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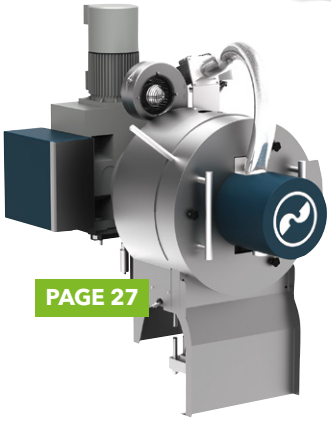
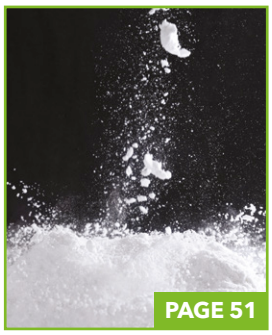
PAGE 5


PAGE 15


PAGE 27


PAGE 39


PAGE 48


PAGE 51

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› PVC plasticisers › WPCs › Screws and barrels › Reactive compounding › K2019 visitor guide

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KM invests in extrusion; axes Berstorff brand

KraussMaffei is to build a new manufacturing facility for its Extrusion Technology division at Hanover in Germany. Work will start on a 50,000m² production building on an 80,000m² site on the Latzen/Rethen Ost business park in the near future with completion planned for 2022.

The move comes as the company implements a rebranding of its different business units. This will see the Berstorff name disappear and the Netstal injection moulding machine brand become a product name. At a meeting in Dusseldorf in Germany earlier this month, KraussMaffei CEO Dr Frank Stieler said KraussMaffei Berstorff GmbH will become KraussMaffei Extrusion GmbH and will be integrated into the company's Extrusion Technology division.

A key feature of the new Hanover extrusion facility will be an Innovation Centre, which will be equipped with more than 20 extrusion machines ranging from laboratory to high volume production systems. It will also incorporate a "smart factory" demonstration facility that will be equipped for continuously networked production and data processing in real time, including process and data evaluation.

KraussMaffei, which has been owned by China's ChemChina since 2016 and listed on the Shanghai stock exchange at the beginning of this year, said the decision to invest at Hanover demonstrates commitment to its German workforce. "We consciously chose the Hanover region as the location in order to be able to shape the future together with our experienced employees," said Matthias Sieverding, President of the Extrusion Technology segment in the KraussMaffei Group.

› **www.kraussmaffei.com**

PHOTO: KRAUSSMAFFEI

Above: KraussMaffei is to build a new 55,000m² extrusion machinery plant at Hanover

Perstorp unveils Pevalen Pro

Sweden's Perstorp is launching a new renewable polyol ester non-phthalate plasticiser. Pevalen Pro will contain up to 40% renewable content, with the long-term potential to become fully renewable.

The company said the new plasticiser "will make flexible PVC an even more attractive choice of plastic, based on a significantly lower carbon footprint versus competing materials and technologies."

This introduction follows the launch of the first Pevalen grade in 2014. Pevalen combines high plasticising efficiency, fast processing, low volatility, and high UV stability with cost-effectiveness and a favourable sustainability profile. The Pro grade can be used as a drop-in replacement for the original Pevalen product.

› **www.perstorp.com**

DSM starts new Arnitel line at Emmen

DSM has started a new production line for its Arnitel range of thermoplastic copolyesters (TPCs) at Emmen in the Netherlands. The new line will up capacity by 20% and will enable greater supply flexibility and security, the company said.

"We see increasing demand of Arnitel in various application areas including automotive, consumer and industrial. This capacity expansion shows DSM's commitment to our customers and industries we serve," said Lu Zhang, Global Business Director at DSM Engineering Plastics.

TPCs provide a good combination of elasticity, high temperature resistance, mechanical performance and processing. They are also seen as a "lighter, greener alternative to conventional rubbers in automotive applications", according to the company.

› **www.dsm.com**

PHOTO: DSM

DSM has upped Arnitel capacity at Emmen by 20%

Vinmar establishes Axia Plastics

Plastics and chemicals sales and marketing firm Vinmar will start operation at a new European subsidiary, Axia Plastics, in February 2020.

Axia Plastics will offer "a full-service distribution model, with warehouses in several countries and industry-leading technical service and application development support to its customers", the company said. It is an official distributor for ExxonMobil, Vistamaxx and Escor copolymers.

Initially, Axia Plastics Europe will have local sales, technical and service teams for the UK, Germany, Austria, Switzerland and Poland.

› **www.axiaplastics.com**

Polykemi ups capacity at Ystad to target EVs

Swedish technical compounder Polykemi has commissioned a new 58mm Coperion compounding line at its plant at Ystad as it prepares to meet demand for new formulations tailored to the needs of the growing electric vehicle (EV) market.

According to the company, the growth in EV production will see increased demand for reinforced, light weight and flame retarded compounds. With this in mind, the new line has been equipped with a number of precision dosing units capable of handling performance modifying additives in both granular and in liquid form.

The line is said to be highly flexible in production and will be able to produce compounds with up to 65% reinforcement.

PHOTO: POLYKEMI

Polykemi is preparing for increasing demand for EV compounds

"We are quite proud of Polykemi´s new production line," said Polykemi Development Manager Anette Munch Elmér. "It will allow us to sharpen our products to a higher level, all to further improve ourselves. Now we manufacture ever better high quality flame retardant plastic compounds."

› **www.polykemi.com**

Borealis steps up recycling with Borcycle

Borealis is introducing a new technology – Borcycle – that will be used to make compounds from recycled polyolefins (rPOs).

The technology transforms polyolefin-based waste streams into quality pelletised polymer. The technology is said to be scalable and modular and is designed to help producers of products such as appliances by guaranteeing "a consistent supply of high-quality recyclate" so that they can fulfil pledges to increase the amount of recycled plastics in their goods.

PHOTO: BOREALIS

Borealis plans to introduce a full line of Borcycle recycled POs

The Borcycle MF1981SY grade will be the first of several upcoming introductions under the brand, Borealis said. It is a 10% talc-filled compound that contains more than 80% recycled material. It provides a good balance of stiffness and impact and is said to be suitable for use in visible black parts in small appliances.

■ Separately, Borealis has signed a letter of intent to step up its long-standing partnership in the field of mechanical recycling with Erema, the Austrian producer of plastics recycling systems and components.

The two companies will specifically collaborate on: developing improved technologies and processes in mechanical recycling; using knowledge exchange and best practices to design and implement new and practical technical systems; standardising and harmonising input feedstock and recycle output; and scaling up plant sizes and total production volumes.

› **www.borealisgroup.com**

› **www.erema.com**

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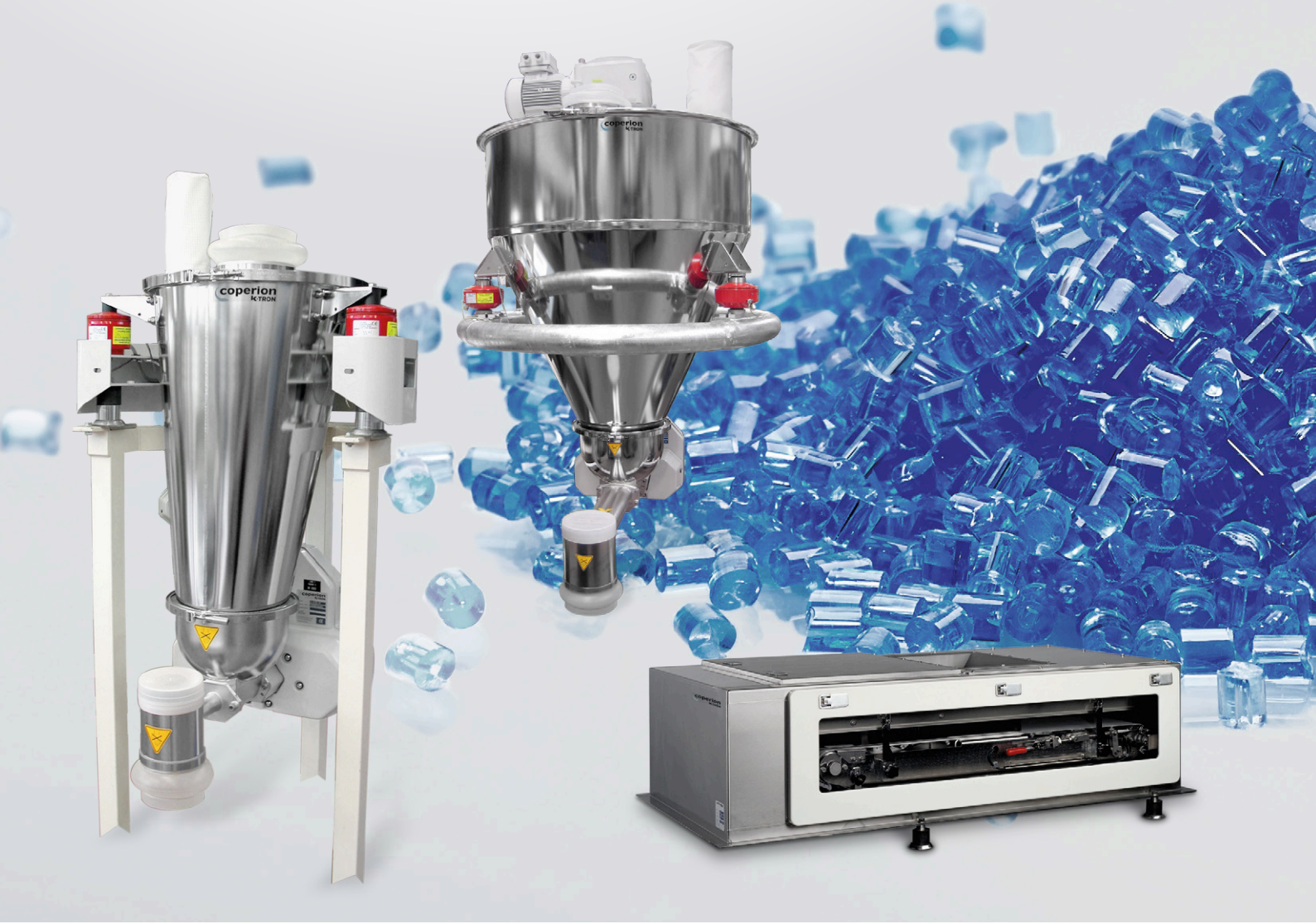

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BASF to cut 6,000 jobs

BASF has announced plans for an "organisational realignment" that aims to streamline its administration and accentuate the role of the regions and services. The programme is expected to see 6,000 jobs go worldwide with the first changes taking effect on 1 January 2020, the company said in a statement.

The process is intended to generate savings of €300m and is part of BASF's ongoing excellence programme, which is targeting annual savings of €2bn in additional earnings from 2022.

The job cuts will be focused on central functions such as finance, HR, communications and supply chain, with the corporate centre slimming down to about 1,000 people. BASF officials have told *Compounding World* that there will be no job cuts in customer-facing or operational areas and that there may, in time, be additional jobs in fields such as production or digitalisation.

Management and employee representatives are currently renegotiating the site agreement at the Ludwigshafen plant in Germany. The current agreement expires at the end of the year.

› **www.basf.com**

Flame retarded PA for 3Dprint

CRP Technology has added Windform FR1 to its Top-Line family of composite powder materials for 3D printing. The company claims the PA-based material is the first carbon-fibre-filled flame-retardant material for SLS additive manufacturing carry a UL94 V-0 rating.

According to CRP, the FR1 grade also passes the FAR 25.853 12-second vertical and 15-second horizontal flammability tests, as well as the 45° Bunsen burner test. Applications are envisaged in aircraft, automotive, consumer goods and electronic applications.

› **www.crptechnology.com**

PHOTO: CRP TECHNOLOGY

CRP claims a first with its FR1 flame retarded SLS polyamide

NEWS IN BRIEF...

Italian hindered amine light stabilisers (HALS) producer **Sabo** has announced a strategic partnership with Korea's **Ziko**, which makes UV absorbers and heat stabilisers, to manufacture its UV formamidine class UV absorber Sabo Stab UV1. It said demand for the product "has been steadily increasing" and the deal will enhance security of supply in Europe.

www.sabo.com
www.e-ziko.com

CEFIC has launched a voluntary, multi-year action plan for review and improvement of REACH dossiers. It will be implemented in cooperation with ECHA to ensure that any scientific or technical challenge related to dossier updates is resolved. It will be guided by a joint steering committee from ECHA and CEFIC member companies.

www.cefic.org

PolyOne introduces Pinpoint Express

PHOTO: POLYONE

Pinpoint combines PolyOne liquid colour and 3M dispensing technologies

PolyOne has launched Pinpoint Express, a liquid colorant and dosing system that combines software and liquid colour technology from its ColourMatrix Select system with dispensing and dosing technology from 3M.

The system is said to accelerate the design and colouring of injection moulded parts by enabling users to create, match and mix colours on site. It claims this has reduced lead times for short-run colour development from weeks to hours in customer trials.

Will Nordloh, general manager for ColourMatrix, described Pinpoint as a "targeted complement" to the ColorMatrix product line. "The system helps reduce operating costs by eliminating the need to carry excess or expired colorant inventory" he said.

The system is to be introduced to the North American market immediately but a spokesperson for PolyOne said expansion to other regional markets is "under consideration."

› **www.polyone.com**

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PHOTO: FOSTER CORP

Foster Corp's new building will expand production capacity by 80%

Foster Corp adds more compounding capacity

US specialist medical compound producer Foster Corporation has broken ground on a new 5,182m² manufacturing facility adjacent to its headquarters building at Putnam in Connecticut.

The value of the investment has not been disclosed but a spokesperson for the company said the scheme would add 65% to the space at the site and expand its production capacity by 80%.

The project is expected to be complete by November of this year.

According to the company, the expansion is driven by the ongoing growth in its compounding and distribution businesses. It will include more compounding equipment, will expand the company's 'clean compounding' capabilities, and will provide it with additional space to hold more inventory for its growing distribution activities.

"The new building will not only allow our growth to continue, but it will also allow us to grow in new markets where we haven't been able to compete in the past, including larger volume medical applications," said Foster Corp CEO and owner Larry Acquarulo. He said the company plans to invest heavily again over the next five years or so.

› **www.fostercomp.com**

Magnifin considers second site

Magnifin Magnesiaprodukte is to carry out a detailed engineering study that is intended to lead to construction of a second production site to address growing global demand for its halogen-free magnesium hydroxide flame retardants.

The company is a 50-50 joint venture between JM Huber's Martinswerk and Veitscher, part of RHI Magnesita. Production is currently located at a site at Breitenau, Austria.

Magnifin's halogen-free materials are used in a wide range of polymer compounds, most notably thermoplastic materials and elastomers requiring processing temperatures in excess of 200°C.

› **www.hubermaterials.com**
› **www.rhimagnesita.com**

Neste/LyondellBasell make bio-based POs

Neste and LyondellBasell are claiming the world's first parallel commercial scale production of bio-based PP and LDPE.

The move was announced as part of a project using Neste's renewable hydrocarbon feedstocks, which are derived from sustainable bio-based raw materials such as waste and residue oils, at LyondellBasell's production site at Wesseling in Germany.

The collaboration yielded "several thousand tonnes" of material, which were third-party tested and shown to contain over 30% renewable content. LyondellBasell is marketing them as Circulen and Circulen Plus, its new circular economy product brands.

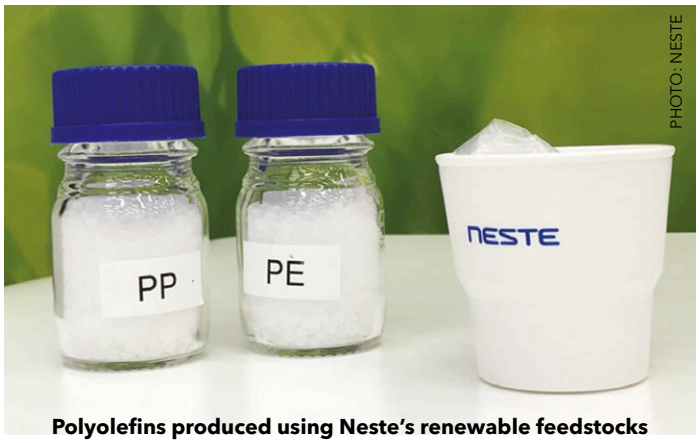

PHOTO: NESTE

Polyolefins produced using Neste's renewable feedstocks

The resins are approved for production of food packaging; Melitta subsidiary Cofresco, a producer of household films, has bought and used some of the polymers.

