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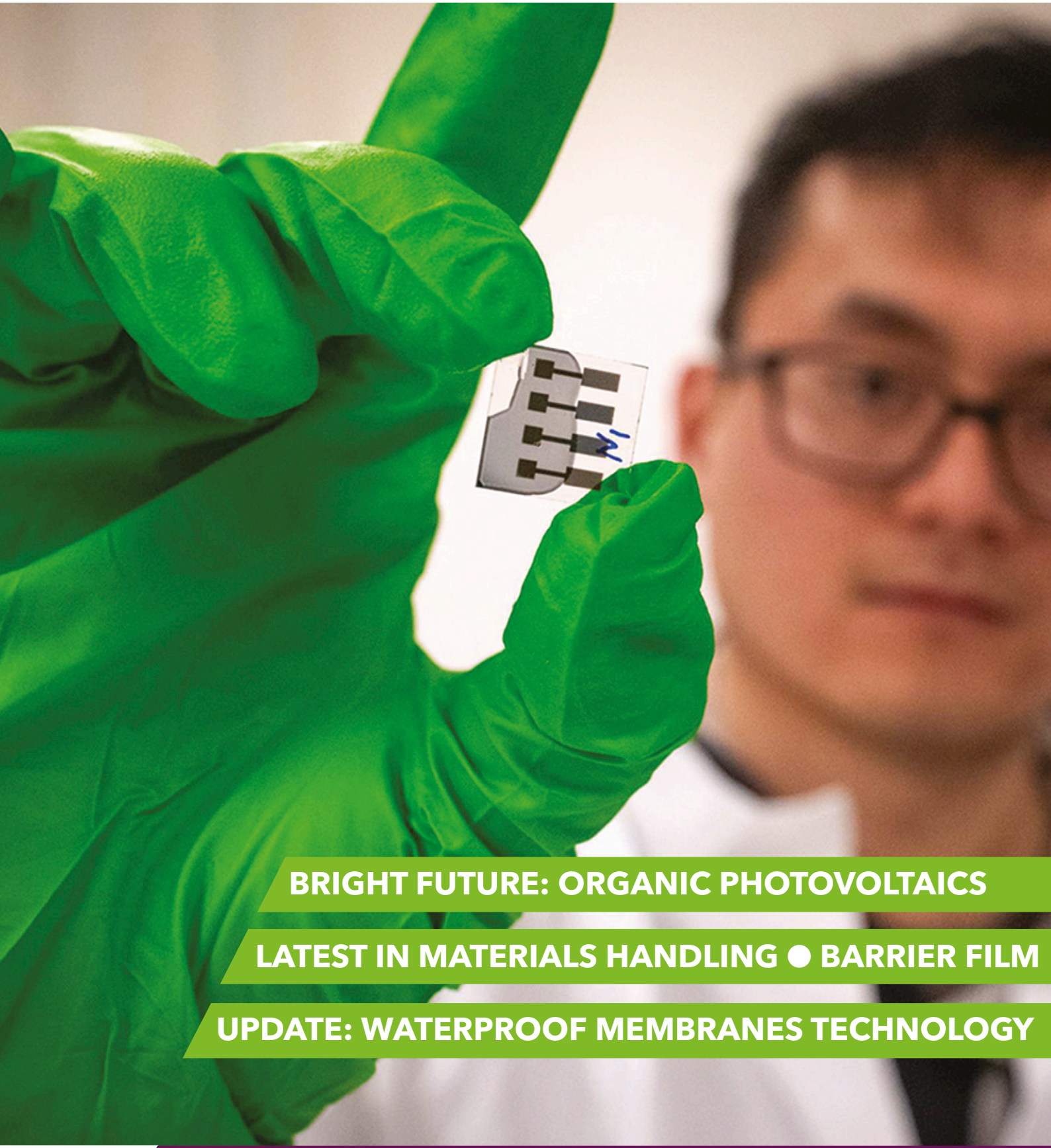

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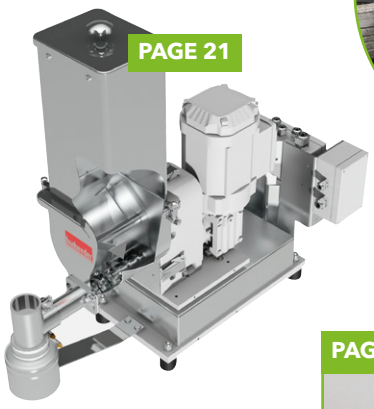

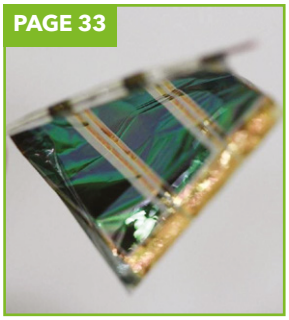

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Simona sales rise in 2019 on back of strong growth in North America

Simona of Germany – which makes both extruded sheet and pipe – grew both sales last year, due mainly to a solid performance in North America.

The company posted revenues of nearly €433 million (US$462m), a rise of more than 3%. Despite this increase, poor sales in Europe saw the company fall just short of its target revenue figure of €435-450m (US$464-480m).

For the same period, profitability (EBIT) fell by around 11% to just over €29m (US$31m).

"Given the economic fundamentals, we are satisfied with our EBIT margin of 6.8%," said the company.

It also said that EBIT for the first quarter of 2020 has risen to nearly €10m

Schoenberg: "Solid earnings performance in the first quarter of 2020 shows we are on the right track"

(compared with around €8m, in 2019), despite the initial impact of the Coronavirus pandemic.

Revenue growth in 2019 was due almost entirely to business in the USA. The first-time inclusion of its extrusion subsidiary Simona PMC for a full annual period helped drive sales in the region up by nearly 16% to almost €132m (US$141m) – a rise of nearly 16%.

The Americas region as a whole saw its share of revenue increase to more than 30%. In Europe, sales fell by 1.5% to almost €270m (US$288m) due to a downturn in the economy in the second half of the year. In Asia, business performance was influenced by a weak first quarter, though sales rose more than 2% to nearly €31m (US$33m) for the year.

In its semi-finished products division – which includes plastic sheet – sales grew more than 3% to exceed €344m (US$367m) due to solid business in aircraft interiors. Sales of PVC foam sheets for applications in digital printing and construction fell year on year – though this has begun to pick up again.

For comparison, its pipes and fittings division increased sales by 5% to exceed €88m (US$94m).

"Our solid earnings performance in the first quarter of 2020 illustrates that we are on the right track with the strategic projects aimed at an application- and process-driven realignment of our semi- finished parts business in Europe," said Matthias Schoenberg, CEO of Simona. "Due to the uniqueness of the coronavirus pandemic, we are not able to draw on fundamental data that would allow a reliable forecast for the year as a whole."

› **www.simona.de**

Huhtamaki grows in first quarter of 2020

Packaging giant Huhtamaki saw a 5% increase in sales for the first quarter of this year.

Revenues reached €845m (US$902m) for the period, due mainly to solid demand for food packaging. For the same period, adjusted EBITDA was €117m (US$125m), a rise of of around 9%.

The company saw a 12% in sales growth in North America to exceed €286m (US$305m), while flexible packaging sales grew 8% to €271m (US$289m). However, Foodservice sales fell by 5% to around €218m (US$233m).

"The solid performance in Q1 was marked by contrast: while good demand for food packaging continued, the outbreak of Covid-19 quickly transformed the overall business context," said Charles Héaulmé, president and CEO of Huhtamaki.

› **www.huhtamaki.com**

California reverses bag ban for 60 days

California has temporarily reversed its ban on single-use plastic bags in an attempt to stop the spread of the Coronavirus.

Gavin Newsom, governor of California – which is the USA's most populous state – signed an executive order to reverse the ban on 22 April.

The statewide ban on single-use plastic bags has been in place since 2014.

The bag ban will be lifted for 60 days, to stop customers from bringing their own reusable bags to shops. During this time, shops will provide bags free of charge.

The move is "critical to protect the public health and safety and minimize the risk of Covid-19 exposure for workers engaged in essential activities, such as those handling reusable grocery bags", said the order.

Cleanable film for masks

KraussMaffei's extrusion division, at its Hanover site in Germany, has responded to the shortage of personal protective equipment (PPE) by producing reusable facial visors.

The visors are designed to be used by medical and healthcare professionals, as well people working in jobs with a high degree of personal contact. The main visor component is a stable, transparent film that can be cleaned with common disinfectants, is impermeable to droplets and keeps hands away from the face.

So far, the company has supplied the visors to several hospitals in Hanover.

"Our visors are not certified, but we do not intend to supply bulk buyers – rather small next-door institutions that are in desperate need of masks but finding it difficult to get them," said Matthias Sieverding, president of KraussMaffei's extrusion technology division.

› **www.kraussmaffei.com**

Shifting production to clinical waste sacks

UK-based Berry BPI recently made an urgent delivery of clinical waste sacks to a new temporary hospital in London.

The NHS Nightingale Hospital is situated in the Excel exhibition centre – which has been converted into a hospital with the capacity to treat up to 4,000 patients affected by Covid-19.

BPI's Heanor factory received a call from the National Health Service (NHS) to urgently despatch 150,000 clinical waste bags directly to the hospital. Production was rescheduled, and the following morning a delivery was arranged with its logistics partner.

"We have been working closely with the NHS to ensure that we meet the increased demand for clinical waste bags," said Lorcan Mekitarian, sales director at Berry BPI. "However, given the speed of development of the Nightingale Hospital, we were asked to deliver these sacks in less than 24 hours."

The Heanor factory is a major supplier to the NHS and has recently turned over a large of part of its capacity to meet increased demand for clinical waste sacks, from hospitals across the country.

Clinical waste sacks are vital in the fight against infection and in keeping hospitals functioning, said the company.

› **www.berryglobal.com**

Pilot plant for protective clothing

Austrian plastics machinery manufacturer SML has set up a pilot plant to produce laminates for protective clothing, in answer to the call from the Federal Government,

Production can be carried out on an industrial scale on a modern extrusion line at the company's site in Redlham. This plant is otherwise only made available to customers as a demonstration line and for product development. SML's new company headquarters, including its development department and production facilities in Redlham, opened just one year ago.

"Normally our business is to develop and manufacture machines, and not the production of materials – however these extenuating circumstances require extraordinary measures," said Karl Stöger, managing director of SML.

A pilot plant at SML's headquarters is making materials for protective equipment

The line used to make materials for protective clothing is an extrusion line for coatings and laminates. It is equipped with SML's patented DoubleCoat process. This process is typically applied to the production of thin laminates and membranes. Materials produced using DoubleCoat also have high breathability and elasticity.

"The materials we are now producing are laminates combined with what are known as 'monolithic membranes'," said Mario Höllnsteiner, product manager at SML. "In contrast to many of the other laminates used, these form an extremely effective barrier against viruses and bacteria."

