➤

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| **Grafting type polymer:** PP-g-MAH, POE-g-MAH, POE-g-GMA, PE-g-MAH.

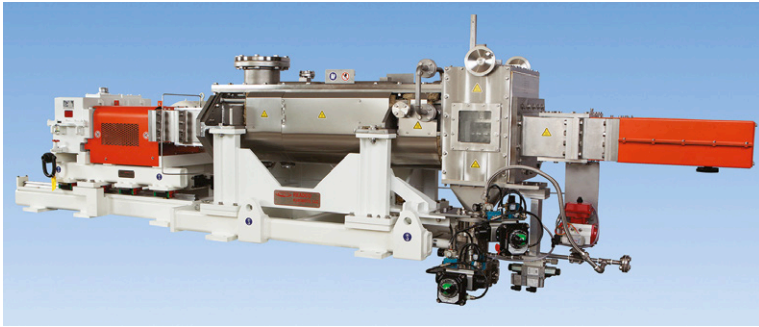
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PHOTO: READCO



**Above: The SC Processor from Readco Kurimoto offers high thermal transfer in a compact design**

**Compact solutions**

US-based **Readco Kurimoto** has introduced a new continuous processor. The SC Processor (SCP) is said to provide highly efficient heat transfer in a compact design, allowing it to transform slurries into powders and/or increase the viscosity of slurries in a single step. Designed to continuously accept a wide range of liquids, slurries, powders, and/or wet cake, the SCP is said to be capable of drying, cooling, degassing, crystallising, chemically reacting, and solvent recovery duties. The company says the SC Processor line has proven effective in continuously processing a wide variety of thick and sticky products—including plastic resins—that are difficult to process in batches.

The unit uses counter-rotating, hollow, twin screw shafts in a jacket that can provide heating or cooling. Differential screw rotation creates a consistent material flow towards the discharge, while a self-wiping action ensures a homogeneous end product. It can operate in vacuum conditions. The SC Processor line comprises four models, all of which are custom-engineered to the customer’s application requirements.

Meanwhile, **HF Mixing Group** has launched

Advise 4.0, a modular, scalable system for automating mixing rooms. All areas of the mixing room are included, starting with inventory management of raw materials in the warehouse, going to the manual weighing of small chemicals, the fully automated weighing of bulk material, the control of the mixing process, downstream equipment such as open mills and single or twin screw discharge extruders, and the compound storage room. Depending on requirements, individual applications can be selected and combined to create a comprehensive automation solution.

The company says it has also further developed its Umix universal mixer. The Umix series includes laboratory mixers with volumes from 0.25-8.0 litres, as well as production mixers with volumes up to 4,300 litres. The machines are designed to process medium and highly viscous compounds, such as colour pigments. Depending on mixer size and application, they can be equipped with a removable or tiltable trough, with a bottom discharge valve or discharge screw. The Umix universal mixer is said to be particularly suitable for research, development and production purposes.

**CLICK ON THE LINKS FOR MORE INFORMATION:**

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- > [www.promixon.com](http://www.promixon.com)
- > [www.mti-mixer.de](http://www.mti-mixer.de)
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**Plastics recycling in Europe - Capacity, capabilities and future trends 2018**

NEW from AMI Consulting

The plastics recycling industry is a complex, dynamic segment with a varied supply stream and value chain.

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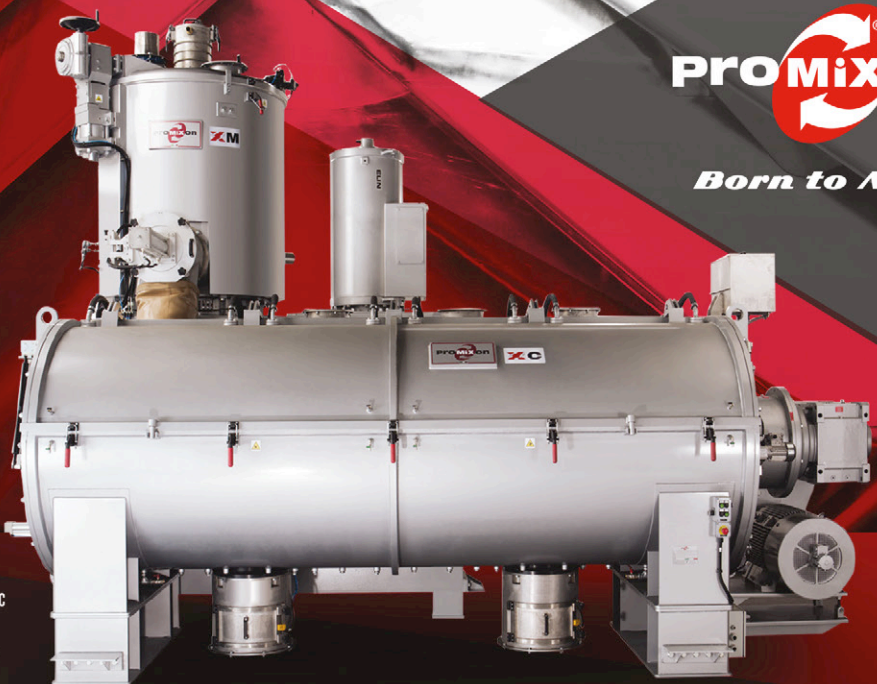
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*Demands for improved performance and sustainability are leading the carbon black sector through innovative times. Peter Mapleston looks at some of the latest developments*

# The black art of carbon

Carbon black producers—both established and newcomers—are moving ahead at a rapid pace with developments to satisfy an seemingly insatiable thirst in the market for the material's unique properties. Calls for carbon that is blacker than black are being met; significant improvements in electrical properties for applications requiring electrical conductivity—especially where shielding against electromagnetic shielding is needed—are being made; and projects to make carbon black “green” are coming to commercial fruition on a major scale.

**Cabot Corporation** has been providing information in recent months on several developments underway that it says will deliver improved performance in plastics, either by making finished parts blacker – or jetter, as it says – or preserving mechanical properties. Back in May, for example, the company launched Black Pearls 5160 specialty carbon black for PET fibre. “Cabot was able to develop a carbon black with higher jetness than our Black Pearls 5560 speciality carbon black while still having it easy to disperse to enable consistent fibre spinning,” says Dominique Strässler, Global Market Segment Manager Plastics.

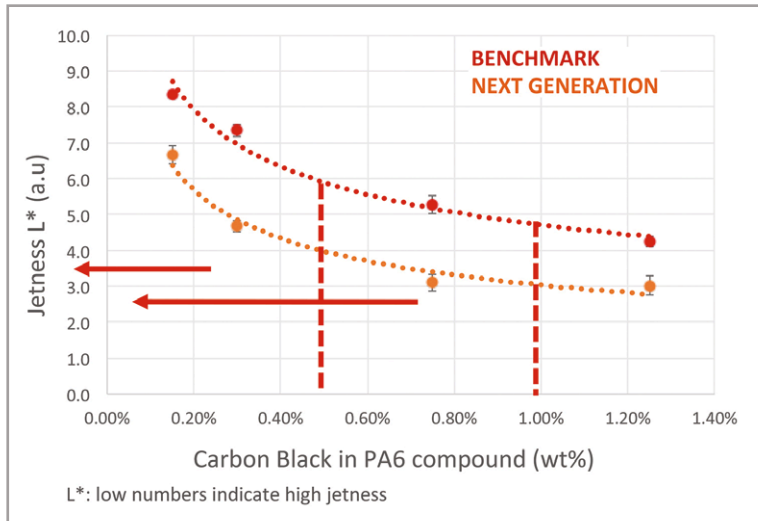
“Balancing the colour/dispersibility trade-offs is critical to getting successful adoption of a new carbon black,” he says. Black Pearls 5160 shows an improvement of 10% in jetness over Black Pearls 5560, with only a minimal change in the blue tone value, according to the company's data.

More recently, at the Performance Polyamides 2018 conference organised by *Compounding World* publisher AMI in September, Strässler presented a developmental Cabot carbon black that he said delivers on next generation performance in polyamides, allowing compounders and processors to achieve the desired jetness without sacrificing mechanical properties (Figure 1). “Essentially, through our process technologies and plastics application knowledge capabilities, we are better able to deliver a better dispersing product for polyamides that achieves the desired jetness at lower loadings, thereby preserving the underlying mechanical properties,” he says.

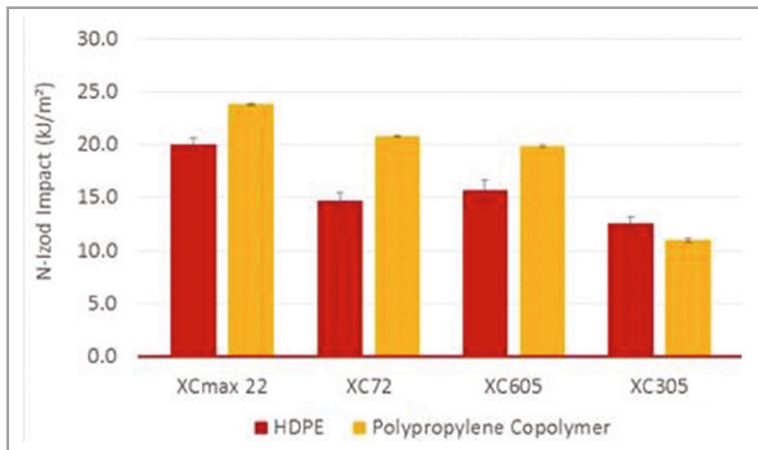
In the conductive area, Cabot earlier this year announced the successful scale-up of its Vulcan XCmax 22 speciality carbon black, after it moved production to commercial units to meet growing demand. The product's key feature is the ability to achieve target conductivity at almost half the loading levels required for other speciality blacks, such as its own Vulcan XC72. “This is particularly critical in high performance applications where the preservation of mechanical properties is paramount,” says Strässler. The retention of impact performance is shown in Figure 2.

The company is also developing a broader portfolio of conductive carbon additives. Emmanuel Tarret, General Manager EMEA for Cabot's

**Main image:**  
Carbon black producers continue to develop new grades offering improved aesthetics and electrical properties while meeting environmental demands



**Figure 1: Experimental next-generation carbon black from Cabot achieves the same jetness as the benchmark at around one third of the loading**



**Figure 2: Impact strength values of various compounds with a conductivity of 1000 Ohm.cm, produced with different Vulcan XC speciality carbon blacks**  
Source: Cabot

Masterbatch business, says it is working on a new technology to provide higher performance in electrically conductive applications. "We are optimising not only our formulation manufacturing capabilities, but also broadening our scope with innovative materials that will play an important role in enhancing the functionality of plastics in automotive, medical and industrial applications," he says.

Then at Fakuma last month, Cabot introduced a new brand of black masterbatches called Techblak. These are formulated using recycled resins obtained from both post-industrial and post-consumer sources. Cabot says it has extensive experience in formulating specific blends of recycled raw materials that enable high performance, deliver consistent colour, UV-protection and quality for applications where there is a need for increased sustainability.

**Optimised products**

At **Birla Carbon**, Applications Manager Plastics Ranjan Kamat points to the company's various Raven high-colour product series, which he says were designed by optimising surface area, aggregate size, and bead quality "to achieve excellent colour and easy processability to cater to the growing demand for darker, bluer and glossier finish." He says the products show very good dispersion as well as colour performance in a wide range of thermoplastics, adding that Birla takes extra care with these grades to achieve high levels of physical and chemical cleanliness. "These properties are not only essential for easier dispersion and hence better colour but are critical to meet food compliance regulations," he says.

**Polymer distribution in Europe 2018**

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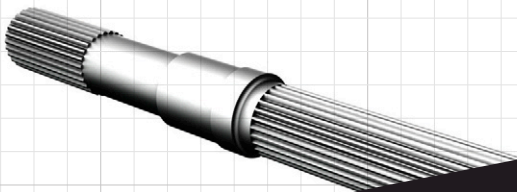
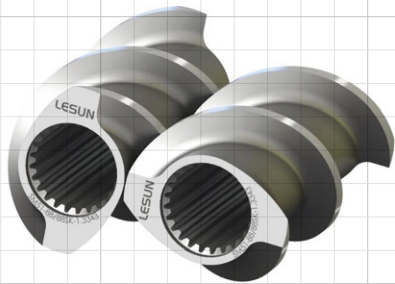
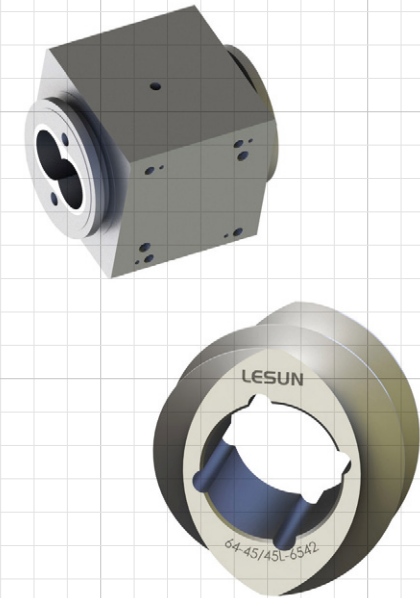
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PHOTO: CABOT CORP



**Above: Automotive is a potential market for Cabot's latest developmental blacks, which offer high jetness in PA while maintaining mechanicals**

Echoing Strässler's comments, Kamat says that in high jetness applications extracting the full potential of carbon black becomes a challenge, as carbon blacks with high surface areas are more difficult to disperse. "With increasing surface area of carbon black other factors like compounding equipment, polymer types and polymer viscosity start to play more dominant role in achieving the desired performance," he says.

"Compatibility between carbon black and polymer matrix shows varying effect on the dispersibility of carbon black depending upon the type of compounding equipment," Kamat says. "We have observed that specific energy input can be a good indicator to monitor dispersion quality. Surface area of carbon black and screw/rotor speed contribute significantly to the total specific energy input value. We support our customers to optimise their compounding process to extracting the best performance from a carbon black."

For conductive applications, compounding of a conductive product like Birla's Conductex offers a special challenge, since the desired performance cannot be achieved if the additive is not adequately dispersed, or over-dispersed, or fragmented, Kamat adds. "So the goal during compounding of conductive products is to achieve a high level of distributive mixing without applying too rigorous a shear force."

**Right: Carbon black with higher surface area per unit volume - smaller particles in other words - provides higher jetness**

With the increasing diversity of polymer applications, it is becoming apparent that "one size will not fit all," Kamat says. A particular challenge when serving an emerging market is to understand how quickly the performance requirements are changing. "In order to serve these emerging markets, we are adapting a dynamic proactive approach by

identifying/modifying/developing products to better serve these markets," he says.

