

# Plastics Recycling WORLD



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# Plastics Recycling WORLD

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COVER PHOTO: AMP

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# Mars 'unlikely' to meet 2025 plastics targets

In its latest sustainability report, Mars, the US-headquartered manufacturer of confectionery, pet food, and other food products, says though it has succeeded in some areas, it is unlikely to meet all the goals needed to fulfil its commitment to the Ellen MacArthur Foundation by the end of 2025.

When it signed onto the Ellen MacArthur Foundation's Global Commitment, which "unites businesses, governments, NGOs, and investors behind a common vision of a circular economy", Mars set targets that: 100% of its packaging would be reusable, recyclable, or compostable by 2025; it would reduce its use of virgin plastic by 25% by 2025 versus 2019; it would increase its recycled content to 30% PCR by 2025.

The reality is that as of 2023, 61% of the company's packaging is recyclable, reusable or compostable, and it used an average of 1.5% recycled content across its packaging



Plastics packaging for pet food has been one target area for Mars

portfolio. Regarding virgin plastic reduction, against a 2019 baseline of 180,000 tonnes, it used 206,850 tonnes in 2023.

These figures were included in its recent report on Sustainable in a Generation, a plan it launched in 2017.

"We are making good progress, and we would expect that to continue to accelerate," the company wrote. "However, the design and infrastructure changes needed are taking longer than we anticipated, and we are unlikely to fully meet

them by the end of 2025."

In mitigation, the company also said it is "investing millions of dollars to improve the recyclability of our packaging, increase the amount of food-safe, recycled content, and to reduce the use of virgin plastic."

Mars joins a growing list of brand owners in acknowledging ambitious 2025 targets are unlikely to be reached, including Unilever, Colgate-Palmolive and PepsiCo.

> [www.ellenmacarthurfoundation.org](http://www.ellenmacarthurfoundation.org)  
> [www.mars.com](http://www.mars.com)

## Capri-Sun rethinks straws

In August, several industry outlets, including Just Drinks, reported that Switzerland-based Capri-Sun Group was looking at alternatives to the paper straws it introduced in 2021 which could see a return to plastic in its home market. As Switzerland is a non-EU member state, businesses operating there do not have to abide by the Single Use Plastic Directive.

Just Drinks claimed a spokesperson for Capri-Sun told them that as part of a planned changeover to the recyclable mono-material PP pouches introduced in March, it was examining the possibility of replacing the paper straw with a plastic straw which would allow both the pouch and the straw to be recycled in the same recycling stream. As it stands, the paper straw would contaminate the plastic recycling stream.

> [www.just-drinks.com](http://www.just-drinks.com)  
> [www.capri-sun.com](http://www.capri-sun.com)



Origin says the cap design is simple, clever, and user-friendly

## First tethered PET caps

US technology company Origin has engineered and manufactured what it says are the first tethered PET caps ever made, expected to be commercially available in Q4 2024. PET bottle caps are usually made from HDPE or PP.

"Our patent-pending tethered cap design is simple, clever, and user-friendly," said John Bissell, Origin Co-Founder and Co-CEO. "We use the threads of the PET cap and bottle to lock the cap into place, angled away from the mouth, not toward it. We are combining the performance and sustainability advantages of our PET caps - recyclability, shelf-life extension, lightweighting, ability to use recycled PET, and enablement of mono-material packaging - with an excellent user experience."

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# EC makes slow progress on mass balance method

The European Commission (EC) is inching closer to making a decision on which allocation method chemical recycling companies must use for the mass balance approach in calculating recycled plastics output from their facilities.

"We have been intensively discussing this internally," said Julia Roettgerding, Policy Officer in the DG Environment Circular Economy Unit, in a keynote speech at the Plastics Recycling World Expo in Brussels in September. "We are very much aware of the urgency in giving certainty."

There have been lengthy discussions about mass balance with EU member states, which are continuing, she said. The EC's attempts to reach a decision have been further delayed as new Commissioners appointed after EU elections in June have set up their departmental teams.

When plastics waste is used with virgin feedstock in a petrochemical plant, mass balance enables a company to say a proportion of the plant's output is recycled (more details [here](#)). Some aspects of what the EC will



IMAGE: D. ELDRIDGE

**The audience listening to the keynote speech by Julia Roettgerding of the European Commission at the Plastics Recycling World Expo in Brussels**

permit have been decided, such as not allowing a company to transfer mass balance credits between sites.

Roettgerding said that in its discussions with member states, the EC supports the Fuel Use Excluded method for calculating the amount of recycled products, which provides a freer allocation than the Proportional and Polymers Only options. The EC's decision on the allocation method is crucial for chemical recycling companies whose investment plans are based on being able to allocate at a

higher level of recycled products.

The EC is also working on connected elements such as chemical traceability. "It must be possible chemically to produce output from the input waste," said Roettgerding, as it is important to show a link between the waste feedstock and the product allocated as recycled.

Certification requirements in the value chain are being developed with a view to limiting the administrative burden, she said.

<https://commission.europa.eu>

## Audi radiator grilles include recyclate



**A blend of PC and PET recyclates are used in the new A3 model**

IMAGE: AUDI

Audi said it is mass-producing painted radiator grilles made from a blend of PC and PET recyclates for the new A3 Sportback and A3 Sedan. This is the result of a collaboration between the German automotive manufacturer, compounding specialist Mocom, and plastics processor Winning Plastics.

The recycling process begins with scrap parts from production. After the defective parts are shredded, they are processed in a hammer mill designed by Mocom where the paint is removed and the resulting debris vacuumed away. During extrusion, the plastic mass undergoes fine melt filtration where it is passed through special filters and the resulting PC+PET recyclate blended at a nominal 27% into the production of new radiator grilles.

[www.audi.com](http://www.audi.com) [www.mocom.eu](http://www.mocom.eu)

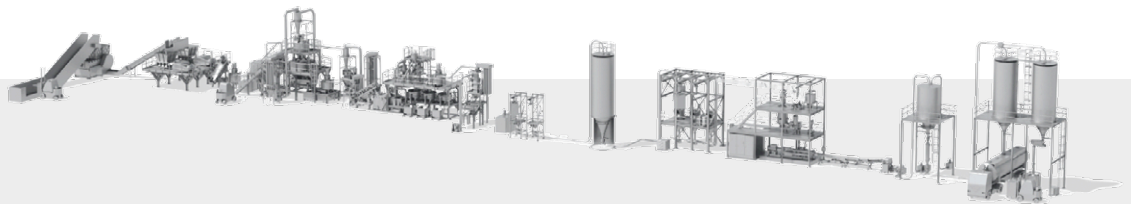
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IMAGE: RÖCHLING



Impression of how Röchling Industrial's expanded site will look

## Röchling Industrial to expand German site

Semi-finished products manufacturer Röchling Industrial is investing almost €10m in an expansion of its Sustainability Centre in Geeste-Dalum, Germany. Polyethylene (PE) and polypropylene (PP) are primarily recycled at the facility.

Since 2021, offcuts from customers and the company's own production have been returned to the Geeste-Dalum facility where the material is cleaned,

sorted, and processed into new raw materials. These are then reprocessed into high-quality semi-finished technical plastic products and eventually sold in the Röchling-ReLoop product family.

"Thermoplastics are ideal for mechanical reprocessing," said Wilhelm Korte-Dixen, COO of Röchling. "Together with our customers, we systematically close value loops and conserve valuable fossil resources."

In addition to the sorting plant, several new shredders as well as grinding and production plants will be purchased. A modern office building and a new production hall will also be built, both equipped with photovoltaic systems to use electricity from renewable energies.

The expansion, covering a floor area of more than 7,000 m<sup>2</sup>, is expected to be completed by 2027.

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

## US Plastics Pact report is updated

The US Plastics Pact has released an updated report detailing ongoing action to eliminate "problematic and unnecessary materials" from the plastics value chain.

Activators will take

measures to eliminate additional items on the list, which now includes: foamed PET when it interferes with sortation and density requirements per the APR Design Guide; multi-materi-

al rigid plastic packaging that does not comply with the US Plastics Pact Design for Circularity Playbooks; and non-compostable produce stickers.

➤ <https://usplasticspact.org>

## Ganesha Ecopet boosts capacity in India

PET recycler Ganesha Ecopet in India, which says it aims to recycle 25% of the country's PET bottle waste by 2026, has boosted its bottle-to-bottle recycling capacities to 42,000 tonnes/yr with the addition of two new lines. The Starlinger RecoStar PET 165 HC iV+ recycling lines are set up at the

company's facility in Warangal, Telangana State, and have been in operation since the middle of the year.

The upgrade is, in part, a response to the Indian government's introduction of Extended Producer Responsibility for importers, brand owners, and plastic waste processors, under its

Plastic Waste Management (Amendment) Rules. The rules stipulate that brand owners and producers must include a 30% share of PCR content in PET bottles by 2025, gradually increasing to 60% by 2029.