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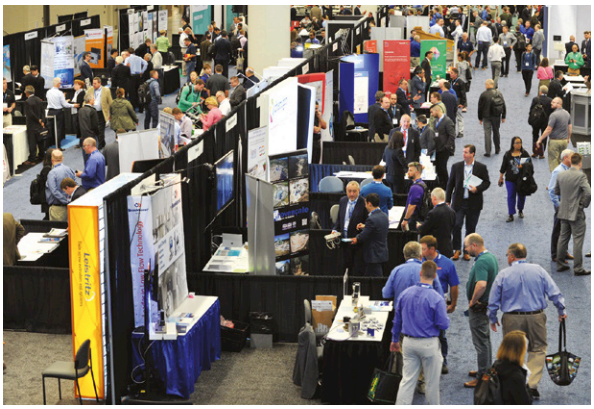
AMI's Cleveland Expositions on shortlist for exhibition awards

AMI's first plastics industry exhibition in the USA has been selected as a finalist for two prestigious awards organised by the Association of Event Organisers (AEO). The exhibition, which was held in Cleveland, Ohio on 8-9 May 2019, included the Plastics Recycling World Expo, Compounding World Expo and Plastics Extrusion World Expo.

It has been shortlisted by the AEO for both the 'Best Event Launch' and the 'Best International Show – Americas' categories. The winners will be announced at a ceremony in London on 4 December 2020.

"We are delighted that the success of our American expos has been recognised in the AEO Excellence Awards 2020," said Rita Andrews, AMI's head of exhibitions. "AMI has a long history of organising conferences, but this was only our second big tradeshow and the first outside of Europe, so it's a fantastic result to be shortlisted alongside lots of established players," she added.



The co-located shows return to Cleveland in November of this year

The Cleveland Expos attracted 261 exhibitors and 4,375 visitors from 42 countries to the city's Huntington Convention Center. In addition, more than 1,000 people attended the evening networking party at The Rock & Roll Hall of Fame.

"The focused nature of the expos worked very well for visitors from the plastics recycling, compounding and extrusion sectors," explained Andy Beevers, events director at AMI. "They could meet with key suppliers and participate in highly relevant conference sessions all under one roof. Similarly for exhibitors, the clear focus of the events meant they were meeting large numbers of buyers with a very specific interest in their products and services".

The Plastics Recycling World Expo, Compounding World Expo and Plastics Extrusion World Expo next take place at Messe Essen in Germany on 7-8 October 2020, and they return to Cleveland, Ohio on 4-5 November 2020. At both locations, they will be joined by the new Polymer Testing Expo.

› https://www.ami.international/exhibitions

Euromap and OPC publish new interfaces for extrusion machines

OPC 40084 describes a standard interface for extrusion line

Euromap and the OPC Foundation have extended the scope of standardised interfaces for plastics and rubber machinery by publishing a guide for extruders.

The publication, called OPC 40084, considers the extrusion line as a whole with its production status and order management as well as the individual components with status and process values.

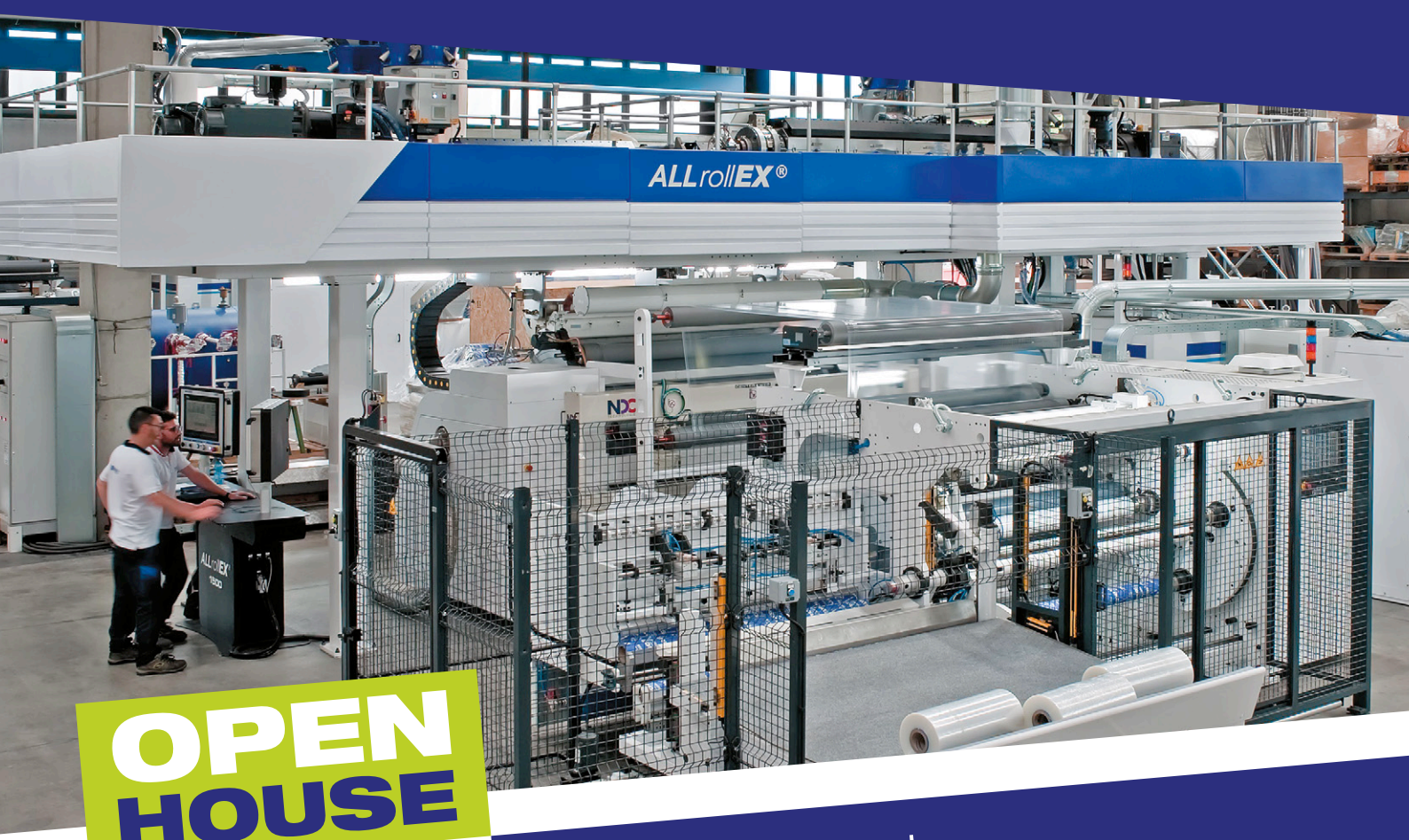
Currently the different parts cover extruders, haul- offs, melt pumps, filters, dies, pelletising, cutter, calibration and corrugators. Further parts for components such as calenders, splitting and winding are being prepared. The use of standardised digital data exchange facilitates the commissioning and operation of the extrusion line, said Euromap.

The publication on extrusion follows earlier versions that covered injection moulding machines and temperature control devices. These guidelines have now been published under the neutral umbrella of the OPC Foundation (rather than Euromap).

"This paves the way for the adoption of the standard in other regions such as Asia and America," said Euromap. "Even if the standard is translated into national adoptions and, if necessary, assigned a different local number, the uniform namespace ensures that the data to be exchanged is uniform and is recognised by the connected devices."

The OPC UA specifications for plastics and rubber machines can be downloaded from OPC, Euromap and VDMA websites.

› https://opcua.vdma.org/companion-specifications



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Next year's Chinaplas will be held in Shenzhen

Chinaplas cancelled due to Coronavirus

Chinaplas 2020 has been cancelled – having earlier been rescheduled from April to August of this year.

The next edition of the show will now take place on 13-16 April 2021, at the Shenzhen World Exhibition and Convention Center in Shenzhen.

Adsale, the organiser of the show, said in a statement: "Since the occurrence of Covid-19, we have been closely monitoring the situation. The virus is now largely under control in China but poses a high degree of uncertainty globally. China has now a formidable task of fighting against local rebound infections while preventing the next wave of outbreak from imported cases."

On 6 April 2020, the State Council of China issued a circular on controlling further spread of the disease – which said that "all kinds of exhibitions have to be stopped for the time being", said Adsale.

Next year's event is being held in a new venue, having previously been scheduled to take place at the National Exhibition and Convention Center in Shanghai.

› **www.chinaplasonline.com**

EuPC: "Delay single-use plastic directive by a year"

EuPC, the organisation that represents European plastics converters, has sent an open letter to the European Commission urging it to delay implementation of the Single-Use Plastics Directive by one year.

In the letter, it says that the directive is aimed at reducing littering – and does not account for how the ban would affect hygiene.

"Many independent studies show that plastics is the material of choice for ensuring hygiene, safety and preservation from contamination," it said.

EuPC is asking the Commission to inform EU members to postpone the implementation deadline of the SUP Directive for at least an extra year at national level – and to lift all existing bans on some of the single-use plastics items.

"The postponement will give all member states time to focus on more urgent measures in the fight against Covid-19 – by distributing also SUPs in emergency situations – whilst the industry can continue to produce all those plastic products and others that are needed," it said.

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The latest waterproof membranes have higher performance, last longer and are more environmentally friendly thanks mainly to materials innovations

Staying dry: advances in waterproof membranes

Waterproof membranes, used in applications as diverse as reservoirs and roofing, are becoming more sophisticated – as production methods and new materials help to raise their performance and extend lifetimes.

Delegates at the recent *Waterproof Membranes* conference, organised by **AMI**, heard about some of these new materials and techniques.

Roberto Cardinale, co-CEO of **Tecnofilm**, told delegates that his company has filed several patents for new materials for use in bitumen-based membranes.

Its RD Prene series of materials are derived in part from used car tyres – one of the main waste streams in the automotive industry, accounting for around 3.2 million tonnes every year.

"We produce modified bitumen – similar to that of products obtained through the modification of bitumen with higher performance (SBS) – using end-of-life materials and SBS with specific properties and using a particular production process," he said.

Modified bitumen with RD Prene has a number of advantages, he said, including energy saving and a saving of natural resources – through the recycling end-of-life materials – and a reduction of waste going to landfill.

He said that the grades are cheaper than those using traditional virgin SBS – because the SBS from tyres is cheaper and has a more stable price.

One grade, RD Prene CPR/3T is based on radial SBS and rubber powder. It improves the properties of bitumen, and can be used in combination with SBS and PP/PE compounds in formulations for waterproof membranes. One advantage, he said, is that it can improve their flexibility.

A second grade, RD Prene Tak, can be used on conjunction with tackifiers and used in self-adhesive membranes, but at lower cost.

Hot stuff

Alexander Kulichenko, technical director of Netherlands-based **Europiren**, described how a modified magnesium hydroxide mineral – called brucite – has been used to improve the flame retardancy of roofing membranes.

When it is extracted, brucite is contaminated

Main image: Tecnofilm is part of an EU-wide project, Ecomobi, that is using recycled tyres as a bitumen modifier in applications such as waterproof membranes

Above: Geomembranes must be protected from UV exposure in order to extend their lifetimes

with impurities – such as other minerals – which must be removed. One way that this is done is with X-ray separators, which helps to identify and separate these impurities.

There are several challenges to developing a flame retardant for TPO roofing membranes, including: dimension stability; a necessary lifetime of around 20 years; good mechanical properties; and good ageing resistance – under conditions of high temperatures, external UV exposure and weathering factors such as oxygen and humidity.

The company developed a number of research grades, with varying granule size and chemical composition. One grade – Ecopiren 3,5 – is aimed at TPO and PVC roofing membranes. It has a particle size of around 5.5 microns, and magnesium hydroxide accounts for nearly 93% of the formulation. For a typical membrane, it was used at a 40% loading, with a PP roofing grade co-polymer, for instance.