"It is very satisfying to see Neste's renewable hydrocarbons performing perfectly in a commercial scale production of bio-based polymers, providing a drop-in replacement option to fossil materials," said Neste's President and CEO Peter Vanacker.

› **www.neste.com**
› **www.lyondellbasell.com**

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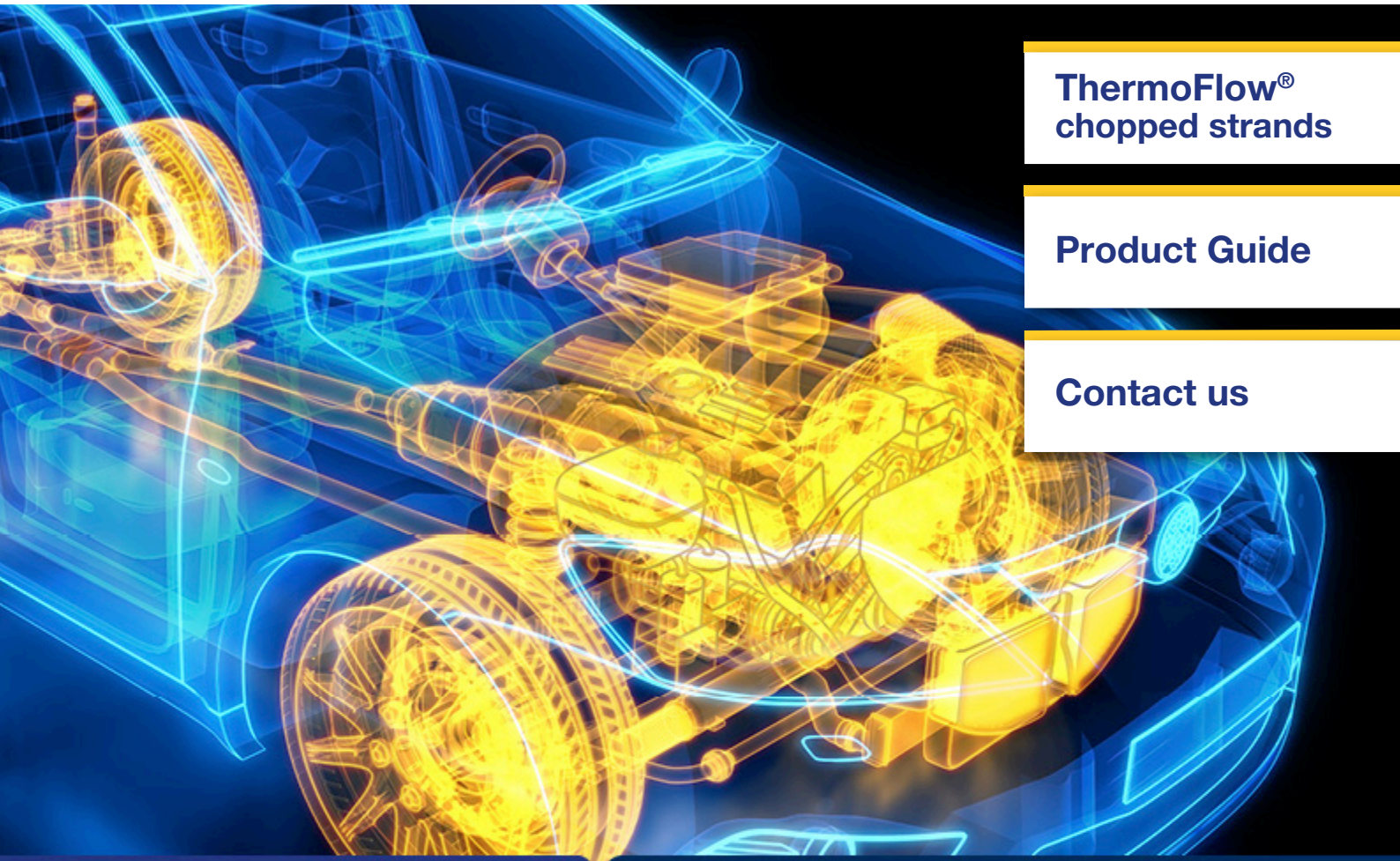

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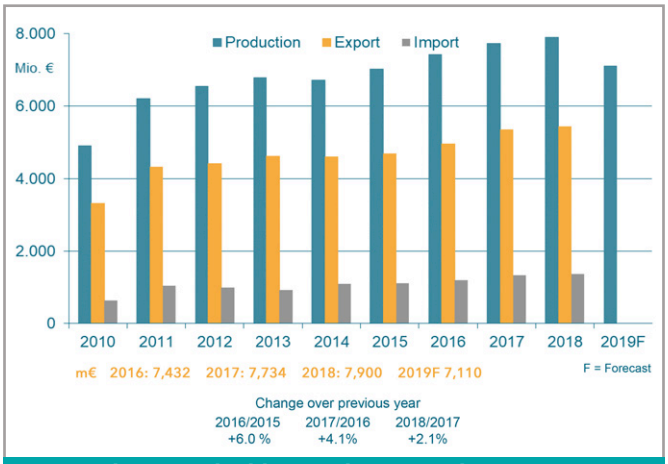
German machinery makers see 10% market decline for 2019

German plastics and rubber machinery production is forecast to decline by 10% or more in 2019, according to VDMA trade association data based on reports from its member companies.

In 2018, German machinery manufacturers increased total turnover by 2% over 2017 to €7.9bn. That was less than the 3% growth the association had originally predicted due to the market weakening towards the end of the year. Orders fell by 1% for 2018 but slumped by 10% year-on-year for Q1 2019 – a trend which VDMA says is likely to continue through the course of this year.

The association identifies three main negative factors: a cyclical downturn reinforced by "great insecurity" in the automotive and packaging sectors; trade conflict between the US and China causing shifts in supply chains; and uncertainty in Europe around the UK's exit from the EU and Italy's national debt.



German plastics and rubber machinery production
Source: VDMA

"Investments [in automotive] are virtually at a standstill," said Thorsten Kühmann, Managing Director of VDMA's plastics machinery group. "Companies that are very close to this sales market already perceive this downturn even more intensely. But also in the packaging sector, use of plastics materials is increasingly being questioned."

The downturn is not even across the industry. Machinery executives have privately told *Compounding World* that orders for injection moulding machinery have declined by 30% or more while demand for recycling equipment is proving robust.

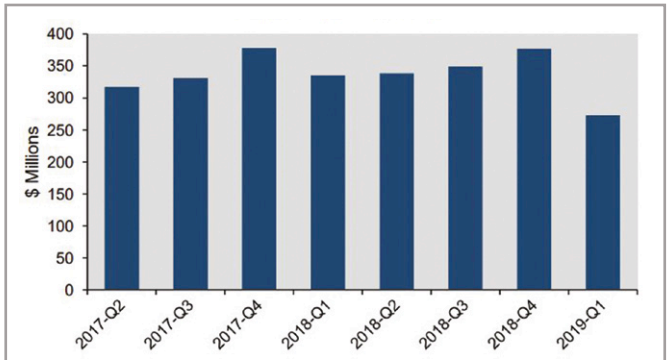
German machinery exports increased by 1.5% to €5.43bn in 2018. Exports to China climbed by 19% to €853m, making it the top destination. The US dropped to second in the list of major export countries, as exports from Germany to the US fell by 3% to €820m.

› **https://kug.vdma.org/en/**

US machine sales slump in Q1

The value of primary plastics machinery shipped in the US slumped in Q1 2019, according to statistics compiled and reported by the Plastics Industry Association's Committee on Equipment Statistics (CES).

The CES preliminary estimate puts Q1 2019 shipments at $273m – nearly 28% lower than Q4 2018 and 18% down on Q1 2018. It is the weakest Q1 result it has recorded since 2013.



US primary plastics machinery shipments 2017-2019
Source: Plastics Industry Association's Committee on Equipment Statistics

"First quarter data usually comes in soft, but the declines reflect the expectation of weaker US and global economic growth," said Perc Pineda, Chief Economist at the association.

"Demand in the plastics industry is expected to remain positive against the backdrop of slower US economic growth this year. However, plastics machinery makers should also consider that weaker global economic conditions will have knock-on effects," he said.

› **www.plasticsindustry.org**

Chase Plastics to expand

US distributor Chase Plastics has broken ground on a major expansion of its distribution centre at South Bend, Indiana.

The project should be complete in 2020 and will increase warehouse capacity at the plant, which opened in 2016, by more than 60% by adding 5,570m² of extra space. The plans will increase material throughput by about 33%.

› **www.chaseplastics.com**

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PHOTO: SHUTTERSTOCK

Trends in markets from consumer goods to healthcare indicate good potential for antimicrobial additives, but misperceptions need to be addressed. Jennifer Markarian finds out more

The battle to beat bacteria

Media coverage of the global growth of "superbugs" such as MRSA (Meticillin-Resistant Staphylococcus Aureus) means consumers today are well aware of the risk posed by microbial infection. And for good reason; the US Centers for Disease Control and Prevention recently estimated that microbial and fungal infections play a part in up to 100,000 hospital deaths annually in the US alone. Meanwhile, consumers hear near-daily of problems associated with food safety or bacterial growth on surfaces in public areas.

Antimicrobial materials and additives are one of the tools available to manage such risk. However, consumers – and the companies that make plastic products for them – often have questions about their safety. They ask, for example, about toxicity and whether such additives lead to antimicrobial resistance. Antimicrobial – or biocide – suppliers reply that their additives can help to protect plastics from microbial growth and that they are both extensively tested and registered with all relevant regulatory authorities. Keeping up with these global regulations is a challenge for additive producers and users, but many also see an ongoing opportunity to educate users about the value of antimicrobial technology and how it fits into the sustainability picture.

Although single-use plastic items such as plastic bags and bottles are coming under attack over concerns about waste and littering, re-usable items of all types – including plastics – are viewed by most consumers as sustainable. Antimicrobials have value in keeping these re-usable products "cleaner" by promoting a hygienic surface, and can extend acceptable lifetimes by preventing degradation or reducing odour and staining caused by microbiological activity.

UK-based **Addmaster**, for example, has been promoting the benefits of its Biomaster antimicrobial technology in protecting and prolonging the useable life of products such as reusable water bottles, coffee cups or shopping bags that are not cleaned adequately between each use, says founder and CEO Paul Morris. He

Main image: Concerns over hospital-acquired infections and the risk of product contamination are behind the growing interest in antimicrobial additive technology

PHOTO: ADDMASTER

Above: Reusable shopping bags can benefit from antimicrobial linings

cites a **study** by Aston University in the UK that found reusable coffee cups using Biomaster antimicrobial technology had reduced residual levels of bacteria on the lid and internal cup surfaces compared to cups without the additive.

Reusable plastic goods in a wide range of areas, from cutlery to plastic transit pallets, use SteriTouch antimicrobial additives to reduce contamination risk. UK-based SteriTouch, which was established in 2003 with a focus on antimicrobials, has since expanded into other functional additives and the company has recently been renamed **Radical Materials**. The SteriTouch antimicrobial brand continues to be a key part of the company's portfolio.

Other factors likely to fuel demand for antimicrobial additives include a move to bio-based plastics, some of which present a more favourable environment for bacterial growth. "Increased use of greener materials and bioplastics, such as those derived from soybeans, corn, flax, and other materials will also play an important demand for antimicrobials," says Maria Regina Prioli, Senior Marketing Manager for Materials Performance & Protection at **Lonza**.

And increasing consumer concern over cleanliness of public areas, such as airplane interiors and hospitals, is also driving demand for antimicrobials, says Mark Juve, Business Director of Extrusion at **Americhem**, which supplies nShield antimicrobial masterbatches.

Automotive potential

For the future, automotive interiors may present a space for potential antimicrobial use. "As we move towards ride and car sharing, these environments can become significantly unhygienic without constant cleaning and the use of antimicrobials will benefit these vehicles," says Ivan Ong, Vice President of R&D at **Microban**.

Other growing uses for antimicrobials include all kinds of consumer products, especially babies' and children's toys, personal care items and appliances. Water filtration, ice-makers and food-preparation (either consumer or commercial) are also important areas for those biocides that are food-contact approved in the relevant geographic region. Sean Reid, Managing Director at **BioCote** in the UK says the food and beverage industry widely accepts the benefits of antimicrobial technology.

That view is supported by Jonathan Goff, Vice-President of R&D at **Gelest**. "Food processing equipment, conveyor belts, preparation surfaces, packaging materials, as well as food and beverage tubing are all … an area of strong interest for antimicrobials," he says. The company's Biosafe HM4100 Antimicrobial is compliant with US FDA regulations and certified by NSF for use in food-contact articles.

Some companies are considering antimicrobials in food packaging as a solution to extending the shelf-life of food, potentially as an alternative to conventional food preservatives, according to Tom Ellefsen, Chief Executive of Thailand-based **Life Materials Technologies**. "LIFE DJ/AM-00-1A is an additive registered for use in in food contact plastics in China, the US, South America, and Europe. In addition to antimicrobial effect from zinc and silver ions, LIFE DJ/AM-00-1A also has a potent adsorbent effect; this dual activity has proven particularly effective in several food packaging applications. To date, LIFE DJ/AM-00-1A has delivered significant shelf life extension in both polyethylene milk bottles and polyethylene bakery packaging," he says. Life Materials Technologies products are distributed in Europe by Velox.

Recycling issues

Suppliers note that customers frequently ask whether antimicrobials impact the recyclability of a product. Microban's Ivan Ong says there is no cause for concern in that quarter. "Antimicrobials are added at very low levels in plastics and protect their host materials in an effective way that does

PHOTO: RADICAL MATERIALS

Right: The HyTensil cutlery set from Bower & Wood uses a SteriTouch silver-based antimicrobial additive embedded in the PP cutlery and case

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Oxoplast.com/en/plasticizers/adoflex

GRUPA AZOTY

PHOTO: BIOCOTE

Above: Polypipe partnered with BioCote to provide antimicrobial odour protection for its range of water pipe connectors

not affect recyclability or disposal – they will not leach out and 'poison' a landfill," he says.

Use of antimicrobials does not affect the rate at which regrind can be added, according to Ong, and can in some cases improve the properties of recycled plastics. "For recycled materials that are processed at very low temperatures, such as recycled foams that are then added to binders for making carpet underlayment, there might still be viable microbes left in the material, such as bacteria, fungal spores and yeast. In this case, an incorporated antimicrobial brings benefit by preventing residual microbes from surviving and growing," he says.

In addition, antimicrobials can counter potential harmful effects of organic contamination (such as sugars or dirt) in recycled materials. "During processing, these organic residues are often not removed or destroyed by heat and stay in the materials as organic content. In some materials, presence of organic content can encourage microbes to survive and attack the materials because the residual organic content acts as a potential food source for microbes," Ong says.

Antimicrobial and antibiotic resistance is a concern worldwide and compounders and end-users frequently ask whether the use of antimicrobials in plastics can cause resistant strains of bacteria. "Unlike antibiotics and the abuse of them, the antimicrobials we use do exhibit selectivity over specific strains of bacteria. In addition, antimicrobials we use attack bacteria in multiple routes, unlike specific pathways addressed by antibiotics," Ong says.

The difference in the means of operation is also highlighted by Gelest's Jonathan Goff. "Biosafe antimicrobials prevent the growth of bacteria through physical kill and reduce the risk of causing antimicrobial resistance," he says.

Tackling resistance

Antimicrobials in healthcare and medical environments actually help in the fight against antibiotic resistance, according to Lise Moloney, Director Business Development Healthcare at **Sciessent**. "We need to do what we can to prevent infections in the healthcare setting as these [drug-resistant] infections become more difficult to treat. Preventing infections will also help reduce the use and potential misuse of antibiotics, which is a contributing factor to the development of drug resistance," she says.