Birla has also launched a new Raven product for production of general-purpose masterbatch that the company claims is the first of its kind. "This easy-to-process product allows masterbatch manufacturers to produce highly loaded (65%) masterbatch, Kamat says. "It allows the masterbatch producers to add other fillers and thus lower their overall masterbatch cost."

**Shielding performance**

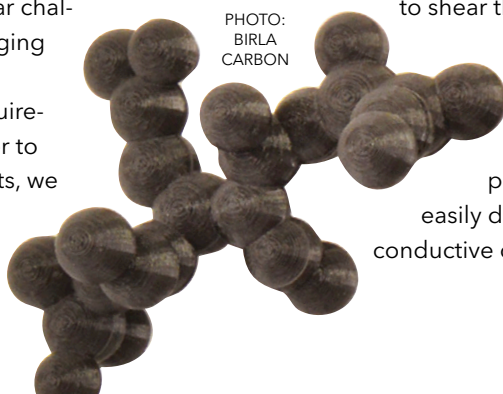
At **Imerys Graphite & Carbon**, Anna Ellett, Field Application Engineer Polymers, highlights work the company is performing related to shielding against electromagnetic interference (EMI). This has long been a concern in maintaining performance of electronic devices and systems in areas as varied as aeronautic, automotive, medical and telecommunications industries. However, it continues to grow, especially in automotive, where the use of electronic devices is on a constant upward curve and where lightweighting issues are leading to further substitution of metal casings—which are inherently good at providing shielding - with plastics that are not. Hence the increasing need to develop thermoplastic compounds with better EMI shielding effectiveness.

Carbon black is one of the most frequently used electrically conductive fillers used for EMI shielding. Ellett describes Imerys's Ensaco 250G as "a unique cutting-edge solution, with a winning combination of high structure and low surface area, which guarantees excellent dispersion in polymers and allows excellent mechanical and flow properties retention." She cites a test involving 2mm thick sheets of polypropylene (PP), produced with Ensaco 250G loadings ranging between 20% and 40%. The EMI shielding effectiveness, measured in the range 10 MHz - 1 GHz, reached between 28 and 40 dB at 20% and 35% loading respectively (Figure 3).

Ensaco 260G, which has a higher specific aggregate conductivity, provides a higher conductivity than Ensaco 250G at the same level of loading, resulting in higher EMI shielding effectiveness. Increased conductivity also comes from the structure of Ensaco 260G, which is more resistant to shear than that of Ensaco 250G.

Ellett says Imerys's proprietary process for making conductive carbon blacks enables the controlled production of extremely clean, easily dispersible, low moisture conductive carbon blacks that match the

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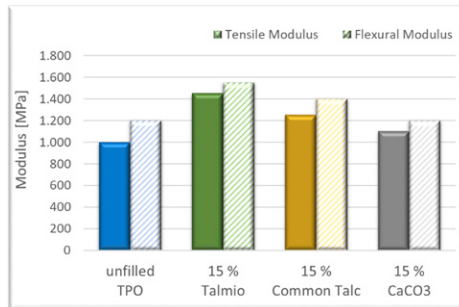
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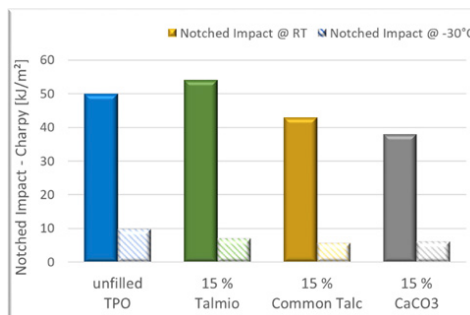
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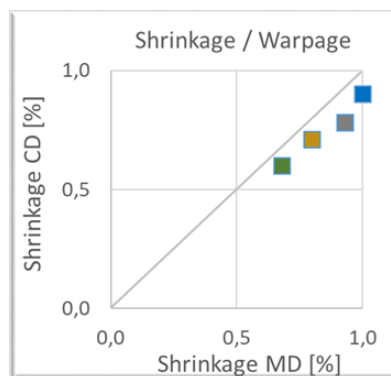
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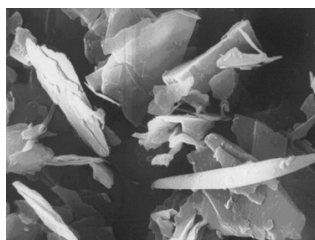
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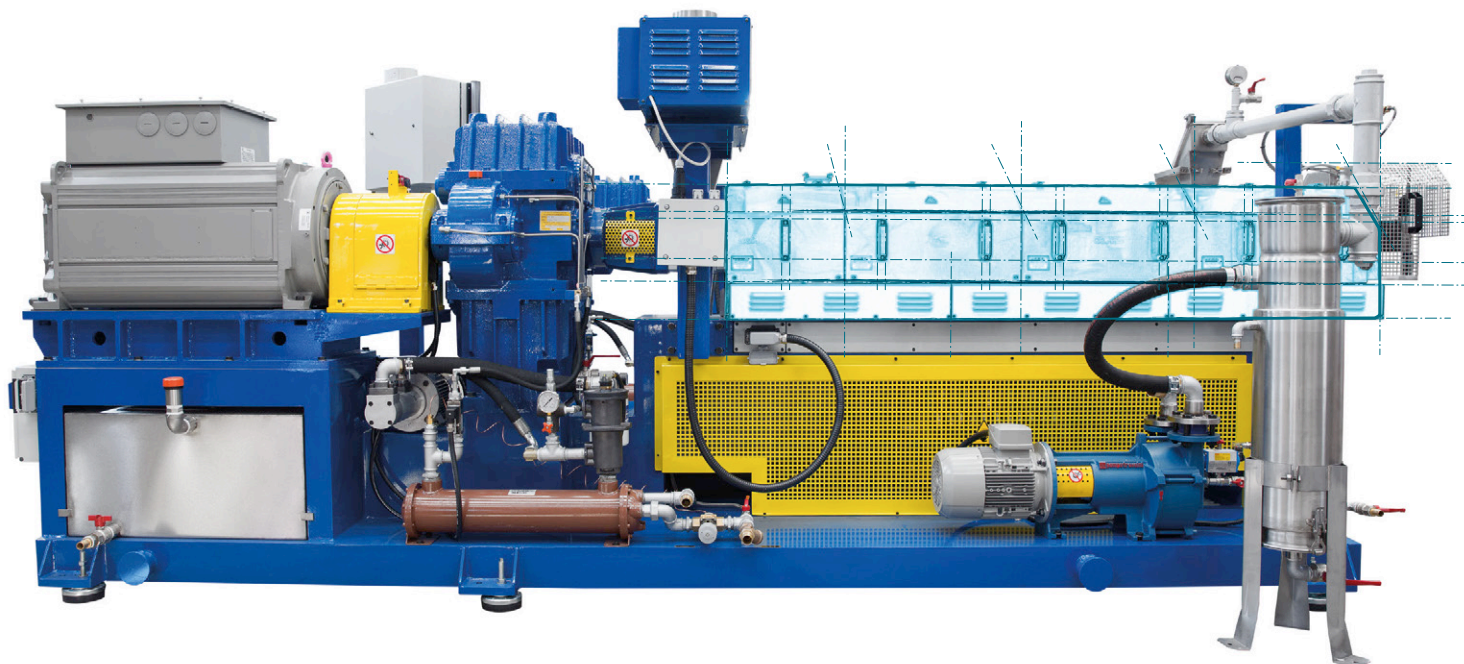
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severest purity requirements for low PAH and BAP. "The unique combination of high structure and low surface area achieved with the process enables easy dispersion, the low surface area improving polymer wetting and the high structure decreasing the contact forces between aggregates. Dispersibility is further improved by Ensaco's low moisture uptake, which additionally avoids the formation of bubbles.

The purity of a carbon black grade is critical in electronic packaging applications as soluble ions can migrate and induce corrosion of electronic devices such as hard disk components and semiconductors. "Ensaco carbon blacks, with very low levels of metallic impurities, low ash content and soluble species content more than one order of magnitude lower than competitor conductive carbon blacks, are ideal for demanding applications such as ESD [electrostatic discharge] control," claims Ellet.

**Sustainable options**

Developments in producing carbon black from alternative resources are now yielding returns, as demonstrated by **Black Bear Carbon**, which

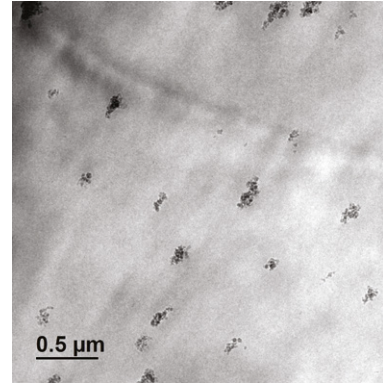
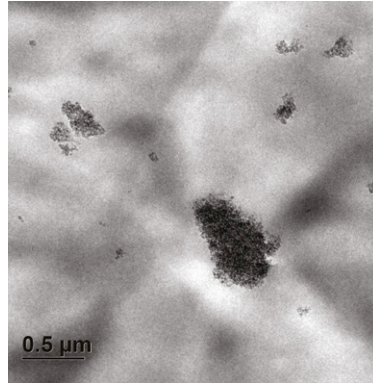


PHOTO: BIRLA CARBON

recovers carbon black from end-of-life tyres and produces clean oil and gas along the way. Its first pilot plant went into operation in 2016 at Nederweert in The Netherlands. It can process more than one million waste tyres a year, yielding 5,000 tonnes of carbon black, 5,000 tonnes of bio-fuel, 3,000 tonnes of steel and 1 MWh of electricity. The plant is operated in partnership with Kargro, a major European tyre recycler.

Black Bear now says it is on the verge of scaling up and is aiming to build more than 1,500 production plants around the world to tackle the global waste tyre problem. It says it also aims to disrupt

**Above: TEM images show dispersion of carbon black in a polymer matrix. Better dispersion (right) leads to better colour**

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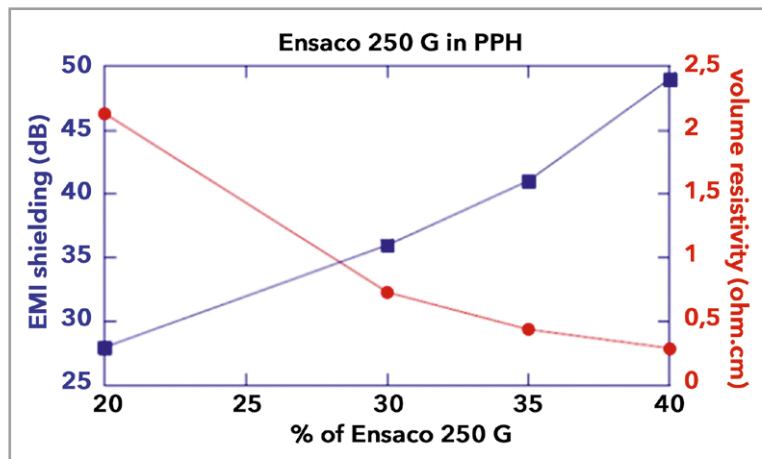
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**Figure 3: EMI Shielding effectiveness (dB) of Ensaco 250G, measured in the range 10 MHz - 1 GHz on 2 mm thick polypropylene sheets containing the conductive carbon black**

Source: Imerys Graphite & Carbon

**Right: Imerys claims its proprietary production technology results in high purity carbon blacks**

the traditional “furnace” carbon black production process, which uses oil as its feedstock. The company plans to roll out the new plants in cooperation with local partners. It says that taken together, the planned plants would result in CO<sub>2</sub> emission reductions equivalent to the planting of more than 1bn trees and have the potential to reduce global oil consumption by more than 215m barrels.

The company recently received €11m in equity funding, which it says will allow it to realise further developments of its process and product. It is already at the negotiation stages for “a handful” of commercially sized production plants. “The industry is at a turning point,” says Black Bear Carbon Sales Specialist Ad van Oorschot. “Legal and environmental pressures are growing even faster than oil prices. The carbon black market volume is 15m tonnes per annum and the industry has a CAGR of +5%.”

Earlier this year, coatings company AkzoNobel entered a partnership with Black Bear; it will use the material in its powder coatings. AkzoNobel has been a major producer of carbon black for a long time but its speciality chemicals arm, which includes the carbon black business, was sold earlier this year to US private equity group Carlisle. It now operates as **Nouryon**.

“Besides AkzoNobel, our clientele has grown to over 30 customers in many different industries,” a Black Bear spokesperson says. “With scheduled repeat orders we know that we have now grown our concept into a working reality. Our recovered Carbon Black (rCB) has received promising feedback from specialties manufacturers in ink, coatings and polymers ...[and] has made interesting developments in the rubber industry as well.”

**Below: A million used car tyres can produce 5,000 tonnes of carbon black plus fuel and steel**

Chris Twigg, Black Bear Carbon Technical Director says the company can guarantee PAH levels below 20ppm in all of its products.

Rival carbon-from-tyres technology company **Pyrolyx** operates a plant at Stegelitz in Germany, with an output of 3,600 tonnes/yr. It said in a statement in October that its new plant at Terre Haute in Indiana in the US, which is currently under construction, should be fully operational next June. The company draws confidence from recent oil price rises, noting that prices of oil derived carbon black have increased by 26% between July 2017 (when it launched its IPO) and September this year.

**Environmental impacts**

Pyrolyx also says that a further positive development—from its point of view, at least—is that the number of carbon black manufacturing plants in the US is expected to decline “as some less environmentally efficient plants have become unviable with increased environmental regulation.”

Meanwhile, at another carbon black start-up, **Monolith Materials’** Sales & Marketing VP John Reese says a new plant at Hallam in Nebraska, US, is slated to be mechanically complete next June, with commissioning complete a few months later and commercial sales expected to begin towards the end of 2019.

Monolith Materials has developed a process to make carbon black using natural gas feedstocks and electric plasma arc technology. Reese says the purity of the gas will enable the company to produce a “unique” line of specialty products, using a process that is far cleaner than traditional ones. Monolith has a demonstration plant located near San Francisco.

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PHOTO: BLACK BEAR CARBON

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# Forming the right response to regulatory questions



PHOTO: SHUTTERSTOCK

*Regulation of plastics is intensifying around the world, making it essential for companies to keep on top of compliance. We preview AMI's Plastics Regulations, Pittsburgh 2018 conference, the first to take place in the US*

**Main image:**  
Hear from experts who know the plastics rulebook

AMI's Plastics Regulations conference provides expert analysis and guidance on a range of international legislative and regulatory issues that will impact on polymer producers, compounders, processors and end users doing business in the US and beyond. The two-day conference takes place in Pittsburgh, PA on December 11-12.