The research grades were tested for mechanical properties, such as elongation variation after 10 weeks, elongation at break and tensile strength. They also performed well in ageing tests – and in fire tests.

"Ecopiren 5,5C, with a low content of Fe_2O_3 – and a 1.5% coating by stearic acid – showed the highest OIT and highest stability during the ageing at 140°C in comparison with synthetic FR fillers," said Kulichenko.

UV protection

As with many types of plastic product, longevity is a key issue. Derek Hepburn, technical director at **Colloids**, told delegates of some of the factors behind extending the life of waterproof membranes using carbon black within the formulation.

When assessing possible lifetimes for geomembranes, he said that degradation due to environmental factors – such as UV exposure and thermal stress – lead to cracking and field damage. Sheet thickness is another factor behind potential lifetime. Although more often associated with pipes, geomembranes can undergo stress cracking and rapid crack propagation under certain conditions.

Some particular failures include: ductile yielding – in which the geomembrane is overstrained; slow crack growth, caused by material creep; and brittle failure, where stress concentrations lead to failure.

One of the main ways to prevent these mechanisms is to restrict UV light – and this can be done by adding carbon black to formulations, he said.

"It acts as a light screen, absorbing harmful UV radiation before it reaches the photo chromophic species in the polymer molecule," he said. "As well as being a UV absorber, carbon black acts as a radical scavenger."

However, carbon black can be designed to give maximum effect by ensuring that molecules are of the correct size and morphology. It can also be combined with other additives to lengthen product life.

By combining the carbon black with a hindered amine light stabiliser (Hals) system also offers higher protection. There is also a synergistic effect between the Hals and an acid scavenger.

Formaldehyde challenge

Many compounds, across a range of applications, are now being scrutinised for the use of potentially harmful chemicals. In plastic pipes, for instance, lead- and chromium-based heat stabilisers have been phased out in Europe. In waterproof membranes, a related issue is the use of formaldehyde in latex binders.

"Formaldehyde is a key raw material with significant health and safety implications," said Sören Butz, head of technical service for SBU functional solutions at **Synthomer** in Germany.

Formaldehyde is a key component in the crosslinking of binders in applications such as roofing membranes. Within the textile industry, there are moves to restrict exposure to formaldehyde – though exact limits have not yet been set.

Butz explained how Synthomer has developed a polymer binder for PES roofing felt with the aim of reducing formaldehyde emissions from "in the ppm range" down to levels that are "below the detection limits of Law 112 and VDI 3862.". The aim was to develop self-crosslinking latex without any emissions and use low temperature curing. The 1K system that the company developed now offers these ultra-low emissions.

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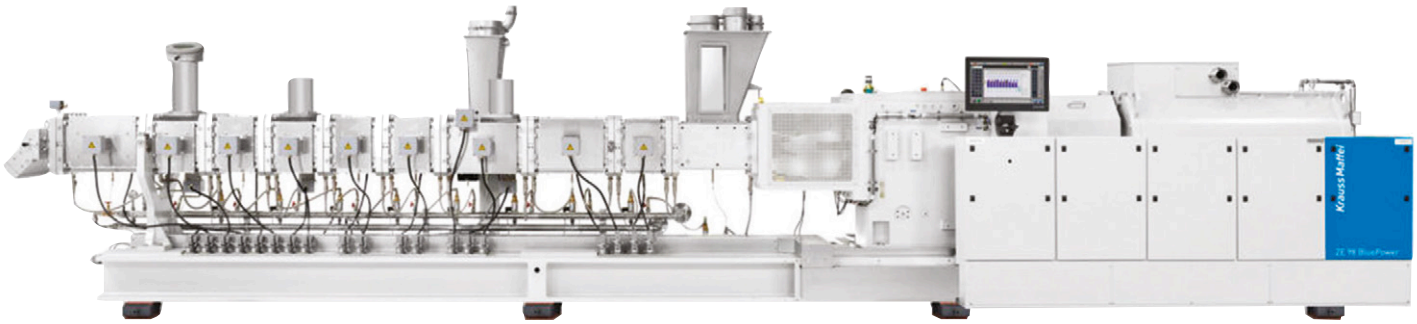

Above: KraussMaffei says that its ZE Bluepower compounding machines can be used in a process to make roofing sheet via direct extrusion

process conditions regarding coating or impregnation, said Butz.

There was also faster film formation (during the drying stage), making energy savings and higher line outputs possible.

Sheet production

Hilmar Heithorst, division manager for sheet and foam extrusion lines at **KraussMaffei**, told delegates of a new concept for medium capacity production of roofing sheet.

He said that direct extrusion – using its ZE Bluepower range of compounding machines – converts raw materials into finished sheet in a single step.

"Intermediate compounding or pelletising – followed by sheet extrusion – requires extra capital equipment, production and logistic expenditure, and results in additional heat history for the polymer," he said. "Direct extrusion, using a co-rotating twin screw extruder, can melt the polymer, incorporate fillers and additives, degas, and extrude in a single step."

He said there are limits to direct extrusion, which are imposed by physical and chemical barriers – such as liquid diffusion and temperature. In trials with the ZE BP 65 (with an L/D ratio above 40), he said that one point of entry for the plasticiser is enough.

"Filler content is the key to control temperature, and acts like a stabiliser," he said.

In addition, a gear pump helps to reduce melt temperature, while processing length can be increased, in order to add extra time for diffusion. ❯

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Cutting waste

Ken Piora, a senior product engineer in the coating business at **Davis-Standard**, described how the company can generate less waste in the production of extrusion-coated reinforced membranes.

Extrusion coating is commonly used to make membranes, but both the production and rewinding operations generate waste material – such as when rolls are trimmed to size.

The first place that waste can be reduced is during the unwinding process. High speed roll-to-roll changeovers consists of splicing one length to another – which results in waste.

"You can minimise the tail length through precision machine controls," he said.

Here, an encoder can identify the position of splice tape on a new incoming roll. Correct timing of the pastor roll and knife can help to reduce tail length. Splicing is initiated by expiring roll diameter, roll length or push button.

At the same time, being able to process edge trim is a key factor behind reducing waste, he said. Correct design of the extruder and screw allow edge trim to be processed in-line. For instance, the screw design should consist of duel mixers and an in-line static mixer. Edge trim fluff can be re-introduced automatically into the extruder, by conveying it to the hopper via blowers.

By constantly monitoring how much incoming material is being consumed – by weighing incoming rolls and resin blends – the total waste can be calculated. This type of monitoring helps extruders move towards a 'smart factory' concept.

"Advances in technology reduce material waste and improve efficiencies, for a higher return on investment," said Piora.

■ The next *Waterproof Membranes* conference is held on 16-18 November 2020 in Bonn, Germany. For more details, contact conference organiser Lorna Grey (**lorna.grey@ami.international**) on +44 (0)117 314 8111.

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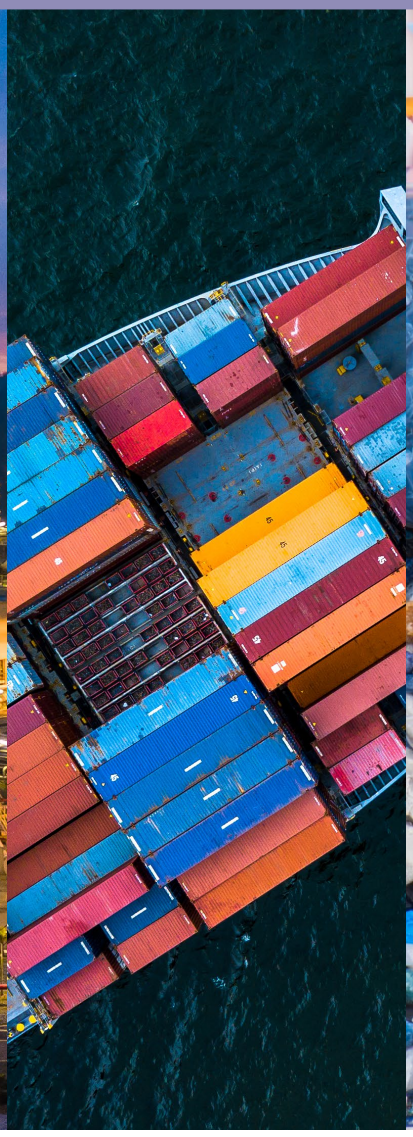


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Measured approach: materials handling

Materials handling machinery prepares, transports and measures polymer into the extruder. We look at some of the advances in this vital part of the plastics extrusion process

Main image: A colour touchscreen HMI gives Conair's ResinWorks a host of advanced control features

Machinery as diverse as drying, conveying and dosing equipment helps processors to control the input of raw polymer into their process. It is a vital filter in ensuring that material is correctly prepared and fed to the extruder in the right amounts.

The latest ResinWorks central drying and pre-conditioning system from **Conair** allows users to equip each drying hopper with a 4in colour touchscreen HMI – enabling independent operation, data monitoring and other advanced control features.

"It allows users of new ResinWorks systems to implement advanced control features on a per-hopper basis, even if they are using an older Conair dryer – or certain competitive dryers," said AJ Zambanini, drying product manager at Conair.

The new HMIs, which are part of a control system upgrade that reaches across Conair's dryer line, offer simpler, plain-text interaction with hopper features, settings, and help information, he said.

Users have instant access to a range of features and control settings, including: auto-start; temperature control; drying monitor; temperature setback; and energy consumption and trending.

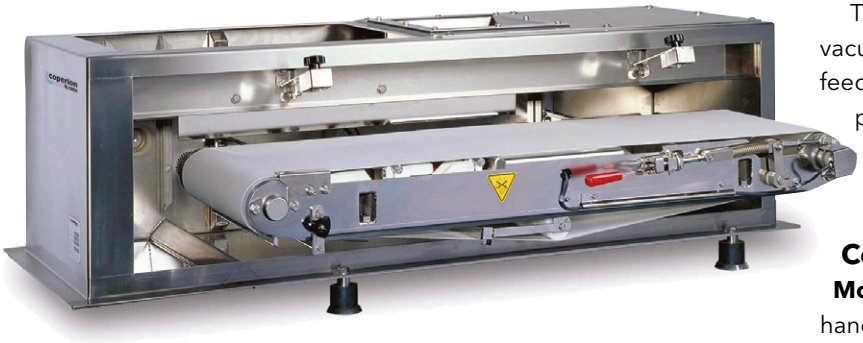
Auto-start allows users to program automatic start-up for individual hoppers so that pre-drying begins at a set day and time, and under specified drying conditions. The drying monitor checks temperature profile at multiple points in each hopper – and prevents material being conveyed further until the control verifies it has been properly dried.

Users who pair the latest ResinWorks equipment with one of Conair's new Carousel Plus dryers have the added option of controlling all hoppers centrally using the dryer control, or locally with the optional HMIs.

Feeder premiere

At K2019 last year, **Coperion K-Tron** exhibited a variety of its materials handling technologies. The show was the European premiere for the company's redesigned K3 vibratory feeder line – and its V200 model was also shown as part of a running system.

