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COVER PHOTO: TOTALENERGIES


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Hexpol acquires Turkish TPE firm Symplast

Global polymer group Hexpol has announced an agreement to buy 80% of Symplast, a Turkish developer and manufacturer of thermoplastic elastomer (TPE) compounds with a strong position in custom-made and value-added solutions for the automotive, construction, consumer, and electronics industries.

Hexpol is paying €54m in the deal, which is expected to close in Q1 2027, and it has an option to acquire the remaining shares in Symplast. The group said the acquisition significantly strengthens its compounding platform and reinforces its position in the growing Turkish market.

"Symplast brings strong formulation and application expertise, modern production capabilities and an entrepreneurial organisation with a clear focus on customer service," said Jan Wikström, President of the Hexpol Thermoplastic Compounding business area. "The company is highly complementary to our existing thermoplastic operations, and provides an attractive platform for continued growth, both in Turkey and in export markets."



Symplast produces a wide range of TPE products, including Symflex S SEBS-based compounds

Symplast's production facility, headquarters, and R&D centre, are located in Izmir, where it manufactures TPE compounds, including TPV and TPO-based products. The Izmir operation has substantial available capacity and room for further expansion within the existing footprint.

The company also operates a facility for semi-finished materials in Poti, Georgia, and has a sales office in Germany.

Symplast was founded in 2013 by a group of experienced plastics specialists and has become an established TPE compounder. Two of the original founders, Fahri Tolga Sarıkahya and Ali Rıza Kır, will continue to run the company as a subsidiary.

› **www.hexpol.com**
› **https://symplast.com.tr**

New Bay Plastics facility

Bay Plastics Machinery, the US manufacturer specialising in compounding, recycling, and pelletising technology, has officially opened a new Training, Technology and Manufacturing Centre in Bangor Township, Bay City area, Michigan, US.

During a speech at the opening ceremony, Jim Forgash, VP of Bay Plastics, welcomed around 100 local officials, employees, plastics professionals, members of the media, friends, and family, saying: "Today is about celebrating a manufacturing legacy that began here in Bay City more than six decades ago, and looking ahead to the people, technology, and opportunities that will carry that legacy into the future."

The move is expected to create more space to serve customers, drive innovation, and develop the next generation of plastics professionals.

› **https://bayplasticsmachinery.com**

Delta Tecnic looks at new approach for ATO

To promote a safer and more controlled way of incorporating antimony trioxide (ATO) into plastics processing, Delta Tecnic is proposing a new technique whereby the direct handling of powdered ATO is replaced with prior incorporation. ATO is used as a flame-retardant synergist.

In the new solution, the ATO is distributed and encapsulated within a polymer matrix before it arrives at the customer's plant, which makes it easier to handle, reduces operators' exposure, and enables better incorporation.

"The innovation lies in transforming the way ATO is used in the plant, rather than in replacing it," said Eva Gotor, Marketing Manager at Delta Tecnic. "The masterbatch format addresses a handling safety issue and a process issue at the same time, enabling a more controlled and homogeneous incorporation of the additive."

As well as other benefits, the method facilitates the use of high-purity ATO, above 99.8%, and a high level of batch-to-batch consistency, factors that are particularly relevant in technical applications where formulation stability is essential.

Delta Tecnic holds its own Reach registration for ATO, which allows direct management of regulatory compliance and provides traceability within the European market.

› **https://deltatecnic.com**

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BASF and HSCC come together to explore PA6 joint venture

BASF and Chinese conglomerate Highsun Holding Group (HSCC) have signed a non-binding Memorandum of Understanding to explore the combination of their respective European activities across the polyamide 6 (PA6) value chain in a 50:50 joint venture.

Both companies are also evaluating the inclusion of their global extrusion activities outside of North America in the joint venture (JV). The engineering plastics downstream businesses of BASF and HSCC are not part of the evaluation.

"The European chemical industry needs to become more competitive. It requires supportive industrial policies as well as consolidation to create stronger companies that are better positioned to compete successfully on a global scale. BASF intends to actively shape this development," said Markus Kamieth, Chairman of the Board of Executive Directors of BASF.



Markus Kamieth (left), Chairman of BASF, and Chen Zhong, President and CEO of Highsun Holding Group

He said that in the exploratory work with HSCC, BASF will consider opportunities to strengthen its PA6 business by combining the most competitive assets from both companies, along with technologies and commercial expertise.

With production assets in Germany, Belgium, China, and US, BASF operates one of the largest production networks for polyamides worldwide. HSCC, which is headquartered in Fuzhou, China, is a multinational enterprise operating 31 facilities in various locations in China as well as in Europe. It is a major producer of polyamide precursor caprolactam.

› **www.basf.com**
› **www.hscc.com**

IN BRIEF...

Avient Corporation's Board of Directors has appointed Mike Frank as President and CEO. Frank, who has served as CEO of UPL since 2022, succeeds Ashish Khandpur, who will remain in an advisory capacity through December 31 to help facilitate a seamless transition.
https://avient.com

SI Group has announced the appointment of Marcello Boldrini as CEO. He was previously CEO of Kraton Corporation. Boldrini succeeds David Bradley, who has served as President and CEO of SI Group since 2019.
https://siigroup.com

Solstice makes R&D investment

Solstice Advanced Materials is to invest $49m in expanding research and development capabilities at its facility in Buffalo, New York, US. The upgrades will include expanded capabilities for refrigerant and thermal management research, enhanced toxicological testing, and the construction of a lab.

"Innovation is one of the core reasons customers choose Solstice, and these investments will strengthen our ability to develop and commercialise the next generation of advanced materials," said David Sewell, President and Chief Executive Officer of Solstice.

The Buffalo site employs approximately 180 scientists, engineers, and support staff, and has been at the forefront of advanced materials innovation since it opened in 1955.

› **www.solstice.com**

Sirmax launches new E&E compounds

Italian compounding group Sirmax introduced new products at the Fakuma exhibition in October.

In the electrical and electronics sectors, it presented halogen-free flame-retardant PA6 and PA66 compounds with UL certifications, available both in virgin versions and with recycled material content obtained through mechanical or chemical recycling.

Sirmax has also expanded its range of amorphous polymers, with certification of Green flame-retardant polycarbonate and PC blend grades containing mechanically recycled material. It has also introduced a new series of filled and unfilled, halogen-free and PFAS-free flame-retardant PP grades.

› **www.sirmax.com**

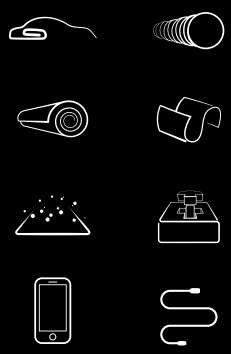


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Febo expands in Morocco

Italian distributor Febo Group is strengthening its presence in Morocco with the establishment of Febo E&R Polymers in Tangier Free Zone.

The new company is focusing on polymer materials for the automotive, electrical and electronics, lighting, and household appliance sectors.

"We see significant opportunities in industrial applications that require high-performance materials," says Giuseppe Carocchi, CEO of Febo Group.

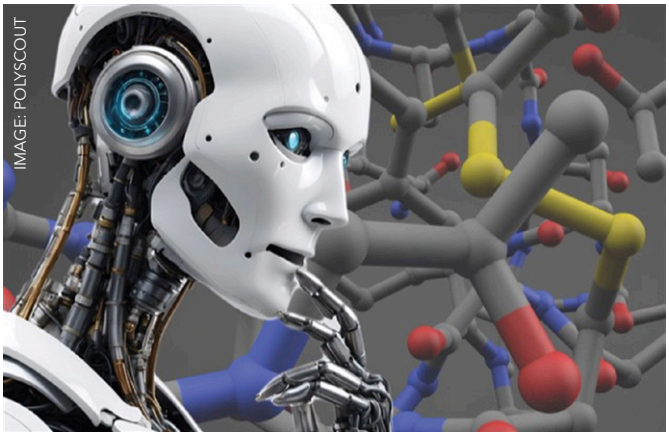
The Tangier Med port, the Free Zones, and the region's manufacturing network make the area a strategic link between Moroccan, European and African supply chains.

Febo previously made an investment in Fnegoce, a distribution company based in Casablanca, through which it says it has strengthened its presence in the Moroccan commodities market.

› **www.febo.it**

New Dutch company uses AI for formulating

TNO Ventures in the Netherlands has launched Polyscout, an independent AI company that designs polymers to specification. The Polyscout platform combines polymer-focused AI models, a proprietary verified database, and high-throughput lab validation to formulate polymers meeting customers' specific requirements.


IMAGE: POLYSCOUT

The new company, led by co-founders Michaël van der Jagt (CEO), Ellen de Ruiter (CCO), and Milad Golkaram (CSO), is currently in discussions with manufacturing companies and materials producers about its first design programs. Polyscout is particularly focused on the transition from fossil-based polymers to sustainable materials.

Traditional polymer development often starts with making molecules and then measuring their properties, whereas Polyscout says it reverses this process. Customers first specify the desired properties, such as a glass transition temperature above 105° C, transparency, or dishwasher resistance, and AI models select suitable candidates from industrial, Reach-certified building blocks.

Using this system, the company says the polymers it designs can be scaled directly for production, which is crucial in sectors such as electronics, automotive, and textiles, where sustainability, compliance, and rapid innovation are essential.

Polyscout has developed a polymer-native AI representation based on a verified database of thousands of polymer-property data points, built up over four years of research at TNO. The AI models are trained to predict polymer behaviour in terms of technical performance, safety, sustainability, and cost-effectiveness.

It says that rapid development of custom polymers can help European companies respond more effectively to regulatory requirements and remain competitive. The approach enables delivery of lab-validated materials within weeks, compared with the years-long duration typically required for traditional polymer development.

› **www.polyscout.ai**
› **https://ventures.tno.nl**

Westlake closes German PVC plant

Westlake has announced that, in light of challenging market conditions, it is closing its PVC plant in Cologne, Germany.

The US company said that chemical production in Europe continues to face various difficulties including weak demand, elevated energy costs, and increased import pressure from Asia.

The Cologne site, which has a production capacity of 165,000 tonnes/yr, is expected to cease operations in the first quarter of 2027.

"Given the persistent, challenging market conditions facing the global chemical industry, we have made the difficult decision to cease operations at [the] site as part of our ongoing optimisation of business operations," said Westlake President and Chief Executive Officer Jean-Marc Gilson.

Due to its smaller scale and higher logistical burden, the Cologne plant has higher costs than the company's other European PVC sites. It will continue to serve customers from its remaining PVC facilities in Germany, including the recently acquired Wilhelmshaven site.

› **https://westlakevinnolit.com**

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Compounding experts gather at free conference

Visitors to Plastics World Expos 2026 on 11-12 November in Cleveland, Ohio can hear insights and updates from plastics industry leaders in North America. The free-to-attend event will also host around 100 expert speakers in its four conference theatres involved in presentations, keynotes and panel discussions.


IMAGE: AMI

The Compounding World Expo conference theatre will provide compound makers with news and views on the latest technical, regulatory and market developments shaping the compounding industry.

On November 11, the keynote presentation will focus on five emerging technologies that are changing plastics compounding. These technologies include AI, robotics, in-line sensing, reactive extrusion, and intelligent circular compounding. The presenter will be Roger Avakian from Avakian PolyChem Consulting.

On Day 1, the first panel discussion is about the opportunities and challenges in high-performance compounds. Key participants include members from Schneider Electric, Americhem, Avient, Hubron, and Radici High Performance Polymers.

On November 12, the keynote will cover the state of mergers and acquisitions in compounding, led by presenters John Hart and Soren Rossi from the Plastics & Packaging team at PMCF Investment Banking.

The first panel discussion on Day 2 is on PFAS in plastics. The panellists are Sarah Kettenmann, Environmental Attorney at Shipman & Goodman, and Mark Robinson, National Service Leader for EHS Chemicals at TRC.

