

# Compounding WORLD



**EXPLORING INNOVATION IN CARBON BLACK**

**REINFORCEMENTS ● PACKAGING ADDITIVES**

**BATCH MIXING ●  2019 EXHIBITION NEWS**

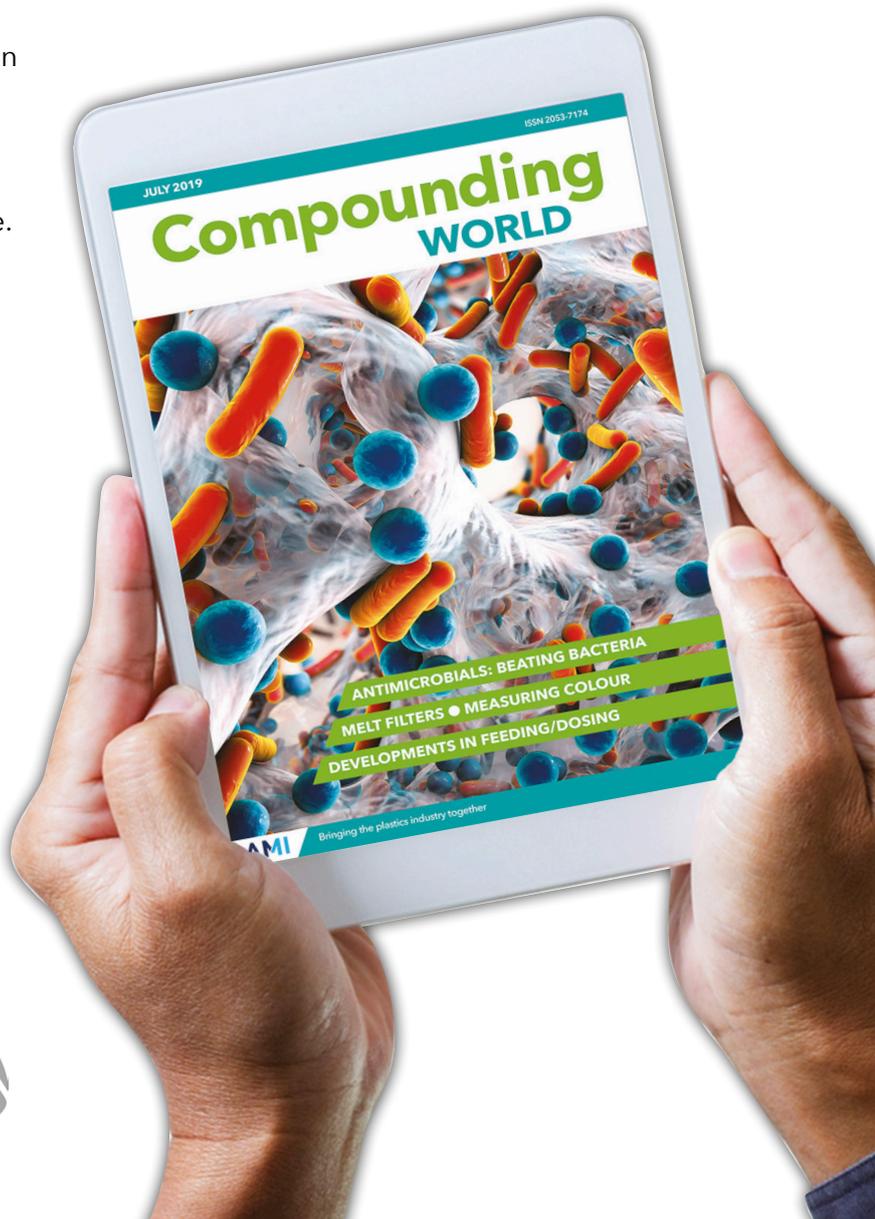
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# Compounding WORLD

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# Fire Resistance in Plastics

Cologne / 2019

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**3 - 5 December 2019**

**Maritim Hotel, Cologne, Germany**



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# Clariant masterbatch revenues weaken

Clariant posted its Q3 results last month, revealing a near static sales result for the first nine months at CHF3.72bn (€3.38bn) but a 5% decline in revenues—2% in local currencies—for its Masterbatch and Pigments units. These are now listed as discontinued operations as plans progress to dispose of them during 2020.

“For the first nine months as well as in the third quarter of 2019, sales in discontinued operations (Masterbatches and Pigments) declined by 2% in local currency, negatively impacted by the weakened economic environment,” the company said.

“The EBITDA after exceptional items decreased in absolute value year-on-year in both the first nine months as well as in the



Clariant CEO Hans Bohnen

third quarter, due to the sales contraction and increased one-time costs required by the separation and carve-out of the discontinued businesses.”

Slowing markets are likely to make a sale more challenging. However, at K2019 Clariant CEO Dr Hans Bohnen said “multiple parties” were interested in acquiring the Masterbatch and Pigments business

units. He declined to comment on the detail of any discussions but said the company expected to close deals in 2020.

Various financial media have linked PolyOne with the Clariant negotiations, although it is also said to be attracting interest from private equity investors. *Compounding World* also understands that events are being watched closely by some smaller masterbatch producers hoping to bid for parts of the Clariant business should a trade buyer need to address regulatory competition demands.

Clariant announced the closure of the sale of its Healthcare Packaging business to Arsenal Capital on 31 October for CHF308m (€280m).

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

## Italmatch invests in FRX

Italian speciality chemical group Italmatch has made an unspecified investment in FRX Polymers, a US-based company specialising in halogen-free flame-retardant additives based on polymeric phosphonates.

FRX Polymers’ materials are used in textiles, PUR foam and coatings, polycarbonate blends and alloys and other thermoplastics.

Both parties said that they expected the deal to unlock technical synergies between their respective products. Marc Lebel, founding CEO of FRX Polymers, said the company will also gain access to Italmatch’s global sales network.

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

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

## IMCD buys in India

Netherlands-based chemical distributor IMCD has completed the acquisition of Indian firm Monachem Additives and its subsidiary Addpol Chemspecialities.

Monachem recorded sales of about €10m in its 2018-19 financial year and employs 22 staff.

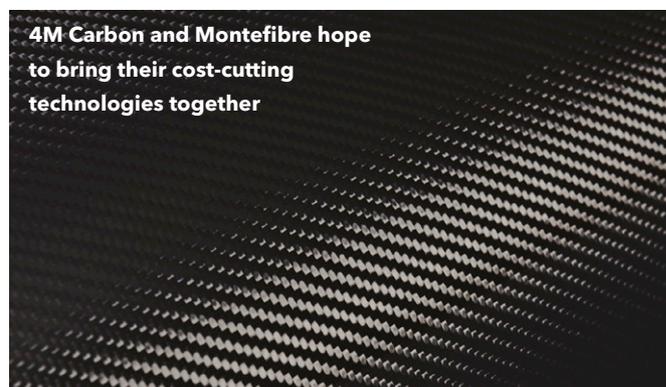
It will be integrated into IMCD’s Advanced Materials business by the end of the year.

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

# Cutting the cost of carbon

4M Carbon of Tennessee, US, and Spain’s Montefibre Carbon Fibre are close to finalising a letter of intent to establish a partnership, which includes a manufacturing joint venture in the US that will, they claim, be capable of producing the world’s lowest-cost industrial-grade carbon fibre.

The venture will combine Montefibre’s ultra-large tow precursor technology, which is backed by Spanish government investment and



4M Carbon and Montefibre hope to bring their cost-cutting technologies together

reduces precursor costs, with 4M’s fibre production technology. The latter is claimed to reduce initial investment in a

manufacturing line by 50% and to cut operating costs by 30%.

> [www.4mio.com](http://www.4mio.com)

> [www.montefibre.es](http://www.montefibre.es)

# Borealis cooperates with Neste on renewable PP feedstocks

Borealis has begun a strategic co-operation with Neste for production of PP at its sites at Kallo and Beringen in Belgium using renewable propane derived from Neste's NexBTL technology at Rotterdam in the Netherlands.

The NexBTL technology is claimed to produce renewable raw materials for the chemical industry using "nearly any bio-based oil or fat as raw material, including lower-quality waste and residue oils."

Production will begin at the end of the year, the companies said. It will be both the first time that Borealis has used a bio-based feedstock in commercial PP production and the first

time that renewable propane dehydrogenation (PDH) has been carried out at an industrial scale.

Borealis operates a PDH facility alongside its PP plant at Kallo so it will not only be able to offer biobased propylene and PP but also to physically verify and measure the bio-based content (mass balance approach will be used at both sites with the process certified by International Sustainability & Carbon Certification).

Borealis said the PP produced from the Neste feedstocks will offer the same product properties as conventional PP.

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

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



**Borealis will use Neste renewable propane in PP production**

## Renolit switches to Pevalen

The US division of plastic film and sheet producer Renolit has switched from a phthalate plasticiser to Perstorp's non-phthalate Pevalen product for its signage and graphics products. It claims to be the first in the sector to move to a non-phthalate alternative.

Renolit Business Unit Manager Ralph Gut said the switch "takes our compliance beyond the tough existing safety regulations and responds to the increasing consumer demand for greater sustainability." It is also said to gain from Pevalen's low migration.

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

## Maag Group acquires ROC

Maag Group, the Swiss-headquartered manufacturer of gear pumps, pelletising systems, filtration systems and pulverisers for the plastics and other industries, has acquired ROC, which supplies colour management and quality control products to the plastics extrusion, compounding and recycling industries.

The acquisition was made shortly before the K show in Germany, where ROC demonstrated its second-generation Colour&Pellet Control system on the Maag Group stand. This features a new housing developed for direct use in the production environment and supports connection to process control systems via industry-

standard data exchange.

In addition to colour measurement, the new ROC system allows pellets to be analysed in terms of size, shape and defects. "With the colour control wizard it is possible to correct the colour fully automatically during production," the company said.

➤ [www.maag.com](http://www.maag.com)

## Solvay PESU line onstream

Solvay said it has started operations at its new Veradel polyethersulphone (PESU) line at Panoli in India.

Targeting growing demand in the Asian region from healthcare and water treatment industries, the investment is part of Solvay's plans to increase sulphone polymer production capacity by 35% by 2022. This will include investment and process optimisation at its two US sites.

Separately, Solvay has also announced

the opening of two innovation centres dedicated to thermoplastic composites (TPCs). The Product Development Centre at its Speciality Polymers and Composite Materials business HQ in Alpharetta, Georgia, US, will focus on development of new TPCs, while the Customer Engagement Centre at Brussels in Belgium will offer virtual engineering, rapid prototyping and advanced mechanical testing and validation.

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

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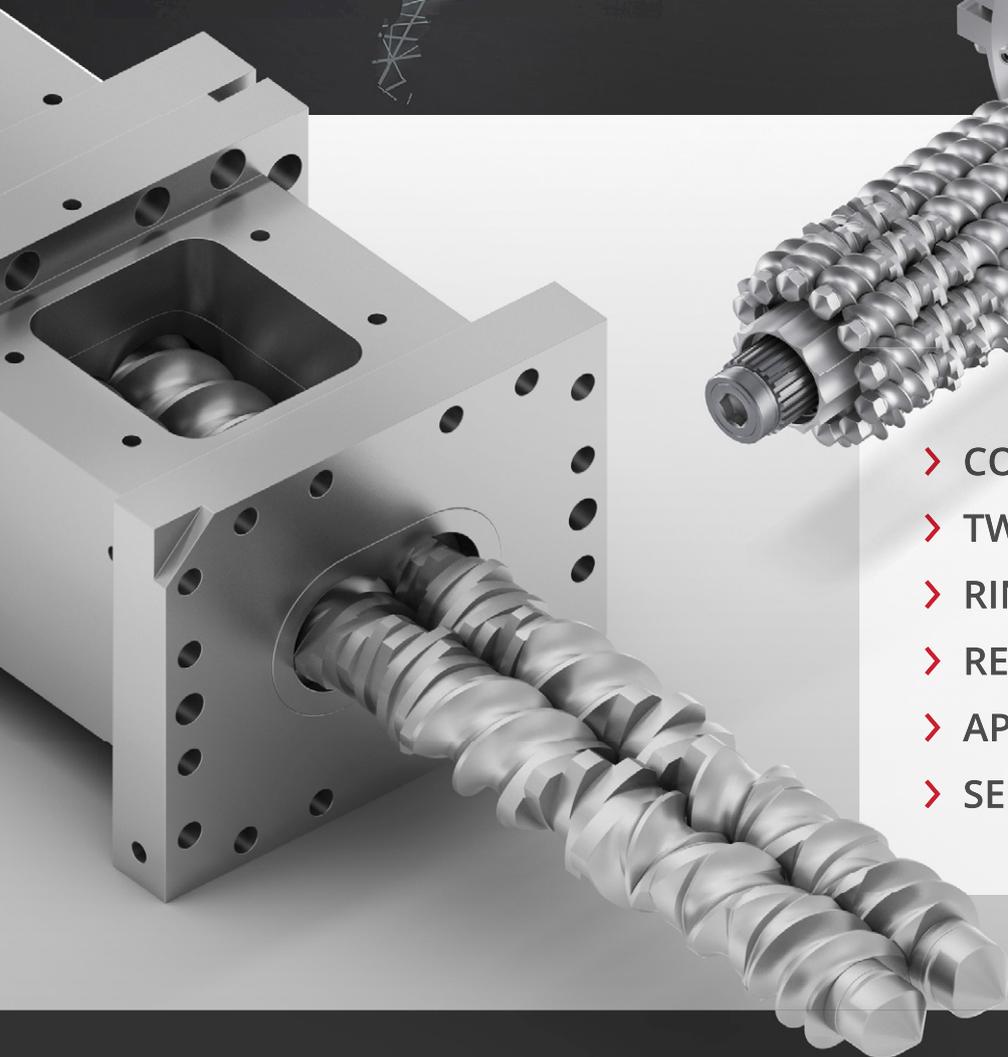
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## Holland Colours sales up

Holland Colours saw 1H 2019 revenues grow by 14.5% to €52.3m from €45.6m in the same period in 2018. Operating result rose from €4.6m to €6.1m over the same period.

The company said around 2.5% of the increase was due to the strength of the US dollar, but the result mainly reflected strong growth across its business and in packaging in particular.

In Europe, revenue growth was up 13%, driven by volume increases. Operating result ended at €2.1m, up from €1.3m. The Americas division was up 8% in constant currency terms, with packaging the strongest contributor. Operating result was up 40% at €1.4m. Asia division revenues were 14% ahead and operating result up 42% at €1.7m.

Separately, Holland Colours announced that CFO Margret Kleinsman has resigned. The company said the search for a successor is underway.

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

# Gabriel-Chemie keeps strategy in the family

Colour and additive masterbatch maker Gabriel-Chemie has named Stefanie Sommer, the daughter of CEO and owner Elisabeth Sommer and granddaughter of company founder Josef Houska, to the new position of chief strategy and sustainability officer (CSO) with immediate effect.

Sommer's role will include assisting the Gabriel-Chemie board in creating its strategic goals and her core responsibilities will include formulating and transferring company and strategic ambitions into operational initiatives.

She will also further develop Gabriel-Chemie's sustainability-strategy, which already includes near-infrared detectable and

post-consumer recycled masterbatches as well as technologies that support the ambitions of the Circular Economy.

One example in the latter area is reusable packaging made with the company's laser marking masterbatch. This has been used in combination with the EcoCore manufacturing technology platform for containers developed by Bockatech. It enables producers to add unique identifiers, such as QR codes, to boost reuse and recycling via smartphone apps.

➤ [www.gabriel-chemie.com](http://www.gabriel-chemie.com)

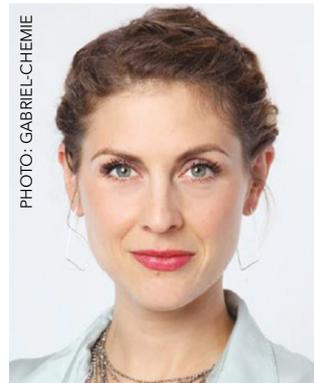


PHOTO: GABRIEL-CHEMIE  
**Stefanie Sommer takes on strategy and sustainability role at Gabriel-Chemie**

## Ampacet launches R3 concept

US-based masterbatch giant Ampacet has officially launched R3 Sustainable Solutions, an internal initiative that includes sustainable masterbatch and additive products, participation in global sustainability programmes and collaboration on recycling and conservation projects with communities and organisations near its plants.

The name R3 derives from 'reduce, reuse and recycle'. Its aim is "to help customers reduce waste and energy in manufacturing processes and products, reuse more

post-consumer and post-industrial resins in finished products and recycle a higher percentage of their products," according to Doreen Becker, Ampacet's Sustainability Director.

The company said that teams representing all disciplines within its organisation—including manufacturing, R&D, regulatory, marketing, sales and procurement—are working with schools and local recycling and conservation groups.

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

## US forum for trends in technical compounding

AMI's Technical Compounds Forum takes place in Tampa, Florida, US, on 3-4 December, presenting the North American compounding sector with the opportunity to learn more about the market and technical challenges facing the sector.

The event—formerly known as the Compounding World Forum—brings

together a long list of expert speakers from key companies including Budenheim, Cabot, Clariant, Coperion, Imerys, KraussMaffei, M Holland and Whirlpool.

Topics on the agenda range from the polymer needs of the appliance industry, through the performance requirements of electric vehicles, to

technical demands for 5G antennae.

AMI Director of Events and Magazines and *Compounding World* launch editor Andy Beevers will also present an exclusive analysis of global thermoplastic compound market trends.

To find out more or to book a place visit the [conference website](#)

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# Compounding World Expo is filling up fast

The Compounding World Expo returns to Messe Essen in Germany on 3-4 June 2020 and more than 250 leading suppliers have already reserved space at the event and its co-located plastics recycling, extrusion and testing exhibitions.

Organised by *Compounding World* publisher AMI, the Compounding World Expo, Plastics Recycling World Expo, Plastics Extrusion World Expo, and Polymer Testing World Expo are all free to attend and include focused exhibition areas plus five free conference theatres. Last year's debut event in Essen attracted 4,024 visitors.

"We already have over 250 exhibitors signed up for next year's shows, which is 25% more than the final number at our launch event in Germany in 2018, and we still have over six months to go," said Rita Andrews, Head of Exhibitions at AMI.

The more than 250 companies that have



PHOTO: AMI

**The first Compounding World Expo in 2018 attracted 4,024 visitors**

reserved stands include leading suppliers of polymers and additives, such as BASF, Biesterfeld, Borealis, Cabot, Clariant, Evonik, ExxonMobil, Imerys, Omya, Solvay and Wacker. Visitors will also be able to learn about the latest equipment developments from companies such as Buss, Coperion, Feddem, Gneuss, KraussMaffei Extrusion, Leistritz, Maag, Motan Colortronic, NGR, Nordson and Theysohn Extrusion.

"There is considerable crossover between the different sectors of the

plastics industry that are covered by these four focused exhibitions, which will benefit exhibitors and visitors alike," said Andy Beevers, Events Director at AMI. "1,722 of the visitors to the last year's compounding and recycling shows in Essen said that they were involved in materials R&D and testing, which led to the addition of the Polymer Testing World Expo".

Stands at the exhibitions start at less than €3,000. For more information contact AMI's exhibition team at [exhibition\\_sales@ami.international](mailto:exhibition_sales@ami.international)

## NEWS IN BRIEF...

**Emerald Kalama Chemical** has opened a new office at Rotterdam in the Netherlands that will become its central hub for European operations. The facility will house its order fulfillment and technical service teams for all products manufactured at Emerald's operations in Europe, including those from its nearby plant at Botlek and UK facility at Widnes

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

**Trinseo** plans to build a thermoplastic elastomers (TPEs) pilot facility at Hsinchu, Taiwan, where it already has a TPU manufacturing site. It will begin operation in 2020 and will supply TPEs mainly to the automotive, consumer electronics, footwear and medical markets in the Asia-Pacific region. The company described the move as the next step in its TPE growth roadmap following the acquisition of API in Italy in 2017.

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

# BP plans chemical recycling pilot plant

**BP hopes to convert waste PET packaging back to PTA and MEG feedstock**



PHOTO: BP

BP has announced plans to build a \$25m pilot plant at its R&D hub at Naperville in Illinois, US, to prove the viability of its Infinia enhanced recycling technology, which chemically converts PET into virgin-quality PTA and MEG monomer feedstocks via depolymerisation.

The facility is expected to be operational in late 2020. If Infinia can be developed and used at multiple commercial plants, BP estimates it "has the potential to prevent billions of PET bottles and trays from ending up in landfill or incineration every year".

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

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# Speeding progress in FR TPUs

Scientists from the Fraunhofer Institute for Structural Durability and System Reliability (LBF) at Darmstadt and the German Federal Institute for Materials Research & Testing (BAM) have combined to demonstrate more rapid manufacture of flame-retardant plastics, specifically thermoplastic polyurethane (TPU). The results of their joint project were on show at K2019.

The research set out to address the shear stress that builds up during TPU processing, which complicates dispersion of the flame retardant and makes the development of



suitable formulations “demanding and cost-intensive”. The researchers used Combinatorial Compounding/High Throughput Screening’ (CC/HTS) to characterise the formulation, enabling compound development to

be “significantly accelerated”, it is claimed.

The project also established that a rapid mass calorimeter is suitable for evaluating the flame retardance of any flame-retardant TPU as the different types displayed only a few,

albeit significant, differences in mechanical properties. Comparisons within material sets based on the same concepts showed “excellent correlations”.

“The knowledge gained can now be used directly by companies in the development of flame-retardant formulations for TPU,” the partners claim. “Furthermore, the use of halogen-free flame retardants as part of the research project demonstrated synergies between various flame retardants, simplifying the development in companies in this growth market”.

➤ [www.lbf-fraunhofer.de](http://www.lbf-fraunhofer.de)

## Huber expansion update

The Fire Retardant Additives business unit of JM Huber has announced that the second phase of the planned fine precipitated hydrate expansion at its Martinswerk plant in Germany will be completed by the end of this year.

The expansion will increase capacity for Martinal LEO grades of fine precipitated alumina hydrate by about 20%.

The company said that the investment will also help it deliver on “several significant sustainability improvements” at the facility.

