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CONTACT US

AMI
Third Floor, One Brunswick Square,
Bristol, BS2 8PE, United Kingdom
Tel:+44 (0)117 924 9442
Fax:+44 (0)117 311 1534
www.ami.international
www.twitter.com/plasticsworld
Registered in England No: 2140318

EDITORIAL

Editor-in-Chief: Chris Smith
chris.smith@ami.international

Editor: Lou Reade
lou@filmandsheet.com

Events and magazines director:
Andy Beevers
andy.beevers@ami.international

ADVERTISING

Sales & commercial manager: Levent Tounjer
levent.tounjer@ami.international +44 (0)117 924 9442

Advertisement manager: Claire Bishop
claire.bishop@ami.international +44 (0)1732 682948

Sales manager (China): Jenny Zhou
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Compounding WORLD

Plaskolite buys Covestro's North American PC sheet business

Acrylic sheet manufacturer Plaskolite is to buy Covestro's North American polycarbonate sheet business. The acquisition will combine the leaders of acrylic and polycarbonate sheet manufacturing in North America, said Plaskolite.

For Covestro, it is part of a wider strategy to exit the polycarbonate sheet business worldwide.

As part of the US transaction – which is expected to complete by August of this year – Plaskolite will acquire sheet headquarters, production sites and warehouse facilities in Sheffield, Massachusetts and maintain an existing third-party distribution warehouse facility in Hebron, Ohio. After the acquisition, it will employ 950 people.

"This is transformational for Plaskolite and strengthens our industry leadership position," said Mitchell Grindley, Plaskolite's president and CEO. "We will be the only manufacturer ever to offer a complete clear sheet product portfolio, including acrylic, polycarbonate, PETG and ABS."

The move follows Plaskolite's announcement in February that it will acquire the Continuous Cast Acrylic Sheet Business of Lucite International, giving it an entry into the spa and bath sheet business.

Covestro will soon open a bidding process for its European operations, and afterwards a similar process for its remaining outlets in the Asia-Pacific region.

Patrick Thomas, CEO of Covestro, said: "We continuously evaluate our portfolio, and it became clear that our sheets business will not be a strategic fit to our polycarbonates business in the long term. We decided that it can develop and grow better under new ownership."

› **www.plaskolite.com**

ETFE saves steel in stadium

3M Dyneon's ETFE fluoroplastic has saved around 1,500 tonnes of steel in the construction of Estadio Cuauhtémoc – the home ground of Mexican first division football club FC Puebla. Its façade consists of 124 vertical segments, each about 40m high. A total of 5,952 ETFE film sections in three shades were welded to one another for the segments. The ETFE films require no plasticisers – which would evaporate over time and could promote algae or fungal growth. ETFE films are smooth enough to ensure that rain showers are sufficient to clean the façade. They are also resistant to other chemicals, so can withstand environmental influences such as exhaust emissions for decades, says 3M. Nowofol of Germany extruded the 200 micron films. The weight per unit area of ETFE is around 95% lower than that of glass. As a result, only 1,000 tonnes of steel were needed to support the façade – compared with 2,500 that would have been needed for a glass version.

› **www.dyneon.eu**

German converters' record year

GKV, the organisation that represents German plastics processors, reported a record performance last year.

It said that sales rose to €63.7bn in 2017, a rise of nearly 5% over the previous year.

As well as increased turnover, processing volume also increased – up around 4.6% to 14.7 million tonnes of plastic. In the same period, the industry's workforce increased by around 2% – taking numbers beyond 320,000 by the end of 2017.

"For 2018, we estimate an increase in sales of around 4%," said Oliver Möllenstädt, CEO of GKV.

› **www.gkv.de**

Huhtamaki adds labels in India

Huhtamaki is to buy the Indian business and related assets of Ajanta Packaging, a privately owned manufacturer of pressure sensitive labels.

Huhtamaki says the acquisition will further strengthen its labelling business in India by adding new printing technologies – as well as improving its innovation capability. The acquisition is complementary to Huhtamaki's existing labelling product portfolio.

Annual net sales of Ajanta are approximately €10m (around US$12m). It employs around 170 people and has two manufacturing facilities located in India. The debt-free purchase price is around €13m (around US$16m). The transaction is expected to close at the end of April. The business will become part of Huhtamaki's flexible packaging segment.

› **www.huhtamaki.com**

Constantia expands in India and Vietnam

Constantia Flexibles has stepped up its operations in Asia – acquiring an Indian laminates producer and investing in new technology in Vietnam.

It will acquire a majority shareholding in the Indian film-based laminates producer Creative Polypack. Financial details were not disclosed, and the transaction is expected to be completed shortly, pending regulatory approvals.

Creative Polypack was founded in 1986 and is expected to achieve sales of about €75m (US$93m) in 2017/2018. It employs around 850 people at eight sites, and claims to be India's fourth largest flexible packaging group

Alexander Baumgartner, CEO of Constantia Flexibles, said: "Through this acquisition, we will become the third largest flexible packaging company in India."

Constantia Flexibles owns another Indian flexible packaging supplier, Parikh Packaging, where it is investing in a new green-field site that will house a polyethylene blown film extruder, high-definition flexo printing press and laminators to make high barrier laminates. This extra capacity will come onstream in 2019.

Constantia will invest a single-digit million Euro amount at its plant in Vietnam

At the same time, it is investing a "single-digit million euro" amount to install a new printing machine and laminator at Vietnamese subsidiary Oai Hung Manufacturing in Ho Chi Minh City in order to expand its product portfolio.

It says the wide printing machine will have reverse printing capabilities to serve new trends in the Home & Personal Care (HPC) and dairy lidding sectors. The duplex solvent-based adhesive laminator, located in a clean room facility, can produce high-adhesion structures for sachet and pouch laminates. The new technology is expected to go onstream during the second half of this year.

Pierre-Henri Bruchon, executive vice president and head of Constantia's pharma division, said: "The new technology will allow Oai Hung to diversify its leading foil-based pharmaceutical portfolio based on GMP standards."

› **www.cflex.com**

Polyplastics makes COC changes in USA

Polyplastics of Japan has merged the North American operations of Topas Advanced Polymers (TAP) – which makes cyclic olefin copolymer (COC) resins – into its US business.

The new combined business will be headquartered at Polyplastics USA's existing offices in Farmington Hills, Michigan.

Polyplastics has held an ownership stake in Germany-based TAP GmbH for more than a decade.

"We plan to leverage and further enhance TAP GmbH's global leadership position in COC as Polyplastics moves forward to expand its market reach in the Americas," said Lindsey Deal, president of Polyplastics USA, and Timothy Kneale, president of TAP USA.

Polyplastics USA has retained most of TAP USA's staff. After the merger, TAP USA will no longer exist as a legal entity. The merger has no effect on TAP GmbH's European arm, which will continue to manufacture COC in Oberhausen, Germany, and handle sales for Europe, Middle East, and Africa (EMEA).

› **www.polyplastics.com**

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Treofan to sell its North American business to CCL

Italian investor M&C, which owns Treofan Holdings, is to sell Treofan Americas to Canadian label manufacturer CCL Industries.

The deal is expected to close in the second quarter of this year, subject to regulatory approval and closure procedures. The purchase price, including the acquisition of a new production line that is currently being built, is US$251m (around €205m).

As well as having distribution in North, Central and South America, Treofan Americas has a production site in Zacapu, Mexico with a nominal capacity of 60,000 tonnes and around 300 employees.

Bickel: "We will use sale proceeds to develop our production sites in Europe"

CCL will continue the existing Treofan business in America under the Innovia brand.

Walter Bickel, CEO of Treofan, said: "We will use the proceeds from the sale to de-leverage the company and further develop our production sites in Europe – driving our strategy for profitable growth. We will advance our product portfolio into speciality films and strengthen our research and development in this area."

› **www.treofan.com**

Film specialist Altor to buy Trioplast

Private equity fund Altor is to acquire plastics film specialist Trioplast Industrier of Sweden.

Trioplast, founded in 1965, has a turnover of SEK4.3bn (US$517m) and around 1,000 employees. Its main office is located in Smålandsstenar. The company has production in Sweden, Denmark and France, and its products are sold globally.

"We are impressed with Trioplast and its management team and look forward to developing the company further," said Bengt Maunsbach, partner at Altor. "We believe there is a lot of potential in the many high-tech product segments and we will keep investing in new technology to produce sustainable plastic."

Andreas Malmberg, CEO of Trioplast, added: "Altor has a long-term perspective and we have a common view of how to develop Trioplast."

The transaction is subject to regulatory requirements and approvals. Once it is complete, Altor and key executives in the management team will own 100% of the shares.

› **www.trioplast.com**

ECHA: no need to act on DINP

The European Chemicals Agency (ECHA) says that di-isononyl phthalate (DINP), a commonly used plasticiser, does not warrant classification for reprotoxic effects under the European Union's Classification, Labelling and Packaging (CLP) regulation.

ECHA's risk assessment committee (RAC) performed a hazard assessment of DINP and concluded that it could safely be used in all current applications. The proposal to classify DINP was originally submitted to ECHA by Denmark in February 2015.

Michela Mastrantonio, manager at European Plasticisers, which represents manufacturers of DINP, said: "We are confident this brings a reassuring message to the industry, the value chain and consumers on the safety and sustainability of DINP and flexible vinyl articles made with DINP."

› **www.europeanplasticisers.eu**

Total Corbion starts PLA plant in Thailand

Total Corbion PLA has begun production of PLA plastic and lactide monomers at a 1,000 tonnes/year plant in Rayong, Thailand.

The facility makes a range of its Luminy PLA resins.

"Our customers have been looking forward to testing and validating our resins" according to Francois de Bie, senior marketing director at the company.

"Luminy PLA is now available for customer sampling."

The company will also be able to use the pilot plant for future product development.

On the same site, is expanding its lactide plant capacity to 100,000 tonnes/year, while a 75,000 tonnes/year PLA polymerisation plant is under construction.

Simon Goldney, plant director, added: "The PLA polymerisation plant is on track to deliver its first commercial quantities of PLA during the second half of 2018."

› **www.total-corbion.com**

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Italian machine sales boom on back of healthy exports

Italian machinery manufacturers reported a 10% increase in sales last year – buoyed by a large increase in sales to some of its leading export markets.

Amaplast, the trade organisation that represents around 170 manufacturers of plastics and rubber machinery, said that total sales rose to €4.67bn in 2017.

Of this, €3.3bn was due to exports – which increased by 12% compared to 2016.

Sales to Germany – its top foreign market – rose by nearly 20%, to exceed €481m. It raised sales to its second largest market, the USA, by a similar amount to reach €276m. And, while sales to France rose more than 21% to €159m and to Spain by nearly 5% (reaching €148m), there were some declines – notably to Mexico (down nearly 17% to €143m) and Poland (a fall of nearly 4% to €159m), it said.