➤ <https://ganeshaecosphere.com>  
➤ [www.starlinger.com](http://www.starlinger.com)

## Henkel installs lab unit

Consumer products group Henkel has installed a Tomra Autosort detection system in its laboratory to ascertain whether packaging has the right properties for easy sorting and recycling before it is launched. The scanner is equipped with a NIR and a VIS sensor meaning the device not only detects the product material type, but also the colour of the packaging, which can be decisive for sortability.

Volker Rehrmann, EVP and Head of Tomra Recycling, said sorting is an essential step in packaging recycling. "At Tomra, we know how product packaging needs to be designed so that modern sorting technologies can recognise it clearly, and we have made it our mission to share this knowledge."

He said that a functioning circular economy is only possible if everyone involved in the value chain works together.

➤ [www.tomra.com](http://www.tomra.com)  
➤ [www.henkel.com](http://www.henkel.com)



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# Carbios signs deals to roll out bio-recycling for textiles

French biotech company Carbios and UK recycling and waste management firm FCC have signed a Letter of Intent (LOI) to establish a plant in the UK using Carbios' PET bio-recycling licensed technology.

The enzymatic depolymerisation technology facilitates the recycling of all types of PET waste, including problematic fractions such as polyester textiles.

Carbios has also signed a LOI with Turkish polyester fibre and filament yarn producer SASA to work toward a licensing agreement that would allow SASA to construct and operate an enzymatic depolymerisation plant in Adana, Turkey, with a capacity of 100,000 tonnes/yr. The Carbios



IMAGE: CARBIOS

recycling technology would be used to produce polyester pellets, fibres, and textiles from various waste sources.

Less than 1% of textile waste is currently recycled into new textile fibres. In a further attempt to boost

these numbers, Carbios has signed a Memorandum of Understanding (MOU) with Nouvelles Fibres Textiles, a French company specialising in the recovery of end-of-life textiles, for supply to the Carbios PET recycling plant under construction in Longlaville, France.

The contract will enable 5,000 tonnes/yr of textiles prepared in France to be redirected towards bio-recycling from 2026 onwards.

The wide variety of textiles is holding back large-scale deployment of recycling, the company said, but new technologies, such as Carbios' enzymatic depolymerisation are overcoming this obstacle.

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



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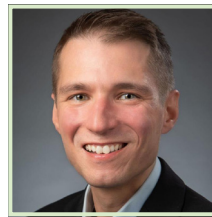
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*Sorting technology firms aim to solve challenging tasks through advances in optical systems, robotics and AI. Mikell Knights reports on the latest advances*

# Separation anxiety: how to improve sorting accuracy

Recently introduced sortation technologies look to enhance recycling and purity of dirtier plastic waste materials having higher contamination. Advances in optical, sensor and robotic sorting, software and monitoring functions increase the recovery of bottles, containers, films, foils from commingled sources as well as regrind, flake and pellets.

Sorting methods that blend artificial intelligence (AI), computer vision technology and automation into systems capable of improving the accuracy and speed of material separation from waste is finding increasing use at Materials Recovery Facilities (MRFs), plastics recycling plants and packaging maker plants.

Sorting technology is benefiting from the connection of proprietary higher-performing cameras and sensors to computer software algorithms that can interpret information from the images of objects on a conveyor belt to quickly identify recyclable materials based on features such as shape, texture and colour or non-visual

features such as size, weight and density.

The software intelligence gained through evaluating the captured data is used to separate recyclable materials from the waste into the desired fractions with a high degree of accuracy. Analysis of the data set is driving deep learning, where AI and machine learning algorithms teach neural networks that drive sorting equipment to better differentiate various recyclable materials, leading to more accurate and precise sorting for increased recycling rates with lower contamination.

**Tomra** says its high throughput Innosort Flake unit launched last year offers simultaneous separation of flakes by polymer type, colour or transparency from highly contaminated mixed waste, giving access to recyclable materials that might otherwise be lost or downcycled for lower-grade applications.

The Innosort Flake unit incorporates what the company calls a powerful sensor combination that allows for the sorting of a range of polymers, while the design of the unit delivers a level of machine

**Main image:**  
**AMP One uses AI technology to sort mixed plastics waste**

**Right: Tomra says its new Innosort Flake unit uses advanced NIR spectrometer technology to precisely detect various polymers from highly contaminated infeed**

flexibility that makes it possible to run multiple sorting and recovery steps in a single machine, leading to considerable time savings coupled with less material handling, said Alberto Piovesan, Global Segment Manager for Plastics at Tomra Recycling Sorting.

Innosort Flake can sort mixed plastic fractions that have been shredded and washed into clean fractions of PET, PP, PE, PVC, ABS, PS, PA, PC, PLA, PMMA, POM and more, the company said. The model utilises advanced NIR spectrometer technology to precisely detect the various polymers from highly contaminated infeed. Dual-sided high-resolution cameras are used to detect millions of colours to create single colour fractions. The high-contrast imaging is also able to differentiate between white, opaque, natural, transparent, and translucent flakes, reducing material loss and maximising yields, said Piovesan. The unit's higher-end optics also includes enhanced illumination intensity with a changeable colour background, for sorting flexibility and adaptability.

**Data analysis**

The Innosort unit is offered in a choice of three working widths of 1,000 mm, 1,500 mm and 2,000 mm. It can be ordered with two to four chutes and can process up to 8 tonnes/hr of flake. Tomra says the Innosort Flake has an integrated passive cooling system to ensure consistent and reliable operation even in challenging environments.

Tomra's Insight cloud-based data monitoring platform can be installed as an add-on service to further improve sorting performance by optimising processes through data analysis. Tomra Insight can provide digital metrics like throughput, material distribution across the conveyor belt, accept and rejection rates. It can identify inefficiencies and

**Below: Sesotec's new Varisort+ Film unit has features to stabilise film waste during sorting**



IMAGE: SESOTEC



IMAGE: TOMRA

carry out predictive maintenance to further support the reduction of productivity losses and machine downtime, the company said.

The Innosort Flake unit joins Tomra's Autosort Flake sorting machine which is designed for high-end applications like bottle-to-bottle recycling where contamination of the infeed material is low but quality requirements are high, said Piovesan. It features an NIR spectrometer in combination with a full colour camera and high sensitivity electromagnetic sensor for ferrous and non-ferrous metal detection, providing simultaneous material, colour and metal detection, to achieve both high purity and stable throughput.

**Difficult objects**

German separation and sorting systems manufacturer **Sesotec** developed Varisort+ Film, a new multi-sensor system for sorting plastics films. The film sorter is a modular system based on the proven features of the company's Varisort+ device family but incorporates new technical developments that enable optimum conveying of flexible packaging and films.

Varisort+ Film features a new specially generated laminar air flow design that stabilises the film for reliable identification and sorting. Another innovation incorporated into the new unit is an aerodynamically designed separator housing that prevents air turbulence, which usually impairs the sorting efficiency of flexible packaging.

Sesotec introduced its latest developments in material evaluation methods based on AI that enable reliable detection and the differentiation identifying of many materials beyond the limits of high-tech sensor technologies.

The company developed Object-Ai, which uses colour and shape sensor technology with AI to classify objects that were previously difficult to detect



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and identify in heterogeneous material flows. Impurities or differentiating good or bad material based on shape, colour and texture can be detected using a multivariant method, efficiently sorted out by blow nozzles, according to Andreas Hanus, Development Engineer and Product Owner Plastics Recycling at Sesotec.

Also new is NIR-Ai, which can differentiate between optically similar plastic products, for example such as monolayer PET and multilayer PET. The ability of NIR-Ai to differentiate between closely similar or vastly different polymers using spectral analysis leads to increased accuracy and adaptability of the sorting process, and improved sorting performance, especially for mixed plastics and plastics with additives, Sesotec said. The NIR-Ai solution is available for all Varisort+ family models and can be retrofitted onto existing units. Object-Ai is available currently for the Varisort+ Film, Flex and Unity models, as these systems are supplied with AI capable hardware as standard.

### Pre-sorting

Sesotec also developed a mobile multi-sensor pre-sorting system for plastic regrind. Its Pre-Sort VCM model incorporates a colour, metal and NIR sensor to reliably detect and separate plastic types, colours and metals from regrind of various qualities. The fully automated, compact system combines several standard Sesotec technologies into a single unit on a mobile platform. This includes use of the Varisort Compact multi-sensor system, featuring state-of-the-art signal evaluation technologies that, with the sensors, guarantees high detection accuracy and an evaluation of up to 500,000 parts/sec.

Other features include a counterflow classifier system that separates dust and fine particles from the ground material, and a standard central vacuum conveying system that ensures smooth material transport through the dedusting system to the Varisort Compact unit. A central control unit connects the conveyor technology, deduster and sorting unit. It has an integrated start and stop function to ensure optimal operating convenience.