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

## Sukano proves the recyclability of light barrier PET compounds

Sukano, a Swiss specialist in additive and colour masterbatches, and blow moulding machinery maker Sidel have claimed a success in moulding white opaque light-barrier PET bottles from recycled material at virgin throughput rates without impact on colour, properties, functionality or production rates.

According to Sukano, a monolayer PET white bottle masterbatch was formulated and recycled using the European PET Bottle Platform recycling protocol. Melt viscosity, pressure and stability were tested and the material shown to be highly processable.



**White PET bottles for dairy products on a Sidel production line**

The material was said to show a very stable colour, remaining white even at 100% recycled content.

Sukano said this material was then used on Sidel’s EvoBlow blow moulding equipment to produce 25%, 50% and 100% light barrier white opaque rPET bottles.

The development partners said that the difference in terms of colour shade in the polymer “was barely noticeable” and integrity of the light barrier was confirmed for extreme conditions, such as <0.1% light transmission at 550nm.

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

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*Linda Campbell,  
Vice President of Sales,  
ENTEK Extruders*



# Thermoplastic Concentrates

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**Plastics associations say Italy's proposed plastic packaging tax would hurt the economy**

## Associations hit out at Italian tax

Leaders of Europe's three plastics industry associations - Renato Zelcher of European Plastics Converters, Javier Constante of PlasticsEurope and Ton Emans of Plastic Recyclers Europe - announced their opposition to the Italian government's proposed €1,000/tonne tax on plastic packaging.

Speaking at K2019, they said it "is likely to have a negative impact on the local market, in terms of job losses and consumers being

negatively affected by such a regressive tax".

About 50,000 people work for 2,000 SMEs in the plastics value chain in Italy, which is Europe's second largest producer of plastics products after Germany. The associations said the proposed tax would jeopardise their jobs, as well as costing households €140/year on average.

> [www.plasticsconverters.eu](http://www.plasticsconverters.eu)  
> [www.plasticseurope.org](http://www.plasticseurope.org)  
> [www.plasticsrecyclers.eu](http://www.plasticsrecyclers.eu)

## Chroma Color grows

Chroma Color has completed a \$1m investment at its site at Leominster in Massachusetts, US.

The project included new compounding lines, dust collection system and a new colour development laboratory. Following the upgrade, the company will relocate its operations at nearby Clinton to the Leominster facility.

"This move is intended to streamline operations and better serve customers by integrating key operations into existing manufacturing facilities where we have more advanced lab and technical equipment leveraging robust analytical and formulation resources," said CEO Tom Bolger.

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

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



## A new way to purchase TiO<sub>2</sub> from Chemours

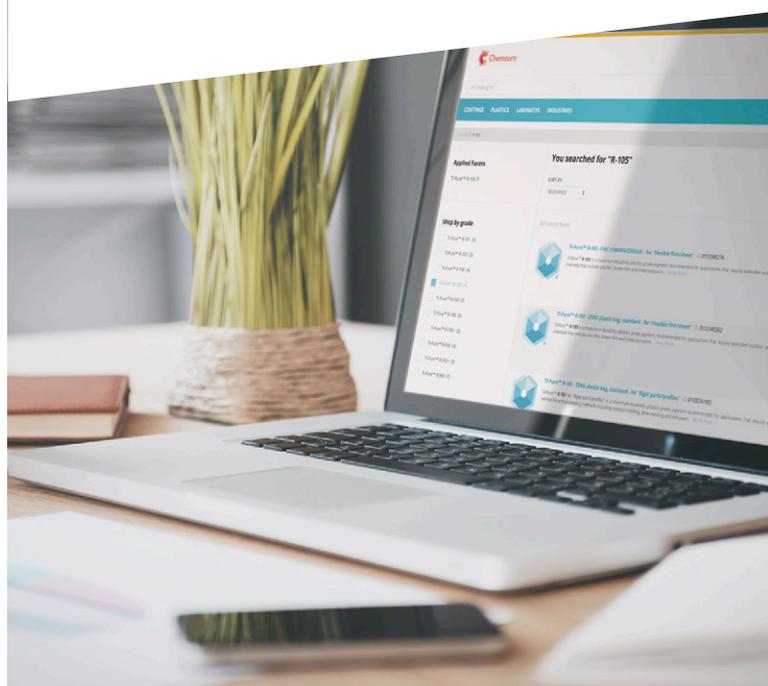
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# Technical Compounds Forum

2019

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**December 3-4, 2019**  
**Renaissance Tampa International Plaza Hotel,**  
**Tampa, FL, United States**



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## Tuesday, December 3, 2019

- 8:00 Registration and welcome coffee  
9:00 Opening announcements

### SESSION 1: IDENTIFYING MARKET TRENDS AND EMERGING OPPORTUNITIES

- 9:10 **Analyzing global market trends for thermoplastic compounds**  
Mr. Andy Beevers, Director, Events and Magazines, AMI, United Kingdom
- 9:40 **Assessing polymer requirements for the home appliances of the future**  
Mr. Maurizio Longhi, Materials Technology Principal Engineer - Resins GSME, WHIRLPOOL, United States
- 10:10 **Formulating sustainable thermoplastic solutions in the 21st century**  
Mr. Roger Avakian, Owner, AVAKIAN POLYCHEM CONSULTING LLC, United States, and Ms. Maggie Baumann, President, G.H.ASSOCIATES/PERFORMANCE POLYMERS AND ADDITIVES LLC, United States

10:40 - 11:20 Coffee break

### SESSION 2: DEVELOPING POLYMERS FOR THE CAR OF THE FUTURE

- 11:20 **Assessing the rise of electric and hybrid vehicles - what are the implications for engineering plastics?**  
Dr. James Mitchell, Global Market Director, SOLVAY ENGINEERING PLASTICS, France
- 11:50 **Leading into new horizons: novel additive formulations for the new mobility, including autonomous driving, shared mobility and electrification**  
Mr. Sebastian Heitkamp, Global Marketing Manager, CABOT CORPORATION, United States
- 12:20 **Developing liquid crystal polymers for producing high-performance antennae by laser direct structuring for automotive and 5G applications**  
Dr. Young Kim, New Product Development Leader, CELANESE, United States

12:50 - 2:20 Lunch

### SESSION 3: MEETING THE DYNAMIC DEMANDS OF 3D PRINTING

- 2:20 **Examining the rise of 3D printing and the implications for plastics compounds**  
Ms. Hayleyanne Freedman, Market Manager, 3D Printing, M. HOLLAND COMPANY, United States
- 2:50 **3D printing and developing mechanisms to accelerate the adoption of 3D printed parts**  
Dr. Thomas Fabian, Research Manager, Retail & Industry, UL LLC, United States

3:20 - 4:00 Coffee break sponsored by:



### SESSION 4: ADDING FUNCTIONALITY AND VALUE WITH THE LATEST ADDITIVES

- 4:00 **Improving fire resistance with innovative halogen-free intumescent systems**  
Mrs. Carolyn Pressley, National Sales Manager Business Unit Material Ingredients, BUDENHEIM NORTH AMERICA, United States
- 4:30 **Advances in additives for tailoring toughness, density, dispersion and scratch resistance in performance compounds**  
Mr. Don Beuke, Technical Development Leader, MITSUI PLASTICS INC., United States

- 5:00 **High-performance stabilization solutions for challenging technical compounds applications**  
Ms. Emilie Meddah, Technical Marketing Manager BL Performance Additives, CLARIANT BU ADDITIVES, United States

5:30 - 7:00 Cocktail reception

## Wednesday, December 4, 2019

- 9:00 Opening announcements

### SESSION 5: EXAMINING ADVANCES IN WEAR-RESISTANT PLASTICS

- 9:10 **Modifying the wear and friction properties of plastics to deliver fuel economy improvements in the cars of tomorrow**  
Mr. Jippe van Ruiten, Advanced Development Manager - ICE Efficiency and Emissions, DSM ENGINEERING PLASTICS INC., United States
- 9:40 **Advances in carbon fillers for modifying the wear and friction properties of thermoplastic compounds**  
Mr. Rijo Jacob Robin, Technical Product Manager, SUPERIOR GRAPHITE, United States

### SESSION 6: OPTIMIZING CONDUCTIVE COMPOUNDS

- 10:10 **Challenges and techniques for successfully compounding conductive polymer compounds**  
Dr. Paul Andersen, Process Technology Consultant, COPERION, United States

10:40 - 11:20 Coffee break

- 11:20 **Investigating high-aspect-ratio graphites for high-performance thermally-conductive compounds**  
Dr. Anna Ellett, Field Application Engineer Polymers, IMERY'S GRAPHITE & CARBON, Belgium

### SESSION 7: MAKING THE MOST OF INNOVATIVE COMPOUNDING TECHNOLOGIES

- 11:50 **Exploiting a fully configurable process zone to optimize the production of engineering plastics**  
Mr. Dana Pulvino, Vice President Sales - North America, BUSS INC., USA., United States
- 12:15 **New technologies for compounding heat- and shear-sensitive materials**  
Mr. Alan Malott, Global Product Manager, Mixing Systems, B&P LITTLEFORD, United States

12:40 - 2:00 Lunch

- 2:00 **Enhancing product quality to enable the circular economy**  
Dr. Jeff Galloway, Director of Process Technology, Extrusion Division, KRAUSS-MAFFEI CORPORATION, United States
- 2:25 **Top tips for compounding nano-additives in engineering resins using continuous mixers**  
Mr. Slayton Altenburg, Application Specialist, TECHNICAL PROCESS & ENGINEERING, INC., United States
- 2:50 **Optimizing screw geometries for maximizing dispersion, retaining fiber length, achieving high loadings and handling shear-sensitive materials**  
Mr. Prasanna Kumar, Business Development & Process Technology Manager, STEER AMERICA, INC., United States

3:15 Closing remarks

3:30 Conference ends

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# The plastics industry “faced up” to global challenges at K2019

K2019 arrived as the plastics industry faced multiple challenges—a faltering global economy, the prospect of US-promoted trade wars, seemingly endless uncertainty over the UK’s departure from the EU, ongoing technological shifts in critically important end-markets such as automotive and, of course, the intense environmental pressure on plastics and single-use plastics. However, the show came at “precisely the right point in time,” according to Werner Matthias Dornscheidt, President & CEO of organiser Messe Dusseldorf.

“Especially in times of great challenges, a platform like the K is indispensable,” he said on the final day of the October event. “It provides guidance and perspectives, sets sustainable economic impulses, shows forward-looking trends and concrete approaches. The industry and its professional associations enjoyed the unique opportunity here to present sector-specific solutions and debate

PHOTOS: MESSE DUSSELDORF, CONSTANZE TILLMANN



**K2019 Exhibitor Advisory Board Chairman Ulrich Reifenhäuser**



PHOTO: MESSE DUSSELDORF, CONSTANZE TILLMANN

**K2019 visitor numbers held close to 2016 levels despite tougher economic times**

questions of socio-political relevance on a global scale.”

Certainly, the show was well attended—fears that the economic conditions would keep visitors away or that the anti-plastic lobby would be unable to resist the publicity opportunity it presented both proved unfounded. Provisional figures from Messe Dusseldorf showed that 225,000 attended the event over the eight days, down by just 2% on the 2016 figure. As might be expected, the single largest national group was drawn

from Germany, followed by Italy, the Netherlands, India, Turkey, China and then the US. The organisers said they had also recorded “a marked increase” in the number of visitors from Russia, Japan and Brazil.

Ulrich Reifenhäuser, Chairman of the Exhibitor Advisory Board for K2019 and Chairman of film machinery manufacturer Reifenhäuser, was also clearly pleased with the event and particularly with the steps exhibitors had taken to tackle issues such as waste and the Circular Economy.

“It was a great trade fair,” Reifenhäuser said. “On the one hand, the conditions were not so good; the industry in 2019 has had a real media bashing and the image of plastics has been going down the drain. We have a real waste problem. The good thing is that the plastics industry recognises

that. We have faced up to it, we have looked for solutions, and we have presented solutions...many people have given us input; we now need to use that input.”

Given the predicted declines in plastics machinery production forecast by industry association Euromap at the show (reported separately in this section), Reifenhäuser remains remarkably convinced that the plastics industry has a sound future. “We look towards the future with a lot of optimism—plastics are indeed the materials of the future,” he said.

The plastics industry will be able to judge if Reifenhäuser’s optimistic perspective is well founded in three year’s time at what will be the 70th K fair. The dates for that are set for 19-26 October 2022. Location, of course, Dusseldorf.

➤ [www.k-online.com](http://www.k-online.com)



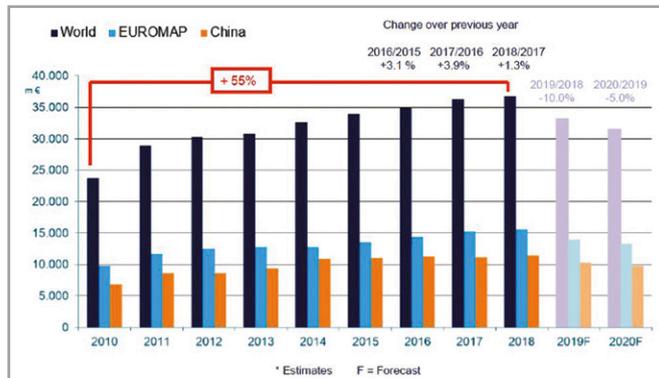
**Werner Dornscheidt, President of K2019 organiser Messe Dusseldorf**



# Global machinery output to fall by 10% in 2019

Global production of plastics machinery grew by 1.3% in 2018 to reach a value of €36.8bn, according to data released at K2019 by the European plastics and rubber machinery association Euromap. European machinery makers enjoyed growth above the global rate, at 1.9%, taking the total for the region to €15.6bn. However, that was a poor performance by recent standards and producers are now preparing for much weaker demand.

"After 10 years of continuous growth and an increase in the Euromap production of 59% since 2010, 2019 will see the expected economic dip," said Luciano Anceschi, President of the association. "Apart from a worldwide economic slowdown, it's above all the slump in the automobile sector as well as decreasing investments due to political uncertainties caused by the trade conflict between USA and China, Brexit and unpredictable national laws for the use of



Global plastics machinery production by value, 2010-2020

Source: Euromap/VDMA

plastics that are clouding over business prospects."

Euromap is forecasting a 10% decline in global production this year to €33.1bn. The value of European plastics and rubber machinery production will also fall by 10% in 2019 to €14.0bn. A further 5% contraction is forecast for 2020, with both global and European production down 5% to €31.5bn and €13.3 bn respectively.

The future is not without opportunity for Europe's plastics machinery makers, however. The association believes EU demands to

raise plastics recycling volumes to 10m tonnes by 2025—four times today's levels—and to ensure all plastics packaging is recyclable by 2030 will provide a boost for manufacturers of both recycling and processing machinery. "Circular Economy will thus become a growing business field and have positive impacts on machinery manufacturers who enable a functioning circular economy by applying their technologies," said Euromap Vice President Michael Baumeister.

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

## DSM will offer "green" alternatives

DSM intends to offer alternative versions of its complete engineering thermoplastics portfolio incorporating more than 25% bio-based and/or recycled content by 2030 at the latest. It plans to achieve this target using a combination of technologies, such as mechanical recycling, fermentation and mass balance accounting for bio-based or chemically recycled feedstock.

Making the announcement at K2019, Shruti Singhal, President of DSM Engineering Thermoplastics explained that the strategy to offer a complete range of bio-based and recycled content alternatives was in response to changing demands from end-customers. "We are seeing big shifts behind the scenes," he said, adding that an estimated 15% of the engineering plastics market would be bio- or recycled-based by 2030.

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

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# Albis Plastic makes compounds a standalone business unit

Albis Plastic revealed plans to split its distribution and compounding operations. The move, which the company says it has been planning for two years, will be completed by the middle of 2020.

"We are separating our own product portfolio from our distribution activities. It will give the businesses more focus—distribution and compounding needs different skill sets," said Albis Plastic CEO Philip O Krahn. "We are not selling the compounding business," he emphasised.

The two new companies will operate as standalone entities. The Albis name will remain with the distribution operation, which will be run by the company's current VP of Distribution Horst Klink. The compounding business will operate under a new and yet-to-be-decided name under the direction of current Chief Sales Officer Ian Mills.

Albis reported sales of around €1.1bn last year. Distribution accounted for around 70% of that, with compounding and tolling work making up the remainder. Krahn said 2019 sales "would be lower" due to slower market conditions that had reduced volumes, particularly from the European automotive sector, but that was not a factor in the restructuring.

Krahn said the move would have a minimal impact on its customers, the

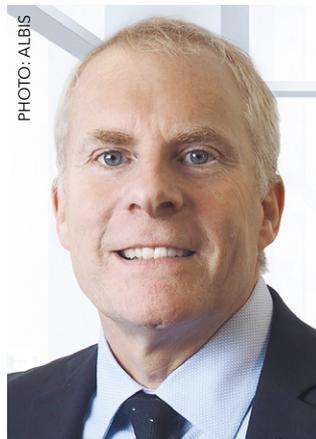


**Albis CEO Philip O Krahn: Giving the business more focus**

majority of which buy only distributed products. "Around 40 to 160 out of our 13,000 customers will be moved to compounding, which will have a small sales force, but for most there will be no change," he said.

What those compounding customers will gain from, according to Krahn, is an increased focus on technical solutions. "We have a very strong product development structure in the business. We want to focus even more on technical solutions for customers—we do not want to make me-too products," he said.

Albis has invested around €25m in its compounding operations over the past two years. This has seen a major bottlenecking and the installation of two new lines at its site at Zülpich and two more lines at Obernburg in Germany, the commissioning of a dedicated medical compounding line at



**The new un-named Albis compounding business will be headed by Ian Mills**

Hamburg in Germany, the addition of two more lines at Changshu in China, and the resumption of US manufacturing with the start-up of its plant at Duncan in the US.

Further targeted investment is likely. "From what I see today I don't see more investment [in US capacity] in the next two years. But it is different in Asia. If the trend continues I can see us investing again at our site at Changshu," Krahn says. For Europe, investment is likely to be focused on areas such as medical, where the company is reporting growth rates of around 10%, and recycling.

Krahn said the company had made considerable investment at the Wipag recycling and compounding sites at Gardelegen and Neuburg in Germany. Albis acquired the Wipag business in 2017 and operates it as a standalone activity. Krahn said it was yet



**Distribution operations will be managed by Horst Klink**

to decide whether to keep it that way or to integrate it within the new compounding business unit.

The latest addition to the Wipag offering is what Krahn describes as "Recycling as a Service." He said it aims to help customers that want to make more use of production waste or material from other waste streams but do not have the equipment to do so. "We can offer shredding, delamination, de-painting or sorting as an additional service to our customers," he said.

■ Albis has also announced plans to end compound production at its plant at Knutsford in the UK and relocate it to its German plants at Hamburg, Zülpich and Obernburg. The move is aimed at improving group efficiency at a time of increasing competitive pressure, said Ian Mills.

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

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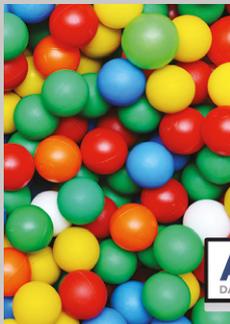
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# Domo prepared for “big step” in PA engineering plastics

The completion of the acquisition of Solvay’s European PA66 business, which should be finalised in January next year, will be the biggest step to date in Domo Chemical’s plans to create a fully integrated position in polyamide-based engineering plastics.

“It is a big step for us but it is a merger of equals,” Domo Chemicals CEO Alex Segers said at the show. “We will double the solutions we can bring to our customers.”

The €300m deal to buy the European parts of Solvay’s Performance Polyamides business includes engineering plastics operations in France and Poland, a high performance fibres unit in France, PA66 polymer and intermediates capacity in France, Poland and Spain, and a BASF/Domo adipic acid production joint venture in France.

The sale of the units was required to gain European Commission approval for BASF’s acquisition of



**Domo Chemicals CEO Alex Segers: Merger of equals**

Solvay’s global PA business. The move will see Domo’s annual revenues grow from €900m to near €1,600m and will double its number of employees to more than 2,100.

Segers described the deal – which involved more than eight months of negotiations between BASF, Solvay and the European Commission and is still, at least technically, not finalised – as “a complex process.”

The acquisition will bring together the Solvay Technyl PA brand with Domo’s existing Domamid virgin

and Econamid recycled products.

However, it is in the downstream integration that Segers sees the big appeal. “Our strength is in downstream,” he said. “When the Solvay businesses came on the market we saw a perfect fit.”

Domo’s polyamides business traces its roots back to the 1994 acquisition of the Leuna site. It has since invested some €650m in the facility, which produces caprolactum and other intermediates. It made its first substantial move into engineering plastics in 2004 when it bought a PA6 production unit at Premnitz followed in 2013 with the acquisition of Aquafil Engineering Plastics in Italy and the purchase of US firm Technical Polymers in 2015. Domo is also a leading European producer of biaxially oriented PA films.

While undoubtedly a huge bolt-on to Domo Chemicals, Segers said integrating the new businesses was something it

felt very capable of doing following the experience gained with its acquisitions of Aquafil and Technical Polymers. “We want to integrate the business well. It is a big step and we are not underestimating it...but we have grown as a company in our competence and technical capability in engineering plastics. We could have not done this five years ago,” he said.

The ability this deal presents to add new capabilities right along the PA66 production process is also in line with Domo’s strategy of integrated production and further strengthening of its overall position in polyamides, which Segers says offer unrivalled versatility and performance and, due to their recycling opportunities, fit well within the circular economy.

“We believe in integrated companies,” he said. “We buy to grow, we don’t buy to do what we did in the past.”

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

## Sirmax to add LFT capacity in Europe

Italian compounder Sirmax said it is to install a line for production of long fibre thermoplastic compounds (LFTs) at the new facility it is building at Kutno in Poland.

A spokesperson for the company said the production-scale line will use LFT compounding technology developed by Autotech Polymers India, its Indian joint venture partner in

Autotech Sirmax India.

The intention is to produce PP-based LFTs initially – Sirmax already has an R&D line in Italy with a capacity of around 200 kg/h of PP-LFT materials. However, the Autotech technology is said to be readily adaptable to bio-based LFT formulations and the company expects to utilise that capability in the future.

In addition to the LFT compounding capability, the Kutno facility will also be home to the first TPE production capacity within the Sirmax group. The plant will begin operation with three TPE/TPV lines, which will be located alongside two lines for PP compounds and another two for production of engineering compounds.