"The order portfolio horizon for Italian manufacturers has been considerably extended," said Alessandro Grassi, Amaplast president.

"Many companies are able to plan production at least to the end of the year – and quite a few are having difficulty keeping up with customer requests."

Further down the list, both Romania and Russia increased orders by almost 70% in 2017 – with sales to each country reaching almost €100m.

Sales to Asia were generally weak, with modest sales increases to the Middle East offset by declines in more important markets like India and China.

In South America, sales to Brazil rose by around 40% to exceed €50m

In addition to healthy exports, domestic sales also rose by 10%, to €2.3bn, while machinery imports were up 14% to €970m.

Grassi added that the forthcoming Plast exhibition – held in Milan in late May and early June – will help to accelerate these gains.

"Participants are confident of doing significant amounts of business and expanding their order books directly," he said.

› **www.amaplast.org**

Top 10 export markets for Italian machinery (%)

Country	2017 sales (€m)	Rise/fall (%)	% of total
Germany	481	+19.7	14.5
USA	276	+20.4	8.3
France	160	+21.5	4.8
Poland	159	-3.7	4.8
Spain	148	+8.1	4.5
Mexico	143	-16.7	4.3
China	134	-2.5	4.1
Czech Republic	127	+25.9	3.8
UK	119	+1.1	3.6
Romania	96	+68.6	2.9
Others	1,467	+11.8	44.4

Source: Amaplast

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Injection WORLD

Growth factor: reaping the benefits of agricultural film

From mulch film to greenhouse film, plastics can help to boost the production of everything from coffee to tomatoes. Lou Reade reports

Agricultural film could be as important to boosting crop yields as fertilisers and pest control chemicals, as they can help to retain moisture, filter out harmful radiation and ensure that the minimum amount of chemicals are used and retained.

Delegates at last year's *Agricultural Films* conference, organised by AMI, learnt some of these benefits – including projects to recover these films from the landscape. Damien Cabaret, business development manager at **Trioplast** in France, told delegates about his company's 'Trio-Smart' project to recycle LLDPE agricultural films from one year to the next.

Here, farmers are part of the project, and small tunnel films are developed according to their needs. Also, they do not 'buy' the film – but instead 'rent' it according to how much they need. Each year, film is collected, recycled, regranulated and used to make new film.

"The film – and granules – remain the property of Trioplast," said Cabaret.

He said that the market for small tunnels in the Nantes area is around 2,000 tonnes of LLDPE, equivalent to around €4m.

One challenge was to reduce the level of dirt – which was as high as 80% – before recycling the film. Also, the initial target for the use of regranulates in each new batch of film was 10%, but after four years of testing this was raised to around 90%.

Crop improvement

One of the most important types of agricultural film is for mulching – which keeps moisture in the soil and prevents weed growth.

Braskem was determined to help Brazil's coffee industry remain the world leader, by developing a mulch film to boost crop yield. In collaboration with the **Federal University of Uberlandia**, and a local farm in Monte Carmelo, it developed a series of three-layer polyethylene mulch films. The films were 40 microns thick, 1.6m wide and intended for use over 24 to 30 months. The project evaluated two double-sided films: both had black internal layers, but one had a silver external layer, the other

Main image: Braskem has teamed up with a local farm to develop a film that boosts coffee production

Right: Novamont says that using its mulch films have helped to improve rooting systems in many plants

a white external layer.

One formulation used 55% Flexus 9211 (a metallocene LLDPE), as well as an LLDPE butane grade and a masterbatch to incorporate pigments and additives.

Some of the advantages were: a 30% reduction in weed killer costs; a similar reduction in water consumption; and improved yields on the first commercial harvest.

In similar fashion, Australia-based **Hydrox Technologies** has developed a solar reactive mulch film that helped to improve yields of melons – among other crops.

Rob Trenchard, a director at the company, told delegates that farmers usually shy away from mulch film because it is expensive – both to buy and dispose of – difficult to use, too thick and can cause damage to plants (such as when it flaps in the wind).

One melon farmer trialled the use of Solar Shrink film – which had much higher strength in the machine direction than traditional mulch film, as well as being thinner. It also 'tightens' in the sun, so will remain more tense when in place. Overall, the farmer saved around 12% in film costs, cut the use of film by 31,000kg and saved fuel and labour costs by applying the film to the land around 15% faster.

"He also saved around 10% on seasonal disposal costs," said Trenchard.

Degradable advantage

Novamont of Italy said that its biodegradable mulch film has helped to boost crop yields while reducing the job of collecting film at the end of the growing season.

Agricultural waste accounts for around 5% of all plastic waste, said the company – and mulch films are generally difficult to recycle because of their high level of impurities. For this reason, degradable films can help to overcome this.

Below: Mulching is of vital importance in agriculture

The company says that its Mater-Bi mulch film has helped to boost the growth of a variety of crops, including tomato, asparagus, rice and grapes.

"For some crops, like rice and grapes, mulch film is impossible to remove at the end of the crop cycle," said Novamont's Sara Guerrini.

Tomatoes, for instance, had better-developed root system and higher yields when using Novamont mulch film, while it cut the need for weed control in asparagus.

In vineyards, the film had the effect of boosting rooting systems compared with conventional PE film (or bare soil), while vines under Mater-Bi mulch were harvested 17 months after planting – around one year faster than those planted on bare soil.

Repsol of Spain has also developed a biodegradable mulch film – in this case, by incorporating an enzyme into the material. Under specific conditions of moisture, bacteria and temperature, the enzyme triggers the break-up of the polymer chains.

"These serve as a source of carbon and energy for bacteria already in the environment," said Roberto Gómez Bernardo, polyolefins advisor at Repsol.

Soil samples

Biodegradable films break down where they are, sidestepping the need for collection. However, some organisations have looked into what chemical species accumulate in the soil as these films break down.

Sam Deconinck, deputy lab manager at **OWS** in Belgium, said that not all the carbon in a biodegradable polymer is converted into carbon dioxide – and that intermediate degradation products will enter the soil.

"These cannot be quantified," he said.

In legislative terms, a biopolymer is classed as being 'totally degradable' if it biodegrades by 90%, he said. Some of the 'unconverted' portions

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Above: Kuraray said that its high barrier film has been used to improve the performance of silage film

include 'biomass' – which typically varies between 10 and 40%.

"The purpose of lab testing is to show the inherent nature of the material to biodegrade under a given set of conditions," he said.

He also pointed out that 'non-biodegradable' film leaches into the soil: a conventional LDPE mulch film has a maximum accumulation level of 463kg per hectare after 10 years. Downgauging the film actually increases accumulation, he said. In comparison, a biodegradable film would build up a maximum accumulation level of 463kg per hectare, after two years.

BASF, whose biodegradable PLA-based Ecovio is commonly used in agricultural mulch film, has also looked at soil accumulation. The company has used a range of analytical techniques – including NanoSIMS, to assess the incorporation of polymer carbon into the soil, and Cavity Ring Down Spectroscopy (CRDS) to track 12C and 13C-carbon dioxide.

"There is a strong stakeholder demand to know the fate of materials introduced into the soil," said Andreas Kuenkel, vice president of biopolymers research at BASF in Germany.

In addition, he said BASF could differentiate between biodegrading microbes and other soil microbes by seeing which ones actually grow on the polymer.

"Fungi is the most potent degrading micro-organisms in the soil," he said.

The team has identified more than 150 species in soil that play a role in biodegradation.

Barrier performance

As well as retaining moisture, plastic film can also help to retain other species – such as fumigants and other chemicals.

Frank Balemans, senior regional technical sales manager at **Kuraray**, told delegates how barrier properties were vital to total impermeable film (TIF) – which helps to reduce the use of fumigants by ensuring that it is not lost to the environment after dosing.

Methyl bromide, for instance, is used as a fumigant but is an ozone-depleting substance. For this reason, its use must be limited. Balemans showed a seven-layer TIF structure, incorporating a middle layer of EVOH.

"The EVOH layer should be less than 10% of the total structure to have good mechanical properties," he said.

Tests by the University of California Davis, for instance, showed that TIF helped to keep methyl iodide soil retention levels at 2,000ppm after 180 hours – where it was around 100ppm for standard LDPE film after the same period.

In a similar way, high barrier films can be used to improve the performance of silage film – preventing the degradation of feed such as wet corn. It can also prevent mould, infestation and aroma loss in harvest such as grains.

The company has demonstrated a proof of concept high barrier storage bag, to store corn for five months. It was conducted in Indonesia using plastic liners inside a woven PP bag.

Another TIF, from **Arkema**, was similarly used for crop fumigation. Here, the fumigant was dimethyl disulphide (DMDS) – a natural substance found in brassicas and onions, that is an alternative to methyl bromide. Arkema's film also uses EVOH – in a seven-layer structure – and includes a photocatalyst (titanium dioxide) that speeds up the decomposition of DMDS.

Fighting UV

Kompuestos of Spain has developed a greenhouse film that fights the detrimental effects of UV light. Its PEUV7001 is an anti-UV masterbatch that is an alternative to either UV absorbers or UV scavengers. Instead, it uses 20-30nn inorganic particles to reflect and absorb UV light. It is transparent to visible light – which is vital to plant growth – and does not migrate, said the company.

In addition, it retains its mechanical properties after UV ageing, said Kompuestos.

The company has also developed anti-IR film which helps to control greenhouse temperatures. Its PEIR1000 incorporates an engineered inorganic additive – sized optimally, to ensure maximum translucency – which helps it to reduce greenhouse temperatures by as much as 6°C. This helps to reduce thermal stress and enhance plant growth.

"Greenhouses could use this film all year round – in summer, to keep the interior cooler, and in

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winter to minimise additional heating costs," said Grégory Coué, technical manager at the company.

At the same time, **Kafrit** of Israel shared detail of its Valota project to develop cooling greenhouse film. The films, comprising layers of LDPE, metallocene LLDPE and EVA, were applied to crops of cucumbers and tomatoes in Italy. Trials ran in 2016 and 2017.

The film contain near-infrared (NIR) reflecting pigments, and help to reduce internal greenhouse temperatures by around 6°C at the peak of the summer.

"Calculating optical and thermal parameters of the films can be a useful tool for development and efficiency evacuation of heat suppression films before field trials," said Hanna Schwarz, agrifilms and films team leader at the company.

Crop models

Researchers at **Wageningen University** in the Netherlands said that methods to model the effect of greenhouse films on crop yields deliver answers more quickly than actual growing trials. The team has assessed physical models such as Kaspro, Intkam and Raypro, which account for various levels of light, carbon dioxide, temperature and other factors – which can all be controlled by greenhouse film – in order to predict their effect on growing conditions.

Light, for instance, is critical: a 1% increase in light levels accounts for around the same increase in production for most crops; at the same time, a 10% increase in diffuse light can boost production by 1.5%.