Later in the day, another panel will explore regulations and technical developments affecting PVC's future, featuring leaders from Teknor Apex, Westlake, Manner Polymers and Vision Extrusions Group.

The final panel at the conference will discuss recent changes in masterbatch with Americhem, Polyvel and Mosaic Colors executives.

The Cleveland expos and conference sessions are organised by AMI, publisher of *Compounding World*. Find out more about the conference and how to register for free at the event **website**.

Americhem adds med facility

Americhem has opened a new clean compounding facility in Suzhou, China, expanding its ability to support customers who manufacture in the region. Designed to meet ISO 13485 and cGMP requirements for demanding medical device applications, the plant joins the company's network of certified facilities in the US and Denmark.

"Our customers need more than local production," said Rose Tu, Vice President of APAC at Americhem. "They need a material solutions partner who understands their technical requirements, quality expectations, and growth objectives. The Suzhou facility allows us to collaborate more closely with customers in China."

Healthcare is a leading growth market for Americhem, driven by demand for biocompatible, sterilisation-durable, traceable, and regulatory-ready materials. Its solutions are used in healthcare devices.

› **www.americhem.com**

Xenia enters research partnership in Italy

Italian compounder Xenia has entered into a collaboration with the Institute for Polymers, Composites and Biomaterials (IPCB) of the National Research Council of Italy (CNR).

The agreement aims to strengthen the connection between industry and research, promoting advanced research activities and experimental development focused on the design of new smart materials capable of meeting market needs increasingly driven by lightweight design, high performance, and technological innovation.

"This agreement represents a strategic step towards leveraging the Institute's scientific expertise in a concrete industrial context," said Pietro Russo, Materials Engineer and senior researcher at IPCB-CNR.

"The collaboration with Xenia Materials will allow us to develop specifically optimised advanced engineered materials, accelerating technology transfer and the impact of research on manufacturing processes."

› **www.xeniamaterials.com**

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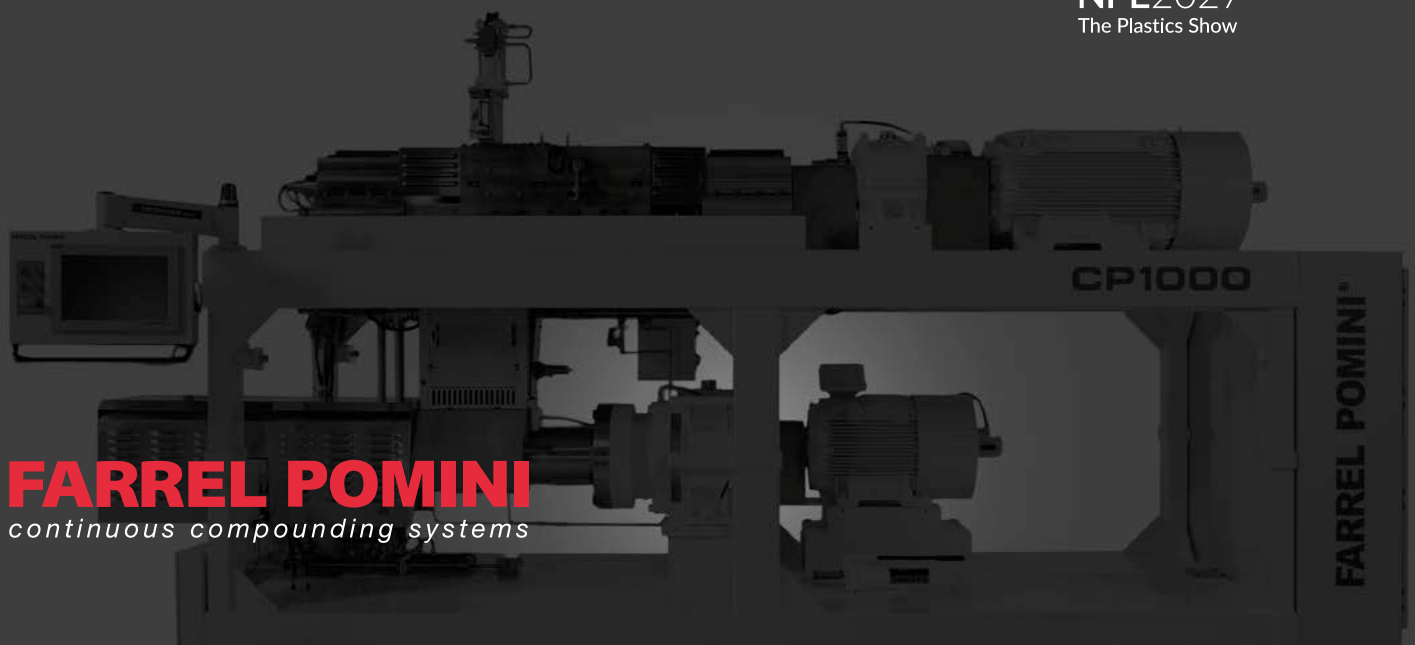
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Seeking performance and processability in biopolymers

Benefits of bio-based compounds, such as lower carbon footprint and end-of-life options, are being combined with improved properties. Jennifer Markarian reports on recent developments



IMAGE: TOTALENERGIES

Main image: Packaging applications are an established use for PLA and other bio-based polymers

Bio-based materials – including fillers and polymers – are being used in a wide range of thermoplastic processes and applications, including consumer goods and single-use packaging. Because bioplastic compounds use raw materials sourced from renewable carbon, they typically have a lower carbon footprint than alternatives. Some bioplastics compounds are compostable at end of life, and others, including PLA, can be recycled in either mechanical or chemical recycling processes, as reported in AMI's *Plastics Recycling World* March 2026 edition.

Bioplastic compounds can include polymers that are analogous to their fossil-fuel based counterparts but are derived from renewable raw materials. Bio-polyethylene, for example, can be produced from ethanol sourced from sugar cane. Bio-polyamide has castor oil as its source. As additional chemicals begin to be made with renewable sources, more polymers may join this category. Bioplastic compounds like these are usually not biodegradable, and they have processability and performance properties similar or equivalent to their fossil-fuel based equivalents, which makes them "drop in" alternatives.

Another category of bioplastic compounds includes polylactic acid (PLA), polyhydroxyalkanoate (PHA) and others that offer the benefit of compostability. A key to commercial success for these compounds is the ability to convert them on conventional plastics processing equipment at similar production rates compared to traditional materials, without significant process modification. If this efficiency can be achieved, along with acceptable performance in end-uses, the barriers for these compounds to replace conventional plastics are lower. Suppliers have been working toward this goal.

Microplastics

Producers and users of compounds made from PLA, PHA, and other bio-based, biodegradable materials are beginning to highlight that the materials do not leave behind permanent microplastics, either for compostable applications or reusable and recyclable products. Despite the fact that the science around microplastics resulting from conventional plastics is not yet settled, there is interest from the market in solutions that avoid consumer concerns and the potential for future regulatory restrictions in certain applications.

CJ Biomaterials, which produces PHA biopolymers, has introduced an all-PHA compound that meets the objective of improved processability in injection moulding for applications such as cutlery, caps, enclosures, beauty packaging, agriculture, and horticulture. The new grade, PHACT CB0104A,


IMAGE: TOTALENERGIES

Right: TotalEnergies Corbion has launched Luminy Foam 50F, a high melt strength PLA grade developed for extrusion foamed packaging applications

recently received certification for commercial and home compostability through the **Biodegradable Products Institute** (BPI) and has also earned **TÜV Austria** OK compost Home and OK compost Industrial compostability certifications.

The new compound is a combination of CJ Biomaterials' neat bio-based PHA resins, PHACT A1000P amorphous PHA (aPHA) and PHACT S1000P semi-crystalline PHA (scPHA). The aPHA grade is a soft and flexible material that reduces brittleness and improves processability, and the scPHA is a more rigid PHA that provides toughness and high-heat stability, the company said. The new blended product has been confirmed to achieve competitive cycle times in standard injection moulding equipment, allowing better throughput than incumbent commercially compostable cutlery.

"With PHACT CB0104A, we have developed a remarkable compound that combines the home compostability consumers and brands are looking for alongside the performance and production efficiency that converters expect," said John Licata, newly appointed head of R&D at CJ Biomaterials.

The new compound can be run on standard, existing, cold- and hot-runner injection moulding machines. In cutlery applications, it is suitable for both hot and cold foods, and it is certified for home compost environments at thicknesses up to 1.8 mm, which is an effective solution for typical 1 mm thick cutlery.

CJ Biomaterials also announced a partnership with **Dongsung Chemical** to introduce a PHA-based hotmelt adhesive to the US market. The Ecoviva Hotmelt Adhesive is designed for bonding substrates in packaging and other applications.

Earlier this year, CJ Biomaterials announced a collaboration with **BIQ Materials** to develop artificial turf infill from PHA. BIQ noted that biomaterials for infill are a solution for the upcoming EU regulatory change under Reach, which has banned rubber infill on artificial turf beginning in 2031.

PLA foam

The latest from **TotalEnergies Corbion** is Luminy Foam 50F, a high melt strength PLA grade developed for extrusion foamed packaging applications, including food trays, clamshells, bowls, and other formats. The new product has been designed to run on existing extruded polystyrene (XPS) extrusion foaming lines with minimal modification, which the company said helps converters transition from XPS to foamed PLA without major investment or disruption to production.

"With polystyrene bans accelerating, this is one of the first solutions positioned as a true industrial-scale replacement, not a niche material," said Laurent Daligault, Global Packaging Segment Leader at TotalEnergies Corbion. Foamed PLA is recyclable and industrially compostable.

The material is reported to have comparable density and functional properties to XPS and enables stable foam production without the need for extra additives, chain extenders, or reactive processing. The company said that parts made with the sugarcane-based PLA can have a 70% lower carbon footprint compared to XPS foam parts.

PLA bioplastics are already well-established in a range of applications and thermoplastic processes, including extrusion, moulding, nonwoven fibre production, and 3D printing. Commercial supply is growing.