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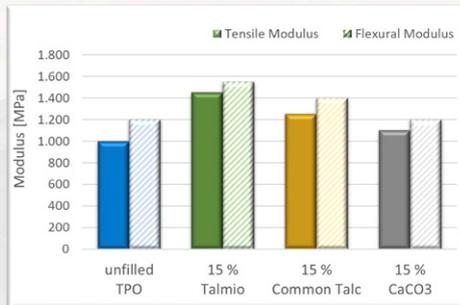
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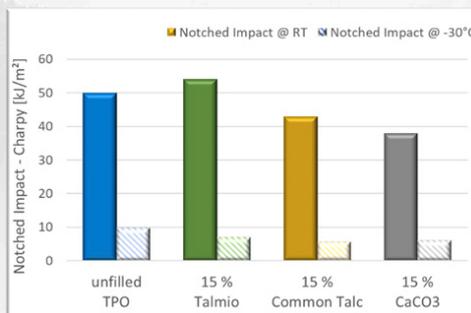
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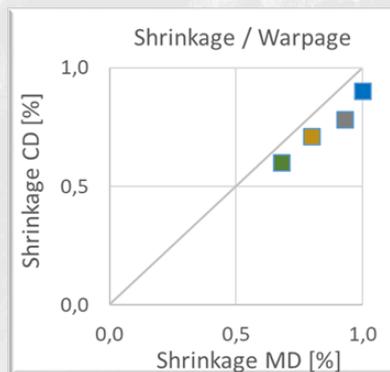
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# Tosaf sees opportunities ahead

Global economies may be slowing but Tosaf Chief Operating Officer Giuseppe Giusto said at K he sees big opportunities ahead for the company, which is looking to further expand its position in the Americas and its established market of Europe and particularly in colour masterbatch.

"We see more and more opportunities. We are one of few [masterbatch] companies with solid growth, not only through acquisitions but also organic growth," Giusto said. He puts the Israel-headquartered company's success to date, at least to a large part, down to its strategy of targeted acquisition and a focus on colour and service.

In the US, where Tosaf has invested more than €30m to establish a

presence, he said it is now seeing a solid return. Its 2016 acquisition of Arlington, Texas-based Adtec Colorant was followed by the establishment of its first Tosaf production unit at Bessemer in North Carolina. "This year we will be almost on target and for us this is important as this was our first greenfield investment outside of Israel," he said.

"It is not complicated for a company like Tosaf to build a plant but enlarging the customer portfolio—this can take some time," Giusto said. "It is not easy in the US and it has been more difficult than we expected. But we see there is a need for service and a place for someone proposing a different way of doing business."

Back in Europe, he



**Tosaf COO Giuseppe Giusto: Suffering but growing**  
Image: AMI

reports challenges in key markets but remains optimistic. "We are particularly in strong in automotive and particularly strong in Germany. We are suffering but in a different way to others. We are suffering but still growing. And we are positioned to take all opportunities."

Tosaf is a major player in

additive masterbatch for the agricultural and BOPP films industries, in flame retardant additive masterbatches, and in black and white masterbatch (the latter an essential capability to support the colour masterbatch market where Giusto sees most future growth potential).

"We want to build a colour network [in Europe] and our dream is to have a colour company every 1,000km," he said. "Masterbatch is not a finished product, and it is not a material. It is a service."

Giusto said Asia is also of interest – it has a small manufacturing presence in China through its Colloids business. "We are working on it," he said. "We are not able to catch all the opportunities we could."

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

# KraussMaffei emphasises the circular approach

KraussMaffei launched its PolyMore online marketplace at a special event in Dusseldorf during K2019. Intended to connect compounders and recyclers with plastics processors, the venture is one of the key initiatives from the machinery maker's recently digital business unit.

According to Nadine Despineaux, President of the Digital & Service Solutions unit, 19 compounders and recyclers have already signed up to the venture, which initially focuses on the European market, and more than 100



**Nadine Despineaux, President of KraussMaffei's Digital & Service Solutions unit**

processors have expressed interest in joining in the pre-launch phase.

Users of the PolyMore platform can opt to use the



**Dr Michael Ruf, KraussMaffei Chief Operating Officer**

system on a subscription or transaction fee basis.

The digital venture is also in line with KraussMaffei's Circular Economy ambitions.

Chief Operating Officer Dr Michael Ruf said the topic is now a management board topic and he expected the company's activities in the areas of recycling and sustainability to grow rapidly.

Aside from organic developments such as its Edelweiss upcycling compounding technology, Ruf said the company was also prepared to target acquisitions in this area. "We are totally open to everything," he said. "We don't have firm plans but we are looking."

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

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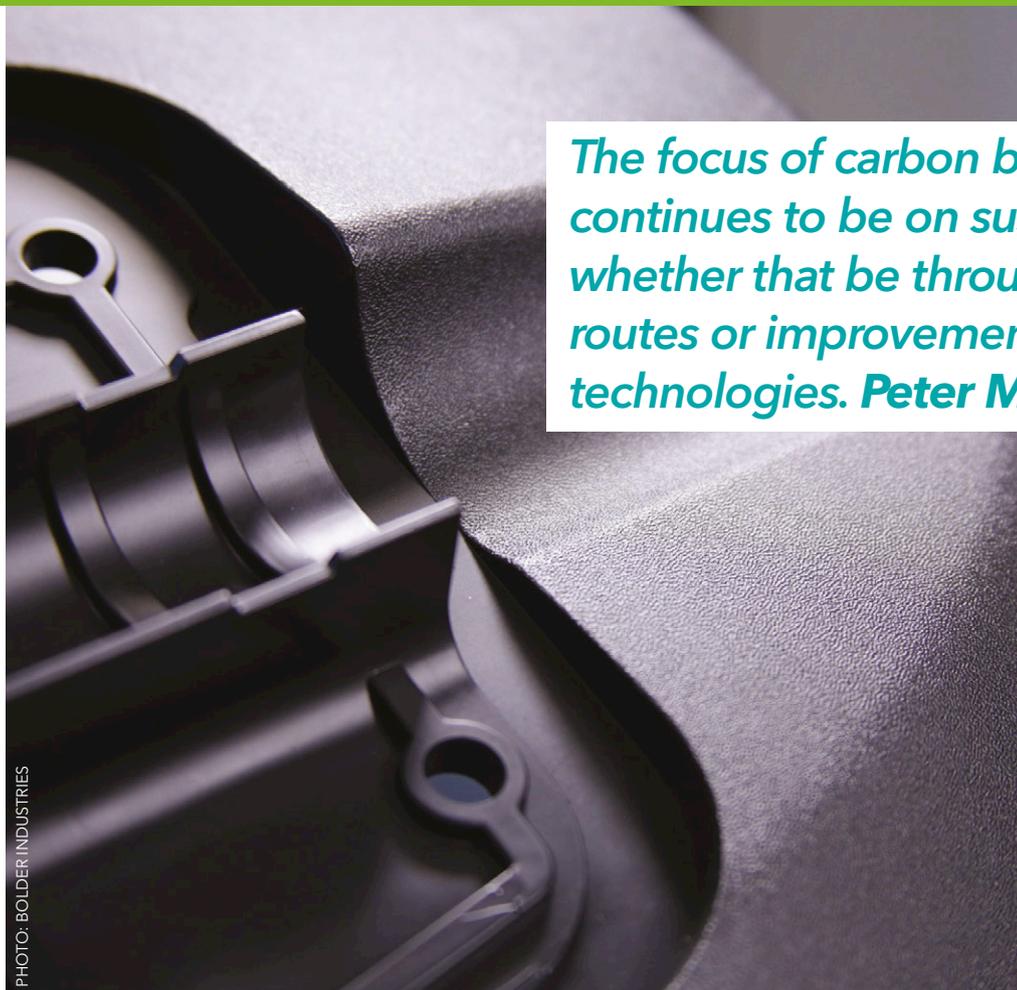


PHOTO: BOLDER INDUSTRIES

*The focus of carbon black production continues to be on sustainability, whether that be through new recycling routes or improvement of traditional technologies. Peter Mapleston reports*

**Main image: Producers of plastics parts - in this case an office chair - are looking for more sustainable carbon blacks that will not compromise aesthetics or performance**

# Sustainability is the goal for carbon black suppliers

Technologies for converting old tyres and other types of waste into recycled carbon black (rCB) suitable for plastics compounds are moving from the concept stage to commercial reality. And while pyrolysis of tyres to produce rCB for use in new tyres is a fairly well-established procedure, improved technologies are now making it possible to create grades suitable for use in plastics where technical specifications are typically much more demanding.

Life cycle analysis of the pyrolysis route to rCB shows some significant advantages over traditional technologies based on fossil fuel feedstocks, according to proponents of the technology. So compounders looking to improve their environmental footprint may do well to investigate the latest possibilities. At the same time, of course, established carbon black producers are investing in equipment and R&D to improve their green credentials, too. All of these developments are important because carbon black is so widely used in plastics applications—it offers not only colour and tint but also

functionality, such as conductivity and UV protection. And applications span just about every sector.

The technology for production of rCB (and energy) by pyrolysis of old tyres appears to be coming of age. An ever-growing number of start-ups are joining the fray—at least one taking the increasingly popular crowd-funding route—while more established players in the field are moving from pilot stage into full-scale commercial production.

One leading player, Netherlands-headquartered **Black Bear Carbon**, says CO<sub>2</sub> emissions associated with its process are five tonnes less per tonne of rCB produced compared with conventional processes for manufacture of furnace black. The company says it already has approvals for its NEptune branded rCBs from two major masterbatch producers (which it declines to name at this time).

Black Bear Sales & Product Manager Frank Cremer says one reason for its success is its ability to consistently produce material with very low sieve residue and extremely low PAH (polycyclic aromatic

hydrocarbon) levels. This, among other things, enables them to be used for products that come into direct contact with foods in Europe (he says restrictions on such applications are tighter in the US). Particle size distribution is also very consistent and ash content variation is in the range of  $\pm 0.5\%$ , which he claims is around one order of magnitude less than some rivals and is a critical attribute for obtaining consistency in masterbatches.

Cremer also says that NEptune grades have slightly different particle surface characteristics, which makes them both easier to disperse and slightly less polar than traditional blacks. With a Hansen solubility parameter of around 2, compared with anywhere from 8 to 14 for regular furnace blacks, NEptune grades cannot be used as drop-in substitutes for existing carbon blacks. The materials are also non-conductive so may need to be modified for applications such as cable compounds.

### Treading carefully

Despite the world being seemingly awash with old tyres that offer potential for conversion to rCB, Cremer says the considerable variability in tyre formulations means it has to be very careful in selecting its feedstocks. Depending on the tyre type (whether formulated for road or agricultural use, for example), the silica levels can vary substantially. It currently obtains its feedstock material from Kargo, the largest tyre recovery company in the Benelux region of Europe, which supplies it with rubber that has already been separated from its metal or synthetic fibre reinforcement.

Black Bear currently has a pilot facility at Nederweert in the Netherlands, although it is currently out of commission following a fire there in February of this year. *Compounding World* understands that the company will shortly announce commercial-scale facilities for the same country and also in Germany; it is currently seeking debt and equity finance. These new facilities are likely to have capacities to produce around 12,500 tonnes/yr of rCB, which means that they will process 31,000 tonnes of tyre granulate annually (the balance being converted into oil and gas). Black Bear is also in discussions with potential licensees for its technology in other countries.

Swedish company **Enviro Systems** is also active in the tyre pyrolysis sector and already has a plant converting around 6,000 tonnes/yr of tyres into rCB

and pyrolysis oil at Åsensbruk. The company is currently targeting applications in rubber more than plastics and is also looking toward plant sales and joint ventures outside Sweden. It is currently finalising an agreement with TreadCraft Carbon of Buffalo in New York State, US, to establish a jointly owned plant in the country.

Enviro Sales Manager Fredrik Olofsson says a problem with making rCB suitable for plastics applications is that in many cases where good blackness is required, ash levels of around 0.5% are needed. This is possible with conventional carbon black but is challenging with rCB, he says. Without special, and costly, treatments rCB has ash contents of upwards of 10% and can frequently exceed 20% if no tyre pre-sorting is employed.

Meanwhile, Munich-headquartered **Pyrolyx** said last month that it had completed "cold commissioning" of the major systems at its recently constructed plant for producing rCB from used tyres at Terre Haute, in Indiana in the US. Cold commissioning is the full operation of machinery and systems and is carried out in preparation for hot commissioning and initial production, which the company says should begin soon.

Pyrolyx recently acquired J&R Used Tire Service, which has a tyre processing facility 45km from Terre Haute. It also has a plant at Stegelitz in Germany and is planning a third plant, which will be located in the east of Europe and could go into operation in late 2021.

Canadian company **Klean Industries**, which is based in Vancouver, says it is already producing several grades of carbon black for use in rubber and—to a lesser extent—plastics. It claims that it is "currently the only supplier to our knowledge that is capable and is providing rCB carbon materials directly back in new tyre and retread tyre manufacturing processes globally." It also says that its Klean Carbon CBk carbon blacks are widely used for various masterbatch applications.

Klean Industries also sells equipment for producing carbon black from old tyres using its CBk proprietary process. It describes this as a post-processing method and technology platform that can significantly modify and improve the

**Below: Old tyres are the feedstock for the recycled carbon black industry but must be selected with care**





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**Right:**  
**Tyre-derived**  
**Bolder Black**  
**straight off the**  
**production line**

recovered carbon black from tyre pyrolysis and reduce rCB agglomerations and particle size, as well as reducing zinc and silica and removing impurities. The company claims to be working with “several of the largest global tyre manufactures, rubber and plastic automotive parts suppliers, along with numerous other supply line producers and end users.”

**Bolder solutions**

Maryville, Missouri, US-based **Bolder Industries** claims to have perfected a carbon black produced from post-consumer or post-industrial tyres and rubber scrap for use as and a black pigment in plastics and a semi-reinforcing rubber filler. “To date, more than half of our annual commercial production is dedicated for use in the plastic industry as black masterbatch,” says Chief Technology Officer Nate Murphy.

“To fulfil the market’s appetite in both rubber and plastics, our Maryville facility is currently undergoing an expansion scheduled for completion by Q3 2020, which will nearly triple our annual production capacity,” he says. “After a year of achieving 100% in-spec product and 85% uptime, our fully vertically integrated solution, including our own core technology, is ready for market scale. While our first manufacturing plant is undergoing its planned expansion, we also have a permitted site in the US that is finalising its construction timeline in parallel with plants in Europe and Asia.”

Bolder has also opened its Bledsoe Innovation Center, a fully equipped compounding laboratory dedicated to incorporating sustainable materials such as its Bolder Black into plastic and rubber recipes. “We built this for our customers to help guide them through the challenging process of incorporating sustainable materials into their current

**Below:**  
**Manufacturing**  
**equipment and**  
**chemical**  
**processing**  
**systems at**  
**Bolder**  
**Industries in**  
**the US**



PHOTO: BOLDERBLACK

process while meeting the rigorous standards of the end products,” Murphy says.

Production of Bolder Black is said to use at least 90% less water and to emit at least 90% fewer greenhouse gases than traditional carbon black, figures it claims are supported by certified lifecycle analysis. “Different from other recovered carbon black producers, who also have the core technology to convert scrap tyres into recovered carbon black, only Bolder Industries has a fully commercial, operational manufacturing facility that begins with whole tyre acceptance and ends with pelletised Bolder Black, petrochemicals, steel and power the feeds our facility and local community,” Murphy claims.

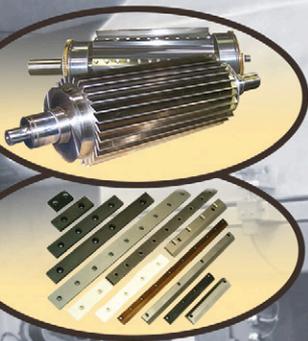
In September this year, **PolyOne** announced availability of its OnColor RC Environmental Black, which is produced using Bolder Industries’ Bolder Black. PolyOne says that when used in place of traditional carbon black, OnColor RC Environmental Black “maintains expected performance levels in plastics. It passes REACH and RoHS requirements and is available for use in multiple resins across a variety of industries and applications, such as automotive, appliances, electronics, and office furniture.”

Start-ups are also trying to get into the rCB market. **Carbon Recovery** in Austria has developed its own pyrolysis process and says it has a tried-and-tested pilot plant that it plans to install near Vienna that will be capable of handling 8,000 tonnes of old tyres per year. From next year, it plans to build further recycling plants at selected locations in Austria and worldwide—it estimates that some 1.5bn tyres are discarded every year round the world. The company started a crowd-funding campaign last year, which it says led to more than 300 investors contributing close to €300,000. ➤



PHOTO: BOLDER INDUSTRIES

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**Right: The Monolith Materials natural gas to carbon black pilot facility at Seaport in the US**

**Alternative production**

US-based **Monolith Materials** is nearing completion of its commercial scale plant for production of carbon black from natural gas at Hallam in Nebraska. Monolith’s plasma production process is said to virtually eliminate pollutants created with traditional carbon black manufacturing. As a further gain, it creates hydrogen as a co-product; Monolith will use this to power an electricity generating plant to replace one of its coal-fired generators.

According to an independent full-life cycle environmental impact study commissioned by Monolith and based on production of 210,000 tonnes/yr of carbon black, the company’s plasma process will lead to an annual reduction of more than 500,000 tonnes/yr of CO<sub>2</sub>, 20,000 tonnes of NO<sub>x</sub>, and 3,000 tonnes of SO<sub>x</sub> compared to traditional furnace black processes.

Monolith’s chief commercial officer Chris Cornille says early discussions with customers have been positive. “We’re scheduled to complete our commissioning in Q1 of 2020,” he says. “In the second half of 2020, we plan to have product shipping to customers.”

**Critical applications**

Among established producers of carbon black, Dominique Strassler, Global Marketing Segment Manager at **Cabot Corp** says innovations taking place at the company are intended to enable new technologies that will deliver improved efficiency and performance in critical thermoplastics applications. For automotive applications, where demand for lightweighting and metal replacement is growing and where requirements for mechanical performance of components continually increase, it is targeting its speciality Black Pearls 800, 880 and 900 grades, as well as a soon-to-be-launched easy-to-disperse high-jetness carbon black. Black Pearls grades are also said to provide good surface finish in parts, as well as chemical resistance.

With the electrification of the automotive



PHOTO: MONOLITH MATERIALS

powertrain and the increasing number of sensors for driver-assistance and autonomous driving, the need for excellent electromagnetic shielding (EMI) has also gained traction, notes Strassler. Vulcan XCmax 22 specialty carbon black as well as Athlos carbon nanostructures are said to deliver value in a broad range of polymer resins needing shielding properties. “Cabot also possesses deep knowledge of how these products interact with other additives in these conductive applications,” she says.

Recycling enablement is also high on the company’s priority list. “Cabot continues to contribute to the circular economy and is collaborating with sorting technology providers and creating new formulations to improve the sortability of black plastics,” Strassler adds. In a related development, Cabot collaborated with sorting equipment specialist Steinert, which now offers equipment that sorts out black plastics items in post-consumer waste (UniSort Black) and also separates black plastics by polymer type (UniSort BlackEye).

In addition, at K2019 in Dusseldorf last month, Cabot launched a new series of black masterbatches - TechBlak 85 -made from post-industrial carbon black and recycled polymers. They are said to be tailored for compounding, injection moulding and non-critical film applications in markets such as industrial, packaging and consumer.

At **Imerys Graphite & Carbon** Anna Ellet, Field Application Engineer Polymers, says the company’s Ensaco and high aspect ratio specialty C-Therm

**Below: Imerys Graphite & Carbon has opened this new R&D centre at its headquarters at Bironico in Switzerland**



PHOTO: IMERYS GRAPHITE & CARBON

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PHOTO: IMERY'S GRAPHITE & CARBON



**Above:**  
Automated packaging of conductive carbon black at the Imerys Graphite & Carbon plant in Belgium

carbon solutions are proving well suited to adding electrical and thermal conductivity to polymers to meet industry mega-trends such as metal replacement, light-weighting and the spread of 5G technology."

Ellett describes Ensaco as a "cutting-edge conductive carbon black, with a winning combination of high purity, high structure and low surface area, which guarantees low moisture pick-up as well as easy dispersion." She says this set of properties makes it possible to reach high levels of conductivity at low loadings and is a key benefit for a compound's mechanical and flow properties.

This April, Imerys Graphite & Carbon opened an application laboratory dedicated to graphite and conductive carbon black at Bironico in Switzerland. Ellett says the new laboratories, together with a new quality control laboratory that was opened last month at the Imerys conductive carbon black production facility at Willebroek in Belgium, will strengthen the company's analytical capability and competences. A fully automated packaging line was also installed at Willebroek earlier this year.

"Through automatisisation and optimised packaging technology, the individual packages undergo less manipulation and stress, higher pallet stability

and improved water resistance, thus improving quality and uniformity," Ellett says. There are also important health and safety benefits for workers at the plant.

Addressing sustainability issues, Ellett takes a slightly different tack from others. "In April 2019 we switched from truck to barge transport for shipment of our conductive carbon black grades from our Willebroek plant to the ports of Antwerp and Rotterdam, thus reducing CO<sub>2</sub> emissions by around 40% for the considered transportation leg," she says. "A rainwater recovery system has also been installed at the plant, in a continuous effort for resources management."

**Tackling dispersion**

The performance of carbon black in any application is determined both by its own properties as well as the dispersion level in the resin matrix. The most important physical and chemical properties include particle size and surface area, structure, porosity and surface chemistry. The dispersion level achieved in thermoplastic resins is strongly influenced by carbon black properties, polymer formulation, compounding equipment and processing conditions.

**Farrel Pomini** says its Farrel Continuous Mixer (FCM) is a proven compounding technology for processing carbon black. Features such as its non-intermeshing, counter-rotating rotor design provide various benefits, including efficient shear, tight temperature control, the ability to accept high filler loadings, and high output rate. It recently collaborated with Birla Carbon on tests using a Farrel Pomini CPeX laboratory compact processor incorporating continuous mixing technology at the Farrel Pomini Process Laboratory at Ansonia in Connecticut, US.

