

K-PROFI

international edition



Our quality promise to plastics processors

- › Trendsetting know-how
- › Success stories from Europe
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Cortizo in Padrón extrudes PVC profiles for windows and doors on 28 lines. The Spanish company is fully committed to automation – for dryblend mixing, extrusion, stacking and film lamination.

Extrusion trimmed for efficiency

How **Agathon** optimises the injection moulding of chocolate moulds. How the **Franz Morat Group** creates added value for customers in 'Gear Valley'. Why **AST** builds its own blow moulding machines and processes PE for hazardous goods containers. And what **ICE**, **KraussMaffei** and **PRSE** had to offer.

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High-tech in injection moulding, extrusion and blow moulding

Dear reader,

agathon, the world market leader in chocolate moulds, moved from Bottrop to Essen a few months ago – from a plant that had grown over decades to an industrial building on a greenfield site that was planned on the drawing board. Development, toolmaking, injection moulding production, warehousing and administration are now united under one roof. agathon aims to increase its efficiency with the re-organised production facility: details from page 6. Cortizo in Padrón, Spain, only started extruding PVC hollow chamber profiles on two machines in 2014 and began producing window systems in 2015. Today, 28 extrusion lines process around 50,000 tonnes of PVC per year around the clock. From the production of the dryblend to extrusion, stacking and film lamination, the company is highly automated. You can read about a visit to Galicia from page 12 onwards.

The 'TCE' in Munich once again proved to be the industry meeting place for converting technologies. It attracted more international exhibitors, and there was record participation in the voting for the awards: page 18. AST Kunststoffverarbeitung in Erndtebrück produces hollow bodies of all kinds up to 1,000 litres, builds its own blow moulding machines and processes small and large containers such as ad-blue canisters, surfactant canisters, drums and even IBCs – including into new hazardous goods containers: page 21. Eisenbach in the Black Forest has the world's highest density of gear manufacturers. The Franz Morat Group is the largest employer in this 'Gear Valley'.



From page 26 onwards, you can read how the specialist for gear components and drive systems creates decisive added value for customers with its growing knowledge of materials and applications.

Low overall demand, low virgin material prices, pending regulations and a lack of willingness to invest are depressing the mood in the recycling industry. Nevertheless, the industry showed its best side at the 'Plastics Recycling Show Europe' in Amsterdam: exhibitor and visitor numbers achieved a top result: page 34.

We wish you a pleasant summer and a good rest!

Markus Lüling, Editor-in-Chief
lueling@k-profi.de



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Trade Fair Calendar

Trade fairs related to plastics processing in 2025 and 2026

All information without guarantee. Short-term cancellations or postponements are possible at any time.

Utech Asia	Guangzhou, China	03.09. – 05.09.2025	www.puchina.eum
Plastics Recycling Show ME&A	Dubai, UAE	15.09. – 17.09.2025	www.prseventmea.com
Kunststoffbeurs	's-Hertogenbosch, The Netherl.	17.09. – 18.09.2025	www.kunststoffbeurs.nl
Vietnamplas	Ho Chi Minh City, Vietnam	17.09. – 20.09.2025	www.chanchao.com.tw/vietnamplas
PackPrintPlas Philippines	Manila, Philippines	18.09. – 20.09.2025	www.k-globalgate.de
Fachpack, Powtech	Nuremberg, Germany	23.09. – 25.09.2025	www.fachpack.de ; www.powtech.de
K 2025	Dusseldorf, Germany	08.10. – 15.10.2025	www.k-online.de
Compamed	Dusseldorf, Germany	17.11. – 20.11.2025	www.compamed.de
Formnext	Frankfurt/Main, Germany	18.11. – 21.11.2025	www.formnext.de
Plastics and Rubber Indonesia	Jakarta, Indonesia	19.11. – 22.11.2025	www.plasticsandrubberindonesia.com
Shanghai World of Packaging	Shanghai, China	25.11. – 27.11.2025	www.swop-online.com/en
SPS	Nuremberg, Germany	25.11. – 27.11.2025	sps.mesago.de
Plastics Live Ireland	Dublin, Ireland	26.11. – 27.11.2025	www.plasticlive.ie
PlastEurasia	Istanbul, Turkey	03.12. – 06.12.2025	www.plasteurasia.com
Omanplast	Muscat, Oman	09.12. – 11.12.2025	www.omanplast.net

Plastex 2026	Cairo, Egypt	11.01. – 14.01.2026	www.plastexegypt.com
Swiss Plastics Expo	Lucerne, Switzerland	20.01. – 22.01.2026	www.swissplastics-expo.ch
Warsaw Plast Expo	Warsaw, Poland	03.02. – 05.02.2026	www.warsawplastexpo.com
Plastindia	New Delhi, India	05.02. – 10.02.2026	www.plastindia.org
Intl. IKV Colloquium	Aachen, Germany	04.03. – 05.03.2026	www.ikv-kolloquium.de
MECSPE	Bologna, Italy	04.03. – 06.03.2026	www.mecspe.com
JEC World	Paris, France	10.03. – 12.03.2026	www.jec-world.events
Plastpackprint Nigeria	Lagos, Nigeria	24.03. – 26.03.2026	www.ppp-nigeria.com
Plast Alger	Algier, Algeria	30.03. – 01.04.2026	www.plastalger.com
Wire, Tube	Dusseldorf, Germany	13.04. – 17.04.2026	www.wire.de ; www.tube.de
Utech Europe	Maastricht, The Netherlands	20.04. – 22.04.2026	www.utecheurope.eu
Plastics Recycling Show Europe	Amsterdam, The Netherlands	05.05. – 06.05.2026	www.prseventeurope.com
Interpack	Dusseldorf, Germany	07.05. – 13.05.2026	www.interpack.com
Interplas	Birmingham, UK	02.06. – 04.06.2026	www.interplasuk.com
FIP 2026	Lyon, France	02.06. – 05.06.2026	www.f-i-p.com
Equiplast	Barcelona, Spain	02.06. – 05.06.2026	www.equiplast.com
Plast	Milan, Italy	09.06. – 12.06.2026	www.plastonline.org
Plastics Recycling Show Asia	Singapore	17.06. – 18.06.2026	www.prseventasia.com
Expo Plast Peru	Lima, Peru	19.08. – 21.08.2026	www.expoplastperu.com
ColombiaPlast	Bogota, Colombia	21.09. – 25.09.2026	www.colombiaplast.org
Compounding World Expo	Frankfurt, Germany	23.09. – 24.09.2026	eu.compoundingworldexpo.com
Fakuma	Friedrichshafen, Germany	12.10. – 16.10.2026	www.fakuma-messe.de
IPF Japan 2026	Chiba, Japan	01.12. – 05.12.2026	www.ipfjapan.jp

“Realising all potential to increase efficiency”

How the global chocolate mould market leader agathon is optimising its new location

A few months ago, agathon GmbH moved from Bottrop to Essen – from a factory that had grown over decades to an industrial building on a greenfield site that had been planned on the drawing board. Engineering, toolmaking, injection moulding production, logistics and administration of the world’s largest manufacturer of moulds for industrial chocolate processing are now united under one roof. “We were happy to invest here in Germany,” says President and CEO Volker Krämer, “but we are forced to utilise all potential to increase efficiency.” A look at the reorganisation of production – with injection moulding, automation, material supply, logistics and optimised processes.

Text: Dipl.-Ing. Markus Lüling, Editor-in-Chief K-PROFI



Photo: K-PROFI

Due to the company’s rapid growth, the main plant in Bottrop reached its limits in the early 2020s. A newly reclaimed industrial site in Essen-Karnap, just four kilometres from the Bottrop site, offered itself as a new home on a greenfield site, so to speak. In a construction period of just under two years between the end of 2022 and the end of 2024, a three-aisle industrial building with an administrative wing in front was built here. From every office room in the three-storey administration building, glass fronts provide a view of the production area, which is divided into logistics, toolmaking and injection moulding production.

The plant is optimised along the material flow. One bay is reserved for warehouse logistics and pre-commissioning, a second for toolmaking and mould finishing and the third for injection moulding production. Following a smooth relocation from Bottrop to Essen, the core machines in the completely transparent production facility now include numerous milling centres and six large injection moulding machines. Another new milling machine and a large injection moulding machine will follow before the machine park is complete. “We won’t be making any major expansions in injection moulding,” explains Volker Krämer. Instead, he is focusing on utilising existing capacities by increasing efficiency: “The resources we have should be idle as little as possible and actually have to run 24/7.”

Chocolate moulds by injection moulding

Since its foundation in 1949, agathon has specialised in the production of chocolate moulds. In 1970, agathon made its first attempts to convert chocolate moulds from metal to plastic, and in 1978 it switched completely to plastic, specifically polycarbonate. Today, more than 160 employees work around the clock to develop and produce up to 700,000 moulds a year, weighing up to 9 kg and measuring up to 1,700 mm in length.

agathon CEO Volker Krämer (left) and Operations Manager Bernd Wilming continue to optimise the efficiency of chocolate mould production – with design, toolmaking, injection moulding, automation, material supply, logistics and digitalised processes.

Chocolate moulds are exposed to extreme mechanical and thermal stresses during operation, regardless of whether they are chocolates, bars or hollow figures. In continuous operation in the confectionery industry, many of the same moulds are often used in parallel and are regularly replaced. To ensure that the moulds are compatible with the chocolate moulding machines, agathon adapts them to the respective standards of the machine manufacturers.

“We have 2,600 customers, including all the major billion-dollar companies in the confectionery industry. In contrast, almost all manufacturers of confectionery machines and almost all manufacturers of chocolate moulds are European family businesses,” reports Volker Krämer from the market environment, “and agathon is now the world’s largest supplier of chocolate moulds.”

Diverse stresses in series production

“If our customers handle the moulds professionally, a chocolate mould will last for many years,” explains Bernd Wilming, referring to the confectionery machines that put them through a variety of stresses in circulation: “Transporting with propulsion by chains or carriers, turning, rotating, preheating with occasional overheating in the heating sections, pouring in the warm chocolate with a wide variety of ingredients, stamping, vertical or horizontal vibrating sections to degas the chocolate, cooling at sub-zero temperatures, demoulding by twisting or knocks on the back of the mould as well as impact from surface soiling and washing – all this

every second and in multi-shift operation is pure stress for the chocolate mould. Polycarbonate moulds have withstood all these stresses well without losing the important gloss level for chocolate products.”

Compact storage capacity under one roof

With the new building, agathon has combined its warehouses for moulds, operating materials and small parts in one location, consolidating them and significantly shortening the distances for logistics personnel. “The warehouse for semi-automated order picking was also a huge investment,” says Volker Krämer, looking back. Each of the eight storage towers for tools and add-on parts is 9.50 metres high, reaches up to the hall ceiling and is equipped with storage lifts from SSI Schaefer. Each tower holds 105 trays, each with a load capacity of 520 kg. “The 1.20 m x 4 m trays are actually designed for small parts, but they are just right for our tools.” The storage lift delivers the required tray to the operator opening. There, the tool components can be transferred directly to cranes using a handling tool.

Minimised logistics effort and cycle production

Speaking of cranes: the two open bays with crane runways are each equipped with two 12.5-tonne crane bridges, which – in addition to a few lifting trolleys – handle the entire internal logistics for individual components and complete tools. “We no longer have any forklift trucks in the factory, no more gas in the hall, we don’t get dirty or



Bernd Wilming shows one of agathon’s largest chocolate moulds with a length of 1.70 m.

wet, we do everything by pick-and-place of the required equipment via our crane runways,” explains Bernd Wilming. In future, the goods will arrive at the workers on the floor in a synchronised manner – and should always be passed on in an orderly fashion. “We didn’t want to have any more long routes or large open spaces, because otherwise they would fill up by themselves,” smiles Wilming.

Floor-to-ceiling glass fronts provide a view of agathon’s newly built production facility in Essen from all offices in the three-storey administrative wing in front of the building.