Another misperception sometimes raised by potential users is whether making everything "too clean" will prevent people from developing immunity or exacerbates allergies. "There isn't really any evidence to securely link the improved cleaning practices developed in modern society with atopy (tendency to develop allergic reactions)," says Megan Vaughan, Technical Manager at BioCote. "The purpose of antimicrobial products containing BioCote is not to rid the world of microbes and make everything 'too clean', or to live a sterilised existence, but to control the level of microbes on key surfaces in environments where hygiene is of the utmost importance."

Paul Morris at Addmaster agrees, saying that there is mixed messaging in this area with concerns about being "too clean" on the one hand and, on

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PHOTO: SCIESSENT

Right: This water treatment system from Pentair uses Sciessent's Agion antimicrobial in its filters

the other, of "scaring people to be as hygienic as possible." To counter these messages, Morris co-authored a **white paper** published in October 2018 by the International Scientific Forum on Home Hygiene to promote the risk-management approach of targeted hygiene. "[It] provides solid scientific advice on when extra help (biocides) are required, such as food preparation areas, and we also tackled the misinformed scare stories about hygiene," he explains.

Medical applications

Use of antimicrobials in medical devices entails considerable regulatory hurdles and additional requirements for proving safety and efficacy, but suppliers of silver-based antimicrobials have been supporting these uses for years. "Silver continues to be a very good option and has proven itself in the healthcare space, which has the highest safety demands and efficacy requirements," says Sciessent's Lise Moloney.

Earlier this year, Netherlands-based **Parx Plastics**, which supplies concentrates for various polymer types in a range of applications using its patented antimicrobial technology based on elemental zinc, established a joint venture in Belgium under the name Zinkh NV to develop antimicrobial technology in dental applications. One example is a prevention tray under development to reduce bacteria build-up in the mouth overnight. Michael van der Jagt, CEO at Parx Plastics, says: "The trace element of zinc is an essential element for the human health and the human immune system. … Zinc is also a known component helping to prevent plaque build-up on teeth." He says *in-vivo* trials have shown promising results and an initial product will launch soon.

Regulations governing biocides in plastics and restrictions on different types of active ingredients vary by geographical region. In the US, biocides are regulated by the EPA, which has a programme for reviewing registered active ingredients. In the EU, biocides are regulated under the Biocidal Products Regulation (BPR) and all active ingredients must go through the BPR's review programme for approval. The differences in US and EU regulations lead to different ingredients being used in the two regions.

In the US, OBPA (10,10'-oxybisphenoxarsine) use continues to grow, says Helena Kim, Business Manager Plastics at **Troy Corporation**, which is the sole supplier of OBPA in North America. She says OBPA remains the most effective biocide for flexible PVC applications due to its broad-spectrum capabilities in resisting fungi, bacteria, and pink staining caused by *actinomycetes*. The company has invested significant resources in the testing required by the US EPA for federal re-registration of OBPA, and testing should be completed by the end of 2019, she says.

Regulatory challenges

In the EU, meanwhile, suppliers did not support notification of OBPA in 2013 but Troy is currently evaluating the feasibility of including OBPA in the BPR review programme. "OBPA was never at any point banned in the EU. Quite simply, OBPA was listed under the old EU BPD and supplied successfully and safely for many years. But once the new EU BPR took effect in 2013, OBPA, alongside other biocide molecules, was not carried forward by other suppliers or listed under the new Review Programme. As a result, its permitted use simply ended," Kim says.

Isothiazolinones, which are an alternative to OBPA for use in PVC, also face restricted use in multiple regions. The EU BPR has restricted OIT and DCOIT in paints and coatings to 15ppm due to sensitisation precautions, and these restrictions are expected to be extended to plastics uses by 2021, says Kim.

Right: The casing for this Thermapen food-preparation thermometer contains Biomaster antimicrobial additives

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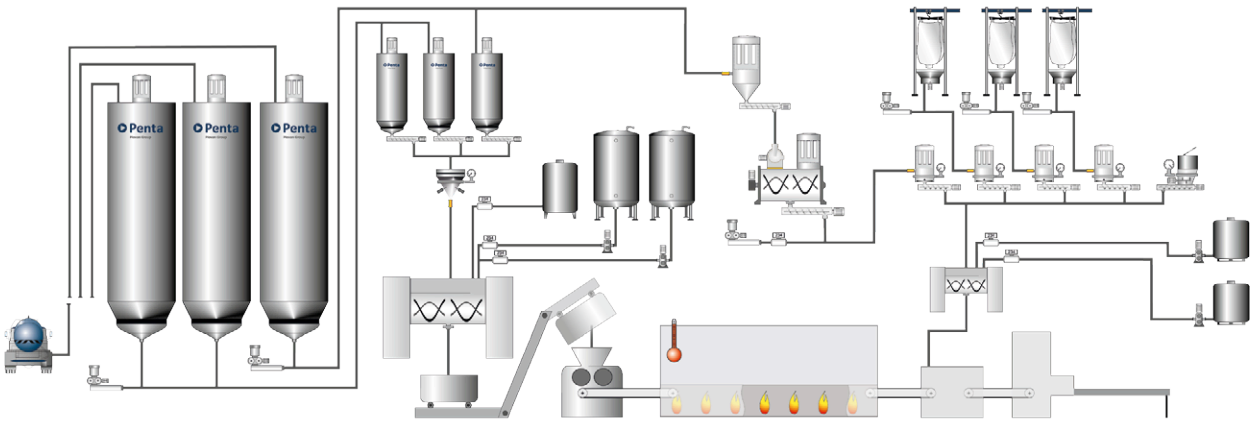

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Sanitized adds development capacity

Swiss antimicrobial company Sanitized has expanded its ability to develop customer-specific antimicrobial masterbatches with the addition of an 18-mm twin-screw extruder at its technical centre.

"The selection of the appropriate antimicrobial active ingredients depends on the defined protection goals, on their compatibility with the relevant processing method and the polymer type," says Christine Niklas, Product Manager at Sanitized. "[Using the new equipment] we can do a small-scale replication of the customer's manufacturing process, which reduces testing time and costs for the customer."

PHOTO: SANITIZED

Sanitized has installed additional lab compounding capacity

Key customer concerns include compatibility of the additives with the production process and whether the antimicrobial active ingredients affect the physical and visual properties of their products.

In addition to customer-specific tests, Sanitized is working to develop new protection technologies, such as masterbatches with encapsulated antimicrobial active ingredients. Encapsulation could potentially improve the thermal stability of the antimicrobial active ingredients or prevent interaction with other ingredients in the customer's formulation, Niklas explains.

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In Korea, fatalities were linked to CMIT/MIT [chloromethylisothiazolinone/methylisothiazolinone] treatment in humidifier filters and this has caused Korean companies to specify their formulations to be isothiazolinone-free, says Kim. The Korean Consumer Chemical Products and Biocides Safety Act (K-BPR) launched in January this year and Kim says it closely mirrors the European BPR.

Kim says another biocide used in plastics—zinc pyrithione (ZPT)—is also facing potential restrictions. "With ZPT being labeled as CMR [carcinogenic, mutagenic, or toxic for reproduction] in Europe, that technology's eventual ban seems likely in the EU. Already, ZPT users are asking for alternatives," she says, adding that alternatives include Folpet and IPBC, both of which are offered by Troy. "Folpet is already approved for Product Type 9 [fibre, leather, rubber and polymerised materials preservatives] and has a long, positive regulatory outlook in the BPR," she says.

The challenge of navigating EU regulations for biocides is having a negative effect on use of antimicrobials in plastics, says Life Materials Technologies' Tom Ellefsen. "There is still a lot of uncertainty and concern about how [BPR] applies to intermediate products and treated articles. … Additionally, now that active substances are moving from the Review Programme to the positive list, the new requirement to obtain costly country-by-country authorisations for biocide products is fragmenting the EU-wide system into an unwieldy mess."

Outlook for silver

Silver has a long history as an effective antimicrobial in a range of plastics; it can be used in high-temperature plastics and typically can be used in food-contact applications. In the US, the EPA is in the process of re-registering silver antimicrobials, and some products are being reclassified as nano-silver, says Sciessent's Lise Moloney, who adds that Agion's products are not part of this classification. Although the EPA will request further test data (for example, respiration studies) for some products, no problems with health effects are expected to be demonstrated.

The outlook for nano-scale antimicrobials is not assured, according to Life Materials Technologies' Tom Ellefsen. "There is a strong sentiment against nano-particles in Europe and North America. As a consequence, antimicrobial substances that use nano-particles will likely not succeed in the marketplace. This holds not only for nano-particles of silver, but nano-particles of zinc, copper and other substances." However, he believes that silver-based antimicrobials will continue to play an important role.

In addition to ionic silver-based inorganic antimicrobials and organic antimicrobials, Life offers antimicrobials that use a botanical active based on a plant extract, targeted for consumer uses. Ellefsen says that the Life Natural range of antimicrobial additives and masterbatches is suitable for use in EVA, PVC, PU, PE, PP and other polymers and that it delivers the same efficacy as

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PHOTO: BIOCOTE

Above: Waterlogic's water dispensers incorporate BioCote's silver-based additive in external casing and dispensing parts

silver-based antimicrobials at competitive cost.

There is interest in alternative metals to silver, according to Microban's Ivan Ong. "Zinc-based antimicrobials are, like silver, effective in protecting polymers. However, due to the temperature sensitivity of zinc-based chemistries, they are not employed in polymers that are processed at higher temperatures," he explains.

Microban uses both zinc and silver-based antimicrobials in many polymer applications, with Ong explaining that the company carefully studies processing and end-use conditions and performance requirements before making a technical recommendation in any application.

Moloney, meanwhile, cautions that not all silver technologies are the same: "Companies should take the time to identify their product requirements and use those requirements to choose the best technology for their application." This advice can be applied more broadly to any active ingredient and any plastics application—understanding how and where a product will be used is one of the keys to success.

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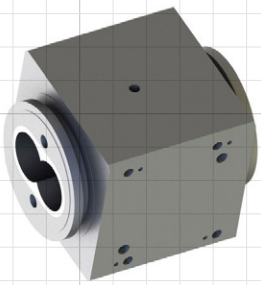

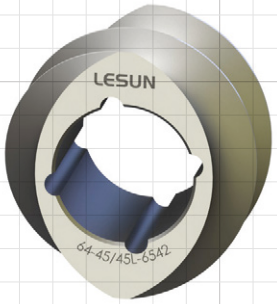

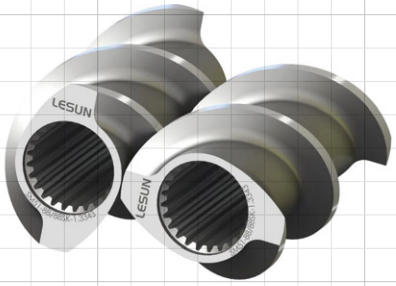

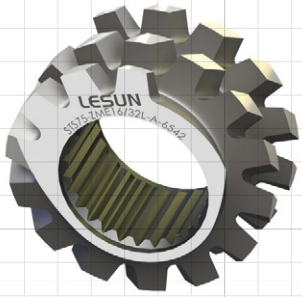

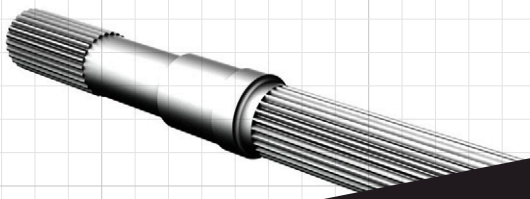

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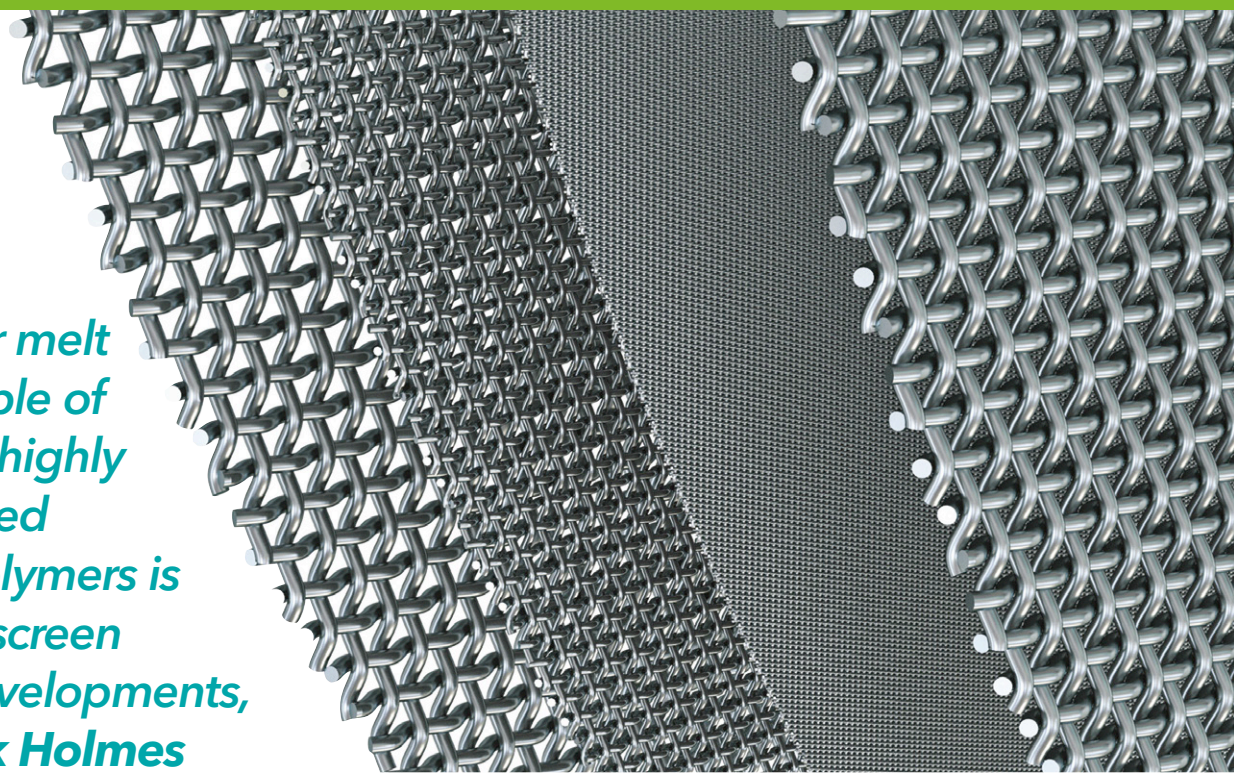

PHOTO: NORDSON POLYMER PROCESSING SYSTEMS

Increasing demand for melt filters capable of processing highly contaminated recycled polymers is advancing screen changer developments, writes ***Mark Holmes***

Cleaning up in melt filtration

With quality demands intensifying, melt filtration is being used increasingly widely across the compounding industry. To ensure the most cost-effective production, melt filter and screenchanger manufacturers work hard to ensure their hardware integrates seamlessly within the compounding line. However, they are also being asked to deliver increased output, achieve finer filtration, and to be able to process ever more demanding materials. And, with the use of recycled polymer feedstocks rapidly increasing, screenchangers for compounding applications will need to be capable of handling higher levels of contamination than in the past.

Designing screen changers and melt filters for plastics compounding applications presents a number of special issues, according to Dr Oliver Schmidt, Manager Product Management at **Gneuss Kunststofftechnik**. "Frequent colour and material changes in the compounding process require filtration systems with excellent purging properties and/or a design that allows easy mechanical cleaning," he says.

"In addition, sensitive polymers need good rheological properties in order to avoid any degradation during the filtration process," Schmidt says. "Combined recycling and compounding is another important area for filtration, where high exchange rates for the screen area are required. Filter changes must not affect the upstream compounding process, through back pressure effects, as well as the downstream process. Finally, direct compounding – combined compounding and production to the final product – also requires a filtration system that does not affect the production process during screen change."

Gneuss highlights several trends and customer requests for its filtration equipment for compounding. These include the need for higher throughputs and for finer filtration, as well as an increasing need to process recycled material and demand for filtration systems able to accommodate direct compounding. The company says that if two or more of these requests are combined, then the limits of conventional screen changers can be exceeded.