The components of the Pre-Sort unit are factory installed onto a structural platform designed for rapid commissioning, the company said.

Pre-Sort VCM works with Class 1 materials that have a low level of impurities and up to 10% foreign matter, Class 2 materials with medium to high contamination levels and up to 35% foreign matter, and Class 3 materials that have a colour mixture of materials that require a pre-sorting stage to sort out several material fractions. The unit



IMAGE: MSS OPTICAL

delivers throughput up to 600 kg/hr. and handles grain sizes from 2-10 mm.

The addition of AI-powered capability is the most recent sorting development from US optical plastics sorting equipment supplier **MSS Optical**, the optical recycling division of CP Group. It is launching Vivid AI, a complementary technology to its Cirrus family of optical sorters for recycling plastics containers, flexible packaging, and flake materials.

The addition of the AI component builds on the identification technologies that its models with NIR technology do not have, the company said, allowing for the detection and sorting of more classes of material. The incorporation of AI technology will allow for enhanced plastics material sorting, such as differentiating PET bottles from PET thermoformed products.

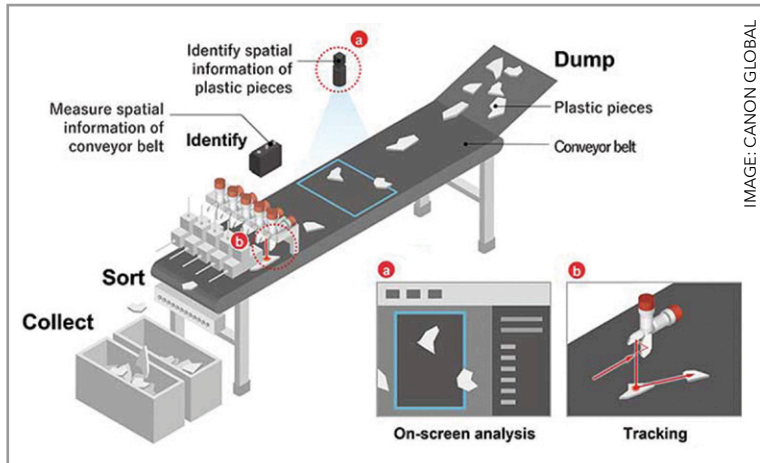
### Vision-based AI

The core of MSS' new Vivid AI solutions is the incorporation of intelligence technology developed by London-based technology company **Recycleye** that provides deeper levels of data and analysis for finer classifications of individual product and material categories. The company's Recycleye AI sensor captures images of the items on the conveyor belt which it sends to Recycleye Vision, the company's AI central processing software which contains millions of product images of materials, packaging and container types, and a custom-build data neural network from which the captured images from actual MRFs and recycling centres are compared for identification.

The immediate identification of objects by the Recycleye technology allows sorting machines to make a yes/no sorting decision in real-time. The neural network's data collection is continuously growing to accommodate new types of material and expand the characterisation of known materials.

MSS offers its Vivid AI in two versions. Vivid Air

**Above: The PlasticMax unit from MSS Optical can operate at a capacity of 2-12 tonnes/hr**



**Above: Canon Global has developed sorting technology which uses tracking type Raman spectroscopy to identify material types**

combines the Recycleye AI sensor and Vision with MSS' proven air ejection system to sort material at a volume compared to robotic or manual extraction methods. It delivers ten times higher picks per minute than any mechanical arm or human sorter, according to Felix Hottenstein, Sales Director for MSS. Conveyor belt speeds can be increased over the same conveyor width to maximise throughput and sorting efficiency, the company said. Multiple objects can be extracted side-by-side at the same time, similar to conventional optical sorters, and it requires lower compressed air usage.

**Robotic solution**

MSS also offers a VividBot version with a robotic sorter for material extraction. The robotic arms are employed in applications where air jet units will not fit or where multiple separate sort categories are required to be extracted at once, MSS said. Recycleye QualiBot is based on retrofitting a multi-axis robot co-developed by Recycleye and Fanuc for plastics, non-ferrous and fibre materials sorting.

Recycleye said its vision and robotics solution were tested in a case study seeking to segregate higher levels of HDPE and remove contamination from a split-stream plastics line. The AI-driven robotic sorting system achieved 55 picks/minute and increased the volume of the targeted material from the waste stream by 12% while attaining 99% purity with less than 1% contamination.

MSS will also offer VividVision, a statistics and data monitoring tool for incoming and outgoing material streams that can be used to create data and material audit reports. User selected metrics regarding the exact amount and type of material picked in a specific period selected by the user can be shown on the Recycleye dashboard. This enables the user to gain a clearer understanding of the value of the materials picked and on the belt.

MSS offers a range of optical sorters in its Cirrus

family that incorporate NIR, colour and metal sensors, as well as its patented MaxSelect sequential scanning technology, integrated ClearLight technology and proprietary air-assist material handling system. This includes the flagship PlasticMax line for MRFs and municipal solid waste facilities which operate at a capacity of 2-12 tonnes/hr with up to 98% efficiency. Its PurePlasticMax line for plastic recyclers is designed to sort full body sleeved PET, PE, and PP bottles at rates of 3-7 tonnes/hr with up to 98% efficiency. It also offers its FilmMax line for film recyclers that incorporates a proprietary material handling system to remove contaminants and off-colour materials from pre-shredded film and flexible packaging at rates from 0.5 to 3 tonnes/hr, and its FlakeMax line that can separate contaminants and off-colour materials from plastic flake, including black items.

Multinational technology giant **Canon Global** has launched a new series of plastics sorting equipment based on an innovative material identification process capable of measuring black plastic pieces even when mixed in with other colours. The company said it is currently taking orders from the market for its TR Series, inaugurated with the TR-S1510 model.

Canon Global's first model in the TR series maintains a conveyor speed of 1.5 m/sec and can sort up to 1 tonne of plastic per hour. The unit can be customised to a client's throughput and installation space by changing the module which tracks and measures the plastic pieces or a combination of conveyor belts, the company said.

**Raman spectroscopy**

The TR series is based on a process the company revealed a year ago which uses tracking type Raman spectroscopy technology to identify material types (*Plastics Recycling World* September 2023). The Raman spectroscopy detection method utilises laser light to illuminate plastic waste to obtain molecular information about material. This makes it possible to detect black plastic pieces or plastic pieces of black shades, which has been more challenging with other technologies. A substance emits Raman scattered light yielding a great deal of information when it is illuminated with laser light.

Canon Global's development combines Raman spectroscopy with its own measurement and control equipment. Tracking type Raman spectroscopy technology can direct laser light toward the pieces to ensure there is enough measurement time for each piece of plastic.

Austria based sensor technology company



BT-Wolfgang provided a portfolio of factory solutions for the mineral and conveying industries before establishing its **Redwave** recycling and waste processing division in 2004. It launched its Redwave line of machinery which incorporates its sensor-based sorting technologies. In July of this year BT-Wolfgang officially merged with compatriot company BT-Anlagenbau, a specialist and general contractor for plant construction to form BT-Systems.

The latest advancement in sorting technologies from BT-Systems' Redwave recycling division is the connection of the Redwave 2i line and what the company describes as its new generation of intelligent sensor-based sorting, where machine learning and AI are linked with different types of sensors. Redwave machines incorporate the company's independently developed camera and lighting technology and associated control and monitoring software for seamless operation.

Redwave 2i enables up to 4-channel sorting with just one machine and can operate as a 2-way or 3-way system, the company said. The plug & play unit is offered in four sizes, including the Redwave 2i 1400, 2000, 2400 and 2800 models that offer sorting rates of approximately 3-8 tonnes/hr



IMAGE: REDWAVE

depending on model. Waste material containing PET clear, PET blue, PET green and PET skyblue can be sorted, resulting in a fraction with just one of the PET types with a purity of 98%, the company said.

The company's Redwave C line scan camera for colour recognition and separation and its Redwave NIR sensor for material recognition and separation are combined into the Redwave NIR/C sensor for separation of different materials and colours in one sorting step. The NIR/C sensor is combined with

**Above: The Redwave 2i system enables up to 4-channel sorting with just one machine and can operate as a 2-way or 3-way system**

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**Right: Pellenc ST has developed the Compact+ sorting units for retrofit or refurbishment projects**

RGB cameras and metal detectors in a Sensor Fusion system, according to the company. The light source is generally a high multispectral LED light but in special cases, such as PUR foam sorting, the detection unit can involve halogen lighting.

Redwave also unveiled Redwave Mate, its AI-support technology for monitoring and optimising the entire sorting system as well as plant operations. Redwave Mate can use data collected by an Industry 4.0 system that communicates information from equipment and machinery in a production cell or plant. Redwave Mate measures, records, and evaluates information collected during production, with the data used as a source for machine monitoring and to ensure optimum system and sorting operation.