One partially enclosed hall bay (far right) is reserved for storage capacity and assembly, one each for toolmaking (right) and injection moulding (left).





Six brand-new silos from Siloanlagen Achberg, each with a capacity of 78 m³, supply the dryers installed by Labotek with polycarbonate via the shortest route.



The central material supply with twelve drying hoppers is installed on a concrete platform and is supplied via the outdoor silos or via big bag emptying stations under the platform.



View behind the drying hoppers: Two water-cooled air compressors (in blue at the front) transfer the heat a few metres further to the water heat exchangers of the dry air generators (at the back).

Efficient centralised material management

The low hall height at the Bottrop plant restricted automation, and intersecting material flows resulted in excessive logistics costs. Materials were supplied in batches with decentralised drying in individual units in the shadow of each injection moulding machine. Today, material management at agathon has been completely reorganised: The majority of the annual throughput of around 1,200 tonnes comes into the production hall via six external silos from Achberg, each with a capacity of 78 cubic metres.

Labotek Germany was selected as the system supplier for material management. Labotek has been developing and producing a wide range of peripheral technology for energy-efficient material management in the plastics industry for decades. The company specialises in systems for storing, conveying, drying, mixing and dosing free-flowing plastic granulate and powdered material, including central drying

and conveying technology as well as comprehensive control systems. Labotek installed the central material supply with twelve stainless steel drying hoppers on a concrete platform at the front of the new hall. These are supplied either via the external silos or via big bag emptying stations under the platform.

With the help of two neighbouring coupling stations, the granulate can be conveyed flexibly from each silo to each dryer and from there to each machine. The fill level in the active containers is regulated by the throughput of the machine being operated, which ensures that

Eight 9.50 m high storage towers store over 800 trays with up to 400 tonnes of tools and attachments with the help of automated storage lifts.



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Dosing units from Movacolor gravimetrically add several masterbatch components to the polycarbonate on the injection moulding machine.

the material always remains at the same level between drying and plasticising. All pipe bends in the pneumatic conveying lines are designed with large radii. This ensures that the polycarbonate is transported particularly gently, minimising the number of particles that detach from the granulate. Dust separators are also installed on the injection moulding machines to prevent black specks caused by burnt dust in the chocolate moulds.

Precision through gravimetric dosing

The shot weights for the chocolate moulds are usually between 3 and 6.5 kg. Depending on customer requirements, they are coloured in different shades. For dosing the masterbatches, agathon opted for the gravimetric MDS-Balance dosing systems from Movacolor. Movacolor ensured the high dosing time of 120 s by extending the programming. Bernd Wilming: "The centralised material supply got off to a very good start – from the manual operation with mixing and filling to the central system with central control." The switch to gravimetric dosing has now demonstrably increased the precision of the colour settings and saved on expensive masterbatch. "With several chambers for additives, agathon can even reproduce rarely required colour settings from two known masterbatches with repeat accuracy," explains Axel Brandenburg, owner of the industrial representation agency ABraWi, who has been supporting agathon in material supply issues for more than 20 years.



Heat recovery for drying and heating

Two water-cooled compressed air compressors operate behind the drying hoppers. This heats the cooling water up to 70 °C. The heated water is fed a few metres further into two highly efficient EHR air/water heat exchangers of the two Labotek drying systems, where it transfers its heat energy to the process air. This minimises the energy costs of drying the material. The fact that two compressors and two drying systems are installed is due to the high capacity and serves the purpose of redundancy. The water releases its residual heat into the outside environment via free coolers in summer and into the hall heating system in winter, which is also fed from the cooling of the injection

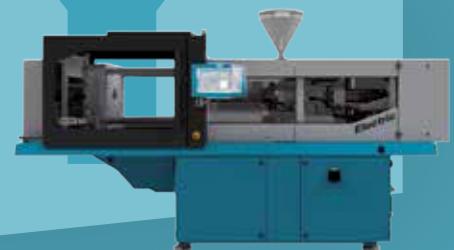
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moulding machines. This has significantly reduced the electrical energy required for material pre-drying. Volker Krämer is proud: “We heat the entire building using the waste heat from the machines and systems.”

Self-sufficiency through photovoltaics and energy saving

agathon has installed a 524 kWp photovoltaic system on the roof of its new building. “Our average energy consumption is 250 to 350 kW,” reports Bernd Wilming, noting on the sunny day of K-PROFI’s visit: “Now, at lunchtime, we are completely self-sufficient when the sun is shining.” Volker Krämer criticises: “Energy costs in Germany are too high overall. That’s why we’re making huge investments to generate our own electricity and reduce our consumption at the same time. But in the end, these investments must also pay off.”

Preheating for minimum set-up times

To improve capacity utilisation, agathon is also focusing on reducing set-up times for the large machines. The Essen-based company already uses a self-developed mould system with fixed frames and interchangeable inserts for the various types of chocolate moulds, so that in most cases only the moulding inserts with a low mould height need to be changed. In future, each injection moulding machine will have an external

preheating station from which the mould inserts, which are encased in insulating sleeves, are transferred to the machine and quickly put into operation. In the near future, the chocolate moulds will be optically inspected directly at the machine after automatic removal, weighed, processed in cycles, provided with laser codes, stacked on a pallet system and forwarded to final assembly. “Orders are then processed from A to Z away from the machines,” says Volker Krämer, looking to the future.

Operating safety thanks to standardised controls

“In the old factory, the hall height was not sufficient to install removal robots on every machine,” says Bernd Wilming, looking back. agathon is now making up for this by installing standardised vertical robot technology of the same brand on three large Krauss Maffei machines. Standardised control systems for the injection moulding machines, the robot technology and the machining centres in toolmaking – this is crucial for flexibility in production and for personnel, emphasises Bernd Wilming.

Switch from polycarbonate to copolyester

The decision in favour of a central material supply coincided with the discussion about changing the main component from polycarbonate to copolyester. During the quotation

phase, the new requirement arose to dry not only PC but also copolyester. “As a result, we redimensioned the system – because of the longer drying time for copolyesters to larger containers and larger air volumes,” explains Lukas Pawelczyk, Managing Director of Labotek Germany.

“The EU has banned the presence of bisphenol A in food contact materials,” explains Bernd Wilming, which is why chocolate moulds may no longer be made from polycarbonate after a transitional period expires at the beginning of 2028. Due to the diverse requirements described above, polycarbonate cannot be easily replaced in moulds for the food industry. Manufacturers and users of chocolate moulds have identified copolyester as the most promising alternative at present.

Volker Krämer and Bernd Wilming are not happy with the ban: “There are many producers of polycarbonate all over the world, but the situation is completely different with copolyesters,” Volker Krämer doubts the supply security: “There are far fewer suppliers on the market, and none from Europe, only from Asia or North America.” According to Bernd Wilming, far fewer suitable types of copolyesters are available than for polycarbonate. With a global market volume of “perhaps 5,000 tonnes” for chocolate moulds, extensive development work is still required on the one hand, and on the other hand, compromises in the property profiles of the moulds

The dry air generators from Labotek are equipped with EHR heat recovery (top left) and an additive trap (top right). The coupling stations convey the granulate from each silo to each dryer (left) and from each dryer to each machine (right).



In the pneumatic conveying lines, pipe bends with large radii ensure that the polycarbonate is transported gently so that as few particles as possible can detach from the granulate and cause black specks in the chocolate moulds due to burnt dust.



may be unavoidable. “Chocolate moulds have high requirements, and with polycarbonate we were able to assess them. Now the requirements are different,” feels Bernd Wilming, “we are currently carrying out intensive pioneering work. Getting copolyesters into the value chain is a major challenge for everyone involved and requires mould manufacturers to work together with material experts, manufacturers of confectionery machines and chocolate OEMs.”

More simulations and structural analyses

In addition to mould flow analyses and simulations of mechanical influences on production, the dimensional accuracy and flatness of the large moulds in particular require structural analyses of the components as well as fatigue strength tests in the field at agathon. From design and injection moulding to the application properties of copolyesters, there is still a lot to be developed and tested that the team in Essen has been familiar with in five decades of working with polycarbonate. Bernd Wilming: “Close to the fastenings on the frames and end pieces, there are sometimes areas with a wall thickness of 8 to 9 mm.” This is countered by the fact that 1.70 m long moulds with a wall thickness of more than a few millimetres cannot be filled conventionally. In addition, there are further challenges in processing: long dwell times in the cylinder of up to six minutes, shrinkage on the mould surfaces and a change in mechanics due to the lower hardness of the copolyester: “The systems today are set up for hard mechanics,” explains Bernd Wilming. Many customers are thus achieving their usual cycle times – materials other than polycarbonate do not currently offer the same performance.

Strengthening the unique selling points

“In the market, we tend to specialise in large and complicated chocolate moulds,” Bernd Wilming goes into detail, “even large standard plastic moulds measuring 1.40 m or 1.70 m in length may only have deviations of a few tenths of a millimetre.” Volker Krämer explains: “We want to develop further unique features so as not to be price-driven.” A central element of this is so-called intelligent moulds, equipped with sensors and data storage. “Our data logger weighs just 36 grams, has a WiFi connection and contains sensors for acceleration, temperatures, strain and much more. It can be accessed from anywhere and provides information about the operating conditions and therefore potential problems at any time.”

Digital transformation of production

All machines and peripheral devices such as temperature control systems and material management are equipped with OPC UA interfaces at agathon in order to implement the digital transformation in injection moulding production. In the long term, the process data from systems and devices will be used to increase production quality using AI, enable data-based decisions – and, in line with Volker Krämer’s vision, tap into all potential for increasing efficiency. 

www.agathon-moulds.com



Photo: K-PROFI

The chocolate moulds are produced on injection moulding machines with up to 16,000 kN. In future, they will be inspected after automatic removal, weighed and sent to final assembly in a timed process.

Philipp and Axel Brandenburg (ABraWi), Volker Krämer and Bernd Wilming (agathon) with Jasmin Girrbaich and Lukas Pawelczyk (Labotek) celebrate the positive conclusion of the “Central material supply” project (from left).



Photo: K-PROFI



Photo: Exelliq

An impressive picture: 28 extrusion lines working around the clock, side by side.

“We wanted the best of the best”

How Cortizo advanced from an aluminium window manufacturer to a global manufacturer of aluminium and PVC profiles

Since 1972, Cortizo, headquartered in Padrón, Spain, has developed from a small craftsman's business for windows and doors into a system provider for aluminium and PVC door and window profiles. With currently 28 and soon 45 extrusion lines, the family-run company produces PVC hollow chamber profiles in a highly automated process at its headquarters. From the production of the dryblend to extrusion, stacking and film lamination, production is geared towards efficiency. Impressions from a visit to Galicia.

Text: Dipl.-Ing. Gabriele Rzepka, Editor K-PROFI



Photo: Cortizo

Marcos Pérez Villaba, responsible for the PVC division at Cortizo, is already looking to the future: “We want to expand our production to 46 extrusion lines, to a production capacity of 100,000 tonnes of PVC per year.”

As you enter the PVC extrusion plant at Cortizo in Padrón, the colour red dominates. No wonder, as almost all of the extrusion lines come from Exelliq Austria in Nußbach/Austria. The main extruders and coextruders come from Battenfeld-Cincinnati, Vienna/Austria, while Exelliq supplied the 40 single-screw extruders for applying seals to the profiles. Marcos Pérez, Head of the PVC Division, explains frankly why the Galicia-based company opted for this partnership: “Nobody can fool us in the extrusion of aluminium profiles. We are one of the market leaders in this field. When we thought about entering the PVC profile extrusion market in 2013, we knew that we couldn’t afford to make a mistake if we wanted to compete with the established market players. We therefore wanted the best of the best in terms of equipment in order to be able to manufacture high-quality products. For the construction of our first PVC production plant, we carried out a comprehensive study at European level, focusing on Austria and Germany. During the analysis, we found a significant reliance on manual labour in many of the factories we visited. This was not an option for us and was the decisive factor in our decision to use state-of-the-art technologies to optimise our processes.”