Legal and regulatory experts will cover new and impending regulations in areas such as TSCA, product stewardship, biomaterials, single-use plastics, plastics waste and the Circular Economy. Key stakeholders from Europe will also address issues from across the Atlantic affecting the plastics supply chain in the US.

Food contact legislation is another evolving subject that has significant implications for the suppliers of polymers, additives, compounds and masterbatch, as well as the producers of food packaging and food processing equipment. Legal experts at the conference will review existing and planned regulations in this area and provide advice on how to meet them.

Here we preview the conference, highlighting expert speakers from government agencies, compliance departments and specialist law firms.

## US regulatory scene

The opening session of Plastics Regulations, Pittsburgh 2018 takes a closer look at the current regulatory landscape and some of the challenges likely to affect those in the plastics industry. **Ed Brzytwa**, the Director for International Trade at the **American Chemistry Council (ACC)** in the US, starts proceedings with a look at how global trade conflicts are impacting on the US economy and the business of chemistry. This is followed by a talk from **Christopher Thelen**, Regulatory Specialist at **M. Holland Company** in the US, who discusses a modest new approach to regulatory compliance.

## Product stewardship

The second session features **Bernard Henn**, Supplier Development Manager at **Verisk 3E** in the US, who investigates modernising product stewardship in the plastics industry. The second talk in the session, focusing on biomaterials supplier liability issues with regards to FDA regulation and managing risk, is given by **Frederick A. Stearns**, Partner at law firm **Keller and Heckman** in the US. **Beth Trenor**, Advanced Regulatory Specialist at **Milliken & Company** in the US, then presents from

the additive supplier perspective and how Milliken is thriving through innovation in a challenging regulatory environment.

After lunch, the session is continued by **Dee Wilson**, Senior EHS Specialist at **UL Product Supply Chain Intelligence** in the US, who covers antimicrobial protections as a solution in the move towards reducing single-use plastic waste - the talk focuses on the regulatory challenges and requirements for pesticides.

### Europe and beyond

The third and final session of day one opens with a paper about the recent proposed amendments to the EU Waste Framework Directive from **Dr Anna Gergely**, Director, EHS Regulatory at **Step toe & Johnson** in Belgium. This is followed by a look at the Circular Economy and plastics by **Roberto Crespi**, Senior Associate Lawyer at **Fieldfisher** in Belgium.

After a networking and refreshment break, **Alfred Voskian** and **Jytte Syska**, Partners at **Syska Voskian Consulting** in the US and Denmark, then discuss EU REACH and CLP (Classification, Labeling and Packaging) regulations affecting the plastics industry. The final talk of the day is given by **Michael Fischer**, Vice President, Codes and Regulatory Compliance at **Kellen** in the US, who focuses on the impacts and solutions relating to construction regulations in China, for US producers of foam plastic-core insulated metal panels.

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

### Food contact

Day two of the Plastics Regulations conference is opened by **Dr Mitchell Cheeseman**, Managing Director at **Step toe & Johnson** in the US, who

looks at building a global strategy for innovative food contact products.

This is followed by a close look at the US FDA Food Contact Notification Program presented by **Dr Jessica Cooper**, Review Chemist at the Center for Food Safety and Applied Nutrition, Office of Food Additive Safety in the Division of Food Contact Notifications at the **US Food and Drug Administration (FDA)**.

After the morning refreshments, **Jim Mo**, Business Development at **CIRS Group** in the US, showcases a road map to Food Contact Materials and Articles regulations in China. And finally, **Naeem Mady**, Vice President, Regulatory Market Access, Health, Environmental & Regulatory Services (HERS) at **Intertek** in the US, presents a paper on migration protocol in support of global food contact notifications and compliance.

### Packaging applications

The final session of the conference begins with a look at emerging issues and insights related to food and beverage packaging delivered by **Dr Ruud Overbeek**, Chief, Business Development & Strategy at **Decernis** in the US. **Dr Dave Brassington**, Vice President Regulatory Affairs at **Addivant** in the UK, explores non-intentionally added substances and developing new plastic additives in the era of the parts-per-trillion detection limit. Closing the conference is **Dr Grant B. Kenion**, Scientific Fellow at **Henkel Corporation** in the US, who makes a comparison between direct contact, different food contact layers, and conditions of use analytical extractive studies versus diffusion modelling predictions.

**Speakers at the conference include (from top):**  
**Christopher Thelen from M. Holland, Bernard Henn from Verisk 3E, Frederick A. Stearns from Keller and Heckman, Grant B. Kenion from Henkel, Jim Mo from CIRS Group and Ruud Overbeek from Decernis**



# About Plastics Regulations Pittsburgh 2018

Plastics Regulations 2018 takes place on 11-12 December at Pittsburgh Marriott City Center, Pittsburgh, PA, in the United States. In addition to the formal conference sessions detailed above, attendees will benefit from the chance to discuss and network during informal refreshment breaks and at the drinks reception in the evening of day one.

Whatever your role in the polymer supply chain, AMI's Plastics Regulations conference will give you vital information on how to ensure your company is compliant with current and future chemicals legislation. Don't get caught out by new legislative developments. Attend Plastics Regulations, Pittsburgh 2018 to discover the most effective ways to protect your business and ensure compliance. Book your place today!

For further information about attending the event, please contact the Coordinator, Shannon Slaff: [shannon.slaff@ami.international](mailto:shannon.slaff@ami.international) Tel: +1 610 478 0800. More information at the [conference website](#).



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*Food waste is a huge global problem. Packaging can minimise the losses; active and intelligent packaging technology can provide even greater protection. Jennifer Markarian reports*

## Packaging gets active

Packaging plays a vital role in protecting the quality of food and pharmaceuticals from spoilage or degradation caused by oxygen, moisture and bacteria. Passive barrier layers limit oxygen and water vapour transmission into the package while vacuum packaging or modification of the gas in the package by purging with nitrogen or carbon dioxide provide additional protection.

However, active packaging—that is packaging that uses additives that either absorb unwanted molecules or release helpful ones—is also finding growing use. Combining active packaging with intelligent packaging - incorporating sensors that can indicate freshness, for example - takes the technology one step further.

Packaging supplier **Sonoco** says packaging can play a significant role in alleviating the challenge of food waste. At the end of last year, the company established a partnership with Clemson University in South Carolina, US, called Sonoco FRESH that aims to further efforts in this direction. “The vision is to create a hub where academia will collaborate with the public and private sectors to develop solutions to reduce food waste. As much as one-third of the

global food supply is wasted, and we believe that packaging technology advancements can reduce this number significantly. The Sonoco Foundation has committed to a gift over five years to establish this hub as well as \$1m in research funding to support proprietary Sonoco projects at the university,” the company said at the time.

The push for more recyclable packaging is driving growth in mono-material, multilayer film structures that use active packaging solutions, such as oxygen absorbers, to maintain or improve properties, according to Roland Schultz, Director of Global Marketing at **Albis**. Ilias Ali, Research Engineer at packaging supplier **Printpack** agrees, saying that using a combination of passive and active barriers in a mono-material (typically either PP or PET) for improved recyclability is increasing.

Meanwhile, the **AIMPLAS** plastics technology centre in Spain is developing customised solutions for ethylene scavengers. These are intended to eliminate ethylene from the package environment, so slowing down the ripening processes and the deterioration of vegetable products or flowers and extending their shelf life. ➤

**Main image:**  
**One third of food produced for human consumption globally goes to waste. Packaging can cut waste; active and intelligent technologies provide further protection**

**Right: Mono-material films containing active components can substitute more complex and difficult-to-recycle multi-material packaging, according to Albis**

**Antimicrobial options**

One of the challenges for food packagers is to extend the shelf-life of ‘natural’ foods with no or reduced preservatives. Antimicrobials in the packaging can help extend shelf life, but they must also be approved for use in food-contact plastics. “There has been significant research in this area [antimicrobials], but very few technologies have been successfully commercialised for primary food packaging due to effectiveness, cost and regulatory restrictions,” according to a spokesperson from Sonoco. However, the company continues to evaluate both additives and coatings that provide antimicrobial properties to a variety of packaging formats, particularly for fresh foods.

An additive from Thailand-based **Life Materials Technologies** (LIFE DJ/AM-00-1A) combines an inorganic antimicrobial with a molecular sieve, with the two working synergistically in plastic packaging to help delay spoilage of foods. LIFE DJ/AM-00-1A is said to comply with biocide regulations in the US and EU and is approved for use in food contact plastics globally, according to Tom Ellefsen, CEO of Life Materials Technologies (the company’s products are distributed in European markets by **Velox**).

Natural additives obtained from fruit waste or other agro-industrial waste are being investigated as active-packaging additives. The aim is to take advantage of the fact they are edible and therefore give rise to no concerns in food packaging, says Vanessa Gutiérrez, Researcher in the Compounding Department at Aimplas. Potential additives include highly antioxidant substances that can be obtained from olive and vine industry byproducts, she says. Extracts with antifungal and antibacterial properties have also been obtained from garlic and onion production and from orange peel. These have been shown to have a proven ability to



improve the shelf life of foods such as strawberries and fresh cheese.

Challenges of using natural active substances compounded into plastics to obtain an active package include controlling the release rate of the active substance, the thermolability (sensitivity to heat) that most natural antimicrobials display, and the effect these additives can have on organoleptic properties, says Gutiérrez. “There are somewhat thermal stable extracts, such as oregano, thyme, cinnamon, clove (up to 250°C), which can be used in polyolefins and some polyesters, that offer high activity after multiple process-

ing steps, for example compounding, extrusion and thermoforming. But there are several other extracts such as garlic and rosemary with a decomposing temperature close to 150°C, which make them suitable for only low temperature processing polymers, such as LDPE, EVA or TPS.”

**Encapsulating additives**

AIMPLAS researchers have developed additive incorporation methods using encapsulation and employing suitable carriers. It says encapsulation offers release control, thermal and shear protection, and the additional advantage of offering the ability to handle a powdered agent instead of a liquid.

One experiment used an additive based on encapsulated garlic extract, which is an antibacterial and antioxidant agent, in a PLA matrix. A container for fresh salad using the additive showed a significant difference from the control container with no active additive after four days at room temperature (Figure 1). In another experiment, 1% of a garlic extract was incorporated in a polyethylene film used to package strawberries. The additive showed the ability to significantly protect the fruit from mould growth (Figure 2).

“Depending on the final product to be packed, organoleptics could affect the customer’s perception. However, even when using garlic extract (the strongest smell), the product taste of strawberries was not affected,” says Gutiérrez. She adds that researchers continue to work on different encapsulation processes to minimise the organoleptic issues while keeping the activity of the extracts.

Organoleptics can affect the consumer’s impression of freshness in vacuum-packaged meat products and a new technology from **Bemis** is intended to provide a solution to this problem. “When combined with low oxygen transmission

**Figure 1: Packaged salad samples after four days at room temperature. Both containers are made from PLA; the pack on the left contains an active encapsulated garlic extract additive**



PHOTO: AIMPLAS

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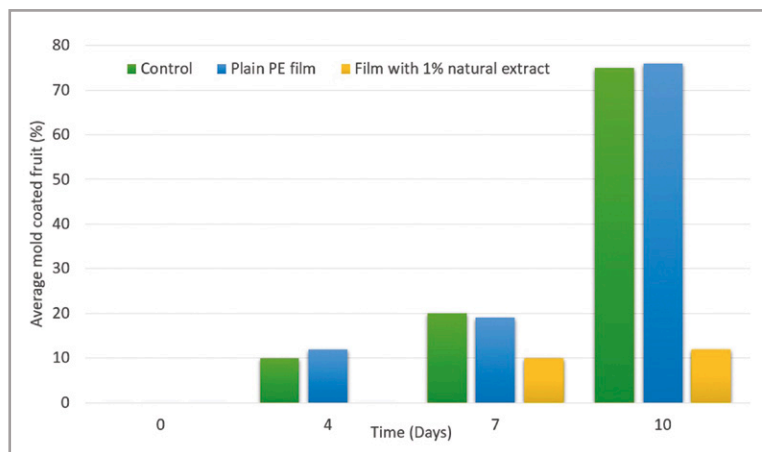
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**Figure 2: Researchers at AIMPLAS have shown that PE films containing an encapsulated active garlic extract can reduce mould growth in packaged strawberries**

Source: AIMPLAS

rate (OTR) films, vacuum packaging extends meat shelf-life by reducing headspace oxygen, which in turn decreases the growth rates of spoilage bacteria and minimises the organoleptic effects of lipid oxidation. However, an unintended consequence of using low OTR packaging is the development of confinement odour," says Ankush Gokhale, PhD, Senior Research Scientist at Bemis Central R&D in Wisconsin.

Although this odour quickly dissipates once a package is opened, its detection by the consumer has a negative impact on acceptability, Gokhale says. Confinement odour is a particularly vexing problem for the poultry industry. "Because use of traditional low OTR vacuum packaging leads to confinement odour, processors often choose to use packaging that supports freer gas exchange at the expense of more rapid bacteria growth. Bemis's new technology addresses this shortcoming by adding a new form of intervention that helps to maintain the quality standards set by meat processors."

### Odour suppression

The Bemis technology uses potassium sorbate—an FDA-compliant food ingredient—compounded into the food-contact layer of the packaging inside an oxygen barrier (Figure 3). "The novel combination of potassium sorbate modification and low OTR packaging films results in slower bacteria growth rates as well as suppression of confinement odour," says Gokhale. "The new Bemis technology will help poultry processors estimate 'sell-by' dates with added precision and better corroborate consumers' freshness expectations. Additionally, shelf life extension techniques like this help producers reduce food waste."

Gokhale says that the company worked with the

Food Research Institute (FRI) at the University of Wisconsin-Madison over the past couple of years to test the validity of the packaging concept. "The researchers at the FRI documented the concept's microbiological and organoleptic benefits on confinement odour, meat texture and colour under different packaging conditions," he says.

Bemis is also working on a packaging film containing a melt-compounded odour absorber used for organoleptic enhancement of some ground meat products. Another development from the company is the Bemis Freshcase vacuum packaging for fresh red meat, which uses *in-situ* generation of nitric oxide to maintain the red colour associated with fresh meat. In this packaging technology, sodium nitrite particles are melt compounded into the food-contact layer of the films, where it is reduced to nitric oxide by enzymatic activity on the meat surface. The nitric oxide stabilises the bright red colour associated with meat packaged in a high oxygen environment, while enabling the microbiological shelf-life advantages of low OTR packaging, the company claims.