Filtration systems with large filter areas and high filter exchange rates, as well as a high process consistency, are typically required by the compounding industry. Gneuss says it has developed newly designed and optimised filtration systems for the continuously changing compounding market, and it will be presenting these at the K show in Germany in October.

Optimised packs

Nordson Corporation has developed a new series of high performance screen packs for its BKG screen changers that can withstand higher extrusion pressures and provide maximum filtration and optimum melt flow while ensuring longer working

Main image: Nordson BKG's optimised four-layer screen packs combine durability with high levels of melt filtering and permeability

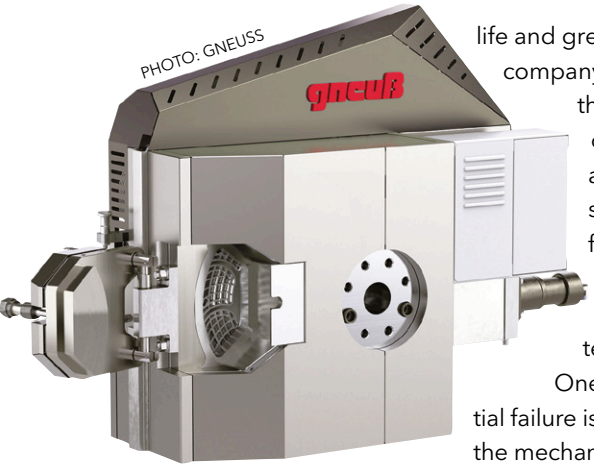

PHOTO: GNEUSS

Above: The RSFgenius from Gneuss is a fully automated rotary screenchanger with backflush designed for demanding processing tasks

life and greater reliability. The company says one key factor in the enhanced performance of the new screen packs is a robust multi-layer structure that prevents failure caused by the pressure differential – up to 200 bar – encountered during filtration.

One typical pressure differential failure is 'screen dimpling', where the mechanical stress can force the screen layers into the holes of the breaker plate that supports the screen in the cavity. This distorts the screen, breaking the peripheral seal and allowing contaminants to bypass the screen and become part of the end product.

Nordson says it precisely tailors the size of the screen pack to the dimensions of the cavity, eliminating the risk of contaminant passing the screen pack at the edges. In addition, all screen pack components are ultrasonically pre-cleaned during manufacture to eliminate contamination from the oil and grease used in the weaving process.

"The new Nordson screen pack design maintains structural integrity while efficiently filtering out contaminants and ensuring optimal melt permeability," says Christian Schröder, Global Product Manager for melt delivery systems. "As a result, our screen pack yields more output between screen changes than screen packs offered as low-cost alternatives, increasing the productivity of the extrusion line and enhancing profitability."

Nordson supplies the screen packs with different layer combinations optimised for specific customer applications. One common structure, for example, incorporates four layers, including two coarse square-weave layers that serve as the outer components and a finer internal square-weave layer. This combination provides support and drainage functions and withstands high tensile forces. The fourth layer is an optimised Dutch-weave wire mesh that serves as the fine filtration component. The small geometric pore size of the Dutch weave layer ensures high permeability. Filtration takes place crosswise with respect to the direction of melt flow, enabling dirt particles to be very efficiently separated from the melt.

"A key factor for efficient filtration is permeability," says Stefan Woestmann, Nordson Application Engineer. "The Nordson screen pack provides the optimum ratio of solid material and free volume, so that the polymer melt can use as many flow paths as possible to make its way through the filtration medium. In processes with low-end screens, which are not flow-optimised in this way, polymer melt builds up and causes a significant increase in pressure. This leads to premature and costly screen changes and endangers the quality of the end product. If the polymer flow is not uniform, the end product cannot be either."

Production critical

Nordson has also introduced the BKG FlexDisc design for producers of critical films and PET recyclers. The company says the FlexDisc filter for piston-activated screen changers substantially enlarges available filtration area without the need to increase machine size, enabling processors and recyclers to achieve finer filtration, higher throughput, longer filter service life, and reduced specific backflush volume. Nordson recommends the BKG FlexDisc for bottle-to-bottle PET recycling, PET fibre recycling, and battery separator film applications.

The function of the hydraulic pistons, which many BKG screen changers are equipped with, is to insert the screen cavities into the melt stream for filtration and to remove them for cleaning or replacement. In systems where the new FlexDiscs are used, each cavity contains a filter stack comprised of two to four FlexDiscs, depending on machine size, and each FlexDisc is equipped with two screen packs. As a result, there is up to 4.5 times more filtration area available for each cavity with the new FlexDisc than with conventional standard round screens and 25% additional area (on average) when compared to the former FlexDisc model (actual increase is dependent on machine size).

Screen changers equipped with Nordson's backflush technology include the BKG V-Type 3G and BKG HiCon K-SWE-4K-75/RS (backflushing diverts the contaminant from the melt stream). The

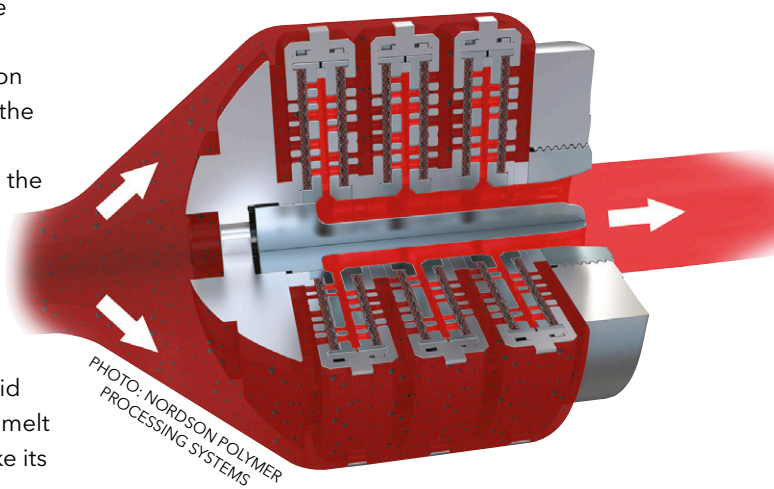
PHOTO: NORDSON POLYMER PROCESSING SYSTEMS

Right: This cut-away view of the BKG FlexDisc filter stack shows how the melt is distributed among the different FlexDisc filters

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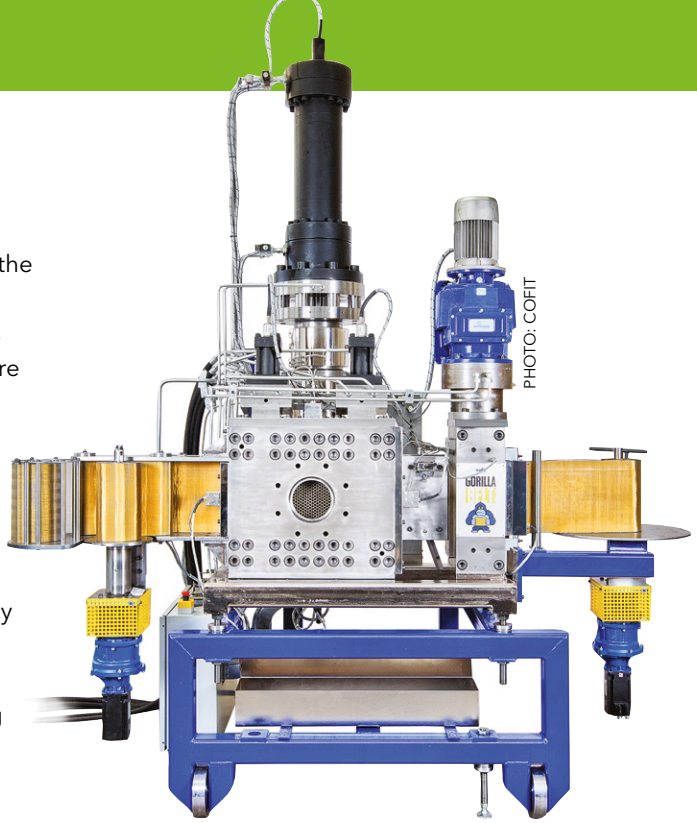

PHOTO: COFIT

Right: Cofit's Gorillabelt T model is claimed to offer high filtration performance with no material losses

greater filtration efficiency of the new FlexDisc reduces the frequency of backflushing and thus the amount of specific backflush volume. As melt enters the filter stack from the upstream side it is evenly distributed among the FlexDiscs, which are rheologically optimised to provide efficient filtration with minimal shear stress. At the same time, the structural integrity of the FlexDisc design enables it to withstand pressure differentials up to 130 bar (1,900 psi) during the backflush procedure.

"The substantially increased filtration efficiency of the FlexDisc can enable the processor or recycler to save on investment cost by purchasing a smaller machine without sacrificing throughput," says Schröder. "There are also significant operational savings possible with the reduction of specific backflush volume."

Getting smarter

Italian company **Cofit International** has introduced the Gorillabelt T automatic and continuous screen changer for highly contaminated plastics with a high filtration level of up to 50 microns (270 mesh). "The plastics market is currently asking for increasingly complex, faster, smarter and better quality solutions in extrusion plants," says President Aleesandro Fabbri. "This involves optimisation of devices, materials, processes and technologies. High quality products can be obtained from cheaper raw materials as a result of refined processing and innovative solutions in filtering and in screen changer technology. With the Gorillabelt T screen changer technology and design, only dirt, impurities and plastics sticking on the filter screen surface are discarded. During cleaning, material loss is eliminated."

Cofit claims the Gorillabelt T offers a number of advantages over alternatives. These include production of good quality materials with zero or extremely low levels of impurities and the ability to use raw materials, such as highly contaminated post-consumer plastics, with a level of contamination of up to 10%. Extrusion of most thermoplastics, including PET, is possible and the Gorillabelt T provides increased output rates and improved levels of automation by being easily programmable with user-friendly controls. No polymer is lost during the cleaning cycle. Operating costs compared with manual operation are reduced through lower energy consumption, and fewer maintenance interventions and system shutdowns.

The Gorillabelt T operates at temperatures up to 300°C and pressures up to 300 bar, with an output rate of up to 3,000 kg/h. It is particularly suitable for filtering highly contaminated thermoplastics, such as agricultural or building films or post-consumer materials, and it can handle all types of contaminants including metal, wood, paper, textile fibres, unmelted plastics, aluminium and sand. The screen changer features LAN connectivity and a remote assistance module allowing any process failure to be easily assessed and fixed, as well as ensuring control software can be quickly updated. An

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According to Sandy Guthrie, President of US company **ADG Solutions** –manufacturer of the CFO series of continuous melt filtration systems – reliability and durability are the most important issues to consider when selecting screen changers and melt filters for compounding.

"These are the two features where the CFO filter excels," he says. "The screen or filter medium is a plate and is extremely reliable in terms of filtration and, in the case of contamination, strong enough to prevent a breach that might make for filtration failure. In addition, continuous filtration is essential. The CFO is designed to run for 2,000-4,000 wipes, contamination dependant, so that the process can run uninterrupted for extended periods of time without a screen change. In continuous mode, there is very little pressure drop and the wipe timing in this mode is variable."

Guthrie adds that with the ability to export plastics from the US for recycling all but gone, the need for recyclers and compounders to filter these materials has greatly increased. "In general, we are able to run materials with more paper, floor sweeps, unmelts and contamination. This helps keep a lid on purchases as the price for scrap and virgin materials continues to swing. Buying at the lower end of the market is much more stable, although costs of the reprocessing equipment are higher," he says.

The CFO series is said to perform very well with high levels of contaminants, including hard materials such as paper, unmelts, stones and small metals. "We continue to develop new, stronger, longer lasting screens. We are also targeting reduced manpower on the line as the screens have an extremely long wipe life. Future developments under design include a new discharge system to work with paper and smaller contaminants," Guthrie says.

PHOTO: ADG SOLUTIONS

Left: The CFO 25 is the latest continuous filter addition to the ADG Solutions product line

Expanding options

ADG Solutions has made a number of improvements to the CFO line of continuous melt filtration systems including the introduction of a new model – the CFO 25. This can process up to 7,500 lbs/h (3,402 kg/h) depending on materials and contamination. The new CFO 25 is said to offer a 10% larger screen surface area than competitors and sizing that is completely Imperial (it replaces the existing 600mm model). Features include 360 degrees of studs, which improves surface sealing and prevents leaks. The design is claimed to tolerate pressures of up to 3,500 psi.

The company says that other advances implemented across the full CFO line include a new scraper design that has been refined for smaller purges. This improves efficiency and covers a broader range of applications. The corresponding computer program controls have been updated to allow the amount of scrapes in-between purging to be varied, so the user can maximise contamination collection. The screen plate filter has also been redesigned to be thicker,

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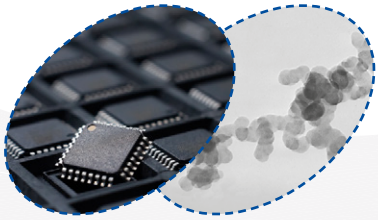

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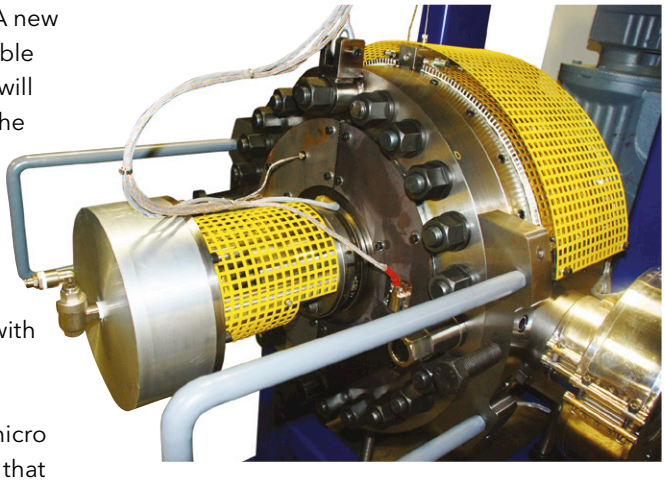

PHOTO: ADG SOLUTIONS

Right: Evenly spaced securing studs are claimed to minimise the risk of melt leakage in ADG Solutions' CFO series machines

harder and with a more uniform hole quality. A new diamond-hard plate surface will also be available for aggressive and abrasive processes, which will extend screen life by two to three times over the existing version.

ADG Solutions says the CFO (Continuous Filter Operation) system makes uninterrupted extrusion a reality, even when processing highly contaminated materials. It says this is because the CFO can operate automatically with minimal operator attention during a shift. As extruded material enters the unit, it passes through a stainless steel screen plate that is micro drilled and hard faced, filtering contaminants that are caught on the screen plate surface. When waste builds up and back pressure reaches a pre-set level, a rotating blade sweeps the screen and removes the contamination through a discharge port.

There are now three CFO models in the line-up. The CFO 15 has a throughput of 800-1,800 lbs/h (363-816 kg/h) with the CFO 20 capable of 1,200-4,000 lbs/h (544-1,814 kg/h). The new CFO 25 has a diameter of 25 inches (63.5 cm) and a throughput of 3,000-7,500 lbs/h (1,361-3,402 kg/h). The CFO design handles a broad range of materials including PE, PP, PS, PC and ABS. The filter can handle up to 10% paper and other foreign objects up to 0.75 inches (19 mm) in diameter. Contaminants such as metal, wood, paper, textile fibres, un-melted plastic granules, and a smaller percentage of aluminium, lead, copper, rocks and other impurities is readily tolerated.

ADG Solutions has machines operating in a number of challenging environments. "We have new machines working in Ohio on post-commercial films that have been baled at MRFs (material recovery facilities)," says Guthrie. "Processes are able to work through many different types of contamination that vary greatly, without notice as they are in bales. Performance of the filters continues to work with up to 10% contamination. We have also assisted Aaron Industries in Massachusetts to increase capacity and significantly lower operator interface."