The company installed the first two machines in its halls in 2014 and began producing window systems in 2015. Today, 28 extrusion lines process around 50,000 tonnes of PVC per year around the clock. The last seven lines were not installed until 2024, with five parallel and two conical counter-rotating twin-screw extruders, all from Battenfeld-Cincinnati. Marcos Pérez is already

looking to the future: “We want to expand our production to 45 extrusion lines, with a production capacity of 100,000 tonnes of PVC per year. We always try to operate at around 70 per cent capacity so that we have reserves available. If an order comes in at short notice, we can also serve this customer without any problems and always meet our promised delivery times of three weeks. That’s important to us.”

Sophisticated workflow

In addition to the Exelliq extrusion lines that fill the production hall side by side, there is another aspect that stands out: The operation is spotlessly clean and state of the art. The entire production process is automated, including the stacking of the finished profiles. This starts with the production of the dryblends. The PVC raw material is supplied as silo goods, as are titanium dioxide (TiO_2) and calcium carbonate (CaCO_3). Other additives are available in big bags. The mixing area is arranged vertically and is based on two basic formulations: one white with TiO_2 , one non-white without TiO_2 . The silo goods are fed from above into one of the five heating/cooling mixers from a German manufacturer. Recipe management is completely digitalised and centrally controlled. Further additives such as stabilisers or impact modifiers are added in appropriate quantities as required.

Once the dry blend has been mixed, the mixture is transported to the extruders via intermediate silos. The majority of the tools at Cortizo come from Exelliq. Dies are changed on the lines several times a week. These have to be as quick as possible. For this purpose,

Cortizo relies on the “Profile.Starter” start-up system from Exelliq. Marcos Pérez explains: “This simple device is a real benefit. We are twice as fast with the first good part. This means we have fewer rejects and can get back into production more quickly.”

Hollow chamber profiles can be shaped and vacuumed within three metres using the “Profile.starter”. During the start-up process, the operator clamps a start-up gripper (“Profile.Grip”) to the profile coming out of the nozzle. This is connected to a cable that has previously been guided through the entire wet calibration process and the haul-off. The “Profile.Starter” pulls the profile through the wet calibration with a force of 14 kN. The tanks are closed right from the start, allowing efficient evacuation to take place from the very beginning. Werner Huber, CSO at Exelliq, explains: “The start-up time is halved, and waste is reduced by up to 80 per cent. It’s a simple solution with a big impact.”

Cortizo is also very satisfied with the start-up aid and has three of the devices in use. As they are mobile, the operators simply push them to the relevant extrusion line for the start-up process. Cortizo’s start-up bars and rejects are sent to its own PVC recycling plant in Guadalajara in central Spain, where the company processes offcuts from window manufacturers as well as old windows.

The mixing area is arranged vertically and is based on two basic recipes: one white with TiO_2 , one non-white, without TiO_2 .

The recipe management of the dryblends is completely digitalised and centrally controlled.



Photo: Cortizo



Photo: Cortizo



Photo: Exelliq

Automation via the “iQ.Stack”. It works wonderfully, as Wolfgang Degwerth can see for himself.

“We are focussing on automation”

In 2024, Cortizo not only ordered seven extruders with the corresponding extrusion lines from Exelliq, but also five “iQ.Stack” stacking systems – also from Exelliq. The stacking systems are integrated into the existing extrusion lines. After the calibration section, the profiles enter the caterpillar haul-off and are usually cut to length of 6.50 metres at the end of the line. The pusher moves the cut profile onto the table of the stacker. The stacker recognises from the stored program which type of profile with which dimensions and geometries is involved and knows according to which packing pattern the profiles should be placed in the cassette.

How this works was clearly illustrated during the on-site visit. To achieve the ideal packing density, the stacker rotated every second cut profile by 180°. A toothed ring grips the profile and fixes it in place. A half-shell is integrated at the end of the table, which lifts slightly when the sprocket turns. This facilitates the 180° rotation. The profiles are moved from the table to a storage device consisting of several foldable angle supports by means of a pusher – always rotated alternately. When the layer is full, five contacts move over it. Two clamping jaws at the front and rear hold the layer in position, the angle supports fold against the system and the

clamping jaws lower the layer into the cassette. As soon as the contact positioned in the centre of the layer notices that the sagging profiles in the middle are touching the bottom of the cassette, the clamping jaws retract and the layer slides into the cassette.

At the line where Marcos Pérez explains the stacker, the cassette holds a total of 80 profiles. After around 1.5 hours of production time, the cassette is full. An operator uncouples the cassette from the stacking device and moves the unit, which is mounted on a rail system, forwards. After folding the protective film in the cassette over the top layer, he takes it to the warehouse, deposits the contents there and returns with an empty cassette. He docks this back onto the “iQ.Stack”.

Marcos Pérez makes it clear: “We rely on automation as the key to optimised production. Many competitors on the market do a lot of things manually. That is not a solution for us.” Exelliq has customised the five new “iQ.Stack” to Cortizo’s needs. “We have incorporated Cortizo’s experience from the existing stacking systems into the design of our systems. We looked at where the profiles could get stuck in the stacking system and saw where things were not running smoothly. Together with Cortizo, we continued to optimise our stacking system until it was just right. It was a very successful collaboration,”



Photo: Cortizo

The “iQ.Stack” rotates every second cut profile by 180°, to achieve the optimum packing density.

recalls Wolfgang Degwerth, CEO at Exelliq, and Werner Huber. One point was important to Cortizo for the new system: the operator should be able to approach the stacked profiles freely and safely in order to remove individual profiles as required. For this reason, they should be easy for the employee to reach and handle. Marcos Pérez is very satisfied with the result: “We received a system that exactly met our needs. The delivery time was short, and the price was very fair. We can also rely on Exelliq for support. That’s important, because if there’s ever a problem, we have to solve it quickly.”

Profile lamination for coloured decors

Cortizo’s PVC division offers window and door profiles in around 250 different designs. The company trains and advises window manufacturers on which profile geometry makes sense for which purpose. This depends on the size and weight of the finished windows or doors, type of glazing, opening and closing mechanism, thermal insulation, design and much more.

The lion’s share of profiles is white, but the demand for other looks is not insignificant from region to region. White profiles are given their colour and protection against yellowing due to UV radiation by TiO₂ Colouring and protection for other decors is provided by film lamination. At least 42 film types are

available, and nine laminating systems apply the films to the profiles. Marcos Pérez explains: "With the new laminating systems, the pressure rollers can be changed within 10 minutes, whereas with the three older models it takes two hours." All parameters are stored in the system for each profile geometry that runs on the new laminating systems. When the profile is changed, the rollers can be adjusted in a flash.

The systems are currently still loaded manually. The operator places the profile in the machine, then the primer is applied and dried. The profile then passes through the heating section, followed by the film application. The numerous rollers generate the contact pressure that finally adheres the film to the profile.

Cortizo buys the films in widths of 660 mm and cuts them into the required profile widths on two machines. Marcos Pérez reiterates: "We deliver every profile in every colour and quantity to our customers within three weeks. We have 42 decors in our standard range, but we can access a further 200 colours if the customer wishes."

The laminating systems are still located separately in their own hall. This will change as part of the planned expansion. In the future, a gangway above the roofs of the existing buildings will link the existing extrusion with the 18 new systems, which will be located in a separate hall. The laminating lines will also be transferred to a separate hall at the new production site. The new laminating line will have automated systems for feeding and removing profiles. In addition, an automated warehouse will be created for the management of commissioned orders for finished products. This is important for



Nine laminating systems apply the films to the profiles.



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The windows undergo numerous tests. This involves mechanical parameters such as bending modulus, breakage test and impact resistance.

Cortizo as the company does not impose minimum order quantities on its customers - the minimum order quantity is just one profile, regardless of the finish. "Our main laminated products are produced with inline lamination directly on the extrusion lines. We currently have four lines, but we will add more in the next expansions," says Marcos Pérez, looking to the future.

From earthquake to hurricane tests

Cortizo is a system provider for window and door profiles. In order to be able to supply customers with high-quality products, the company has set up a modern test centre on its new technology campus. There, employees install the windows, balcony doors or façades together with the locking systems. Laboratory manager Manuel Santiago ago then puts the finished products through their paces.

During the leak tests, the experts place the windows in the test station and subject them to pressure, which is increased in 50 Pa increments. At the same time, the window is sprinkled. Manuel Santiago explains: "We continue to increase the pressure until a defect occurs. This is how we determine the standard of the tested profile." The window is then exposed to "gusts of wind", a pressure of 3,000 to 7,000 Pa.

In another chamber, the laboratory team tests the sound insulation of the windows. To do this, the window is installed between two rooms. Noise of 80, 90 and 100 dB is generated on one side. On the other side, highly sensitive microphones measure the incoming sound. Numerous installations direct the sound waves in accordance with country-specific and EU standards. There is always a temperature of around 20 °C in the chamber, as the sound absorption of the windows is temperature-dependent.

Of Cortizo's 3,500 employees, 280 now work in the PVC division. The PVC production in Padrón can be easily identified by the silos in the background and the gangway above the roofs.



Photo: Cortizo

A few steps further on, the focus is on the mechanical parameters: bending modulus, breakage tests, impact resistance. The testers also scrutinise the closing mechanism. The robot patiently opens and closes one window after another, day after day. In the climate chamber, the company tests the heat transfer and material behaviour at extreme temperatures between -25°C and $+60^{\circ}\text{C}$.

The testing of aluminium profiles for glass façades is spectacular. Cortizo has erected a façade measuring 8 x 10 metres and is testing it for air, water and wind resistance. Earthquakes and hurricanes are also simulated here with the help of huge fans and lances that are fired at the façades.

Entering the world of PVC together with customers

“When we started with PVC extrusion, we didn’t bring in any expertise from outside. We built it all up with our own people,” Marcos Pérez recalls proudly. The production process for PVC profiles is completely different from that for aluminium profiles. Cortizo became big and well-known with aluminium profiles. The company processes 150,000 tonnes of aluminium per year. Dry and wet calibration is not required for aluminium, and the process temperature of 400°C is far higher than that of PVC. In short, Marcos Pérez makes it clear: “We have not been able to tap into processing expertise from decades of experience with aluminium profiles.” What the profile specialist did benefit from,

however, was its large customer network. Together with their customers, the Spaniards have taken the steps into the world of PVC profiles, as the demand from the market for PVC systems has grown steadily. Cortizo has supported its customers with processing machines, training and design software. “Our existing customers have worked with us to expand their market to include PVC, and we have supported them in the process. Window manufacturers needed different processing machines for PVC, for example. We bought these in large quantities, achieved a good price and then passed the machines on to our customers at cost price,” Marcos Pérez looks back.

On the road to success for over 50 years

It is hard to believe that the company, which today has 3,800 employees and now employs 280 people in the PVC division, was founded in 1972 by José Manuel Cortizo Sónora as a small workshop for windows and doors with five employees. Two years later, between 1974 and 1976, Cortizo found a market niche for his products in Salamanca and began to establish himself as a manufacturer of aluminium windows and doors. At this time, most window and door manufacturers were still working with iron. As demand increases, so does the number of competitors, which is why Cortizo reorganises its activities within the industry. In 1978, the company became a distributor of aluminium profiles. Over the course of the 1980s, Cortizo integrated

more and more parts of the production process for profiles. In 1981, the first anodising plant went into operation, enabling the purchase of raw profiles. Just three years later, in 1984, the painting plant was opened in Padrón.

Beyond distribution, anodising and painting, the Galicians expanded the production process further and commissioned the first aluminium extrusion line in 1986. Since then, the production of profiles, including aluminium casting, has been carried out entirely in-house. The last years of the 20th century and the first years of the 21st century were a time of national and international expansion for Cortizo. Today, the company has nine production sites, 31 branches and is represented in 87 countries.