### Active pharma

In pharmaceutical packaging, there is an increasing need for active packaging solutions, according to **Aptar CSP Technologies** (CSP Technologies was acquired by the Aptar Group in August). The company specialises in development and production of active packaging for food, pharmaceutical, nutraceutical and other applications using its Activ-Polymer compounds. These incorporate additives to absorb or adsorb moisture, gases and odours, or to release gases (such as aromas or antimicrobials). For example, the company's Activ-Film materials are used in stick packs, pouches, and sachets. Its Activ-Seal gas-scavenging technology is designed to be built into induction-sealed screw caps. And its Vital containers are one-piece, flip-top desiccated vials and bottles used for probiotics.

In September, CSP Technologies announced a collaboration with PCI Pharma Services, a contract manufacturer and contract packaging company for the pharmaceutical industry, to further develop its Activ-Blister solutions. This technology is intended to control the headspace inside individual blister cavities in blister packaging. "The collaboration will expedite time to market for drugs and probiotics, among other oral solid dose applications. PCI Pharma will have the capability to produce clinical trial and stability study product with Activ-Blister solutions that might otherwise have significantly longer lead time for customers," says Craig

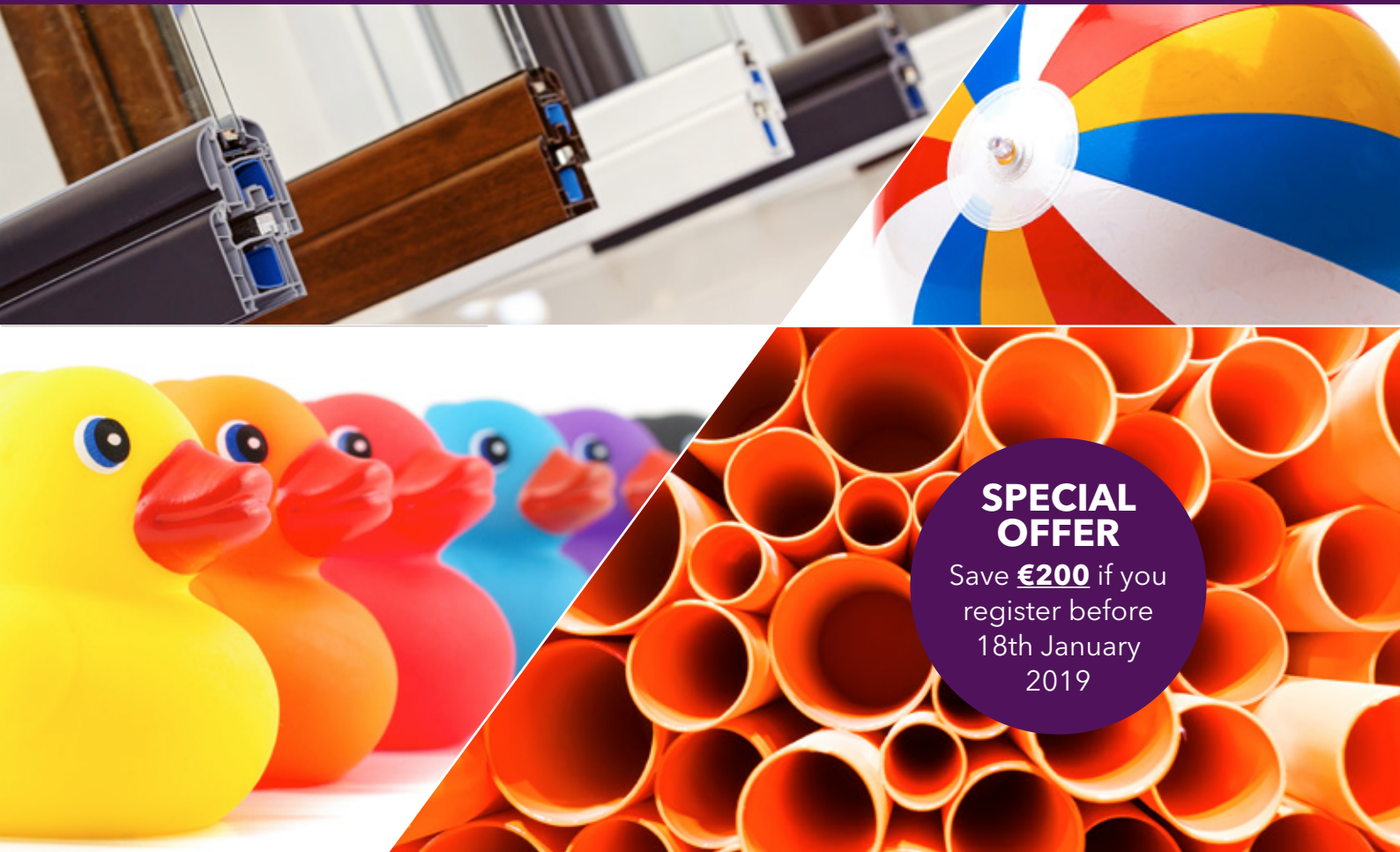


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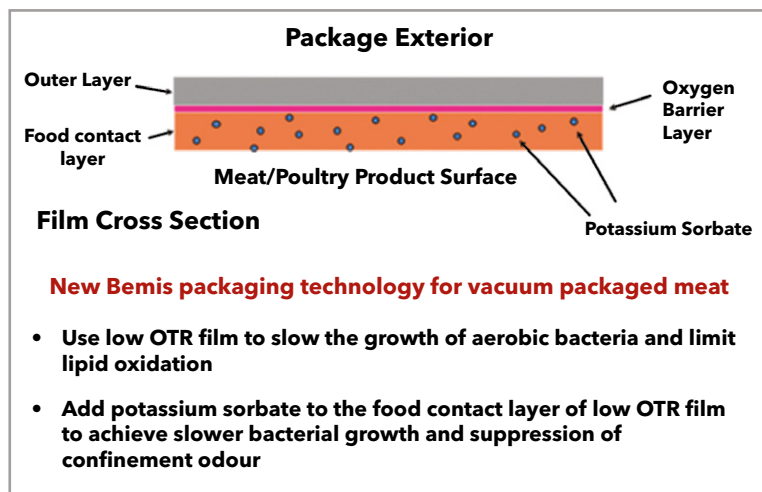


Figure 3: Schematic showing the construction of the latest active odour control solution for vacuum packed meat from Bemis

Source: Bemis

Voellmicke, Vice-President of Business Development for Aptar CSP Technologies.

This active packaging solution provides an alternative to high barrier films and foils where it is necessary to achieve extended shelf life. The Activ-Blister products scavenge moisture and/or target gases from three sources: in the blister at the time of packaging; from ingress over time; and from moisture/gas released from the packaged drug tablet or capsule.

“High barrier films, while an effective barrier to environmental conditions, can also trap moisture in the package at time of production, as well as retain moisture and gases that are released over time from the oral dose,” explains Voellmicke. He says that purging (often with nitrogen) is used to lower the amount of oxygen in a standard blister package made with high barrier foils, but the process can be difficult to manage and especially difficult to achieve lower levels of oxygen.

In addition, purging is typically limited to high barrier foil packages, because standard barrier thermoformed packages typically allow too much oxygen ingress to make purging worthwhile. “By contrast, Activ-Blister can achieve very low oxygen levels [without purging] by scavenging the gas present at time zero and—when used in combination with thermoformed materials with oxygen barrier properties—any additional oxygen ingress over time,” he says.

**Engineering solutions**

Although active packaging is often concerned with minimising moisture and/or a gas in a package, Aptar CSP has also engineered materials to create and maintain elevated moisture levels while releasing desired gases. “Novel drug formulations

and drug/device combinations can benefit from these package headspace conditions to enhance shelf life,” says Voellmicke. “In these applications, drying of the drug/dosage form can be detrimental to stability.”

Voellmicke expects to see continued demand for customised active packaging solutions, such as child resistant or senior friendly (CRSF) designs, as well as the addition of intelligent technology to active packaging and a gradual convergence of active and intelligent packaging.

Another partnership was announced last month between **Pylote**, which has an active packaging antimicrobial technology, and packaging company Amcor. The two companies launched a stick pack laminate for liquid pharmaceuticals that offers protection from microbial contamination without using preservatives in the liquid. Pylote’s technology uses mineral microspheres incorporated into the high barrier packaging material.

**Indicator advances**

Among available intelligent packaging options is the use of indicators incorporated into the package or in a label to indicate the state of a modified atmosphere or the quality of the packaged goods. Sensors can indicate when a package has been opened or can identify changes in pH or temperature in order to give the end-user a measure of “freshness” or quality, which could also help address the significant problem of food waste by supplementing or replacing use-by dates. The problem is being tackled from various angles by academia and industry to find sensors that will work hand-in-hand with active and passive barrier packaging.

For example, UK-based **Insignia Technologies’** FreshTag and After Opening Freshness Timer are time and temperature sensitive labels based on colour-changing pigments extruded in polymer

**Right: Activ-Blister from Aptar CSP Technologies is an alternative to high barrier films for sensitive drugs**



PHOTO: APTAR CSP TECHNOLOGIES

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**Right: Amcor worked with antimicrobial technology firm Pylote to develop this stick pack for preservative-free liquid pharmaceuticals**

films. The colour change rate depends on carbon dioxide diffusion through the barrier film in the label or as a response to changing temperature. The company claims to be able to develop pigments that can respond instantly or over a pre-calibrated time period, allowing it to customise sensing performance. Typical applications include indication of food freshness, packaging opening times, cold chain integrity, and or tampering/damage to the packaging.

Modified atmosphere packaging (MAP) presents specific challenges for the food industry. Lola Gómez, Researcher in the Functional Printing and Coatings Department at AIMPLAS, explains that MAP replaces air inside the headspace with an inert gas (nitrogen or carbon dioxide) that increases shelf-life by displacing the oxygen that reacts with food to cause rancidity or that promotes the growth of aerobic microorganisms that decompose food. "In a typical MAP food package line, the quality and proper performance of MAP is measured with expensive analytical equipment. Furthermore, during food package transportation and delivery, small impacts can cause a loss of the hermeticity without any way to check it. There is a clear need for a cheap and reliable oxygen indicator able to provide a simple response related to quality and safety," she says.

AIMPLAS is currently conducting research to develop an oxygen indicator that is suitable for food contact, easy to handle, adjustable regarding oxygen concentration, economical and that provides an irreversible response to the presence of oxygen, Gómez says. The researchers are looking at indicators based on redox sensors that comprise a UV-absorbing semiconductor, a redox-indicator, a sacrificial electron donor and an encapsulating polymer as an ink that can be coated on different substrates.

**Below: Insignia Technologies' intelligent film-based indicator labels can be customised to specific performance requirements**



PHOTO: AMCOR

The sensors become colour-less when activated by UV light and are re-oxidised to their original colour when exposed to oxygen, showing that oxygen has entered the package. The researchers are optimising the sensor to be sensitive to low concentrations of oxygen. To date, the indicators have been tested in a number of coatings. Temperature-resistance of the reagents will have to be checked if the indicators are to be incorporated in a polymer using a compounding process, says Gómez.

**Natural sensors**

Researchers at **Clemson University** (in South Carolina in the US) have, in the past, focused largely on antimicrobial food packaging. However, they have recently been investigating spoilage sensors based on autoinducers, which are the signaling molecules sent by cells as they start to break down. The method, called quorum sensing, takes what the micrororganisms do naturally and combines that with the ability to sense the onset of a food spoilage then builds both functions in to a sensor, according to Kay Cooksey, Cryovac Endowed Chair of the Clemson Food, Nutrition and Packaging Sciences department at Clemson.

Cooksey's goal is to develop a sensor that detects food spoilage when it begins, which she says will be an improvement over current detectors, such as those for meat packaging, that change colour based on volatile ammonia or sulphur that occur when meat spoil. "By the time the colour change occurs, the human nose can just as easily detect the aroma of the volatiles," she says. "Results from the proposed research will serve as a foundation for biosensors and ultimately intelligent packaging to effectively monitor changes in food and, in turn, improve food quality and safety."

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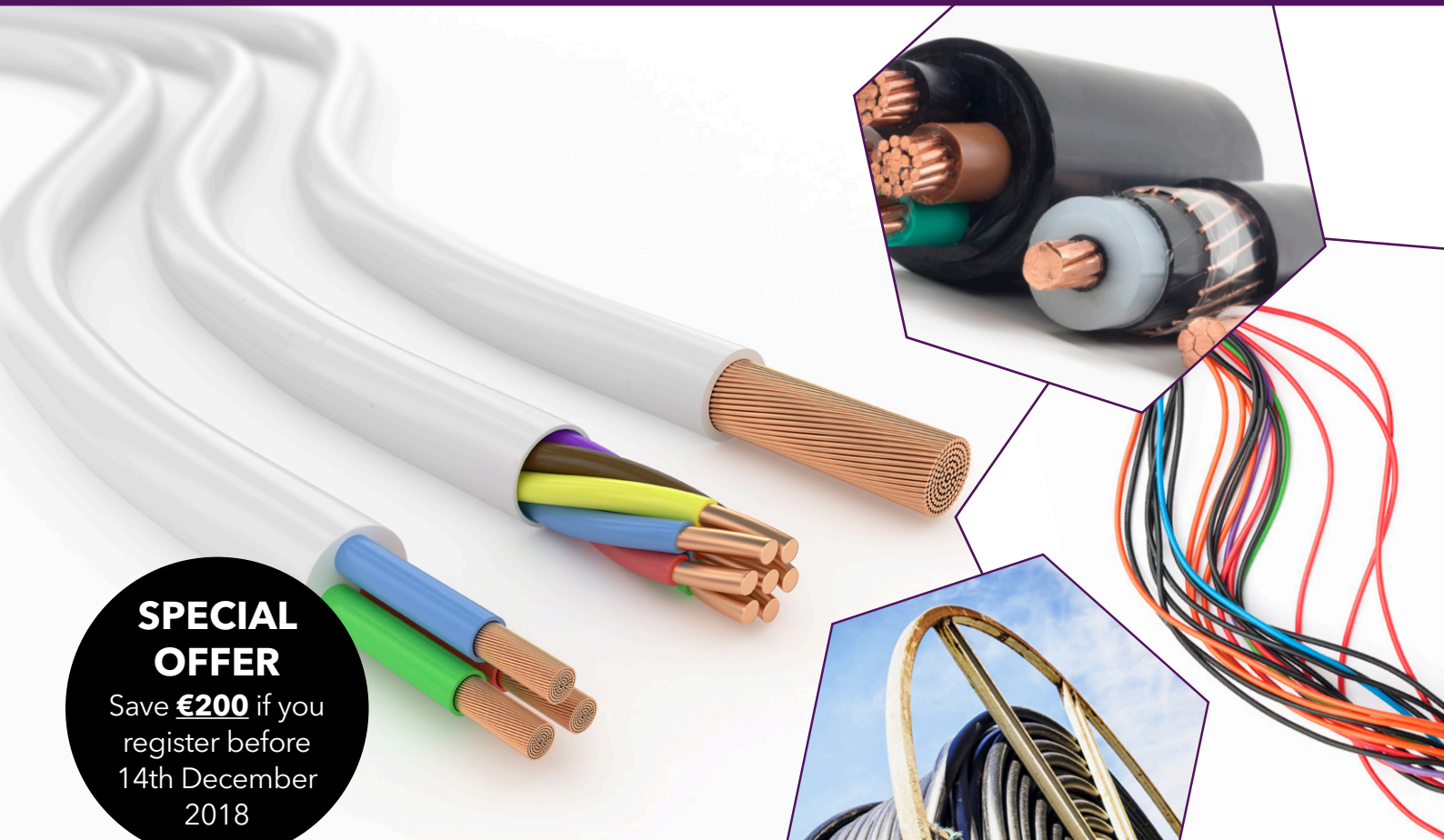


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# The options broaden for bio-polyesters

*Bio-based polyesters such as PLA represent a major slice of the compostable bioplastics market. Peter Mapleston finds out more about the latest higher performing variants and compounds*

Bioplastics make up around one percent of the more than 300m tonnes of plastics produced every year. The bioplastics market is, however, growing at a healthy, if not spectacular, rate and ever more sophisticated biopolymers continue to emerge. According to the **European Bioplastics** trade association, worldwide production of bioplastics is expected to increase from just over 2.0m tonnes in 2017 to around 2.4 million tonnes by 2022.