Below: Ettlinger has added a 60 micron option to its laser-drilled ECO filter range

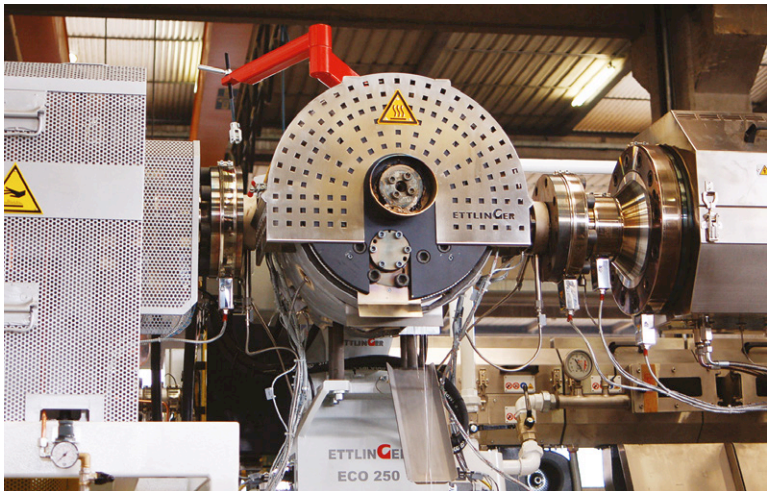

PHOTO: ETTLINGER

Laser addition

Maag Group company **Ettlinger** has added a 60 micron option to the laser drilled screens used in its self-cleaning ECO melt filters, targeting recycling of PET. According to the company, the conical precision holes in the ECO filters are much more effective than traditional wire mesh screens, which due to their construction can allow particles larger than the design mesh size to pass through and can also distort at high operating pressures. In contrast, all contaminants larger than the 60 micron diameter laser drilled holes are retained on the surface of the rotating cylindrical screen and continuously removed by the scraper.

The company says that in reprocessing of PET, the 60 micron ECO melt filters can remove even challenging contaminants such as paint particles, silicones, barrier materials, cross-linked fractions and gels. The new fine screens also allow the use of the PET fines that are created during the sorting, grinding and washing process and which are usually sold at low value.

Originally developed for highly contaminated recycled material streams, **Erema** says it uses its Laserfilter screenchangers even for lightly contaminated projects now due to its improved efficiency. "By doing this we can reduce the material losses of a typical mesh screen filter from around 1.5-2.5% to values below 0.5%, according to Robert Obermayr, Head of Business Unit Powerfil, which is Erema's melt filtration division. "In addition, due to its background and design, the Laserfilter is a robust and reliable filter, which helps to reduce manual screen changes from one to three times for a mesh screen filter to once every three or four weeks or even up to three

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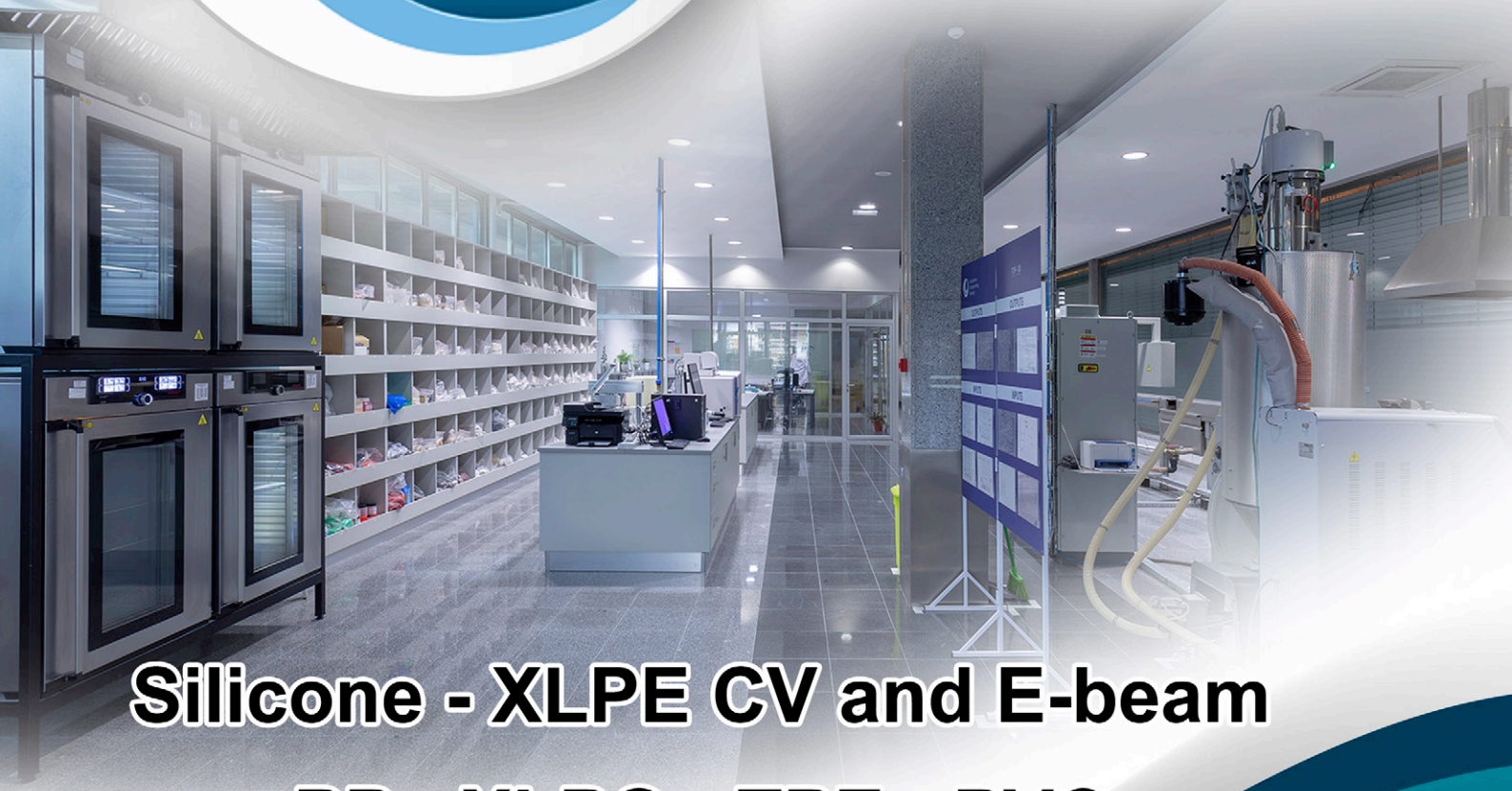

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PHOTO: FIMIC

Right: Fimic installed this RAS500 melt filter with 35 mesh punched screen to process PP at US recycled compound producer Aaron Industries

months depending on parameters."

Erema adds that the Laserfilter system incorporates a "Lock and Change" unit, which allows individual filters (Laserfilter systems can be supplied in Twin, Triple and Quattro variants) to be shut off for changes without interrupting production. The company also says that, because the melt fitration system is based on fixed screens, there are no inspection and maintenance issues relating from the use of rotating seals.

Film recycling

Italian melt filtration firm **FIMIC** has developed a special screen changer for production of compounds from agricultural films. "Agricultural film is a complex material, not only for washing but also for extrusion and filtration," says Erica Canaia, Sales Director. "Everything that can be removed upstream, by high performance washing and efficient water treatment, will allow the extruder and the filter to work to the best of their abilities."

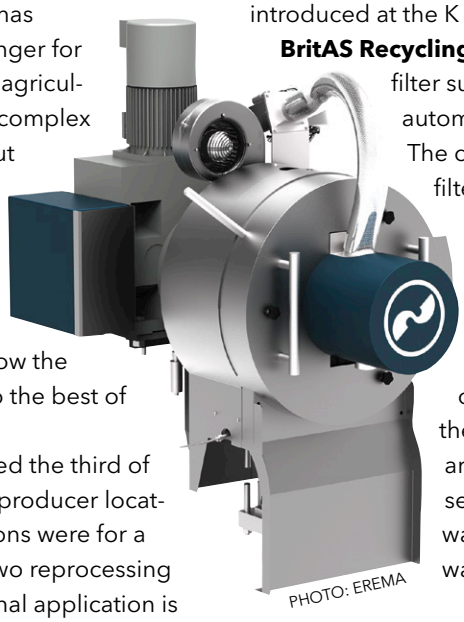

PHOTO: EREMA

Right: Erema's Powerfil Laserfilter is said to provide benefits even in lightly contaminated applications

The company has now installed the third of these agricultural film units to a producer located in Italy (the first two installations were for a customer in Mexico operating two reprocessing lines). In the latest project, the final application is production of garbage bags.

One of the challenges in reprocessing of agricultural films is that each country has a different type of soil contamination, which is a major consideration in ensuring the most effective filtration. FIMIC says that its experience in Mexico allowed it to adapt the filter for the different type of contamination present for the Italian customer.

Canaia explains that this need to adapt equipment is an increasingly common requirement in the sector today. Manufacturers of melt filters for highly contaminated plastics can no longer only afford to simply make standard machines, but must adapt them to each specific application, she says.

FIMIC melt filters are now available in two additional laser filtration models (laser drilled screens are said to provide finer filtration). It has recently added two more filtration levels: 120 microns (as an intermediate model between 100 and 150 microns) and 300 microns. It can also customise filter fineness according to the user's requirements.

In addition to the RAS-type melt filters, the company has also developed the ERA and TEN model, which is currently undergoing customer trials. The ERA melt filter provides direct filtration in two steps using only one melt filter. A feature of the design is that the laser screen, which is the most expensive element, is protected from damage by a less-costly punched screen. This arrangement increases the unit's lifetime and means there is no need for a gear/melt pump and second melt filter. The TEN model is currently undergoing customer trials and is an adaptation of the company's previous NET model. The company says the new TEN design will be commercially available by the end of this year. A further new melt filter will be introduced at the K show.

BritAS Recycling-Anlagen has increased the filter surface of its ABMF 1600 automated belt melt filter by 50%. The company says that the increased filter surface both improves total output and allows processing of plastics waste with a higher degree of contamination, for example paper. The melt filter also has increased motor capacity for belt take-off and the belt magazine. BritAS filters are used in the post-consumer sector and for agricultural film waste, but also for post-industrial waste and by compounders.

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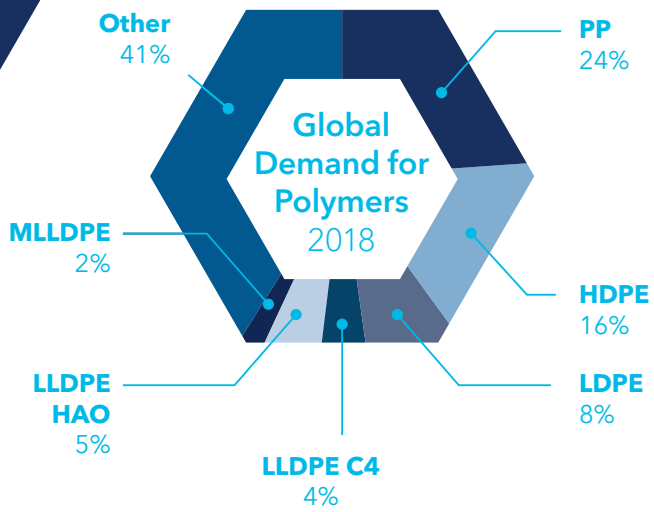

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PHOTO: SHUTTERSTOCK

The latest colour measurement systems are designed to better integrate into today's smart manufacturing systems, easing use and cutting waste. ***Peter Mapleston*** *reports*

Suppliers of equipment to measure the colour of plastics compounds both in-line and in the lab continue to make advances, with the latest developments promising to help customers reduce waste while making their operations smarter and more connected in line with the move to Industry 4.0 manufacturing systems.

"We are seeing more and more brands and their suppliers shifting to a digital workflow as part of the Industry 4.0 and smart manufacturing trend," says Richard Knapp, Product Manager at colour measurement and management systems producer **X-Rite** and subsidiary **Pantone** (perhaps best known for its Pantone Matching System – PMS – proprietary colour space). "Digital colour communication plays a critical role in embracing Industry 4.0 strategies and helps improve efficiencies, reduce production times, waste and costs as well as supports sustainability efforts," he adds.

"Using digital standards for colour and appearance complements traditional physical standards used by designers, specifiers and suppliers. When digital standards and spectral data are shared across the supply chain, they can be implemented immediately in designs, marketing, formulation and production. This ensures everyone is working with, measuring and reporting based on the same digital colour specification," Knapp explains.

"The data can be easily integrated into product design software, formulation software, measurement devices, and quality control software. From a production standpoint, this streamlines the colour management workflow and helps create detailed audit trails at each step - from the lab to production to assembly. It also makes it easier to identify and eliminate potential colour errors throughout the process," he says.

X-Rite measurement devices, Color iMatch formulation and Color iQC quality assurance software all integrate with PantoneLIVE, allowing suppliers to use spectral values to verify colour accuracy and improve manufacturing efficiency. The company says this means, for example, that a masterbatch producer can start formulation more quickly and with more confidence.

Digital standards also include valuable

Main image: The latest developments in colour measurement are designed for better integration into smart manufacturing systems

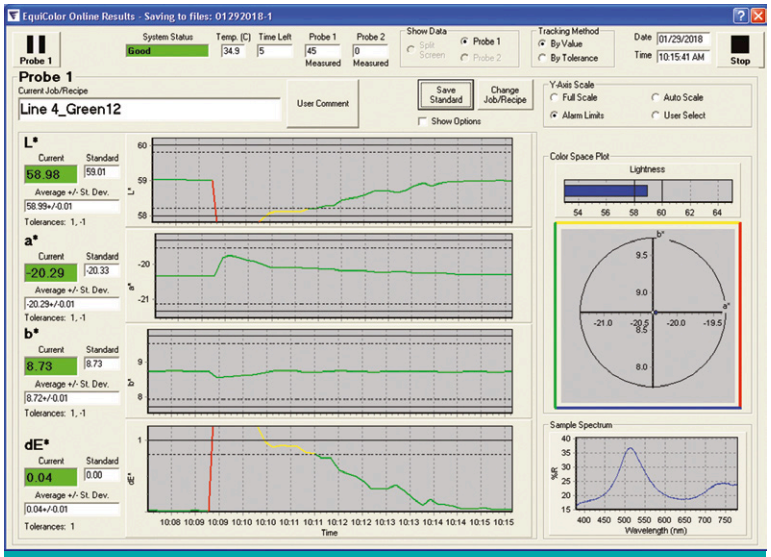

Figure 1: An EquiColor Process Control Chart showing L*,a*,b* and dE* values with their upper (UCL) and lower (LLC) control limits at an extrusion operation. The process was stopped at 10.09 and re-started a minute later. It shows the L* value trending up between 10.11 and 10.14 but stabilising thereafter
Source: Equitech

information on how to measure samples and operating procedures. This ensures that each measurement device used by a compounder can be set up to use the same specified template and each individual measurement is recorded. Using Color iQC software, compounders can set up the process variables impacting colour that they want to track and analyse. Quality control professionals or plant managers can leverage that data to better understand where colour drift occurs in the manufacturing process.

Color iQC software syncs with X-Rite measurement devices, making it easy to graphically see the colour variation of a series of measurement samples. Using the digital standard, the software can plot whether failing colours are too light, too dark, too red, and so on. Equally important, the software can be used to sort, group and analyse process variables. Users can quickly identify patterns and the cause of colour variation in production. For example, a compounder can produce a set of samples using the same plastic formula and run it under a variety of different settings. That data may show that a temperature increase or reduction in dwell time is causing the colour to shift.

In March this year X-Rite put out a new release of Color iMatch, which it says helps compounders and masterbatchers accelerate colour development through better initial matches and the need for fewer corrections.

Larger colour palettes, complex materials and effect finishes add time to the formulation process but today's plastic suppliers need to deliver colour matches more quickly in order to win business. The new release of Color iMatch has a redesigned formulation engine that significantly improves initial match and correction performance. In addition, a new "search and correct" algorithm enables better utilisation of legacy data. It uses proprietary search metrics to more accurately identify candidate formulas containing the most likely colorant combinations for more rapid formula convergence.

According to Knapp, the redesigned formulation engine can cut the number of steps required to get an approved colour match in half. "This provides a significant competitive advantage to resin, colorant, pigment and dye suppliers," he says.