The five employees have grown to around 3,800, and the company’s turnover in 2023 was around EUR 700 million, of which EUR 91 million came from the PVC division alone. While the aluminium profiles are used worldwide, the main market for PVC profiles is predominantly in Spain and Portugal. Exports are also made to France, Belgium, Italy, Romania and the Balkans; North Africa is soon to follow. According to Marcos Pérez, the signs are pointing to growth for PVC. “We are planning to open a second production site for PVC profiles. This will be located in the heart of Europe,” he reveals. ■

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Ideal for machine presentations

The “ICE” industry get-together for converting in Munich was a success

Taking a machine with you to a customer? That’s hardly possible in the boot of a car! “A trade fair is still the easiest way to present machines and show them to as many customers and interested parties as possible. There is no substitute for it,” says Patrick Herman, Event Director of this year’s ICE, explaining why the well-known converting trade fair was not only successful again, but also attracted more international exhibitors. This year also saw a record number of 3,800 votes for the awards organised by British trade fair organiser RX in collaboration with C2 Coating & Converting. Prizes were awarded in the categories “New Technology”, “Workflow Connectivity and Automation” and “Sustainability” – a topic that was much more prominent at this year’s trade fair.

Text: Dipl.-Ing. (FH) Karin Regel, Editor K-PROFI



Event Director Patrick Herman was very pleased with the international participation at this year’s ICE, which recently took place again in Munich.

For Patrick Herman, sustainability begins with trade fair construction and stand design, where he has observed a number of changes. “As organisers, we have completely dispensed with carpets in the hall aisles, just as we did in 2023.” Recyclable plastic flooring and textile tensioning materials were used on the stands instead of chipboard.

Environmentally friendly because solvent-free

Tesa won the award in the “Sustainability” category for its paper-based design adhesive tapes for corrugated cardboard and cardboard packaging. “We were naturally delighted to receive the award,” emphasises Andreas Tanzer, Head of Sales & Marketing PPS Europe, Tesa. This once again underlines the importance of the issue and confirms the company’s strategy of growing with more sustainable products. “We have been working for several years on adhesive solutions for various applications that are produced without solvents,” emphasises Andreas Tanzer.

Automation against downtime

Tesa’s “debonding on demand” solutions are also sustainable. For example, they can be used for smartphones to release a connection for repair, thereby increasing the service life of smartphones or allowing the components to be reused beyond the product life cycle. For manufacturers of separator films for batteries in e-mobility applications, Tesa presented a machine solution for “flying splice”, the flying connection of two film ends in the winder. This allows larger film rolls to be produced, thereby avoiding changeover and downtimes as well as waste during further processing, e.g. during coating.

Jürgens Maschinenbau from Emsdetten also wants to avoid downtime and reduce the workload of its employees. The company offers various handling and packaging solutions, e.g. for use after a roll cutter. “Automation is a top priority for us,” explains Jens Albers, Head of Packaging Technology. Operating personnel only need to take action when consumables are required. This applies equally to film packaging machines, labellers and the feeding of empty pallets.

Tesa’s new flying splice system, presented here as a laboratory machine, enables larger film rolls and thus less downtime during further processing, e.g. during coating.





Fabian Sundermann (left), Director of R&D Winding, and Julian Zurbrüggen, Sales & International Group Manager at W&H, present assistance systems that make complex systems easier to operate.

Content is a top priority, which is why the premiere of the ICE conference, featuring several presentations on all days, was well received right from the start.



Retrofit instead of large-scale systems

Like many of the exhibitors surveyed, Jens Albers currently sees a somewhat weaker but thoroughly stable market in Europe, coupled with increased demand from the USA. With a rather cautious willingness to invest in large-scale systems, interest in retrofit solutions has grown significantly. This was confirmed by Axel Fengler, Area Sales Manager at Er-We-Pa in Erkrath, which belongs to the Davis Standard Group along with battenfeld-cincinnati, Exelliq, Simplas, Maillefer and Black Clawson. "Safety aspects often lead to retrofit solutions." In further conversation, Axel Fengler emphasises that in the packaging sector, there is increasing demand for extrusion lines for mono-material composites in order to meet the EU's sustainability requirements. The same is reported by film line manufacturer Windmöller & Hölscher, which is satisfied with the willingness of its international customers to invest. "Film lines with MD0 units are a good alternative for producing a monomaterial solution with a barrier layer," explains

Fabian Sundermann from the Extrusion Business Unit. His colleague Julian Zurbrüggen from the Sales Team adds: "In addition to our concepts for mono films and PCR processing, our customers also appreciate the Turbostart and Easy 2 Change assistance systems." These make it easy and safe to operate highly complex systems.

It's all about the surface

Derichs Walzenmanufaktur in Viersen has developed a smart solution for all plastic production lines that use rollers. Managing Director Maria Barthels explains: "Our new inline unit for automatic roller cleaning works with cold plasma. Klöckner Pentaplast in Ritterhude already has several of the systems in use and is very satisfied with them." Thanks to the systems, downtimes for cleaning the rollers can be eliminated and consistent film qualities can be achieved. "On request, we can visit the customer with a test unit and demonstrate the before and after effect."

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Managing directors Maria Barthels (left) and Stephanie Holzmann and their ten-strong team in the roller manufacturing facility provide customer-specific solutions and have developed an inline cleaning system.



Oliver Hissmann (left) and Vasco Gerace, Sales Manager at OCS, recommend comprehensive solutions for quality control from incoming goods to the finished film.

Film and surface quality are also a top priority at Excelitas Noblelight in Kleinostheim. "We offer LED spotlights for plastic film printing systems. These ensure that the plastic is not subjected to any physical, i.e. thermal, stress, but that the ink used is chemically cured," explains Key Account Manager Frank Mohr. This creates an ideal surface that is glossy or matt, depending on the desired look. Surfaces also play an

Entex Sales Manager Frank Asmuss reports that customers appreciate the long process units of the planetary roller extruders, which can combine many steps such as melting, cooling, discharging and dosing sensitive additives.



important role in the coating of furniture, where there is currently a slight shift away from PVC films towards TPO coatings, reports Frank Asmuss, Sales Manager at Entex Rust & Mitschke in Bochum. PVC films nevertheless retain their raison d'être, for example for flooring or roofing membranes, as they are easy to process and offer an excellent range of properties. Regardless of the material to be processed on an Entex planetary roller extruder, the machines have to perform many tasks. "Processing units are tending to become longer, as everything has to happen in one machine: melting, cooling, discharge, dosing of sensitive additives, and in some cases even the addition of high filler contents with two side dosing units on both sides of the processing unit." Ideally, everything in one.

Content is key

According to Patrick Herman from the trade fair company, content is more important than ever. "We launched the ICE conference, which attracted a lot of attention right from its premiere this year," he says happily. Sharing knowledge and discussing it is definitely one of the most important tasks of any trade fair. Each day, there were four to six presentations at various locations on the exhibition grounds. Discussions and knowledge sharing are, of course, essential reasons for visitors and exhibitors to attend the trade fair. Although not all exhibitors surveyed by K-PROFI were entirely satisfied with visitor numbers, which may well have been due to the strike situation in the transport sector,

they were very pleased with the quality of the discussions. Many confirmed that they visit ICE not only because it is the most important trade fair in the industry, but also because its informal atmosphere provides the ideal setting for good discussions and networking. Content is what counts.

In a figurative sense, content also counts in production, as OCS reports. "We offer comprehensive quality control solutions that enable our customers, such as film manufacturers, to monitor both incoming goods and the entire film production process," explains Vasco Gerace, Technical Sales Manager at OCS Optical Control Systems in Witten.

Quality is particularly important in recycle processing. More than 1,300 pellet scanners from OCS are already installed on the market, ensuring that defective granulate batches do not even enter the film production process. OCS is also seeing growing demand for intelligent automation systems that prevent machine downtime and simplify operation. One such solution is a specially developed workflow software that detects errors in film material, codes them with a laser marker and thus greatly simplifies detection and removal in the subsequent process. **K**

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Hazardous goods canisters made from recycled materials

Why a blow moulding manufacturer became a recycling specialist

It's clear: consumers return empty bottles to reverse vending machines and dispose of shampoo bottles in the recycling bin. But what happens to empty 10-litre AdBlue canisters? How does a cleaning company dispose of empty surfactant canisters, or a chemical company empty 220-litre drums or even 1,000-litre IBCs? K-PROFI got answers to these questions in a chat with Managing Director Jörg Strohmann and recycling expert Hauke Grabau at AST Kunststoffverarbeitung GmbH in Erndtebrück. AST isn't just a manufacturer of all kinds of hollow bodies with volumes from 5 ml to 1,000 l, but also builds its own machines and has been a processing specialist for small and large containers for a few years now. They explained in detail what processing options are available, what has happened here in recent years and what will happen in the future.

Text: Dipl.-Ing. (FH) Karin Regel, Editor K-PROFI

AST has grown significantly in recent years, both organically and inorganically. Today, the family-run company, now in its second and third generation, employs 700 people at 17 European locations worldwide. "Until 2005, we exclusively manufactured industrial packaging, and in 2006 we expanded our portfolio to include drums up to 220 litres," reports managing partner Jörg Strohmann. Since 2012, the 45-year-old company has been pushing ahead with inorganic growth and has acquired Sandermann Cleaning and Euro Moldings, both from the Netherlands,

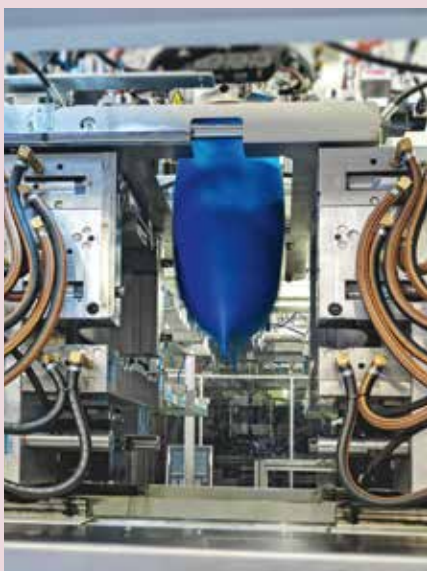
and Joh. Sieben from Germany. It has grown organically by establishing new production sites in the United Kingdom, Belgium, the Netherlands and Germany. "This has enabled us to steadily expand our portfolio and now offer the entire range of polyolefin hollow products."

The companies in the group process around 100,000 tonnes of HDPE per year. More than 50 blow moulding machines are available for this purpose in Erndtebrück alone. "We now build most of the blow moulding machines



All photos: AST

The site in Erndtebrück alone has around 50 blow moulding machines for the production of various canisters and drums, many of which are designed in-house.



Sorted by colour, the recycled hollow bodies are processed into reusable regranulates in the in-house compounding department.

Managing Director Jörg Strohmann is convinced that the process management and precise knowledge of the largely self-built machine technology are partly responsible for the success of his group of companies.



Erik Strohmann is the third generation to be active in the family business. He has already developed a solution for automatically inserting the rolled-up spout into the trough of the AdBlue canister, which previously had to be done manually.

and heads ourselves,” says the managing director proudly, presenting the latest bottle moulding machine in the machine hall, where up to twelve machines are manufactured each year, which is scheduled to start its first production run the next day. He is convinced that the company’s own experience and process engineering focus will enable it to maintain its competitive edge. He has clearly passed on his technical affinity to his son Erik, who has been working in the company for many years and has made further developments of his own. He found a solution for automatically inserting the rolled-up spout into the recess of the AdBlue canister, which previously had to be done manually.

Why just recycle?