European Bioplastics uses a slightly confusing definition of bioplastics as polymers that are bio-based or biodegradable or both, so those figures cover all sorts of polymers: low-end and high-end; bio-based and petroleum-based, biodegradable and non-biodegradable. But a good proportion of the market is, and will continue for the future, to be based on the biodegradable polyester polylactic acid, or PLA. Growth in the use of this polymer—or rather this polymer family, since there are different types—is virtually guaranteed due to the combined efforts being put in by polymer makers, compounders, and researchers. Together, they are doing an pretty impressive job of improv-

ing PLA properties to make it suitable for a growing variety of increasingly demanding applications.

At the **IKT Institute of Polymer Technology** at the University of Stuttgart, for example, researcher Svenja Murillo-Castellon reports on work to improve foaming properties of PLA. The polymer, with its competitive system costs, is considered to be a promising alternative to polystyrene in foams. “From an ecological point of view especially short-living packaging should be produced by bio-based and biodegradable polymers like PLA,” she says.

Murillo-Castellon says that one major drawback of PLA, however, is its low molecular weight. “This affects the melt viscosity, the melt strength and elasticity, and also the mechanical and thermal properties. These drawbacks inhibit the production of low-density foams with uniform cell morphology. For foaming, the low weight PLA must be modified to increase the melt strength,” she explains. “Reactive extrusion on a twin-screw extruder is an effective tool to overcome these drawbacks by grafting, cross-linking or extending the PLA chains in a continuous process.”

**Main image: Polyesters produced from bio-based sources make up a large part of the bioplastics market. New developments tackle processing, mechanical and processing challenges**

**Right: Image showing the morphology of a modified and foamed PLA developed by researchers at IKT in Germany**

IKT is working on this technology, together with the Department for Polymer Engineering at the University of Bayreuth Germany. Murillo-Castellon says that “by using a suitable modification” researchers have created a PLA foam with properties comparable to those of polystyrene (PS). The focus of their research is to investigate the influence of different modifiers and the molecular properties of PLA on foaming behaviour and foam quality. The research team is working with different modifiers, which it will not disclose at the present time, that are said to act in a physical or chemical manner during the compounding process.

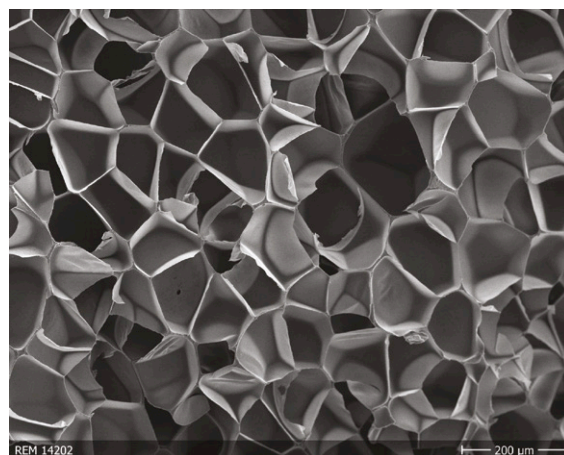
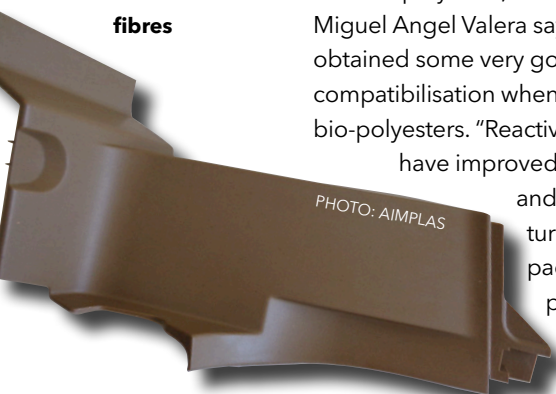


PHOTO: IKT INSTITUTE OF POLYMER TECHNOLOGY

**Below: This truck cabin foot rest is made using PLA reinforced with natural fibres**



**Matching tradition**

Spanish plastics technology institute **AIMPLAS** says it is obtaining properties similar to polypropylene (PP) in compounding trials using various biopolymers, including PLA and PHB (polyhydroxybutyrate, another polyester). Senior Polymer Researcher Miguel Angel Valera says the organisation has obtained some very good results with reactive compatibilisation when mixing different kinds of bio-polyesters. “Reactive extrusion modifications have improved mechanical performance

and also Vicat softening temperature from 65°C up to 98°C for packaging applications, allowing pasteurisation and in some cases sterilisation,” he says.

“Mechanical properties can also be improved in terms

of stiffness by using natural fibres, especially for injected parts and both PLA and PHB are the best candidates. Flax, kenaf and hemp have been incorporated in AIMPLAS developments to improve stiffness and HDT for automotive and other transport applications. Once again compatibilisation and dispersion play the most important role,” he adds.

Improvements in thermal properties are one of the biggest challenges with PLA, according to Valera. “It is very important to speed up the crystal-

lisation rate when we are obtaining the final product. Plasticisers and nucleating agents are fundamental to reach an HDT close to 140°C in PLA.” Reactive extrusion can also be used to create PLA copolymers. “Screw design and a good balance between throughput and screw speed are mandatory to match the kinetics of the chemical reaction,” he says.

**Smelling the coffee**

Heat resistance is also key in another application that is in the cross-hairs of a growing number of bioplastic makers and compounders—coffee capsules. That is no surprise, perhaps, given the potential size of the market. Martyna Fong, Packaging Unit Manager at **AMI Consulting** (part of the group that publishes *Compounding World* and which runs conferences in Europe and the US on single-serve capsules) estimates that current global consumption is close to 60bn capsules.

At the present time, the vast majority of single-serve capsules end up in landfill. However, that may be set to change. Germany-based specialty compounder **Golden Compound** displayed what it claims is the first home compostable coffee capsule at the Fakuma fair in Friedrichshafen. Produced by **Alpla** for Austrian coffee brand Amann Kaffee, it uses a capsule produced in a biodegradable polymer (the company will not disclose the material) filled with sunflower husk fibre together with a compostable fleece filter. Golden Compound Managing Director Reinhard Trumme said at the fair that it had received the OK Compost Home certification on 1 October in time for the official launch of the system by Amann at the Gustav Dornbirn consumer goods show.

Meanwhile, Italian food packaging producer **Flo** earlier this year introduced Gea, an industrially compostable coffee capsule created in partnership with NatureWorks. Flo says the new design should “deliver on the high-performance requirements of the most demanding roasters.”

**Below: AIMPLAS says reactive compatibilisation has delivered good results in bio-polyester modification**



PHOTO: AIMPLAS

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Gea is entirely composed of NatureWorks' Ingeo PLA. The capsule technology platform is fully approved for food contact and is in final testing by TÜV Austria and the Italian Composting and Biogas Association (CIC) for compostability certification. "Being able to count on a capsule that does not show signs of ageing in a few months, but is shelf stable for years, is a huge value for coffee roasters," says Erika Simonazzi, Marketing Director of Flo. Gea capsules are also said to provide high barrier to oxygen. They went onto the market in October of this year.

### Brewing improvements

Italian compounder **API**, now part of Trinseo, introduced its first compostable Apinat Bio compound for single-serve coffee capsules four years ago. The Apinat Bio family includes grades that are biodegradable according to EN 13432 and use 60 to 90% bio-based material. "Apinat Bio bioplastics offer very good mechanical and thermal characteristics during the brewing process and can easily substitute conventional plastics," the company claims.

The materials are based on PLA and developments to increase thermal resistance and barrier led to the introduction of new grades earlier this year. "Our first priority is to enhance the barrier towards water vapour and oxygen, thereby extending capsule shelf-life," says Aldo Zanetti, Business Unit Manager at Trinseo. "We are also working on improving our material's thermal stability for the purpose of extending its use in complex capsules and for higher brewing temperatures and pressures." Trinseo says the materials comply with FDA and EU food regulations and are supported by a range of colour masterbatches developed for compostable applications.

M:Vera GP1012 is **Bio-Fed's** offering in this area. This biopolyester-based compound - the company does not specify which polyester - was recently tested by inspection, control and certification

corporation TÜV Austria and awarded the "OK biodegradable SOIL" certificate as per EN 13432. To qualify, at least 90 % of the material must degrade into carbon dioxide and water in a soil environment.

The company, which is a branch of German compounder Akro-Plastic, says all elements of the compounds meet FDA



**Above: Trinseo's bio-platform includes not only the API Apinat biodegradable materials for applications such as coffee capsules, but also non-biodegradable products such as Apilon Bio 52 thermoplastic polyurethane elastomers (TPE-U) for footwear and Megol Bio styrene-based TPEs (TPE-S)**

requirements for use in products that come into contact with foodstuffs. The requirements for other certification—such as OK compost Home—as well as approval for products intended to come into

contact with food as per EU 10/2011 are expected to be met in the first half of 2019. Due to its light colour, the material can be coloured with a bio-based masterbatch from another Akro-Plastic branch, **AF-Color**.



PHOTO: API

### Resisting the heat

At the Fakuma exhibition last month,

German compounder **FKuR** presented various bio-based thermoplastic compounds, including an advanced injection moulding grade Bio-Flex S 7514 as well as bio-based TPE and even PP grades partially derived from renewables.

The PLA-based Bio-Flex S 7514 has been optimized by FKUR to improve processability. With an MFR of 27 g/10 min, it can be used in multi-cavity moulds and for production of parts with longer flow paths. FKUR says the grade offers high heat resistance (Vicat A 110°C), which is achieved without hot mould settings so allows for shorter cycle times. Typical target markets include catering applications such as cutlery. Bio-Flex S 7514 has a bio-based content of 75%. It is available in both natural and white and can be coloured if required.

Advances in PLA modification using additive masterbatches were the subject of presentations by masterbatch makers Natur-Tec and Sukano at the NatureWorks' Innovation Takes Root forum for Ingeo users, which took place in San Diego in the US in September.

Shilpa Manjure, Senior Manager R&D at **Natur-**

**Right: API has upgraded its PLA-based Apinat Bio grades for coffee capsules to enhance barrier and thermal stability**

**Below: Coffee capsules are a possible application for M:Vera GP1012 biopolyester from Bio-Fed**



PHOTO: BIO-FED

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**Right: Disposable cutlery is a potential application for FKUR's Bio-Flex S 7514 PLA, which has been optimised for improved flow and heat resistance**

**Tec**, covered advances in injection moulding of PLA for high-heat food service applications using the company's BF3002HT product. She said this performs cost-effectively using one and two-step processes for annealing parts to increase crystallinity.

Meanwhile, Daniel Ganz, Global Product Development Leader Bioplastics at Switzerland-based **Sukano**, discussed several new additive masterbatches. These include transparent and opaque impact modifiers (Sukano PLA im S633 and Sukano PLA im S687-D respectively), transparent slip/antiblock (Sukano PLA dc S511), a nucleating agent for thermoformable PLA sheet (Sukano PLA na S516), an internal mould release and processing aid for injection moulding (Sukano PLA mr S533), and a reactive chain extender system to improve IV when recycling PLA (Sukano PLA me S733).

### Supertough hybrids

Earlier this year, **Oak Ridge National Laboratory** (ORNL) in Oak Ridge in the US said it had developed a novel technology that creates a "supertough" material through the addition of very small amounts of silanes to PLA. "Our fast, scalable approach makes a new form of PLA that is 10 times tougher without sacrificing strength or stiffness," says ORNL's Soydan Ozcan. "This could broaden applications where polymer toughness is critical." The team plans to tailor the new polymer for additive manufacturing and packaging.

The researchers' work to date is described in a paper titled "Supertough PLA-Silane Nanohybrids by in Situ Condensation and Grafting" in the American Chemical Society journal *ACS Sustain-*



PHOTO: FKUR

*able Chemistry & Engineering*. Xiangtao Meng and colleagues say the supertough PLA was achieved by mixing 0.5–1.0 wt% of organoalkoxysilane with PLA. Three organosilanes, (3-aminopropyl)triethoxysilane (APTES), 3-(triethoxysilyl)propyl isocyanate (ICPTES), and trimethoxymethylsilane (MTMS), were selected for the study.

The researchers say that "remarkable improvements in ultimate tensile strain (up to 12-fold) and tensile toughness (up to 10-fold) were observed in APTES and ICPTES-modified PLA without any loss in tensile strength and modulus. Glass transition temperatures ...did not show any obvious decrease."

The ORNL team proposes that the in-situ condensation of organosilane and grafting of PLA to form a silica-PLA core-shell nanocomplex may be the reason for the good mechanical properties. The researchers observed nanofibrils at fractured

## Biodegradable plastic – the proof at last

This August, researchers at **ETH Zurich** and the Swiss Federal Institute of Aquatic Science and Technology (Eawag) said they had demonstrated that soil microorganisms metabolically utilised the carbon in polybutylene adipate terephthalate for energy production and also to build up microbial biomass. PBAT is the basis, among other things, for BASF's Ecoflex and Novamont's Origo-Bi, which it uses in its Mater-Bi products.