For many high-end consumer applications, very high jetness with a blue undertone, a high surface smoothness/gloss, and UV stability are key desir-

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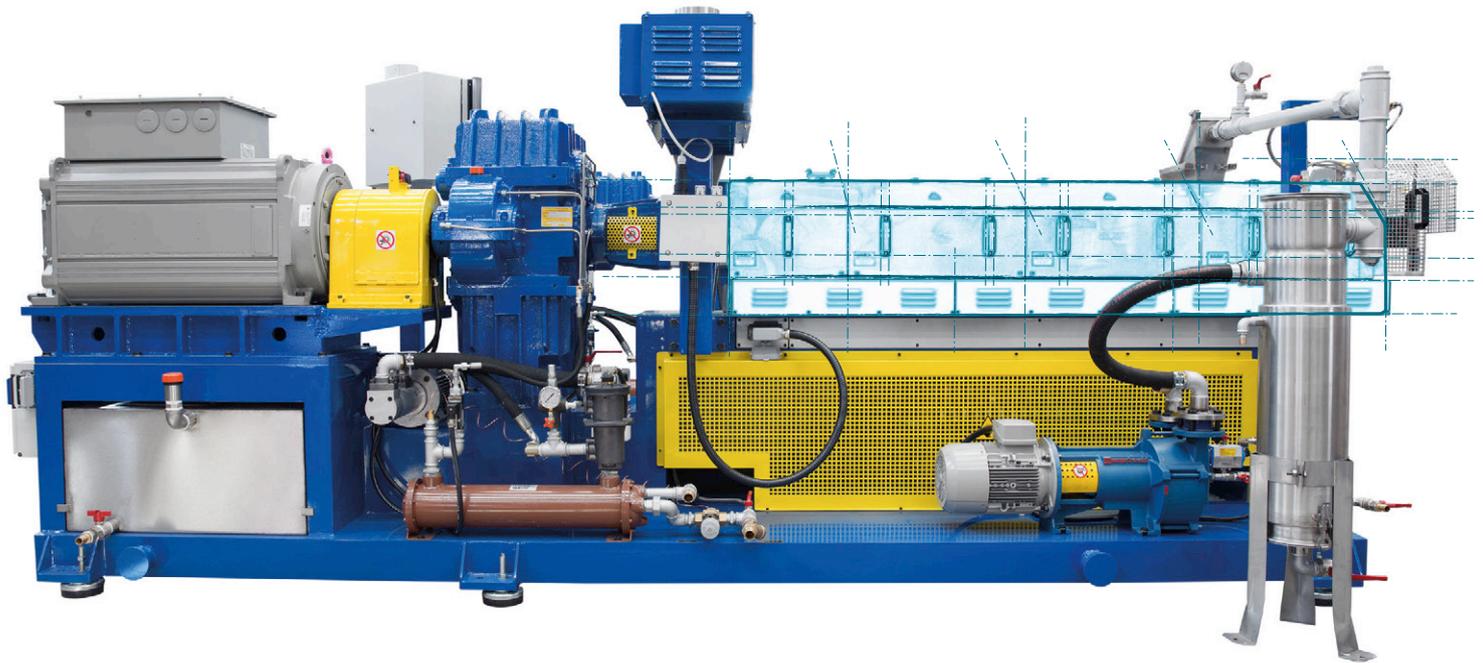
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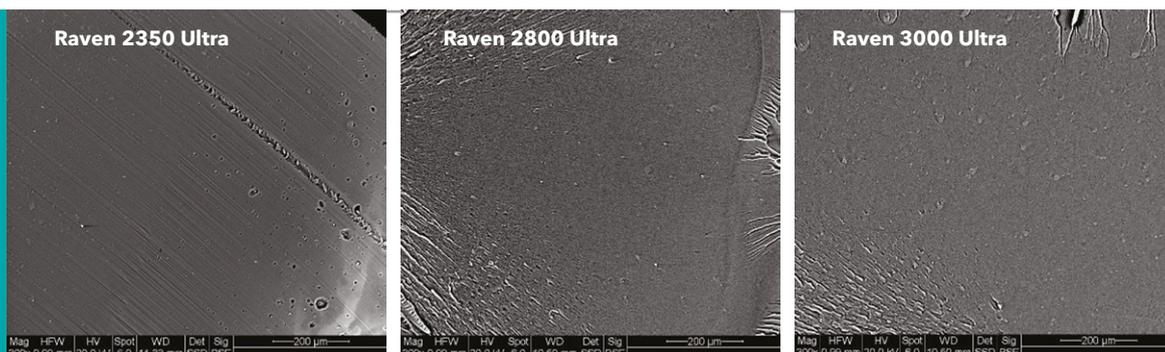


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**Figure 1: SEM micrographs showing dispersion of different high colour carbon blacks**



Source: Farrel Pomini/  
Birla Carbon

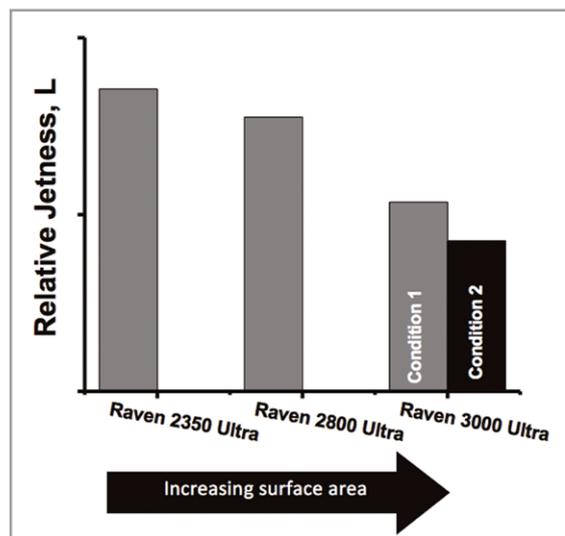
able characteristics, according to Birla. The company says a high colour carbon black such as its Raven 3000 Ultra is capable of meeting these requirements when suitably compounded. “The small particle size is good for colour, tint, UV protection, but it is also difficult to disperse in plastics,” says Deepak Tandon, Global Segment Director—Plastics at the company. “As a result, it can be difficult to extract the full benefit of high surface area carbon black.”

Birla has been working together with Farrel Pomini to better understand the role of CPeX compounding parameters on dispersion and colour performance of high-colour blacks in an engineering plastic (they chose a polycarbonate). “Our findings suggested that CPeX lead to excellent dispersion of high-colour black (Figure 1), and we can see the clear distinction in jetness of carbon black with different surface area or particle size (Figure 2),” the two companies say. “Desired quality and production rate can be achieved by changing different parameters. It was very interesting to find that the jetness values show linear relationship with specific energy input.”

### US opportunities

Indian company **Himadri Speciality Chemical** is looking to build a presence in the European and North America markets for specialty carbon blacks. It entered the North American market earlier this year. George Haines, formerly with Cabot but now Business Director North America for Himadri, says the region’s market has been tight for some time and is forecast to be a net importer of carbon black. He says the market also faces challenges around EPA requirements and feedstock volatility due to changing regulations.

“Himadri Speciality Chemical is engaged in an exciting journey to bring the highest quality carbon blacks to the global market,” Haines says. “Currently we produce 120,000 tonnes of carbon black in our facility in Kolkata. We have recently made investments in our line to produce both ASTM carbon blacks but also a few specialty blacks



**Figure 2: Jetness of samples containing carbon blacks of different surface area (1% carbon black in PC). Samples prepared by compression moulding. Lower L values indicate higher jetness.**

Source: Farrel Pomini/Birla Carbon

targeted for high specialty rubber applications as well as for black masterbatch.”

The company is close to completing an expansion of its carbon black production, which will add a further 60,000 tonnes of capacity by the end of the year. “This expansion will reinforce our position in value added, high performing carbon blacks particularly in ‘clean’ specialty carbon blacks for high end rubber applications but also specialty applications such as plastics and coatings,” he says.

Haines claims Himadri benefits from its backward integration into feedstock. “That gives us an additional lever to develop high quality carbon blacks including application specific carbon blacks that can bring additional performance in terms of dispersion, filter life, and so on while still delivering on colour, conductivity or UV protection.”

Also investing is **Orion Engineered Carbons**. Henry Brooks, Vice President Americas for Specialty Carbon Blacks, says that over the past five years Orion has invested “significant” capital in North American and European specialty carbon black production units. “Demand for chemically clean,

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easy-to-disperse carbon blacks within almost all thermoplastic applications requires unique process design and raw materials that possess low sulphur and ash," he says.

The company's recently launched Printex kappa 70 conductive carbon black is one of the fruits of these investments, Brooks says. "Printex kappa 70 offers a combination of cleanliness and conductive efficiency that makes it well suited for traditional conductive plastics applications in electronics and safety and allows access to growing markets such as electric and autonomous vehicles."

Orion Technical Market Manager Vasanth Narayanan says: "Customers who process carbon black in fibre and thin film applications expect excellent dispersion and product purity to enable their applications. Film thickness can be achieved at processing rates that are acceptable to our customers and that reduce product defects for end users."

### Concentrate products

Recently, **Unipetrol** said it had developed several new concentrates and compounds based on PVC and its highly conductive carbon black Chezacarb. The company says there is a possibility to produce these materials at large scale in cooperation with Anwil, a sister company within the PKN Orlen group that produces PVC and fertilisers. The concentrates can be used for pipes, ESD shielding, cables, flooring, extruded profiles and other products.

Unipetrol points out that resistivity is significantly

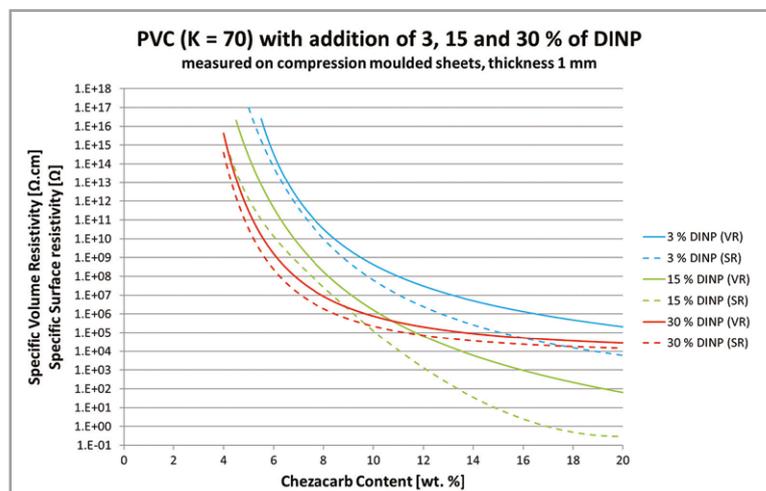


**Left: Electronics packaging makes use of Orion's carbon blacks to provide conductivity and cleanliness**



influenced not only by carbon black content but also by other additives. "So tailoring of such a concentrate can be quite a challenge," a company spokesperson explains. "Usually it is recommended to use less filler when using our carbon black as it also makes the compounds stiffer. When we tried different plasticiser content in PVC (DINP, diisononyl phthalate), there was significant synergy between carbon black and plasticiser: the resistivity was decreasing quicker. But after a certain point of plasticiser addition, the plasticiser will change the PVC inner structure, resulting in a slower reduction of resistivity." The results can be seen in Figure 3.

Unipetrol has also introduced a PLA concentrate with carbon black, which is aimed mainly at 3D printing using the fused filament fabrication (FFF) technique. "Along the way, there were a few challenges such as brittleness of PLA after addition of carbon black, but it was solved by blending PLA with other biopolymers," the spokesperson says. "These biopolymers influenced not only the mechanical properties but also the resistivity, so it was crucial to select the right one which had the optimal properties."



**Figure 3: Specific volume/surface resistivity of DINP-plasticised PVC compounds containing Chezacarb conductive black**

Source: Unipetrol

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

- > [www.blackbearcarbon.com](http://www.blackbearcarbon.com)
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*Compounders are finding new ways to reinforce their products, exploiting an expanding range of fillers and fibres to extend the performance of thermoplastics. Mark Holmes reports*

# Adding strength to polymers

The addition of fibres and fillers to modify the performance and extend the scope of application of thermoplastic compounds is not new. However, compounders can now draw on an even broader range of reinforcement technologies. Short and long glass fibres are now being joined by increasingly affordable carbon fibres, as well as a growing range of natural fibres. New fillers and sizing options are emerging. And novel compounding technologies promise to make it easier to introduce previously difficult to disperse nano-scale reinforcements.

Earlier this year, **BYK** introduced its BYK-MAX CT 4270 functional filler, which the company says provides a highly efficient reinforcement for lightweight thermoplastic compounds. The additive is based on an organo-modified phyllosilicate and is designed as a functional filler to replace talc, glass fibre or other traditional minerals in TPO-based automotive parts. Offering a high level of reinforcement at low dosage levels, BYK-MAX CT 4270 is claimed to enable a lower total mineral content in the final compound. The company says this results in a significant weight reduction in the final part and a much improved scratch and mar profile compared to parts produced using traditional fillers such as talc. The additive is also said to improve mould filling during processing while parts display a better surface finish and dimensional stability.

Key to the development of any successful reinforced compound is the bond between the matrix resin and the reinforcement, achieved in the fibre sector through the use of performance sizings. Additive supplier **Vertellus** introduced a new addition to its ZeMac line of copolymers for



epoxy sizing formulation at K2019. ZeMac E10, currently offered as a development grade, is an ethylene-maleic anhydride alternating copolymer with a very high 78% maleic anhydride content. Suitable for use in the formulation of glass, carbon and even LCP fibre sizings, the copolymer is said to enable compounds with higher mechanical and thermal performance to be realised, together with better chemical and hydrolysis resistance. The company says it is suitable for development of sizings for polyesters and polyamides.

The latest Hydrosize water-based sizing solutions from **Michelman** are allowing carbon fibre manufacturers to optimise interfacial adhesion between the polymer and fibres by tailoring the surface chemistry of the reinforcement to the chemistry of the specific matrix resin. The company now offers a series of grades covering different resins, fibre types and the desired compound performance.

The Hydrosize Carbon 200 Series, for example,

**Main image:**  
**Functional fillers such as BYK-MAX CT 4270 provide an alternative to talc, glass fibre or other traditional minerals in TPO-based automotive parts, promising improved performance and scratch resistance**

**Right: New sizing technologies from companies such as Michelman are improving the performance of carbon fibre-based thermoplastic composites**

is designed for use in performance polyamide compounds where greater thermal stability is required and is solvent and VOC-free. Typical applications include automotive coolant system pumps. Hydrosize Carbon 300 Series grades are formulated for PC and PC blends, such as PC-ABS, where it offers good chemical resistance. Hydrosize Carbon 400 Series products are high-performance grades able to withstand the processing temperatures required for PEEK, PPS and PEI. This sizing range is said to result in compounds that exhibit good thermal stability, mechanical properties and low creep and is especially well suited to chopped carbon fibre applications.

**Sustainable innovation**

Some of the factors driving interest in carbon and other high performance fibre reinforced compounds include the availability of recycled fibre grades and introduction of more easily handled formats. Recycled fibres can reduce compound cost and allow end-users to move towards meeting sustainability goals while easy-to-handle dust-free formats make life easier for compounders.

Next month **Procotex Corp** subsidiary Apply Carbon will start up a new line at its plant at Languidic in France to produce its granular recovered carbon and para-aramid fibres. The investment will increase capacity at the plant by 300% and will ensure supply flexibility and security, according to the company. "We see increasing demand for our technical fibre granulates in various application areas including automotive, consumer and industrial.

Most of our customers look to increase electrical conductivity, reinforcing capacity, lightweight materials, higher friction capacity and higher wear resistance," says Director of Sales Bruno Douchy.

"The major factor limiting the growth of the conductive compound market is the high cost of production, including high raw material costs and the manufacturing processes. That is why we developed a sustainable carbon fibre solution," says Douchy. "We can offer a wide range of carbon fibres with virtually the same quality characteristics as virgin grades but at prices 30-50% cheaper."

Apply Carbon's production technology allows milled carbon fibres to be supplied in a dust-free granular format that is easy to dose and disperse. "While these carbon fibres have a length of 300 microns, we are also working on granulates with longer fibres of up to 1 mm. This will further

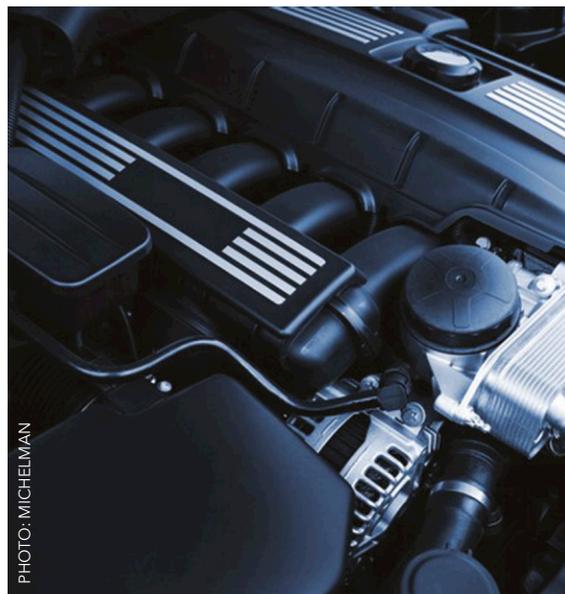


PHOTO: MICHELMAN

improve conductivity levels and the reinforcing capacity of the compounds," Douchy says.

Para-aramid fibre granulates, which are also recovered, can produce wear and temperature resistant compounds with very good mechanical properties. According to Procotex, the granular form makes compounding easier than using traditional para-aramid products, with Douchy claiming output rate gains of up to 10%, while many also report improved surface finish.

Procotex is also developing granular versions of other alternative fine and fibrillated fibre reinforcements that present dosing difficulties. "In the next months, we will introduce also jute and flax granules to promote the increased demand for natural fibre reinforced compounds" he says.

Another manufacturer of recycled carbon fibre is **ELG Carbon Fibre**. It has been working with INEOS Team UK in its America's Cup 2021 build programme and has processed 1,000kg of carbon manufacturing waste and end-of-use parts for the UK challengers. ELG takes fibre offcuts from the composite manufacturing process and converts them to milled and chopped products to make thermoset and thermoplastic compounds and non-woven mats. Some of the reprocessed material has been used to manufacture composite parts for the AC75 boat that will compete in Auckland, New Zealand in 2021. These include two cradles to support the AC75 during transit as well as the hull and deck moulds.

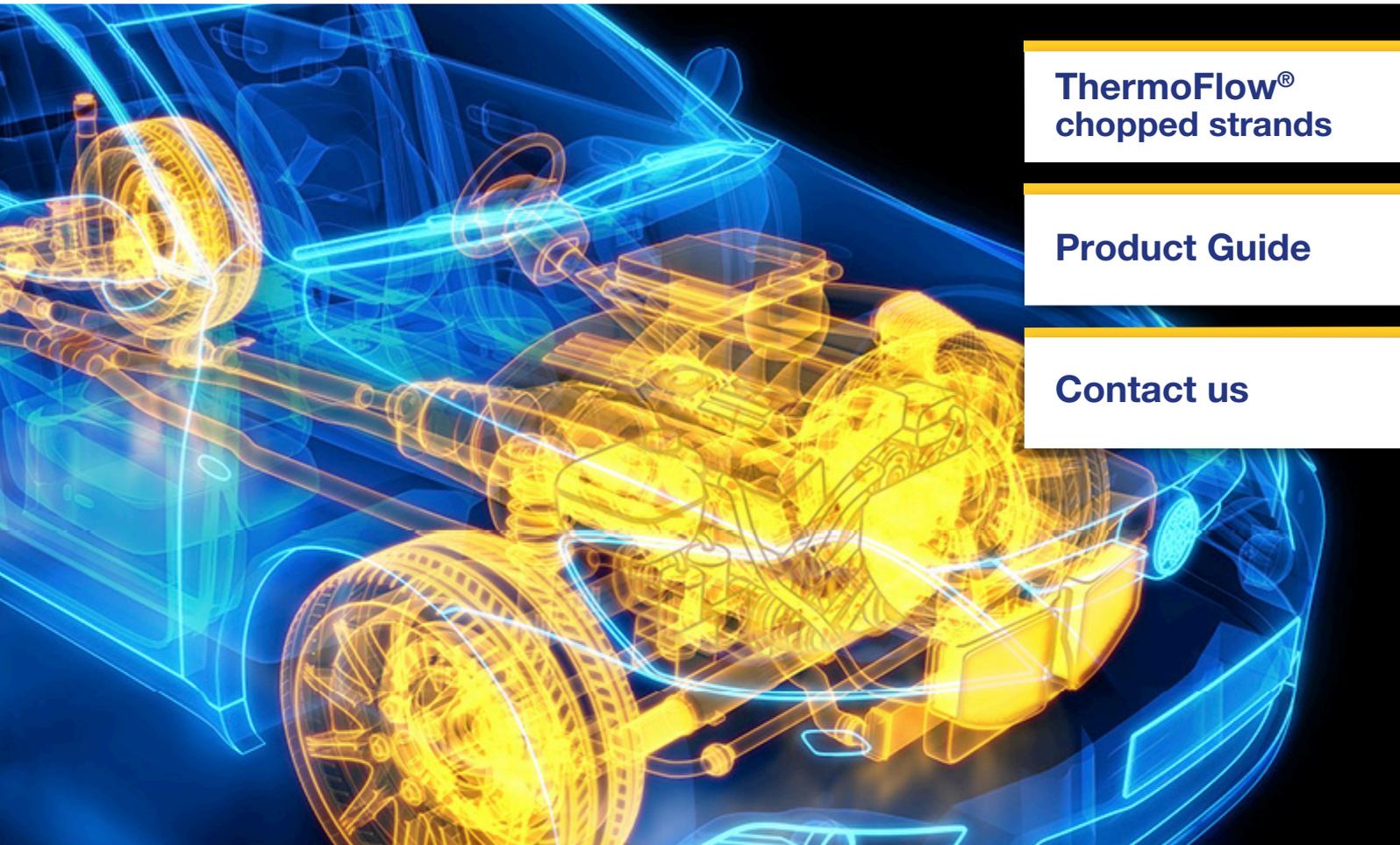
The company says that the material has numerous advantages in addition to being lightweight. The battery enclosure's stiffness is comparable to that of an aluminium construction but uses much less material, and with a thermo-conductivity that is around 200 times less than that

PHOTO: PROCOTEX



**Above: Procotex subsidiary Apply Carbon has expanded capacity for production of its granular recycled carbon fibres**

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**Right: This shaving head is made in a 60% glass reinforced Durethan PA grade from Lanxess**

of aluminium, CFRP better protects the battery from heat and cold. Furthermore, the material also provides optimal values for water and gas impermeability. NIO adds that the battery can be exchanged during everyday use at exchange stations it owns, many of which have already been set up along China's highways. The process of exchanging an empty battery for a fully-charged one takes just three minutes.