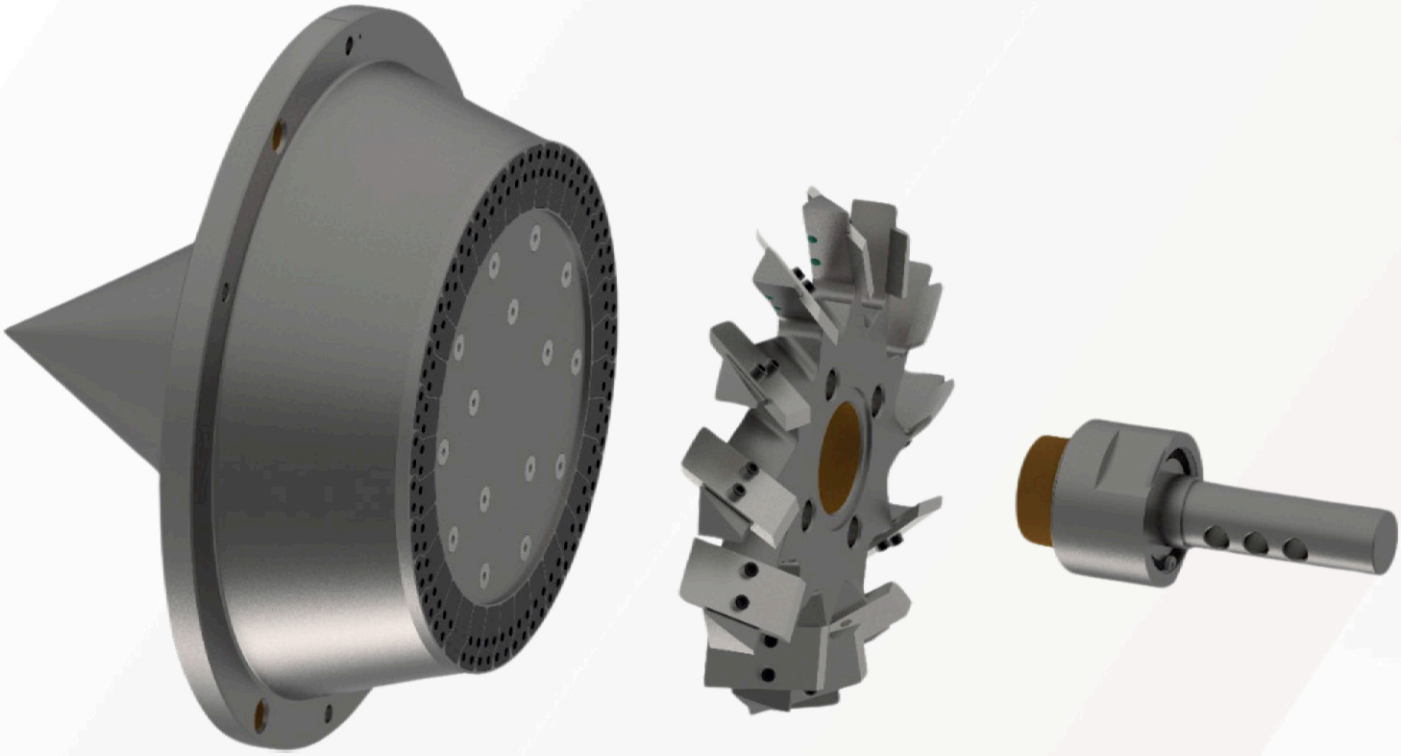
PLA-producer **NatureWorks**, which is jointly owned by US-based Cargill and Thailand's PTT Global Chemical, opened a new production site for its Ingeo biopolymers in Nakhon Sawan, Thailand this year. The company's first production facility in Nebraska, USA, has been making PLA polymer from lactic acid since 2002 and lactic acid since 2003. The new, integrated facility in Thailand includes lactic acid production derived from locally sourced sugarcane, lactide monomer production, and polymer manufacturing in one complex. The facility has an annual production capacity of approximately 75,000 tonnes of Ingeo biopolymer. The use of renewable carbon supports a carbon-neutral to net-negative profile at the polymer level, based on life cycle assessment data, the company reported.

"With the opening of our Nakhon Sawan facility, we are taking a major step forward in scaling access to Ingeo biopolymers globally," said Erik Ripple, CEO at NatureWorks. "This fully integrated site enables us to better serve our customers while

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IMAGE: HESBURGER

Right: Fast-food chain Hesburger has introduced reusable cups made from Sulapac PLA at restaurants in Lithuania

advancing the transition to renewable, lower-impact materials."

The company said that demand for bio-based materials continues to accelerate in the Asia Pacific region. The Thailand facility will produce PLA for growing applications including flexible packaging, compostable food serviceware, nonwoven fibres and 3D printing.

Emirates Biotech, which is building a PLA production facility in the UAE, launched its Embio PLA product range late last year, designed to make it easier for customers in the Middle East to develop applications and transition to plant-based materials. Grades include three extrusion grades suitable for rigid and flexible packaging, food serviceware, agricultural applications, and 3D printing, as well as a high-flow grade for injection moulding and two medium viscosity grades for fibres and nonwovens.

"Our goal was to design a product that performs similarly to traditional plastics yet runs smoothly on existing equipment. This makes the transition to sustainable materials simple and seamless for converters," said Watid Watanyupaisan, Technical Solutions Manager at Emirates Biotech.

The company said that the products support the UAE's sustainability goals and development of a circular economy. Plant-based PLA items are considered acceptable alternatives to the single-use plastic items that were banned in the UAE since January this year, such as cups, lids, cutlery and food containers.

Reusable applications

Finland-headquartered **Sulapac** said that it uses bio-based, biodegradable polymers as well as natural fillers, such as wood or clay minerals, to produce bioplastic compounds that do not leave behind any permanent microplastics. This year the company launched new applications made from its Sulapac Solid, which is a PLA material that has a natural clay mineral in the formulation. The compound is being used in a cutting board from a Nordic consumer brand that specifically wanted a dishwasher-safe material that would not result in permanent microplastics.

It is also used in reusable cups that have been adopted by Finland's burger restaurant chain Hesburger at its 69 locations in Lithuania. The cups can go through up to 300 washing cycles and can then be recycled.

"Lithuania was chosen as the starting point due to new national regulation passed in May 2025 requiring restaurants to provide reusable alternatives. We are glad to pilot with Sulapac cups which gives our customers a choice to choose between reusable and paper cup," said Eeva Mäki, Global Sustainability Manager at Hesburger. The chain aims to introduce reusable tableware in all its restaurants by 2030.

Sulapac Solid was chosen this year for the lid of a new cosmetic packaging from Yom Beauty, where it was used in its natural color that gives a pearlescent appearance. The monomaterial lid, with a closure also made from Sulapac material, is designed to support recycling as bio-based recycling streams begin to develop, the company noted.

Bio-Fed, a branch of Akro Plastic, introduced M·Vera GP1065, a food-contact biocompound designed for coffee capsules. The material has an improved oxygen barrier, high heat deflection temperature, and high dimensional stability. The company said the material allows fast cycle times, good flowability, and demouldability to allow efficient production. It is home-compostable and over 98% bio-based.

Alternative feedstocks

A wide range of renewable carbon sources to make bioplastics have been investigated over the years, often with a focus on using local agricultural waste or other non-food streams.

Perennial Polymers, a US-based start-up launched this year by plastics industry veteran Nathan Noyes, is developing Verys thermoplastic resins made directly from fallen leaves and other non-food lignocellulosic biomass. Noyes said there is interest in bioplastics that do not require dedicated agricultural feedstocks, especially for single-use applications.

"Perennial Polymers was launched in response to a fundamental challenge facing bioplastics: how to

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IMAGE: TRACELESS



Above: Opening ceremony of Traceless's first production facility Hamburg, Germany

make sustainable materials more competitive on both performance and cost," said Noyes. "The current focus is on scaling the technology, expanding material characterization and application testing, and working directly with compounders, converters, and end users to identify the applications where Perennial can deliver the greatest value."

A perspective article published in June this year by authors from the **American Chemical Society** Green Chemistry Institute's Natural Polymers Consortium described natural polymers as inherently renewable and degradable (based on the definition in the European Chemical Agency Guidance for Monomers and Polymers) and highlighted challenges in achieving the functional performance, scalability and sustainability that such polymers need to compete with incumbent plastic materials. The group called for academia, industry and funding agencies to partner in supporting innovation and commercialization of natural polymers, such as cellulose, lignin and others.

Materials derived from unmodified natural polymers are allowed under the EU Single-Use Plastics Directive. The **European Economic and Social Committee** adopted an opinion this year calling for natural polymers development: "A comprehensive strategy for nature-based biodegradable materials to foster circularity and resource efficiency, strengthen the agri-food sector and scale-up the EU bioeconomy."

Efforts have been underway to develop various kinds of natural polymers for many years, and progress is being made.

Natural polymers producer **Traceless** announced the opening of its first production facility in Hamburg, Germany this May. The company's patented technology extracts natural polymers from plant-based residues from the agricultural industry without modifying their natural chemical structure. The granulates are home compostable and can be processed in standard thermoplastic equipment, the company said, with target applications of single-use items, packaging, paper coatings or adhesives. The new plant has capacity of approximately 3,000 tonnes/yr. The company said its pilot plant, which has been in operation since 2022, would also be relocated to the site.

The company also announced a distribution partnership with Biesterfeld, which will distribute the company's injection moulding grades, called Traceless-Form, across Europe. These grades can be processed on conventional injection moulding machines and are compatible with cold- and hot-runner systems and suitable for multi-cavity moulds. The company is not seeking to replace conventional plastics in all applications, but rather in applications with short or single-use lifecycles, products that have limited recyclability, and products that are likely to enter the environment.

Another European natural polymers producer, **Lignin Industries**, produces Renol, which is a blend of lignin extracted from waste biomass, functionalized with a bio-based oil, in a masterbatch form. The product is designed to be blended into formulations with conventional plastics, potentially at up to 40%, to significantly reduce carbon dioxide emissions without affecting processability. Earlier this year, the company announced an exclusive partnership with AMP Polymix to distribute Renol in industries including mobility, consumer goods, packaging and industrial applications.

"Together, we can rapidly grow lignin-based materials and make a meaningful impact on the plastics industry's transition to high-performing, resilient and EU-made materials," said Brita Kämpe Bromé, CEO at Lignin Industries.

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IMAGE: MUNSON

Getting more from mixing systems

Technology suppliers are responding as greater demands are being placed on mixing systems in PVC and compounding settings. Chris Saunders reports on new developments

As compounders face increasingly demanding requirements, mixing technology is evolving beyond simply achieving a homogeneous blend, with recent developments focused on higher-intensity mixing, improved process control, greater energy efficiency, and handling challenging feedstocks. At the same time, advances in simulation and digitalisation are giving equipment developers better tools for optimising geometry and operating conditions, while formulations are becoming considerably more complex. High filler loadings, recycled polymers, natural fibres, nanomaterials, and heat-sensitive biopolymers, can all place different demands on the mixing process.

Perhaps the single most important development in recent times has been the increasing integration of mixing with the rest of the compounding line. Modern systems can combine gravimetric feeding, pre-blending, twin-screw mixing, feeding, vacuum devolatilisation, filtration, pelletising, and digital process monitoring, with new equipment developments increasingly aimed at making these stages operate as a coordinated system.

In polymer formulation, selecting the right mixer is only part of the challenge. Processors must also consider how raw materials are introduced, how powders are wetted out, how viscosity changes throughout the batch, and how the product moves through subsequent processing stages. These demands are driving greater interest in complete systems that integrate mixing, dispersing, milling, material handling, tanks, and controls around a defined production objective.

"A successful system begins with the material and the process, not with a predetermined piece of equipment," said Chris Spatz, President of **Schold**. "Understanding the formulation, required throughput, viscosity range, and desired product characteristics, allows each part of the system to be engineered to work together."

For compounding operations involving liquid resins, pigments, fillers, plasticisers, and other additives, the process usually begins with a high-speed disperser which generates the shear needed to incorporate powders into a liquid phase, break apart agglomerates, and establish a

Main image: In the 700-TS-140 Rotary Batch Mixer from Munson Machinery, mixing flights create a four-way tumble-turn-cut-fold action

IMAGE: MUNSON



Above: An operator at Polymer Resources programs mixing cycles on the Munson Rotary Batch Mixer

consistent premix. A high-speed disperser or rotor-stator can supply shear while a low-speed sweep or helical blade keeps the full batch moving. This combination is particularly useful when a formulation must maintain turnover as it becomes thicker or more heavily loaded. Inline dispersers and rotor-stator mixers can also be incorporated where continuous circulation, rapid powder incorporation, emulsification, or additional deagglomeration, is required. When finer particle reduction is required, a media or bead mill sometimes follows the premixing stage.

The larger opportunity, however, comes from connecting this equipment into a coordinated process. Tanks, pumps, bulk-bag unloading, powder induction, dust collection, platforms, and automated controls, can all affect production efficiency and final product consistency.

"Processors are looking beyond the individual mixer and asking how the entire operation can become more repeatable, scalable and easier to manage," said John Duong, Vice President of Sales at Schold. "That requires examining material flow, operator interaction, controls, and downstream requirements alongside the mixing technology."

Taking a mixing operation to the next level requires material handling, dispersion, controls, and product transfer, to work as one coordinated process. For compounders managing especially demanding formulations, this integrated approach can provide added flexibility, consistency, and scalability. US compounder **Polymer Resources** provides tailored products for critical applications in the medical device, electronics, automotive, construction, and consumer goods sectors. At its headquarters in Farmington, Connecticut, the company operates both single and twin-screw compounding lines. To ensure that all compounds from a single production run are identical in colour, melt properties, and mechanical performance, they are often blended following extrusion and pelletising. This was initially carried out by a ribbon blender, but that began to threaten product quality.