The K3-ML-D5-V200 vibratory feeder was seen in action as part of a recirculating system – with automatic refill provided by a P-series vacuum receiver and a compact vacuum pump. Vibratory feeders are ideal for feeding recycled material or flakes as well as for the addition of glass fibre in compounding processes. They are nearly maintenance-free, as there is no wear on the mechanical parts. P-series vacuum receivers can be used to convey a wide range of bulk materials – in conveying only applications such as hopper loading, as well as loss-in-weigh feeder refill applications. The

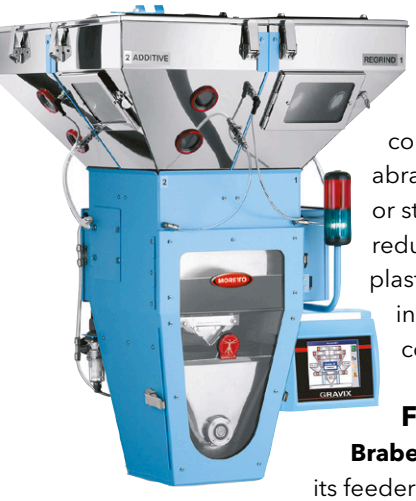


Above: Coperion K-Tron's SWB-300 weigh belt feeder promises high accuracy and efficient process control

receivers are made of stainless steel, and their features include steep cone angles – to ensure efficient discharge – and band clamps for quick disassembly.

Also on display was the company's SWB-300 weigh belt feeder, a reliable gravimetric feeder for high accuracy and efficient process control that is quite simply constructed,. Weigh belt feeders of this type can feed large volumes of bulk materials with various flow properties and are well suited for, among other things, processing recyclates, said the company.

Another materials handling solution is Fluidlift Ecoblue, a pneumatic conveying process for plastic pellets that increases efficiency and minimises degradation. In contrast to conventional designs, it reduces abrasion – which cuts the generation of dust or strands to maintain product quality and reduce waste accumulation. It also enables plastics manufacturers to lower costs and increase throughputs, thanks to low energy consumption.



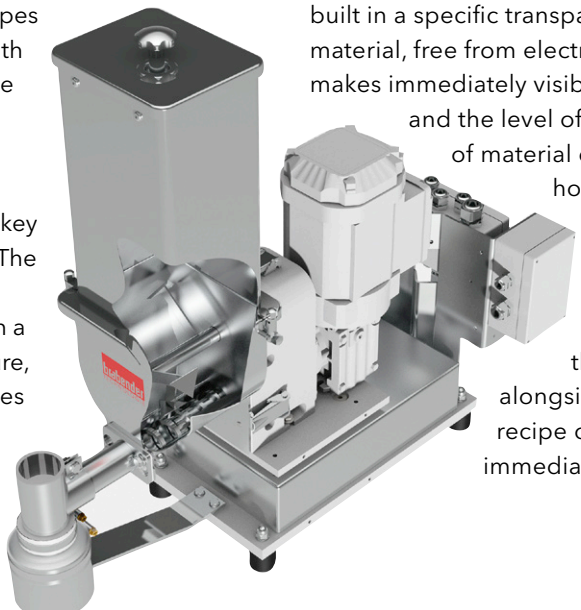
Above: Moretto's DGM Gravix batch gravimetric dosers promise high accuracy and precision

Feeding time

Brabender Technologie has redesigned two of its feeders – the DSR28 and DDSR20. As well as having a new type of gearbox, the machines use a number of new components that allow easy cleaning.

Both were displayed at K2019, along with different possible motor types – such as the new motor with extended adjustment range (1:100).

The company has also developed a new OPC-UA interface, which it says is a key step towards Industry 4.0. The new interface transmits process and control data in a service-oriented architecture, opening up new possibilities for customers, says the company.



Right: Brabender has redesigned two of its feeders, including the DSR28

The expansion to upstream machines, such as vacuum conveyors, is also now available in the feeder control and the OP16 control unit. This provides customers with a control for both machines from a single source, allowing them to optimise refill processes.

Conveying and dosing

Moretto of Italy showed a range of its materials handling technologies – including dosing and conveying – at K2019.

To manage and supervise the conveying process – of small or large quantities of plastic – its One Wire 3 system ensures high transport efficiency, thanks to its FIFO logic. One Wire 3 also controls the devices, which contribute to optimising the granule conveying and feeding process. In particular, the Dolphin manifold unit automatically supplies and distributes all the materials to all the machines, avoiding the risk of contamination and human error.

Kruise Kontrol (KK), patented by Moretto, can manage material speed during the conveying phases. This eliminates the formation of angel hair and wear of the pipes. It acts differently to typical inverter systems that simply act on air speed, but do not account for numerous other variables that characterize each material, Moretto – pointing out that KK controls more than 15 parameters.

Its DGM Gravix batch gravimetric dosers promise high accuracy and precision – up to 0.01% – thanks to its Vibration Immunity System and double eyelid system. They cover dosing requirements for granule, powder and flakes, with dedicated applications, up to 12 materials and 12,000 kg/h.

The company also offers its DPK weight-in-loss dosing system, for dosing small amounts of masterbatch or additives. The technology of the load cells – and the control algorithm – give it a dosing accuracy of ±0.03%. The masterbatch or additive to be dosed is contained in a hopper built in a specific transparent resistant acrylic material, free from electrostatic charges, which makes immediately visible the content material and the level of load and avoids the stop of material on the hopper walls. The hopper is easily removable without the use of tools and, together with the intelligent storage and recognition system of the masterbatches alongside the machine, the recipe change is even more immediate, says Moretto.

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Handling range

Motan focused on a range of materials handling technologies at K2019. Its Spectroplus synchronous dosing and mixing unit was developed for extrusion and compounding and replaces its earlier Graviplus range. With a modular design, it is suitable for a large range of different materials – from powders, granulates and regrinds to liquids and flakes. Additionally, the synchronous dosing unit can be augmented with the Spetroflex dosing modules, which are also available in gravimetric and volumetric versions.

Spectroplus is controlled with the new Spectronet control, which can control both volumetric and gravimetric dosing modules, as well as external dosing units.

Meanwhile, its Metroflow gravimetric material loaders offer precise vacuum conveying – such as to move material from a silo to a drying bin, or to the procesing machine. With their precise weighing technology, they are particularly suited for monitoring material consumption in real time, which means that the units are ready for use in an Industry 4.0 environment.

Also, its new Luxor CA A compressed air dryer, with optimised control and integrated ETAplus technology, is designed for small to medium material throughputs. The dryer operates at temperatures of 30-180°C. It can be installed directly on top of the processing machine or on a mobile frame. The dryer is available in four sizes with bin volumes of 8, 15, 30 and 60 litres.

The company has also reworked and expanded its Metro range of individual material loaders. The new Metro G (for granulate) model, for large material throughputs, is available in 60, 100 and 150 litre capacities. Metro R (for regrind) is designed for processing recyclate, and is available in the same three sizes, as is the Metro F (for processing flakes). As a non-free-flowing material, flakes are prone to bridge-building, so this model is equipped with an extra-large outlet flap.

Left: Motan's range of materials handling technologies includes its Spectroplus synchronous dosing and mixing unit

The Metro SG loaders offer an affordable range for standard applications, and are quick and easy to install. The Metrovac SG conveying station – with conveying control, blower and central dust filter – can supply up to eight material loaders and four purging valves. At the same time, the new Metronet SG provides the matching control, from which eight material loaders and one stand-by blower can be managed via a colour touchscreen display.

Mixing it up

Plasmec, which specialises in plastic mixing machinery, showcased a range of its technologies at K2019.

Combimix-HC mixers are aimed at technical mixing applications in the field of PVC or WPC dry blend production. Versions span from 200/800 to 2500/8500 litres capacity. A high output can be achieved thanks to the optimised design of the high-speed TRM mixer, and the high-efficiency HEC cooler type mixer.

Plasmec also showed a TRR-1500/FV container mixer, which complies with the Atex Directives. It is suitable for mixing additives with potential explosion risk and can be installed in classified areas. It is an alternative to conventional turbo-mixers for masterbatch, pigments and technical polymers when production conditions require a high degree of versatility and a wide range of different recipes to be mixed with the same machine, says the company.

Left: Plasmec says its Combimix-HC mixers are aimed at technical mixing applications in PVC or WPC dry blend production

Compressed variants

FarragTech of Austria says it has continued to refine the design of its compressed air resin dryer (Card) – and showed a number of variants at K2019. ›

Right: Farrag will show its Card E/S, Card M and Card L/XL bulk materials dryers at K2019

The dryer, first developed in the 1990s, relies on a new method of drying.

"In extrusion blow moulding, it was standard for a long time to vent the dry blower air at the end of each cycle," said Rainer Farrag, founder of the company. "As a result, a lot of unused air – and energy – was lost, which I found was a pity. The idea struck me to use this air for resin drying."

Using compressed air from an upstream process to dry resins made it possible to dehumidify material with minimal extra energy – and no moving parts. It proved a cost-effective, reliable alternative to adsorption drying.

Although the basic design is the same, improvements continue to be made: better process integration, modern controls – such as the Sleep mode – and the reduction of the amount of air after reaching a particular temperature in the upper range of the drying hopper all help to reduce energy consumption further. The heat recovery from the air compressor has meanwhile led to resin drying which can mostly dispense with additionally supplied energy.

At K2019, the company showed its Card E/S, Card M and Card L/XL bulk materials dryers. These variants can, among other things, be combined with systems for condensation water protection and for internal mould cooling. This way, they make the whole process more efficient, says the company.

"It has to be assumed that resin drying using compressed air will become the standard in the plastics industry in the years to come," said Farrag.

Energy efficient

Maguire showcased its vacuum resin dryer, which it says uses a fraction of the energy of a desiccant dryer. The dryer, which has been renamed Ultra (it was formerly called VBD), can drastically reduce energy bills, says the company.

"While the energy needed to heat polymer to its required temperature is roughly the same for both vacuum and desiccant dryers, the Ultra dryer uses much less energy in the next stage – when the heated resin is actually dried," said Frank Kavanagh, vice president of marketing and sales at Maguire.

He cites a typical example for a process running at 220lbs (100kg) per hour, for 6,000 hours per year. An average desiccant dryer might run at 60 Watts per pound of material, versus the Ultra, which consumes 19 Watts per pound. While each system uses around 15W to heat the material from ambient temperature, the energy used to dry is very different: the desiccant dryer would use another 45W, while the Ultra uses just 4W – around 10 times less.

For an average US price of $0.12/kW, the annual energy bill for the desiccant dryer is $7,128, and $570 for the Ultra.

"Over the average lifespan of a dryer, that

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Right: ProTec launched its new Somos RDF flexible modular drying system at K2019

equates to $65,580," said Kavanagh.

Using load cells in the dryer – on the vacuum hopper and retention hoppers – allows the touchscreen controls of the dryer to control the process in a way not seen with desiccant dryers, he said.

"The use of data provided by the load cells allows the dryer to achieve many functions automatically, such as automatic start-ups, automatic stops, and making cleaning and materials changes extremely rapid," he said.

Ultra dryers are available with throughputs of 150, 300, 600, and 1,000 lbs/hr. (68, 136, 272, and 454 kg/hr).

Its Ultra Low Energy vacuum dryer has a touchscreen that enables users to show the process graphically. Load cells on the vacuum chamber and retention hopper allow the drying rate to match the process rate. A pre-heat hopper that is smaller than most means the unit holds less material in the process, so it uses less energy.

Chris Crittenden, a director at Maguire IMEA, said the touchscreen changes how an operator can use the dryer.