Color iMatch is compatible with current and future Microsoft Operating Systems and offers support for X-Rite and non-X-Rite instruments.

Automating control

At US-based in-line process measurement specialist **Equitech**, CEO Jaime Gómez points to the current trend of automation and interconnectivity in manufacturing technologies made possible by advances in communication technologies and sensors. "The adoption of Industry 4.0 by manufacturing plants is helping create 'smart factories' where decisions are made by machines based on the input received and using Artificial Intelligence (AI) to inform the operator of current trends that will affect the performance of the process, thus enabling corrective actions to be taken before off-spec product is produced," he says.

"However, to achieve this level, a smart factory needs to be able to collect real-time data, store it, analyse it, and make decisions according to its findings. This is how Equitech is helping its customers," Gomez adds.

Equitech's Equispec spectrophotometers handle collection, storage, and analysis of real-time data through fibre-optic probes and a software package called EquiColor (Figure 1). "We successfully measure colour directly in the melt just before the die gives form to the final product and correlate it to laboratory measurements taken under controlled conditions," he says. "But the Equispec does not stop here. It serves as a 'process sleuth' that can detect processing conditions and issues that are impossible for humans to detect. We have successfully detected lack of product homogenisation, twin-screw elements wear, feeder pulsation, contamination, and product composition."

Gomez says that, over the past few months, Equitech has advanced its technology. "We have successfully achieved closed-loop control in a plastics extrusion operation where our customer

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PHOTO: LIAD WEIGHING AND CONTROL

Right: The SpectroSave spectrometer is a differential device, which is claimed to minimise any negative temperature and humidity effects

wanted to switch from colour A to colour B and back to colour A with minimisation of waste," he says. "Equitech is helping the plastics industry address the most important issue that plastic producers' CEOs are worried about at the moment: plastic waste. Increased production rates, overall lower production cost and improving operator awareness and intelligence of the process are also benefits of using this technology."

Differential measures

Also working on in-line control is Israeli company **Liad Weighing and Control Systems**. Joint General Manager Uri Eisenstein says the company's patented SpectroSave takes a "revolutionary" approach to colour measurement. "It is a differential spectrometer, which means it has two branches in its probe that are measured by the same optical device," he says. "The fact that there is one optical device for two branches ensures that if there is any temperature or humidity influence on measurement it affects both tests, so the difference in measurements, especially the ΔE, is very small."

SpectroSave is a compact unit that can be placed at the extruder (or beside an injection moulding machine), making possible a range of high-demand and real-time QA applications. Applications include digital setting of a pass/fail criteria, in-line testing of product colour, real-time analysis of masterbatch dispensing, and automatic colour shade adjustment. The equipment can be operated in either differential or absolute modes, enabling measurement of new-product colour differences with either a reference part or coordinated L*a*b*.

Eisenstein says the SpectroSave unit can work either as a standalone QA machine or with an interface to a gravimetric or volumetric feeder, also supplied by Liad. "As a standalone its dry contact pass/fail output can be used, for example, by the robot to put the part in one place if it passed or in another place if it failed," Eisenstein says. When SpectroSave works with Liad ColorSave gravimetric or volumetric feeders, it sends feedback about the ΔE to the feeder and adjusts the setpoint according to the measurement.

Transmitted colour, opacity, reflected colour shade or haze can be measured according to QA requirements, with easy switching between probes within the same spectrometer, Eisenstein says.

The patented optical design for the probe on the SpectroSave is said to make it impervious to distance, surface texture, and lateral or angular positioning. It also provides resistance to vibrations, varying temperatures and typical manufacturing environments. "In addition, the design allows easy 'plug-and-play' installation and operation, without special alignment procedures or complex calibration routines, Eisenstein says.

Below: ColorLite's ColorTube benchtop spectro-photometer offers an 80mm measurement area and d/0° measuring geometry

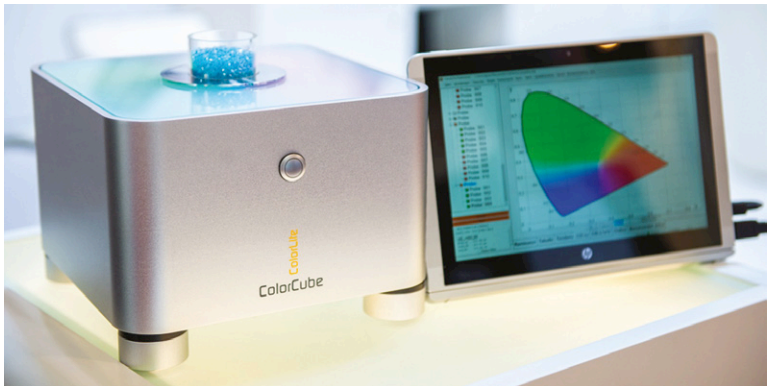

PHOTO: COLORLITE

Precision focus

Katlenburg-Lindau, Germany-based **ColorLite** was established around the dawn of the LED lighting revolution and focuses on development and manufacture of high precision spectrophotometers, with a product line including portable, bench-top and production line models. The instruments are designed to meet processing, testing and quality control requirements. Solutions offered by the company for measuring colour in granules include the ColorCube MA80, ColorTube, and the sph9i inline system.

The ColorCube MA80, which won a Red Dot Design Award in 2016, is a benchtop spectrophotometer with a d/0° measuring geometry and a large measuring area of 80mm, which makes it possible to measure even inhomogeneous samples with very good reproducibility. ColorLite says the instrument, which has a minimalist design and just one control button, is very easy to use and highly accurate. It uses LED illumination technology to guarantee an extremely long life and long-term stability.

Launched earlier this year, the ColorTube is the company's most recent development. Another benchtop spectrophotometer, it is a standard two-channel system suitable for use with solid samples, although it can also measure granules in

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PHOTO: COLORLITE

Above: ColorLite's ColorTube is a two-channel spectro-photometer offering repeatability of ΔE 0.01 CIELab

cuvettes. At its heart is a 140mm integrating sphere and two spectrometers for the sample and reference channels. The repeatability is ΔE 0.01 CIELab. An integrated gloss trap enables measurements with and without gloss exclusion (SCI and SCE).

The colour of sample materials can be highly temperature dependent, according to ColorLite Managing Director David Pryor, who warns that neglecting this fact can lead to false measurements. This is addressed in the ColorTube through the optional integrated infrared thermometer, "which closes a big gap in the measuring methodology of colours." Using this option, colour deviations due to thermochromatic effects can be accurately examined and evaluated.

The sph9i measuring system is intended for 100% production control and connectivity to dosing and process control systems "with highest flexibility and reliability," Pryor claims. Granules are conveyed via a bypass into a measuring chamber and collected to a fixed level. The probe head is attached to a glass pane on the measuring chamber. The material can then be returned to the process or the system gives a warning message for colour deviation outside the tolerance limit.

Germany-headquartered **PCE Instruments** has extended its already broad range of spectrometers, the most recent of those suitable for compounding operations being the PCE-CSM 20 series and the PCE-CSM 30 series. The PCE-CSM 20, for example, is a handheld unit featuring a single 8mm aperture and including SCI and SCE specular modes. It covers the spectrum from 400nm to 700nm in 10nm increments. Other models in the series have more light sources. The PCE-CSM 30 series spectrometers are table-top units intended for laboratory use. They use both transmission and reflectance to accurately measure liquids, solids, and pastes.

Multiple measurement

The latest additions to the **Konica-Minolta** product line-up are the single aperture CM-25d and dual aperture CM-26d portable spectrophotometers. These two new models will be joined by the CM-26dG version later this year, which allows simultaneous measurement of both colour and gloss.

The new instruments are intended to replace the existing CM-2500d and CM-2600d spectrophotometers, which are widely used for colour control of automotive and consumer electronics products. The CM-25d model has a fixed 8mm diameter measurement area while the CM-26d and CM-26dG versions can switch between 8mm and 3mm measurement areas.

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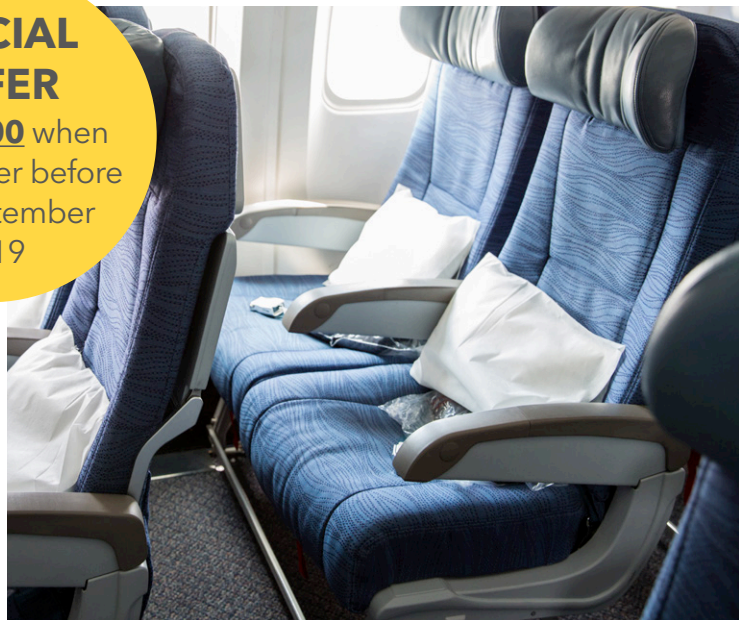

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Right: Konica-Minolta's CM-26dG portable spectro-photometer supports simultaneous measurement of colour and gloss

All models enable fully digital colour management (no physical colour standards are required). Inter-instrument agreement (average for 12 BCRA colour tiles) is said to be within ΔE* 0.12 for the CM-26dG and CM-26d variants, an improvement of around 40% from previous models. The instruments are also equipped with the company's Job Function feature, which allows measurement instructions (including photographs) for routine tasks to be registered in the instrument. This is said to improve process accuracy, productivity and consistency where the portable devices are likely to be used by several different operators.

Frankfurt, Germany-headquartered **Techkon**, which makes colour measuring devices and software solutions for quality control, says its SpectroDens series makes colour measurements quick and easy. The instruments are claimed to solve the problem of measuring and matching colours on various substrates and surfaces. Beside its one-second measurement time and high accuracy, the SpectroDens device offers customers the option to measure with standard light conditions by supporting all measuring conditions inclusive of M1.

Low cost option

A relatively low-cost alternative to spectrophotometers or manual control with light cabins comes from Swiss company **Colorix**. Its Colorcatch Nano is listed at €445 before tax, fits in the palm of the hand, and connects with an app on a separate device. The product is mostly intended for quality control on printed images or coloured finished materials of various types but, because it measures areas as small as 0.3mm across, it can also be used to measure colour of individual plastics granules.

The Colorix app displays the CMYK, Lab, Lch and sRGB values, as well as the deviations for each. Set tolerances can be checked within one click, and information can be exported and sent in just a couple more.

Colorix says the Colorcatch Nano is the only colorimeter in the world equipped with a camera that can be connected to a smartphone, tablet or PC. It does not take a photo, but films the surface and captures up to five colours simultaneously. A version sold by RAL shows the filmed colour or colours, finds the next RAL colours, and displays the technical specifications.

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A quick look at colour

*Colour is complex. Here colour measurement specialist **Datacolor** provides some basics on how the human eye perceives colour and how that process can be instrumented*

Main image: The human eye is an impressive colour perception device but has its limits as a colour matching tool

Human perception of colour is not straightforward and science is still uncertain of the precise processes involved. According to traditional trichromatic theory (also called Young-Helmholtz theory), rod-shaped photoreceptor cells in the retina of the eye allow us to see at very low light levels but only in shades of grey. Different cone-shaped cells allow us to perceive colour in brighter light through their response to roughly three different wavelength spectra: blue (absorption peak around 445nm); green (535nm); and red (565nm). However, a newer alternative theory postulates that colour vision depends upon three receptor complexes with opposing actions: light/dark (white/black), red/green, and blue/yellow. In any case, what is clear is that the way in which we perceive colour is complex.

Humans are pretty good at recognising the colour of familiar objects, even under different ambient lighting conditions. This adaptation of eye and brain is known as colour constancy. It doesn't apply to subtle colour variations, though, and does not counteract the changes in colour due to intensity or quality of light.

We may also be able to agree with each other on the wavelengths that define basic colours, although this could have more to do with our brains than our eyes. In a 2005 study at the University of Rochester in the US, for instance, individuals were shown to perceive colours the same way even though the number of cone receptors in their retinas varied widely (researchers found that when volunteers were asked to tune a disc to "pure yellow" light everyone selected nearly the same wavelength, for example).

However, the situation gets more complicated

when different individuals are asked to match colours to samples. Local environmental factors and personal differences (age, memory, medication, even mood) among viewers seem to alter perception, which means we can't be assured of accurate matches. In an industrial environment, this can cause problems such as production delays, material waste and quality control failures. As a consequence, business is increasingly turning to mathematical equations to specify colours and non-subjective measuring devices to ensure matching.

Mapping colour

The CIE colour model, or CIE XYZ colour space, created back in 1931, is a mapping system that plots colours in a three-dimensional space using red, green, and blue values as the axes. Variants of this model include CIELAB, defined in 1976, where L refers to luminance, A the red/green axis, and B the blue/yellow axis. Yet another model, CIE L*C*h, factors in lightness, chroma, and hue.

Measurement depends upon colorimeters or spectrophotometers that provide digital descriptions of colours. For instance, the percentages of each of the three primary colours required to match a colour sample are referred to as tristimulus values. Tristimulus colorimeters are used in quality control applications.

Light and perception

Colour in light, unlike colour in a pigment, depends on the spectral energy it contains. Objects that appear red reflect red energy while absorbing all others. Without the red energy, a normally "red" object will appear black.

The colour of a light source can be described by measuring the relative powers of various wavelengths. As this spectral power distribution (SPD) changes, so does the way light is reflected to our eyes, which affects the colours we perceive.

Light sources are measured according to their ability to accurately reveal colours in comparison with natural lighting. This value, determined by the spectrum of the light source, is called a colour rendering index (CRI). The CRI for natural, outdoor light is 100.

But natural light varies with the weather, time of year, time of day, position of a building, and many other factors. Lighting designers can make adjustments through the careful selection of artificial light, while paint and textile colours can be chosen to offset characteristics of natural light. For instance, indirect northern light can make colours appear darker, so a designer might select brighter colours than for a southern exposure.

■ Datacolor develops and supplies software, instruments (including a full line of spectrophotometers) and services to ensure accurate colour control of materials, products, and images.