"We were experiencing contamination issues because operators could not clean the blender thoroughly," said Cole Accardi, Lead Process Engineer. "It had nooks and crannies where pellets could lodge. That's when we began researching alternatives."

This prompted the company to replace the ribbon blender with a Rotary Batch Mixer, model 700-TS-140 from **Munson Machinery**, which has no agitators and thus no internal shafts or bearings. Instead, its horizontal vessel rotates on external trunnion rings located at each end. "We purchased this blender because it has the gentlest mixing that we could get, and it won't alter the properties of our material because there's no heat generation," said Accardi.

Pelletised compounds are discharged into Gaylord containers. At the conclusion of a production run, the contents of each container undergoes testing to assess uniformity of all properties. If any variation is detected, the containers are taken to a post-blending area where they are unloaded into portable stainless steel hoppers. An operator then discharges the contents into the mixing vessel, where flights create a gentle four-way tumble-turn-cut-fold mixing action, achieving total batch uniformity in minutes.

Since the mixer's installation, the time required to post-blend a typical production run has decreased by over 30%. Additionally, it has reduced material losses, lowered the risk of contamination, and shortened blend times.

"With ribbon blenders, you don't get all the material out because there's a dead zone underneath the ribbon where material just sits, whereas the Munson evacuates the entire batch and is devoid of crevices that can trap pellets," Accardi said. "Right off the bat we were getting perfect blends in two minutes, and we no longer have any reported issues of contamination."

Energy trade-offs

Energy consumption is receiving greater attention as compounders seek to reduce operating costs and improve environmental performance, the challenge being that intensive mixing generally requires significant mechanical energy. Specific mechanical energy (SME), expressed as energy input per unit mass processed, provides one useful method of comparing process conditions. Research indicates that SME can vary considerably

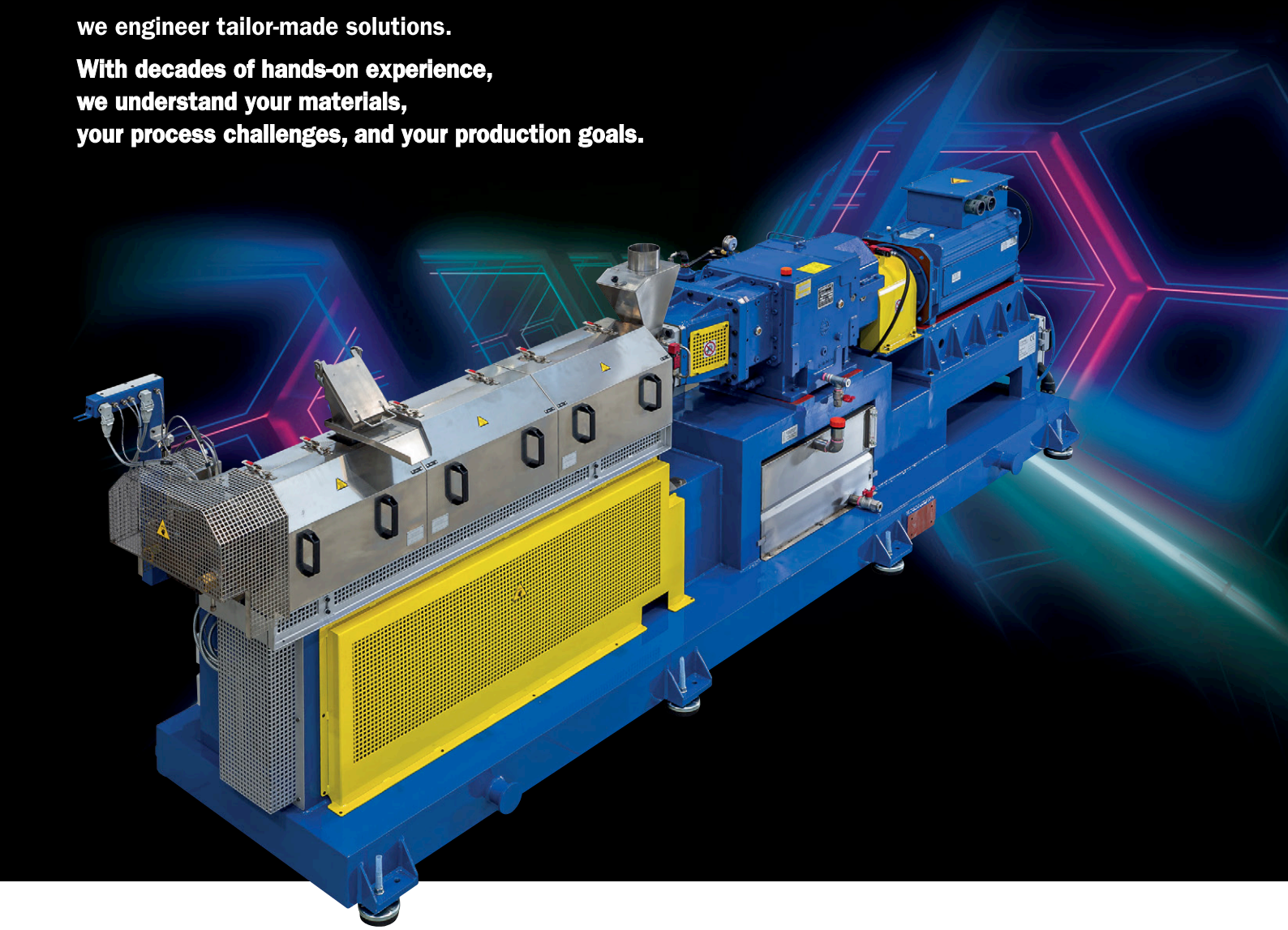
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depending on formulation and mixing requirements, with intensive dispersion and reactive processing demanding substantially more energy than straightforward melting and blending. Consequently, the objective is not simply to maximise mixing intensity but to use the minimum mechanical and thermal energy needed to achieve the required dispersion.

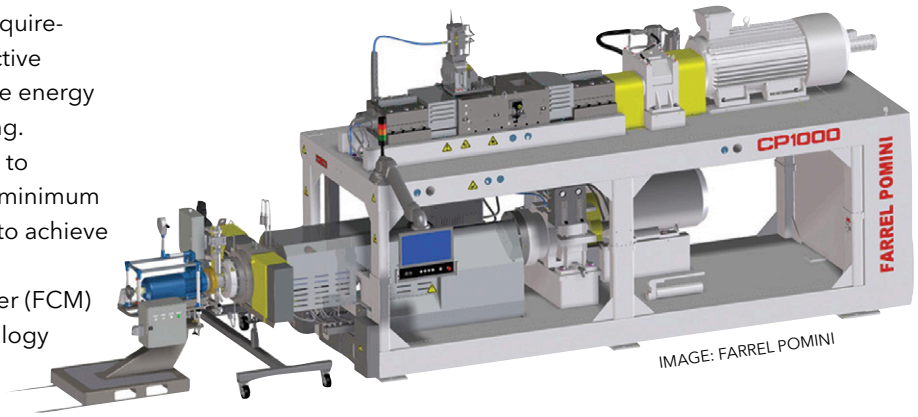


IMAGE: FARREL POMINI

Above: The Farrel Pomini CP1000 is a mid-sized, integrated continuous mixer and hot-feed extruder system

Farrel Pomini's Farrel Continuous Mixer (FCM) has long served as a foundational technology in polymer compounding, widely recognised for its high energy efficiency. Operating via two non-intermeshing, counter-rotating rotors housed within a dual-bore chamber, the system imparts precise mechanical energy to process high-viscosity resins and heavy filler loadings. Upon completing primary dispersive and distributive mixing, the molten compound discharges into a hot-feed single-screw extruder designed to generate the head pressure necessary for melt filtration and pelletising.

Historically, devolatilisation within the FCM chamber occurred exclusively under atmospheric pressure. While atmospheric venting provides sufficient off-gassing for standard compounding formulations, process streams requiring enhanced volatile removal rely on auxiliary vacuum venting. To significantly increase devolatilisation performance, Farrel Pomini has introduced a novel, patent-pending architectural modification that integrates direct vacuum venting. Retaining the characteristic non-intermeshing, counter-rotating rotor configuration, the redesigned geometry incorporates dedicated processing stages sequentially arranged along the rotor axis. Downstream of the primary melting zone, a pair of internal rotary dams restrict polymer flow, establishing a localised increase in fill factor.

This accumulation forms a dynamic, air-tight melt seal that effectively isolates the upstream melting section from the downstream processing environment. Immediately following this melt seal, a specialised secondary mixing section operates under direct communication with an external high-vacuum manifold. As the rotors continuously shear and wipe the polymer melt across this isolated, sub-atmospheric chamber, rapid surface renewal occurs. The combination of intense mechanical working, elevated melt surface area, and low absolute pressure, drives rapid mass transfer kinetics aggressively extracting volatiles, including entrapped moisture, unreacted monomers, residual solvents, and low-molecular-weight volatile organic compounds (VOCs).

By consolidating efficient dispersive/distributive mixing with active sub-atmospheric devolatilisation into a single processing chamber, this architectural breakthrough fundamentally expands the opera-

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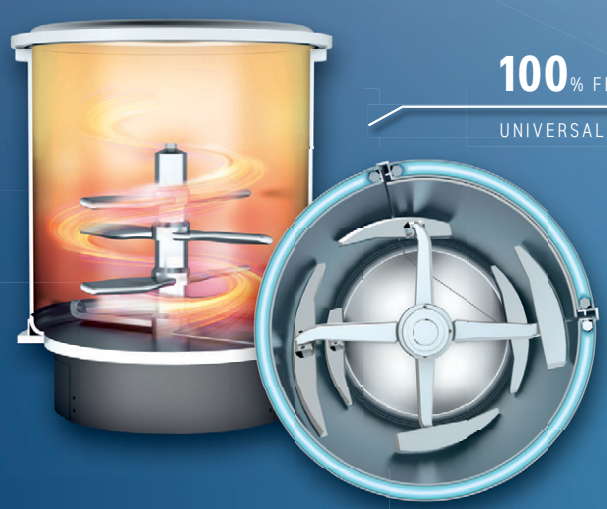
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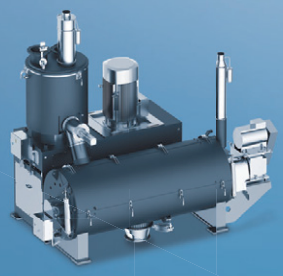
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IMAGE: RENOLIT



Above: Construction of Renolit's new mixing plant in Worms, Germany

tional window, while extracting VOCs during active mechanical working – rather than relying on post-mixing downstream extraction – maximises mass transfer rates. This capability is particularly valuable when feedstocks carry complex contaminants.

Continuous mixer

With current high energy costs, efficient processing of powders and granulates is essential in minimising production costs. A screw-based continuous mixer of the type produced by **Ajax** can help processors ensure their mixing is efficient in a variety of ways. Continuous mixers are designed to achieve homogeneity quickly and efficiently. A profiled casing prevents any material from becoming trapped in a dead zone, while twin paddle augers combine the powders and any additives as they travel along the screws. As a result of the mixing action, the work input is reduced and the energy required minimised. A further advantage is consistent quality, as the highly effective mixing action helps ensure homogeneity and minimises any particle attrition and damage to materials.

Continuous mixers also offer production flexibility, while interchangeable screw augers allow one model to be used for multiple products. In some cases, different mixes may require distinct auger designs. For example, materials vary in their sensitivity to being worked, whilst sticky materials are likely to build up internally. Quick release augers enable engineers to swiftly change the augers and move to processing a different product, and enable them to be removed for cleaning.

"Ajax has found that when engineers complain of inconsistent performance and having to intervene during processing, this is due to the machine and materials not being well suited," said Eddie McGee, Managing Director at Ajax. "To ensure a mixer works with the material, Ajax recommends starting with material testing. A small investment that delivers reliable and productive equipment, and lower cost of ownership, over an extended service life."