The unique selling point of the AST Group is the “Cipacks” system introduced in 2020, a take-back system for used canisters and their reconditioning. “Over the past five years, we have built up an integrated recycling and packaging collection system,” explains Hauke Grabau, Senior Associate

Recycling and head of the innovative project. “With Cipacks, we enable our customers to recycle all kinds of hollow containers. This in turn enables our customers to offer their customers greater sustainability and a reduction in their CO₂ footprint,” says Hauke Grabau, explaining why the system was well received right from the start and why AST is already recycling many canisters today. In this case, recycling does not necessarily mean shredding, melting down and remanufacturing; recycling can also mean cleaning.

Defining circulation systems for canisters

But right from the start: After production and use, canisters or drums must first be collected and returned to AST. While it has long been a matter of course for drums and IBCs to be taken back and recycled, this is new for canisters. “We work with our customers to develop suitable recycling concepts,” says Hauke Grabau, describing the starting signal for a closed cycle. The solution can be that the customer collects empty containers in a pallet cage provided by AST, but it can also be that the customer’s customer collects them themselves and AST collects the used containers directly from there. AST not only has its own fleet of lorries for this, but also an app, which was presented for the first time at the PRSE trade fair in April: “We have developed our own app in which companies can register the quantity and collection requirements. We plan our lorries’ routes accordingly and inform the customer of the collection date.” Ideally, the customer can integrate the app into their own ERP system so that the exact number of available and used containers is always known and the ordering of new canisters or the order for collection is automated.

Washing as a sustainable alternative

Once the old containers have arrived at AST, the UN number is first checked in order to categorise the containers into hazardous and non-hazardous goods containers. This is followed by an odour test using a sniffer, colour sorting and a visual inspection of the condition. Canisters that were filled with acids are rinsed with a neutralisation solution. If they contained acids such as peracetic acid, the canisters have to be sorted out completely because they cannot be used for recycling hazardous goods packaging. “We don’t have to neutralise canisters or drums that were filled with alkaline media, as we use alkaline washing,” explains Hauke Grabau.

Speaking of washing. What is already standard practice for drums and IBCs is now also carried out by AST for canisters in good condition. Washing, drying and reuse. Hauke Grabau explains: “Depending on the transport route, cleaning canisters often has a better carbon footprint than recycling them by melting them.” Ultimately, both the carbon footprint and the price play a major role in determining a take-back cycle with the customer. In the case of an IBC, contract cleaning is worthwhile, accounting for only around a quarter of the cost of buying a new canister; for canisters, it is not quite as clear. The price of producing a new canister from recycled material is even slightly higher than a comparable canister made from virgin material – if the customer nevertheless decides in favour of reprocessing, it is for reasons of sustainability.

Granulate production as a company mainstay

All colour-sorted and used hollow bodies that are not washed are now sent to a Lindner shredder and a Getecha secondary shredder for plastic processing. On their way, they are also subjected to a Lindner hot wash, density separation and air separation. At the very end, the prepared flakes pass through an NIR colour sorter from Chinese supplier Meyer.

AST processes all canisters and drums that cannot be cleaned into regranulates itself and reuses them in new production.



“We opted for this sorter because it is currently the most modern on the market, already works with AI-supported separation and delivers very precise results,” explains Hauke Grabau.

Before the flakes are then processed into pellets in one of the extrusion systems, AST determines the density and MFI in its in-house laboratory. More precise material characterisation is carried out using Collin and Zwick Roell systems, including notched impact strength and impact resistance after pelletising. AST operates a total of nine pelletising lines, including five classic single-screw extrusion lines with underwater pelletising (UWG) and four NGR lines with a shredder-extruder combination and also UWG. “As a group, we have a total extrusion capacity of 3.5 tonnes per hour,” says Jörg Strohmman, presenting the company’s mainstay of granulate production.

Sell or use yourself?

The pellets are either used in-house to produce new canisters or are offered to the co-operation partner LyondellBasell or the market. Depending on customer requirements, AST reuses the recyclates produced in-house in production: Bottles and canisters can consist of up to 100 % recyclates. “We also use our granulates on our coextrusion blow moulding systems for the middle layer of containers,” continues Hauke Grabau.

In the production of granulates containing residual materials from hazardous goods containers, AST ensures a maximum proportion of 50 % and sells these to manufacturers of injection-moulded pallets, for example, which are then used for stacking and transporting canisters and drums. “We also take back films that have been used to stretch-wrap canisters, for example, and regranulate them in our NGR systems, which can also process high-volume waste.”

Preparation completed

At present, recyclates may not be used for the production of new hazardous goods canisters. While it was initially planned to regulate the recycling quota for hazardous goods canisters from this year, EU legislation has postponed this until next year. Hazardous goods canisters are exempt from the recycling regulation. “Of course, canisters for hazardous goods are subject to different requirements than those for non-critical media, but it is also possible to use recycled goods here,” Hauke Grabau is convinced. After all, AST had already prepared for the production of hazardous goods canisters with a recycled content of up to 35 % following the announcement of the regulation. “With our experience, our own material production and machinery and, last but not least, our extensive laboratory equipment, we are ideally prepared for the production of hazardous goods canisters from recycled material.”

www.ast-kanister.de



Recycling expert Hauke Grabau and his team have set up the take-back and recycling system for canisters at AST. Today, many hollow containers are already produced using the company’s own recycled materials.

Cleaning IBCs, drums and canisters is usually more cost-effective and has a lower CO₂ footprint than new production.



Everything to delight the extrudeur's heart

How the "TecDays" attracted 300 guests to Laatzen and provided many a wow effect

Single-screw or twin-screw, counter-rotating or co-rotating, conical or parallel, single unit or complete line, pipe or profile, virgin polymer or reclaim – KraussMaffei's state-of-the-art extrusion technology centre in Laatzen offers every possibility. There are already 22 extrusion lines in the 10,000 square metre, 18-metre-high hall – there is room for six more, and ten can run simultaneously. "We enable customers to scale up their own R&D activities to production scale or carry them out completely here in the Technology Centre. Of course, we also work here on our own innovations for tomorrow," explains Sales Director Ralf J. Dahl to K-PROFI during the exclusive tour. 300 customers took advantage of the three-day "TecDays" at the end of March and were amazed by the equipment and specialist lectures, live presentations and accompanying exhibition – the small trade fair for networking.

Text: Dipl.-Ing. (FH) Karin Regel, Editor K-PROFI



In the centre of the impressive technical centre, presentations were given on all days of the Tec Days, some by external and some by internal speakers.



Managing Director Ralf Benack is convinced that KraussMaffei is currently the extrusion system manufacturer with the widest range of machines.

"We change the pipe dimension on an extrusion line several times a week," reports Plant Manager Michael Göbels from the Belgian cable plant in Eupen during his presentation on one of the first days, which were entirely focussed on Pipe & Profile. The pipe manufacturer began converting its extrusion lines to the automatic pipe dimension change system "Quickswitch" a few years ago. Michael Göbels expresses his satisfaction with a comparison: "With a conventional line, a dimension change costs us four hours, two operators and 70 metres of pipe waste; with Quickswitch, it only takes half an hour, one operator and 26 metres of waste." Especially against the background of a lack of skilled

labour and cheap products from abroad, the company is thus securing its competitiveness. The machine manufacturer KraussMaffei has a long-standing partnership with the Eupen cable factory. 100 years – according to the historical book that was read out during the evening event on the first evening. The representatives of Kabelwerk Eupen received a thank you from KraussMaffei Managing Director Ralf Benack for 100 years of loyalty.

Ralf Benack was not only very satisfied with the large number of participants at the TecDays, but is also very positive about the future, which the industry is currently rather wary of. "No other extrusion company is as

broadly positioned as we are," he is convinced, "so we can compensate for weaker demand in one segment with better demand in another." For recycling applications, KraussMaffei is currently number one in the market for large-scale systems with more than 3 tonnes per hour, as "we offer solutions for PET recycling as well as for the mechanical, solvent-based and chemical recycling of polyolefins." Vice President Technology Dr Thomas Unger emphasised during the press conference: "We always find the right individual solution for the customer's task, as we can not only draw on a wide range of products but also support the pilot plant tests and recipe developments with our own analytical laboratory."

All photos: KraussMaffei

It is very important to both of them to push ahead with digitalisation. Ralf Benack explains: “Sustainability always includes the efficient operation of a plant.” To drive this forward, the machine manufacturer is investing in AI developments. “Exploiting the potential of a system further and further is what drives us, right through to unmanned machine operation.” Further development work is being invested in energy efficiency, calculating the CO₂ footprint and innovative machine components and processes.

Ivar Viira from Mineralplast OÜ in Tallinn, Estonia, presented a particularly interesting project in this context. “Whole mountains of fly ash, which are produced as waste in the petrochemical industry, are just waiting to be processed. In our development project, we use fly ash instead of calcium carbonate as a filler in polyolefins or PVC with proportions of up to 80 per cent.” This would reduce the CO₂ footprint by around 40 per cent when manufacturing a three-layer pipe with a middle layer of fly ash compound. Mineralplast has already carried out its first successful trials at the KM technical centre, with the first step being compound production and the second being pipe production. Thomas Unger comments: “By bundling the extrusion expertise under one roof, we can combine the processes quickly.”

KraussMaffei demonstrated how well the combination of process steps works on the other days of the TecDays, which were dedicated to recycling and compounding. During the live demonstration, visitors were able to experience the impressive influence that the addition of fillers or peroxides has on the rheological properties of the PP melt and how the colour of the compound produced can be measured and controlled.

Many technical centre lines are not laboratory systems, but small production systems, including the compounding line, which is equipped with a ZE 65 Blue Power twin-screw extruder and has an output of up

to 1,500 kg/h. “The highlight of this installation is that we do not filter the melt at the extruder outlet, but directly after the melting zone. For cleaning, we channel the entire melt out of the twin-screw extruder into a filtration unit and then back into the processing unit,” says Ralf J. Dahl, explaining the special feature of the process, which was patented back in 2004 and is being used again for the current processes. The advantage, especially when processing recyclates, is that impurities and contaminants are already removed before compounding. Fibres can also be added, as there is no need for a filter at the end of the line.

In his presentation, Nicolas Elwing from PureCycle, Antwerp/Belgium, emphasised KraussMaffei’s expertise in recycling and compounding as well as the benefits of the wide range of extruders. Several identical plants for recycling polypropylene are being built in Ironton OH/USA and at the other site in Antwerp. Each plant has an annual capacity of 60,000 tonnes and is operated with two ZE 166 Blue Power twin-screw extruders, three KE120, KE250 and KE400 single-screw extruders and a ZE 65 Blue Power additive masterbatch extruder. The twin-screw extruder serves as a melting extruder for the PP composite material before the melt is fed into the reactor, the centrepiece of each system. Here, impurities such as colour residues, foreign plastics and odours are removed until a pure melt, a kind of sludge made from PE and fillers, and the solvent remain. The single-screw extruder KE 400, which, like the melting extruder, has a large free volume and degasses the remaining solvent, now takes over the pure melt. Before pelletising, a smaller twin-screw extruder adds any necessary additives such as antioxidants or antistatic agents. The result is a high-purity PP pellet that, with a purity of over 99 %, is virtually indistinguishable from virgin polymer and can therefore be used for high-quality extrusion and injection moulding products. 

www.kraussmaffei.com

All extrusion capacities are now bundled at the Laatzen site, the production halls are directly adjacent to the technical centre and were visible during the guided tour.



During the live demonstrations, around 300 visitors to the Tec Days were able to see the pipe, profile and compounding systems for themselves.



Plastics put to the (gear) test

How the Franz Morat Group plans to drive future markets with its systems



The speeroX gear technology developed by the Franz Morat Group offers an alternative to, for example, classic worm gear or screw gear sets that is optimised in terms of installation space and efficiency. It has recently also become available as a metal-plastic pairing.

“We develop and produce gear wheels, gear components and complete drive systems for the individual requirements of our customers. This customer focus and individuality are very important to us,” emphasises Stefan Federer, Head of Marketing and Business Development. Since the beginning of 2024, the focus on specific industries and applications has also been reflected in the organisation. Until now, the Franz Morat Group, founded in 1912, had separated its two companies Framo Morat (machining of gears, gear and drive technology) and F. Morat (plastic injection moulding) purely on a technology

basis. With effect from 1 January 2024, F. Morat focused specifically on the automotive sector, while Framo Morat has since covered the entire business with all other industrial markets, regardless of the technology used.