**Pellenc ST** has developed new optical sorters specifically designed for installations where space and access are limited. The Compact+ sorters are ideal for retrofit or refurbishment projects and can be built with the option of offsetting the control cabinet or conducting a modular assembly on-site.

Compact+ is equipped with company innovations that improve the performance of the unit. This includes use of the new Flow detection system which combines a new spectrometer with an extended NIR/VIS spectrum and focused illumination that enables recovery of waste to high levels of purity. The Flow detection system in example improves the separation of different grades of PET, Pellenc ST said. Other features of the unit include a large display screen on the control cabinet to improve the human-machine interface.

Compact+ interfaces with all types of high-speed conveyors supplied by different integrators and is compatible with belt speeds up to 4.5 m/sec. Its Central Nervous System (CNS) software platform allows operators to integrate technologies such as the Industrial Internet of Things (IIoT), watermarking and AI, and other Pellenc ST scanners in the form of upgrades.

Compact+ features options familiar from Pellenc ST's Mistral+ Connect line of multi-material sorting



IMAGE: PELLENC ST

machines for sorting and recycling centres, such as dual vision, metal detection and profile detection for the detection of black and inert materials, the company said. Maintenance and low energy consumption were focused on during the unit's development. The replacement rate for parts has been considerably reduced and maintenance costs have been minimised. Pivoting reflectors are provided to facilitate the ease and safety of maintenance operations. For energy savings, the unit is designed so that air consumption has been cut by 30% compared to previous ranges of machines, the company said.

Users can also use the Smart&Share performance support application that continuously analyses the operation of the optical sorter from real-time data to help optimise the operation. Users can receive intelligent alerts and customised reports for increased availability and better sorting quality, Pellenc ST said.

**Flakes and pellets**

Anhui Zhongke Optic-electronic Color Sorter Machinery, a Hefei, China-based optical sorter technology company for food in China also offers several machines under its **AMD Sortex** line for plastics sorting.

The company, which had an exhibitor booth at this year's NPE Show in Orlando, Florida, US, developed the AMD U series sorting machine for ageing PET flakes and fluorescent flakes. The unit uses a customised high-precision optical system consisting of an advanced, concentrated, ultraviolet light source and a unique image enhancement algorithm to accurately identify extremely faint flaws in the polymer. The AMD U series is offered in

**Right: The AMD U series is offered in five models with capacities ranging from 2 to 8 tonnes/hr depending on the model**



IMAGE: AMD SORTEX



five models with capacities ranging from 2 to 8 tonnes/hr depending on the model.

AMD also developed a sorting machine for plastic pellets and granules. The AMD LZ Pro (ES) model draws on the company's extensive colour sorting experience to create an optical sorter designed to reduce the bouncing of particles to achieve effective sorting. The AMD optical pellet sorting machine integrates advanced visible light sorting technologies combined with several product features for precision detection and inspection. This includes the E image processing technology, 3D surround recognition technology, multi-frame composite noise reduction, true colour restoration, micro-chromatic aberration algorithm, centroid 3.0 algorithm and dual-view cameras to detect and separate materials with subtle defects. AMD offers the LZ1 Pro (ES) and the LZ3 Pro (ES) models for pellets or granules, each with a capacity of 0.1-0.3 tonnes/hr.

AMD also developed a sorting machine specifically designed to separate PET and PVC flakes. The AMD GI series sorts the plastics mixture based on the near infrared spectral properties of the polymers. The company said separation of PET and PVC is a "critical step in ensuring the purity and quality

of the recycled materials, as these two materials cannot be recycled together due to their different chemical properties." The NIR sorting unit can detect and separate non-PET materials in PET flakes and can also detect and separate impurities in HDPE bottle flakes from non-HDPE materials such as PP, PC, or PVC. AMD offers the GI line in three models with a capacity ranging from 0.8-6 tonnes/hr, depending on model.

### Picking robots

AMP Robotics, the US-based developer of AI-based robotic sorting systems, simplified its company name this year to **AMP** to reflect its delivery of AI-powered solutions at scale, said Carling Spelhaug, Director of Communications. "Each of our products uses the same core vision system to sense and sort, making the solutions highly modular and scalable," she said. AMP offers multiple versions of pick-and-place robots performing upwards of eighty picks per minute on conveyor belts operating at 300 feet/minute (fpm), and jet systems that perform thousands of picks per minute on conveyors operating at 600 fpm.

AMP's newest offering is AMP One, a highly

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IMAGE: AMP



**Above: AMP has developed AMP One, a highly automated factory-scale sorting solution**

automated factory-scale sorting solution, available in a modular design capable of achieving throughput of 15,000-100,000 tonnes/year with 90%+ recovery of recyclables. AMP One uses AI-driven sorting technology to transform single stream municipal solid waste, materials recovery facility residue, mixed plastics and other infeeds into bales of valuable recyclable materials.

A primary benefit of an AMP One system is realised when a facility is built with AI capabilities in mind from the outset, said Spelhaug. "One can optimise its design around the technology, which supports changes measured in orders-of-magnitude compared to a retrofit. It is not just that one may operate with fewer sorters but also without manual sorting altogether," said Spelhaug.

With the consideration of AI-enabled data collection up front, one has the possibility to make the sorting lines wider and higher speed. AI can help replace entire classes of equipment that create maintenance and downtime events. "By reducing the cost of sorting, our technology is growing the market of recycled materials by making it profitable to recover material where it currently is not. We create the opportunity to sort new material combinations, unlocking higher revenue from the same infeed material," Spelhaug said.

This year, Recycling and Disposal Solutions of Virginia (RDS) installed an AMP One advanced recycling system at the Pitt County Recycling Center in Greenville, North Carolina, to process approximately 10,000 tonnes of single-stream and commercial recycling. RDS installed the unit at the site, which it owns and operates, as part of a modernisation effort to process recyclables more efficiently at lower cost through efficiencies.

Also, this year, AMP installed an AMP One system in a municipal solid waste (MSW) facility, which Spelhaug calls an industry first. The MSW

facility, also owned by RDS, currently processes 150 tonnes/day of local MSW with over 90% uptime. AMP says the operational efficiency is an industry first, delivering an "unprecedented level of reliability for mixed waste sorting systems at a scale and footprint not previously feasible economically." The AMP One system separates bagged trash into its component parts of mixed recyclables, organics, and residue. The RDS facility can divert more than 60% of landfill-bound material with the system, which can effectively sort dirtier materials with more contaminants.

### Automated operations

California-based tech start-up **Everest Labs** has developed an AI, robotics and data platform purpose-built for recyclers, reclaimers and packaging manufacturers designed to automate sorting operations, improve feedstock supply, and increase recovered recycled content.

Its RecycleOS platform, which the company considers the first enterprise AI and robotics system for recycling plants, combines several proprietary company innovations in vision system technology, industrial edge computing, and deep learning AI to efficiently sort and process high volumes of recyclable materials accurately and quickly. It increases material recovery rates by up to 40% while lowering labour and material disposal costs by 40-60%, according to JD Ambati, founder and CEO.

The RecycleOS platform can conduct live audits and identification of the recycling stream, provide object tracking for sorting equipment and is able to perform packaging type, size, and mass characterisation of an object through its enterprise level cloud data platform. The company built its material characterisation model and its machine learning model from the ground up.

Everest Labs typically operates the RecycleOS platform with robotic sorting equipment, that, when combined, outperforms manual sorting of bottles, containers, and other recyclables from commingled input materials by a factor of two or three, said Ambati.

The company's RecycleOS Robotics cell features a self-contained industrial 3D vision system that is self-lit and easily mounts on top of a conveyor to capture an image of the objects. The vision unit incorporates 3D depth sensing cameras that can identify up to two hundred items in each frame. The system can accurately process 30 frames/sec.

Image and sensor data is sent to an industrial edge computer containing a custom AI model for object detection, developed by Everest Labs. The AI algorithm compares the images to a classifica-



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tion dataset of more than 3bn recyclable objects developed and iteratively refined by the company using real-world data. The proprietary high-speed AI algorithms translate images into 40-plus classes of objects with 95%-plus accuracy in 10-15 milliseconds, said Ambati.

“Within 12 milliseconds our AI software can classify what the objects are and can communicate with the robot sorter recovering the item,” said Ambati. Results from the AI software are used to program the robot sorter to pick the material accurately. The robotics software can be configured to prioritise specific sorting tasks.

Everest labs developed small form factor robotics with custom end effectors to maximise pick success. The low latency of the high-speed AI enables the RecycleOS cell to maintain a picking accuracy of 90% or better.

The RecycleOS platform’s neural network is iteratively refined for new classes of materials and learns to recognise an object even if it is partially covered by another object or mangled, crushed, cut in half, folded over or dirty, the company said.