"We equip each dryer with two pairs of load cells, one pair on the vacuum chamber and one pair on the material retention (feed) hopper. This allows us to make the software far more intuitive – so an operator can see exactly what the status of the dryer is, how much material is in process, what the demand on the dryer is and exactly what the 'live' consumption is," he said.

Left: Maguire says that its Ultra vacuum resin dryer can drastically reduce energy bills

Seeing exactly what is in process – down to the last gramme – allows Maguire to add more interactive software functions like Dynamic Drying – where the system sees the demand for dried materials go up or down and automatically increases or decreases the material in process. "This is more energy efficient and better for technical raw materials," he said.

Flexible drying

ProTec Polymer Processing launched a new flexible modular drying system at K2019.

The Somos RDF modular resin drying system, for flexible stationary use without a central dry air generator, consists of autonomous units with their own Industry 4.0-capable controllers.

Depending on requirements and desired throughput, the modules can be combined into a variable overall system with central visualisation and control.

Components are available with capacities of 50-400 litres, with each individually controllable. When interconnected, they can be controlled using a common operator control unit. As standard, they offer drying temperatures of 60-140°C, while high-temperature variants for up to 180°C are also available.

Each module has an integrated air generator, which rules out complete failure – as may occur with a centrally supplied drying system.

Installation requires little space and effort as the modules are compact and do not require extensive supply and return air piping. The system also saves energy because only the components that are needed are operated. If requirements change, modules can be added or removed, says the company.

The modules can store up to 200 formulations. They have their own dry air generators and also provide several energy-saving systems: drying air volume is adapted to throughput, while regeneration cycles are controlled on the basis of the actual water content of the pellets, for instance.

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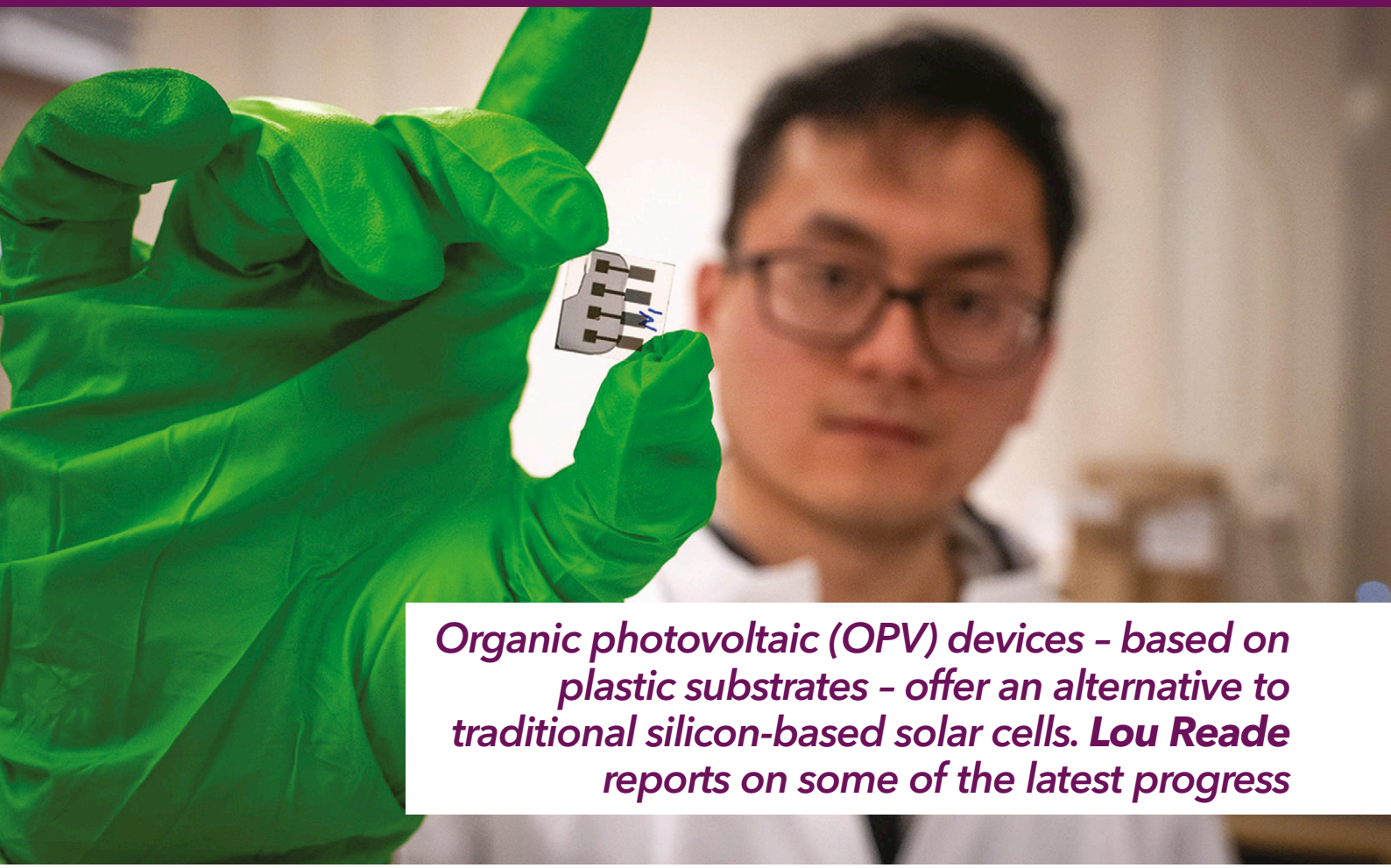


Organic photovoltaic (OPV) devices – based on plastic substrates – offer an alternative to traditional silicon-based solar cells. Lou Reade reports on some of the latest progress

Shining examples: latest news in organic solar cells

Plastics are often used to substitute more robust engineering materials, such as metals. Another substitution that is gathering pace is using plastics in place of silicon, in a new breed of photovoltaic (solar) cells.

These organic photovoltaic (OPV) devices generally consist of a plastic film substrate printed with electronic circuits and incorporating highly specialised semiconducting plastic materials. This makes them far cheaper than traditional silicon-based solar cells. They are also highly flexible – meaning OPVs can be used in potentially new applications.

Traditionally OPVs have typically been far less efficient than silicon solar cells. However, this can often be justified thanks to their lower cost.

Many researchers are studying OPVs in an attempt to understand their mechanisms, raise their efficiency and look for new ways of deploying them at a time when solar power is becoming a greater part of the energy mix.

Good vibrations

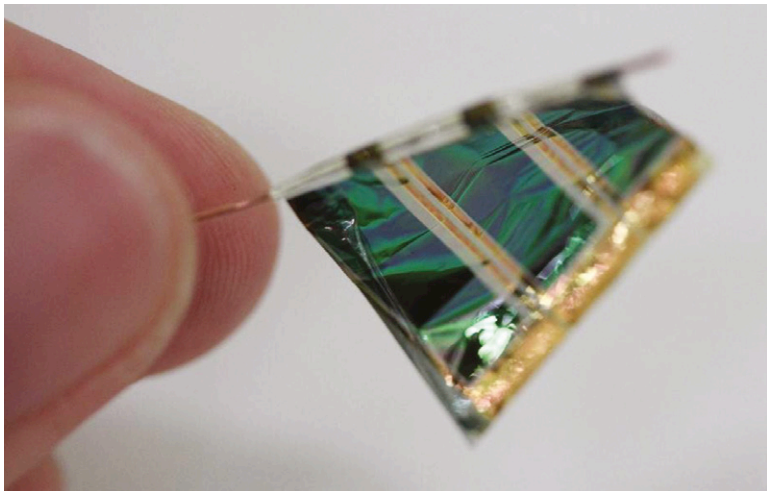
For instance, scientists at Germay's **TU Dresden** and Belgium's **Hasselt University** have investigated the physical causes that limit the efficiency of solar cells based on OPVs. The low voltage of the cells is a reason for their low efficiencies. However, the scientists found that fundamental quantum effects – called zero point vibrations – make a significant contribution to voltage losses.

The study, published in *Nature Communications*, found a direct relationship between molecular properties and macroscopic device properties. This provides important information for developing and improving novel organic materials for OPVs, said the researchers.

The researchers found that the zero-point vibrations caused a large amount of absorbed energy – from sunlight – to be re-emitted, which was a factor in reducing the open-circuit voltage.

"These voltage losses can now be predicted from electronic and vibronic molecular param-

Main image: Linköping University researchers say that understanding a quantum phenomenon could help them increase OPV efficiency



Above: Researchers from Riken in Japan have used a post-annealing process to create an ultrathin organic solar cell that is efficient and durable

eters," said the researchers.

This effect, which is strong at ambient temperatures, can significantly reduce the efficiency of the OPV. With this information, the authors say they are now working on ways to reduce these vibration-induced voltage losses.

Quantum effect

At **Linköping University** in Sweden, researchers have identified a quantum phenomenon that influences the formation of free charges in OPVs.

"If we can properly understand what's going on, we can increase the efficiency," said Olle Inganäs, professor of biomolecular and organic electronics at the university.

The research, published in *Nature Communications*, came about after doctoral student Qingzhen Bian obtained unexpected results in an experiment to optimise a solar cell material. In several repeated experiments, a brief periodic waveform appeared as a photocurrent flowed in the solar cell material – which seemed to undermine existing understanding.

Inganäs theorised that 'coherence' – a link between two different parts of the system – was taking place. "This helps to create the charges that [generate] the photocurrent at room temperature, but we don't yet know why or how," he said.

He said that understanding these fundamental details could have practical significance.

"If we understood better how the charge carriers are formed – and how the process is controlled – we should be able to increase the efficiency of organic solar cells," he said. "If we can design molecules that help increase the photocurrent, we can use the phenomenon to our advantage."

Staying indoors

Separate to this, Linköping researchers have teamed up with scientists from China to develop OPVs that are optimised to convert ambient indoor light to electricity. Although the power they produce is low, it could be enough to supply the many 'internet of things' devices – such as multiple sensors – that are likely to be used in future.

The researchers have developed a new combination of donor and acceptor materials, with a carefully determined composition, that can be used as the active layer in an OPV device. The combination absorbs exactly the exact wavelengths of light that are found in indoor lighting.

The researchers describe two variants of an organic solar cell in an article in *Nature Energy*, where one has an area of 1cm^2 and the other 4cm^2. The smaller cell was exposed to ambient light at an intensity of 1000 lux, and up to 26% of the light energy was converted to electricity. The larger cell maintained an energy efficiency of 23%.

"This shows great promise for organic solar cells to be widely used in our daily life for powering the internet of things," said Feng Gao, senior lecturer in the division of biomolecular and organic electronics at Linköping University.

Thin and durable

Physical structure is critical for organic solar cells. Now, scientists from **Riken** in Japan have created an ultrathin organic solar cell that is both efficient and durable.

Ultrathin flexible solar cells could find use in a variety of applications – such as wearable electronics – but tend to be relatively inefficient, with energy conversion ratios of 10-12%. They also tend to degrade rapidly under the influence of sunlight, heat, and oxygen.

Using a simple post-annealing process, the researchers have created a flexible OPV that degrades by less than 5% over 3,000 hours in atmospheric conditions and has an energy conversion ratio of 13%.