Highly automated production of large quantities for automotive customers contrasts with the wide variety in the industrial sector. According to Holger Kuster, the

separation by markets enables the best possible adaptation of processes: “We can take a pragmatic, fast and flexible approach to industrial applications without compromising on quality. At the same time, the automotive sector benefits from the development and design expertise within the Franz Morat Group, as the complexity of components and actuators is increasing in this area. This is the right strategic path for us.”

All photos: K-PROFI

The community of Eisenbach in the Black Forest, with a population of 2,200, has the world's highest density of gear manufacturers and offers more jobs than it has residents. In "Gear Valley," the Franz Morat Group is the largest employer at its headquarters with 560 employees. The specialist for gear components and drive systems develops and manufactures 90 % of its components and systems from metal and plastic, individually designed for specific applications. "Anyone can build to print; this area is highly competitive," emphasises Head of Technology Holger Kuster. K-PROFI learned in Eisenbach how the Franz Morat Group is constantly expanding its knowledge of materials and applications through its own research in order to create decisive added value.

Text: Dipl.-Ing. (FH) Sabine Rahner, Editor K-PROFI

The application is at the forefront

The Franz Morat Group generates around a fifth of its business volume in the automotive industry. The rest is broadly diversified. This includes drive solutions for mechanical engineering, intralogistics, robotics and automation, renewable energy technology, façade construction, food technology, pump systems and agricultural technology. "We are not dependent on any customer or industry," says Stefan Federer. Diverse applications related to accessibility, rehabilitation and medical technology account for the largest share, at just under a quarter. Framo Morat has developed drives for curved stair lifts in private homes, for example, and is one of the global market leaders in this field.

Holger Kuster, who is responsible for product development, uses this success story to explain how Framo Morat designed a hybrid, customer-specific gearbox. "For stair lifts, the customer uses gearboxes with a total transmission ratio of approximately 1 to 200. The noise requirements are high. Our approach is a hybrid planetary gearbox. The first stage is made of plastic, which optimises the acoustics. The steel motor shaft with sun gear meshes with the plastic planets, which in turn mesh with the internally toothed plastic ring gear. If the torque becomes too high for plastic in the second stage, powder metallurgy-manufactured planets take over. Compared to machined planetary gears, they are more cost-effective. In the third stage, we switch to machined planetary gears made of a case-hardened high-performance metal material. Ultimately, this hybrid gearbox achieves 240 Newton metres and, overall, the most economical solution in terms of requirements."

Independent of customer projects: innovations driven by our own initiative

The Franz Morat Group is convinced that its combination of metal and plastics expertise and customer support, from the initial idea through development and design to production, enables it to offer a range of services that is unique in its complexity. In addition, the company focuses on the development of new drive and gear technologies independently of customer projects. This enables the specialists to respond quickly to changing market conditions. This could be

Holger Kuster, Head of Technology, is responsible for product development at Framo Morat. Here he is shown with four generations of a custom-developed drive for curved stair lifts.



the switch from combustion engines to electric drive technology, which means that the noise generated by auxiliary drives is becoming more important (see "Trend topic: Acoustics" on page 30). Or regulatory requirements may change. The EU Ecodesign Directive, for example, places a particular focus on resource efficiency in the design of energy-related products.

High-ratio gearboxes are typically implemented using multi-stage spur gear and planetary gear sets or, if an angular arrangement is required, using bevel, helical and worm gear sets. Depending on the requirements in terms of efficiency, service life, running noise or installation space, these variants may reach their limits. This background was the trigger for the development of an innovative, under-researched gear concept, which the Franz Morat Group markets as speeroX technology. It was born from the idea of meeting the above-mentioned application-specific requirements when conventional gear variants, such as multi-stage spur gear and planetary gear sets (consisting of many components), bevel gear sets (require at least one preliminary stage and are comparatively loud) or worm gear sets (lose power and service life due to friction) reach their limits, explains Holger Kuster.

Stefan Federer is Head of Marketing and Business Development at the Franz Morat Group: "speeroX is aimed at applications where efficiency is paramount or where small, delicate installation spaces are involved."





As Head of Technology, Benjamin Haberschosch is responsible for process development, among other things: "We operate three injection moulding facilities: our own automotive injection moulding facility and the industrial applications facility of Framo Morat here in Eisenbach, as well as our production site in Mexico."



Markus Winterhalder has been with the company for 19 years and, after working in toolmaking, assembly and work preparation, took over the role of Sales Team Leader in 2021. He shows a plastic gearwheel with an attached solenoid coil.

Innovative gear technology

A young technologist asked the crucial question: "What if we stick with a cylindrical worm, as in the established worm gear set, and move the gearing to the flat side of the wheel?" Although this gear kinematics was conceivable in theory, the appropriate gear geometry and manufacturing process for the ring gear had to be developed from scratch. In simple terms, a practical simulation tool was developed for generating and designing the gear geometry, which can also

be used to simulate the manufacturing process and its effects on the gearing. Framo Morat produced the first prototypes additively from PA12 using selective laser sintering in order to test the gear kinematics. The result: the speeroX gearing not only offered fewer restrictions in terms of freedom of installation but also delivered improved performance.

Once the machining process was up and running, Framo Morat initially tested and validated pure steel-steel pairings. "speeroX

saves installation space, ensures better power flow and enables high transmission ratios in just one stage," says team leader Markus Winterhalder from the sales department. Holger Kuster adds: "We were able to convince a large number of customers of the advantages and were involved in their development projects at an early stage. They realised that we can keep our promises. Various customer trials of speeroX for a wide range of applications, such as robotics systems, medical technology, dosing technology and automotive, are now in full swing or have even been completed. In addition, the first speeroX series orders have already been delivered."

Compact and high-torque – even in plastic

Based on its extensive experience with speeroX as a steel-steel wheel set, the company decided to transfer the concept to plastic-metal pairings (plastic wheel, metal worm). Holger Kuster comments: "We see extreme advantages there too." One advantage concerns manufacturability: "In contrast to a typical globoid worm gear, which would in principle allow performance improvements, we can demould the speeroX gear with a relatively simple two-plate tool because the contact angles point in the direction of demoulding." In application, the focus is on the significant space savings: since the worm is located on the flat side and thus closer to the centre of the wheel, the centre distance is already considerably reduced due to the design. In addition, the power density is increased by the higher tooth coverage. Compared to conventional worm gear sets or standard screw gear sets, more teeth mesh with each other, giving this gear design a high load-carrying capacity. "With speeroX, we can transmit higher power or achieve a longer gear life in the same installation space."

Stefan Federer sums it up: "speeroX addresses applications where installation space is a priority or where efficiency plays a decisive role. We are approached by customers with applications that require extremely compact gearboxes for transmitting high torques that were previously impossible to achieve."



The gear test bench was developed in-house to determine the characteristic values of various plastics required for gear design.



In the previous system, thin wire brackets were separated in the vibrating pot and often became entangled during the project start-up phase. By ramping up the project quantities, it was possible to switch to a coil feed with an integrated punching process.



Highly integrated production of cover caps: A robot picks up the wire brackets directly from the punching tool and places them in the four-cavity mould.



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The Franz Morat Group has set up its own additive manufacturing division for plastic 3D printing using various processes and currently has seven systems.

There are no standards or data for plastic gear teeth

Apart from a few standard products such as worm gear sets, slip-on worm gear motors and hub gear units for intralogistics, the Franz Morat Group's product and service portfolio is dominated by custom-developed components and drives. "In drive technology, we are particularly distinguished by our ability to closely support projects from design to series production. We develop with the aim of manufacturing; we do not act as a pure engineering service provider," says Holger Kuster. While standard products are often overengineered to enable a wide range of applications, detailed knowledge of the application in terms of environmental conditions and load requirements opens up a tailor-made and technically and economically optimised complete solution.

Plastics in particular open up a wide field for tailor-made solutions. However, there is one major difference to metals, as Holger Kuster explains: "There are standard material properties for the use of metallic gear materials. There is no comparable standard for

plastics. Some research topics are based on comparability with metal. However, it makes no sense to apply gear geometries designed for metal to plastics and then compare them."

In-house gear testing bench and additive manufacturing

As part of its technology roadmap, the Franz Morat Group therefore placed a strong focus on gear design and material characterisation for plastic applications. "The characteristic values provided by plastics suppliers are not suitable for gear design. Suitable data simply does not exist. In the past, therefore, large safety factors were used, and requirements were exceeded. We have now moved to researching the necessary values for the mechanical properties and wear of all plastics used ourselves," says Holger Kuster. To this end, students at the Eisenbach-based gear specialist developed their own gear test bench as part of various student research projects. Here, a wide variety of installation situations, centre distances, tolerances, etc. can be tested under air-conditioned conditions.

"Only with this material knowledge can we achieve the same level of precision in the plastics sector that has long been standard in metal gearing. Combined with our geometric expertise, we hold the key to optimal drive development," Kuster is convinced. "Which gear concept is suitable for the installation space and application? And with which material pairing? How is the macrogeometry defined and the microgeometry optimised in such a way that the contact pattern and

For acoustic optimisation, each tooth on the hollow wheel (right) was designed individually. The corresponding sprue is used entirely for the non-critical lower part (left), so that no new material is required.



The largest grinding mill on the largest injection moulding machine: Where possible, the sprue is reused and validated in sample parts with the appropriate proportions.



Trend topic: acoustics

Around 80 % of F. Morat's automotive components are used in the comfort sector and are therefore independent of the type of engine. However, the switch to electric motors means that the noise generated by auxiliary drives is becoming increasingly important, as it is no longer masked by the basic noise of the combustion engine. "Acoustics is a hot topic right now," emphasises Holger Kuster. Using their own acoustic test room, the specialists analyse the relationships between tooth engagement, housing structures and the resulting excitation frequencies, as well as possible overlaps. Markus Winterhalder cites the example of a hollow wheel used in automatic start-stop systems, where each tooth was designed individually: "With individual tooth correction in the μm range, we were able to achieve the best possible noise level for this drive."

acoustics are effective?" The technology experts at the Franz Morat Group take these aspects into account at an early stage of the development process. In order to gain important insights from practical tests with real samples at an early stage based on theory, the Franz Morat Group has set up its own additive manufacturing division for plastic 3D printing with various processes and currently seven systems – and the number is growing.

Cooperation with Igus for durable wear parts

On the one hand, there are FDM (fused deposition modelling) systems, which are particularly suitable for creating fixtures thanks to their layering technology. The two Polyjet systems from Stratasys offer greater precision: "Relatively complex and expensive, but the ultimate solution for some components." According to Holger Kuster, stereolithography (SLA, DLP) achieves the best results for gear components in terms of accuracy, detail and comparability with injection moulding results. The resolution is 35 µm. In addition, the variety of materials available for stereolithography is immense. An interesting development is that these results can now be achieved with equipment from the "more professional do-it-yourself sector." "We achieve outstanding quality with these systems. They are completely open to all materials and all parameters can be freely varied. This gives us the freedom we need for research and development."

The Franz Morat Group is working closely with Cologne-based motion plastics specialist Igus GmbH to further develop additive manufacturing materials specifically for long-life wear parts. The market does not offer any stereolithography-optimised materials for gear components. Igus has discovered a niche here and in 2022 offered the world's first 3D printing resin specifically for DLP 3D printing of wear parts. "As a technology partner, we are refining and optimising this material together with Igus, using our gear test bench." One goal is to compare different prototyping processes: How does the quality of a 3D-printed gear made from Igus material and one milled from plastic compare to the final injection-moulded series component? "In the best case, the additive process is identical or only slightly worse. This would allow us to enter the verification phase of a gear design at a very early stage, eliminate correction loops and accelerate development."