Caglia Environmental, an MRF in Fresno, California installed a RecycleOS system and several robotic sorters onto its “last chance” line to improve PET recovery efficiency. The system allowed Caglia to identify and sort the PET in the waste stream into three specialised categories: PET bottles, PET thermoformed trays and pigmented/opaque PET. The RecycleOS system in place at Caglia has one vision system and three robotic sorters that separate each PET material into a fraction.

RecycleOS can assist packaging manufacturers with data to optimise the recyclability of their



IMAGE: EVEREST LABS

packaging. Data on material characterisation, recovery rates, bale/feedstock quality can be identified and tracked. The platform can generate reports on sustainability metrics such as greenhouse gas emissions, carbon reduction or energy consumption, and can convert recovered and diverted material into a commodity value.

**Above: Everest Labs’ RecycleOS platform combines AI with robotic sorting**

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# HolyGrail 2.0 technologies are successful in industrial testing

**In this article, Margherita Trombetti at AIM - European Brands Association provides an update on a key sorting initiative**

The packaging industry is buzzing with anticipation as the implementation of mandatory European Union-wide rules for packaging and packaging waste draws near. A key aspect of these rules – enshrined in the EU’s Packaging and Packaging Waste Regulation – is the requirement to incorporate a specific percentage of recycled content in plastic packaging, necessitating a significant shift in the industry from a linear model to full circularity.

Digitalisation, powered by innovative technologies, presents a unique opportunity to spearhead this transformation in the waste industry.

In this context, the Digital Watermarks Initiative HolyGrail 2.0, driven by AIM - European Brands Association and powered by the Alliance to End Plastic Waste, continues the journey towards industrial trial validation of the digital watermarks technology, approaching the end of R&D phase. The consortium has reached a new milestone with the successful validation of the digital watermark technology’s advanced sortation capability in combination with NIR in an industrial environment, delivering positive results in

		December 2023 only flexibles average throughput 800 kg/h	February 2024 Flexibles + rigids average throughput 2000 kg/h
PP flexibles	Digimarc detection efficiency	>99% <i>(for one use case, not possible to verify for the other)</i>	Not tested*
	Sorting efficiency	85.7%	
	Purity	76.7%	
PE flexibles	Digimarc detection efficiency	96.8%	89.9%
	Sorting efficiency	93.8%	75.1%
	Purity	70.6%	88.1%

\*Due to multiple baling and unbalancing operations, some samples were heavily fragmented, and this led to poor detection and sorting results. The results were therefore not considered.

relation to the separation of hygiene-grade LDPE films and food-grade PP films.

Industrial trials took place at the Hündgen Entsorgung material-recovery facility in Swisttal, Germany in December 2023 and in February 2024 using a prototype detection module developed by machine vendor Pellenc ST and digital watermarks technology provider Digimarc, as part of the initiative.

Digital watermarks are imperceptible codes that can be added to the surface of consumer goods packaging, and which carry a wide range of packaging-related attributes. The idea is that the digital watermark can be detected and decoded by a special high-resolution camera once the packaging enters a waste sorting facility, hence achieving more granular sorting and higher-quality recyclates.

Tests were performed on real streams that were bulked up with additional quantities of digitally watermarked PP films, as well as LDPE films, produced

by some brand owners including Essity, Kraft Heinz, PepsiCo and Procter & Gamble. The focus was on sorting flexible packaging to create specific types of output fractions – food-grade PP flexibles and hygiene-grade PE flexibles – from a mixed waste stream. During trials in December 2023, single-pass sorting achieved, on average, 95% detection efficiencies, 85% sorting efficiencies, and 70% purity. Two-pass sorting, typically used in recycling plants, is expected to improve purity of the output fractions by around 20%.

In February 2024, trials on contaminated streams showed 89.9% detection efficiency, 75.1% sorting efficiency, while purity was 88.1% despite harsher conditions (i.e. multiple baling/unbaling, mix of flexibles and rigids, high throughputs up to 2,500 kg/h, dirtier) that are not reflective of normal industrial settings.

The overall sorting results were consistent despite challenging conditions,

suggesting that the December results are more indicative of typical performance in standard industrial settings.

The upcoming step involves a three-month trial aimed at sorting post-consumer rigid packaging, digitally watermarked and introduced to the Danish and German markets by various HG2.0 member companies. If successful, the test will further confirm the technology’s detection and sorting capabilities in an industrial environment, demonstrating the system’s robustness and indicating that the technology has reached TRL 9 – watermark-based sorting proven in actual operational setting.

In parallel, the HolyGrail 2.0 Initiative has engaged in a new separate project aimed at testing the capability of another watermark technology – the CurvCode watermarking technology by FiliGrade – to close the loop on HDPE milk bottles in the Netherlands. If successful, the technology will be brought to TRL 7.

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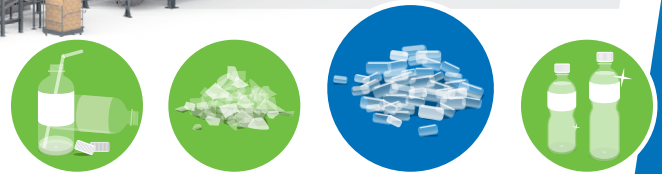
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*Companies in the polyolefins value chain are working collaboratively to optimise recycling of packaging items such as PP containers and PE caps and bottles.*  
**By Chris Saunders**

# Unlocking the potential of rigid polyolefin waste

PET bottle recycling is a process that is relatively well understood in Europe, but the recycling of rigid packaging made from polyolefins is a different matter. Polypropylene and polyethylene bottles and containers are a complex recycling area for various reasons: from the highly mixed and contaminated waste streams, through problems of identification during sorting, to difficulties in producing food-contact recyclates. Challenged by these issues, various companies and organisations are working to develop solutions that help rigid polyolefin recycling pursue its potential to greatly improve packaging circularity.

The European packaging industry is under increased pressure due to the EU Packaging and Packaging Waste Regulations (PPWR) which stipulates that by 2030, all packaging must be recyclable and contain a specified percentage of recycled material. Contact-sensitive packaging

must include at least 10% recyclate, single-use plastic beverage bottles 30%, and all other packaging at least 35%. This is particularly difficult to achieve with materials like polypropylene (PP) and polyethylene (PE), which can be highly contaminated from previous uses and the recycling process, complicating their use in sensitive areas.

Jörg Sabo, Global Director Marketing & Innovation, **Greiner Packaging**, said: "Producing high-quality recycled PP that meets strict hygiene standards for food packaging is especially challenging. By 2030, demand for recycled PP and PE is expected to exceed supply by five times, intensifying the pressure on manufacturers and recyclers to find efficient solutions."

Traditionally, mechanical recycling has been largely effective when applied to clean, homogeneous plastic waste, but struggles with heavily contaminated or mixed materials, as often seen

**Main images:**  
**Municipal collection point for plastic caps in Betancuria, Fuerteventura, Spain**



IMAGE: GREINER

**Above: Greiner Packaging is involved in a project with Siegwerk and Kronos on deinking of rigid plastic cups during recycling**

with food packaging. Establishing closed loops can mitigate this issue. "In a project with ARA, Austria's leading collection and recovery scheme for packaging, we successfully established such a loop," Sabo said. "In collaboration with the Austrian Coffee Brewers Association, used coffee capsules are collected, cleaned, and disassembled into pure aluminium and plastic, which are then used to make new products."

When mechanical recycling falls short, chemical recycling offers a potential alternative for mixed packaging waste containing PP and PE. However, it is generally more energy-intensive and produces higher CO<sub>2</sub> emissions, making it a complementary rather than primary solution. "Progress in recycling processes is already evident," said Sabo. "There are promising signs of progress. With technological innovations, strategic adjustments, and close industry collaboration, we are confident that the PPWR requirements will be met and that the transition to a functioning circular economy will be successful."

Further underlining the importance of collaboration, Greiner Packaging has also joined forces with wash technology group **Kronos** and **Siegwerk**, a German provider of printing inks, in a new initiative highlighting the capabilities of modern recycling facilities in the conversion of direct-printed PP and polystyrene (PS) cups. Despite being considered non-recyclable by some in the context of design for recycling, the alliance was able to effectively deink and convert rigid containers into high-quality white recyclate without altering the ink formulation or print design. This was achieved by using hot caustic washing, a process for PET bottle recycling being increasingly adopted by those working with polyolefin (PO) and PS rigid streams. These findings emphasise the need for guidelines to evolve with technological advancements, ensuring they reflect the most efficient and sustainable routes to a circular economy available at any given time. The

**Right: Gneuss says use of its Super Clean Process enables regrind from bottle caps to be reprocessed back into caps**

project partners say they are now advocating a re-evaluation of the role of printing inks and coatings in recycling and calling for a broader assessment of packaging deinkability under standard hot caustic conditions which will hopefully culminate in the adoption of the corresponding test standard published under DIN SPEC 91496.