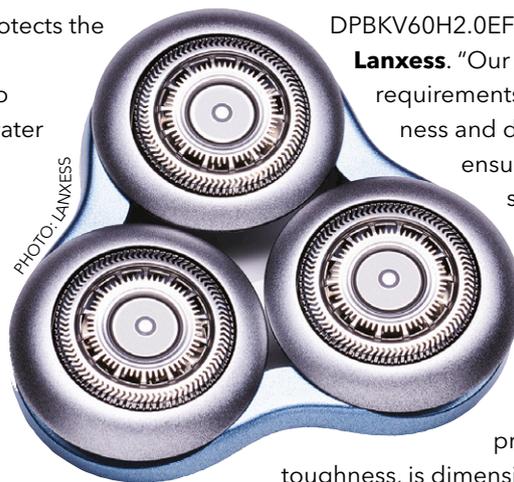
**Working in print**

**Techmer PM** has opened a carbon-fibre reinforced plastics production line to support the demands of the large-scale 3D printing industry. It has been working in collaboration with the **Oak Ridge National Laboratory (ORNL)**, the largest open science laboratory within the US government's Department of Energy (DOE), since 2013 on joint research and development for large-part 3D printing or additive manufacturing (AM). The new high-capacity, twin-screw compounding line is installed at its Clinton facility in Tennessee. Other partners in the federal/private industry partnership

include the Institute for Advanced Composites Manufacturing Innovation (IACMI), and machinery makers Cincinnati Inc, Thermwood Corp, and Ingersoll Machine Tools.

In the early stages of the collaboration, Techmer PM produced small quantities of carbon-reinforced polymers that it transported to ORNL for testing on its 3D printing equipment. In late 2014, ORNL printed a full-size car using Techmer's 3D materials. This early collaboration demonstrated the potential of additive manufacturing, encouraging Techmer to invest to further the technology through the development of more sophisticated and specialised engineered materials.

Electric razor shaving head carriers are the latest application for the highly glass reinforced Durethan



DPBKV60H2.0EF polyamide compound from **Lanxess**. "Our polyamide 6 fulfils the strict requirements regarding rigidity, toughness and dimensional stability and ensures high-quality surfaces," says Marc Marbach, Head of the E&E sales segment in the Lanxess High Performance Materials (HPM) business unit.

The company says the DPBKV60H2.0EF grade provides high stiffness and toughness, is dimensionally stable and resistant to moisturising creams, and provides a good surface quality despite its 60% glass content. The latter is due to its good flow characteristics, which also allow it to be used in highly complex parts with thin wall sections. The company claims flow and processing characteristics are similar to a typical 30% glass reinforced PA.

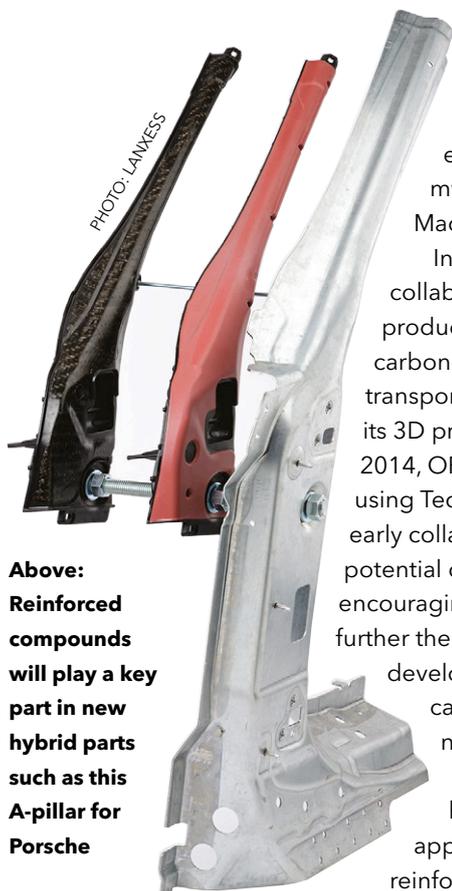
Impact resistance is also a requirement for this application as fully assembled razors have to withstand a drop from a height of one metre without damage. "Despite its high filler content, our polyamide 6 is so tough that the components made from this material do not break when they hit the ground," says Marbach. The material also absorbs very little water and remains dimensionally stable throughout the entire lifetime of the razor.

The shaving head carriers and blade holders are available in black as well as in painted versions. Some also feature a skin comfort coating, which contains metal pigments and is intended to ensure the shaving head glides more smoothly over the skin. "Our compound creates smooth and attractive surfaces that are easy to paint and exhibit good paint adhesion," says Marbach. "Another benefit is the polyamide's strong chemical resistance to the ingredients used in shaving creams, soaps and care emulsions."

Lanxess says Durethan DPBKV60H2.0EF has become well established in lightweight automotive constructions such as front-end carriers, luggage compartment recesses, oil sumps, oil filter extraction tools, transmission housings and chassis-strengthening structural inserts. It sees the move to electric vehicles offering enormous future potential for the compound in applications such as battery housings and carriers for electrical and electronic modules.

**Hybrid opportunity**

Reinforced thermoplastic compounds are also benefiting from the growing interest in lightweight



**Above: Reinforced compounds will play a key part in new hybrid parts such as this A-pillar for Porsche**



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PHOTO: POLYONE



**Above: PolyOne has added a thermoplastic composite innovation laboratory at its Polystrand manufacturing facility in the US**

continuous fibre-reinforced thermoplastic, where Lanxess is a key player with its Tepex product line. A recent example can be seen in a lightweight structural A-pillar developed by Porsche's 3D hybrid design and intended for use in cars such as convertibles and roadsters.

The first application of the technology can be seen in the Porsche 911 Cabriolet. Its A-pillar features an insert made from high-strength steel which is supported internally by a formed blank of PA6-based Tepex dyalite 102-RG600(6)/47% thermoplastic sheet and a ribbed injection moulded structure made from short glass fibre reinforced PA66 Durethan AKV30H2.0. This is bonded together using friction welding of a special structural foam—L-5235—developed by L&L Products.

In terms of strength and rigidity, the hybrid insert A-pillar design matches the rollover performance of previous designs using high-strength steel tubes but is around five kilograms lighter. As this weight reduction is achieved in the upper section of the vehicle, it also lowers the car's centre of gravity so improves vehicle dynamics.

"The excellent mechanical performance of the

hybrid A-pillar demonstrates that hybrid inserts based on steel sheet, Tepex blanks, polyamide 6 or polyamide 66 variations of Durethan as a back-injection material and on a structural foam such as L-5235 also offer considerable potential for use in structural lightweight vehicle body design. That applies to electric vehicles in particular, as their heavy batteries give them a high impact mass," says Henrik Plaggenborg, Head of Tepex Automotive at the Lanxess High Performance Materials (HPM) business unit.

Other potential applications for the hybrid composite elements include reinforcing cross-members and side members, B- and C-pillars, load-bearing battery parts or door components that are critical to safety.

Tepex dyalite is already used in series production at Porsche for another safety-critical hybrid moulded component—the brake pedal for the Porsche 918 Spyder, Porsche Macan and Porsche Panamera NF. The part is claimed to be the first all-plastic brake pedal to be used in series automotive production.

Hybrid applications are also being targeted by **PolyOne**, which developed a continuous fibre reinforced thermoplastic overmoulded hybrid solution for a new snowboard binding. The recently-launched Rome Black Label snowboard binding is made using Polystrand continuous fibre reinforced thermoplastic composite laminate combined with a reinforced polyamide compound via injection moulding. The ultra-lightweight binding is said to offer users very good torsional flex without compromising on strength and power.

PolyOne has recently added a thermoplastic composite innovation laboratory within its Polystrand manufacturing facility at Englewood in Colorado, US. The company says it includes the latest injection and compression moulding equipment for overmoulded composite part sampling and prototyping, as well as advanced

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**Right: The Rome Black Label snowboard combines PolyOne continuous fibre reinforced thermoplastic composite and short glass compound in its overmoulded construction**

testing systems for material analysis. "Hybrid overmoulding with thermoplastic composites is an emerging technology, expanding into industries from automotive to consumer electronics and sporting goods," says Mike Mosley, General Manager Advanced Composites at PolyOne. "Our new lab will enable collaboration with product designers and engineers looking to improve performance, reduce weight, or consolidate parts with continuous fibre reinforced thermoplastic tapes and laminates. We can use injection and compression overmoulding to help them meet their most challenging performance requirements and bring innovative products to market."

**Johns Manville** has been sampling a new line of continuous fibre reinforced thermoplastic sheets during this year, following their launch at last year's Fakuma trade fair in Germany. "The OS-6 series of nylon 6 based organosheets are an ideal structural reinforcement solution for lightweight parts. They are suitable for high throughput manufacturing processes, such as injection overmoulding and compression moulding," says Matthew Walp, New Business Innovation Leader in JM's Corporate R&D.

The sheets are produced using a proprietary technology that is said to provide greater control of fibre content. The company claims that crimped and non-crimped fabrics as heavy as 2,500 g/m<sup>2</sup> can be fully impregnated in one step, eliminating the need for lamination/consolidation steps to build up thickness.

**Lifting limits in LFTs**

Interest is also growing in long-fibre reinforced (LFT) compounds, with the key drivers being weight saving and part integration. While most of the volume in the LFT market is in PP compounds,

**Below: Frame and wheels of Stajvelo's new electric cycle are injection moulded in a polyacrylamide based performance LFT from Solvay**



PHOTO: POLYONE

some are exploring more exotic matrix materials.

**Solvay** is an example, and is supplying an LFT based on its Ixef PARA polyacrylamide engineering resin to French company Stajvelo for production of an injection moulded electric bicycle. The Xencor PARA LFT significantly extends the performance capabilities of Solvay's Ixef PARA compounds, which have successfully replaced metal in medical devices, automotive exteriors, and small appliances where a highly aesthetic surface finish is required. Stajvelo selected Solvay's Xencor PARA LFT for its ability to meet its stringent structural, mechanical and aesthetic requirements. "Stajvelo's e-bike design embodies the hard-to-achieve balance between form and function, due in part to Xencor PARA's unique combination of properties," says Thierry Manni, Founder and Chief Executive Officer of the cycle maker. "Thanks to Solvay's polymer expertise and processing technology support, we were able to design a manufacturing process with optimal function integration and time-saving assembly operations."

The Xencor PARA LFT compound is used to injection mould the frame and wheels of the cycle.

A particular benefit of the Xencor PARA grade is its ability to produce a very smooth as-moulded surface; the parts used on the Stajvelo cycle are painted but the high gloss surface is produced with no surface preparation beyond degreasing.

Solvay's Xencor LFT compounds are available with a wide range of matrix resins, including a pre-commercial PPS version. They



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**Above:**  
**Borealis has added more compounding capacity in the US to serve automotive customers**

typically contain between 30-60% fibre reinforcement, depending on polymer and grade. Solvay sees the Xencor LFT compounds bridging the price-to-performance gap between short fibre thermoplastics and advanced composite materials. Key attributes include high strength, outstanding crash/impact performance, thermal stability, low creep, and easy processing characteristics.

“Xencor compounds are designed to replace metal in semi-structural applications that require greater performance than is attainable with SFT products and where metal is not a desirable option due to weight or per part cost,” says Eric Martin, Global Manager for Xencor LFT compounds for Solvay’s Specialty Polymers global business unit.

Meanwhile, **Borealis** has commenced production at a new compounding plant at Taylorsville in North Carolina where it is producing thermoplastic olefin (TPO) and short glass fibre reinforced compounds. The 4,600m<sup>2</sup> plant is said to be well positioned to serve automotive customers in the southeast of the US and adds a further 30,000 tonnes to the Borealis/Borouge global PP compounding capacity.

The company has also added a new material to its low-density PP portfolio for interior applications—Daplen EE058AI. “The 10% talc-filled and elastomer-modified high-purity grade is designed to meet the latest OEM requirements for automotive interior applications with low odour, emission and fogging levels, while offering significant weight savings,” says Nicholas Kolesch, Head of Automotive Marketing for Borealis. “It combines an excellent balance of stiffness and impact strength with class A aesthetic surfaces and high scratch resistance.”

The first commercial interior applications for Daplen EE058AI include lower dashboard, glove box and centre console mouldings in the new

ŠKODA Scala compact car as well as the automaker’s latest Kamiq urban SUV.

**Mixing in nano-scale**

Nano-materials such as clays and more recently graphene have long shown promise in terms of reinforcement. However, achieving the level of dispersion required to fully exploit the benefits of their structure has presented a challenge. New nano-compounding technology from **Gneuss** may provide a solution. It says incorporation of nano scale fillers is problematic because the powders frequently contain agglomerates. In addition, the handling of extremely fine powders requires extensive safety measures.

Nano scale additives are characterised by an extremely high surface area in relation to their mass. This characteristic can be used to significantly improve mechanical and other key material properties at low filler addition levels if sufficiently well dispersed, which Gneuss says its Nano Compounding Technology can achieve.

The company’s technology was covered in detail in the **October edition** of *Compounding World*. In essence, it exploits the devolatilisation capability of the company’s MRS multiple screw extruder to allow the introduction of nanoparticles (less than 100nm) into the polymer during compounding in a aqueous liquid suspension. The particles are much more easily dispersed in water, which also safely contains them so making handling less hazardous.

The process involves plastification of the polymer followed by the introduction under pressure of the aqueous nano-particle suspension before subsequent devolatilisation of the water. For a mixture of polymer (greater than 70%) and suspension (less than 30%), this final step can be achieved in less than five seconds, the company says, leaving the nano-particles fully dispersed but completely embedded in the polymer.

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# Electrically conductive compounds and CHEZACARB® AC carbon black

Unipetrol Group's highly conductive CHEZACARB® AC carbon black is a significant additive for polymers, resins and rubbers, expanding their scope of application into new fields by increasing conductivity. This high performance carbon black provides a large surface area of around 1000 m<sup>2</sup>/g and DBF absorption of around 400 ml/100 g. These properties, together with its particle structure, are responsible for the high performance provided at low addition levels in a broad variety of polymer matrices, ranging from polyolefins to ETPs and TPEs.

The addition of CHEZACARB® AC reduces matrix resistivity, so the modified material is able to dissipate or safely conduct away unwanted static charge that could otherwise damage sensitive packed or transported goods. In principle, the CHEZACARB® AC carbon black elementary particles, which are sized around 10-30nm, create a network of chains through the matrix polymer. This network of chains creates conductive pathways that allow any unwanted charge to be grounded.

Creating such a structure requires the use of twin-screw compounding extruder or a kneader extruder to disperse the carbon black particles. However, it is a delicate process. If the particles are

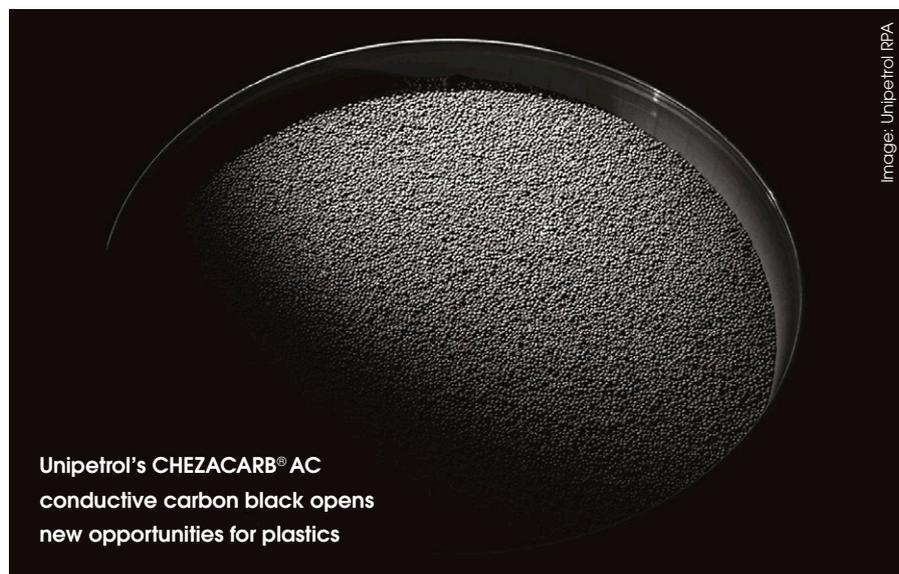


Image: Unipetrol RPA

**Unipetrol's CHEZACARB® AC conductive carbon black opens new opportunities for plastics**

placed under too much shear stress—if the mixing period is too long or the material is processed multiple times—the network of chains can be destroyed leading to a reduction in conductivity.

The main applications for CHEZACARB® AC compounds include packaging, ESD shielding, flooring, pipes, safety protection, fuel tanks, transport boxes or pallets, special cables or even 3D printing filaments.

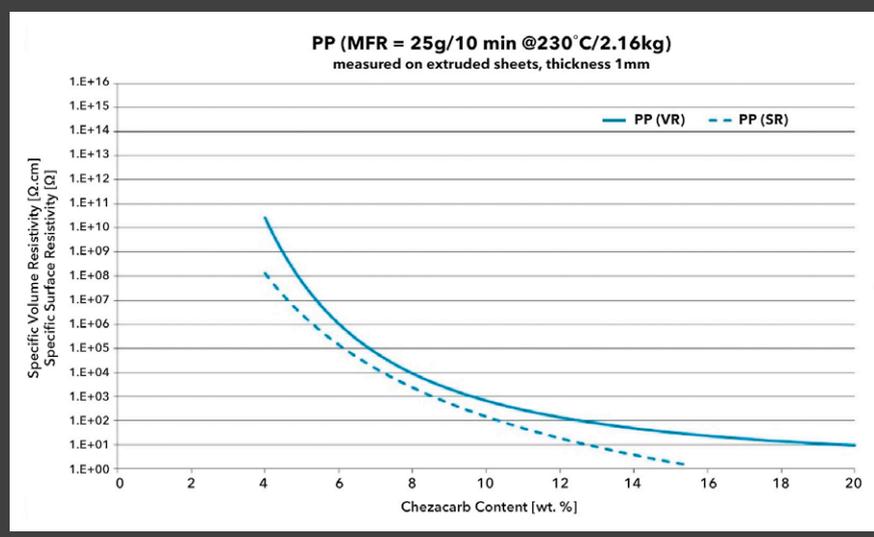
While dispersion of CHEZACARB® AC requires the use of a twin-screw or kneader extruder, Unipetrol is also able to

supply concentrate or masterbatch versions. These MAKROPLUS® CC grades can be diluted and are ready-to-use directly on equipment such as single-screw extruders, injection moulding machines, and other processing machinery. The concentrate carrier is not limited only to polyolefins (PP, HDPE, LDPE, LLDPE). Unipetrol can also supply tailor-made concentrates in EVA, PS, ABS, PET, PLA, PA6, PA66, PC and TPE.

Both CHEZACARB® AC carbon black and MAKROPLUS® CC concentrates can very effectively enhance electrical conductivity. The dosage of carbon black required varies from 4% to 15% and is dependent on the polymer used and the processing technique. But such additions of carbon black can reach surface resistivity values ranging from 10<sup>12</sup> to 5 Ω.

A cooperation between Unipetrol and Orlen Group has resulted in a range of PVC-based conductive concentrates and compounds for applications in profiles, cables and flooring. Over the coming months, Unipetrol will focus on development of conductive fibres based on PET, PA6 and PA66. As part of the company's focus on the Circular Economy, its R&D team is also working to incorporate CHEZACARB® AC into recycled polymers for applications that do not require the highest mechanical performance.