In order to be able to manufacture as autonomously as possible despite high quantities in the automotive sector, multi-level conveyor belts are used for box storage to increase autonomy times.



Holger Kuster sees the systematic investigation of plastics with regard to different recycled content on the gear test bench and the quantification of any changes as a task for the near future. The aim is to be able to use these findings in product design and take them into account in prototypes. It is already standard practice for new projects involving non-safety-critical components to inject and validate sample parts with regrind in the appropriate ratio of component to sprue weight. "Once the product has been approved in this way, we don't have to discuss whether regrind can be used. With 100 percent material utilization, we not only reduce waste, but also the price of the parts."

Developing products and processes in close collaboration

When it comes to implementing and industrialising projects from the development stage, Benjamin Haberbosch comes into play. As Head of Technology and Sales, he is responsible for plastics processing and tool and process technology for F. Morat, among other things. Benjamin Haberbosch and Holger Kuster's departments work "closely together" because "product development determines process development and vice versa," says Haberbosch. Plastic-compatible design, feasibility studies, mould flow analyses, modifications and correction strategies right through to final product approval are carried out here. In addition to its own toolmaking department with almost 20 employees, who focus on maintenance, servicing, repairs and corrections, the Franz Morat Group has a large network of partners, which it is gradually expanding in line with market requirements and experience. "This enables us to respond to increased demands in terms of precision, time-to-market and costs. We support the projects from our Eisenbach site in the form of technical project management, design, sampling and measurement. We define the processes. This means we have all the necessary technologies in-house. We map out suitable work steps and trades with selected external partners," says Haberbosch. Everything comes together in the Eisenbach process development department. "We serve three injection moulding shops: our own automotive injection moulding shop and the industrial applications of Framo Morat here in Eisenbach, as well as our production site in Mexico. We hand over the tools, the injection moulding process, the test plan and the fixtures for series monitoring."

The production of industrial applications is characterised by smaller batch sizes and frequent set-up processes. The granulate is transported to a central material station via an AGV.



Three injection moulding facilities in Eisenbach and Mexico

The materials processed place high demands on production. Filler contents of up to 60 % (usually glass and carbon fibres) are not uncommon. The range of plastics includes PC (for housings), POM, PA, polyphthalamides, i.e. semi-crystalline aromatic polyamides such as PA9T, as well as PEEK and, in isolated cases, PTFE. Due to PFAS issues, PTFE is not used in new developments. The three injection moulding sites operate a total of around 80 injection moulding machines with clamping forces ranging from 250 to 4,000 kN from Arburg, Engel and Sumitomo (SHI) Demag. When making new investments, the company focuses on hybrid and electric machines from Arburg. Benjamin Haberbosch comments: "In terms of machine capabilities, repeatability and tolerances, Arburg machines operate at the highest level. This gives us the added value we need."

In line with the industry focus on automotive and industrial applications, injection moulding production in Eisenbach



Two ball bearings plus six screw and threaded bushings are inserted manually and overmoulded for this housing. The metering pump gearbox is completed at the assembly plant in Poland.



The small quantities do not justify automation here: the metal shaft is heated before manual insertion. After overmoulding, the components are visually inspected.

is divided into two areas. The two production facilities each house 25 injection moulding machines. Higher tonnages for multi-cavity moulds (up to 64 cavities) and a high degree of automation due to large quantities characterise automotive production. The industrial sector is characterised by lower quantities, smaller batch sizes and frequent set-up processes. One focus is on applications in which screw and threaded bushings, ball bearings or shafts are inserted and overmoulded. "In most systems, the inserts are placed in the mould manually because the quantities do not justify automation," explains Markus Winterhalder. In contrast, all finished parts are removed from the mould by grippers or suction cups using linear handling devices. "We have no free-falling parts," emphasises Benjamin Haberbosch. "Our quality standards are so high that all parts are placed on conveyor belts and cooling lines."

A total of 26,000 m² of production space is available in Eisenbach, with a further 3,000 m² in Mexico and 2,500 m² for the assembly plant in Poland, where an additional expansion is planned for the growing drive technology division. Despite signs of a global crisis, the Franz Morat Group considers itself well equipped with its broad positioning and strong development expertise, according to Stefan Federer: "We have worked on a large number of strategically important development projects in recent years, which will go into series production at the end of this year and the beginning of next year." ■

www.f-morat.com
www.framo-morat.com
www.igus.de



On this test bench, various plastic combinations of a new planetary gear design are tested for service life and performance, for example, how unfilled and filled materials behave when in contact with each other.



Circular economy – also for durable and complex plastic components?

The challenges posed by material flows
from technical applications

Prof. Dr.-Ing. Achim Grefenstein is Senior Vice President R&D at Constantia Flexibles and Scientific Director for Circular Economy at the Institute for Plastics Processing at RWTH Aachen University (IKV).

The relevant European directive has been implemented for packaging, and the first effects, such as the ban on the use of fluoropolymers as processing aids in films for food contact, which will come into force in August 2026, will soon be felt. The industry is preparing for this, and it is encouraging to see that the transition is progressing well for most market participants, even if efficiency losses are still to be expected when using some PFAS-free alternatives in high-performance plants.

Following the elections in Europe and Germany, with de-bureaucratisation on the agenda, some are wondering whether similar legislation currently underway for other industries such as automotive, electrical and construction might be postponed or watered down. Well, we in the plastics industry should not count on that. In any case, it is worth considering a few facts here, as the circular economy will face fundamentally different conditions in these industries than in packaging.

For one thing, plastic products in all these industries are significantly more durable than packaging, which is disposed of within a few months to a maximum of one to two years. A ban on PFAS in packaging materials

While the replacement of problematic additives such as PFAS-containing plastics in short-life packaging is progressing well, the recycling and reuse of material flows from the construction industry and technical value chains is becoming a challenge – with potential interactions.

would have an impact on recyclates in a much shorter time. Electrical products, but even more so automobiles and building materials, have significantly longer life cycles. Over the next few decades, it is to be expected that old additives and fillers that are currently no longer permitted will be present in recyclates, unless modern recycling processes can remove them.

On the other hand, these products often consist of complex components made of several significantly different plastics and/or fibre composites made of thermosets instead of thermoplastics. For example, although thermoplastic mass plastics such as polypropylene and polyethylene are often found in large quantities in automobiles today, mixtures of PU, PVC and PP are also used for visible components with soft-touch properties. Polyurethane and PVC can theoretically be recovered by solvent-based recycling or depolymerisation and freed from unwanted additives, but at what cost if the feedstock is not very pure?

The recycling yields in vehicle construction are correspondingly low – with the consequence that other material streams are often used when PCR is used in the automotive industry. For example, PET recyclate from the bottle fraction is increasingly being used for textiles in automobiles when certain recyclate quotas have to be met. These quantities are then no longer available to the packaging industry to meet its quotas.

The topic of “design for recycling” will also become increasingly important in industries other than packaging in the long term. Today, for example, a soft-touch feel can also be achieved by back-injecting TPO films with compatible materials. However, such concepts certainly do not yet meet the quality requirements of the luxury car segment.

Regardless of political developments, we must focus on recycling-friendly product design and the further development of recycling technologies in all areas of plastics application. ■

Well prepared: recycling industry waiting for upturn

Insights gained at the Plastics Recycling Show Europe



All photos: K-PROFI

Even though the outlook for the recycling industry is not exactly rosy at present due to a lack of investment, low virgin prices and pending regulations, the recycling industry met in Amsterdam at the beginning of April and presented itself from its best side. The Plastics Recycling Show Europe (PRSE) had grown again, exhibitor and visitor numbers were up, discussions were intense, presentations were substantive, and the mood was very good. Everyone is well prepared for an upturn and hopes that it will soon be felt.

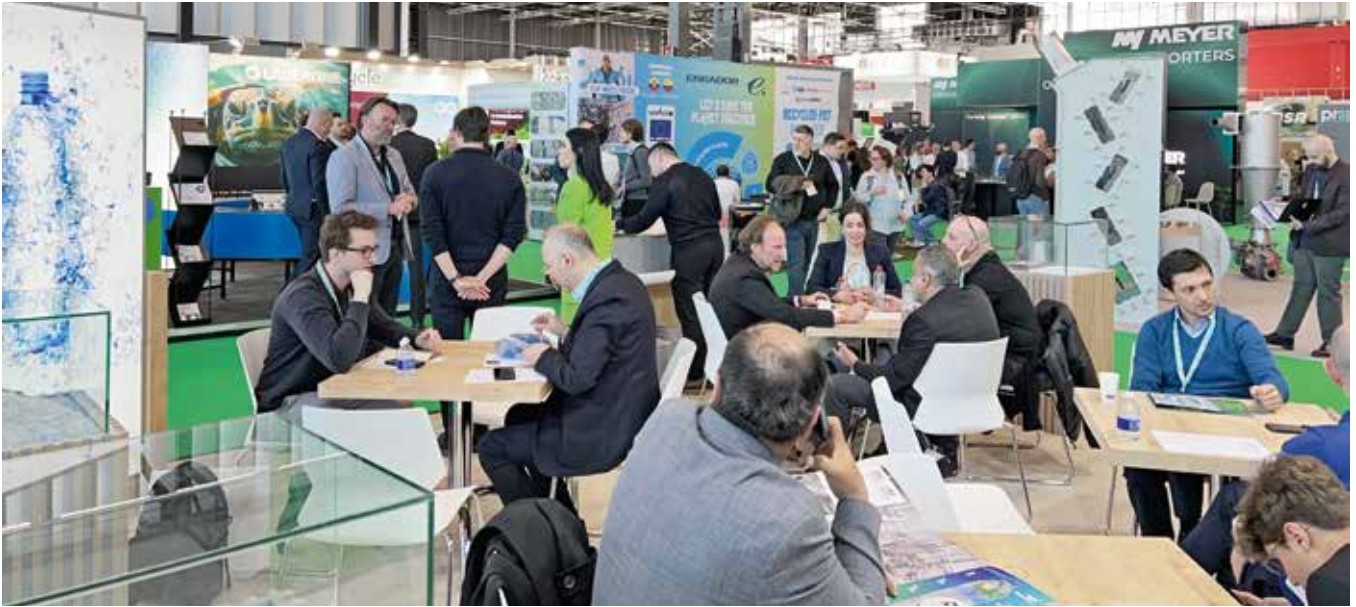
The industry is prepared and now offers the desired material in the desired colour for every application, even from recycled materials.

Text: Dipl.-Ing. (FH) Karin Regel, Editor K-PROFI

When it came to the size of the trade fair, PRSE exhibitors were of two minds. "It's great that the trade fair has grown so much and is becoming increasingly international." – "It's a shame that the trade fair has become so big. The atmosphere is less informal, and some of the discussions are less intensive." Both statements are understandable, and there is certainly some truth in both.

However, visitors and exhibitors were unanimous in their fundamental attitude towards plastics recycling: "We must push ahead with recycling. As an industry, we are needed. We are united in our optimism that the new Clean Industrial Deal, including circularity, is important for the EU and must be implemented." Manfred Hackl, Managing Director of Erema, puts it this way: "Despite

everything, our industry is not being listened to enough. We need more support. There are special funds for wood and steel recycling, so why not for plastics recycling?" The Erema boss is not dissatisfied with his business against the backdrop of the current framework conditions. "In the last ten years, we have tripled our turnover from EUR 120 million to EUR 380 million."



Record attendance at this year's PRSE in Amsterdam: More than 500 exhibitors welcomed 13,325 visitors.

However, the market is currently stagnating. Manfred Hackl differentiates: "PET recycling is relatively stable worldwide, but things are too quiet for polyolefins." Although there are individual companies that have the courage and foresight to invest in recycling technologies – regardless of material and region – there are too few of them. He sees the two main reasons for this as being global political uncertainty and the lower percentage of plastic consumption in certain industries, especially compared to the growth in virgin material capacities and the resulting low prices for virgin materials. In addition, many processors are weighing up how green they need to be today, how economical they want to be and whether the two are compatible.