The group began with a semiconductor polymer for the donor layer developed by Toray Industries and experimented with the idea of using a non-fullerene acceptor – which increased the thermal stability. In addition, they added a simple post-annealing process, where the material was heated to 150°C after an initial annealing at 90°C. This created a stable interface between the layers.

"Our research shows that ultra-thin organic solar cells supply high power in a stable way over long periods of time, and even used under severe conditions such as high temperature and humidity," said Kenjiro Fukuda, one of the authors of the study.

The research was published in *Proceedings of the National Academy of Sciences of the United States of America*.

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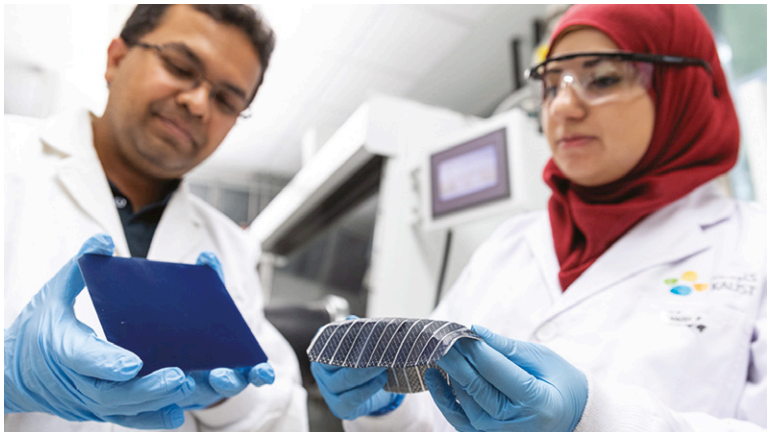

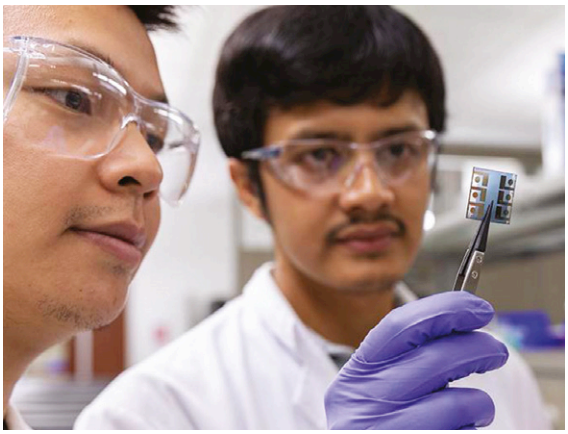

Above: Kaust researchers have combined silicon solar cells with a polymer backing to create devices that combine flexibility with high efficiency

Right: In Kaust's Solar Centre, researchers have used tiny tungsten disulphide flakes to improve the performance of organic solar cells

1% contact

UK researchers have found that a truism of creating OPVs is not necessarily correct – determining that electrodes can be far less conductive than previously assumed.

Scientists at the **University of Warwick** in the UK have found that the electrodes in organic solar cells actually only need around 1% of their surface area to be electrically conductive to be fully effective.

It has long been assumed that 100% of the surface of each electrode should be electrically conductive to maximise the efficiency of charge extraction. The findings mean that a wider choice of materials could be used at the interface between the electrodes and the light-harvesting organic semiconductor layers. The research is reported in *Advanced Functional Materials*.

The researchers developed a model electrode whose surface area could be systematically changed. They found that when as much as 99% of its surface was electrically insulating, it performs as well as if 100% of the surface were conducting – provided the conducting regions are not too far apart.

The researchers say that composites of insulators and conducting nanoparticles – such as carbon nanotubes, graphene fragments or metal nanoparticles – could have great potential for this purpose, offering better device performance or lower cost.

"There is a fast-growing need for solar cells that can be supported on flexible substrates that are lightweight and colour-tuneable," said Hatton. "Conventional silicon solar cells are fantastic for large scale electricity generation in solar farms and on the roofs of buildings, but they are poorly matched to the needs of electric vehicles and for integration into windows on buildings – which are no longer niche applications. Organic solar cells can sit on curved surfaces and are very lightweight and low profile."

Stretching silicon

A key advantage of OPVs is that, despite their lower efficiencies, they are more flexible than traditional silicon solar cells – so can be used in a variety of new applications. However, researchers at the **King Abdullah University of Science and Technology** (Kaust) in Saudi Arabia have managed to combine silicon solar cells with a highly elastic polymer backing to create cells that combine flexibility with high efficiency. The researchers have devised a way to turn rigid silicon into solar cells that can be stretched by 95%, while retaining an energy efficiency of 19%.

The research was published in *Advanced Energy Materials*.

The researchers took a commercially available, rigid silicon panel and coated the back of it with a stretchable, biocompatible silicone elastomer called Ecoflex. The team used a laser to cut the rigid cell into multiple silicon 'islands', which were held together by the elastomer backing. Each silicon island remained electrically connected to its neighbours via contacts that ran the length of the flexible solar cell.

The team initially made rectangular silicon pieces that could be stretched to around 54%, but beyond this point the stretching led to diagonal cracks within the brittle silicon islands. The team then tried a diamond pattern before settling on triangles.

"Using the triangular pattern, we achieve world record stretchability and efficiency," said Muhammad Mustafa Hussain, professor of electrical engineering at Kaust, who led the research.

The researchers plan to use the material to power a multi-sensory artificial skin that they have developed. Making 'stretchy' solar panels is also a target.

"These solar cells can be mainly stretched in one direction, and we are working to improve the multi-directional stretching capability," said Hussain.

Elsewhere in Kaust, researchers in the Solar Centre are using microscopic flakes of tungsten disulphide – just a few atoms thick – to improve the performance of organic solar cells.

The team, led by Thomas Anthopoulos, says the

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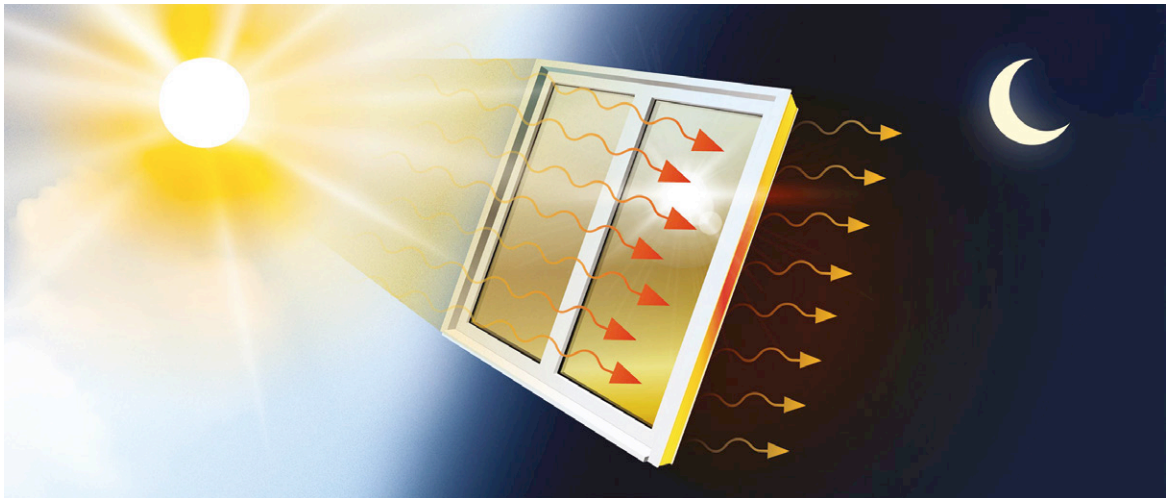

Right: Chalmers University researchers have designed a window film – using a new molecule – that captures solar energy in the day and releases it at night

inexpensive materials help to channel charge in the devices, and so raise efficiency.

When light hits the solar cell, it frees electrons from the material and leaves positively charged 'holes'. Electrons and holes are gathered by different layers of the device, and delivered to the cell's electrodes to generate a current. The leading hole transporter is a polymer called PEDOT:PSS. However, it is acidic and absorbs moisture from the air – which degrades other materials in the solar cell.

The team has developed a hole-transporting layer made from 2D flakes of tungsten disulphide. The researchers used ultrasound to tear the flakes off powdered tungsten disulphide suspended in a mixture of water and ethanol. This method is inexpensive and easy to scale up, and the flakes can be spread onto an electrode using a simple, widely used process called spin-coating. The team made several OPVs this way, and the best had a power conversion efficiency of 17%.

"Our immediate goal is to push the efficiency of our organic solar cells well beyond 17% and toward our theoretically predicted limits," said Anthopoulos. "We also aim to study the stability of these high-efficiency organic solar cells."

Details of the work were published in *Advanced Materials*.

Hot and cold

Researchers at **Chalmers University** in Sweden have developed a window film – using a specially designed molecule – that could even out the extremes of temperature from day to night.

When the molecule is struck by the sun's rays, it captures photons and simultaneously changes its form – it is isomerised. When the sun stops shining on the window film, the molecules release heat for up to eight hours after the sun has set. The research is published in the journal *Advanced Science*.

"The aim is to create a pleasant indoor environment – even when the sun is at its hottest – without consuming any energy or having to shut ourselves behind blinds," said Kasper Moth-Poulsen, professor of chemistry at the university, who is leading the research.

The molecule is part of a concept the research team calls Most (Molecular Solar Thermal Storage). Previously, it was presented as an energy system for houses based. In that case – after the solar energy had been captured by the molecule – it could be stored for an extended period, such as from summer to winter. The researchers realised that they could shorten the step to application by optimising the molecule for a window film.

At dawn, when the film has not absorbed any solar energy, it is yellow or orange. These colours are at the opposite end of the spectrum to blue and green – which is the light spectrum that the molecule captures from the sun. When this happens, it loses its colour and becomes transparent. As long as the sun is shining on the film it captures energy, so that less heat penetrates the film and enters the room. At dusk, when there is less sunlight, heat is released – and it slowly returns to its yellow shade, ready to capture sunlight again the following day.

"Airports and office complexes should be able to reduce their energy consumption while creating a more pleasant climate with our film, since the current heating and cooling systems often do not keep up with rapid temperature fluctuations," he said.

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Green boost: combining barrier with recyclability

Manufacturers of barrier packaging are using a variety of methods to maintain packaging performance while making their products more recyclable

Manufacturers of plastics products are under increasing pressure to improve the recyclability of their products. This can be notoriously difficult in barrier packaging, where the use of several materials boost barrier performance but makes recycling almost impossible.

Packaging group **Mondi** has teamed up with Reckitt Benckiser (RB) to launch recyclable, mono-material flexible plastic packaging for its Finish dishwasher tablets Quantum Ultimate.

This product had previously used a multilayer, PET/PE laminate pouch construction that was not recyclable. With RB's commitment to make 100% of its plastic packaging reusable or recyclable by 2025, this had to change.

"We worked closely with RB to find the best solution and make this product fully recyclable without sacrificing the high-end look, feel and performance," said Olivier Seux, global key account manager at Mondi Consumer Flexibles. "We asked questions about the entire process and tailored various aspects to meet the customer's precise needs."

The packaging uses Mondi's BarrierPack Recyclable, which combines a high oxygen and moisture barrier with ease of recyclability.

"It was vital that the stand-up pouch was rigid enough with a smooth appearance, while offering exact colour matching and a quality feel," said Seux. "There could be no compromise in the barrier properties of the package, and it also needed to incorporate a recyclable zipper for ease of use in opening and closing the pouch."