The researchers used a PBAT labelled with a carbon isotope, which enabled them to track the polymer-derived carbon along different biodegradation pathways in soil. It

showed that the carbon from PBAT was not only converted into carbon dioxide as a result of microbial respiration but also incorporated into the biomass of microorganisms colonising the polymer surface. The researchers claim to be the first to successfully demonstrate where the carbon of a polymer ends up, and that a plastic material really is effectively biodegrading in soils.

"This clarifies that nothing remains after biodegradation besides water, CO<sub>2</sub>, and biomass," says Hasso von Pogrell, Managing Director of trade association European Bioplastics. "With this study, two concerns that are

constantly being raised about biodegradable plastics have been rebutted – the doubt that microorganisms fully metabolise certified biodegradable plastics and the concern that the oil-based part of the polymer will not biodegrade completely."

PBAT was originally fossil-based, but **Novamont** has developed technology to produce it using vegetable oils. It now has capacity for 100,000 tonnes/yr of its Origo-Bi polyesters at its plant at Patrica in Italy (a conversion of a former PET production unit acquired from Mossi & Ghisolfi in 2016).

> [www.ethz.ch/en](http://www.ethz.ch/en)

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surfaces. Rheological studies also showed increased chain entanglement in the polymer melts, which contributed to one order of magnitude higher complex viscosity and storage modulus. “The simple PLA toughening strategy and the new mechanism revealed in this study will open a door to novel performance polymer materials and broader use of PLAs,” they claim.

### Compounding options

Compounders have an increasing array of PLA polymers to play with. In May this year, **Total Corbion** PLA launched what it described as a “novel technology that can create full stereocomplex PLA in a broad range of industrial applications.” This will enable PLA applications able to withstand temperatures close to 200°C (HDT-A). Samples of glass fibre reinforced stereocomplex PLA should be available around now. Total Corbion PLA says it is looking for brand owners, converters and compounders that wish to validate and capitalise on this new technology.

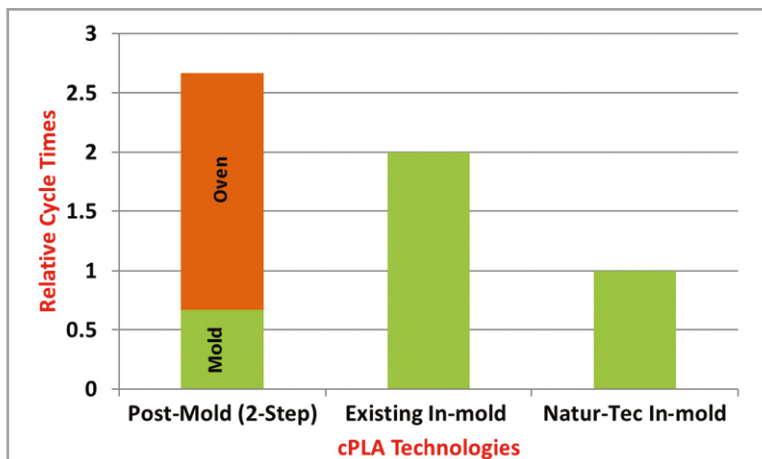
The technology enables stereocomplex PLA—a material with long, regularly interlocking polymer chains that results in higher heat resistance than standard PLA. “This breakthrough in PLA temperature resistance unlocks a range of new application possibilities, and provides a bio-based replacement for PBT and PA glass fibre reinforced products,” says the company.

“For example, injection moulded applications for under-the-hood automotive components can now be made from glass fibre reinforced stereocomplex PLA, offering both a higher bio-based content and a reduced carbon footprint.” The company is also targeting aerospace, electronics, home appliance, marine and construction industries.

“Over the past decades, the benefits of full stereocomplex PLA have been studied by universities and R&D departments on a laboratory scale”, says Stefan Barot, the company’s Senior Business Director Asia Pacific. “Now, Total Corbion PLA is the first company to scale up this technology and make it available for a broad range of industrial applications. The technology enables full stereocomplex morphology not only in the lab environment but also in commercial production facilities”.

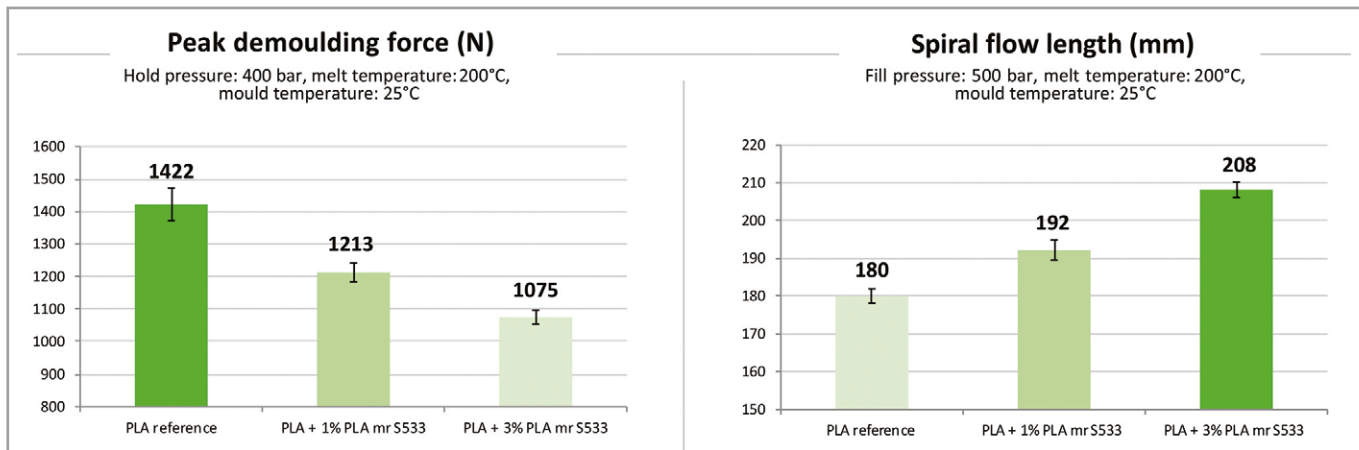
Stereocomplex PLA will be available from Total Corbion PLA as a marketing compound. “This means samples will be available for customer evaluation, but Total Corbion PLA will not supply these on a commercial scale,” says a representative. “We are working with various compounders who will be able to buy neat PLA and neat PDLA resins from us to add them together, potentially also adding glass fibres, to create full stereocomplex compounds.

Total Corbion is also on track for a start-up before the end of this year of its first commercial PLA plant, with a capacity of 75,000 tonne/yr at Rayong in Thailand. It is currently said to be in the commissioning phase. A 1,000 tonne/yr pilot plant,



Comparison of total cycle times using different annealing processes for production of injection moulded PLA cutlery

Source: Natur-Tec



Addition of Sukano PLA mr S533 reduces peak demoulding force and improves spiral flow length in an injection moulding grade of PLA

Source: Sukano



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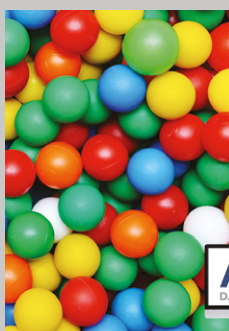
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**Right: Total-Corbion's 1,000 tonne/yr pilot PLA plant is already in operation in Thailand; its 75,000 tonne production plant is in commissioning**

also in Thailand, started up last December. Last year, **NatureWorks** licensed and later acquired Optipure chemical processing technology from UK start-up Plaxica for the production of D-lactic acid, which is a mirror image of the more common L-lactic acid. The license provides NatureWorks with a low-cost route to produce D-lactic acid, which it says is a building block for a further range of performance Ingeo PLA grades.

Bill Suehr, NatureWorks Chief Operating Officer, says that while small volumes of D-lactic acid have previously been available from producers in Europe and Asia, they have until now been at a substantive price premium to the L-lactic acid which NatureWorks currently uses. In combination, the two can produce polymers that offer useful features such as higher melt point and melt strength. Competitor Total Corbion also produces L and D-lactic acid.

**Investment challenges**

For all the positive vibes around the bioplastics market, it's not an easy ride. That is in part due to the considerable investments that are required in research, development, and production plant before a profitable market can be created. Metabolix, with its PHA polymers (polyhydroxyalkanoates, which include PHB), ran into the sand a few years ago. It still exists as Yield10 Bioscience but it sold its biopolymer IP in 2016 to Korean food company CJ CheilJedang Corp and now concentrates on the food market.

Among the latest to fall is BioAmber, which appeared to have considerable promise with its bio-based succinic acid technology before its money ran out. Succinic acid is a feedstock for polybutylene succinate (PBS), which has mechanical properties not dissimilar to polyethylene. It can also be used in pigments, food and polyurethanes.

Last month, the BioAmber plant in Sarnia,



PHOTO: TOTAL-CORBION

Canada, was sold to a start-up company co-owned by Visolis (with offices in the US and the Netherlands) and Taiwan-based LCY Chemical Corp. The facility is currently out of production.

Bio-based succinic acid is also produced on a small scale by a few other companies, including PTT subsidiary **GC Innovation** (which has a demonstration plant at Lake Providence in the US) and **Succinity**, a BASF/Corbion joint venture in Spain. A representative for Succinity says it can produce several thousand tonnes/yr. "Succinity is actively offering and selling bio-based succinic acid in the market," the spokesperson says. "However, sales volumes are small given the slow pace of market development."

**CLICK ON THE LINKS FOR MORE INFORMATION:**

- > [www.european-bioplastics.org](http://www.european-bioplastics.org)
- > [www.ikt.uni-stuttgart.de/en](http://www.ikt.uni-stuttgart.de/en)
- > [www.aimplas.net](http://www.aimplas.net)
- > [www.ami.international/cons](http://www.ami.international/cons)
- > <https://golden-compound.com/>
- > [www.alpla.com/en](http://www.alpla.com/en)
- > [www.flo.eu/en](http://www.flo.eu/en)
- > [www.apiplastic.com/en](http://www.apiplastic.com/en)
- > [www.bio-fed.com](http://www.bio-fed.com)
- > [www.af-color.com](http://www.af-color.com)
- > [www.fkur.com/en](http://www.fkur.com/en)
- > [www.natur-tec.com](http://www.natur-tec.com)
- > [www.sukano.com/en](http://www.sukano.com/en)
- > [www.ornl.gov](http://www.ornl.gov)
- > [www.total-corbion.com](http://www.total-corbion.com)
- > [www.natureworksilc.com](http://www.natureworksilc.com)
- > [www.gcinnovationamerica.com](http://www.gcinnovationamerica.com)
- > [www.succinity.com](http://www.succinity.com)

**Below: Oak Ridge National Laboratory researcher Halil Tekinalp combining silanes and PLA to create a supertough renewable polymer**



PHOTO: ORNL

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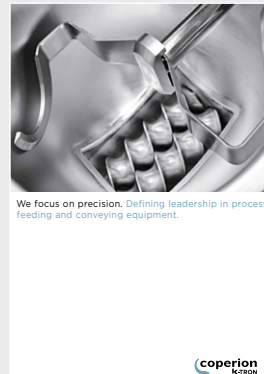
## LEISTRITZ: MASTERBATCH SYSTEMS



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

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## COPERION: FEEDING TECHNOLOGY



Coperion K-Tron provides a full portfolio of feeding and conveying equipment for compounders. This 16-page brochure details the full range, from volumetric and gravimetric feeders to blenders and metering units.

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## CPM EXTRUSION: SYSTEMS AND PARTS



This new brochure from CPM Group details the extended range of compounding extruders, production lines and replacement parts available from the company following its recent acquisition of Germany-based Extricom.

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## COMAC: COMPOUNDING LINES



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

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## BAY PLASTICS: STRAND PELLETERISERS



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

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## FARREL POMINI: CPEX PROCESSOR



Farrel Pomini's CPeX Laboratory Compact Processor is ideally sized for compound testing and development applications. Offering production capacities of 10-30 kg/h, it accepts full size pellets and all standard feed materials. Find out more in this brochure.

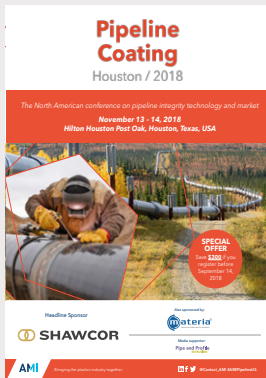
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If you would like your brochure to be included on this page, please contact Claire Bishop [claire.bishop@ami.international](mailto:claire.bishop@ami.international). Tel: +44 (0)1732 682948

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

## PIPELINE COATING USA 2018



The third edition of AMI's North American Pipeline Coating conference takes place on 13-14 November 2018 in Houston, Texas, bringing together leading pipeline contractors and operators, pipe producers and coaters with specifiers and materials and machinery suppliers.

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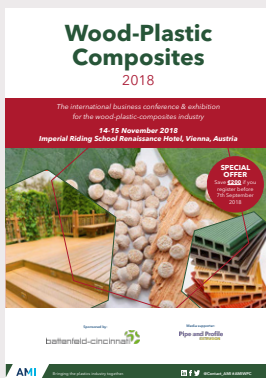
## PERFORMANCE POLYAMIDES USA



The second US edition of Performance Polyamides will provide a forum for the entire polyamide supply chain to examine the latest advances in polyamides, reinforcements and additives for applications in industries such as automotive and E&E.

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## WOOD-PLASTIC COMPOSITES 2018



Now in its 12th year, AMI's Wood-Plastic Composites conference will be held in Vienna in Austria on 14-15 November, bringing together expert speakers to discuss the latest product, process and materials developments in the US and European WPC markets.

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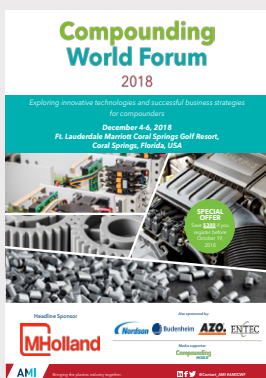
## POLYMER FOAM 2018



Taking place in Hamburg in Germany on 28-29 November 2018, AMI's sixth Polymer Foam conference brings together international experts to learn about the latest developments in blowing agents and physical foaming of polymers.

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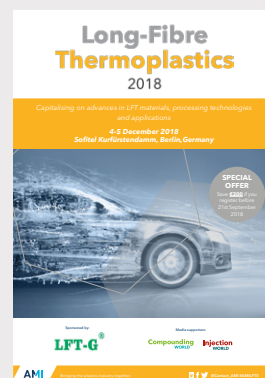
## COMPOUNDING WORLD FORUM 2018



The 6th Compounding World Forum takes place on 4-6 December 2018 in Coral Springs, Florida, USA. This annual meeting point for US technical compounders covers business strategies and new materials and processing technologies.