Conventional high-intensity mixers rely on one mixing shaft and one defined friction and shear profile. **Mixaco**'s Infinity Mixer (IM) combines two overlapping mixing tools in a dual-vessel geometry which can run co-rotating or counter-rotating. In co-rotating mode, very high relative velocities arise in the interaction zone between the tools. In one example, two tool speeds of 20 m/s result in a relative impact velocity of 40 m/s. This supports intensive dispersion, high shear, and rapid homogenisation. In counter-rotating mode, the flow pattern and shear profile change while homogenisation stays quick. The advantage is not simply higher speed, but the ability to create different mixing dynamics within one machine.

For compounders, this flexibility translates directly into process quality. Depending on the application, the IM supports gentle homogenisation, intensive dispersion, deagglomeration, densification, and fibrillation, even when several of these phases need to happen in a single batch. The interchangeable Apex tool adds another lever; materials, coatings, and geometries, can be selected to suit the process, so that tool design, shear forces, and particle movement, are treated as one system. Sizes range from the Infinity Mixer 200 with 170 litres of usable volume to the Infinity Mixer 4500 with 3,825 litres. At the Mixaco Test Centres in Germany and the US, processors can run their own materials and evaluate operating modes, tool configurations, and process parameters under realistic conditions.

"For us, the future of mixing is not about speed alone," said Marco Marinello, CSO, Mixaco. "It is about giving processors the flexibility to adapt the process to the material, not the other way around."

Plant upgrades

Construction has begun on a new mixing plant at the headquarters of PVC processor **Renolit** in Worms, Germany. The €56m investment is designed to improve cost-effectiveness through a higher degree of automation allowing critical parameters such as speed, time, temperature, and sequence, to be monitored and repeated. A properly developed control strategy can reduce operator variability while providing the flexibility needed to accommodate multiple formulations. The new building spans several storeys while a connecting tunnel links the new mixing facility directly to the existing production hall. State-of-the-art technology is also being used. For example,

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"With this investment, we are safeguarding the long-term performance of our main plant in Worms," said Michael Bätz, Plant Manager at Renolit's headquarters. "The new facility enables us to make our production processes more efficient whilst significantly improving working conditions for our staff through modern ergonomic and logistics concepts."

Following the start of construction in February this year, the building's structural work is due to be completed by December 2026. Installation of the new plant equipment will begin in November and take place in parallel with the ongoing construction.

Ystral, a German designer and manufacturer of custom mixing, dispersing, and powder-wetting machines, has opened a new trial centre at its headquarters in Ballrechten-Dottingen. The new facility enables the company to carry out more customer trials than before while processing a broader range of raw materials. The company says it has already conducted a number of tests in the new trial building, during which users can follow proceedings remotely via livestream. In the in-house laboratory, samples can be examined under a microscope to determine viscosities, density measurement, and particle size.

"At our current company size, we are very well positioned with our existing trial facilities," said Ystral Managing Director and co-owner Peter Manke. "We planned our new trial centre from the outset in such a way that expansion is possible."

With a construction and commissioning phase of just under 12 months, work on the centre progressed quickly. The main building was constructed in a compact cubic design on an area of around 150 m² and can be expanded with an additional trial building on an adjacent site.

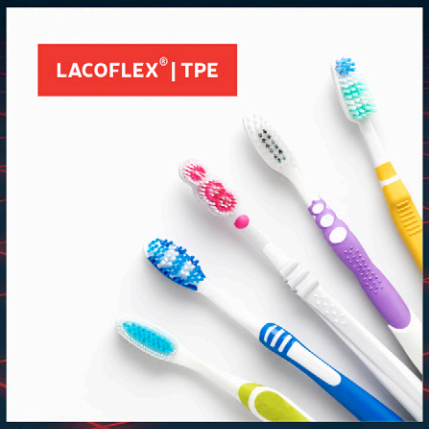
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IMAGE: SHUTTERSTOCK

PVC recycling: Building for the circular future

PVC remains one of the most widely used plastic materials, especially for applications where weather resistance is paramount. Its growth is expected to average 3.4% per year until 2035, in applications such as pipes, electrical cable insulation, window frames and flooring, according to research firm Market Reports World.

The wide variety of formulations and end applications, as well as the material's longevity, determine the remarkable versatility of PVC. And all these advantages require, at the same time, complex targeted strategies to achieve circularity. The presence and concentration of legacy additives determine the potential recovery of products which have been in the market for several years. The formulation stability and the purity of the waste streams determine their use and implementation in recycled applications.

In 2025, **VinylPlus** declared that 765,975 tonnes of PVC was recycled in the EU, UK, Norway and Switzerland. This represented a 5.7% increase on the 724,638 tonnes recycled in 2024. From the reported volume, 58.8% was from pre-consumer applications and 41.2% from post-consumer waste streams.

In comparison to other plastic waste streams, PVC recycling has shown resilience, with stable capacity and continued growth in volumes. The well-established European collection and recycling value chains continue to operate and grow, and there is an established market for recycled material. However, the market outlook continues to be uncertain. Geopolitical disruptions make it difficult to predict the future. Energy costs remain a dominant component in the financial viability of recycling projects, while shifting regulations and economic pressure bring further uncertainty to the recycling market.

Growth in PVC recycling remains steady, despite adverse market and political conditions. Adding to mechanical recycling, chemical processes are now being researched, writes Laura Florez

"Our circularity ambitions have focused on resource efficiency and producer responsibility, supported by smart design, effective collection systems, and both mechanical and advanced recycling technologies," said Karl-Martin Schellerer, Chairman of VinylPlus.

The Revinylfloor project has brought together manufacturers, technology development partners and external experts to scale up the recycling of



IMAGE: CEFA

Right: Used PVC roofing membrane ready for recycling

post-consumer PVC flooring in Europe. During the last year, laboratory-scale sorting trials were carried out, enabling the separation of flooring containing legacy additives, such as DEHP plasticiser. The association also launched an initiative called "Project-Loop – Concept Design & Hub Establishment", aimed at developing a dedicated collection, sorting and recycling system of post-consumer PVC flooring in Belgium. The consultant Recydata, a Belgian firm specialized in circular solutions for the industry, developed a detailed implementation pilot plan, including stakeholder mapping, technical scoping and partnership engagement.

The Coated Fabrics and Film Association, **CFFA**, has been working in the collection, processing and recycling of PVC roofing membrane. The initiative is designed to establish practical, repeatable models for PVC roof membranes, particularly in construction and industrial sectors, where recovery has historically been limited.

Vinyl-coated fabrics and film products present unique recycling challenges, due to their composition and end-of-use conditions. The CFFA, based in Cleveland, USA, is working on the coordination of recycling projects, including contractor-supported material recovery projects and trial runs with equipment manufacturers, to validate recycling processes. Logistics and transportation are amongst the topics of research, as well as the evaluation of results, to support future scaling and replication. Planned activities include roof tear-off recovery pilots, processing trials and transportation of recovered materials to recycling partners, helping to test real-world recycling pathways.

Below: Using recycled PVC in new pipe systems leads to 85-90% lower CO_2 emissions per kg compared to virgin PVC, says TEPPFA



IMAGE: TEPPFA

The initiative received a $75,000 grant from the **Vinyl Institute** earlier this year. "This investment reflects our ongoing commitment to strengthening vinyl recycling systems and supporting innovative approaches to material recovery," said Jay Thomas, VP of Sustainability at the Vinyl Institute. "Partnering with organizations like CFFA helps accelerate scalable solutions that can increase recycling rates and support long-term sustainability goals."

Pipes and siding

Another field that has benefited from financial Aid of the Vinyl Institute is the Polymeric Exterior Products Association (**PEPA**), through the Revinylize Recycling Collaborative, a recycling program focused on the recycling of rigid vinyl materials, including siding. Through this initiative, PEPA will focus on coordinating recycling efforts, engaging stakeholders across the value chain and identifying opportunities to expand recycling infrastructure and participation. The project is designed to support early-stage coordination and strategy development that can lead to expanded recycling capacity over time; the initiative will identify practical pathways for increasing recycling rates for exterior vinyl building products.

The European Plastic Pipes and Fittings Association, **TEPPFA**, in collaboration with the British Plastics Federation Pipes Group, commissioned the Oakdene Hollins consultancy, to carry out a material flow analysis of plastic pipes in the UK in 2024. The study provided an overview of key market participants, production volumes by application, waste generation and recycling practices, and assessed the use of post-consumer recyclates in plastic pipe manufacturing. The study highlighted the need for fostering collaboration among stakeholders, and investing in upskilling the workforce.

The latest VinylPlus Progress Report from 2026 said that 104,633 tonnes of PVC cable waste was recycled in 2025; this is a significant growth from the 92,478 tonnes recovered in 2024. According to **VinylPlus Cables**, a group within the VinylPlus framework, the result demonstrates the strength of established European collection and recycling value chains for PVC cables, even in a challenging market environment for the plastics and recycling sectors

In 2025, for the PVC window profile sector, the

European Trade Association of PVC Window System Suppliers, **EPPA,** commissioned the consultancy TNO to develop a comprehensive study assessing the feasibility and impacts of a European Extended Producer Responsibility (EPR) Scheme for Windows.

The study concluded that a future EPR scheme for windows should ensure transparent and fair processes, prevent free riding through EU-level registration of windows producers, introduce fees that stimulate circular innovation, and apply progressive financing to promote recycled content and sustainable design. EPPA has worked in the development of local recycling capacity, and in preparing the market for future scale-up.

In the last 15 years, the European PVC window sector has increased nearly four times the annual rate of PVC profiles recycled. In 2025, 416,000 tonnes of PVC was recycled. The growth was 12.5% compared with 2024.

Chemical recycling

Mechanical recycling is a well-established practice in the PVC sector, but chemical recycling is starting to emerge as an alternative for highly mixed PVC waste streams. Dechlorination and selective dissolution open new routes for complex waste streams, with several pilots underway.

An Israeli startup under the name of **Plastic Back** is using a low-temperature chemical process to convert PVC waste into reusable raw materials, separating chlorine and carbon. In partnership with chemical recycler Freepoint Eco-Systems, the company is launching a pilot project in Hebron, Ohio, USA, to test its technology at scale. The initiative is supported by a $3m US-Israeli BIRD Foundation grant and a Vinyl Institute viability grant aimed at advancing innovative recycling solutions.

The process uses a chemical dechlorination and depolymerization solution, converting chlorine into a salt solution that can be reused in petrochemical



IMAGE: PRETTY PLASTIC

MVRDV's new office in Munich, Germany, uses recycled PVC shades to build a fish-like pattern

Carefully selected colours for recycled PVC cladding

The Dutch Company **Pretty Plastic** found a novel way to transform PVC scrap into cladding. Using the trim left over from PVC pipe, siding and wind trim, collected from construction projects, the scrap is repurposed in tiles to be used in mosaic arrays on building exteriors. By sorting the colours, attractive visual effects are achieved in façades.

One of the company's latest projects, the architectural firm MVRDV's new office in Munich, Germany, uses the shades to build a fish-like pattern.

The tiles are manufactured through injection moulding, after careful sorting of PVC waste by type and colour. The material can deliver very important savings in terms of environmental efficiency when compared with virgin material, reducing the CO_2 emissions from 2.6 kg to only 0.2 kg of CO_2 per kg of material produced.

Pretty Plastic said the project demonstrates how sustainable building materials can be integral to architectural design. "By combining aesthetic freedom with proven environmental benefits, our products help define the new face of urban development," it said.

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LG Chem expands recycling potential in flexible PVC


IMAGE: LG CHEM

Window systems represent one of the most long-established PVC applications in Europe. "As recycling of end-of-life window profiles advances, attention is extending to associated components, including gaskets, and their contribution to material recovery," says **LG Chem Europe.**

Traditional rubber materials for gaskets have been selected for sealing performance, durability and weather resistance, but are not recyclable. The company says these performance requirements remain essential, but new thermoplastic gasket compounds in addition enable end-of-life recovery. LG Chem's HRTP (Heat-resistant and Recyclable Thermoplastic) portfolio of high-molecular-weight, porous PVC resins offer such a solution.