**Deinking labels**

In July, Siegwerk launched its first full UV flexo deinking system for the European market, known as Cirkuit Clearprime UV E02. The new primer technology for non-food packaging applications offers a validated solution for safe and economic deinking of UV-printed pressure sensitive labels (PSL), improving the recyclability of labelled plastic packaging.

"Depending on the substrate, UV inks are often very difficult to remove and can therefore lead to contaminations of recyclates, which significantly limits their further reuse," said Marc Larvor, Head of Technology Narrow EMEA at Siegwerk.

In a field test, experts from **Masterpress**, a supplier of high-quality labels and printed packaging solutions, used uncoated transparent or white PSL made of PE85 and applied Siegwerk's Cirkuit Clearprime UV E02 followed by bleeding resistant UV flexo inks and an UV flexo OPV. The primer created adhesion between substrate and inks, and later enabled full ink and varnish removal of the printed PE film at standard deinking conditions based on the QT 507 washing protocol of the European PET Bottle Platform (EPBP). The primer layer dissolved residue-free.

High-density polyethylene (HDPE) is widely used in the manufacture of bottles, containers and caps because of its superior strength and rigidity, and in packaging for personal care products, detergents, and industrial fluids, because of its durability. HDPE bottle caps can go through the same washing



IMAGE: GNEUSS



systems as the PET bottles they are attached to, before being separated in a float-sink tank so they can be further processed. German technology group **Gneuss** said that if treated with its Super Clean Process, the regrind can be reprocessed back into bottle caps, thus closing the recycling loop. The Gneuss OMNImax recycling system used in this process has undergone multiple tests and been awarded several food contact approvals and Letters of No Objection. The technology does not require any upstream or downstream process steps, which is of particular importance for PE as it must be treated at low temperatures and requires long residence times due to the slow diffusion processes involved.

### Bottle caps

Gneuss says the OMNImax system purifies the polymer by subjecting it to highly efficient degassing using an MRSpure extruder and a robust vacuum system to remove volatile contaminants. The Multi Rotation System (MRS) is preceded by a melt extruder, which separates the plasticising and degassing/deodorising/decontamination steps so the process parameters can be optimised individually. Downstream of the melt extruder the RSFgenius filtration system removes hard contaminants by ultra-fine filtration, while its fully automatic, consistent operation cleans the contaminated screens before they re-enter the melt channel. Typical filtration finenesses in HDPE recycling are 125-300 µm. For HDPE milk bottle recycling, the material can be fed into the extruder via a 3C rotary feeder.

Gneuss says a key feature of this system is its flexibility as it automatically compensates for variations in the waste being processed in terms of moisture, contamination, viscosity, and bulk density. By adjusting the process parameters, material of consistently high quality can be produced and batch changes made quicker due to the short residence time so downtime can be reduced. This makes the OMNImax recycling system very cost-effective, the company says, especially in applications where food contact or odour reduction is required.

Last year, sorting technology provider **Tomra** partnered with **Greenpath Enterprises**, to install and optimise a flake sorting production line specifically to identify and separate polyolefin caps from beverage bottles. PE and PP have such close density characteristics that they can be difficult to separate, which is one reason mixed polyolefins are usually downcycled into more forgiving applications that allow for higher levels of contamination.

Discussions eventually led to Greenpath adopting Tomra's Innosort Flake sorter. "Developing a mechanical sorting process to close the loop



for food-grade cap-to-cap recycling is groundbreaking," explained Joe Castro, president of Greenpath Enterprises. "It's a game changer to create a system to consistently separate mixed polyolefins by polymer and colour with high purity. Tomra's technology is allowing us to purify at a higher level that opens up the whole circular opportunity with going cap to cap."

### PP identification

Earlier this year Tomra introduced three new applications made possible by GAINnext, the company's deep learning-based sorting add-on for its AUTOSORT units which makes it possible to quickly and efficiently separate food-grade from non-food-grade PET, PP and HDPE for the first time. By combining its traditional NIR, visual spectrometry or other sensors with deep learning technology, Tomra says it has developed a highly accurate solution capable of achieving a degree of purity upwards of 95%. (For more on Tomra's technology, see feature on Sorting [p13](#).)

Partners in Project OMNI, a collaborative research project in France, reported results demonstrating efficient decontamination of food-grade PP waste sorted by AI and computer vision. **TotalEnergies**, **Recycleye** and **Valorplast** took part in the project which they said has led to an alternative approach from digital and physical marking solutions for identifying PP packaging which require system-wide packaging changes. (For more on Recycleye's technology, see feature on Sorting on [p13](#) in this issue.)

In a demonstration unit, Recycleye built and trained an AI model based on wastes collected from five locations across France supplied and characterised by Valorplast. The AI and robotic sorting achieved a successful pick rate of 50% of the food-grade material, with >95% purity. This sorting activity produced material used for further

**Above:**  
**Food-grade sorting is now possible for PP, PET and HDPE, says Tomra**

The logo consists of three stylized human figures in white, arranged in a row. Each figure has a vertical line for a body and a curved line for a head, with their arms raised and hands touching. 

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decontamination on a semi-industrial pilot based on off-the-shelf mechanical recycling technologies. TotalEnergies was then able to produce odourless, clean recycled PP suitable for high-end packaging applications.

Alban Cotard, Sales Quality and Development Manager at Valorplast, said: "Being able to recycle food-grade PP is a key factor in the establishment of a circular economy for PP packaging. AI is a promising route for achieving this objective."

### Filtration focus

Impurities are a major challenge in all recycling methods as they hamper the process and compromise the quality of recyclate. Plastic waste often contains dirt, oils, and mixed polymers that drastically reduce the usability of recyclates if they cannot be removed from the melt. One solution currently on the market is the new ZSK Filco filtration compounder from **Coperion** which removes such impurities by melting the material and feeding it through a series of filters. The ZSK Filco is designed to handle various types of impurities and produces recycled material with high purity that can be used in various applications. The life cycle of PP and HDPE is thus extended, and demand for virgin material drops, the company says.

The ZSK Filco also takes over the application-specific enhancement of the material by compounding it with fillers and additives. Since all three processes take place in a single process step, the raw material only needs to be melted once. This reduces the mechanical and thermal stress on the plastic versus conventional two-step processes in which the waste plastic is melted and cooled separately for the filtration and compounding steps.

Polyolefins producer **Borealis** is installing a semi-commercial demonstration compounding line in Beringen, Belgium. The line, which will utilise the company's proprietary Borcycle M technology to transform mechanically recycled post-consumer



IMAGE: COPERION

waste into high-quality rigid PP and PE materials is expected to be fully operational in the first half of 2025 and will be capable of processing a broad range of flakes from both PP and HDPE waste sources, offering exceptional versatility and flexibility. "At Borealis, we are dedicated to supporting our customers to meet their sustainability goals while maintaining exceptionally high quality standards," said Mirjam Mayer, vice president Circular Economy Solutions. "This represents another step in Borealis' EverMinds ambition to deepen our expertise in giving plastic waste a new life in high-value applications."

**Above: PP flakes are one of the target materials for the ZSK Filco filtration compounder from Coperion**

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*Granulator manufacturers are developing their technologies in new ways that help processors deal with the challenges of using regrind material. Chris Saunders reports on new products*

# Making the cut: advances in granulators

In addition to the usual considerations for granulator development, like space-saving and noise reduction, in response to the growing emphasis on sustainability, manufacturers are now focusing their efforts on developing more energy-efficient machines. Intelligent power management is being incorporated to minimise energy consumption, which not only lowers operational costs but also reduces environmental impact, while another notable trend is the integration of smart automation and Industry 4.0 technologies, which enable remote monitoring and control, predictive maintenance, and data-driven optimisation, reducing downtime and enhancing overall efficiency.

At the Fakuma exhibition held last October in Friedrichshafen, Germany, **Hellweg Maschinenbau**, recently awarded the Compamedia TOP 100 2023 seal of approval as a “particularly innovative medium-sized company”, presented a selection of its digitally controlled machines, including the MDSi 340/150 Smart Control machine-side granulator, the most powerful model of the series with drive powers of 1.5kW to 4kW for grinding capacities of 10 kg/h to 80 kg/h. Its primary application is to enable the recirculation of even the bulkiest sprue stars, spiders, or ladders, directly beside one or more injection moulding machines. Material can be fed in by chute, feed hopper, or conveyor belt, and discharged by suction.

The company says its 300 series of central granulators combine a compact design with high performance and allow grinding of thick-walled mouldings, sheets, sprue cakes, pipes and profiles and, when using the special BR rotor, even single-stage shredding of solid lumps from production start-ups. A MDSi 600/300 Smart Control Plus version on display at Fakuma featured power consumption analysis and automated lubrication with Bluetooth monitoring. Hellweg also presented the new MDSGi 1500/600 wet grinder featuring a forced feed system for film recycling.