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## LONG-FIBRE THERMOPLASTICS 2018



On 4-5 December 2018, the 2nd edition of Long-Fibre Thermoplastics in Berlin, Germany will see LFT experts discuss the latest developments in materials, production techniques and end-use applications which are driving growth in LFT composites.

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## FIRE RESISTANCE IN PLASTICS 2018



AMI's Fire Resistance in Plastics conference takes place on 10-12 December 2018 in Cologne, Germany. Now in its 13th year, the event provides a forum to debate fire safety requirements and regulatory and technical developments.

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## PLASTICS REGULATIONS USA 2018



Following two successful events in Europe, AMI's first North American Plastics Regulations conference takes place in Pittsburgh, PA, USA, on 11-12 December and will examine the evolving nature of US and global chemical, plastics and food contact regulation.

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## POLYMERS FOR 3D PRINTING



Polymers for 3D Printing is a new conference from AMI exploring the development, production and application of polymers for 3D printing and other rapid manufacturing technologies. The event will be held in Düsseldorf, Germany on 11-12 December 2018.

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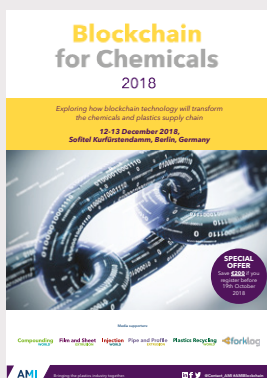
## DESIGN FOR SUSTAINABILITY



A new conference, Design for Sustainability on 11-12 December 2018 in London, UK, discusses how innovations in polymer materials and processes can help designers meet the sustainability challenge in packaging, automotive, electronics and other markets.

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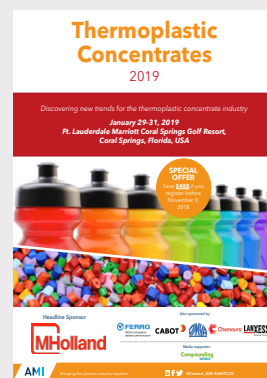
## BLOCKCHAIN FOR CHEMICALS 2018



Blockchain technology is about more than just cryptocurrencies. It could provide new levels of security and traceability in business transactions. The Blockchain for Chemicals conference on 12-13 December in Berlin, Germany, explains how.

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## THERMOPLASTIC CONCENTRATES 2019



Now in its 22nd edition, Thermoplastics Concentrates 2019 is the essential meeting point for all involved in the production and use of concentrates in North America. The 2019 event takes place in Coral Springs, FL, USA on 29-31 January.

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## BPC Toll Compounding & Blending

<b>Head office location:</b>	Illinois, USA
<b>Date founded:</b>	2007
<b>General Manager:</b>	Robin Fourness
<b>No. of employees:</b>	20
<b>Production 2018 (tonnes):</b>	27,000 tonnes/year
<b>Plant locations:</b>	Meredosia, Illinois, USA

**Profile:** BPC's primary business on its formation was extensive testing of polymers and pellets that was carried out at its fully equipped laboratory in Houston, Texas. Due to rapid growth, the company quickly outgrew its Texas facility and, in 2012, it relocated to a larger factory in Meredosia in Illinois.

The move to the new location gave it the space to add a blown film line and injection moulding machine, amongst other equipment, to its product testing and development portfolio. In 2013, BPC installed its first twin-screw extruder, a 70 mm diameter Coperion, giving it capacity to compound a wide range of polyolefin and engineering polymer compounds.

Further growth within its compounding division has seen BPC acquire a new Entek high-torque 73mm twin screw compounding line this year that will expand its capacity by more than 15,000 tonnes annually.

**Product line:** BPC has the capability to compound a wide range of polymers including PP, PE, TPOs and TPEs as well as engineering materials.

**Product strengths:** BPC has the flexibility in production to allow customers to tailor their formulations to exact requirements. Due to its extensive range of laboratory equipment, the company's customers also have access to onsite facilities to undertake tests of their products, as well as to run full trials on a production line.

To be considered for 'Compounder of the Month' contact Elizabeth Carroll: [elizabeth.carroll@ami.international](mailto:elizabeth.carroll@ami.international)

## Compounding FORTHCOMING FEATURES WORLD

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

### November

Carbon black  
Bioplastics  
Active packaging additives  
Continuous and batch mixers

### December

Flame retardants  
Laboratory compounding  
Nanocomposites  
Accelerated testing

Editorial submissions should be sent to Chris Smith: [chris.smith@ami.international](mailto:chris.smith@ami.international)

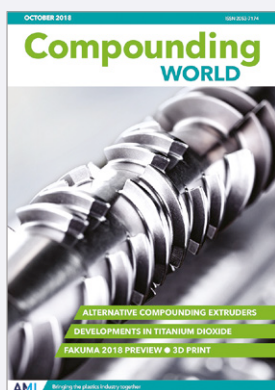
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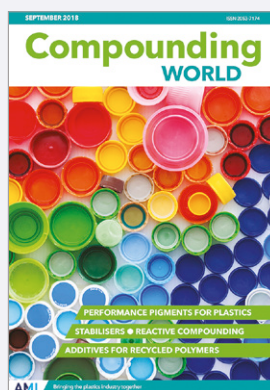
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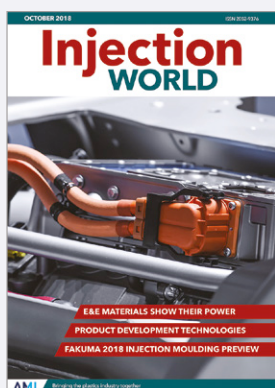
**Compounding World October 2018**  
The October edition of Compounding World considers alternative options to extrusion for compounders, such as kneader technology. The issue also features titanium dioxide issues, 3D printing and a compounding preview of Fakuma 2018.

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**Compounding World September 2018**  
The September edition of Compounding World looks at developments in the world of colours, where pigment price rises are causing pressure. The issue also covers reactive compounding, new stabilisers and additives for recycling.

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**Injection World October 2018**  
The October edition of Injection World magazine reviews developments in plastics for electrical and electronic applications. It also takes a look at product development technologies and the latest materials handling innovations.

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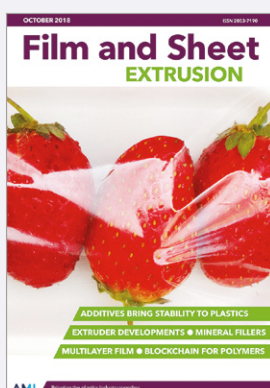
**Plastics Recycling World September/October 2018**  
The September/October edition of Plastics Recycling World looks at the equipment on offer for direct recycling to sheet. Plus, exclusive analysis of Europe's recycling capacity needs and a review of the latest optical sorting technologies.

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**Pipe and Profile Extrusion October 2018**  
The October edition of Pipe and Profile Extrusion magazine has features taking an in-depth look at pipe inspection, oriented PVC, advances in materials handling and new methods for in situ pipe production. The edition also previews AMI's Conductive Plastics conference.

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**Film and Sheet Extrusion October 2018**  
The October edition of Film and Sheet Extrusion examines multi-layer technologies for barrier films. It also reviews the latest moves in film stabilisation and extruder machinery and explores developments in carbon black.

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## GLOBAL EXHIBITION GUIDE

2018	<b>14-16 November</b>	JEC Asia, Seoul, South Korea	<a href="http://www.jecomposites.com">www.jecomposites.com</a>
	<b>26-29 November</b>	All4Pack, Paris, France	<a href="http://www.all4pack.com">www.all4pack.com</a>
	<b>5-7 December</b>	Plastic Japan, Chiba, Japan	<a href="http://www.plas.jp/en">www.plas.jp/en</a>
	<b>5-8 December</b>	Plast Eurasia, Istanbul, Turkey	<a href="http://www.plasteurasia.com/en">www.plasteurasia.com/en</a>
2019	<b>5-8 January</b>	ArabPlast, Dubai	<a href="http://www.arabplast.info">www.arabplast.info</a>
	<b>27-30 January</b>	Saudi Plastics & Petrochem, Jeddah	<a href="http://www.saudipp.com">www.saudipp.com</a>
	<b>29 January - 1 February</b>	Interplastica, Moscow, Russia	<a href="http://www.interplastica.de">www.interplastica.de</a>
	<b>28 February - 4 March</b>	Indiaplast, Delhi	<a href="http://www.indiaplast.org">www.indiaplast.org</a>
	<b>12-14 March</b>	JEC World, Paris, France	<a href="http://www.jecomposites.com">www.jecomposites.com</a>
	<b>12-15 March</b>	Pro-Pack Africa, Johannesburg, South Africa	<a href="http://www.propakafrika.co.za">www.propakafrika.co.za</a>
	<b>12-16 March</b>	Koplas, Goyang, Korea	<a href="http://www.koplas.com">www.koplas.com</a>
	<b>19-21 March</b>	EU Coatings Show, Nuremberg, Germany	<a href="http://www.european-coatings-show.com">www.european-coatings-show.com</a>
	<b>25-29 March</b>	Plástico Brasil, São Paulo, Brazil	<a href="http://www.plasticobrasil.com.br">www.plasticobrasil.com.br</a>
	<b>26-28 March</b>	PlastPrintPack Nigeria, Lagos	<a href="http://www.ppp-nigeria.com">www.ppp-nigeria.com</a>
	<b>28-30 March</b>	Mecspe, Parma, Italy	<a href="http://www.mecspe.com">www.mecspe.com</a>
	<b>2-5 April</b>	Plastimagen, Mexico City	<a href="http://www.plastimagen.com.mx">www.plastimagen.com.mx</a>
	<b>8-12 April</b>	Feiplastic, Sao Paulo, Brazil	<a href="http://www.feiplastic.com.br">www.feiplastic.com.br</a>
	<b>10-12 April</b>	Utech Las Americas, Mexico City	<a href="http://www.utechlasamericas.com">www.utechlasamericas.com</a>
	<b>8-9 May</b>	Compounding World Expo, Cleveland, US	<a href="http://www.compoundingworldexpo.com/na">www.compoundingworldexpo.com/na</a>
	<b>8-9 May</b>	Plastics Recycling World Expo, Cleveland, US	<a href="http://www.plasticsrecyclingworldexpo.com/na/">www.plasticsrecyclingworldexpo.com/na/</a>
<b>8-9 May</b>	Plastics Extrusion World Expo	<a href="http://www.extrusion-expo.com/na/">www.extrusion-expo.com/na/</a>	
<b>16-23 October</b>	K 2019, Dusseldorf, Germany	<a href="http://www.k-online.com">www.k-online.com</a>	


## AMI CONFERENCES

<b>14-15 November</b>	Wood-Plastic Composites 2018, Vienna, Austria
<b>28-29 November</b>	Polymer Foam 2018, Hamburg, Germany
<b>4-6 December</b>	Compounding World Forum 2018, Coral Springs, FL, USA
<b>4-5 December</b>	Long-Fibre Thermoplastics 2018, Berlin, Germany
<b>10-12 December</b>	Fire Resistance in Plastics, Cologne, Germany
<b>11-12 December</b>	Polymers for 3D Printing, Dusseldorf, Germany

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THE LATEST EXTRUDING NEWS FROM ENTEK



OPTICOLOR INC

CHOOSES



ENTEK

## Southern California-Based Color Compounder Uses ENTEK for Masterbatch, Concentrates for Lighting and Optics Applications

When it comes to producing the highest quality compounded materials for the lighting and optics industries, OptiColor is an expert in the field. Founded in 1995 by Daniel Neufeld in Huntington Beach, California, OptiColor specializes in producing small-to-medium sized lots of colored and tinted materials for some of the world's leading lighting and eyewear companies.

Because of the inability to produce highly-concentrated compounds in-house on their single-screw extruders, Dan Neufeld reached out to ENTEK in 2012 and made the trip up the coast to Lebanon, Oregon to visit the company and learn more about their twin-screw extruders. After running material trials at ENTEK's In-House Pilot Plant, he made a call to Jim Drew, OptiColor's Plant Manager.

"'We're buying an ENTEK', he said," laughed Jim in a recent interview. "I had joined Dan early on when he was preparing to expand the business, and Dan always wanted a twin-

screw to help us compound more materials in-house. After running the trials at ENTEK's plant, he was sold."

Jim went up to ENTEK as well and tested several materials on the twin-screw. "I was impressed by the helpfulness and thorough training provided by ENTEK," he said. "We purchased a 40mm machine that year and have been running it ever since. It has really helped us grow our business."

### Bringing More Business In-House

Until 2012, OptiColor was producing compounds in-house on their single-screw extruders, but these machines were only suitable for running small amounts of colorants (2% or less) with the virgin resin. After purchasing the new ENTEK twin-screw extruder, the company began running materials that were heavily loaded with up to 50% colorants and additives.

Doing the heavy duty mixing on the ENTEK machine helps keep the plant clean, and OptiColor takes pride in running a clean operation. "A clean shop leads to clean materials, and no cross-contamination of products," said Jim Drew. "That's extremely important in our business."

In addition to cleanliness, the ENTEK twin-screw extruder opened up new possibilities for OptiColor. The machine has helped OptiColor make products for their own internal use that they used to have to go outside the company to get. Concentrates and masterbatches are now produced both for customers and for OptiColor's own in-house use on the ENTEK machine.

### It's the People

Since installing the new ENTEK machine in 2012, OptiColor has visited ENTEK several times to run additional trials over the years. "ENTEK has some of the nicest people we've ever worked with," said Jim Drew. "Anyone at ENTEK will help you no matter what your question is – they are very willing to help with any problems or questions you have. They always follow up, call you back, and never leave you hanging."

### Future Plans

The materials processed at OptiColor for lighting, lens and eyewear applications include acrylics, nylons, and polycarbonates, mixing with colorants and additives that are proprietary. The advent of LED lighting has driven a lot of new product development at the company.

(continued on page 3)





## 20 Years

Welcome to the latest issue of *Extrusion Solutions*.



Dr. Kirk Hanawalt

“  
*Today, ENTEK has hundreds of twin-screw extruders in operation around the world, and we're growing at a record pace.*  
”

### 20 Years of ENTEK Extruders

Back in 1998, ENTEK, a company that had been in business for 14 years, decided to embark on a new venture – to manufacture and supply twin-screw extruders to the plastics compounding industry. We had some experience – after all, ENTEK was already known as a leading supplier of highly-filled sheet for battery separators, and we used commercially available twin-screw extruders for this application.