**Figure 1: Performance of CHEZACARB® AC in PP matrix**  
(SR - Surface Resistivity, VR - Volume Resistivity)



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### Wednesday 4th December 2019

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

### SESSION 1 - THE FUTURE FOR LFTs - NEW APPLICATIONS AND INNOVATIVE DEVELOPMENTS

- 09:40 **AMI Spotlight: Technology trends and market opportunities for LFTs in Europe**  
Mr. Chris Smith, Editor-in-Chief,  
COMPOUNDING WORLD, AMI, United Kingdom

- 10:00 **Case Study: Using D-LFT technology to produce a ground-breaking multifunctional box for the Ford Puma luggage compartment**  
Ms. Meltem Öztürk, Exterior Trim Design & Release Engineer, and  
Mr. Egemen Erbil, Exterior Trim Supervisor,  
FORD OTOSAN, Turkey  
Mr. Olaf Jacobi, Safety Senior Engineer, and  
Mr. Matthias Hellriegel, Body Exterior Integration Supervisor  
FORD MOTOR COMPANY, Germany  
Dr.-Ing. Egon Moos, Product Manager Aerodynamics,  
ROECHLING AUTOMOTIVE, Germany

- 10:40 **New developments in semi-structural parts using long-glass-fibre polypropylene**  
Mr. Olaf Herd, Global OEM Manager Automotive,  
CELANESE SERVICES SALES GmBH, Germany

- 11:10 Coffee break

- 11:50 **Weight and cost reduction - development of new lightweight and cost-effective applications for automotive safety structures using advanced long-fibre polypropylene technologies**  
Mr. Marco Bernsdorf, Business Development Manager,  
LOTTE CHEMICAL, Germany

### SESSION 2 - OPTIMISING THE PRODUCTION OF LFTs

- 12:20 **Design concepts for LFT pultrusion lines**  
Mr. Klaus Hojer, Business Development / Account Manager,  
FEDDEM GmbH & Co. KG, Germany
- 12:50 **Modern plastics processing on highly flexible LFT pultrusion lines**  
Ms. Karin Luxem, Area Sales Manager Asia / Pacific,  
PROTEC POLYMER PROCESSING GmbH, Germany
- 13:20 Lunch

### SESSION 3 - ASSESSING THE PERFORMANCE OF LFT MATERIALS AND COMPONENTS

- 14:50 **Predicting the short-term performance and life-time of long-fibre reinforced thermoplastics**  
Mr. Julien Cathelin, Application Development Engineer,  
SABIC B.V., The Netherlands
- 15:20 **Numerical simulation validation for long-fibre behaviour in injection moulding**  
Mr. Vincent Hung, Regional Manager,  
MOLDEX3D, Taiwan
- 15:50 **Studying the importance of carbon fibre length in injection moulded parts**  
Mr. Wolfgang Stockreiter, Senior Scientist,  
BOREALIS POLYOLEFINE GmbH, Austria
- 16:20 Coffee break

### SESSION 4 - WHAT NEEDS TO BE DONE TO GROW THE LFT MARKET?

- 17:00 **Roundtable Discussion:** A facilitated solution-focused discussion held with speakers and peers to explore challenges and opportunities. Topics to include: Automotive design trends and opportunities, materials selection and optimisation, concentrates vs compounds, optimising production and reducing costs

- 18:00 Networking Cocktail Reception

### Thursday 5th December 2019

- 08:30 Welcome coffee
- 09:00 Opening announcements

### SESSION 5 - ADVANCES IN FIBRES AND SIZING TECHNOLOGIES FOR LFT APPLICATIONS

- 09:10 **Degradable glass fibre as reinforcement for LFT products**  
Mr. Tomi Kangas, Sales and Marketing Director,  
ARCTIC BIOMATERIALS OY, Finland
- 09:40 **Make impossible things - Innovations in fibre and sizing chemistry for Long Fibre Thermoplastics**  
Ms. Colleen Kennedy, Global Product Manager LFTP,  
OWENS CORNING, United States
- 10:10 Coffee break

### SESSION 6 - MAXIMISING THE PROPERTIES AND PERFORMANCE OF LFT COMPONENTS

- 10:50 **Long-fibre thermoplastics - applications and challenges from a design and processing perspective**  
Dr. Sachin Jain, Director,  
SKYi COMPOSITES PVT. LTD (India), India
- 11:20 **Case study - pushing the limits of LFT performance with carbon fibres and advanced polymers**  
Mr Ji Mingyuan, CEO,  
XIAMEN LFT COMPOSITE PLASTIC Co., Ltd, China
- 11:50 **Hybrid solutions: examining the zero-waste production of tailored blanks for over-moulding with LFTs, using UD tapes**  
Mr. Rien van den Aker, Director,  
VAN WEES UD AND CROSSPLY TECHNOLOGY B.V,  
The Netherlands
- 12:20 Lunch
- 13:50 **Studying the multiaxial impact behaviour of different LFT materials for automotive applications**  
Dr. Susan Zhou, Technical Director,  
SUZHOU SUNWAY POLYMER CO. LTD, China
- 14:20 **Direct processing of recycled carbon fibre - a sustainable approach**  
Mr. Sascha Kilian, Research Engineer,  
FRAUNHOFER-INSTITUT FOR CHEMICAL TECHNOLOGY ICT,  
Germany
- 14:50 Closing remarks and coffee

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# Polymer Foam

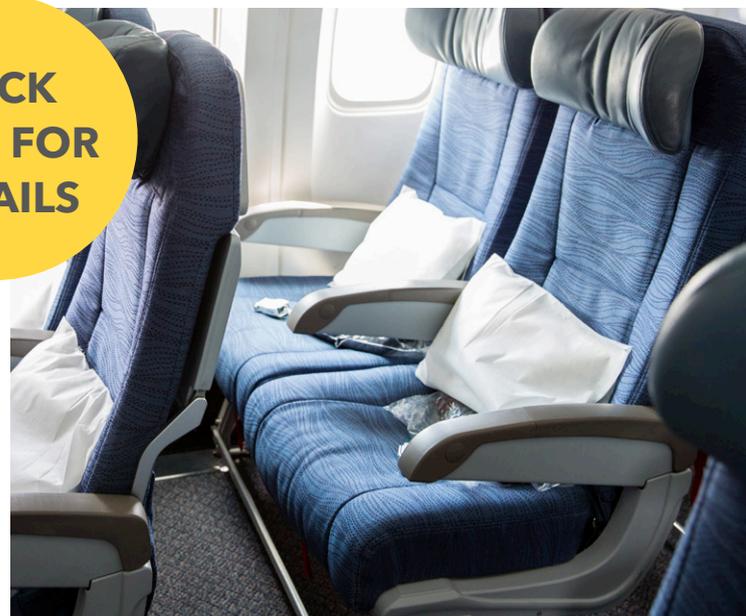
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# Making mixing more effective

*The latest ideas in batch mixing technology were on show at K2019. Peter Mapleston takes a look at some of the innovations*

In essence, at least, batch mixing of ingredients for production of PVC dry blends, wood-plastic composites, additives, colours, masterbatches and the like should not present a major headache for plastics compounders. The underlying technology has been around for decades but, even so, stepwise improvements, fine-tuning and modifications continue to be made—as well as the occasional leap forward. The latest thinking and system offerings were on display at the K2019 exhibition in Düsseldorf, Germany, last month. This article takes a look at some of them.

Automation of multi-ingredient handling and mixing was on the agenda for **Coperion**, which used the show as the launch pad for its new Add-A-Lot system. As the name suggests, this is intended for use in compounding operations requiring mixing on a grand scale. As an integral part of a compounding plant, it enables fully automated recipe preparation that Coperion says fulfils high demands for constant product quality, seamless documentation, and batch traceability.

“Particularly as production trends toward shrinking batch sizes, frequent product changes, and the multitudes of formulations and components associated with them, such automation provides a high degree of safety to the users,” the company says.

At the heart of the Add-A-Lot system is a feeding station with standardised storage containers (IBCs), feeding unit, and mobile mixing containers. Transport of centrally stored components is fully controlled, as is precision feeding and mixing of additives, even in very small quantities.

IBCs docked on the upper level of the feeding station are opened automatically. Feed screws then convey materials to the mixing container in

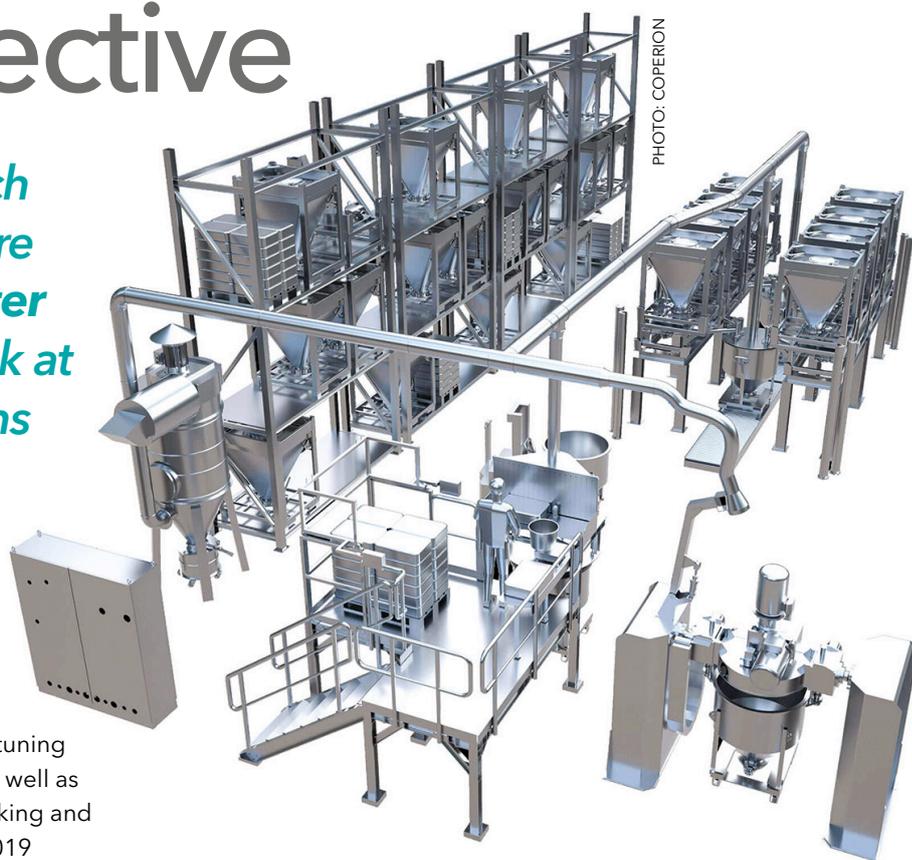


PHOTO: COPERION

accordance with the recipe. As many as eight feed screws can deliver to a single weighing scale. To prevent cross contamination between recipes, feed screws can be easily removed and replaced. IBCs and mixing containers can be either manually or automatically transported using an automated guided vehicle (AGV) or roller conveyors.

Michael Wiedmann, a Development Engineer at Coperion, says the concept was originally developed for use in large PVC compounding operations but adds that it is also suitable for use in plants operating with other polymers. “At the moment, a lot of material dosing is done manually,” he says. “Sacks can be heavy, and there are implications for operator safety as well as for precision and cross-contamination.” The new system is said to take care of these concerns.

The automated system enables maximum efficiency and control in premix manufacturing, Weidmann says. Barcode identification of the IBCs enables proper correlation during filling, independent of how the material arrives – from sacks, big bags, barrels or via pipes, so that recipes and feeding constantly comply with specifications. “Moreover, product-specific assignment minimises cleaning effort,” the company says. ➤

**Main image:** Automation of the mixing process is a common theme that runs from small batch equipment to huge installations such as Coperion's Add-a-Lot

### Flexible optimisation

The Add-A-Lot system is modular, so it can be readily configured to specific customer needs. For example, surge bins (which can be furnished with discharge aids such as pneumatic knockers, agitators, or vibrators) can be modified for incoming packages of various products. And by using a base frame, it is possible to place big bags directly on the feeding station.

The Add-A-Lot feed system's controls are integrated into Coperion's own control systems, enabling recipe management, production planning and storage administration as well as batch tracing and documentation using barcodes, RFID, or other technologies. Customers can choose what brand of container mixer to use in the system.

### Natural solutions

On a slightly less grand scale, a highlight from **MTI Mischtechnik's** display was a Flex-line heating/cooling mixer combination which, together with a Vent tec 2.0 aspiration system, was optimised for the production of dry blends for natural fibre-reinforced compounds (NFCs).

Also designed on a modular basis, Flex-line mixers can normally be used for a wide range of applications; mixer sizes, drives and equipment options can all be individually configured. The M 1000/K 3300 version on the company stand used a heating mixer volume of 1,101 litres and a cooling mixer volume of 3,308 litres, for typical batch sizes of 400 kg and an output of over 1,600 kg/h. The unit was one of a series of machines ordered by an Asian NFC-processing company.

The performance of the aspiration system is matched to the application. "Unlike conventional solutions, these devices control their operation autonomously as a function of actual process parameters, thereby providing constant processing conditions irrespective of changes in process and ambient condi-

tions," says MTI. "They achieve this by continuously monitoring all actual operating conditions via key parameters such as intake air and system air temperatures, air pressure, humidity and, with high significance, the aspiration air flow rate."

MTI says that, even under unfavourable conditions when processing natural fibres with fluctuating but relatively high moisture contents, efficient dehumidification of the blend is ensured. Preparation times, depending on the raw material moisture content, are usually less than 15 minutes, it claims.

Applications of such mixer-aspiration combinations also include the production of almost completely dehumidified rigid and soft PVC dry blends. Especially with PVC formulations containing hygroscopic stabiliser systems, they prevent the formation of deposits on the interior surfaces of mixers and downstream equipment.

### The robot returns

At K2016, MTI showed one of the most novel pieces of kit at the show in the form of a container mixer manipulated by a giant six-axis robot—the C tec PRO. Three years on and company CEO Christian Honemeyer says MTI expects very soon to sign a major contract with an unnamed company that has been using the system for several months for production of pigmented polyethylene. "The system is now fully proven," he says. "We have shown that it can produce up to 10 batches an hour, between 100 and 750 litres each."

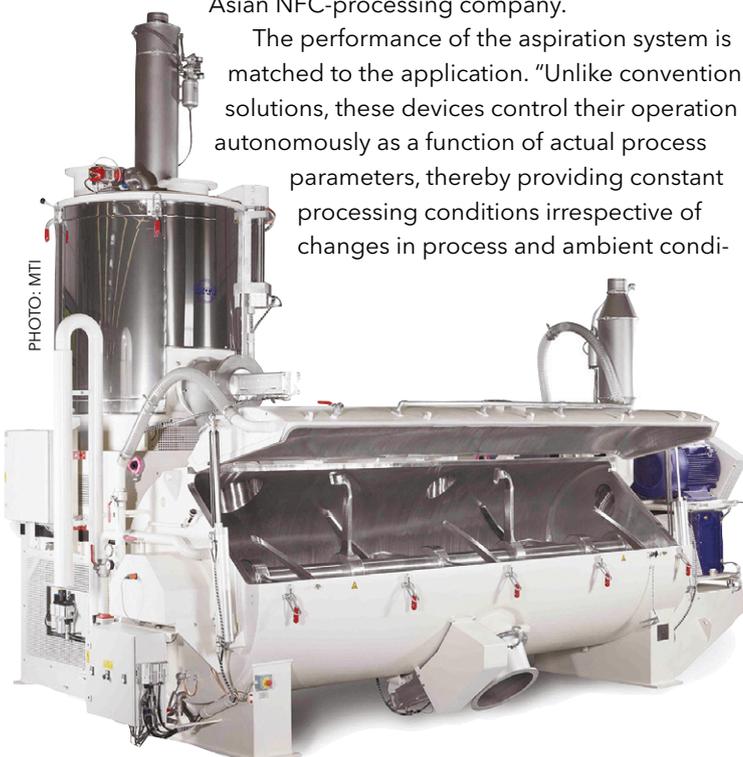
The C tec PRO system now has a CE certification and is ready for operating on a 24/7 basis over the course of a contract (MTI will lease the system) of 36 months. Over the past three years, it has undergone various minor modifications, Honemeyer says, mostly to the mixing head.

### Clean savings

Time taken to clean equipment is unproductive time. And, because of the nature of the batch mixing process, cleaning is an important element in the daily routine. "Especially with small batches, the availability of a mixer decreases," says Karl Hendrik Schluckebier, Sales and Process Manager for the Mixing business unit at **Zeppelin Systems**, which owns the Henschel brand. "By selecting the right mixer types, cleaning time and thus production costs can be saved." He also notes that the use of cleaning agents and the disposal of drag losses are important criteria for investments in new mixing plants.

Schluckebier says that in the development of Zeppelin's new Henschel-Mixer CMQ container mixer, the focus was on not only the quality of mixing and dispersing but also on cleaning

**Below: The Flex-line heating/cooling mixer can be paired with a Vent tec 2.0 aspiration system for mixing natural fibre reinforced compounds**



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aspects. "Critical components were specifically optimised for this purpose," he says.

There are already various solutions on the market for automatic cleaning of the container and, since multiple containers can be used with a single mix head, this operation can be done offline without affecting productivity. But if a recipe change is required, Schluckebier says, the parts of the mixer that come into contact with the product have to be thoroughly cleaned. Contamination on the surrounding periphery must be completely removed too.

"In order to ease the cleaning of the mixing tool, the tool should be easy to dismantle and free of sharp edges and shadows. In addition, the pressure on the wall and bottom created during mixing should be kept to a minimum so that there are no deposits in the mixer and there is no high increase in the material temperature," he says.

Mixers are often equipped with slow-running tools that may work in combination with one or more high-speed dispersion tools. "In view of the cleaning aspect, the aim was to combine moving and dispersing in one tool," says Schluckebier. "With the usual tools, the bottom clearance must be kept very small so that the material circulates evenly in the mixer in the form of a vortex. A large distance means that the material is no longer lifted sufficiently, resulting in an uneven distribution. Although a higher peripheral speed counteracts this, the result is a higher rise in temperature and deposits on the tool and mixing head."

The answer to this quandary came with the development of a new tool with a wing-like cross-section. The mixing arm, which has "winglets" similar to those often used on commercial airplanes to

reduce air resistance, produces a very low mixing resistance. "This reduced energy input limits the temperature rise to less than 2°C/min," claims Schluckebier. It also allows a higher tool speed (up to 20 m/s), which in turn increases dispersion.

The high lift force created by the geometry of the wing allows a very large bottom clearance (up to 70mm), which facilitates cleaning between the tool and mixing head. In addition, the shape and the polished surface of the mixing tool prevent deposits and, on top of this, the mixing tool is light in weight (around 15 kg for a 1,000-litre mixer), so it can be dismantled very quickly for cleaning or replacement by another pre-cleaned tool.

A further benefit of the high lift force is in the seal area. Most mixing heads are trough-shaped, with a seal around the rim where deposits can accumulate. Schluckebier says that the high lifting forces on the CMQ make it possible to use a much easier-to-clean flat plate instead. "This combination achieves at least equivalent results compared to other container mixers equipped with homogenising and dispersing tools," he says.

**Plant cleanliness**

Container mixers are usually moved under the mixing head on a guide system in the floor. When the container is moved away at the end of the mixing process, some material almost

always falls off the mixing head and mixing tool onto the rails. Schluckebier says the design of the CMQ container holder and clamping rotary holders makes it possible for the container to be centred with no need for rails, making floor cleaning much easier. Combined with the other system features, cleaning times can be cut down to no more than 15 minutes, he says, compared with anywhere from 40 minutes up to two hours.

**Hot over cold**

Cleaning takes much longer with hot mixing than with cold mixing because the entire mixing container and the lid must be cleaned and the multi-component tool set and deflector (where used) must be removed in order to gain access to all corners and edges. Zeppelin has been making changes here, too, resulting in what Schluckebier says are significantly reduced cleaning times.

Removing the mixing tool from mixers with a fixed

**Right: Zeppelin's new container mixer works with a wing-profile tool mounted on a flat, polished plate**



PHOTO: ZEPPELIN SYSTEMS

**Left: The three-part design of Zeppelin's new high-speed mixer is said to ensure easy and quick cleaning**



PHOTO: ZEPPELIN SYSTEMS

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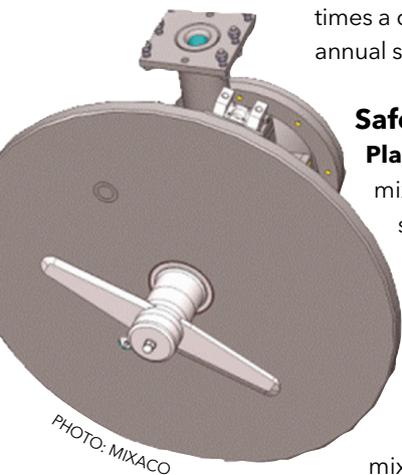
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**Right and below: The Container Mixer i4 mixing head is easy to clean and accepts different container sizes**

mixing bowl requires the operator to bend over the edge of the bowl, and maybe even to climb in. That takes time and calls for special safety measures. With the new design, the operator has full access to the inside of the tank, as it is in two parts allowing the upper part to be lifted from the bottom shell and swivelled to the side. "The new design reduces the cleaning time from 30 to 180 minutes to 5 to 20 minutes," says Schluckebier. "In productions where recipes are changed several times a day and cleaning is essential, high five-digit annual savings can be made."



**Safer mixing**

**PlasMec** showed its well-established Combi-mix-HC-800/2500 mixing system, which it says incorporates the latest developments in terms of mixing safety. Also on the stand was a TRR-1500/FV container mixer configured in accordance with ATEX regulations to make it suitable for mixing powders with explosion potential.

The company says Combimix hot/cold mixers are the ideal solution for mixing dry PVC or WPC (wood/plastic composite) dry blends. Models are available over a wide size range. The TRR container mixer is described as an ideal alternative to turbomixers for the preparation of masterbatch, pigments and engineering polymers, when production conditions require a high degree of versatility and a wide range of different recipes to be mixed in the same machine.

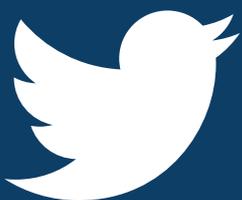
**Mixaco** describes its Container Mixer i4 as the mixer concept for Industry 4.0 and the Internet of Things. Sales and Marketing Specialist Guido Brand says it is the latest progression of the company's original Vortex model. The company

now offers these two units either side of the Multitool model, which introduced the concept of a single mixing head being used for many containers around six years ago.

Brand highlights high mixing flexibility, high quality and reduced required cleaning effort in the new design, which incorporates a new controller, the MCC (Mixaco Control Centre). The inside surface of the mixing head is completely flat, as the sealing gasket is now incorporated into the container. This makes it very easy to clean. It also enables it to be used with three different container sizes (300, 450 and 600 litre), which can all be designed in compliance with ATEX requirements. Dedusting equipment built into the head extracts fine dust generated in the container at the end of the mixing process. The head also contains a temperature sensor, with the temperature indicated on the operating panel.

Brand says the i4 mixing tool enables good mixing vortex formation, even with moderate circumferential speeds of 4-15m/s, which also helps to minimise temperature increases. The mixing equipment is controlled as standard with a Siemens S7 PLC, but users can also opt for Allen-Bradley components. It can also be equipped with an interface for data exchange with high-level

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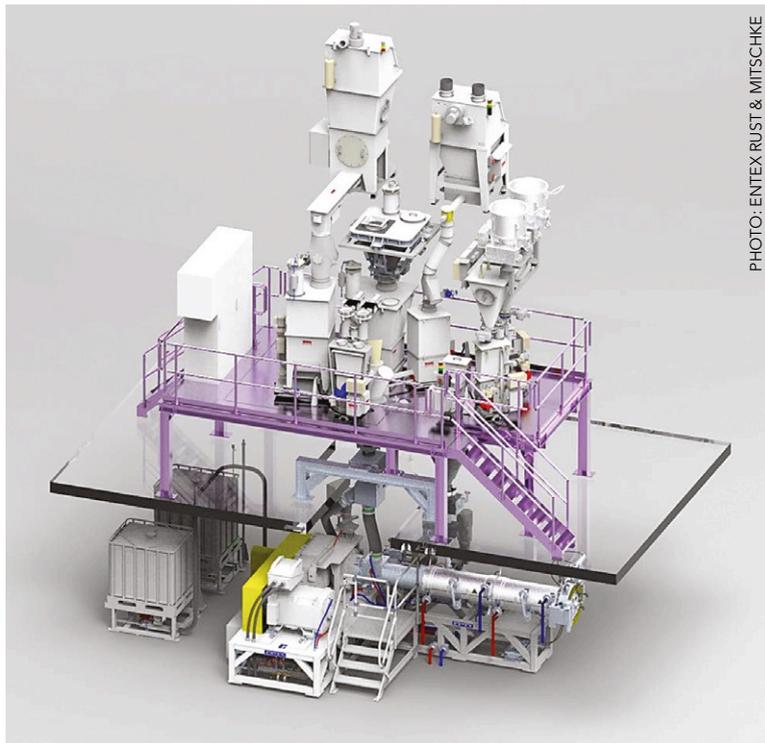


PHOTO: ENTEX RUST & MITSCHKE

**Above: Entex sees its continuous PRE mixing system for PVC as an effective alternative to batch mixers in volume production**

control while a remote maintenance module allows troubleshooting by Mixaco service staff.