These systems feature Hellweg’s digital Smart Control System, developed in-house, which captures parameters such as power consumption, motor speed, and bearing temperatures, as well as blade, screen, and V belt status, and continuously optimises the relationship between motor load and throughput ensuring the most economical operation. Smart Control is generally available for all models and sizes of Hellweg’s systems from the Series 150 beside-the-press granulator for small parts and sprue grinding to the Series 600 large granulator.

A power-saving frequency converter is also fitted, and programmed in such a way that the granulator only requires the power that is needed to grind the current batch of material. In addition, the scissor cut principle used at Hellweg ensures efficient self-dosing and always works around

**Main image: Granulator companies are aiming to improve the quality of regranulated scrap**

IMAGE: HELLWEG



**Above: Lower half of composite image shows Hellweg's Smart Control System**

maximum throughput. Another major advantage of the cut is that even with fast material discharge, the regrind is smooth-edged with an extremely low fines content of around 0.01% for PP and 5% for very brittle materials such as PBT-GF.

Managing Director Mark Hellweg said: "Our work in recent years has focused, and will continue to focus, on applying the possibilities of artificial intelligence to plastics recycling and, in particular, to granulating production waste. Our digital Smart Control system paves the way to greater energy efficiency in granulators, extended service life of all system components, and ultimately increased process sustainability. At the same time, regrinds and granules of higher, more uniform quality are obtained."

**Regrind quality**

**Keeney Holdings**, a US manufacturer and distributor of drainage products, contacted **Wittmann USA** when looking to upgrade its injection moulding operation in Winchester, New Hampshire. With the increased use of regrind in its moulding operations, it was concerned with the overall quality. After an initial meeting, Wittmann USA ran a granulator trial where it obtained Keeney's material, did a grinding test with screenless and conventional granulators, and performed a regrind quality analysis using a multi-stage sieve test where the regrind is passed through a series of sieves with progressively smaller holes. After the trial, the percentage of dust and fines was calculated and compared.

Denis Metral, Wittmann's International Granulators Sales Manager, said: "With the increased push towards recycling and sustainability in our industry, the question has always been and continues to be,

**Right: Wittmann G-Max 23 granulator installed at Keeney Holdings' facility in Winchester, New Hampshire, US**

can we use regrind to make good, finished products? The answer is usually 'yes' but it's important to prove-out the concept to our customers in advance."

Following the trials, Keeney purchased seven new G-Max 23 granulators, bringing its total number of Wittmann granulators to 15, which are now up and running in the Winchester plant.

**Advanced Plastics Machinery (APM)**, the New England Representative of Wittmann USA, produced customised upper feed chutes for the granulators. "The sprues and runners on Keeney's products are often quite large, and sometimes do not have a consistent drop out of the moulding machine," said Bruce Beckmann of APM. "The customised upper feed chutes we designed provide a much larger landing area to the runners, so that they funnel into the granulator without difficulties and directly down into the cutting chamber."

Also at Fakuma, Wittmann displayed its new S-Max Dual 6 granulator, which replaces the Junior Double 6 model. The main difference is that the two 2.2kW motors are now arranged vertically to enable the smallest possible footprint. The S-Max Dual 6 is described as the ideal granulator for central scrap reclamation, and can also be used for inline recycling of sprues from injection moulding machines. It has been designed for a throughput maximum of 40 kg/h and is equipped with two counter-rotating cutting rotors as standard, with six blades and eight toothed rollers in total, and a cutting chamber with dimensions of 530 x 467 mm. The design allows for easy and safe cleaning of the cutting chamber.

The speed of rotation is 27 rpm, ensuring



IMAGE: WITTMANN



# Matsui develops new deduster technology

Ensuring stable material conditions is crucial to keeping your granulator running. A big part of this relates to viscosity. To ensure lower variance of viscosity, **Matsui** has formulated two solutions: the ARV Aero Remover, and the Magic Catch.

The new ARV Aero-Remover aims to eliminate powder and fines

contamination. Traditionally, dedusting occurs during the vacuum-transport delivery or relied on shaking dust off the pellets. But thanks to its unique cyclone filtering design, the ARV can efficiently remove contamination on the material itself and not only in the vacuum line.

Matsui's in-line metal removing unit

comes in two variations: 7,000 Gauss (Magnet Stick) or 13,000 Gauss (Magic Catch). It is available in several configurations and specifications and can be adapted to suit different customer's needs with the aim of preventing metal particles entering the final product or problematic production areas.

maximum torque for the granulation of hard and brittle materials, as well as those filled with glass fibre. Low granulator speed also means less wear on cutting tools for reduced maintenance, low sound levels, and low energy consumption. The low speed also decreases flyback during operation and provides more consistent and better quality regrind. The optional feeding shaft is independently driven and has elongated hooks to pre-cut the plastic parts/runners and push them into the cutting chamber for subsequent feeding, reducing the dimensions of the parts. This promotes the use of a smaller granulator, saving capital expenditure.

## Improved cutting

Austrian injection moulding and thermoforming specialist **Lechner** recently linked up with consultants from **Büchler**, which represents granulator manufacturer **Getecha** in Austria and Hungary. Project Manager Bernhard Lechner explained: "To optimise internal material processing in the two halls at our main factory in Bad Vöslau, we needed multiple state-of-the-art standard granulators for efficient granulation of various scrap material from component manufacture and film processing. After extensive requirement analysis, we selected two granulators of the RotoSchneider generation; a type RS 45090 hopper granulator and a type RS 30090-E infeed granulator."

The RS 45090 is used by Lechner as a central granulation station. It has a cutting width of 900 mm and processes round, square, and heavily ribbed production scrap with an hourly throughput of up to 900 kg. "As the ideal addition to its RS 45090, Getecha also provides a side bypass hopper to feed through long parts. This saves us having to

purchase another granulator," said Lechner.

The grinding chamber features a triple-blade rotor with oscillating weight and additional third stator blade. This robust configuration improves the processing of heavily ribbed components and prevents remnants from dropping too deep, significantly increasing overall efficiency of the granulation process. The inside of the hopper and the granulator housing are both equipped with hardened wear protection plates, which can be replaced when worn. Another important aspect is the integration of a new hopper granulator into the existing disposal/cycle processes at the customer's factory. To facilitate the use of an independent and self-cleaning vacuum conveyor station, Getecha engineers modified the suction tub of the RS 45090 and equipped it with a fill level sensor.

Lechner is using vacuum moulds to process PET and compound films with thicknesses up to 2.5 mm for large-scale production parts. To dispose of scrap web and faulty parts, the company opted for an infeed granulator designed and sized to process scrap material and hybrid films together with cardboard packaging. The hourly throughput rate is up to 670 kg.

Many of the latest granulators to hit the market feature improved cutting technologies, allowing for greater durability and precision in the size and shape of granules produced. High-performance materials and advanced geometries contribute to prolonged operational life, reduced maintenance, and enhanced performance.

Additionally, customisable settings enable operators to adjust parameters such as speed, cutting chamber size, and screen configurations to achieve optimal results with different materials.

**Left: Wittmann S-Max Dual 6 granulator**



**Right: EV916, one of CMG-Granulators' Evoluzione range with a redesigned cutting chamber**

Last April, Italian granulator manufacturer **CMG** presented a new cutting chamber for its Evoluzione series where a new rotor configuration allows rotating blades to cut material perpendicularly against fixed blades.

The blades are mounted directly on the end of the support bracket, which not only facilitates high inclination of the blades, but allows for easy and quick maintenance/replacement as the cutting chamber is accessible from the front of the machine. The material does not rotate with the rotor, avoiding the dust and small particles which become waste material in the washing phase, and the production of micro particles is reduced to a few percentage points, compared to 15% or more with a conventional granulator.

The open rotor design occupies only 30% of the space inside the cutting chamber and the ratio between the volume of the rotor and the cutting chamber is 30/70, while that of conventional granulators is 70/30. The cutting chamber also benefits from tangential development, guaranteeing smooth material ingestion without resorting to forced feeding systems. The EV916 and EV616 models offer solutions for the most critical operat-



IMAGE: CMG

ing conditions which require high performance characteristics such as increased granulation capacity, versatility, efficiency, and sustainability.

CMG has also launched a new series of small granulators for applications in the medical industry. The G17-MED series has been designed to obtain the most homogeneous regrind shape and dimensions with minimal dust. An additional benefit of this new line is the ability to produce regrind with very small dimensions which has no adverse impact

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on the quality of the finished product.

Small capacity systems, injection moulding machines, and extruders equipped with small diameter plastification screws are unable to process granules with dimensions exceeding those of the virgin granule. G17-MED granulators produce regrind which is dimensionally comparable to the virgin pellet. The entire unit can be accessed, cleaned, and put back into operation in a matter of minutes with no need for tools and can be cleaned by vacuum. Perhaps the most innovative feature is the sound insulation shell which conveys sound waves towards absorption panels to maintain low noise levels. The new models are equipped with IP55 certified control panels and are certified for compliance to Industry 4.0.