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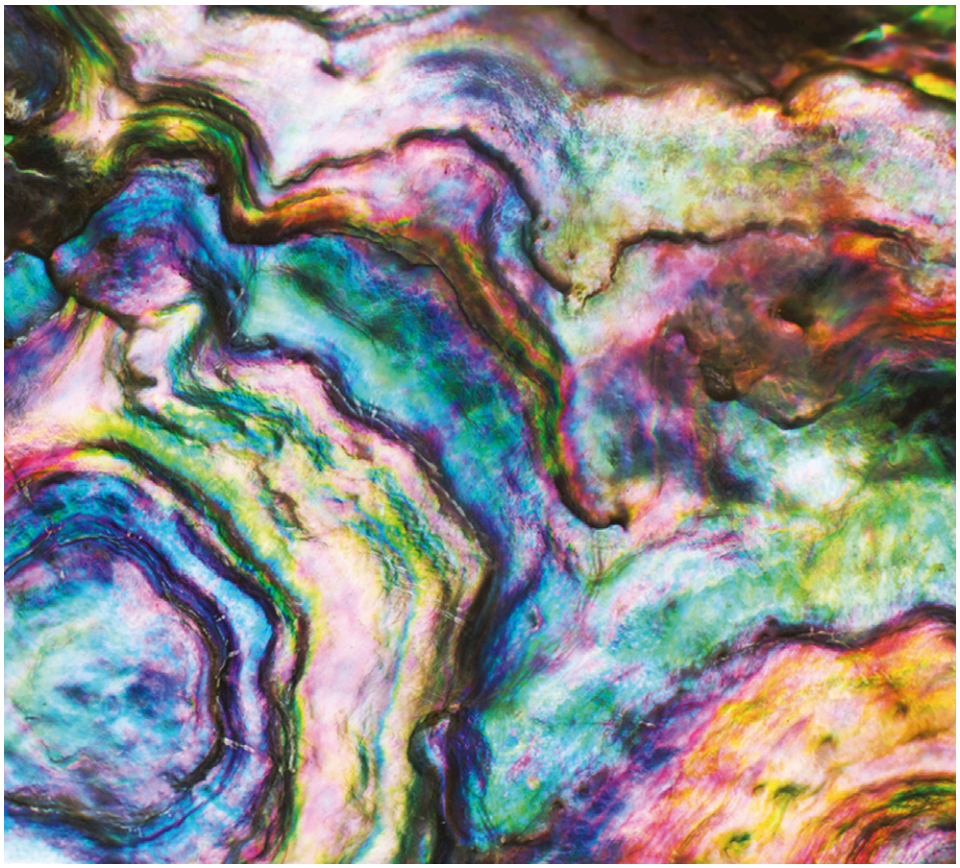


Nano-layering can enhance the properties of film and sheet structures beyond those achieved by simple co-extrusion, says ***Olivier Catherine*** *of Cloeren*

Multi-layered approach boosts physical properties

Co-extrusion is widely used in the film and sheet industry, combining the properties of several polymers in a multi-layer structure. In conventional co-extrusion, the number of layers in the final product is typically between two and 17. A variation of this, called nano-layer co-extrusion, can create structures with hundreds or even thousands of layers – each with micron- or sub-micron individual thicknesses.

Recent research shows that structures with a high number of nanometre-scale layers have remarkable properties, driven by interfacial or confinement phenomena.

Natural effect

This can be seen in nature. Natural materials often exhibit complex, yet elegant structures that are adapted to a specific function. An example is nacre – a natural nanocomposite found in the inner shell of some molluscs such as the pearl oyster[1]. Nacre is made of Aragonite ($CaCO_3$) platelets with typical thicknesses of 400nm, assembled together with biopolymers of typical thickness of 10nm. While Aragonite has very ordinary properties, those of nacre are exceptional – despite it being 95% Aragonite.

In particular, nacre's toughness is about 3,000 times that of pure Aragonite. This huge gain in mechanical properties is a result of the unique nano-layered structure.

Another consequence of the structure is the pearl oyster's 'rainbow' colours.

Researchers have attributed these properties to several complex factors:

- Scaling effects – such as the effect of thickness reduction;
- Multi- scale effects – the effect of several mechanisms at several different scales; and,
- Interfacial effects – such as adhesion and slippage.

This is a perfect illustration of the potential synergies that can develop in a multi-layered nano-scale composite structure.

Main image: Nano-dispersion effects are responsible for the colour – and strength – of pearl oyster shells

Fabrication methods

In the early 1960s, co-extrusion concepts were developed to obtain a high number of layers, such as the 'comb die' proposed by Schrenk et al. in 1965 [2].

However, these tooling approaches were too complex and difficult to machine, resulting in high cost. An alternative method was then developed to combine a traditional feedblock co-extrusion step with several steps of layer multiplication, using a series of multiplication elements[3]. The method – named the 'interfacial surface generator' and developed by Tollar – was similar to a static mixer.

With this method, the theoretical number of layers is:

Total number of layers	=	Initial number of layers × 2^N

Where N is the number of multiplication elements

Several variations of this approach have been developed over the years, such as the layer multiplier developed by Schrenk, using side-by-side channels [4] (seen in **Figure 1**). Research groups – such as that led by Professors Anne Hiltner and Eric Baer at the Case Western Reserve University – have successfully used similar layer multiplication systems to study the benefits of nano-layered polymer structures.

Today, there are two commercially available nano/micro-layer co-extrusion tooling solutions. One, from Nordson EDI, is essentially based on a variation of the layer-multiplier system, combined with a flat die[5].

The second system was developed by Cloeren in the early 2000s and takes a different approach. Its Nanolayer Feedblock was designed to create layers sequentially, each formed by its own dedicated flow channel[6]. These flow channels are machined as flow inserts and assembled in stacks. The flow inserts are therefore designed for a specific structure and material flow properties[1].

Figure 1: Schrenk's layer multiplier design uses side-by-side channels

Tooling considerations

Co-extrusion can be technically difficult on its own and designing the hardware for these applications with thin layers in high numbers can be a major challenge. A typical issue is layer thickness non-uniformity. This is especially true with large viscosity ratios or in some cases, for polymers with matching viscosity but very different melt elasticity.

Designers have worked on design iterations from the original layer multiplier to mitigate the problems, with more or less success. In some cases, layers can become discontinuous.

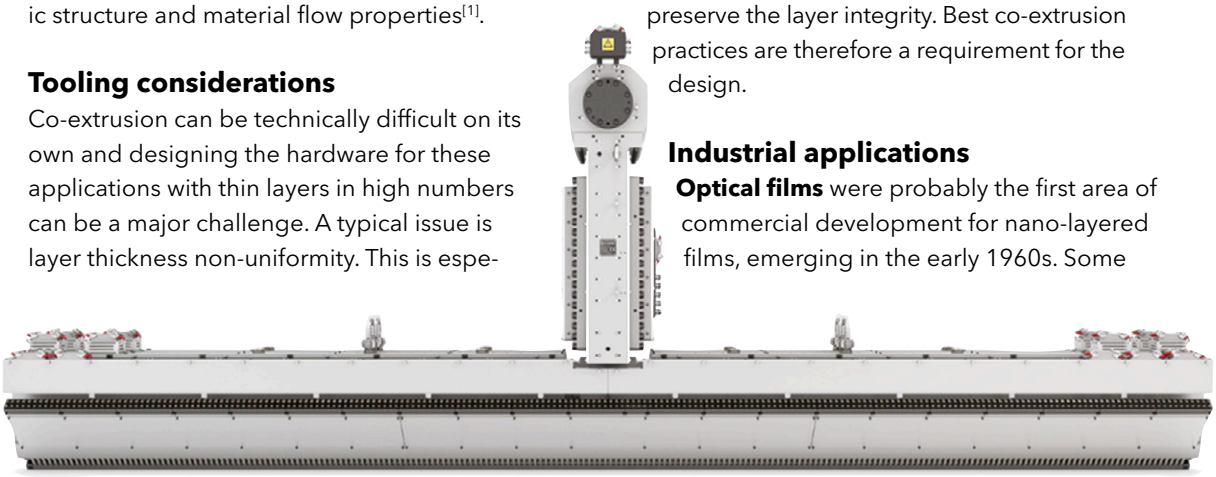
Cloeren's feedblock design aims to reduce the manipulation of the flow streams by forming each layer individually with a dedicated flow insert. The challenge with this approach consists of balancing the flow rate through each flow insert. The design is obtained through numerical optimisation and uses polymer rheology. Design iterations can be calculation intensive, but can help to obtain acceptably uniform layers – even with rheologically mismatched polymers, such as EVOH and TPU.

While the feedblock technology is critical for successful nano-layer co-extrusion, the die is equally important as it needs to shape the co-extrusion structure into a thin and wide web, without creating any layer disturbances. When designed correctly, the die and feedblock system work together to deliver a high-quality co-extrusion. The best example is probably stretch film: today's most advanced structures use 55 layers for a 12-20 micron film total thickness and die slot width close to 5.5m.

The die flow channel design is critical, as it must preserve the layer integrity. Best co-extrusion practices are therefore a requirement for the design.

Industrial applications

Optical films were probably the first area of commercial development for nano-layered films, emerging in the early 1960s. Some



Right: This arrangement of Cloeren's NanoLayer Feedblock with a flat die is used to make stretch film

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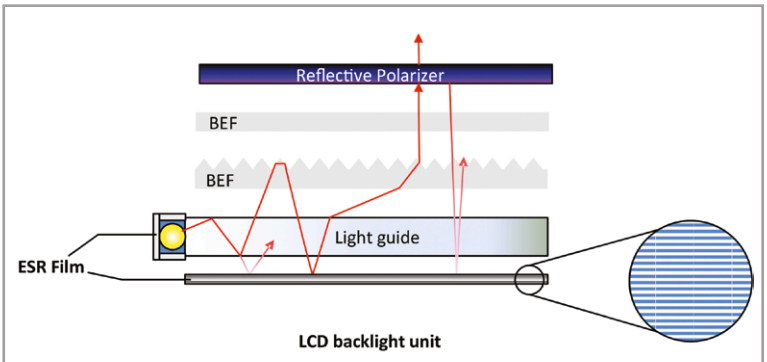

Figure 2: Enhanced Specular Reflection (ESR) films rely on nano-layering for their properties

interesting optical properties can be obtained for multilayer structures with a high number of thin layers, when controlling the thickness and the refractive index of the two alternating polymers. For instance, it is possible to tune the refractive spectrum of the film.

Some films can therefore have iridescent properties just like nacre. One large commercial application of these films is the Enhanced Specular Reflector (ESR) films used in display applications (as shown in **Figure 2**).