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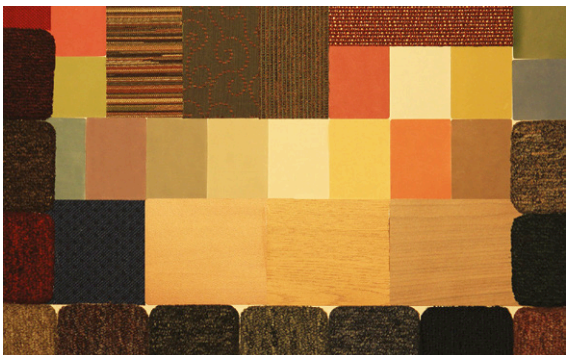

PHOTO: DATACOLOR

Left: Light has a big influence on colour perception. The images show how the same colours appear in incandescent (top image) and cool white fluorescent (bottom image) illumination

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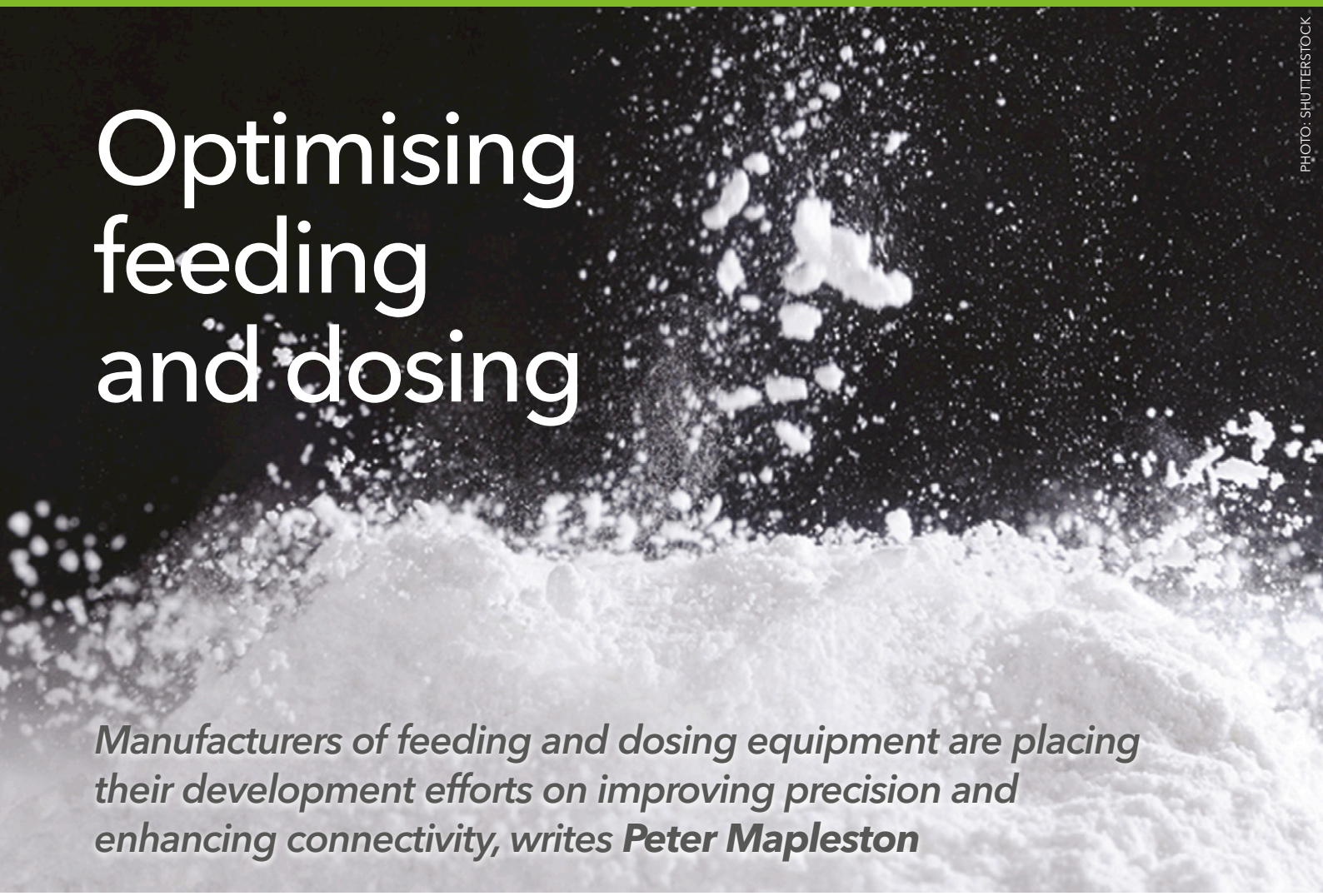

PHOTO: SHUTTERSTOCK

Optimising feeding and dosing

Manufacturers of feeding and dosing equipment are placing their development efforts on improving precision and enhancing connectivity, writes ***Peter Mapleston***

Suppliers of feeding and dosing equipment suitable for compounding applications are aiming to provide processors with more performance for their money, with improved accuracy in hardware and more sophisticated software for supervision and control high on the list of enhanced features.

Wittmann says its latest Gravimax blenders offer a useful route to savings in material costs. The company says that, in addition to easy operation, these blenders offer high levels of accuracy and precision in dosing, made possible by their use of RTLS (Real Time Live Scale) real-time weighing. This helps maintain a metering accuracy of 0.006% while keeping the mixing ratio of polymer to additives on a constant level. New functions contribute further to measurable cost savings in complex metering processes.

Plastics processors often tend to exceed the necessary dosage of additives by up to 30%, Wittman says. This is due to concerns that, due to fluctuations in metering hardware, the dosage could fall below the required minimum level and lead to production of scrap. This can quickly lead to unnecessary extra annual costs, which in some cases could be measured in six figures.

Gravimax feeders include a metering mode called Reference Additive, which is intended to address the strong vibrations of the machine or sudden shocks that can lead to deviations in blending of additives. In Reference Additive mode, the blender instantaneously adjusts the quantity of virgin material to be blended according to the actual quantity of additive so the ratio between the two types of material corresponds to the ratio defined in the original parameter settings for the production lot. This means if an additive is overdosed it is compensated for by addition of more virgin material.

PHOTO: WITTMANN GROUP

Central material drying and handling systems that deliver materials to all processing machines in a plastics production plant are often accessible to all staff members and open to potential risk in set-up or operation, which makes it prudent to put special security measures in place. Wittmann says that a well-planned central system will include several different options in this area. For instance, appliances included in its central systems can be blocked by a key lock function or the entire system

Main image: The latest materials handling technologies aim to maintain better control of raw materials and process recipes

Left: Wittmann's Gravimax G34 blender offers a throughput of up to 350 kg/h

PHOTO: WITTMANN GROUP

Right: The M7.3 IPC network control system automates control of material flow from source to machine using handheld barcode scanners (visible right)

protected in such a way that login to its individual components is only possible by entering a user-name and password. Alternatively, a user administration can be installed that can be operated via RFID cards.

For the installation of a coupling station, Wittmann recommends the use of its Codemax unit. This implements control of the mechanical flow interfaces via contactless coding. All existing interfaces and actions occurring in a central system are visualised on a touch-control panel called M7.3 IPC. Using this panel it is also possible, for example, to check the connection between a given material source and a drying silo. Material transport can then only occur after the control unit receives confirmation that the bar code relating to the material found on its container has been correctly read by a barcode scanner.

Improving traceability

Wittmann says that the increase in attention paid to such safety features at processors reflects the desire for improved traceability and production reliability and has come hand-in-hand with the realisation that this all begins with the production staff responsible for operating the equipment. For this reason, user administration of the M7.3 IPC requires a username and password and individual operators can be allowed or barred from using various options related to the setting parameters. In addition, all log-ins and log-outs, as well as changed to parameters, are recorded and are traceable.

The vast majority of errors, however, occur at the material source, says Wittmann, whether that be an octabin, a big-bag, or a mobile container. "Even when sources are provided with barcodes, this does not necessarily mean that material supplies are only set in motion by qualified equipment operators," the company says. "The risk of using the wrong material source should not be underestimated."

To take care of this, Wittmann also offers a storage surveillance system for its central stations. Within this system, whenever an unauthorised access is registered all appliances that could cause incorrect material handling are automatically stopped and an error signal issued. The appliances restart only once the correct material is reconfirmed via a barcode scanner.

Behaviour of the system when containers are replaced can also be pre-set. Indicator lights at the point of storage will show operators which material source they have access to at any given time. Once the source has been changed, the relevant barcode must be scanned again before material transport can be restarted.

Below: Piovan's Winfactory 4.0 supervisory system allows material data to be better managed

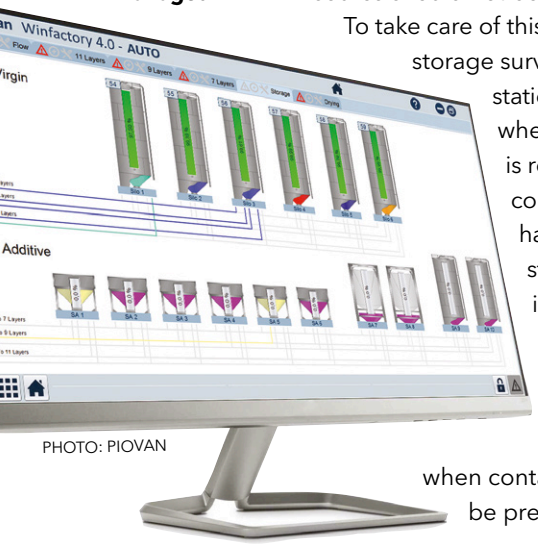

PHOTO: PIOVAN

Communication gains

The big difference that will be seen in the future of feeding systems is not just the ability for moving pellets from one place to another, says **Piovan**, but having the capability to collect data and integrate that in the context. The Italian company says it has created a complete ecosystem that includes devices for the automatic distribution of materials for feeding, tracking of material consumption, quality control and plant supervision. This system covers the process from the very beginning, where raw materials enter into the customer's production facility.

Its latest innovation is a new handheld logging device. Said to be more than a simple barcode reader, it incorporates a proprietary Piovan app to guide the operator step-by-step during the loading procedure of the raw material, in what is intended to be a fool-proof process.

The overall system is complete with a set of visual indications and with storage devices that include electric locks in order to avoid mistakes and to interact with operators. "In this way, there is no more risk of mixing different materials or to use the wrong resin," says Piovan. "The managing of the storage is optimised and always updated without the risk of stock breaches and without untraced materials batches."

The company's Winfactory 4.0 supervising system collects data and oversees everything. Its material tracking tool makes it possible to track each batch of raw material through to its final destination.

Bulk handling

Among the major compounding system producers, **Coperion** has been showing various feeding and dosing solutions offered under the Coperion

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Right: Coperion K-Tron's K-ML-BSP-150-S Bulk Solids Pump feeder

K-Tron brand at recent shows around the world. At Chinaplas in May, for example, it demonstrated what it says is a highly accurate Coperion K-Tron Quick Change twin screw feeder fitted out with an ActiFlow bulk solids activator, Electronic Pressure Compensation (EPC) and 2415 vacuum receiver for refill, as well as its K-ML-BSP-150-S Bulk Solids Pump (BSP) feeder for granular materials.

The QC feeder allows for the removal of the entire feeding module with screws in place for replacement with a second unit. The removed feeding module can then be transported to a cleaning facility for further disassembly, cleaning and prepped for another material. Twin and single screw feeding modules are available. Single screw feeding units handle free flowing powders, granules, pellets and other non-flooding materials, while twin screw units are ideal for floodable powders and more difficult, sticky or hard-to-flow materials.

The ActiFlow smart bulk solids activator offers what Coperion says is an innovative method to reliably prevent bridging and rat-holing of cohesive bulk materials in stainless steel hoppers without resorting to internal hopper agitation. ActiFlow is a non-product contacting device consisting of a vibratory drive and intelligent control unit that is designed specifically to work with Coperion K-Tron's line of gravimetric loss-in-weight feeders. Together with the ActiFlow control unit, it continuously activates the material inside the hopper at an optimised frequency and amplitude without exerting any mechanical force on the bulk material.

Coperion says the K-ML-BSP-150-S BSP feeder is a unique alternative for gentle feeding of free-flowing granular materials. Rather than using the usual screws/augers, belts or vibratory trays to convey material, it utilises positive displacement action with vertical rotating discs to feed free-flowing materials with high accuracy. The company says it offers "uniform discharge, consistent volume and gentle handling." Because the feeder design has no pockets or screws and only one moving part, it can be cleaned in seconds.

At Plastimagen in Mexico in March of this year, Coperion showed a gravimetric screw feeder with continuous and uniform infeed set up for the production of masterbatch. The KT20 twin screw feeder with interchangeable feeding tools mounts on a 24 kg fully enclosed platform scale for high accuracy feeding of difficult flowing ingredients. A horizontal agitator gently moves the bulk material to the large throat and then into the screws. The company says the twin screw feeders are well suited for use with difficult, sticky or poorly flowing materials, as well as for use feeding fibres and flakes.

Last year, the company released version 2.0 of the Coperion K-Tron K-Vision software, which introducing several new features. The K-Vision controller presents a graphical operator interface for controlling multiple devices such as feeders or feeder refill (vacuum receivers). With the latest software, it can handle a total of 24 devices in one or two lines (the previous version managed up to six feeder controllers in a single line). K-Vision uses a 12.1-inch colour LCD display together with a touchscreen as the primary operator input mechanism. It offers a quad screen display mode for viewing multiple pages on one feeder or a single page on multiple feeders.

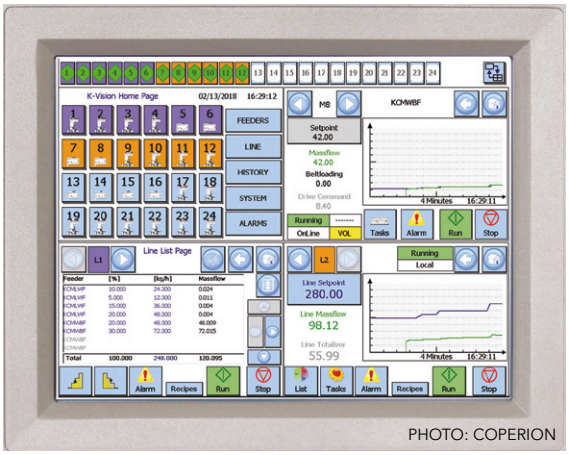

PHOTO: COPERION

Right: The latest version of Coperion K-Tron's K-vision control software can handle four times as many feeders and devices

Joint development

Leistritz takes a different route from Coperion in terms of dosing and feeding technology, cooperating with third party suppliers rather than developing its own products. It recently, for example, cooperated with material handling specialist **AZO** to develop a comprehensive package for production of highly filled compounds. Together, the two companies constructed a demonstration plant at Leistritz's Nuremburg location.

AZO took responsibility for ensuring that additives in powder form would be fed into the closed system with minimal generation of dust. It specified its AZO Mixomat mixer for the project, which was

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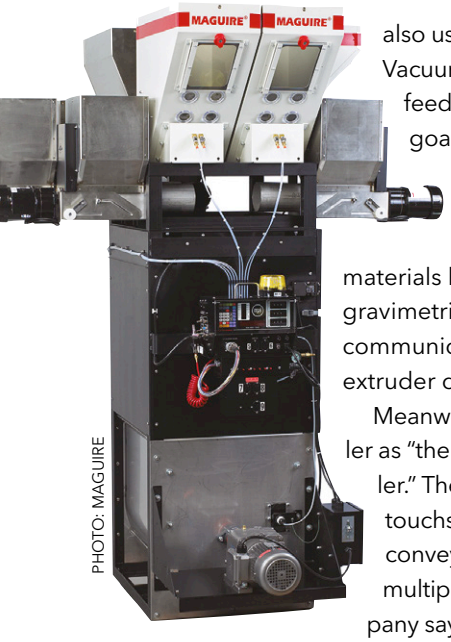

PHOTO: MAGUIRE

Above: Maguire's MaxiBatch blender has been developed for maximum flexibility

also used for premixing different polymers. Vacuum conveying systems are employed to feed Azodos loss-in-weight feeders, with the goal being that there would be no interference with the dosing processes while the dosing units were being filled.

The Azo controls used for the materials handling system and continuous gravimetric feeding operate in continuous communication with the Leistritz compounding extruder control system.

Meanwhile, **Maguire** refers to its 4088 controller as "the world's most intuitive blender controller." The unit has an option of a removable touchscreen interface with embedded conveying software to control loading of multiple materials into a blender. The company says performance is up by 650% over the 4088's predecessor, the 1212. The new controller uses 32-bit data rather than 16-bit and can run at 120 MHz, compared with 16 MHz on the previous version. In addition, it provides eight times as much memory, more storage for data logs, and the ability to handle larger communication buffers.

A keypad/digital thumbwheel interface comes as standard, or operators can choose a new touchscreen interface that is removable for remote operation. This touchscreen interface features graphical display, is available in multiple languages and comes with readily recognisable icons for every blender module and those of a loading system. Compared with previous controllers, the 4088 operates at 45 times the resolution of the load cells used to weigh batch ingredients, for faster and more accurate readings.

Conveying options

Maguire's FlexBus Lite conveying software is designed to handle loading of multiple materials into a blender and metering of the combined materials into a processing machine. FlexBus Lite can control one vacuum pump and up to nine receivers for materials to a blender and then feeding local machines.

"We've connected all parts of the production process with our 4088 controller through an Industry 4.0 setting," the company says. "This brings connectivity, including data analysis, to the whole production process bringing intelligent factory automation for improved efficiency and reduced costs." Maguire says the 4088 controller can easily be retrofitted to most legacy blenders.