CMG Managing Director Giorgio Santella said: "Recycling of production scrap and rejects becomes a subject of primary focus also for suppliers of plastic components for the medical and pharmaceutical industry. CMG Granulators is constantly active in the development of new and particularly challenging solutions."

Germany-based **Zerma** has updated its long-running line of GSL slow speed granulators which are equipped with lightweight hoppers featuring a thick layer of sound insulating material between the inner stainless steel and external aluminium. GSL granulators are mainly used in injection and blow moulding processes. The updated models feature a staggered 300 mm diameter rotor with widths ranging from 400 to 800 mm. The rotor is driven by a geared motor and the low rotor speed reduces the noise level of the machine still further and creates less dust while grinding. The series can be fitted with different hoppers depending on requirements, while varying base frame heights and designs allow them to be tailored for specific applications.

### Compact and powerful

**Conair** recently introduced the compact and affordable GP Series to bridge the gap between shredders and granulators. Dave Miller, Conair's General Manager for Size Reduction, said: "Conair's new GP, or general purpose, shredders, are for processors who need a compact, cost-effective but powerful shredder for small to moderate throughputs. We've designed it from the ground up to be an 'entry-level' shredder, combining durable, reliable performance with low-maintenance features that have, until now, only been available on our much larger shredding equipment. We offer everything from special hoppers, infeed conveyors, and blowers, to all the ancillary equipment needed to build and operate a turnkey shredding system



**Above: Zerma's GSL range of slow speed granulators**

linked to a secondary granulator."

The GP Series is comprised of two models, the GP 924 featuring a 24-inch cutting chamber and the GP 935 with a 35-inch chamber. Within each chamber, scrap is reduced by a single 8.7-inch (220 mm) diameter steel rotor that cuts against a fixed blade knife, both of which are drop-forged from 4140 high-alloy steel for maximum durability. Rotors are equipped with four-sided, indexable cutting knives (23 or 35, depending on the model) that can be unbolted and rotated to provide fresh cutting edges between sharpenings. The fixed-blade knife, or anvil, also offers dual cutting edges.

Power to the single-shaft rotor is provided by a high-efficiency 25 hp or 40 hp AC motor, coupled through a large belt drive to an oversized, heavy-duty gearbox. These drivetrains, housed in the base of the shredder, produce high cutting torque at relatively low rotor RPM to reduce even thick scrap with limited noise. Standard GP shredders offer a large, open-top infeed hopper, at the bottom of which, a horizontal, hydraulic ram drives scrap into the cutting chamber. The ram feed is configured for low maintenance, with top and side scrapers that clean and shield the ram face, preventing shredded material from entering the mechanism. Ram direction and speed, as well as overall shredder operation, are controlled through a programmable logic controller, accessed through a touchscreen HMI.

### CLICK ON THE LINKS FOR MORE INFORMATION:

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- > [www.keeneymfg.com](http://www.keeneymfg.com)
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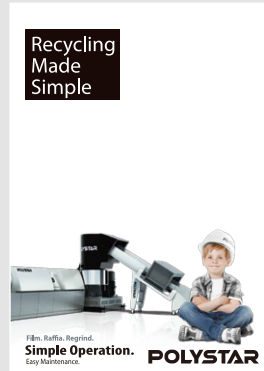
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Recycling Made Simple is the brochure from Polystar where you can find information about all of the company's plastics recycling systems. Its Repro Flex lines can recycle post-industrial and post-consumer PE/PP packaging and PP raffia/woven materials.

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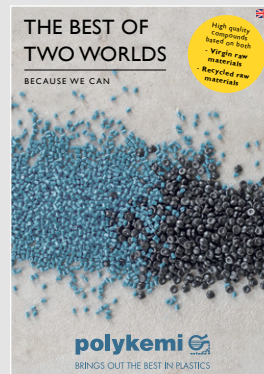
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## Plastics Recycling World July/August 2024

The Plastics Recycling World July-August edition has features that look at washing technology, progress in WEEE and ELV recycling, and what's new in chemical recycling. Plus previews of exhibitors and speakers at Plastics Recycling World Expo in September.

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## Plastics Recycling World May/June 2024

The Plastics Recycling World May-June issue has a cover feature on the growing number of developments in post-industrial recycling, plus articles on compatibilisers and new shredding technology demonstrated at the NPE 2024 show.

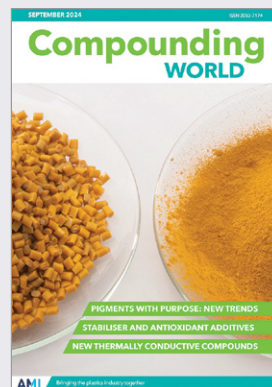
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## Injection World July/August 2024

The July-August 2024 edition of Injection World magazine looks at how bio-based and compostable plastics are used in injection moulding applications. The other feature articles cover developments in energy management and 3D printing.

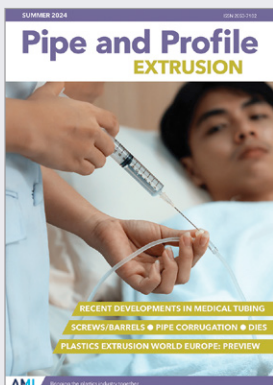
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## Compounding World September 2024

The September 2024 issue of Compounding World magazine has features on sustainability in colour pigments, demanding applications for antioxidants and UV stabilisers, and the latest compounds for thermal conductivity and high-temperature environments.

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## Pipe and Profile Extrusion Summer 2024

Pipe and Profile Extrusion's Summer 2024 edition has a cover feature on developments in medical tubing, including PVC tubing and substitutes. Other features cover screws and barrels, corrugated pipe and extrusion dies.

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## Film and Sheet Extrusion September 2024

Film and Sheet Extrusion's September edition has features covering efficiency gains in the thermoforming process, mono-material film developments, PVC additives and plasticisers, plus it has an update on laboratory extruders.

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	<b>8-10 October</b>	Plastprintpack West Africa, Abidjan, Ivory Coast	<a href="http://www.ppp-westafrica.com">www.ppp-westafrica.com</a>
	<b>8-11 October</b>	Plastex, Brno, Czech Republic	<a href="http://www.bvv.cz/en/plastex/">www.bvv.cz/en/plastex/</a>
	<b>15-19 October</b>	Fakuma, Friedrichshafen, Germany	<a href="http://www.fakuma-messe.de">www.fakuma-messe.de</a>
	<b>13-14 November</b>	Plastics Recycling World Expo, Cleveland, Ohio, US	<a href="https://na.plasticsrecyclingworldexpo.com">https://na.plasticsrecyclingworldexpo.com</a>
<b>4-7 December</b>	PlastEurasia, Istanbul, Turkey	<a href="https://plasteurasia.com/en/">https://plasteurasia.com/en/</a>	
<b>2025</b>	<b>11-14 March</b>	Plastimagen, Mexico City	<a href="http://www.plastimagen.com.mx">www.plastimagen.com.mx</a>
	<b>24-28 March</b>	Plástico Brasil, São Paulo, Brazil	<a href="http://www.plasticobrasil.com.br">www.plasticobrasil.com.br</a>
	<b>6-9 May</b>	Moulding Expo, Stuttgart, Germany	<a href="https://www.messe-stuttgart.de/moulding-expo">https://www.messe-stuttgart.de/moulding-expo</a>
	<b>7-8 May</b>	PlastTeknik Nordic, Malmö, Sweden	<a href="http://www.plasttekniknordic.com">www.plasttekniknordic.com</a>
	<b>14-15 May</b>	Plastics Recycling World Expo, Mumbai, India	<a href="https://plasticsrecyclingexpoindia.com">https://plasticsrecyclingexpoindia.com</a>
	<b>27-30 May</b>	GreenPlast, Milan, Italy	<a href="http://www.greenplast.org">www.greenplast.org</a>
	<b>8-15 October</b>	K2025, Dusseldorf, Germany	<a href="http://www.k-online.com">www.k-online.com</a>
	<b>12-13 November</b>	Plastics Recycling World Expo, Cleveland, US	<a href="https://na.plasticsrecyclingworldexpo.com">https://na.plasticsrecyclingworldexpo.com</a>
<b>4-7 December</b>	PlastEurasia, Istanbul, Turkey	<a href="https://plasteurasia.com/en">https://plasteurasia.com/en</a>	


**AMI CONFERENCES**

<b>30 Sept - 2 Oct 2024</b>	Single-Serve Capsules, Malaga, Spain
<b>2-3 October 2024</b>	Wind Turbine Blades, Boston, MA, USA
<b>21-23 October 2024</b>	Executive Summit, Savannah, GA, USA
<b>23-24 October 2024</b>	Plastics Recycling Technology, Vienna, Austria
<b>12 November 2024</b>	Polymers in Flooring, Cleveland, OH, USA
<b>12 November 2024</b>	Profiles, Cleveland, OH, USA

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

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