As previously mentioned, **stretch film** is also an important application. Research has shown that mechanical properties of a co-extrusion can be enhanced with micro-layered film structures. One such example is the work of Mueller et al., who showed the improvement of toughness as the number of layers increased for a breathable film structure, made of $CaCO_3$-filled PP and PEO co-extrusion [7].

Figure 3 (next page) shows the relatively ordinary tensile properties for the polymers used. Just as for nacre, mechanical properties are improved when coextruding this recipe into nano-layered structures. In this case, the ultimate film made in the lab, with 4,096 layers, has an elongation at break that is better than either of the constituent polymers and equivalent ultimate strength as the filled polypropylene.

While this was a lab-scale demonstration, cast stretch film is an industrial application for commodity film. Here, nano-layer co-extrusion has shown benefits for film mechanical properties and been quite commercially successful. Compared to similar recipes produced as traditional 5 or 7-layer co-extrusion structures, nanolayer films have shown

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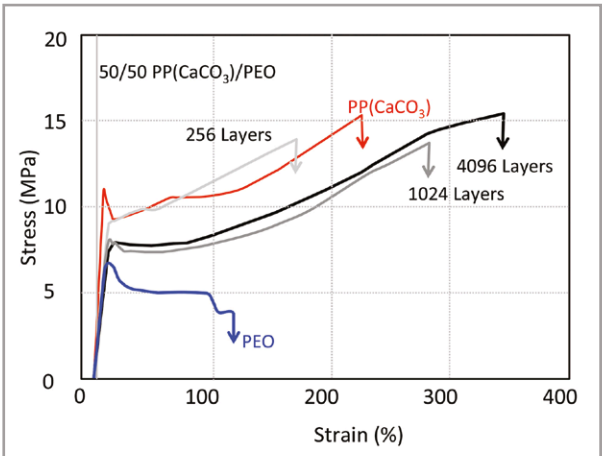


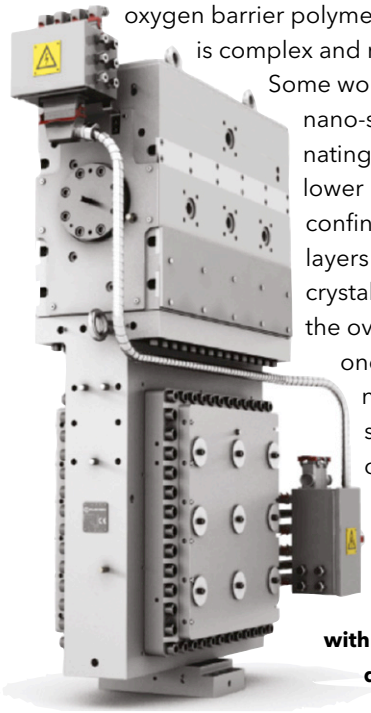
Figure 3: Mueller has shown that nanolayering helps to improve the toughness of film

improved mechanical properties in the test lab, such as greater elongation at break[8]. More importantly perhaps, nano-layer film performance on the pallet evaluated with special test equipment has shown some interesting advantages like the increase in load retention and puncture resistance[9].

This gain can be used as a high-performance advantage or as an opportunity for downgauging, and Cloeren has used it to make a number of nano-layer stretch film structures. [10,11]

The co-extrusion of **barrier film** is more complex. In theory, it would be possible to obtain higher barrier properties when creating thin nano-scaled layers, as it could result in confined crystallisation of the barrier polymer as shown in the lab by Wang [12]. The generation of high-quality, highly oriented crystalline structure would result in the most tortuous path for the gas permeant (usually oxygen).

However, when dealing with EVOH – a common oxygen barrier polymer – the crystallisation behavior is complex and not well understood today. Some work by Kuraray shows that nano-scale EVOH layers with alternating nylon or tie layer results in lower EVOH crystallinity, when confining the EVOH layers with tie layers or nylon layers [13]. The lower crystallinity has negative effects on the overall barrier performance on one hand. On the other hand, the nano-layered structures showed some improvement for flex crack performance of EVOH. ›



Cloeren's Nanolayer Feedblock creates layers sequentially, with each layer formed by its own dedicated flow channel

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This property has been used industrially for the manufacturing of sports shoe air bladders where one of the micro-layer polymers is an elastomeric material [14].

Conclusion

Polymeric nano-layered films have been made in the lab since the 1960s but their industrial development is relatively recent.

Today, there are very successful industrial applications in the main areas of optical film, cast stretch film and special barrier sheet. Still, there seems to be much more potential – and it is likely that the industry will embrace nano-layered film technology further.

One key area is to understand the complex crystallisation behavior of barrier materials in confined assemblies and how it affects barrier performance.

Also, while tooling technology has made significant progress for industrial applications, pushing the boundaries of design will help to create even more complex film structures in future.

■ Olivier Catherine is technical director at Cloeren Incorporated in Orange, Texas, USA

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Davis-Standard has developed an ironing roll winder for larger diameter master rolls up to 1.2m (4ft) in diameter on cast film lines up to 6m (20ft) wide. The company says that the technology is most beneficial for CPP and barrier films where post wrap shrinkage occurs as a result of the types of polymers used in the film structures, or where blocking can occur due to a soft sealant layer with a high coefficient of friction (COF).

The winder incorporates programmable tension control, pre-spreading onto the winding roll, and servo-controlled web entry of the film to influence levelling or lay-flat of the film prior to the lay-on roll. Roll hardness is improved with a more precise loading force of the lay-on roll against the winding roll, controlling the in-wound air at higher production speeds than previously possible. When optimised these features can reduce defects such as tin-canning, caused by blocking and entrapped air, and resulting in annular raised bands on the roll face. Other defects such as buckling, telescoping, and starring can also be reduced with the control features and dynamics of the new winding system.

The variable geometry of the ironing roll enables processors to pre-wrap the film onto the winding roll prior to the lay-on roll, allowing entrapped air to reduce the COF between each wrap. This promotes film flatness prior to engaging roll hardness with the lay-on roll, says the company – resulting in improved control, preventing in-wound imperfections.

The winder is available with a tapeless static knife or patented stationary knife automatic transfer systems, and shafted or shaftless operation to further support efficiency. Although the winder is primarily designed for large master roll winding, in-line slitting is also possible in some shafted applications.

Main image: Davis-Standard's ironing roll winder is aimed at larger diameter master rolls

Slitting range

At this year's Chinaplas, **Goebel IMS** will showcase three of its machines: Monoslit, Interslit and Xtraslit 2.

The company's portfolio covers web widths from 1,800 to 12,000mm. All its slitter rewinders use a digital AC drive technology to reduce operational costs and energy consumption. The technology can recover energy from web tension or during the deceleration at the end of each winding cycle.

The Interslit is aimed at manufacturers of special films with a width between 4,000 and 7,000mm. These include biax, battery separator, optical or ultra-thin films as well as transfer printing applications. The slitter rewinder is suitable for foil thicknesses of 0.5 to 500 microns. Its winding stations can accommodate a roll weight of up to 5,000kg with an unwind diameter of up to 1,550mm and a rewind diameter of up to 1,300mm. Although working with sensitive materials and heavy rolls, it has top speeds of up to 1,200m/min. ›

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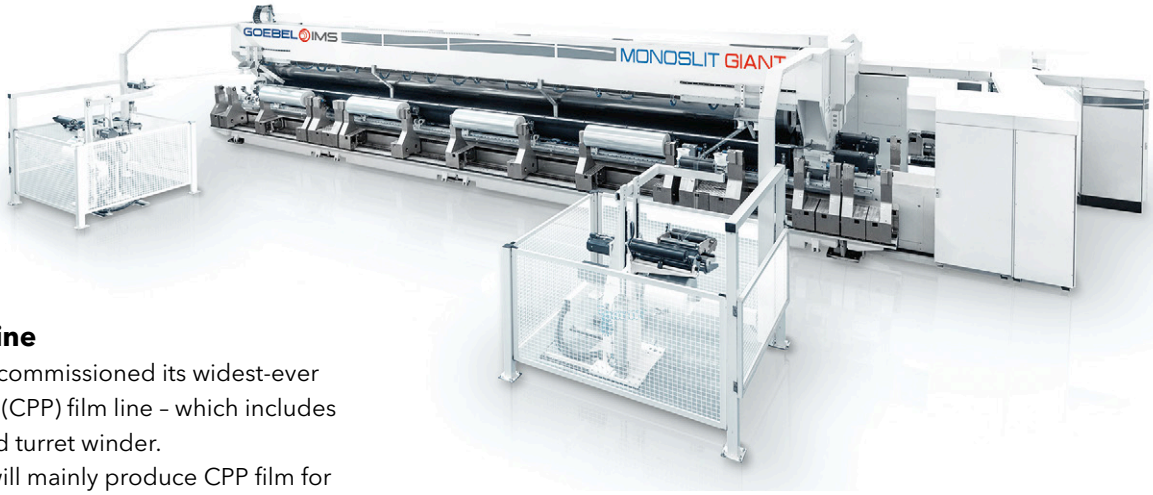
Right: Goebel IMS will showcase its Interslit slitter rewinders at this year's Chinaplas



Wide cast film line

SML of Austria has commissioned its widest-ever cast polypropylene (CPP) film line – which includes a specially designed turret winder.

The line, which will mainly produce CPP film for metallising and laminating applications, has a trimmed final film width of 5,200mm.

The line is equipped a W6000 turret winder, which has been specially designed for wide CPP lines with final film widths of between 3,500 and 6,000mm. The winder, which consists of an inlet section and right and left turret units, offers compact dimensions for transport and reduces the installation time required at the customer premises, says SML.

A spreader roller and a satellite roller are installed upstream of the winding station, making it possible to influence the air entrapment between the single film layers. The winder can operate in both the contact or gap winding mode. During roll changes, cross-cutting is carried out by an electrically activated flying knife and the film is attached to the new winding pipe electrostatically – avoiding the need for adhesive tape, and saving labour. Depending on the end film width, the winder employs 10in or 12in steel winding pipes, which are handled by an overhead crane.

The winder can deal with rolls in diameters of up to 1,300mm and a maximum roll weight of 7,000kg, which corresponds roughly to 60,000m length of 20 micron CPP film. The large winding diameter is a critical advantage for the metallising process because on the one hand, it increases the running time and on the other, cuts the metalliser set-up period.

Auto winding

The FTW3200-Dual, a double automatic turret winder from **Mondon**, can be used for a variety of film production lines, and can handle output automatically.

The winders are located at the output of the extrusion line and are designed to wind agricultural films. Mondon provides two winders with 3200mm width, which load the cores and also unload the finished rolls by themselves. The automatic splice and roll change-over complies with non-stop processes and so means there is no need for an accumulator.