HRTP4000, with a nominal K-value of approximately 100, targets applications requiring high mechanical strength, heat resistance and wear resistance. These include window gaskets, where the non-crosslinked thermoplastic compound requires no separate vulcanisation stage. This allows heat reprocessing and co-extrusion with rigid PVC window profiles.

"The recycling opportunity nevertheless depends on the complete window system and the recycling process used," says LG Chem. "EPPA guidance indicates that limited residual co-extruded flexible PVC (PVC-P) gasket material does not interfere with mechanical recycling of PVC window profiles. Recycling operations can also include gasket-material separation before PVC regranulation. These routes should be distinguished from unrestricted recycling of complete gasket compounds into rigid profiles."

In a recent development, LG Chem has introduced the HRTP2000 family to address a wider range of formulation and processing requirements. Processors sometimes use combinations of K100 and K80 resins to balance mechanical properties, processability and cost and HRTP2000 was developed with these formulation practices in mind.

LG Chem says that, with a nominal K-value of approximately 80, the family comprises two variants. HRTP2000S is designed for applications where transparency is important, and HRTP2000H is focused on cost competitiveness. Potential applications include transparent sheets, films, tubing, moulded products and high-strength water-pipe compounds.

LG Chem says: "Thermoplastic reprocessability is an enabling property, not proof of closed-loop recyclability. Actual recovery depends on formulation, material compatibility, collection, sorting and the requirements of the intended recycled application."

applications. The carbon becomes a hydrocarbon similar to naphtha, that can be fed into steam crackers, according to the developers. A major advantage is the relatively low processing temperature, thus reducing the environmental footprint commonly associated to chemical recycling.

As feedstock, Plastic Back is using PVC from manufacturing, construction and medical waste streams, and is currently testing each to understand how the process performs under different real-world conditions. The pilot is designed to treat approximately 50 tonnes of PVC waste in its first testing phase, before scaling up to commercial units. The objective is to scale up to commercial units capable of processing 15,000 to 30,000 tonnes/yr.

Researchers at **Virginia Tech** in the USA found a way to transform PVC waste into high-performance lubricants. PVC is combined with a solvent, aluminium trichloride and alpha olefins, and the mixture is heated to around 70°C for three hours. After this period, the mixture is transformed into a thick oil.

Initially, the researchers experimented with ways to chemically transform PVC molecules into different materials. The idea was to replace the chlorine atoms with other groups. Already in this initial stage it was seen that the resulting material was soft and sticky. So, the approach was to keep breaking the polymer chains to do smaller sections. As a result, the PVC was transformed into polyalphaolefin, an important ingredient used in lubricants, including engine oil.

Pyrolysis is generally considered unsuitable for PVC waste, as PVC input would lead to oils with high levels of impurity, affecting the performance of steam crackers and leading to corrosion issues. **Arcus Greencycling**, owner of a proprietary pyrolysis technology, reported a successful trial of feedstock containing 10% PVC. The material tested was prepared by pre-mixing 10% by weight of three non-mechanically recyclable PVC waste streams, with 90% of mixed polyolefinic waste. The PVC waste included cable isolation and sheathing waste (5%), pre-consumer medical waste (4%) and post-consumer floor covering (1%). This feedstock was mixed under nitrogen atmosphere, with an absorbent, granular solid carrier and other proprietary additives.

The trial resulted in almost 3 tonnes of pyrolysis oil produced with a conversion rate unchanged by the presence of PVC, and showing virtually unchanged properties and processing cost versus an oil produced from a 100% mixed polyolefin feedstock. As expected, the pyrolysis oil showed residual chlorine and other critical contaminants amounts. The hydrogen chloride generated during pyrolysis by the PVC fraction was neutralized

directly by the pyrolysis reactor and was mostly captured in the pyrolysis coke.

Under current conditions, chemically recycled PVC is more expensive than virgin PVC, and indicative costs are typically around 1.5 to 2.5 times higher per tonne, depending on feedstock quality, chlorine recovery efficiency and plant scale. Rajendra Gupta, Technical Professional Leader for **KBR's Advanced Recycling Technologies**, states that advancing PVC recycling requires efficient chlorine recovery, corrosion-resistant designs, long-term pilots and supportive policy frameworks. From his point of view, the most challenging stage has to do with scaling.

"Most PVC chemical recycling technologies remain at pilot or early demonstration scale, making direct comparison with mature, large-scale virgin PVC production premature. Robust benchmarking will require long-duration, at-scale operation using real post-consumer PVC waste streams," he said.

PVC in healthcare

The **VinylPlus Healthcare** initiative serves as a hub for collaboration and partnerships in the healthcare value chain. In France, the activities of the VinylPlus division progressed with the collection and sorting for DEHP-free single-use medical devices. In December 2025, the first medical PVC waste collection was completed, comprising 89 kg of material, which was manually dismantled and sorted by Elise, a social enterprise specializing in waste management. Approximately 60 kg of PVC waste, including tubing and masks, was made available for mechanical recycling.

The project Select4Care, funded by the Flemish regional government in Belgium, aimed to investigate how to optimize waste collection logistics and maximize recycling rates for non-infectious plastic waste in hospitals. Select4Care demonstrated that established material knowledge, regulatory compliance and value chain collaboration can support scalable recycling models for medical plastics. Design for recycling and a new way of targeting single-use plastics management in medical applications can contribute to better waste streams.

The VinylPlus PharmPack project, run by VinylPlus Deutschland, supports the recyclability of pharmaceutical blister packaging of aluminium and PVC through solvent based recycling technologies. The project focuses on engaging hospital pharmacies as collection points and mechanically recycling post-consumer blister waste.

Healthcare products manufacturer **Baxter** is working through recovery programs to collect used PVC IV bags in various countries in the world. In cooperation with Orbia, a program in Colombia has extended over 90 public hospitals and private clinic, under the name Vida en Movimiento (Life in Motion). The hospital PVC residues are collected separately, and recycled into new non-sensitive applications, such as hoses, shoe soles or floor mats.



IMAGE: BAXTER

Above: Baxter has extended PVC IV bags collection in Colombia

According to Baxter, between the program's launch in 2021 and June 2025, nearly 300 tonnes of PVC IV bags had been recycled and diverted from landfills, avoiding around 600 tons of CO_2 equivalent emissions.

Vinyl Council of Australia (VCA) has published its 2025 PVC Stewardship Program Annual Progress Report, which it said marks another year of measurable progress in sustainability, recycling, and responsible stewardship across the Australian PVC industry.

The 2025 report findings included: average signatory compliance rising to 92%, up from 89% in 2024; five commitments maintained at 100% compliance; 14 of 21 commitments now exceeding the 90% threshold; total PVC recyclate consumption up 28% to approximately 4,964 tonnes, with domestic consumption by local signatory converters and compound manufacturers reaching 2,137 tonnes; and 2025 medical PVC waste collection totalled 117 tonnes across 267 Australian healthcare sites.

Legacy additives

The presence of legacy additives poses a large challenge for the recycling of PVC applications, especially the ones that have been in service over several years, such as ones containing lead-based stabilizers which have been phased out. Though several trials demonstrate that PVC applications can be used and mechanically recycled even after long usage, retaining their properties, the presence of now regulated additives is a challenge for circularity.

In relation to EU limits on lead in PVC products, VinylPlus commissioned the consultancy TAUW to

assess the impact on PVC recycling. Under current regulations, the general maximum lead concentration in PVC articles is 0.1% by weight. Temporary derogations allowed higher levels in products containing recycled PVC: up to 1.5% lead in flexible PVC until 28 May 2025, and up to 1.5% in rigid PVC until 28 May 2033. The study assessed scenarios linked to possible regulatory outcomes and technological progress in lead removal.

The first findings indicate that the date of 2033 now fixed for ending the derogation for rigid PVC could deeply affect the recycling development of pipes, fittings and profiles, limiting the maximum recycled content below 25%, as higher content levels would derive in lead concentrations above the 0.1% limit. The authors recommended an extension of the derogation of approximately five years, to help the European PVC recycling industry to have enough post-consumer PVC waste.

Future challenges

The VinylPlus Progress Report 2026 outlines several pathways to improve circularity of PVC. To ensure that a PVC product reaches end of life and becomes feedstock for recycling, it is important to ensure proper classification and collection. The report points to the need to make pre-demolition or renovation audits and separate collection at source, optimizing technical and financial efficiency.

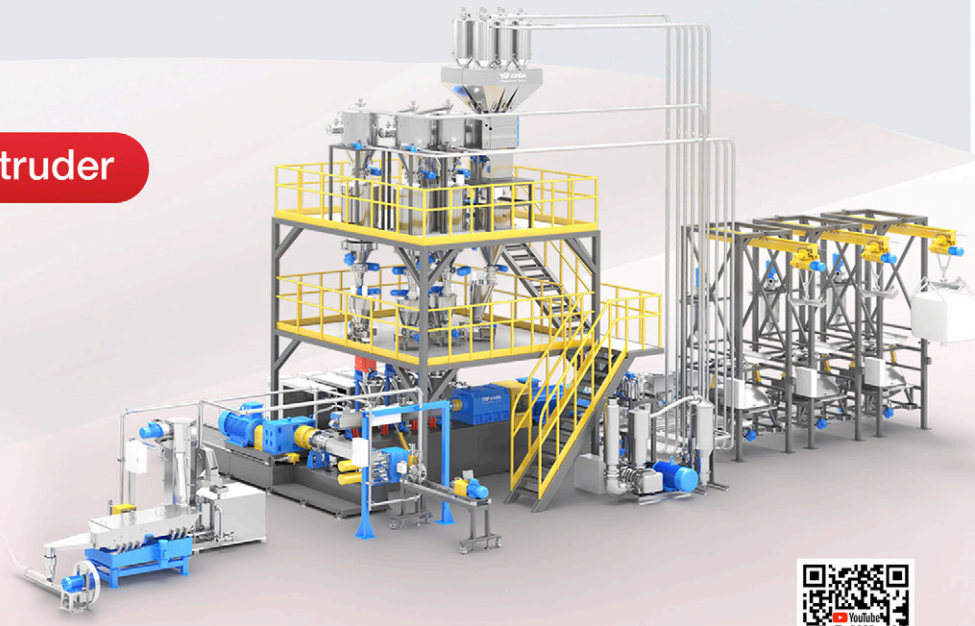
To ensure that PVC is effectively recycled, the report highlights the need to establish EU-wide harmonised End of Waste criteria, including for mechanical and chemical recycling outputs. The report also suggests inserting recycled content targets in product-specific standards or in legislation, and establishing EU-wide mandatory minimum EPR requirements, rewarding durability, long service-life and collection for recycling. The document recommends implementing digital product passports to track products up to the end of their life and enhance waste and recycled content traceability.

Industry organisation **Recovinyl**, which promotes demand for recycled PVC material from the converting industry, adheres to this position and is very emphatic in the need for simplified and harmonised EU rules for collection, sorting and recycled content implementation, and the alignment of EPR schemes across member states. There is a need to create a market pull for "recycled-in-the-EU" materials, so that the European recycling industry can invest and grow.

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What's new in black and white pigments

Jennifer Markarian reviews trends, supply changes, new products, and new alternatives in black and white pigments for thermoplastic compounds

The demands of the circular economy and the need to enhance recyclability are driving new product development in black and white pigments and in recycling sortation technology. These pigments are important in packaging and various consumer and industrial goods, as well as in automotive, building and other applications.

Parts coloured with carbon black have been under scrutiny because of concerns that carbon black can't be detected by the near infrared (NIR) detectors used to sort incoming recycled packages or parts. NIR-detectable blacks, available from multiple sources, provide one alternative.