But there was a problem – we were wearing out screws and barrels with our materials, and we weren't satisfied with spare parts availability. Our engineers and machinists took on the challenge of producing our own screws and barrels in-house – and then we decided to build our own twin-screw extruders as well. We felt our machines were second to none, and the decision was made to become a machine supplier to the industry.

Here we are 20 years later – and we're happy to report that our decision back in 1998 was a good one. Today, ENTEK has hundreds of twin-screw extruders in operation around the world, and we're growing at a record pace. We now offer machines ranging from 27mm to 133mm and have an excellent staff at our Lebanon, Oregon headquarters and in the field supporting our customers every step of the way.

Thank you to all of our customers – your business is much appreciated. We will continue to work with you to help you improve your compounding operations and look forward to our continued, mutual success in the future!

### Growth – Continued

In the article on p. 4 you will see we are once again expanding our facilities here in Lebanon. Due to our continued growth we needed more space in our manufacturing area for fabrication, assembly, testing and shipping. We're excited to have this latest

expansion completed so we can create a better workflow through the building, which will help us operate even more efficiently.

### NPE Recap

In the last issue of *Extrusion Solutions*, I wrote about the upcoming NPE show in Orlando. The show was held from May 7-11 and I'm happy to report it was a great show for ENTEK, and for the plastics industry. Enthusiasm was high, and we enjoyed seeing existing and prospective customers.

I enjoyed seeing large crowds gather at our booth twice a day to see our live screw change demonstrations. Colt McDaniel, who works in our Pilot Plant, was chosen to perform the screw changes and he did a great job under pressure – after all, we told the world that the screw change could be done in 5 minutes or less! We timed Colt and I believe his fastest time was in 3 minutes 30 seconds. Visitors to the booth were impressed. As anyone who has performed screw changes on a twin-screw extruder knows, it can be a difficult task and usually takes over an hour or longer. ENTEK has found a way to take that task and reduce it down to 5 minutes or less – a real advantage for compounders who do frequent color changes and need to change out screws on a frequent basis.

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

As always, I encourage you to contact me anytime at [khanawalt@entek.com](mailto:khanawalt@entek.com).

Sincerely,

Dr. Kirk Hanawalt  
President, ENTEK Extruders





# 20 Years of Building Twin-Screw Extruders!



## 20 Years of ENTEK Extruders

2018 marks the 20th anniversary of ENTEK Extruders. While ENTEK has been in business since 1984, the Extruder division of the company was established in 1998. The story of how and why ENTEK Extruders came to be is not really typical for a leading machine supplier to the plastics industry.

### The Early Years

ENTEK began operations in the 1980's as a processor, compounding materials and producing highly-filled, specialized sheet used in battery separators for the automotive industry. The materials used in this application were challenging to run on twin-screw extruders, to say the least. The wear on the screws and barrels in the extruders created the need for frequent replacement of these critical parts, and ENTEK was dealing with long lead times to get replacement parts from their machine suppliers. Downtime was not an option, so ENTEK began producing its own wear parts, which led to making its own twin-screw extruders for in-house use.

"ENTEK's experience with its own 24/7 for 355+ days per year extrusion operation taught us the importance of equipment reliability, locally sourced parts, and outstanding customer service," said Dr. Kirk Hanawalt, ENTEK President. "ENTEK's background in running extrusion lines really guided our development as an extrusion line supplier. We know that running extrusion lines to make money is hard work and as a supplier we have to go the extra mile in our technical support and service to ensure our customers are successful."

In 1998 the company decided to branch out and market its twin-screw extruders to the plastics industry, and made its first sale. The company that purchased ENTEK's first machine in 1998 has continued to purchase ENTEK extruders over the years, including a recent purchase of multiple machines in 2018.

(continued on page 4)



ENTEK was honored with the "100 Best Companies to Work For" award in 2010 by Oregon Business magazine



Left: ENTEK's Bill Petrozelli (right) sharing his processing knowledge in 2000  
Center: ENTEK's Al Bailey monitoring production on a 2001 control system  
Right: ENTEK's booth at NPE2006

## OptiColor Chooses ENTEK

(continued from page 1)

The 40mm ENTEK machine that OptiColor purchased in 2012 was the right machine for them at the time; they process mostly small lots of materials, and it's not unusual for them to produce 50-200lb lots. The 40mm machine was ideal for this and also robust enough to support their small to large production quantities.

"We're looking at a second, larger ENTEK machine to support our rapid growth in markets we serve that require high quality concentrates," said Jim Drew. "Our niche is producing specialty colors and small lots with concentrate production quantities ranging from 300 to 50,000 lbs. As we continue to grow and the time comes to add another twin-screw extruder, we would start with ENTEK."





# Company Growth



## Some Highlights Along the Way

ENTEK grew steadily over the years with numerous highlights along the way. Some of these included:

- **NPE shows:** After exhibiting at its first NPE show in 1997 with a small 10' booth, ENTEK has been a major exhibitor at every NPE since. In 2018, ENTEK had a 40' x 50' island booth at NPE featuring QC<sup>3</sup> 33mm and HR3 73mm machines, interactive screw design layout programs, and live 5-minute screw change demonstrations
- **Markets:** In its early years, ENTEK began working with leading color compounders who embraced our new extruder design. We offered then and still offer today extruders with the electrical, cooling, heating, and lubrication components onboard within Stainless Steel cabinets; easily sourced electrical and mechanical components; and the willingness to provide custom solutions to suit our customer's unique needs. Today, ENTEK is the leading twin-screw supplier to this market and has become a leading supplier in other markets including wood-plastic extrusion, packaging, bioresins, and specialty materials.



- **QC<sup>3</sup>:** After several years of research and development, ENTEK introduced its new line of QC<sup>3</sup> twin-screw extruders in 2015. QC<sup>3</sup> stands for Quick Change, Quick Clean and Quality Control. Virtually every aspect of the machine was examined and redesigned, if necessary, to improve on all of these key parameters. The machines feature the ability to change screws in 5 minutes or less – a function that takes hours on competitors' machines.

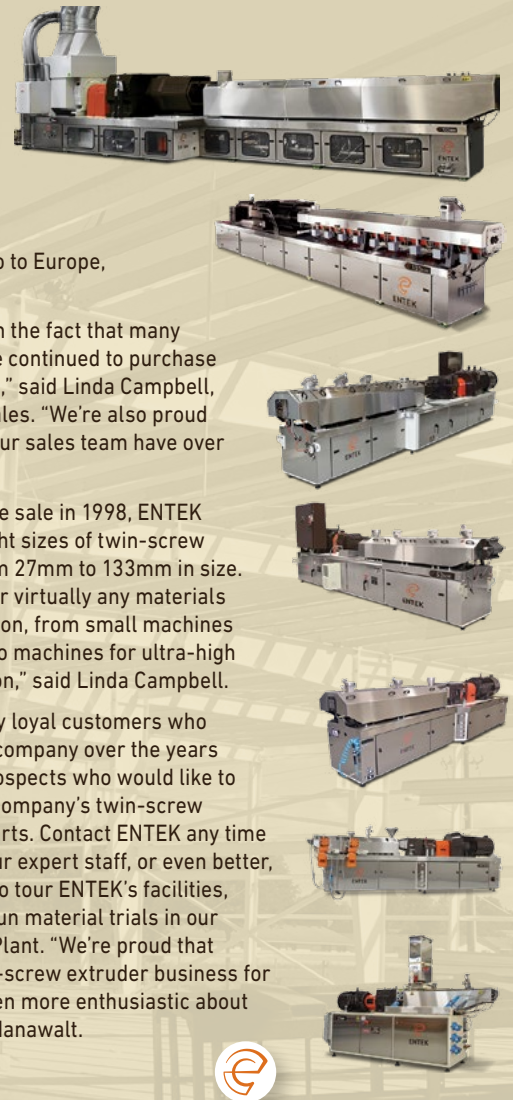
## Today . . .

After 20 years in business, ENTEK has several hundred twin-screw extruders in operation in 14 countries – from the US, Canada and Mexico to Europe, Asia and Australia.

"We pride ourselves on the fact that many of our customers have continued to purchase from us over the years," said Linda Campbell, ENTEK's Director of Sales. "We're also proud that five members of our sales team have over 20 years with ENTEK."

From that first machine sale in 1998, ENTEK now manufactures eight sizes of twin-screw extruders ranging from 27mm to 133mm in size. "We have a machine for virtually any materials compounding application, from small machines for lab environments to machines for ultra-high masterbatch production," said Linda Campbell.

ENTEK thanks its many loyal customers who have worked with the company over the years and welcomes new prospects who would like to learn more about the company's twin-screw extruders and wear parts. Contact ENTEK any time to speak with one of our expert staff, or even better, plan a visit to Oregon to tour ENTEK's facilities, meet our people and run material trials in our state-of-the-art Pilot Plant. "We're proud that we've been in the twin-screw extruder business for 20 years, but we're even more enthusiastic about our future," said Kirk Hanawalt.



## Continued Growth

The sounds of progress continue to be heard outside at ENTEK's headquarters in Lebanon, Oregon. We are in the midst of another expansion of our ENTEK Extruders facility!

Our shop area is being increased with a new 30,000 ft<sup>2</sup> addition. The new area will be used for fabrication, assembly, testing and shipping.

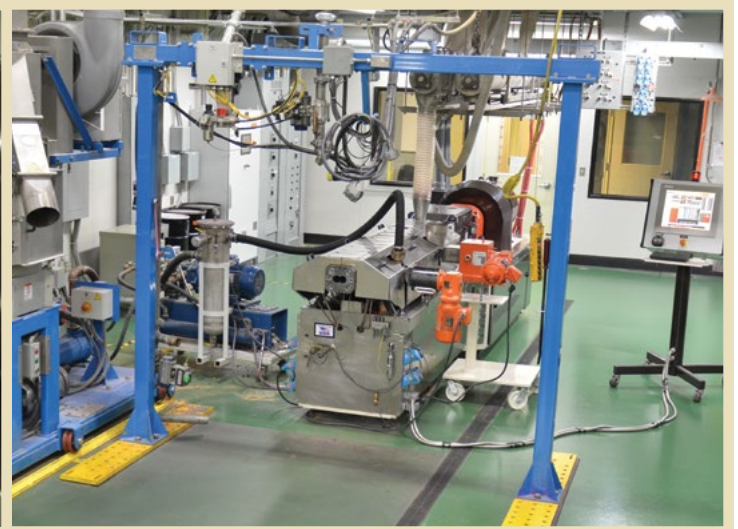
"As our business continues to grow, we needed to expand our shop area," said John Burke, ENTEK's Director of Manufacturing. "We are applying lean principles and will be rearranging the facility flow through the existing and new building to optimize efficiency and production."





## Pilot Plant News

By Dean Elliott, Technical Processing Manager



There has been a steady increase in the use of the ENTEK Pilot Plant over the last 18 months. To best serve our customers, prospective customers, and our employees, we have taken steps to improve the efficiencies and safety of the Pilot Plant along with increasing our full time employees assigned to the Pilot Plant.

We are close to achieving Pilot Plant utilization of 40 to 45 weeks per year. Some of the improvements include purchases to support our QC<sup>3</sup> extruder series (Quick Change, Quick Clean, Quality Control). These include:

1. A 2nd set of screw shafts. This helps to have a built screw set ready to go for quick change overs.
2. Doubled screw element inventory to assist with #1, along with increased processing flexibility.
3. Additional Gala underwater cutter dies to cover a larger range of pellet sizes and to also achieve quick changes (a die can be prepared off line while the extruder is running)
4. Additional strand dies to cover a larger range of pellet sizes and to accomplish quick changes.
5. Modifications to our strand air belt for safer operation.
6. Multiple Water and Air hose reels as well as 110Volt cable reels. This mitigates tripping hazards.
7. A dedicated Pilot Plant forklift – no more hunting down and borrowing forklifts from other departments.
8. Additional platform ladders for loading feeders along with catch trays to minimize mess on the floor.
9. Buckets designed specifically for loading feeders to minimize mess.
10. Modified and specially designed feed hoppers that are easier to fill with materials in order to minimize mess and reduce airborne particulates.
11. Additional air extractors along with carbon filters for fumes to create a dust free and non-toxic environment.
12. A diaphragm pump for transferring fluffy/fluid powdered materials to the feed hopper. This removes the manual “bucket dump” into the feed hopper which causes particles to become airborne.
13. Detailed Pilot Plant trial plans along with trial preparation check lists to ensure a “Ready to Go” mentality. The equipment starts up on Day 1 of the trial as per customers’ expectations.

### Schedule Your Trial Today!

Our Pilot Plant and our experienced technical staff is available to help new and prospective customers to sample their materials and compounds on our machinery. We consider our Pilot Plant and staff second to none – put this resource to work for you! We are ready, willing and able to work with you to help prove-out or improve your compounding applications. For any questions or to schedule a trial, contact me at 541-259-1068 or [delliott@entek.com](mailto:delliott@entek.com).





# We Are ENTEK



## ENTEK at NPE 2018

For one week in May, the global plastics industry descended on Orlando, Florida for NPE 2018. The latest NPE broke records in numerous categories including number of exhibitors, square footage of booth space utilized, and more.

ENTEK would like to thank everyone who stopped by to visit our booth at NPE – we once again enjoyed a great show. Our twice-a-day, live demonstrations of screw changes in less than 5 minutes on our QC<sup>3</sup> 33mm twin-screw extruder were a huge hit and drew big crowds. We also featured:

- a HR<sup>3</sup> 73mm twin-screw extruder in our booth, which was sold to BPC Toll Compounding & Blending and shipped to them after the show;

- two computer stations with hands-on demonstrations of our screw design layout program;
- replacement wear parts and end products displays, and...
- daily happy hour with Oregon beer and wine!

ENTEK's Tammy Straw, who served on the show organizer PLASTICS' 'Attendee Acquisition Committee', said "The quality of the leads we got at NPE were even better than expected, and we have already visited and booked Pilot Plant trials with many potential new customers."

She continued, 'Being on the NPE 2018 Committee was a great experience and it was exciting to see the show come together from the organizer's side. I look forward to serving again on the NPE 2021 Marketing Committee.'

## Upcoming Events

See ENTEK at the following upcoming events in 2019:

**Dec 4-5, 2018 – AMI Compounding World Forum**  
Ft. Lauderdale Marriott Coral Springs  
Coral Springs, FL

**March 11-13, 2019 – Plastics Recycling**  
Gaylord Nation Resort and Convention Center  
Washington, D.C.

**May 8-9, 2019 – Compounding World Expo**  
Huntington Convention Center  
Cleveland Ohio



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