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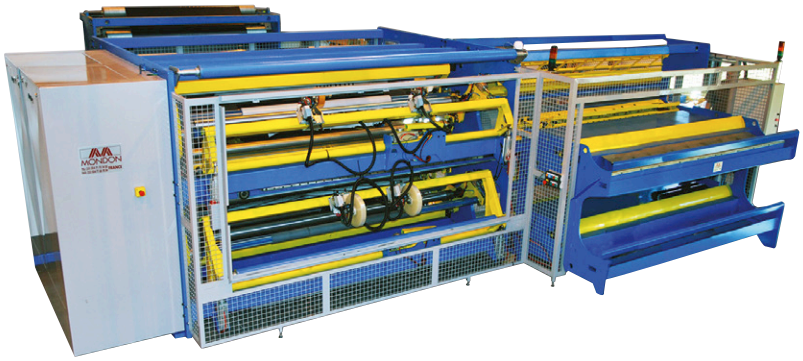

Above: Mondon's FTW3200-Dual is designed for winding agricultural film

The FTW3200-Dual ensures a constant speed and eliminates the damages of over-tension in the product. Each winder is controlled separately in roll diameter and tension. The equipment includes a global touchscreen for machine supervision.

Better flatness

Reifenhäuser says that its Evolution Ultra Flat haul-off system allows the production of films with improved flatness – to ensure better printability and lamination capability. The company says that blown film producers have struggled for years with wave phenomena, and surfaces not being perfectly flat. Stiffer films containing HDPE or PP are particularly affected by these problems – which also often occur in the production of barrier films, said Reifenhäuser.

The company says that the secret behind the Evo Ultra Flat film flattening system is its position within the process: ordinarily, flattening systems have been arranged just in front of the winder. However, Evo Ultra Flat is installed exactly where optimum processing conditions are available for flattening the web – which means upstream, between the haul-off nip roll assembly and turner bar system.

This arrangement offers several advantages: the film still has a temperature above 50°C, so is not fully crystallised; stretching the film is easier while it is still flexible; and the process is more energy efficient than similar systems used at the end of the process.

Other benefits include low investment cost, and high functionality and flexibility. Four heating-cooling rolls and two nip rolls designed for independent speed and temperature control allow producers to obtain the desired flattening effect. In this way, it is possible to obtain optimum results with different raw materials and film thicknesses. In addition, sagging of the web can be reduced by a targeted control of the rolls.

Overall, flatness of lamination and barrier films can be improved by up to 40%, while sagging of the web can be reduced by up to 90%, says the company.

Cutting edge

Atlas Converting Equipment, a leading supplier of slitter rewinders, says that excessive overlap of the top knife is the most common type of shear knife set-up error. According to Dave Rumson, who has written a series of white papers for Atlas on the subject, there are six significant ways in which excessive overlap can lead to slitting defects and poor finished roll quality:

- increased web travel chord;
- cut point location change;
- wider knife-to-web contact;
- increased knife side load contact friction;
- longer slit edge knife face rubbing; and
- slowing of top knife rotation.

In the first of the white papers, Rumson addresses the issue of increased web travel chord.

The cut point is where the web meets the top and bottom knives – which are in contact with each other. To create the cut point, the knives must line up: the bottom of the upper knife must be below the top of the lower knife. To do this, the knife holder overlap stroke is set to the side of the bottom knife, before the 90° knife travel engagement stroke is activated.

With a tangential web path, a slitting system designer has the top knife contacting the bottom knife very close to the bottom knife apex. It is very important that the web be supported by the bottom knife at the cut point location, says Rumson.

"For this reason, the bottom knife should intrude the web to push it slightly above the tangential web path line," he said.

To ensure that this is done properly, the top knife is usually set at an angle to the web path direction (known variously as the shear angle, cant angle, or toe in). The required amount of knife angle misalignment varies according to the material, but is usually 0.25-1.0°.

When shear knives fracture the web, one side of the fracture follows the web path while the other side of the fracture is directed away from the web path by the amount of top knife shear angle. The travel chord is the length the web is in contact with the top knife face – which usually has a bevelled shape. Knife diameters are also important, and will create different web-to-knife contact lengths.

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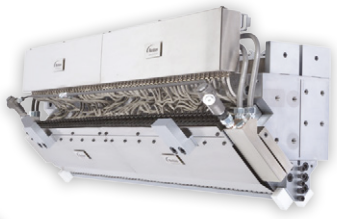

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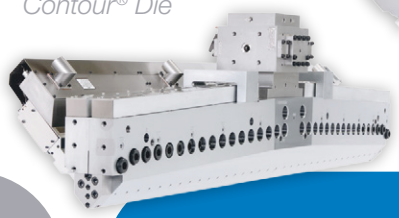

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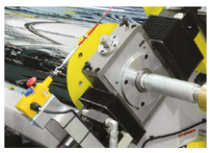

US Pat. #9,182,067
Chrome Roll Skew Mechanism

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Serving the beverage capsules market

The market for home-brewed coffee, made possible by capsule machines, has taken off. We preview AMI's Single-Serve Capsules USA conference taking place in Chicago this June

AMI's new *Single-Serve Capsules* conference takes place on 19-20 June 2018 in Chicago in the US. This brand-new conference for the US market follows the European edition which launched in Germany last year. The conference brings together speakers from the entire supply chain with the aim of identifying opportunities and overcoming obstacles in the US single-serve capsules market.

It provides a unique forum to debate and evaluate the global trends, innovations, challenges and opportunities facing the industry through the entire value chain. This includes capsule fillers, coffee roasters, capsule moulders, material suppliers, technology and machinery suppliers.

From a niche market, single-serve beverage capsules have grown to be one of the most important sub-applications of the ambient thin wall packaging segment in the past five years.

But the industry is under pressure from environmentalists, as well as more conscientious consumers, who are concerned by the growing number of capsules ending up in landfills. There is an urgent need to review the materials used for capsules conversion in search of more sustainable options, as well as to explore end-of-life solutions. In addition to the two-day programme, there are networking opportunities in a focused exhibition area featuring displays from a range of suppliers. Here we preview the event, with a closer look at the line-up of expert speakers.

Market context

The opening session kicks off with **Martyna Fong**, Unit Manager – Packaging at **AMI** in the UK, who gives a global market overview for single-serve capsules. This is followed by **Thierry Fabozzi**, President and CEO at **Plastic Technologies** in the US, on the journey from concept to commercialisation for a single-serve capsules product. The third presentation, focusing on recycling of single-serve capsules, is given by **Norma McDonald**, North American Sales Manager at **OWS** in the US. Closing this session is **Michael Szyliowicz**, the founder of **SolaBev** in the US, who gives his perspective on the future of single-serve in food services.

Capsule production technology

The second session features **Rüdiger Grings**, Key Account Manager at **Greiner Packaging** in Switzerland, who looks at the advantages and disadvantages of various capsule production technologies. He is followed by **Hubert Kittelmann**, Vice President at **Marbach Werkzeugbau** in Germany, who focuses on large and very large thermoform tools for single-serve capsules in polypropylene for the American market.

After the lunch break the session continues with **Manuel Jorge**, Manager, Multi-Layer Packaging Solutions at **Husky Injection Molding Systems** in Luxembourg, who discusses how multi-layer (co-injection) technology is enabling improvements in single-serve capsules. The fourth presentation in the session, showcasing the production of multi-layer barriers by compression moulding is given by **Stefano Chiozzini**, Sales Area Manager – SACMI Closures & Containers BU at **SACMI** in Italy.

Coffee roasting and filling equipment

The third session, which runs over into day two, starts with **Scott Stouffer**, Vice President at **Probat** in the US, who discusses the role of coffee grinding for the perfect brew in creating quality for single-

serve coffee. The final paper of the day is given by **Dave Zurlinden**, Western US Sales Manager at **ICA USA Packaging Machines** in the US, who talks about how single-serve capsules can in fact be considered "green" and sustainable.

To round off the day's proceedings, a networking drinks reception will be held in the exhibition area, where delegates and speakers debate the conference and attendees have the opportunity to network with industry peers.

Day two of *Single-Serve Capsules 2018* starts with **Daniel Ephraim**, President of **Modern Process Equipment** in the US, who focuses on grinding as one of the critical elements in capsule and pod manufacturing.

Material innovations and sustainability

Dave Burke, Business Development: PLM-Food, Consumer Products Division at **Berry Global Group** in the US, begins the fourth session of the conference with a talk on how to navigate the polypropylene transition within the single-serve capsules market in the US. This is followed by a discussion about achieving performance and compostability in a single-serve coffee capsule from **Flavio Di Marcotullio**, Performance Packaging, Business Development Manager at **Natureworks** in the US.

Following the morning refreshment break and networking session, a case study is then delivered by **Michael Schick**, Market Development Compostable Packaging at **BASF** in Germany, which looks at state-of-the-art bio-polymer based compostable coffee capsules with barrier properties. The fourth paper in the session provides an insight into a consumer-friendly approach to capsules recycling and sustainability from **John Brown**, Vice President, Global Marketing, at the **Selig Group** in the US. **Fabien Resweber**, VP Sales & Marketing at **PTT MCC Biochem Company** in Thailand, brings the session to a close with a closer look at compostable single-serve capsules and how new possibilities are opening-up with bio-based polybutylene succinate.

From left: Speakers at Single-Serve USA include: Rachelle Meyeres, a Scientist at MOCON; Rüdiger Grings, Key Account Manager at Greiner Packaging; Thierry Fabozzi, President and CEO of Plastic Technologies and Nino Zehnder, Head of Sales at Beck-Automation

Production optimization and QA

The final session begins with a look at high-speed takeout and in-mould labelling (IML) automation for high cavitation single-serve capsule systems from **Nino Zehnder**, Head of Sales at **Beck-Automation** in Switzerland. **Rachelle Meyeres**, a Scientist at **MOCON** in the US, then questions whether oxygen permeation is a "barrier" to achieving cost reduction and sustainability goals. **Dr Irl Duling**, Director of Terahertz Business Development at **TeraMetrix**, a division of LUNA, in the US, focuses on pulsed terahertz for multi-layer thickness measurement. Closing the conference is **Marcel Fenner**, Technical Manager and President at **Priamus System Technologies** in the US, who examines automatic hot runner balancing and barrier layer detection for multi cavity moulds.

About Single Serve Capsules USA 2018

Single Serve Capsules USA takes place on 19-20 June 2018 at The Westin Chicago North Shore, Chicago, USA. AMI is launching this conference in the US following the success of the equivalent event held in Europe in 2017. The US conference is sponsored by Cobelplast and Polytype OMV.

Single-Serve Capsules in Chicago provides an international forum for all companies, through the entire value chain of plastic and metal capsules in the US, to come together and engage with each other over two days - be they end users, capsule fillers, coffee roasters, capsule moulders, material suppliers, technology and machinery suppliers or converters.