Shepherd Color's Arctic infrared-reflective pigments are compatible with NIR sorting systems and provide another option for dark colours that are recyclable. These highly inert pigments can withstand multiple heat histories, helping recycled plastics retain colour, physical properties and value, said Mark Ryan, Market and Product Manager at Shepherd Color.

"The central challenge is achieving the appearance and performance associated with conventional carbon-black-coloured plastics," said Ryan. "Arctic Black 10F925 provides a jetter black than other options in its pigment chemistry class and can serve as the basis of a non-magnetic black colour package that is compatible with infrared sorting and compliant with FDA requirements for food-packaging applications. Arctic Black 10P951 offers the same FDA compliance at a lower use rate for colouring post-consumer recycled material. Blends of the two create a 'Black Rainbow' that can be tailored to the colour, performance, and processing requirements of specific applications."

In building materials, Ryan said that demand for darker plastics is growing, and formulators increasingly need black and dark colours that also manage solar heat. He said Shepherd Color's Arctic infrared-reflective pigments limit heat buildup, which helps improve dimensional stability and surface comfort for applications ranging from traditional PVC profiles to highly engineered composite decking.

Elix Polymers introduced new black colours for ABS and PC/ABS that are based on deep black pigments that can be sorted more effectively than carbon black in recycling systems. The formulations

also reduce surface temperatures from sunlight exposure in outdoor applications.

"Material design can help address sorting challenges while maintaining the appearance and performance required for engineering-plastics applications," the company said.

NIR black

Elix Polymers collaborated with the **Gaiker Technology Centre** to evaluate sortation of the new black ABS and PC/ABS using three different detection technologies: NIR spectroscopy (900–1700 nm), Raman spectroscopy (1064 nm), and hyperspectral imaging in the short-wave infrared range (HSI-SWIR, 930–2500 nm). Laboratory-scale testing showed that the new black ABS and PC/ABS formulations could be identified using NIR, Raman and HSI-SWIR technologies, and machine learning (ML) classification models improved identification, the company reported.

"Raman and NIR spectroscopy provide spectral information that can be used to differentiate materials according to their chemical characteristics. HSI, in turn, combines spectral and spatial information to map material distribution in an image and identify different regions within a sample," said researchers from Gaiker. "Combining these techniques with ML models enables more effective and robust use of the spectral information. In this approach, dedicated software acquires and analyses spectral data. First, classification models are trained on reference samples to learn material-specific spectral patterns, enabling unknown samples to be classified based on their spectral signatures. Improvement refers to the ability of the ML models to interpret spectral patterns that may be difficult to distinguish through direct spectral analysis, particularly when materials have similar spectral characteristics or when sample variability is present."

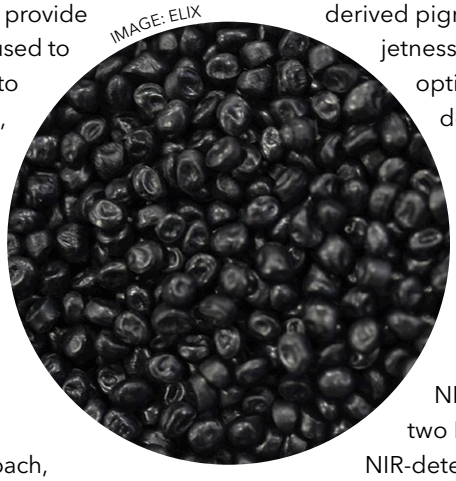


IMAGE: ELIX

Right: Elix Polymers introduced new black colours for ABS and PC/ABS that can be detected by NIR sorting technology

In addition, the researchers conducted real-time, in-line classification trials using HSI-SWIR technology at laboratory scale with conveyor belt speeds of 0.1 m/s, and with advanced NIR technology at pilot scale at conveyor speeds of 2 m/s. The new black formulations from Elix Polymers were successfully identified.

The company said they expect that plastics incorporating the new pigments can be effectively separated in industrial recycling facilities using multiplexed NIR spectrometers and NIR-HSI technologies that are already used in automated plastics sorting lines.

Detection technologies

Another solution to the challenge of black pigments in recyclate is alternative sorting and detection technologies such as mid-infrared (MIR) spectroscopy and Raman spectroscopy.

Canon has introduced the TR-A100 for plastic analysis by Raman spectroscopy that the company said was specifically designed to address black plastic identification. The optical technology can identify 12 plastic types (ABS, PP, PS, PE, PC, PCABS, PET, POM, PMMA, PA, PBT and PVC) regardless of pigments, the company said.

Black pigments derived from bio-based sources are an alternative to petroleum-based carbon black for companies seeking to reduce carbon footprint.

The latest from **Ampacet** is Natura Jet, a black masterbatch using what is described as a "naturally derived pigment" that provides superior jetness compared to other bio-based options. The company said it is designed for injection moulded applications including consumer electronics, housewares and footwear, and is compatible with polymers including PE, PP, PET, PC, PA, ABS, PLA, and TPU.

Although Natura Jet is not NIR detectable, Ampacet offers two REC-NIR Black masterbatch for NIR-detectable applications: REC-NIR-BLACK PE 512 for flexible PE packaging applications that are not exposed to UV and REC-NIR-Black High Alcohol for monolayer PET bottles and containers used in high alcohol applications, including hand sanitizers, household cleaners and personal care.

UPM Biochemicals produces bio-based UPM BioMotion Renewable Functional Filler that offers multiple functions in plastic compounds, including as an NIR-detectable black pigment. It has a black colouring with a slightly reddish and yellowish tone, the company said. Its NIR detectability allows black plastic articles to be identified and sorted during recycling.

"Materials that support mechanical recycling and established sorting technologies are attracting significant interest as manufacturers seek to improve plastic circularity," said Klemens Unteutsch, Business Segment Director for Plastics, Adhesives, Sealants and Rubber at **Krahn Chemie** Deutschland, a regional distributor for UPM

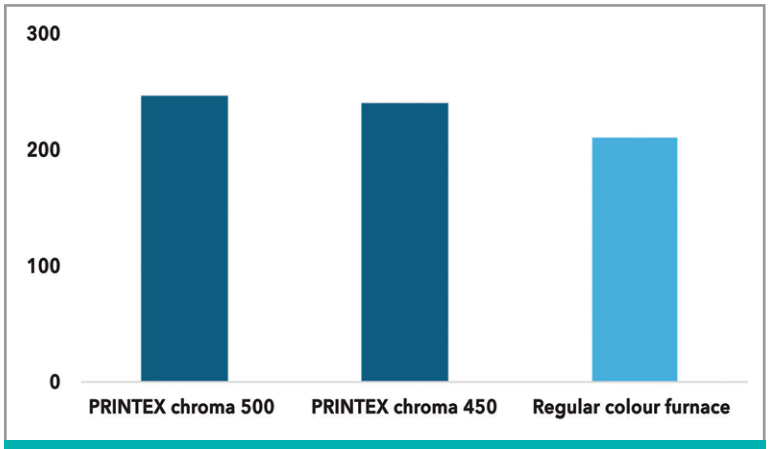
BioMotion. The product has high bio-based content and a uniform, industrial-scale source of bio-based raw material can help reduce the carbon footprint of products and support companies in meeting increasingly stringent regulatory and brand-owner sustainability requirements, he added. It also has very low PAH and sulfur content, good thermal stability during processing and can be processed using conventional compounding equipment.

The material is used in polyolefins (PP and PE), and the company is exploring opportunities in selected engineering plastics and bioplastics. "The most promising application areas include automotive components, building and construction products, packaging materials and consumer goods," said Unteutsch.

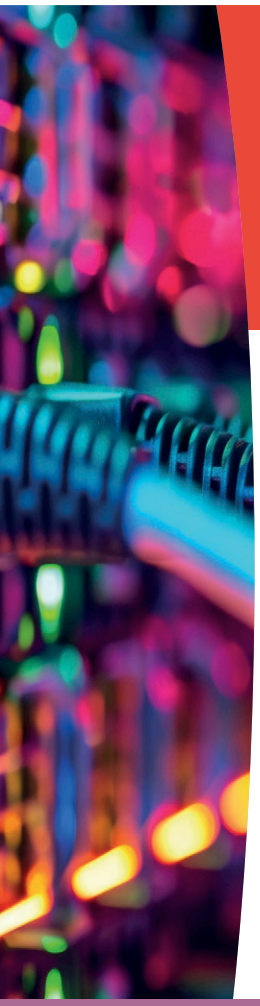
The latest from carbon black supplier **Orion** is Printex chroma 450 Beads, a high-jetness carbon black designed for engineered plastics, such as styrenic polymers (ABS, SAN, ASA), polyamide, polycarbonate and blends. The company said the product has a balance of jetness and surface smoothness.

"The product was developed for applications that require excellent dispersion," said Martin Dauch, director of Global Marketing – Polymer Systems at Orion. "The grade maintains the strong performance profile of Orion's Printex chroma series, providing customers with greater flexibility when selecting the right solution for demanding plastics applications."

Dauch said that following the launch of Printex chroma 500 in 2024, customers requested increased



Jetness comparison of injection moulded ABS with 3% Orion Printex chroma carbon blacks
Source: Orion



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dispersibility. "In response, we designed Printex chroma 450. It offers a very well-balanced combination of colouristic properties, including high jetness, high tinting strength and a bluish undertone in full-shade colouration, and very good processability and excellent dispersion performance across a very broad range of polymers," he explained.

The new grade is available globally. It has EU food-contact approval and is produced at Orion's ISCC PLUS-certified plant in Cologne, Germany. Printex chroma 500 and Printex chroma 450 are also available with reduced carbon footprint based on ISCC+ certification.

"For applications demanding FDA compliance, we currently offer different alternatives, such as Printex F 80, Printex F 85 and Arosperse F 634A. Depending on the market development, we will pursue FDA approval also for Printex chroma 450," said Dauch.

Monolith produces carbon black in Nebraska, USA, using a proprietary hydrocarbon pyrolysis technology in a carbon neutral process. Early this year the company announced plans to expand production at the site. In May, the company promoted its COO Russ Web to CEO.

"I'm honored to step into the CEO role as Monolith advances toward large-scale manufacturing and expansion in Nebraska," said Webb.

Bolder Industries, which recovers carbon black via pyrolysis of end-of-life tyres in Indiana and in Missouri, USA, is moving forward with a commercial-scale recovered carbon black facility in Antwerp, Belgium. The project aims to reduce greenhouse gas emissions, reduce European reliance on imports and promote a circular economy. A permit received in June covers a two-phase project to build an 86,000 tonnes/yr capacity design. Phase 1 will create 43,000 tonnes of annual design capacity, and Phase 2 will expand to the full capacity. The site will produce BolderBlack, which is a sustainable and traceable recovered carbon black, as well as pyrolysis oil. Both products are being used commercially with the company's North American customers.

Below: Staff at Tioxide's Greatham, UK facility with titanium dioxide product



IMAGE: TIOXIDE

Titanium dioxide

Last year saw some shutdown of capacity for titanium dioxide (TiO_2), which is widely used in white pigments for plastics as well as many other applications. This year, some of that capacity came back.

The Greatham, UK facility owned by Venator Materials was idled in the last quarter of 2025 but then acquired by **LB Group** in April and restarted this year under the new company name of **Tioxide**. While Tioxide is a newly established company within LB Group, it builds on the recognised Tioxide and Deltio product brands, experienced people and decades of manufacturing and technical expertise, the company said.