RB plans to roll out its new Finish packaging in Italy from May, followed by Germany and the UK, and then a global launch.

In similar fashion, BarrierPack Recyclable helped Yarrah Organic Petfood to develop more sustainable packaging for its brands. Yarrah wanted to introduce a fully recyclable pouch to replace a multilayer laminate packaging – which was difficult to recycle – to keep it in a circular economy. The pouch also needed to be resealable to keep pet food and snacks fresh, while adding convenience for pet owners.

Healthy snack

Innovia Films has helped to produce a recyclable pack for German snack manufacturer Wildcorn's organic popcorn range.

The joint project to establish a new sustainable packaging standard began soon after the launch of Innovia's Propafilm Strata high barrier film, which achieved the 'Made for Recycling' logo from Interseroh, a German recycling and consulting company.

"This certification proves the recyclability of our new Strata BOPP film," said Alasdair McEwen, global product manager for packaging at Innovia Films. "It has been designed as a standalone mono

Main image: Wildcorn's turmeric and lemon organic popcorn packs use Innovia's Propafilm Strata barrier film

Right: Mondi used its BarrierPack Recyclable material to develop mono-material flexible plastic packaging for Finish dish-washer tablets

filmic solution or, to be used in laminate constructions to be 'recycle ready', or recyclable in countries with the infrastructure to recycle polypropylene."

To make the Wildcorn pack, a lamination of Propafilm Strata and a white cavitated OPP was used. This construction was also tested by Interseroh, who confirmed it was fully recyclable.

Propafilm Strata provides an effective barrier to aroma, mineral oils and oxygen even at high relative humidity levels, ensuring increased shelf life and reduced food waste. It is glossy, is food contact compliant and chlorine free. The film is suitable for use in a range of markets, is printable and offers a wide seal and hot tack range.

Mono-material barrier

At K2019 last year, **Dow** showcased a selection of PE-based pouches – with medium-to-high barrier – in a joint project with **Bobst**, **Hosokawa Alpine** and packaging producer **Elba**.

The packaging was made with machine direction oriented (MDO) films that are designed for recyclability.

"One of the biggest challenges in designing PE-based packaging for recyclability is to incorporate barrier functionalities that are today carried out by different materials in multi- material structures," said Jaroslaw Jelinek, EMEA marketing manager at Dow Packaging & Specialty Plastics. "We have developed our next generation of resins to enable the production of PE-based mono-material packaging solutions."

The combination of MDO conversion machinery with Dow's PE-based polymers gave similar production efficiency to existing multi-material packaging structures, said the company.

A number of Dow products were used in the solution. Its Elite resins offer high stiffness, thermal resistance, good clarity and a wide enough orientation window – which is important for the MDO process – while its Nucrel copolymers create a suitable surface for the coating and metallisation. Innate resins add balanced toughness and stiffness – plus higher dimensional performance – while Affinity sealants provide a low seal temperature and a good operating window on the packaging line.

Below: Several Dow resins have been used to make barrier pouches that are highly recyclable

Barrier labal

Barrier in-mould labels from **Verstraete** have been used to maintain freshness in a variety of products. The problem with many foods – especially something like a fresh pasta sauce – is that it will quicky degrade if any oxygen enters the package. One example was BC Gourmet USA, with its Scarpetta brand.

"We were using citric acid to maintain freshness, but it took something away from the taste of the sauce," said Paolo Volpati-Kedra, the company's CEO. "We knew there had to be a way to bring it back."

The answer was to combine the Berry Global 410 Plus+ container with Oxygen Barrier IML labels from Verstraete.

"The Oxygen Barrier IML is a unique IML label that incorporates a special ethylene vinyl alcohol (EVOH) layer to reduce its permeability to oxygen," said Thomas Coene, regional sales manager for Verstraete IML in North America.

"As a genuine wraparound label, stretching from the brim, across the sides and around base to cover the entire exterior of the container, it dramatically reduces the oxygen transmission rate. In fact, the OTR is about 100 times better than with a regular label."

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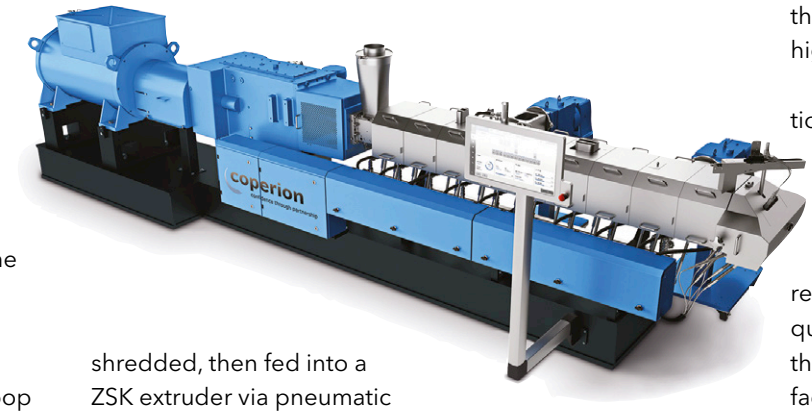
RECYCLING

Closing the loop on multi-layer film

Coperion has developed a closed-loop concept for the production of flexible multi-layer film.

Recycling multi-layer film is often complicated, due to the presence of multiple materials. However, Coperion says it has developed a closed-loop approach that can reprocess and re-use up to 100% of multi-layer film production waste.



Multi-layer film waste is shredded, then fed into a ZSK extruder via pneumatic conveying and feeding. There, the material is homogenised and devolatilised in a co-rotating ZSK Mc18 twin screw extruder.

Within the extruder, dispersion and devolatilisation performance, gentle product handling and good mixing (even at high throughput) help to achieve high product quality.

Following homogenisation, the recycled material is added back into the multi-layer film production process – with a high proportion of added recyclate causing no loss in quality. This helps to ensure that multi-layer film manufacturing can be done sustainably and efficiently.

Coperion will deliver a recycling system of this type of an unnamed customer.

› **www.coperion.com**

RECYCLING

Pre-shredder combines looks with ergonomics

Vecoplan's new VEZ 3200 pre-shredder is one of this year's winners of a Red Dot award for product design.

It was developed to produce refuse-derived fuel (RDF). Vecoplan focused on a contemporary appearance when creating the VEZ – and took on an industrial design company as a partner – but said it was not "just about colour and shape".

"For us, the design was not all about appearance: ergonomics was also an important factor," said Werner Berens, CEO of Vecoplan.

He said that the design influences the machine construction – making the shredder easier to handle for operators. The company has already sold around 15 machines worldwide.

› **www.vecoplan.com**

TESTING

Flexible force testing with multiple options

Ametek has introduced its Chatillon TCM series of flexible motorised test machines.

The TCM series consists of two force testers, offering fast and effective force testing up to 350lbf (1500N).

TCM100 is suitable for low capacity testing up to 100lbf (500N), while TCM350 can test samples at a capacity up to 350lbf (1500N). Both feature a standard crosshead travel of 406mm (16in) and are available in extended editions with a crosshead travel of 812mm (32in).

A throat depth at a full 100mm (3.9in) enables the operator to perform force tests including tension, compression, bending, peeling, adhesion, insertion and extraction on samples up to 200mm (7.8in). This leaves the operator with a wide variety of testing options at a large working area while keeping a compact footprint.

Coupling the force testers with the digital Chatillon DF Series force gauges offers a load accuracy that exceeds 0.1% full scale as well as added benefits such as drive to limit. Chatillon ForceTest software can be added, to enable seamless serial data communication from the force tester to a computer.

› **www.ametektest.com**

FRICTION TESTING

Accurate measurement of coefficient of friction

UK-based RDM says that its CF-200i inclined plane friction tester can be used to measure the coefficient of friction of various materials – including many types of plastic film and sheet.

When replacing a roll of flexible film on a high-speed packaging line, for instance, film that exhibits different friction may not run smoothly – which could cause alignment, snagging and running problems.

The inclined plane method relies on measuring the angle of a slope upon which an object starts to slide. Instruments that do this employ a flat smooth bed fixed to a pivot, upon which a sled – of defined dimensions and mass – is placed with the test materials loaded. The bed starts in a horizontal position and is then moved by hand or powered, whilst an angle measuring device is observed.

The CF-200i uses a fine pitch motor – driven by PLC logic control – to provide smooth, vibration-free movement. An optical sensor reacts in milliseconds, capturing the precise angle when the sled starts to move. The bed is made to a precise roughness and incorporates a clamp for holding the base sample. The sled is supplied with dimensions, mass and surface finish to meet the appropriate test standard.

› **www.rdmtest.com**

DRYING

Multi-hopper drying provides flexible and economic solution

Conair says that its Multi-Hopper Cart (MHC) system is an economical solution to central drying.

The MHC features up to four dependable Conair CH Series mass-flow hoppers mounted on a lightweight pushcart. Even with the largest hoppers mounted, the cart is only 35in deep, which saves floor space and makes it easy to manoeuvre. Material can be dried off-line, then wheeled where it is needed – or stationed remotely to supply material to multiple machines at once.

There are two basic configurations. The simplest has hoppers only with an insulated integral welded manifold system for supply and return of dehumidified air from a central dryer. For smaller applications, it can also heat the material. For larger throughput applications – or those requiring higher temperatures, supported by a Conair D Series Carousel Plus dryer with the DC-C Premium control package – the cart can be wired for power and individual heaters added to each hopper.

Seven hopper sizes are available, with nominal capacities ranging from 18 to 201lbs. Carts are built in two sizes, accommodating either three or four hoppers. A slide-gate discharge port prevents material leakage but facilitates easy hopper draining.

› **www.conairgroup.com**

MIXING

Small-scale production and trials

MTI Mischtechnik plans to showcase its range of laboratory mixers – with heatable and coolable mixing vessels – at Solids 2020 in June this year.

The mixers are suitable for the entire scope of bulk material processing tasks including the production of trial mixtures and small-scale production batches in laboratories and technology centres. Applications range from masterbatches and compounds for the plastics and rubber industry, including the production of natural fibre compounds, to applications in the chemical and automotive supplier industries.

MTI's laboratory mixer range includes the type M vertical high-speed mixers (working volume up to 28 litres), heating/cooling mixer combinations from the M/KMV series (working cooling mixer volume up to 51 litres) and the Unitec type UT vertical universal mixers (working volume up to 51 litres).

› **www.mti-mixer.de**

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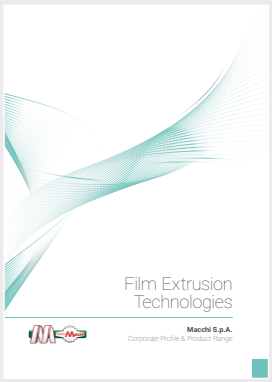

This 28-page brochure from Macchi covers the company's wide range of film extrusion technologies including coextrusion lines, wide webs, die heads, take offs, winders, trim recovery and control systems.

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COLINES: BARRIER FILMS

This new brochure from Colines focuses on extrusion lines for the production of barrier films for vacuum and modified atmosphere packaging to preserve foodstuffs and medical products.