Homework has been done

Dominik Händler, Director Circular Solutions at Mocom Compounds, takes a similar view. "Our industry thrives on optimism and a shared conviction that we are doing the right thing." Mocom offers an increasing range of technical compounds with sustainable ingredients for the automotive, E+E, transport, sports and household goods sectors. The company has developed various recycling technologies for this purpose. "A circular transformation towards sustainability must be priced accordingly. We hope that this will also be rewarded by the market." His recommendation is to think more long-term: "What will happen in 40, 50 or 60 years?"

Technical plastics such as polyamides, which were used to manufacture fishing nets or other yarns and are returned as waste materials, are in high demand, according to Mark Hellweg, Managing Director of granulator manufacturer Hellweg. "We have been able to prove in various tests that the sharp shear cut of our mills delivers excellent results when processing such problematic fractions."

The industry has long since done its homework and demonstrated what is possible – from mechanical to chemical recycling, from standard polymers to technical plastics and from post-industrial to post-consumer waste. AI and deep learning solutions have also found their way into the industry. Take-back systems have been established

to secure material flows. "We take care of all packaging from industry and commerce," says Mirko Gättinger, marketing manager at RIGK GmbH, which is exhibiting at its own stand in Amsterdam for the first time this year. "Due to the enormous importance of recycling cycles, PRSE is set to become our leading trade fair."

RIGK has already launched nine take-back systems with its partner companies, including the ERDE (Erntekunststoffe Recycling Deutschland) system, which is a joint solution from manufacturers, IK Industrievereinigung Kunststoffverpackungen e. V. and RIGK for the environmentally friendly take-back and recycling of used plastics from agriculture. "We achieve a recycling rate of 95 % in all our take-back systems."

Dominik Händler from Mocom presents technical compounds with sustainable ingredients for the automotive, E+E, transport, sports and household goods industries.





Sabine Schönfeld, Sales Manager Recycling, emphasises that customers can benefit from the combined expertise of Coperion and Herbold in complete systems.

Julia Leber and Christian Vith presented Krones' special expertise in washing systems, which is increasingly in demand for the preparation of film residues for chemical recycling.



Comprehensive system expertise is in demand

"We benefit from the synergies with Herbold and can offer solutions from a single source, ranging from customised washing systems and compounding extruders to granulate post-treatment," says Sabine Schönfeld, Sales Manager at Coperion. She emphasises the advantages of twin-screw extruders, which, with their flexibly configurable process units, can be adapted to almost any task in material feeding, homogeneous melting of even very inhomogeneous ground materials, and the addition of additives, filling and compounding of residual materials.

Complete systems are also offered by Krones Recycling GmbH, a company that was spun off as an independent entity within the Krones Group in July 2024. "Krones has been operating a washing competence centre in Flensburg for several decades, where we started out cleaning glass and PET returnable bottles," explains Product Specialist Christian Vith. "Our goal was and is to close the value creation cycle for plastics." This has now been achieved: Krones covers the entire process, from the original filling and packaging systems for beverages and liquid foods to recycling plants and the manufacture of new packaging materials. The latter was made possible in part by the acquisition of Netstal last year. Recycling technology benefits in particular from this comprehensive expertise, says Julia Leber, Marketing and

Communications: "We are convinced that we have the greatest expertise in the recycling market when it comes to hot washing. And this is crucial for producing a high-quality recycle for further processing."

For some time now, Krones Recycling has been focusing on polyolefin films, such as crisp bags and bin liners, which were previously considered a problem fraction. "In our plants, we can reliably remove both contamination and printing so that the plastic can be recycled as a valuable resource. We can carry out individual customer trials for this in our Recycling Technology Centre," says Christian Vith.

Chemical recycling as a supplement

Composite films are among the products that often cannot be mechanically recycled due to their polymer mix. "Chemical recycling is the last option before incinerating plastic waste and is therefore a useful addition to mechanical recycling processes," says Thomas Blocher, Business Manager Chemical Recycling at Buss Chemtech AG. The Swiss company specialises in precisely these processes and offers continuous pyrolysis plants. A complete Buss Chemtech plant consists of an extruder, in which the residual materials are melted, compacted

The accompanying conference with many specialist presentations was once again very well received in Amsterdam.





Heiko Hornberger, Head of Technology, and Philip Cichy from Feddem emphasise the service philosophy of the Sinzig-based twin-screw extruder manufacturer.

“Our innovative Perkadox PM-60ST-GR product, for example, can specifically reduce the MFI of PP,” says Sophie Nieuwenhuis from Nouryon, presenting the possibilities for recycle processing.



and degassed, and a pyrolysis furnace, which ultimately produces three fractions: a solid fraction that must be disposed of, the pyrolysis oil, which can be returned to polymer production, and a gas fraction. The latter is purified and used to heat the plant, which is a plus for sustainability.

Recyclates become recomponds

If plastics are to be mechanically recycled, it is important to have fractions that are as pure as possible, for which Tomra, among others, manufactures sorting plants. “The use of artificial intelligence and deep learning solutions is very important to us,” explains Fabrizio Radice, Head of Global Sales and Marketing at Tomra Recycling. This is the only way to separate juice bottles from surfactant bottles and food trays from non-food trays. He is also eagerly awaiting the EU regulations on the use of recycled materials, including in the automotive industry. His company is prepared for sorting black plastics so that they can be returned to their original application.

Frauke Hoffmann from compound manufacturer Hoffmann + Voss is also “waiting” for the quota regulation for the use of recycled materials in cars. “We had a good first quarter and are supplying our customers, who are already committed to sustainability, with high-quality recomponds.” Hoffmann would like to see clarity at last on the end-of-life vehicle regulation, “how much percent

recycled material, how much percent closed-loop,” as this is the only way to comply with uniform guidelines.

To produce recomponds by upcycling recycled materials, twin-screw extruders such as those manufactured by Coperion or Feddem are usually used. Feddem Sales Manager Philip Cichy comments: “What sets us apart is our service philosophy. We have most spare parts in stock or can supply them at short notice to minimise downtime for our customers.” According to Ralf Kulenkampff, Head of Sales – Plastics at Sikora in Bremen, quality standards in the processing of residual materials have risen significantly in recent years. “We have seen a particularly sharp increase in demand for inline inspection systems.” The company offers the Purity Scanner Advanced for this purpose, which performs inline inspection and sorting.

Polymer modification with additives

In order to turn recycled materials into high-quality recomponds, additives are needed in addition to sorting, inspection and processing machines. Dutch company Nouryon has expertise in polymer modification using peroxides. Sophie Nieuwenhuis explains: “Nouryon is a leading global supplier of organic peroxides, curing agents, reactor additives and metal alkyls.” The use of peroxides is also useful for recycled materials, both for PE and PP. “We play with modification,” says Sophie Nieuwenhuis, describing

the possibilities. For example, it can be useful for recycled materials to increase the MFI with the help of peroxides. “Our innovative product Perkadox PM-60ST-GR, for example, can specifically reduce the MFI of PP.”

Dr Manica Ulcnik-Krump from Interzero and her team have also built up a wealth of experience in the field of additives for residual materials. “With our knowledge, we guarantee a second, third and even fourth life for recycled materials,” says the Doctor of Chemistry with confidence. It is not only important to add additives to the residual materials during compounding, but also to first know which additives are contained in the residual materials in order to be able to take further steps. To this end, Interzero operates an extensive laboratory and technical centre in Lenart, Slovenia. You can read more about this in the article “The chemistry has to be right” in K-PROFI international 1/2025 from page 36 (www.k-profi.world/issue/250128). ■

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A world without production?

Why the idea is tempting, but pointless

It's clear that unforeseen things always happen in production. Disruptions, downtime and quality problems always affect the entire value chain and customers. Everyone is annoyed by production-related delays and often gives free rein to their feelings when disruptions recur and 'production' once again has nothing under control.

How nice life would be without these eternal imponderables caused solely by production. The goods would simply be packed on time, lorries could run their routes punctually, maintenance and servicing could carry out their tasks systematically and calmly, the quality people would have no complaints to deal with, stocks and staffing ratios would always be right, develop-

and in sufficient quantities, that tools and machines are correctly designed and procured, that the entire infrastructure is properly maintained and that staff are well selected, qualified and motivated at all times. All this is achieved through good management leadership. Then production runs almost smoothly.

Understanding and respect for the seemingly 'simple' work in production is sometimes lacking, especially when the individual areas of the company are very far apart. If the individual trades are close together, there is a common concern and personal communication, so that many problems can be solved quickly. I think it is essential that production is seen as a core process in a manufacturing company.

The above ideas can also be applied very well to pure mechanical engineering. Not everyone understands that a unique customised system cannot run at the push of a button and before the planned delivery date. If there are delays or the promised performance is not achieved immediately, everyone gets nervous. In this case, however, standards do not bring innovation. As you want to tap into a new market with new products, you have to take risks. If the trades are well co-ordinated and the customer is well informed all the time, everyone has fun in the end. Common goals are achieved and success can and should be celebrated. ■

ment could work in peace, there would be no overtime, controlling would be happy and management would have time for strategy development. The reality without production would actually be completely different: The entire company with its support functions would not even exist as an employer.

The purpose of companies is to earn money and create added value. This includes ensuring that components and assemblies are developed for production and assembly, that quality criteria are defined in such a way that they can be met, that the right materials are available on time



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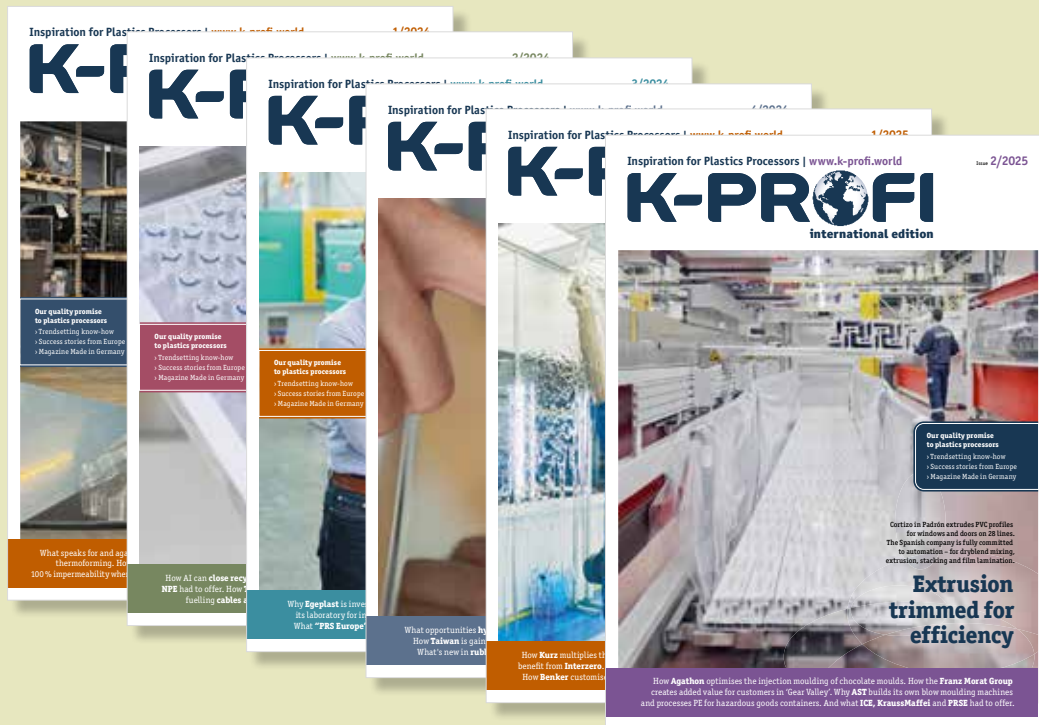
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