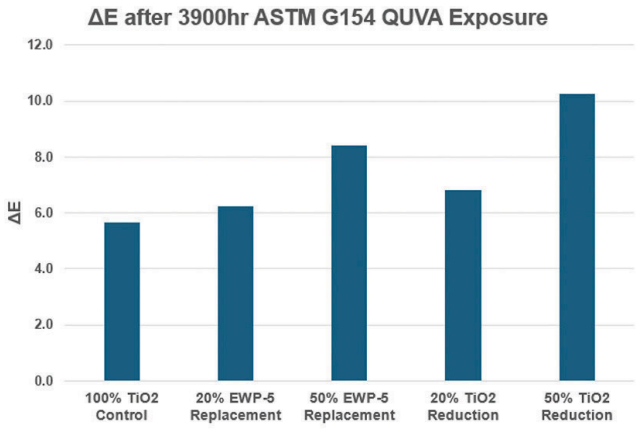
The company resumed pigment production in August and has been ramping up its first production line. It is now manufacturing all of its core grades of Tioxide and Deltio pigment grades for plastics applications. Of these, Tioxide TR48 and Deltio 48X are suited to masterbatch production, high-temperature processing and polymer films. Tioxide R-TC30 and Tioxide TR42 are designed for exterior plastics applications requiring weather resistance and colour stability.

Tioxide's second manufacturing line is on target for startup in early 2027, which will bring the facility to its nameplate capacity of 150,000 tonnes of TiO_2 pigment annually. Tioxide has a new research and development centre in Wynyard and commercial and business support teams based at its headquarters in Stockton-on-Tees.

In March, **Indorama**, through its indirect subsidiary Indorama Advanced Oxides (Spain) acquired the former Venator TiO_2 manufacturing site at Huelva, Spain, which has capacity of 80,000 tonnes per year. The site is Indorama's first in titanium dioxide.

Alternatives to titanium dioxide have been explored. **US Silica** has commercialized its new white pigment as EverWhite Pigment (EWP-5). The company presented the new product at AMI's Compounding World Expo last year in Cleveland. The pigment uses silica sand, mined in the US, as a precursor. The company said that the pigment has been used in applications outside of plastics, such as coatings and caulk, and that it can also be used to complement other white colourants in thermoplastic compounds.

EWP-5 could be used to reduce TiO_2 levels in LDPE or PVC by up to 50%, subsequently reducing



QUVA Exposure	100% TiO_2 Control	20% EWP5 Replacement	20% TiO_2 Reduction
3900hr ΔE	5.6	6.3	6.8

QUVA Exposure	100% TiO_2 Control	50% EWP5 Replacement	50% TiO_2 Reduction
3900hr ΔE	5.6	8.4	10.3

Rigid PVC accelerated weathering (ASTM G154), comparison of US Silica EWP-5 EverWhite Pigment with TiO_2 control
Source US Silica

cost, the company reported. Advantages are price stability and supply security. It has a similar whiteness and hardness to TiO_2, but a lower bulk density (approximately 20-22) and lower specific gravity (approx. 2.3). Colour retention after weathering in a formulation with 2% red colourant, 1.5% TiO_2 and 1.5% EWP-5 was nearly identical to the control of 2% red and 3% TiO_2. Mechanical properties were also maintained.

Since last year's presentation, US Silica has expanded its application testing of EWP-5. In commercially representative rigid PVC window profile formulations, replacing up to 50% of TiO_2 with EWP-5 demonstrated comparable processing behavior, tensile strength, and accelerated UV weathering performance. The formulations also maintained their UL94 flammability ratings, while demonstrating improved Gardner impact resistance and less thermal yellowing compared with formulations where TiO_2 was simply reduced, the company said.

Recent studies evaluated EWP-5 in PE cast and blown films using highly loaded pigment masterbatches. In LLDPE cast films, approximately 30% TiO_2 replacement maintained similar opacity and colour, with minimal impact on tensile strength. Blown-film testing showed comparable tensile and tear properties, with only minor reduction in opacity, the company reported.

New from Ampacet is HyperLustre, a TiO_2-free, semi-translucent effect colourant for PET that is an alternative to pearlescent effects in hair care, personal care and beauty packaging, for example. The colourants are compatible with PET in blow moulding and injection stretch blow moulding processes.

"With the HyperLustre Collection, designers can incorporate a sophisticated luxury aesthetic unlike any other effect currently in the market, without utilizing TiO_2," said Mercedes Landazuri, Ampacet Market Insight Manager.

Risk results

The Titanium Dioxide Manufacturers Assn (**TDMA**), said an assessment by Environment and Climate Change Canada and Health Canada of titanium-containing substances, including pigmentary TiO_2, found low risk to the environment and human health.

"TiO_2 nanoforms, which can have different properties and use patterns, were not part of this evaluation and are to be considered separately in a future assessment," TDMA stated. "With that scope in mind, Canada's assessment adds to a growing body of regulatory reviews that assess potential risks on the basis of actual exposure levels and the totality of available evidence, concluding that TiO_2, in its established uses, poses a low risk to human health and the environment."

The report follows last year's regulatory change in Europe that titanium dioxide powders were no longer classified as suspected carcinogens.

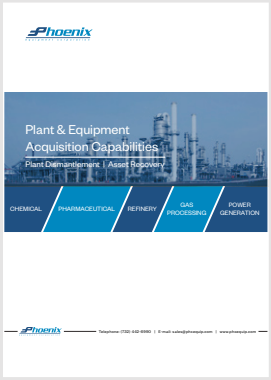
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PHOENIX: SURPLUS EQUIPMENT



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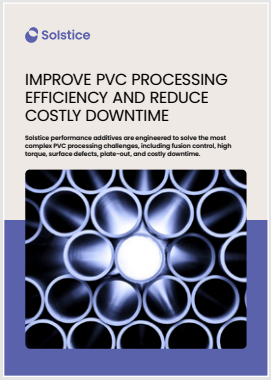
ORLEN UNIPETROL CHEZACARB



In this brochure, Orlen Unipetrol presents its Chezacarb products. These electrically conductive additives can be used with commodity or engineering polymers, as illustrated in this brochure.

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SOLSTICE: PERFORMANCE ADDITIVES



Solstice presents in this brochure the benefits of its additives for PVC processing in PVC pipe and profile extrusion, cable manufacturing, injection moulding, colour masterbatch and polymers.

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CABOT: SPECIALTY CARBON BLACK



This brochure from Cabot details the company's range of Vulcan specialty carbon blacks for formulation of low moisture absorption electrically conductive plastics for applications such as ESD packaging.

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FEDDEM: COMPOUNDING TECHNOLOGY



In this company profile brochure, Feddem presents its compounding technology portfolio, including FED-MT co-rotating twin-screw extruders, plus FSB feeder, FSV side vacuum, and FSE side venting units.

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BIOREGION: TRUBLACK TPA IR



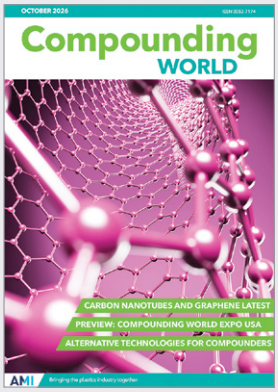
Bioregion Technology has designed TruBlack TPA IR to allow black plastics to be separated in automated recycling lines, without the need for petroleum-based additives, as presented in this brochure.

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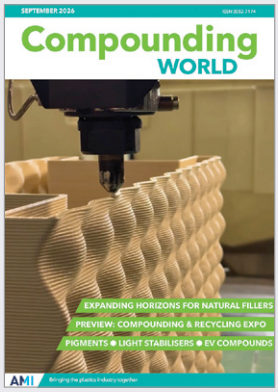
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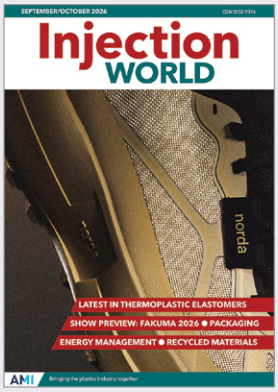
Compounding World October 2026
In the October edition of Compounding World discover how the latest nanoscale additives can support compound development, and read about exhibitors at the Compounding World Expo in Cleveland, plus alternative technologies for compounding.

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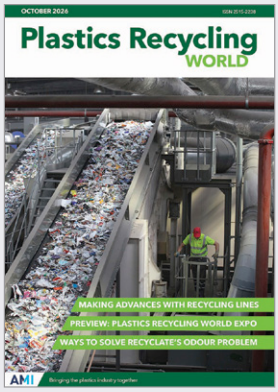
Compounding World September 2026
Compound fillers derived from natural feedstocks are becoming more common, as detailed in the main feature of Compounding World's September edition. There is also a Preview of Compounding & Recycling Expo in Frankfurt and the latest in pigments and light stabilisers.

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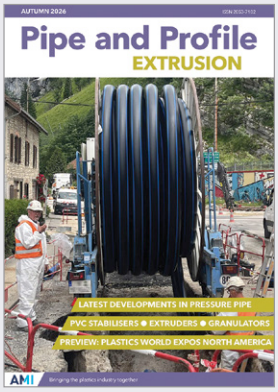
Injection World September/October 2026
Plastics sustainability is a key topic in the new issue of Injection World magazine, covered in features on energy efficiency and recycled materials. Plus: Fakuma 2026 is previewed and TPEs and packaging moulding are explored.

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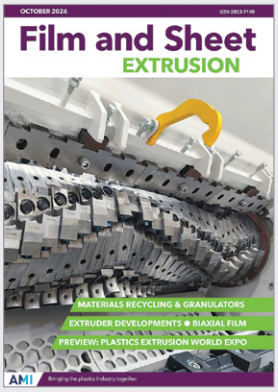
Plastics Recycling World October 2026
New technology for plastics recycling lines is covered in the main feature of Plastics Recycling World's October edition. Other articles report on additives to help compounding with post-consumer recyclate and new developments in odour reduction.

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Pipe and Profile Autumn 2026
The cover feature of Pipe and Profile Extrusion's Autumn edition looks at pressure pipe companies winning praise for their work. The issue also contains features on the latest in extruder and recycling technologies, plus PVC stabilisers.

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Film and Sheet October 2026
Film & Sheet Extrusion's October edition has features which explore new technology in film recycling, the latest extruder developments and the outlook for biaxially oriented film. There's also a preview of the Plastics Extrusion World Expo in the USA.

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GLOBAL EXHIBITION GUIDE

2026	**10-13 November**	Plastimagen, Mexico	www.plastimagen.com
	11-12 November	Compounding World Expo, Cleveland, US	https://na.compoundingworldexpo.com
	1-5 December	IPF Japan, Chiba	www.ipfjapan.jp
	2-5 December	Plasteurasia, Istanbul, Turkey	https://plasteurasia.com
	14-16 December	RACE, Mumbai, India	www.raceexpos.com
2027	**2-4 March**	JEC World, Paris, France	www.jec-world.events
	7-8 April	Textiles Recycling Expo, Charlotte, NC, USA	www.textilesrecyclingexpo.com/usa
	13-16 April	Chinaplas, Shenzhen, China	www.chinaplasonline.com
	20-22 April	UTech Europe, Maastricht, Netherlands	www.utecheurope.eu
	27-29 April	Plast-Alger, Algiers, Algeria	www.plastalger.com
	3-7 May	NPE 2027	www.npe.org
	11-12 May	Moulding Expo, Stuttgart, Germany	www.moulding-expo.de
	16-17 June	Textiles Recycling Expo, Brussels, Belgium	www.textilesrecyclingexpo.com
	11-15 October	Fakuma, Friedrichshafen, Germany	www.fakuma-messe.de

AMI CONFERENCES

24-25 November 2026	Flexible Packaging Innovation & Recycling, Vienna, Austria
1-2 December 2026	Polymer Engineering for Energy, London, UK
8-9 December 2026	Stretch and Shrink Film, Savannah, Georgia, USA
8-10 December 2026	Wind Turbine Blades, Düsseldorf, Germany
9-10 February 2027	Pipeline Coating, Vienna, Austria
24-25 February	PVC Formulation, Charlotte, NC, USA
2-4 March 2027	Cables Europe, Düsseldorf, Germany
20-22 April 2027	Stretch and Shrink Film Europe, Malaga, Spain
1-3 June 2027	Global FilmTech Forum, Savannah, GA, USA
23-24 June 2027	Fire Retardants and Cables, Pittsburgh, PA, USA

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

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