### Powerful blending

**Promixon** was promoting its XM turbo mixer, which the company considers to be “one of our most innovative and powerful systems, capable of blending at any speed while maintaining a high level of performance and reducing usage problems.” Promixon says the XM turbo mixer “lasts longer, is more productive, and is less of a burden on finances.”

The company says requirements from customers for faster intervention to tackle production problems, as well as calls for changes or upgrades on production automation of production, have reached very high levels in recent years. “The accurately-studied automation system provided on our machines, united with a remote connection, helps our customers to reduce risks of non-compliant material due to human error and drastic reduction of machine downtimes, with prompt intervention in very short time by our specialists,” according to a company spokesperson.

Company president Marco Marinello also spoke of its successful bid for what he says was the biggest single mixing plant ever produced. The contract, for a US producer of luxury vinyl tiles, included an XBlend-MC/2500/8600 system comprising an XM-2500 high speed heating mixer and an XC-8600 horizontal cooler XC-8600. The unit was customised to variable filling level and to process a wide range of formulations, oriented to the reduction of mixing time and minimal energy

consumption, Marinello says. It has an output of 9,600kg/h, based on eight batches/h of dry blend. The cooler is engineered to receive up to 1,500 kg/ batch of CaCO<sub>3</sub> filler.

### Continuous options

Meanwhile, **Entex Rust & Mitschke** says its Planetary Roller Extruder (PRE) provides an interesting alternative to the traditional approach of making PVC compounds via discontinuous production of dry blends with hot and cold mixers. When used in a direct compounding configuration (see schematic) the continuously-running equipment has a higher investment cost, but as Thomas Birr, Head of Process Engineering at the company argues, this can be recovered by lower running cost (energy consumption is said to be much lower).

In the Entex solution, raw PVC is dosed into the PRE with the stabiliser system added in parallel as a separate component. Diffusion of the liquid components into the PVC, which normally takes place in the discontinuous process in an internal mixer, takes place mechanically in the PRE through a combination of friction and pressure as the liquid components are rolled over the solid PVC.

To some extent, the direct PVC compounding PRE mimics hot and cold mixing. The PRE comprises two modules: the raw material is melted, dispersed and homogenised in the first before passing directly to the second, where temperature and pressure are significantly lower. Although this process is accompanied by some heating of the polymer, thermal damage is prevented by the short dwell time of the melt in the high temperature zone.

“Examinations of the extrudate have shown that the thermal damage of the polymer in direct extrusion is usually even lower than in the traditional dry blend method,” claims Birr. Entex says that total residence times in hot and cold mixers are several minutes, while in direct compounding can be under one minute.

Entex has been proposing this mixing approach for some time, but Birr says interest has recently picked up, especially for greenfield operations. He estimates there are up to 20 PREs currently being used for PVC direct compounding around the world.

### CLICK ON THE LINKS FOR MORE INFORMATION:

- > [www.coperion.com](http://www.coperion.com)
- > [www.mti-mixer.de/en](http://www.mti-mixer.de/en)
- > [www.zepelin-systems.com](http://www.zepelin-systems.com)
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*With packaging coming under increasing pressure the race is on to develop better performing and more easily recycled solutions. Additives have a role to play, writes Jennifer Markarian*



PHOTO: SHUTTERSTOCK

# Additives set to enable packaging innovation

Plastics packaging—essential for the preservation of food and protection of goods or an unnecessary and waste-creating evil? While we in the plastics industry may feel certain about the overall merits of plastics packaging, the pressure is certainly on to develop packaging solutions that meet consumer demand for minimal waste creation and leave a lighter environmental footprint. That will require some innovative thinking on the part of material and packaging designers and developers.

Modified atmosphere packaging (MAP) creates and maintains the optimal atmosphere for the packaged contents and is widely used today, especially to extend shelf life of pre-prepared convenience foods and bakery items. MAP uses atmospheric gases such as nitrogen to displace oxygen from the headspace of a package to slow or eliminate oxidative degradation.

Maintaining the reduced oxygen environment in MAP systems requires the use of packaging materials with high barrier performance. Sometimes in combination with the use of oxygen absorbing additives. Other additives that can be

used to extend shelf life, and so reduce food waste, include ethylene absorbing additives. Fresh fruits and vegetables give off ethylene during ripening and ethylene absorbing additives can be employed to slow that ripening process.

**It's Fresh!** has developed an ethylene absorber based on a proprietary blend of clay and minerals that is claimed to provide 100 times more capacity for ethylene uptake per gram than current alternatives. The company says its e+ product is also highly selective, absorbing ethylene but not larger molecules such as flavour or aroma compounds. The additive can be incorporated directly into the packaging material or in a separate filter format that is inserted into the package.

The e+ technology has been tested with several fruits in controlled trials, and packages with the filter were found to significantly extend quality and reduce waste compared to control packages without. In a test of bananas, for example, the effectiveness of the additive was investigated for fruit harvested and packed in Ecuador and shipped to the Middle East. The aim was to extend the

**Main image: MAP packaging extends shelf life of prepared foods; further gains could be made using oxygen absorbing additives and mono-material structures**

PHOTO: SHUTTERSTOCK



**Above:** Ecuador's banana producers are to use an ethylene absorber from It's Fresh! to suppress ripening

length of time that the bananas remain green (any bananas that ripen in transit are not considered saleable in the banana production industry). An e+ filter was added to a 13.5kg box of bananas with an HDPE MAP liner and was found to extend the time for turning colour from 62 to 70 days compared to a control container with no filter. In July this year, It's Fresh! announced an agreement with the Ecuadorian banana association-ACORBANEC—to introduce the filter technology to 28 growers and exporters in the region.

**From shelf to recycling**

While shelf-life extension has proved to be the main driver for packaging designers in recent times—and is undoubtedly still hugely important—attention within many companies is moving to recyclability and packaging reduction, according to Sven Sangerlaub, a packaging expert within Germany's **Fraunhofer Institute** for Process Engineering and Packaging (IVV). New recyclability requirements, particularly in Europe, pose a significant hurdle that requires new R&D resources.

He says that a better understanding of shelf life and how this affects packaging requirements is being discussed by both packaging companies and retailers.

Better measurement and prediction of shelf life is important in any attempt to redesign packaging for optimised shelf-life requirements and recyclability. Fraunhofer has developed a simulation toolset for modeling shelf life of products that takes into account product quality properties (such as taste and odour), microbiological activity, processes in the packaging headspace, and material

**Right:** Ampacet's Safari White masterbatch protects dairy products at less than 4% mineral loading

properties. According to the Institute, this simulation tool can be used to make predictions even with just a small amount of experimental data. It can be used for food packaging, including MAP systems, and active packaging systems. Packaging for pharmaceuticals and cosmetics are also seen as possible future application areas.

"One example of how modeling can be used is to correlate light protection, for example titanium dioxide concentration, with shelf life," says Sangerlaub. The idea, he says, is to identify the minimum level of light protection needed to maintain sufficient shelf life and, therefore, to potentially reduce titanium dioxide addition levels.

**Building light barriers**

High levels of titanium dioxide in packaging can impact on recycling, according to **Ampacet**. Mono-layer PET bottles are increasingly being used to package dairy-based drinks in some markets because of their better recyclability and cost-effectiveness. However, the growing quantity of opaque PET resulting from this move is affecting the PET recycling stream, the company says.

Ampacet's Safari White PET masterbatch is intended to provide a solution. The newly-introduced product is designed to reduce mineral loading while maintaining the level of opacity required to protect dairy products from photo-degradation. The masterbatch allows French voluntary guidelines of less than 4% of mineral loading in PET bottles to be met and, as it is NIR-transparent, it does not interfere with the NIR optical sensors used in many recycling facilities. It is claimed to protect the flavor and nutrients in dairy products from the harmful effects of sun exposure or artificial light.

Meanwhile, US-based **Stabilization Technologies** has been focusing on product damage caused by blue light, typically in the wavelength range from 400 to 490nm. While generally considered a minor contributor to polymer degradation, company President Dr Joe Webster says blue light can cause rancidity of oils and foods containing oils as well as accelerating growth of certain fungi.

Webster says the company's UVITA SME 3811 additive is a broad permanent UV absorber (UVA) that acts both as a spectral enhancer and a synergist with



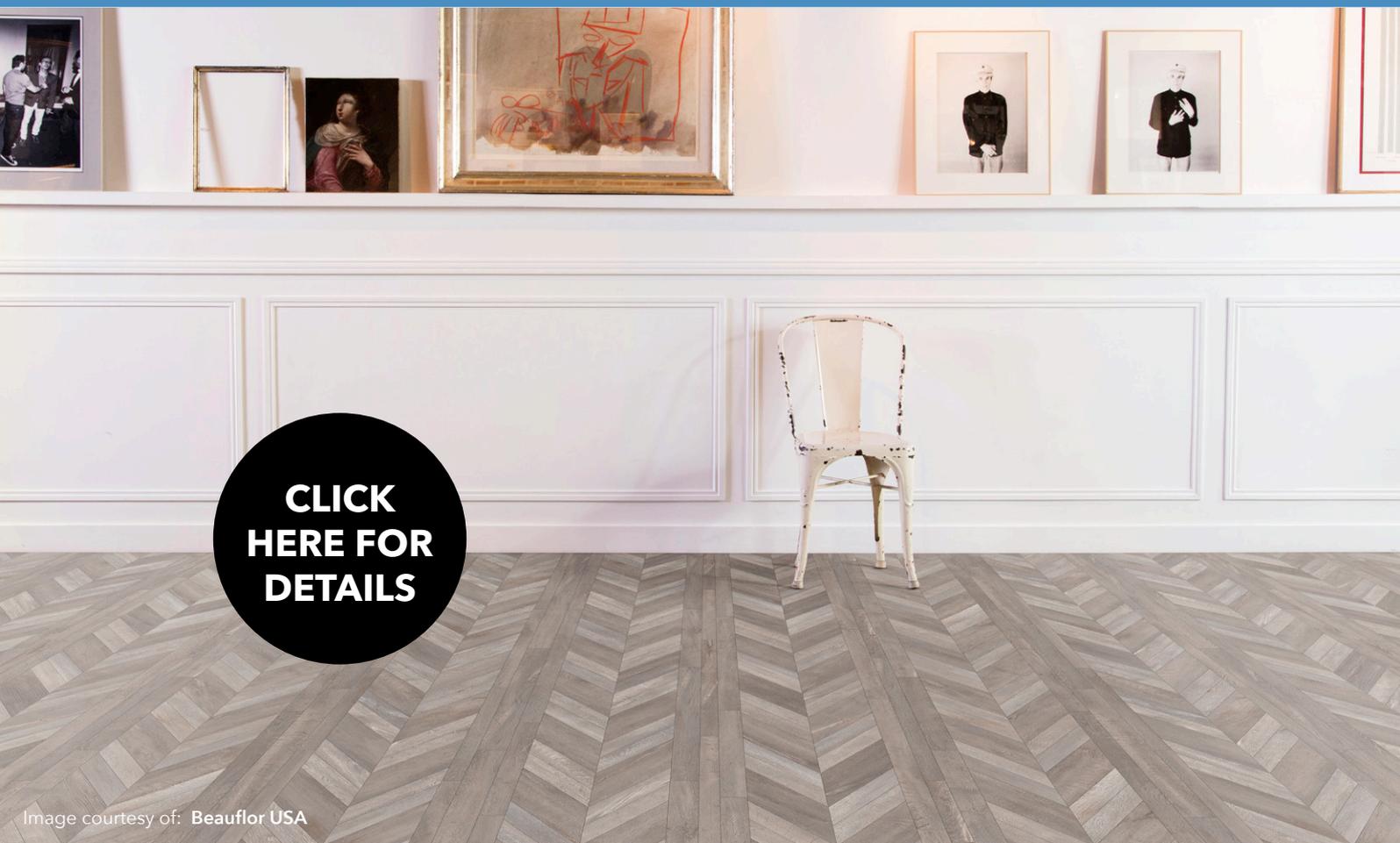
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**Right: Südpack's Johannes Remmele holds a prototype chemically recycled PA/PE laminate pack for Zott's mozzarella cheese**

organic UVAs such as hydroxy substituted benzophenones and benzotriazole. He says the additive functions through plasmonic absorption and transfer of the absorbed energy to adjacent organic molecules, which causes in-situ transformation mechanisms that boost absorbance by between three and seven times and result in a bathochromic (red) shift.

Main applications are seen in packaging films where there is a need for no migration or extraction and constant long term absorption and transmission properties. The additives are also said to be suitable for outdoor high thermal gradient applications such as silage films and roofing. Webster says UVITA SME 3811 has also been found to be effective in controlling growth of harmful botrytis cinera spores in horticultural applications when used in combination with Maxgard 2700 or 2800 UVAs from **Lycus Chemicals**.

**Simplifying film structures**

Packaging designers are working to eliminate, substitute, or reduce barrier layers such as polyamide and EVOH in favour of single material—but often multi-layer—constructions based on PE, PP or PET. Potentially easier to recycle, these mono-material packages may make use of active additives (such as oxygen absorbers or water-absorbing desiccants) to maintain shelf life. Packaging developers are also considering the use of bio-based and/or biodegradable polymer materials and additive formulations.

Last year, researchers at the **Technical University of Munich (TUM)** and Fraunhofer IVV described an oxygen scavenger based on gallic acid (GA), which can be derived from plants (<https://doi.org/10.3389/fchem.2018.00587>). They said that GA, which is a building block found in polyphenol, has been tested in monolayer films based on LDPE and in multilayer films with bio-based LLDPE and polylactide. The researchers

**Below: ITENE's Bioactivelayer project is a biodegradable active packaging concept for dehydrated food products**



PHOTO: BASF

looked at the effect of temperature and relative humidity on an oxygen scavenger consisting of GA and sodium carbonate. They concluded that GA-based scavengers are most appropriate for packaging of food with high water activity that is stored at room temperature.

While mono-material systems may grow in use, chemical recycling is also being considered as a solution for end-of-life management of multi-layer multi-material packaging, which has evolved over the years into very complex constructions. **BASF**, **Borealis**, **Südpack** and **Zott**, for example, announced in July that they had collaborated on a pilot project to produce multilayer packaging film using 100% chemically recycled polyamide from **BASF** in polyethylene from **Borealis**. **Südpack** produced the film with 11 ultra-thin layers, including barrier layers, for mozzarella cheese packaging for the **Zott Gourmet Dairy**.

The high performance film reduces packaging volume to a minimum, according to Johannes Remmele, Managing Director of **Südpack**. The project participants said the design maintained functionality but improved environmental performance because of the recycled source of the polymers. "The collaboration between the companies involved made it possible for the first time to consistently certify each step up from the raw material to the finished packaging," said Maurits van Tol, **Borealis** Senior Vice President Innovation, Technology & Circular Economy Solutions.

The Spanish Research Centre for Packaging, Transport and Logistics (**ITENE**) has several projects ongoing in the area of active packaging. At K2019, it showcased its Bioactivelayer packaging concept, which is described as a 100% biodegradable and compostable package for dry and dehydrated food. The multilayer structure is based on biodegradable materials—including biodegradable polymers—and an active compound and is



PHOTO: ITENE

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PHOTO: CLARIANT

**Above:**  
Clariant's  
CESA ProTect  
masterbatches  
provide oxygen  
protection for  
mono-material  
PET packaging

claimed to remove residual oxygen from the package to achieve a shelf life of 24 months. ITENE says it could replace MAP flexible packaging in some applications.

Other projects at ITENE include development of a package for fresh chicken that incorporates an antimicrobial-releasing function to control bacteria and to generate carbon dioxide in the package as an alternative to MAP.

The group has also developed Pasta-Activepack, an active coating that "repels insects and absorbs moisture that protects and preserves dried food products from pantry pest infestations." For this project, funded by the Spanish Ministry of Economy and Competitiveness, it collaborated with film producer Plásticos del Segura and food firm Pastas Alimenticias Romero.

### Targeting oxygen

PET containers are typically already mono-material and recyclable but, as use expands to food and beverage products beyond water and carbonated beverages, more protection may be needed.

**Clariant** has introduced a new brand of patented oxygen scavenger additive masterbatches—CESA ProTect—designed for use in monolayer PET packaging. The company says the masterbatch "is based on a new molecule that goes beyond existing solutions for PET in protecting content shelf life and taste."

The additive is said to help prevent oxidative degradation such as flavour loss in coffee capsules, vitamin potency loss and colour change in fruit juices, souring in dairy products, and quality loss in beer. "As little as 1ppm of oxygen can change the taste and odour of beer," says Antonello Decortes, Global Product Manager at the company.

According to Clariant, a 3.6% loading of CESA ProTect masterbatch successfully held oxygen

levels below 1ppm for 588 days (more than 18 months) in testing of a 23g 0.5-liter PET bottle (PET without the additive maintained oxygen levels below 1ppm for just 22 days while a competitive oxygen scavenger lasted 63 days, the company says). Effectiveness of the additive depends on the additive loading, package size and design. At a loading of 2%, for example, CESA ProTect masterbatches were found to be effective for 266 days.

The company says initial customer trials have been successful. The masterbatch has little, if any, impact on transparency, appearance, or mechanical properties of the packaging, and does not appear to impact on processing. Food contact approvals are pending.

**Milliken's** ClearShield UV absorber can also protect products in transparent PET from changes in appearance, flavour, or nutritional value due to UV light exposure. The trend towards greater use of natural ingredients, which are more sensitive to UV degradation from UV light, has increased the need for such protection, says the company. Opaque and coloured PET can offer good UV protection but these "tend to make the recycle stream dark, which can make recycling more difficult and lessen the value of the reclaimed product," the company says.

### Tacking bacteria

Antimicrobials could also—where regulations allow—be used to extend the shelf life of packaged products. **Pylote**, which has an active packaging antimicrobial-releasing technology, announced regulatory qualification of beverage bottle caps containing its additive. Developed in a partnership with moulding specialist Curtil, the hygienic caps extend shelf-life and are "effective at eliminating the risk of contamination between uses as well as cross contamination between consumers who might share the same beverage," the two French companies claim. Pylote's antimicrobial technology uses mineral ceramic microspheres compounded into the polymer.

### CLICK ON THE LINKS FOR MORE INFORMATION:

- > [www.itsfresh.com](http://www.itsfresh.com)
- > [www.ivv.fraunhofer.de](http://www.ivv.fraunhofer.de)
- > [www.ampacet.com](http://www.ampacet.com)
- > [www.stabilization-technologies.com](http://www.stabilization-technologies.com)
- > [www.lycusltd.com](http://www.lycusltd.com)
- > [www.tum.de](http://www.tum.de) (Technical University of Munich)
- > [www.basf.com/chemcycling](http://www.basf.com/chemcycling)
- > [www.itene.com](http://www.itene.com)
- > [www.clariant.com](http://www.clariant.com)
- > [www.milliken.com](http://www.milliken.com)
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# Polymers in Footwear

Berlin / 2019

*Capitalising on advances in polymer materials and processing technologies for footwear applications*

**19-20 November 2019**

**Sofitel Hotel Kurfürstendamm, Berlin, Germany**



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# Download these new product brochures

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## KK KOMPOUNDING: COMPOUNDS



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

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## COPERION: 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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## LEISTRITZ: MASTERBATCH SYSTEMS



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

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## POLIMER TEKNIK: POEX EXTRUDERS



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

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## ARKEMA: RECYCLING SOLUTIONS



This brochure from Arkema introduces the Lotryl, Lotader and Orevac materials, which improve the mechanical recycling performance of post-consumer waste when used in plastic compounds, meeting sustainability requirements.

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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

# Learn more about AMI's upcoming conferences

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

## AGRICULTURAL FILM



Now in its 12th edition, the popular Agricultural Film conference will take place on 18-20 November 2019 in Barcelona, Spain. The three-day programme will bring together agricultural and horticultural cover specifiers, raw material and film manufacturers with agriculture stakeholders.

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## POLYMERS IN FOOTWEAR



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

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## POLYMER FOAM 2019



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

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## FIRE RESISTANCE IN PLASTICS



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

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## POLYMERS IN FLOORING EU



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

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## THIN WALL PACKAGING



Get your annual update on the global thin wall packaging industry at AMI's Thin Wall Packaging conference on 2-4 December 2019 in Dusseldorf, Germany. The event gathers leading brand owners, retailers, packaging manufacturers, researchers and suppliers.

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

# Learn more about AMI's upcoming conferences

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

## TECHNICAL COMPOUNDS FORUM



After six successful years, AMI's Compounding World Forum returns with a new identity - Technical Compounds Forum - to Tampa, Florida, USA, on 3-4 December 2019. This year's focus includes EVs, conductive plastics, wear-resistant compounds and 3D printing.

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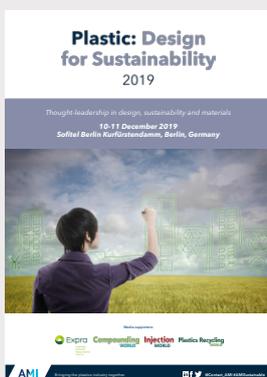
## LONG-FIBRE THERMOPLASTICS 2019



With demand growing from industries such as automotive for lightweight solutions, opportunities for LFTs abound. Learn more at AMI's 3rd Long-Fibre Thermoplastics conference, which takes place on 4-5 December in Düsseldorf, Germany.