Register before April 27, 2018 and pay $1,090 saving $300 on the full price $1,390. There are additional discounts for group bookings. The registration fee includes attendance at all conference sessions, the Networking Cocktail Reception, lunch and refreshment breaks on both days and a set of conference proceedings.

For further information about attending the event, taking a table top exhibition space or sponsoring the conference with one of our unique marketing packages **click here**, or please contact the organiser Agata Swietek: Email **agata.swietek@ami.international**; Tel: +44 (0) 117 314 8111.

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Chinaplas 2018 welcomes visitors to its new home

A new, larger venue will help this year's Chinaplas exhibition to host more than 4,000 exhibitors. Here, we preview some of the technologies on show

Now on its 32nd edition, Chinaplas – the huge plastics show that is now an annual event – has found a new home: for the first time, it will be held at Shanghai's new National Exhibition and Convention Centre (NECC), in the business district of Hongqiao.

Chinaplas 2018 will host more than 4,000 exhibitors – and an expected 180,000 visitors. Exhibition space is expected to exceed 320,000 sq m, an increase of around 30% on the last Shanghai-held show.

"Since 2012, we have faced the problem of space shortage," said Ada Leung, general manager of Chinaplas organiser Adsale. "By moving to the new venue, we can fulfill the strong demand for exhibition space immediately. This relocation is also good for the long-term development of Chinaplas."

This year's show runs on 24-27 April. For walk-in visitors, a one-day pass costs RMB 50, while a four-day pass is RMB 80. Booking online before 18 April gives an early-bird rate of RMB 50 for a four-day pass.

Seminar programme

Chinaplas will again run a number of seminars. For instance, it will run its third 'Industry 4.0' conference, with continuing support from German engineering federation VDMA. Three sessions – covering automotive, electrical and electronics, and packaging – will include speakers from companies such as Erema, Reifenhäuser and RWTH Aachen University. The conference runs on half-day sessions on 24-26 April.

It will also continue its 'Tech Talk' series of presentations on subjects including smart manufacturing, new materials and green solutions. The most relevant presentation for film extruders is a paper by Youneung Lee of Seyang Polymer, on its liquid crystal polymers (LCPs) for high speed film –

Main image: This year's show is held at Shanghai's new NECC for the first time

Total Corbion PLA will show a number of applications based on its Luminy PLA

which is held on 25 April.

However, the overwhelming element of the show is the exhibition itself – and, given the growing importance of China as a plastics powerhouse, many major US and European suppliers have a major presence.

PLA display

Total Corbion PLA will display a number of applications based on its Luminy PLA, a bio-based and biodegradable polymer made from annually renewable resources that offers a reduced carbon footprint versus many traditional plastics.

Pack & Proper has used Luminy to create a thermoformed black platter for attractive presentation of foods such as cheese, sushi and hors d'oeuvres. The material has a slate-like appearance thanks to its surface shape – giving a more exclusive appearance to a disposable application.

Other examples include: PLA-lined paper cups from Totempak; single-use aprons from Gaia; coffee cup lids from WinGram; coffee capsules from Guanghe; thermoformed packaging from Bio4Pack; foamed ice cream packaging from Synbra; and non-woven applications from Yangtze.

Total Corbion PLA is on track to start up its new 75,000 tonnes/year PLA production plant in Rayong, Thailand later this year. The plant will produce a broad range of Luminy PLA neat resins – from standard PLA to versions with high heat resistance, for applications including extrusion and thermoforming.

Below: Brückner Servtec has enhanced its clip and chain refurbishment services in China

Stretching out

German film specialist **Brückner Maschinenbau** will present its new laboratory stretching machine, the Karo 5.0.

More than 40 of its previous-generation Karo IV units have been installed – used for everything from packaging film recipes and optimised skin layers, to high speed resins and capacitor film.

The Karo 5.0 boasts a series of extended features which will be seen for the first time at Chinaplas 2018. These include: ergonomic design for more comfortable and convenient operation; a new visualisation system to allow optimised, intuitive machine control; better process control; faster change of process settings and oven cooling function; quieter operation; and, less energy consumption.

At the show, Brückner says it will introduces two "world novelties" in battery separator film: • A 5.5m line concept for the wet process; and,

• Its Lisim simultaneous stretching process – applied to wet battery separator film production for the first time.

Meanwhile its sister company, Brückner Servtec, will highlight ways to boost the efficiency and profitability of existing film production lines. These include enhanced local services for the Chinese market, a virtualised IPC system upgrade – and clip and chain refurbishment services in China. Many customers already use the company's clip and chain refurbishment service, for sliding and roller chains used in film-stretching lines. The company's expertise, combined with modern tools -- and options such as renting clip and chain parts – help to minimise downtime.

PP sacks

Starlinger will show off its Ad Star technology, for making block bottom valve sacks from polypropylene woven fabric, in two different ways during Chinaplas: through its augmented reality application software; and at an open house in nearby Taicang.

"Having our own factory in China is definitely an advantage in providing support to our customers," said Klaus Mayerhofer, regional sales director at Starlinger. ›

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Right: Kreyenborg has developed two new products based on its IRD Infrared Rotary Drum

Ad Star sacks are typically used to package dry bulk goods such as cement or fertiliser. The sacks are very tight, and prevent product loss during handling, transport, and storage. Fabric for the sacks is woven on high-speed circular looms, and the company will display its RX 6.0 model at the show. In Starlinger's showroom in Taicang, visitors will see live demonstrations of two other lines used in sack production: the coating line LamiTec LX, and the conversion line Ad Star Kon. Visitors will also get a first-hand impression of the patented Ad Star hot-air sealing process, which works without the use of glue.

Right: Windmöller & Hölscher's Turboclean module allows automatic material changeover on its Varex II blown film lines

Banging the drum

Kreyenborg Plant Technology of Germany will present two new products – IR-Clean and PET-Booster – which are both based on its IRD Infrared Rotary Drum.

The IRD is used to crystallise and dry a wide variety of virgin and regrind polymers, and by eliminating the need for hot or dry air, can deliver energy savings of around 30%.

IR-Clean decontaminates post-consumer PET flakes for direct food contact products – in compliance with US FDA regulations. It produces clean flakes using the general crystallisation and drying process of the IRD concept. The flakes are treated under permanent exchange of surface in combination with high temperatures, but without any vacuum systems. IR-Clean is intended to be used in combination with all extrusion concepts and is ideal as an economic retrofit solution for existing PET sheet lines, says the company.

Meanwhile, PET-Booster is a continuously operating system that crystallises and dries PET in less than 10 minutes. It is aimed at applications in extruded PET sheet and films using degassing extruders. It can eliminate varying levels of input moisture that can cause variation in the extrusion process.

Fast change

A highlight of the **Windmöller & Hölscher** (W&H) stand is its Turboclean module, which allows automatic material changeover on its Varex II blown film lines – which will be demonstrated using a five-layer POD blown film for lamination and collation shrink film.

W&H says the Turboclean module can increase productivity due to short flushing times and fast material changes – shrinking order change times from 40 minutes to around 12 minutes.

It is automatically included with the Varex II – but is now also available as a retrofit on any of the company's blown film lines. The company says that retrofitting the Turboclean module to machines made after 2010 should take no longer than two days.

With it, the extrusion system completes the material change almost completely automatically. Work steps are now automated and parallel, rather than having to be changed step-by-step, by a machinery operator.

By combining a three-layer Varex II with inline-MDO stretching unit, W&H offers a machine configuration to make very thin breathable diaper back sheet film of only 12g/m^2. The product is

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Right: Coperion K-Tron's Bulk Solids Pump feeder offers gentle feeding of free-flowing granular materials

typically made in cast film extrusion and with a higher basis weight, says the company.

W&H will also focus on the manufacture of surface protection films, FFS films, barrier films with up to 11 layers and nanolayer stretch films with up to 55 layers – which can all be produced on its Filmex cast film extrusion line. It will also exhibit its Aquarex 'upside-down' line for making films for infusion bags.

"The need for innovative quality forms for special fields of application is increasing, and we take these into account with our developments," said Michael Fischer, CEO of W&H Asia Pacific.

Doing the Twist

WM Thermoforming Machines will showcase its high-speed Twist 700 thermoforming machine at Chinaplas, as part of the Swiss pavilion.

At the show, an 18-cavity machine will produce 24oz cups from 1.7mm PET rolls, supported by a stacker model MSv 7, which is fully synchronised and supervised by a WM Machine Learning System (MSL).

The MLS system consists of two packages, allowing the user to have a full control of the operations.

The first, Multi-Axis Synchronisation (MAS), allows the operator to set the machine speed and stroke easily by entering a few parameters. MAS uses them to synchronise machine and stacking motions without operator overview.

Also, Thermoforming Process Monitoring (TPM) stores the most important process parameters and displays them to the operator, to compare ongoing with optimal parameters.

Other features of the Twist 700 include:

- a lower tilting platen, moved without mechanical cams, which rotates 75° and is guided on prismatic linear guides to reduce vibrations;
- an electronic cam that guarantees high precision and repeatability of the movements;

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- a camless motion system that reaches up to 50 cycles/minute in production, guaranteeing efficiency and speed; and,
- upper and lower platens with an interface that is designed to receive most of the existing tools.

Feeding time

Coperion K-Tron will highlight a range of materials handling technologies at Chinaplas, including a quick-change feeder and a pump for conveying solid material.

Its K2-ML-D5-T35/S60 Quick Change (QC) feeder features its ActiFlow bulk solids activator and Electronic Pressure Compensation (EPC), combined with a 2400 Series vacuum receiver for refill. The T35/S60 is aimed at applications requiring fast changeover of materials, and fast cleaning. The entire feeding module can be removed, and replaced with a second unit. The removed module can be transported to a cleaning facility for further disassembly and cleaning, before being prepared 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; twin-screw units are ideal for floodable powders and more difficult, sticky or hard-to-flow materials. The D5 platform scale features smart force transducer weighing technology to ensure the correct amount of material is fed into the process – maximising end product quality and minimising waste.

The ActiFlow smart bulk solids activator offers an innovative method to reliably prevent bridging and rat-holing of cohesive bulk materials in stainless steel hoppers without internal hopper agitation. It is a non-product contact device, consisting of a patent-pending vibratory drive and intelligent control unit, 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 with an optimised frequency and amplitude, without exerting any mechanical force on the bulk material.

The T35 is also equipped with EPC, for loss-in-weight feeders, which ensures accurate and steady pressure compensation in feeder hoppers and outlets.

Below: Ettlinger says its ERF350 sets a new benchmark in melt filtration

At the same time, the company's K-ML-BSP-150-S Bulk Solids Pump (BSP) feeder offers gentle feeding of free-flowing granular materials. It does not use the usual screws/augers, belts or vibratory trays, but instead uses positive displacement action to feed free flowing materials with high accuracy, offering uniform discharge, consistent volume and gentle handling.