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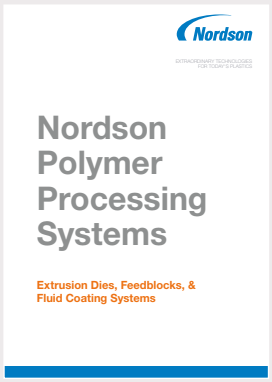
NORDSON: DIES AND FEEDBLOCKS



In this Nordson Polymer Processing Systems brochure, you can discover how extrusion and co-extrusion die and feedblock systems, and slot die fluid coating systems are custom designed to meet the specific needs and process parameters of each end user.

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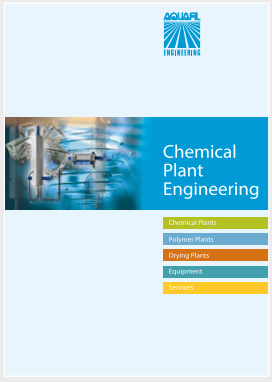
AQUAFIL: PLANT ENGINEERING



This 12-page brochure from Aquafil Engineering details its comprehensive range of chemical plant engineering capabilities, which include polyamide polymerisation, polyester condensation and polymer drying installations.

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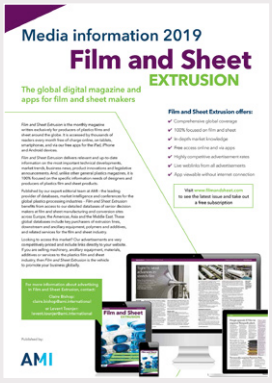
ADVERTISE IN THIS MAGAZINE



An advertisement in Film and Sheet Extrusion magazine is a highly cost effective way to reach key decision makers in the global plastics extrusion industry. Download our 2019 media pack to find out more about upcoming features, ad rates and distribution.

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

Learn more about AMI's upcoming conferences

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

STRETCH & SHRINK FILM

The 17th edition of AMI's Stretch & Shrink Film conference will take place on 14-16 September 2020, in Barcelona, Spain. This is the only platform that brings together a consortium of industry leaders to share essential information on key issues, technical developments and market trends.

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POLYMER SOURCING & DISTRIBUTION

The AMI event specifically created for companies involved at every stage of the European polymer supply, Polymer Sourcing & Distribution takes place in Hamburg on 14-16 September 2020, and reviews trends in sourcing options for both commodity and engineering resin grades.

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PLASTICS RECYCLING TECHNOLOGY

Exploring the future of plastics recycling and finding new ways to boost productivity, quality and profitability are the key reasons to attend AMI's Plastics Recycling Technology event, which takes place for the third time on 16-17 September 2020 in Vienna, Austria.

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BIAX FILM

The launch Biax Film event on 28-30 September 2020, in Madrid, Spain, is the only global conference dedicated exclusively to the bi-oriented film industry, covering the entire BOPP, BOPET, BOPA and BOPE supply chain.

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SINGLE-SERVE CAPSULES

The fourth edition of Single-Serve Capsules on 29-30 September 2020 in Berlin, Germany brings together the entire supply chain to evaluate and discuss the trends, challenges and opportunities facing the single-serve capsules industry.

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PLASTICS REGULATIONS

The 4th edition of Plastics Regulations provides advice on a range of compliance issues at one event. The event takes place on 2-4 November 2020 in Cologne, Germany. The conference provides an ideal environment for regulatory updates.

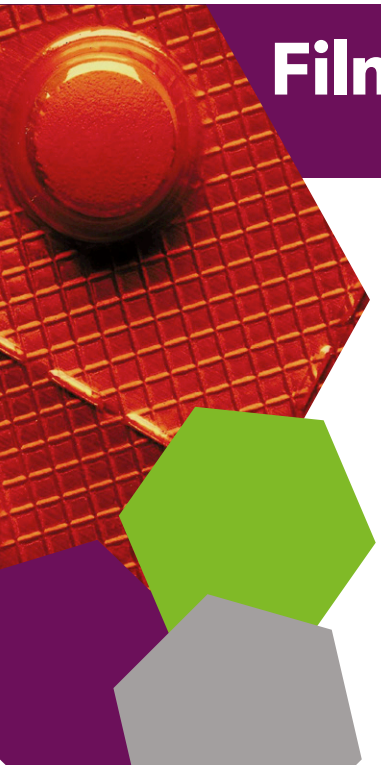
❯ CLICK HERE TO DOWNLOAD

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

Oerlemans Packaging

Head office:	Genderen, The Netherlands
CEO:	Joan Hanegraaf
Founded:	1972
Ownership:	Private
Employees:	Around 250
Profile:	Oerlemans Plastics was founded in 1972 and one year later it began in-house extrusion of plastic films. The company has since expanded over the years, making four acquisitions within the Netherlands. Its portfolio, produced by six subsidiaries, now encompasses a range of flexible packaging and film, including food and non-food packaging, industrial sacks and horticultural film.
Product lines:	The company and its subsidiaries make a diversity of film products. Oerlemans Plastics makes flexible packaging and horticultural film. Plasthill is a specialist in technical films, including its TopEmBoss film, which is often used as a separation film. It produces film up to 10m wide. Oosterwolde Plastic Industrie supplies mono and co-extruded film for applications including fish and meat packaging, as well as products such as waste bags. Perfon is a specialist in clear polypropylene (PP) packaging, augmented by full-colour printing. Fardem Packaging concentrates on heavy duty sacks. And Flexpack supplies packaging for industries such as petfood.
Factory locations:	The company and its subsidiaries have seven production plants between them, located in various locations across The Netherlands. The company recently acquired a Blue Angel quality certificate from Germany's RAL Institute, for a range of products – including its Circuflex film which is made from at least 80% post-consumer recyclate.

To be considered for 'Extruder of the Month', contact the editor on lou@filmandsheet.com



Film and Sheet Extrusion FORTHCOMING FEATURES

The next issues of Film and Sheet Extrusion magazine will have special reports on the following topics:

June 2020
Printing equipment
Blown film dies
Downstream equipment
Plastic pouches

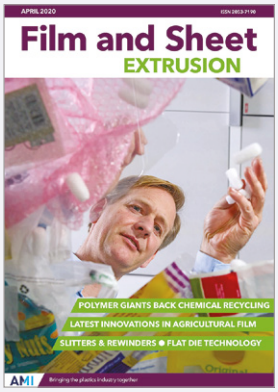
July/August 2020
Bioplastics
Converting/bag making
Stretch & shrink film
Masterbatch developments

Editorial submissions should be sent to Lou Reade: lou@filmandsheet.com

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



Film and Sheet
April 2020
The April edition of Film and Sheet Extrusion looks at how chemical recycling could help boost recycling rates for film and sheet waste. Plus in-depth features on agricultural film, recent advances in flat die technology and the latest in slitters and winders.

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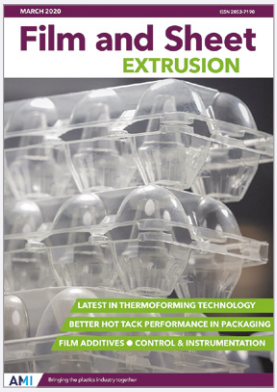

Film and Sheet
March 2020
The March issue of Film and Sheet Extrusion has features on the latest applications in thermoforming, additives for film production and optimised film structures with hot tack/ seal integrity.

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Compounding World
May 2020
The May 2020 edition of Compounding World looks at the latest developments in natural fibres that are helping deliver high performance bio-compounds. Other features cover the burgeoning 3D printing materials sector, engineering plastics and wire and cable compounds.

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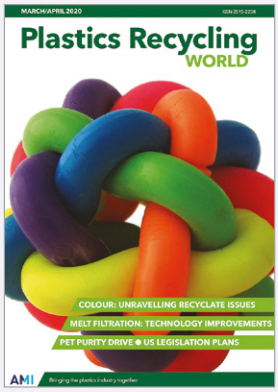

Plastics Recycling World
March/April 2020
The March/April edition of Plastics Recycling World looks at the challenges of effective colouring, plus the latest developments in melt filtration and PET recycling. It also updates on US recycling legislation moves.

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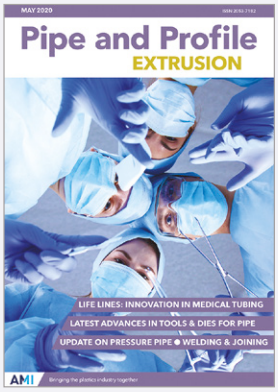

Pipe and Profile
May 2020
The May edition of Pipe and Profile Extrusion magazine examines some of the latest developments in the medical tubing sector. It also looks at innovations in pressure pipes, pipe dies and pipe joining technology.

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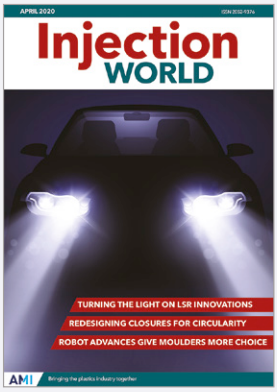

Injection World
April 2020
The April issue of Injection World looks at the growth in applications for liquid silicone rubber moulding as suppliers introduce innovations. Plus features on robots and caps/ closures.

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

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

GLOBAL EXHIBITION GUIDE

2020	**29 Sep-1 Oct**	Interplas, Birmingham, UK **POSTPONED**	www.interplasuk.com
	7-8 October	Plastics Extrusion World Expo Europe, Essen, Germany	https://eu.extrusion-expo.com
	13-17 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
	29-31 October	MECSPE, Parma, Italy **NEW DATE**	www.mecspe.com
	4-5 November	Plastics Extrusion World Expo USA, Cleveland, USA	www.extrusion-expo.com/na/
	8-11 November	Pack Expo, Chicago, USA	www.packexpointernational.com
	10-13 November	Plastimagen, Mexico City, Mexico **NEW DATE**	www.plastimagen.com.mx
	23-26 November	All4Pack, Paris, France	www.all4pack.com
	1-5 December	Equiplast, Barcelona, Spain **NEW DATE**	www.equiplast.com
	2-4 December	Plastic Expo, Tokyo, Japan	www.plas.jp/en-gb.html
2021	**25 Feb-3 March**	Interpack, Dusseldorf, Germany **NEW DATE**	www.interpack.com
	13-16 April	Chinaplas, Shenzhen, China	www.chinaplasonline.com
	4-7 May	Plast 2021, Milan, Italy	www.plastonline.org/en
	17-21 May	NPE 2021	www.npe.org

AMI CONFERENCES

18-19 August 2020	Agricultural Film, San Diego, USA
14-16 September 2020	Stretch & Shrink Film, Barcelona, Spain
14-16 September 2020	Polymer Sourcing, Hamburg, Germany
22-23 September 2020	Stretch & Shrink Film Asia, Bangkok, Thailand
28-30 September 2020	Biax Film, Madrid, Spain
3-4 November 2020	Chemical Recycling, Hamburg, Germany
9-11 November 2020	Agricultural Film, Barcelona, Spain
16-18 November 2020	Waterproof Membranes, Bonn, Germany
17-19 November 2020	Multilayer Flexible Packaging, Vienna, Austria

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

www.ami.international

PLASTICS RECYCLING WORLD EXPO

POLYMER TESTING WORLD EXPO

PLASTICS EXTRUSION WORLD EXPO

COMPOUNDING WORLD EXPO

7 - 8 October, 2020
ESSEN, GERMANY

4 - 5 November, 2020
CLEVELAND, OHIO

www.ami.international/exhibitions