The company's MaxiBatch blenders have been around for some time now in various guises but they continue to meet the demands of the market. The units can blend virtually any combination of powder, wood flour, flake, regrind, pellet and additive, providing advantages at a fraction of the cost and space required by previous methods. Depending on the model, maximum throughput capacity can be as high as 5,500 kg/hr.

Any one blender utilises a variety of proprietary dispense methods to enable accurate blending of up to 12 ingredients as either a major or minor component. Hoppers and dispensing devices are all interchangeable and each hopper incorporates its own dispensing device designed for precise metering in large quantities.

A variety of proprietary, interchangeable dispense devices and bin sizes allows the MaxiBatch to be customised to specific applications. For example, a "high flow corner valve" will dispense pellet or regrind materials at up to 11,000 g/s, while a "low flow pivot valve" for pellets, regrind and some long glass fibre reinforced materials is rated at 2,000 g/s. A wood flour/powder feeder with an internal bridge breaker is suitable for very low bulk density powders, especially wood flour, handling 85 litres/min. Small capacity powder feeders for minor ingredients handle up to either 57 or 85 litres/min, depending on size.

As with all Maguire weigh blenders, ingredients are dispensed sequentially into a weigh chamber; the batch then falls into a mixing chamber. An optional advanced touch-screen control includes wireless capability to eliminate the cost of installing cable throughout the production area and enables links to other wireless equipped machines.

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Right: Maguire's 4088 controller is designed for integration into Industry 4.0 settings

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Asia's compounders to meet in Bangkok

AMI's fifth Compounding World Asia conference takes place in Bangkok in Thailand in September. We take a look at what the event holds in store

The compounding market in the greater Asia region accounts for around 60% of all global compounding activity and is developing quickly. Regional growth exceeds 5%, according to AMI estimates, with key markets such as China and India growing at near to 10% annually. The compounding industry in the region is also highly sophisticated, with many formulations and solutions developed specifically for the needs of the local market. This can often involve the use of different additives and polymer combinations than those seen in other global regions.

AMI's fifth Compounding World Asia conference reflect this diversity and innovation through a series of presentations highlighting added value opportunities. The two-day international event takes place on 25-26 September 2019 at the Banyan Tree Hotel in Bangkok, Thailand, and will provide a platform for all industry professionals and their supply chain partners to exchange ideas, learn about the latest developments in this market and grow their networks. This article previews the event, taking a closer look at the international line-up of expert speakers and the topics that will be covered.

The conference will open with a regional compounding market overview from AMI, followed by a panel discussion that will explore the future outlook and opportunities for the compounding industry across the greater Asia region. Participants include **Shanmugam Srinivasan**, Managing Director of **XMold Polymers** in India and **Montree Pleekhunt**, Compounding Specialist at **PTT Gobal Chemical** in Thailand. **Register your interest** to keep up to date as we announce additional panellists in the lead up to the event.

With the rise of e-mobility and NEVs, the compounding industry is under pressure to ensure its materials continue to meet the changing requirements. The second session of the day covers advances in compounds for automotive applications. **Dr James Mitchell**, Global Automotive Market Director at **Solvay** in France, begins the session with an overview of the rise of e-mobility and discusses the potential opportunities and threats it poses to compounders and the wider industry. The focus then turns to opportunities for polypropylene compounds for automotive applications in Indonesia. **Andri Wijaya**, Senior Engineer Technical Service and Product Application at **PT Chandra Asri Petrochemical** in Indonesia, will speak about developing trends in this emerging market.

Main image: The innovative and fast growing Asian compounding industry will be explored at Compounding World Asia in Bangkok in September

Expert speakers at AMI's fifth Compounding World Asia conference include (from left) Solvay Global Automotive Market Director Dr James Mitchell, ICL Group China FR Technical Manager Dr Daisy Li, XMold Polymers Managing Director Shanmugam Srinivasan, and Fine-Blend Compatibilizer R&D Market Development Manager Duan Hao

Developments in PA6 compounds to substitute PA66 will be covered by **Aumpa Chalermchoknantakit**, Regional Industry Manager Polymers, Plastics and Rubber Asia at **Brenntag Ingredients (Thailand)**. Then **Byungkook Nam**, Team Leader and Principal researcher at **Lotte Chemical Research Institute** in South Korea, will close the session with a presentation on TPO/LFT injection foaming technology for production of light weight automotive parts.

Additive developments

The conference will then move on to additives. **Petri Matikainen**, Sales Development Manager at **Croda** in China, will open the session with a review of the use of permanent anti-static additives in polymer compounds. **Dr Daisy Li**, FR Technical Manager at **ICL Group** in China, will speak about sustainable flame retardant options for engineering thermoplastics for NEVs. And **Cindy Liu**, Marketing Manager APAC-BL Flame Retardants at Clariant Coatings (Shanghai), will bring the day to a close by sharing insight into halogen-free flame retardants for e-mobility applications.

The second day will begin with a review of regional market and research and development activities. **Shanmugam Srinivasan**, Managing Director of **XMold Polymers** in India, will open the session by exploring opportunities in India's fast-growing polymer compounds market. Then **Dr Saifudin Abubakar**, Manager Global Product Fundamentals at **ExxonMobil Asia Pacific** in China, will discuss the future direction of polymer research in the Asia Pacific region.

Two presentations will look at ways to add functionality and value to compounds. **Duan Hao**, R&D Market Development Manager at **Fine-Blend Compatibilizer Jiangsu** in China, will present research into the use of long-chain branched SAN to improve the performance of ABS and ABS blends. **Péter Sebö**, Head of Marketing & Market Development at Quarzwerke Group's **HPF The Mineral Engineers** in Germany, will speak about developments in functional fillers for polymer based applications.

Regulatory challenges

The conference will then turn to the topic of chemical regulation. **Jared Chen**, Regulatory Affairs Consultant at **REACH24H Consulting Group China**, will speak about ways to ensure compliance with chemical regulations in Asia and present practical guidelines for the polymer industry. **Eric Xiong**, Head of Industrial Chemical Sector at **CRIS Group** in China, will talk about compliance of compounding products under REACH-like chemical regulations from the industrial perspective.

The final session of the conference will look into two of the current leading issues for the plastics industry – recycling and bio-based plastics. **Pablo León**, Asia Manager of **Fosimpe SL-Recycled Plastics** in China will provide an overview of plastics recycling across South East Asia, assessing the opportunities and risks created by the Chinese import ban. And **Katedao Chavalitdamrong**, Marketing Manager at **PTT MCC Biochem Company** in Thailand will discuss developments in production and application of the renewable polyester polybutylene succinate.

About Compounding World Asia 2019

The fifth Compounding World Asia conference takes place in Bangkok, Thailand, on 25-26 September 2019. Organised by AMI and *Compounding World* magazine, the event brings together leading experts to discuss trends across the region, highlight threats and opportunities for the industry, explore innovations in additives, and cover key regulatory issues effecting compounders.

In addition to the formal two-day programme of expert presentations, Compounding World Asia includes an interactive exhibition and will provide plenty of opportunities to network during the informal coffee breaks, lunches and the evening cocktail reception. To learn more visit the **conference website** or contact Conference Organiser Rebecca Weir. Tel: +44 (0) 117 314 8111; Email: **rebecca.weir@ami.international**

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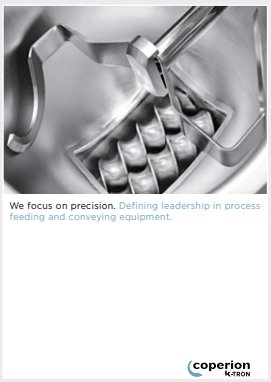

Coperion K-Tron provides a full portfolio of feeding and conveying equipment for compounders. This 16-page brochure details the full range, from volumetric and gravimetric feeders to blenders and metering units.

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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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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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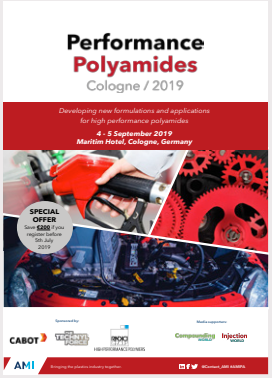

The fourth edition of AMI's Performance Polyamides conference takes place in Cologne in Germany on 5-6 September 2019. It focuses on technological developments and leading-edge applications for high performance polyamides.

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AMI's Masterbatch conference has been the meeting point for this international industry since 1987. The 2019 event takes place in Vienna in Austria on 10-12 September and provides an unmissable learning and networking opportunity.

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

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

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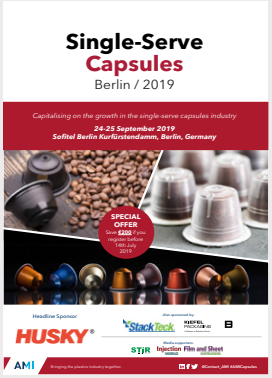

AMI's single-Serve Capsules conference returns to Berlin in Germany for its third edition on 24-25 September. It brings together industry-elite speakers from the entire supply chain to discuss the latest trends, challenges and opportunities.

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COMPOUNDING WORLD ASIA

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

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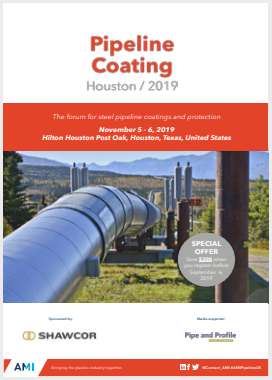
PIPELINE COATING HOUSTON 2019



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

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POLYOLEFIN ADDITIVES 2019

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

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AGRICULTURAL FILM 2019

AMI's 12th Agricultural Film conference takes place on 18-20 November in Barcelona in Spain, which lies at the heart of Europe's plasticulture activities. Delegates will learn about the latest market needs and material and additive solutions.

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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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Calco Poly Technik, India

Head office location:	New Delhi, India
Key management:	Vijay Kumar Gupta (Chairman), Varun Gupta (Managing Director)
Ownership:	Private Limited Company
Sales 2018:	$11m
Production 2018 (tonnes):	8,000 tonnes
Plant locations:	Kundli and Bahalgarh, Haryana, India
Profile:	Calco Poly Technik, part of the Calco Group, was founded in 2011 with the aim of becoming a leading player in the Indian technical compounding industry. Since its formation, the company has grown its capacity to 8,000 tonnes/year and developed a broad range of high performance polymer compounds. Calco continues to invest as it moves forward with its plans to build capacity to around 30,000 tonnes/year by 2023. The next step towards that goal will be the addition of a further 9,300m^2 of floorspace, which is expected to be in operation later this year.
Product line:	Calco products include engineering compounds for the automotive and electrical industries, which account for around 90% of its output by value, as well as for electronics and industrial goods. The range of polymers handled by the company includes PA6, PA66, PBT, PC, PC/PET, PC/PBT and PC/ABS, which are offered in mineral and glass reinforced and flame retarded versions.
Product strengths:	Calco is particularly strong in PA and PBT compounds, which account for more than 70% of its annual product sales. It operates a flexible manufacturing strategy, which allows it to deliver on short leadtimes.

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

Compounding WORLD FORTHCOMING FEATURES

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

August

PVC plasticisers ● WPCs
Screws and barrels
Reactive compounding
K2019 visitor guide

September

Colour pigments ● Bioplastics
Antioxidants and UV stabilisers
Purging and cleaning
K2019 Show Preview Part 1

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

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

Keep informed: read our latest editions

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

Compounding World June 2019
The June edition of Compounding World leads with a feature on how advances in clarifying and nucleating agents are improving resin quality. Features also cover functional fillers, PVC additives and clean production.

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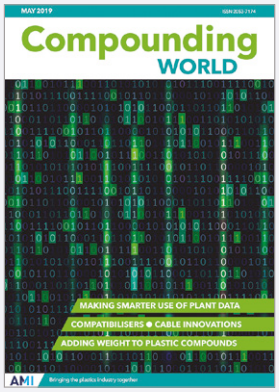

Compounding World May 2019
In the May edition of Compounding World, there are features about smart use of plant data, compatibilisers, cable compounds, and high density plastics. Plus, a preview of the Chinaplas 2019 exhibition and AMI's Compounding World Congress.

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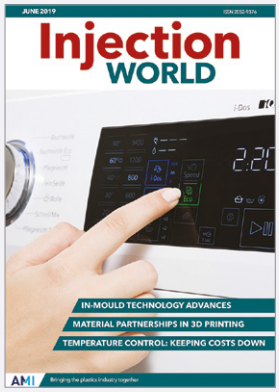

Injection World June 2019
The June edition of Injection World magazine looks at the latest innovations in decorative and functional IML technologies. It also explores developments in additive manufacturing and temperature control.

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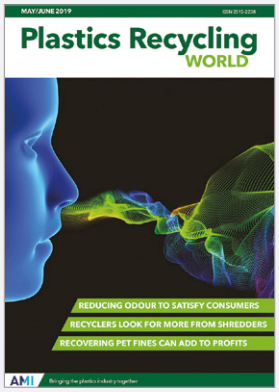

Plastics Recycling World May/June 2019
The May-June edition of Plastics Recycling World looks at how additives suppliers and machinery makers are tackling the issue of odours in post-consumer recyclate. Other features cover new shredder technology and processing rPET fines, plus Plastics Recycling World Expo.

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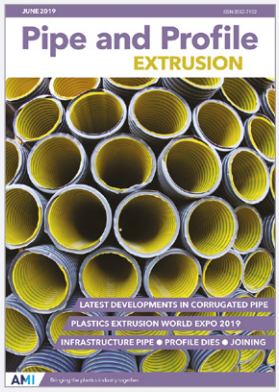

Pipe and Profile June 2019
The June issue of Pipe and Profile Extrusion includes features that cover infrastructure pipes, profile die control, pipe corrugators and pipe weld assessment. Plus it has a review of the Plastics Extrusion World Expo in Cleveland, US, in May.

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Film and Sheet June 2019
The June edition of Film and Sheet Extrusion reviews the latest developments in plastic pouches. It also takes a look at the newest innovations in thermoforming machinery, printing technology and blown film dies.

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

GLOBAL EXHIBITION GUIDE

2019	**1-3 August**	Plastics, Printing & Packaging, Nairobi, Kenya	www.expogr.com/kenyappp
	2-4 September	Interplastics-Kazan, Kazan, Tartarstan	www.k-globalgate.com
	18-21 September	T-Plas/Tiprex, Bangkok, Thailand	www.tplas.com
	16-23 October	K2019, Dusseldorf, Germany	www.k-online.com
	17-19 October	Plastics, Printing & Packaging, Dar-es-Salaam, Tanzania	www.expogr.com/tanzania/pppexpo
	25-28 November	Plastivision Arabia, Sharjah	www.plastivision.ae
	27-29 November	Plastics & Rubber Vietnam	www.plasticsvietnam.com
2020	**13-16 January**	Saudi Plastics & Petrochem, Riyadh	www.saudipp.com
	16-20 January	Plastivision India, Mumbai, India	www.plastivision.org
	21-23 January	Swiss Plastics, Lucerne, Switzerland	www.swissplastics-expo.ch
	28-31 January	Interplastica, Moscow, Russia	www.interplastica.de
	9-11 March	Plast Alger, Algiers, Algeria	www.plastalger.com
	11-13 March	Expo Plasticos, Guadalajara, Mexico	www.expoplasticos.com.mx
	7-13 May	Interpack, Dusseldorf, Germany	www.interpack.com
	13-17 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
	8-11 November	Pack Expo, Chicago, USA	www.packexpointernational.com

AMI CONFERENCES

4-5 Sept 2019	Performance Polyamides, Cologne, Germany
10-11 Sept 2019	Smart Packaging, Hamburg, Germany
10-12 Sept 2019	Masterbatch 2019, Vienna, Austria
17-18 Sept 2019	Polymers in Flooring USA, Atlanta, GA, USA
18-19 Sept 2109	Polymer Testing & Analysis, Dusseldorf, Germany
25-26 Sept 2019	Compounding World Asia, Bangkok, Thailand
5-6 November 2019	Medical Tubing, Minneapolis, MN, USA
5-6 November 2019	Conductive Plastics, Vienna, Austria

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

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