With no pockets or screws and only one moving part, the compact feeder can be cleaned in seconds. It feeds from 34 to 6700 dm^3/h [1.2 to 237 ft^3/h] using five feeding discs to create four feeding ducts.

China focus

Davis-Standard will promote its recent expansion and equipment innovation, including its strengths in Suzhou.

"Our location in Suzhou has been instrumental to our growth in China," said Sekaran Murugaiah, Davis-Standard vice president of business development in Asia. "One customer has made us their preferred extruder provider due to our regional presence and consistent equipment performance."

At the same time, the company's latest DSX Flex-Pack model, the 300S, is a single-station extrusion and lamination line with benefits specifically engineered for the Asian flexible packaging market. It was designed by Davis-Standard teams in the USA, Germany and China to ensure that pricing, machine footprint, speeds and output, and the ability to make shorter runs would accommodate the demands of converters. In addition, Davis-Standard offers a tandem configuration of the machine called the DSX Flex-Pack 300T for the Asian flexible packaging market.

The company plans to have its first DSX Flex-Pack 300S demonstrated during a customer open house in Suzhou in the fourth quarter of 2018.

Davis-Standard also anticipates that its new stretch film line with DS S3 winder will be beneficial to Asian converters. The line is engineered for producing thin films from 31- to 51-gauge (7.8 to 13 microns) at high speeds. Its side-by-side DS S3 overlapping winder is essential to this. It enables maximum slit widths for hand-wrap, machine-wrap and jumbo rolls, supporting multiple market segments on one winder. Films discharge out the front of the line to a common side, which simplifies roll packing and future automation. Cores are also same-side loaded from the back to prevent disruption of packing activities. An auxiliary lay-on roll eliminates top-wind waste during transfer, optimising roll quality and eliminating outer wrap transfer waste.

All features are advantageous for high-grade film operations, says the company. ›

Filter debut

For the first time under the **Maag** umbrella, **Ettlinger** will present its ERF350 melt filter at Chinaplas.

The device, introduced to the market in late 2017, filters plastic melts with impurities and separates foreign materials such as paper, aluminium, wood, elastomers or plastics which fuse at a higher temperature with impurity levels up to 18% – all with very low melt losses.

Designed for high efficiency, it achieves a maximum throughput of 3800kg/h, depending on the type of melt and degree of impurities, as well as the selected filtration rating. It is suitable for all commonly used polyolefins and polystyrenes as well as a large number of technical plastics such as styrene copolymers, TPE and TPU.

Maag acquired Ettlinger at the start of this year, and sees two strong melt filtration players combine their operations.

At the time, Ueli Thuerig, president of Maag, said: "Bundling our products and strengths will deliver a new breadth of custom solutions for plastic filtration."

In the near future, the combined companies will look to vertically integrate their portfolios – though will continue to operate under their existing brand names.

Maag has production sites in Switzerland, Germany, the USA, Italy and China, while Ettlinger has a manufacturing site in Germany.

Volker Neuber, CEO of Ettlinger, said: "This is a unique opportunity to expand our product portfolio and offer our customers complete solutions. At the same time, we are extending our geographic reach, so will be able to enhance our customer service on a global scale."

Granulator series

Rapid Granulator is introducing a new family of shredders for plastics in Asia, called the Raptor series. These modularly designed units – which will be showcased at Chinaplas – feature an 'open-hearted' design. Other notable features include a unique cutting system, tilt-back hopper, and design for integrated granulation.

"The Raptor series is a shredder and granulator hybrid with the shredder's heavy-duty cutting technology combined with granulator features such as Rapid's 'open hearted' design that makes it super-easy to operate, service and clean," said Bengt Rimark, CEO of Rapid.

Above: This year's show will have a strong focus on packaging

The 'open hearted' design of the Raptor enables quick and direct access to the shredder rotor and cutter chamber, simplifying the cleaning and service process. The front door, hinged on the side, provides unrestricted access to the rotor and to the screen, which is mounted in the door. Once the front door is open, the shredder hopper mounted on a rear hinge can be tilted back.

Rapid offers 36 base configurations of the Raptor in order to handle various customer applications. The modular systems feature two diameters and two widths – 31.5in (800mm) and 53in (1,350mm).

There are two system designs for pushing material into the rotor—FlexiPush and PowerPush. The PowerPush is available with an extended pusher length. There are also three different cutting systems: Quad Cut, Claw, and Power Wedge.

CLICK ON THE LINKS FOR MORE INFORMATION:

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Chinaplas 2018 – Key Information

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Clear winner for cosmetics

Velox, a European materials distributor, is offering a range of PET-G grades for film extrusion applications.

Its long-term partner, SK Chemicals, has recently modified its bio-based Ecozen co-polyester lines, improving their transparency and performance.

The grades are aimed at cosmetics packaging, as well as the food, household and consumer goods markets.

"The new Ecozen portfolio is adding value to the needs of the cosmetic and packaging industries by providing a highly transparent polymer that is heat- and chemical-resistant," said François Minec, general manager at Velox. "The colour tone of the material has been improved, and is perfectly suited for clear crystal- or glass-like applications."

Ecozen is an eco-friendly solution, says Velox, containing an appropriate amount of bio-mass and is free of Bisphenol A. Further benefits of the material are easy processing, energy efficiency, high printability, easy recyclability and high impact strength.

The range is available from Velox in most European countries.

› **www.velox.com**

PACKAGING FILM

Protective packaging uses colour to make connection

US-based Pregis has introduced Inspyre – a protective packaging brand with a range of colour possibilities.

The first product under the Inspyre brand is a 12in wide, low-density polyethylene (LDPE) hybrid cushioning (HC) packaging film. The initial stock colour offering will be 'water blue', and a wide array of custom colours will also be possible.

"As e-commerce continues to grow, brands have less opportunity to physically connect with

their customers," said Clint Smith, product manager at Pregis. "Inspyre changes that by using colour to heighten the connection between the brand and the consumer."

Hybrid cushioning features multiple air chambers in a proprietary square pattern that provides high-pressure cushioning and aesthetics. Flat, perforated rollstock is mounted onto Pregis' AirSpeed HC Versa system, which creates the rows of small air-filled pockets as the air is transferred between the individual chambers.

HC is ideal for cushioning, blocking/bracing and wrapping, says Pregis.

› **www.pregis.com**

IN MOULD LABELS

In-mould label film gets thinner but retains mechanical properties

Treofan has thinned down its EWR IML film label.

The latest version, EWR50, is just 50 microns thick – giving it greater efficiency and larger surface yield with the same product properties, says the company. This is of particular benefit to converters in the food and packaging industry. (The previous version, EWR57, was 57 microns thick with a surface yield of 18.3 m^2/kg.)

Just like the EWR57, the solid white EWR50 enables the efficient production of labels. The IML decoration with EWR labels gives packaging a high gloss look. EWR is developed for in-mould labels for PP and PE injection moulding. With good anti-static properties, web flatness and machinability, it is suited for offset sheet-fed printing with UV curing and oxidative drying inks, as well as for gravure and UV-flexo printing.

"EWR50 is geared towards the increasing market demands in terms of efficiency and yield combined with excellent quality," said Joachim Jung, who is responsible for product management and business development at Treofan.

Treofan says that early customer reactions have been positive – with UK label printer Reflex Labels commenting: "EWR50 impresses with superior production performance. The reject rate is reduced compared to competitive IML products."

› **www.treofan.com**

RECYCLING

High-torque granulator cuts thermal degradation

Hellweg Maschinenbau has extended its 600 series granulator at the upper end, by adding a model with a 1,500mm working width.

The new MDS 1500/600 version offers high torque due to the high stability of the entire machine housing and the heavy-duty rotor.

"Aside from the high performance, the machine has other strengths – such as in flexibility on account of its modular design," said Mark Hellweg, managing director. "For example, straight or slanted housing versions are available, as well as different rotor and stator designs, in order to address the different tasks required in the market."

The double-slanted scissor type of cutting ensures that the large granulator can shred articles including thick-walled mouldings and sheets. In continuous operation, maximum heating of material during grinding is no more than 33°C – and a maximum of 38°C when shredding glass fibre reinforced plastics. This removes the possibility of thermal degradation.

Granulators in the 600 series granulators offer the possibility of full scalability. Despite difficult material tasks, the regrind produced can be easily processed further. The latest granulator can be adapted according to predetermined conditions.

The 600mm rotor works at a speed of around 400rpm, and has a working width of 1,500mm. A choice of rotors is offered, with three to seven continuous rotor cutting strips. The usual process of setting rotor blades has been eliminated.

For film applications, the number of stator blades can be increased to four. There are special rotor versions for lumps and film applications, different wear protection packages for glass fibre reinforced material applications, and noise protection cabins.

Hellweg has extended its 600 series

› **www.hellweg-granulators.com**

CPP

Chill roll with fast changeover

Amut has developed a new line for the production of cast PP film.

The 2,100mm-wide ACP series has been designed to make smooth, general-purpose film, and film with an embossed surface for stationery applications such as document folders.

In order to produce both types of CPP film surface, the line has two different chill rolls. A fast-change system enables production to be switched between the two very quickly.

The line has a four-layer multi-manifold die which allows very accurate distribution of the layers by using four extruders.

An independent rotary arm type winder is equipped with an in-line cutting system for the production of finished rolls without any reduction of maximum winding diameter, even when running multiple rolls in winding and with absolutely minimum tail, says Amut.

› **www.amutgroup.com**

BOPP

Polibak plans big BOPP line

Polibak, a leading plastic film producer in Turkey, is planning to boost output by 40% by installing a new line from Brückner.

The company, which has two facilities in Izmir, will now install a 10.4m wide line that has production speeds up to 525m/min, equivalent to an output of over 7,400kg per hour of five-layer film.

Brückner says that, when installed, it will be the largest BOPP film production line in Turkey.

› **www.brueckner.com**

Polymer Testing & Analysis

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September 11-12, 2018
Pittsburgh Marriott City Center, Pittsburgh, Pennsylvania, USA

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Download these new product brochures

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BG PLAST: FOIL AND SHEET PLANTS

This brochure provides information on BG Plast's Complete Extrusion Plants for producing foils and sheets for multiple uses including thermoformed packaging, chemical tanks and containers, applications in cars, household appliances, footwear, lighting and construction.

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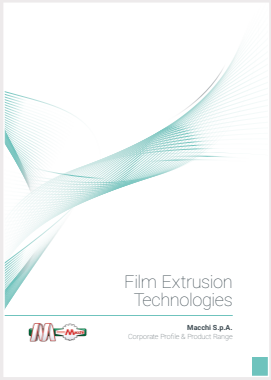
MACCHI: FILM EXTRUSION



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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W&H: VAREX II FILM SYSTEMS

Varex II is Windmöller & Hölscher's latest universal system for high output blown film production. This publication details the critical Varex II system features that ensure production of the highest quality films with minimal scrap and highest plant efficiency.