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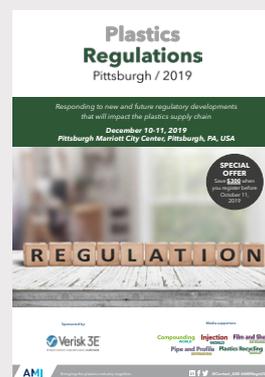
## PLASTIC: DESIGN FOR SUSTAINABILITY



This new AMI conference brings plastics companies together with designers and brands to discuss what changes are necessary to meet sustainability and recycling goals and targets. The event takes place on 10-11 December in Berlin, Germany.

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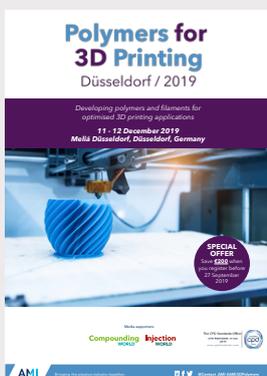
## PLASTICS REGULATIONS USA



Keep up to date with plastics-related regulation and future regulatory developments that will impact the plastics supply chain at this key conference taking place on 10-11 December 2019 in Pittsburgh, PA, USA.

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## POLYMERS FOR 3D PRINTING



Polymers for 3D Printing, on 11-12 December 2019 in Dusseldorf, Germany, will examine materials including ABS, PLA and PETG, together with new high-performance polymers and compounds for this high-growth market.

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## WEAR-RESISTANT PLASTICS 2019



The second Wear-Resistant Plastics conference takes place in Dusseldorf, Germany, on 11-12 December. The event focuses on the critical area of polymer tribology and explores how wear-optimised plastics can open up new applications.

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

## Alba Group

**Head office location:** Berlin, Germany

**Executive Board Members:** Dr Axel Schweitzer, Dr Eric Schweitzer

**Ownership:** Public limited partnership

**No. of employees:** 5,700

**Capacity 2018:** 40,000 tonnes

**Plant locations:** Eisenhüttenstadt, Germany (plastics recycling)

**Profile:** Alba was founded in 1968 in Berlin as a waste disposal firm. Since then it has moved into development of recycling and sorting technologies, as well as logistics and delivery of raw materials worldwide. Its Alba and Interseroh divisions generated revenues of €2.1bn in 2018.

Plastics recycling activities are focused on the Interseroh location at Eisenhüttenstadt in Germany, where the company carries out sorting, washing and re-compounding of post-consumer waste plastics.

Alba aims to be a leader in recycling technology and the company's Interseroh division worked together with Erema to develop the Corema system for compounding recycle inline.

**Product line:** Recythen and Procyclen are trademarked recyclates and compounds based on HDPE and PP. Recythen grades can be used in pipes, garden furniture and cable conduits. Procyclen grades are described as customised recyclates that can be supplied as unfilled, talc filled or glass reinforced products.

**Product strengths:** The key attraction of Recythen and Procyclen compounds is their sourcing and sustainability credentials. The company claims greenhouse gas emission savings of more than 50% for some of its Procyclen grades.

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:

### December

Flame retardants ● Nanocomposites  
Laboratory compounds  
Accelerated testing  
K2019 show review

### January

Pelletising systems  
Film additives  
Polymer testing

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

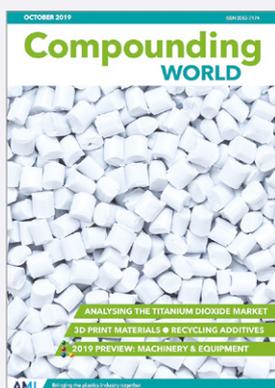
For information on advertising in these issues, please contact:

**Claire Bishop:** [claire.bishop@ami.international](mailto:claire.bishop@ami.international) Tel: +44 (0)1732 682948

**Levent Tounjer:** [levent.tounjer@ami.international](mailto:levent.tounjer@ami.international) Tel: +44 (0)117 314 8183

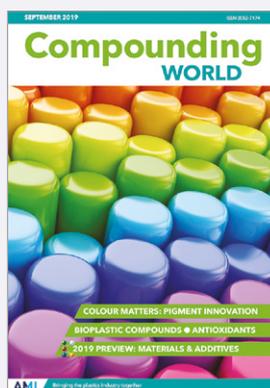
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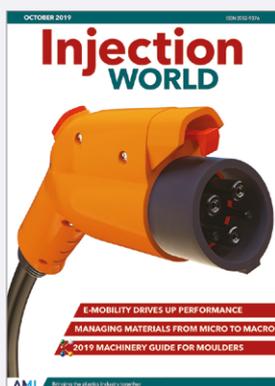
**Compounding World October 2019**  
The October edition of Compounding World goes inside the titanium dioxide market to find out the latest regulatory, technical and market developments. Also featured: 3D printing materials, alternative compounding technology and a K2019 Machinery Preview.

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**Compounding World September 2019**  
The September issue of Compounding World discusses how to get more from pigments and also covers bioplastics, stabilisation and purging. Plus a preview of K2019 materials and additives exhibitors.

[> CLICK HERE TO VIEW](#)



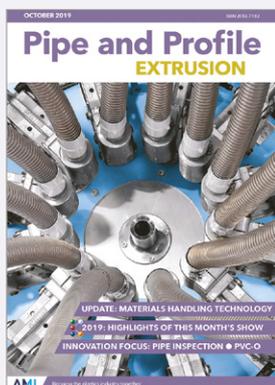
**Injection World October 2019**  
The October issue of Injection World magazine covers new resins and compounds developed for new electro-mobility applications. Feature articles also take a look at what's new in materials handling and product development with 3D printing.

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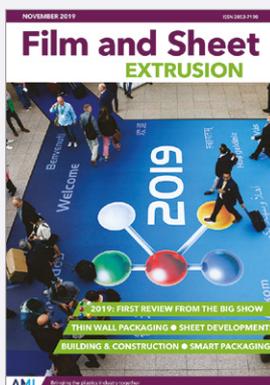
**Plastics Recycling World September/October 2019**  
The September/October edition of Plastics Recycling World explores a new sorting technology that uses watermarks to identify polymers. Plus, a look at the latest initiatives in rigids recycling and a preview of K's innovations.

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**Pipe and Profile Extrusion October 2019**  
The October edition of Pipe and Profile Extrusion magazine looks at the latest developments in materials handling equipment. It also details some innovations in pipe inspection and PVC-O technology, as well as previewing the K2019 show.

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**Film and Sheet Extrusion November 2019**  
The November edition of Film and Sheet Extrusion magazine looks at intelligent and thin wall packaging developments. It also explores the latest sheet and construction innovations and reviews the K2019 show.

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**Plastics Recycling**  
WORLD

## GLOBAL EXHIBITION GUIDE

2019	<b>25-28 November</b>	Plastivision Arabia, Sharjah	<a href="http://www.plastivision.ae">www.plastivision.ae</a>
	<b>27-29 November</b>	Plastics & Rubber Vietnam	<a href="http://www.plasticsvietnam.com">www.plasticsvietnam.com</a>
2020	<b>13-16 January</b>	Saudi Plastics & Petrochem, Riyadh	<a href="http://www.saudipp.com">www.saudipp.com</a>
	<b>16-20 January</b>	Plastivision India, Mumbai, India	<a href="http://www.plastivision.org">www.plastivision.org</a>
	<b>21-23 January</b>	Swiss Plastics, Lucerne, Switzerland	<a href="http://www.swissplastics-expo.ch">www.swissplastics-expo.ch</a>
	<b>28-31 January</b>	Interplastica, Moscow, Russia	<a href="http://www.interplastica.de">www.interplastica.de</a>
	<b>9-11 March</b>	Plast Alger, Algiers, Algeria	<a href="http://www.plastalger.com">www.plastalger.com</a>
	<b>11-13 March</b>	Expo Plasticos, Guadalajara, Mexico	<a href="http://www.expoplasticos.com.mx">www.expoplasticos.com.mx</a>
	<b>21-24 April</b>	Chinaplas, Shanghai, China	<a href="http://www.chinaplasonline.com">www.chinaplasonline.com</a>
	<b>7-13 May</b>	Interpack, Dusseldorf, Germany	<a href="http://www.interpack.com">www.interpack.com</a>
	<b>3-4 June</b>	Compounding World Expo Europe, Essen, Germany	<a href="http://www.compoundingworldexpo.com/eu/">www.compoundingworldexpo.com/eu/</a>
	<b>8-11 June</b>	Argenplas, Buenos Aires, Argentina	<a href="http://www.argenplas.com.ar">www.argenplas.com.ar</a>
	<b>29 Sep-1 Oct</b>	Interplas, Birmingham, UK	<a href="http://www.interplasuk.com">www.interplasuk.com</a>
	<b>13-17 October</b>	Fakuma, Friedrichshafen, Germany	<a href="http://www.fakuma-messe.de">www.fakuma-messe.de</a>
	<b>4-5 November</b>	Compounding World Expo USA, Cleveland, USA	<a href="http://www.compoundingworldexpo.com/na/">www.compoundingworldexpo.com/na/</a>
	<b>8-11 November</b>	Pack Expo, Chicago, USA	<a href="http://www.packexpointernational.com">www.packexpointernational.com</a>
<b>23-26 November</b>	All4Pack, Paris, France	<a href="http://www.all4pack.com">www.all4pack.com</a>	

## AMI CONFERENCES

<b>26-27 November</b>	Polymer Foam, Hamburg, Germany
<b>3-4 December 2019</b>	Fire Resistance in Plastics, Cologne, Germany
<b>3-4 December 2019</b>	Polymers in Flooring, Berlin, Germany
<b>3-4 December 2019</b>	Technical Compounds Forum, Tampa, FL, USA
<b>4-5 December 2019</b>	Long-Fibre Thermoplastics, Dusseldorf, Germany
<b>4-5 December</b>	Oil & Gas Non-Metallics, London, UK
<b>10-11 December</b>	Plastics Regulations US, Pittsburgh, PA, USA
<b>11-12 December</b>	Polymers for 3D Printing, Dusseldorf, Germany
<b>11-12 December</b>	Wear-Resistant Plastics 2019, Dusseldorf, Germany

For information on all these events and other conferences on film, sheet, pipe and packaging applications, see [www.ami.international](http://www.ami.international)

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**ESSEN, GERMANY**

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**4 - 5 November, 2020**  
**CLEVELAND, OHIO**

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# Thermoplastic Concentrates

2020

*Discovering new trends for the thermoplastic concentrate industry*

**January 28-30, 2020**

**Ft. Lauderdale Marriott Coral Springs Golf Resort, Coral Springs, Florida, USA**



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# Thermoplastic Concentrates

2020

AMI's Thermoplastic Concentrates Conference has established a position as the place where leaders of the business meet to discuss the key issues facing the industry. The conference is well known for its high caliber attendees from across the global supply chain, particularly the major concentrate production companies. At last year's event, attendees accounted for over \$3 billion in concentrate sales, representing over 85% of the industry.

The program for Thermoplastic Concentrates 2020 focuses on providing a forum to discuss the changing nature of the business.

The conference will open with a broad ranging discussion of market and regulatory trends, focusing on where opportunity is being created. The later discussions will feature a technology panel focussing on what machine and manufacturing plants will look like in the future, while a further panel has leading designers from customer industries sharing views on their needs from materials and the concentrate industry. The final session of the conference will provide insight from key managers and thought leaders regarding the future direction of the industry.

We look forward to welcoming you in Coral Springs at AMI's Thermoplastic Concentrates 2020 conference!



One of the best forums for learning about market trends, and for opportunities to meet new prospects for sales and technical collaboration

Neil Macdonald,  
LOMON BILLIONS GROUP

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To learn more, visit [www.mholland.com](http://www.mholland.com).

## Five good reasons to attend:

- Gain insight into the latest industry developments
- Learn about new technology
- Deepen your understanding of market trends
- Understand the way customer industries are rethinking the role of plastics
- Network with senior professionals from manufacturing, marketing and research

## Ways to get involved:

### ATTEND

Register before November 15, 2019 and pay \$1190 saving \$300 on the full price of \$1490. There are additional discounts for group bookings. The registration fee includes attendance at all conference sessions, the Networking Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

### SPONSOR

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

### EXHIBIT

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

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

## CONFERENCE HOTLINE

Contact: Stephanie Hume, Senior Conference Coordinator  
Tel: +44 (0) 117 314 8111  
Email: [stephanie.hume@ami.international](mailto:stephanie.hume@ami.international)

**SAVE \$300**

Register before  
November 15,  
2019

## Tuesday, January 28, 2020

8:00 Golf tournament sponsored by:  
(Additional registration required)

1:00 Registration and welcome coffee sponsored by:

2:30 Opening announcements



### SESSION 1 - MARKET OVERVIEW: WHAT SHAPES THE INDUSTRY?

2:40 **Uncertainty and what shapes the future of the plastics industry**  
Mr. Andrew Reynolds, Director,  
ADVANCE BIDCO (OWNERS of AMI), United Kingdom

3:10 **Changing regulations and fitness for use in plastics additives and pigments**  
Ms. Tracey Malone, Senior Product Steward,  
BASF CORPORATION, United States

3:40 Coffee break sponsored by:

4:10 **Colors and effects color collection**  
Ms. Meli Laurance, Commercial Industry Manager,  
BASF COLORS & EFFECTS, United States

4:40 **Key trends in the North American polyolefin market**  
Mr. Esteban Sagel, Principal,  
CHEMICAL & POLYMER MARKET CONSULTANTS, United States

5:10 **Plastic waste management: Pointers and pathways**  
Dr. Bansi Kaul, CEO,  
MCA TECHNOLOGIES GmbH, Switzerland

5:40 Afternoon wrap up and questions

5:45 - 7:15 Cocktail reception sponsored by:



## Wednesday, January 29, 2020

8:00 Registration and welcome coffee

8:30 Opening announcements

### SESSION 2 - RAW MATERIALS: PIGMENT INNOVATIONS

8:40 **The new way to sustainability and recyclability in polymer formulations with effect pigments**  
Mr. Scott Aumann, Technical Manager Plastics - Americas,  
EMD PERFORMANCE MATERIALS, United States

9:10 **The future of color in a circular economy**  
Mr. Philippe Lazerme, Head of Global Marketing / BU Pigments,  
CLARIANT PLASTICS & COATINGS, Switzerland

9:40 **TiO2 for high performance thermoplastics**  
Mr. David Bell, Market Manager - TiO2,  
INEOS PIGMENTS, United States

10:10 Coffee break sponsored by:



### SESSION 3 - TECHNOLOGY: WHAT THE FACTORY OF THE FUTURE WILL LOOK LIKE

10:40 **What will the machine of the future look like?**  
Mr. Philip S. Shoemaker, Director,  
THE POLYMERS CENTER OF EXCELLENCE, United States

11:00 **Special considerations for bioplastics concentrate compounding via twin screw extruders**  
Mr. Charles Martin, President,  
LEISTRITZ EXTRUSION, United States

11:15 **The production of high color carbon black and conductive masterbatch as addressed by the compact processor**  
Mr. Joe Pereira, Process Laboratory Manager,  
FARREL POMINI, United States

11:30 **Continuous Mixers (CM), A practical solution for increased versatility and cost reduction for highly filled compounds**  
Mr. Slayton Altenburg, Application Specialist,  
TPEI, United States

11:45 **MACHINERY PANEL**  
Mr. Philip S. Shoemaker, Director,  
THE POLYMERS CENTER OF EXCELLENCE, United States

Mr. Charles Martin, President,  
LEISTRITZ EXTRUSION, United States  
Mr. Stan Broadhead, Senior Sales Engineer,  
FARREL POMINI, United States  
Mr. Slayton Altenburg, Application Specialist,  
TPEI, United States

12:30 Lunch

### SESSION 4 - ADDITIVES AND SUSTAINABILITY

1:45 **How mineral fillers effect color fade**  
Mr. Kysle King, Technical Sales Manager,  
SIBELCO NORTH AMERICA, United States

2:15 **Sustainable operational excellence**  
Ms. Amy Hickman, Sustainability Manager,  
BIRLA CARBON, United States

2:45 **Graphene: A cost-effective, multifunctional pigment**  
Dr. Nima Moghimian, Global Director of R&D,  
NANOXPLORE INC., Canada

3:15 Coffee break

### SESSION 5 - CUSTOMER NEEDS AND DESIGN TRENDS FOR THE FUTURE

3:45 **Exploration of new materials and technology**  
Dr. David Kusuma, Vice President, Research and Product Innovation,  
TUPPERWARE, United States

4:15 **Material trends in design**  
Dr. Andrew H. Dent, EVP Research, CMO,  
MATERIAL CONNEXION, United States

4:45 **DESIGN PANEL**  
Dr. David Kusuma, Vice President, Research and Product Innovation,  
TUPPERWARE, United States

Dr. Andrew H. Dent, EVP Research, CMO,  
MATERIAL CONNEXION, United States

Ms. Alex Ju, CMF Designer, 3D Print Automotive Applications,  
HP, United States

5:30 Afternoon wrap up and questions

## Thursday, January 30, 2020

8:20 Welcome coffee

8:50 Opening announcements

### SESSION 6 - BUSINESS FORUM

9:00 **Can concentrates conquer the environmental crisis?**  
Ms. Hailey Cassidy, Global Branding & Digital Marketing  
Specialist, and  
Dr. Bhuvanesh C. Yerigeri, Research Scientist,  
AMERICHEM, INC., United States

9:30 **Consumer packaging directions for 2020+**  
Mr. George Iannuzzi, Senior Sales Manager,  
SANDREAM IMPACT INC. (DIVISION of AAKASH CHEMICAL),  
United States

10:00 **Aligning color and special effects with consumer preferences**  
Ms. Theresa Patton, Sr. Marketing Manager, Color and Additives,  
POLYONE, United States

10:30 Coffee break

11:00 **3D printing open source movement a catalyst for growth**  
Mr. Todd Waddle, Director, Wire & Cable,  
M. HOLLAND, United States

11:30 **5 things I wish they had told me about managing a plastics business**  
Mr. Doug Borgsdorf, Business Unit Director,  
PRIMEX PLASTICS, United States

12:00 **Overview of the thermoplastic concentrates business in North America**  
Mr. Andrew Reynolds, Director,  
ADVANCE BIDCO (OWNERS of AMI), United Kingdom

12:30 Afternoon wrap up and questions

12:45 Lunch

1:50 Conference ends

Lanyard sponsored by:



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

# REGISTRATION FORM

Register online

PLEASE COMPLETE IN BLOCK CAPITALS

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Country: \_\_\_\_\_

Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

VAT no.: \_\_\_\_\_

(Must be completed by all EU Companies)

Company activity: \_\_\_\_\_

Purchase order no. (if applicable): \_\_\_\_\_

Invoice address (if different from above): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## DELEGATE/EXHIBITOR DETAILS

Title: Mr/Mrs/Dr/Other: \_\_\_\_\_

First name: \_\_\_\_\_

Surname: \_\_\_\_\_

Position: \_\_\_\_\_

Email: \_\_\_\_\_

Special dietary requirements: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

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

Yes  No

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

I agree to AMI's Privacy Policy ([www.ami.international/about/legal](http://www.ami.international/about/legal))

I agree to AMI's Terms & Conditions ([www.ami.international/about/tac](http://www.ami.international/about/tac))

## PARTICIPATION

Price

Early Booking Delegate Admission Fee: \$1,190.00  
(Until November 15, 2019)

Delegate Admission Fee: \$1,490.00

Exhibition Space: \$2,290.00

Golf tournament \$99.00  
(Includes the greens fee, cart rental, continental breakfast, and lunch.)

Golf clubs \$40.00  
(Please write LEFT or RIGHT handed)

Golf handicap \_\_\_\_\_

Total: \_\_\_\_\_

## METHOD OF PAYMENT

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

Pay by Credit Card by **registering online:**

Alternatively, please provide your contact details and we will send you a link to a secure payment gateway via email.

Name: \_\_\_\_\_

Email: \_\_\_\_\_

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

Account number: 2000030701584

Routing number: 121000248 SWIFT: WFBIUS6S

Note: You are responsible for any bank charges involved with the transaction

**By Check:** Made payable to "Applied Market Information LLC"

# THERMOPLASTIC CONCENTRATES 2020 CONFERENCE INFORMATION

January 28-30, 2020

Ft. Lauderdale Marriott Coral Springs Golf Resort

11775 Heron Bay Boulevard

Coral Springs, FL 33076 USA

Tel: +1 954 753 5598

## HOTEL ACCOMMODATION

Delegates are responsible for booking their own accommodation. We have negotiated a room rate of \$169 plus tax per night at the Ft. Lauderdale Marriott Coral Springs Golf Resort in Coral Springs, FL until January 6, 2020. To make a reservation, please contact the hotel's reservation department at +1 954 753 5598 and indicate that you will be attending "AMI's Thermoplastic Concentrates 2020 conference" to qualify for the special room rate. The hotel is guaranteed for a limited number of rooms so do not delay in making your reservation for a room at the conference location.

You may also make your reservation using the direct hyperlink which can be found on our website [www.ami.international/events](http://www.ami.international/events) (click on 'Thermoplastic Concentrates 2020' followed by Accommodation).

## PARTICIPATION OPPORTUNITIES

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

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

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

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

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

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

### Golf Tournament sponsored by OMYA

The scramble format golf tournament will begin on Tuesday at 8AM with a shotgun start. Teams of four will be assigned to maximize networking opportunities. Cost is \$99 per golfer. This includes the greens fee, cart rental, continental breakfast, and lunch. Clubs are available for an additional \$40 if needed. Limited entry is available so register as soon as possible. Prizes will be awarded to the winning team and winners of on-course contests!

### Networking Cocktail Reception

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

## CANCELLATIONS

Full refunds, less a cancellation charge of \$300 will be made on cancellations received prior to November 15, 2019. Thereafter we regret that no refunds can be made. Delegates may be substituted at any time. Please note that refunds will not be given on exhibition spaces or sponsorship packages at any time.

## CONFERENCE HOTLINE

**STEPHANIE HUME, SENIOR CONFERENCE COORDINATOR**  
AMI

Third Floor, One Brunswick Square, Bristol, BS2 8PE, United Kingdom  
Registered in England No: 2140318

Tel: +44 (0) 117 314 8111

Email: [stephanie.hume@ami.international](mailto:stephanie.hume@ami.international)

The latest program, including any new speakers, changes to the schedule, and any amendments to pricing and terms and conditions can be viewed on our website: [www.ami.international](http://www.ami.international)