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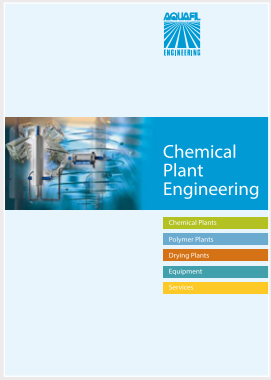
AQUAFIL: PLANT ENGINEERING



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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DAVIS-STANDARD: EXTRUDERS

The Super Blue range of single screw extruders from Davis-Standard is designed for cost effective production of a wide variety of polymer products. This brochure details the key features of the range, which extends from 50.8mm to 114.3mm screw diameter.

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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 2018 EUROPE

AMI's long-established Stretch & Shrink Film conference will take place for the 15th time on 16-18 April 2018 in Madrid, Spain. The event attracts the key players from across the whole supply chain: film extruders, polymer suppliers, machinery producers and end customers.

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POLYMERS IN BUILDING INSULATION

This new event from AMI takes place in Cologne in Germany on 18-19 April 2018 and takes a look at challenges and opportunities for thermal and acoustic insulation. Topics on the agenda include compliance testing and processing innovations.

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PLASTIC POUCHES 2018

The 4th edition of AMI's international Plastic Pouches conference will take place on 24-25 April 2018 in Vienna, Austria. The event will bring together brand owners, retailers, converters, film producers, distributors and suppliers.

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POLYMER SOURCING & DISTRIBUTION

Taking place in Barcelona, Spain, on 15-17 of May 2018, AMI's 13th Polymer Sourcing & Distribution conference brings together polymer producers, distributors, traders and processors to explore critical strategic and market developments.

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SINGLE-SERVE CAPSULES USA

This brand new North American conference takes place in Chicago on 19-20 of June 2018 and brings together a line-up of industry-elite speakers to deliver expert insight into the fast growing market for single-serve capsules.

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MEDICAL FLUID BAGS 2018

AMI's first European Medical Fluid Bags conference takes place in Cologne in Germany on 21-22 June 2018. This high level event looks at the newest innovations in design and production of polymer bags for fluid containment.

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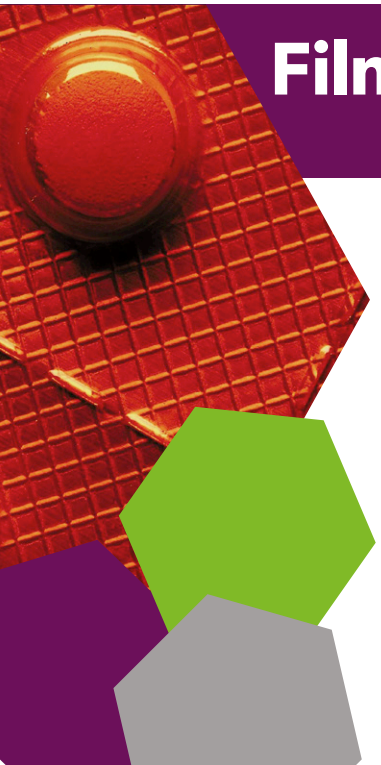
To see our full line-up of more than 50 plastics industry events over the next 12 months, please visit www.ami.international/events

Polibak

Head office:	Izmir, Turkey
General Manager:	Ali Çalişkan
Founded:	1994
Ownership:	Private
Profile:	Polibak, founded in 1994, is a producer of both BOPP and CPP film. It is located in the Izmire Ataturk Organised Industrial Zone and exports its products worldwide – to markets including the USA, Russia, Brazil and Tunisia. Its products are used in a variety of end markets, including food, labelling, stationery and textile packaging. It is one of the 300 largest companies in Turkey.
Product lines:	The company produces a wide range of BOPP and CPP film. In BOPP, its products include LNC co-extruded film, in which one side of the film is treated to give better performance on HFFS and VFFS machines. Film properties include high heat seal strength and excellent hot tack. Other versions of the film are adapted to have either high coefficient of friction (where low slip is required) or low coefficient of friction, for high speed machines. It also offers co-extruded bag film, and a high gloss version. In CPP, it offers versions including a tear-resistant grade, and a special grade for to make in-mould labels.
Factory location:	The company began manufacturing, in Izmir, in 1994. Since then, it has expanded operations – adding metallisation, slitting and more production – so it now has three neighbouring facilities. These house five BOPP lines – which together have a capacity of 155,000 tonnes/year – as well as a 3,000 tonnes/year CPP line. The company will soon boost capacity by 40%, when a new 10.4m-wide metallised BOPP line from Brueckner comes online in late 2019. This will bring its total output to 180,000 tonnes/year.

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:

May 2018
Waterproof membranes
Materials handling
Photovoltaics ● Barrier film
Show previews: NPE 2018; Plast 2018

June 2018
Printing equipment
Blown film dies
Thermoforming ● Plastic pouches
Show preview: CWE/PRWE 2018

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

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

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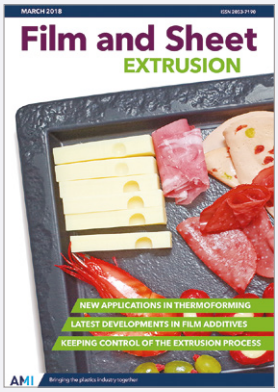

Film and Sheet
March 2018
The March 2018 issue of Film & Sheet Extrusion has a feature on the growth of applications in thermoforming. It also covers performance additives for films, plasmonic UV absorbers, control software and screw design.

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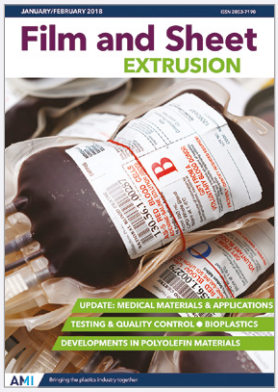

Film and Sheet
January/February 2018
The January/February edition of Film and Sheet Extrusion looks at some of the latest medical materials and applications. It also highlights developments in polyolefin resins and materials testing, as well as reviewing progress in bio-based polymer sourcing.

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Compounding World
Arpil 2018
The April edition of Compounding World explores developments in thermally conductive additives. The issue also looks at how to maintain effective compounding equipment and greener alternatives in processing aids.

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Plastics Recycling World
January/February 2018
The January/February edition of AMI's new digital magazine – Plastics Recycling World – takes a detailed look at the latest innovations in recycling of packaging films. It also explores developments in pelletising and material separation technologies.

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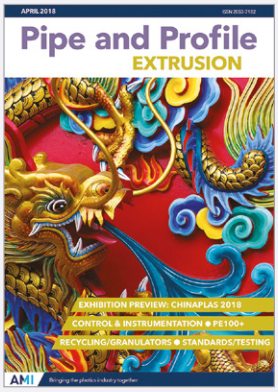

Pipe and Profile
April 2018
The April edition of Pipe and Profile Extrusion magazine previews the upcoming Chinaplas exhibition. It also takes a look at the latest developments in pipe testing, PE100 polymers, recycling technology, and extrusion process control.

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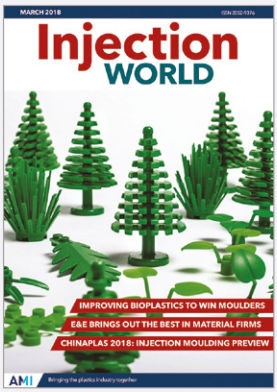

Injection World
March 2018
The March edition of Injection World magazine looks at the latest innovations in bioplastics and polymers for E&E applications. This edition also examines developments in resin drying technology. PLUS Chinaplas 2018 preview

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Plastics Recycling WORLD

GLOBAL EXHIBITION GUIDE

2018

24-27 April	Chinaplas, Shanghai, China	www.chinaplasonline.com
7-11 May	NPE, Orlando, USA	www.npe.org
9-11 May	Plastic Japan, Osaka, Japan	www.plas.jp
15-18 May	Elmia Polymer, Jönköping, Sweden	www.elmia.se
22-25 May	Plastpol, Kielce, Poland	www.targikielce.pl
29 May-1 June	Plast, Milan, Italy	www.plastonline.org/en
11-14 June	Argenplas, Buenos Aires, Argentina	www.argenplas.com.ar/en
19-20 June	Plastics Design & Moulding, Telford, UK	www.pdmevent.com
20-23 June	Interplas Thailand, Bangkok	www.interplasthailand.com
27-28 June	Compounding World Expo, Essen, Germany	www.compoundingworldexpo.com
27-28 June	Plastics Recycling World Expo, Essen, Germany	plasticsrecyclingworldexpo.com/eu
2-4 August	Plasti & Pack, Lahore, Pakistan	www.plastipacpackistan.com
15-19 August	Taipei Plas, Tapei, Taiwan	www.taipeiplas.com.tw
19-22 September	Indoplast, Jakarta, Indonesia	www.indoprintpackplas.com
24-28 September	ColombiaPlast, Bogota, Colombia	www.colombiaplast.org
28 September-1 October	Koplas, Seoul, South Korea	www.koplas.com
14-17 October	Pack Expo, Chicago, USA	www.packexpointernational.com
16-20 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de
7-9 November	Expo Plasticos, Guadalajara, Mexico	www.expoplasticos.com.mx

AMI CONFERENCES

16-18 April 2018	Stretch & Shrink Film, Madrid, Spain
24-25 April 2018	Plastic Pouches, Vienna, Austria
19-20 June 2018	Heavy Duty Sacks, Cologne, Germany
19-21 June 2018	Biax Film, Vienna, Austria
21-22 June 2018	Medical Fluid Bags, Cologne, Germany
5-6 September 2018	Single Serve Capsules, Vienna, Austria
17-19 September 2018	Agricultural Film, Madrid, Spain
25-26 September 2018	Thin Wall Packaging Asia, Bangkok, Thailand

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

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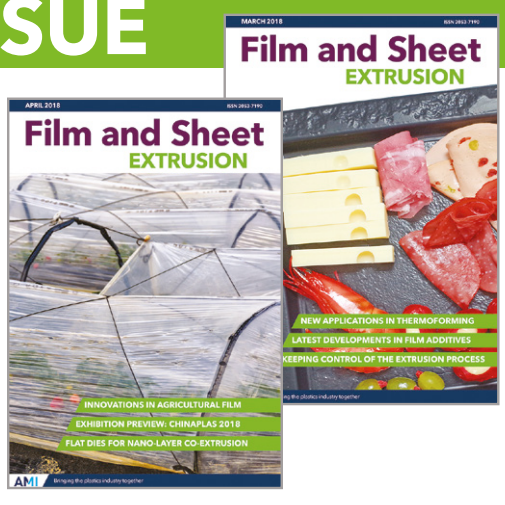

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