Inspiration for Plastics Processors | www.k-profi.world

Issue 1/2022

K-PROFI

international edition

Our quality promise to plastics processors

› Trendsetting know-how
› Success stories from Europe
› Magazine Made in Germany

Borsi's USP is to combine screen printing, thermoforming, machining and assembly under one roof. Peter Breer continues to focus on

XXL logos, covers and claddings

How **BSH** optimises a large mould. How **Headwave** welds loudspeakers with lasers. Why **Lapp** sees connectors at the limit. Why **Hübner-KTB** relies on more than galvanisation. How **Gealan** optimises its in-house PVC recycling. And how **Mattel** builds material cycles via mail-in recycling.

Faster than
you might expect.

Long delivery times and short-term requests are troublesome: With ENGEL you have the necessary agility and flexibility.

We offer you professional and especially quick help. Whether it is our all-electric e-mac or our tie-bar-less victory series, our stock injection moulding machines are there for you in no time.

ENGEL
be the first

engelglobal.com/stockmachines

Orientation in times of powerlessness

Dear reader

As a professional medium, we can analyse trends, show best practice, provide orientation and give impulses. We want to do no more and no less with this issue – despite all the powerlessness we feel these days.

The international trade fair calendar remains in motion. The current status on page 5. Modularity and performance compression are increasingly challenging the manufacturers of connectors. Lapp board member Dr.-Ing. Georg Stawowy explains on page 6 why connectors are increasingly being pushed to the limit. Helmet loudspeakers from Headwave become sound bodies without compromising on safety. How the waterproof laser-welded component withstands a wide range of requirements, from page 8. The toy giant Mattel is building a closed material cycle with Interseroh and HolyPoly: page 12.

The newly merged Hübner-KTB Oberflächentechnik focuses on more than plastic chrome plating: page 14. The start-up Toolplace wants to use artificial intelligence to simplify the procurement of high-quality injection moulds: page 21. Resource conservation, energy transition and climate neutrality are the guiding themes of K 2022. Eight professors support Messe Düsseldorf in their implementation. Prof. Dr. Bernhard Rieger from the Technical University of Munich pleads for an unusual way of dealing with waste from polyolefins: page 22.

Borsi combines screen printing, thermoforming, machining and assembly - an important unique selling point for owner Peter Breer.

How he manufactures XXL illuminated advertising, covers and vehicle parts, from page 24. Gealan Fenster-Systeme now recycles in-house PVC waste even more flexibly and efficiently: Page 30. BSH Hausgeräte has designed new 2+2 stack moulds for the outer shells of a heat exchanger in dishwashers and used the change to save material, optimise components and production: page 32. A few thoughts on the importance of energy saving and recycling on page 37.

Get through the difficult times well!

Markus Lüling, Editor-in-chief
lueling@k-profi.de, Tel. +49 (0)9123/9609-10

In this magazine

Cover photo: K-PROFI/Manuel Hauptmannl

Trade Fair Calender

Trade fairs related to plastics processing in 2022 and 2023

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

GreenPlast	Milan, Italy	03.05. - 06.05.2022	*www.greenplast.org*
Kuteno	Rheda-Wiedenbrück, Germany	10.05. - 12.05.2022	*www.kuteno.de*
Plast Expo Nordic 2022	Helsinki, Finland	18.05. - 19.05.2022	*pfsptec.messukeskus.com*
Plastpol	Kielce, Poland	24.05. - 27.05.2022	*www.targikielce.pl/en/plastpol*
Injection Molding Expo	Detroit, MI/USA	25.05. - 26.05.2022	*www.injectionmoldingexpo.com*
Argenplas	Buenos Aires, Argentina	06.06. - 09.06.2022	*www.argenplas.com.ar*
Wire, Tube	Dusseldorf, Germany	20.06. - 24.06.2022	*www.wire.de; www.tube.de*
Plastics Recycling Show	Amsterdam, The Netherlands	22.06. - 23.06.2022	*www.prseventeurope.com*
Interplas Thailand	Bangkok, Thailand	22.06. - 25.06.2022	*www.interplasthailand.com*
DKT/IRC Intl. Rubber Conf.	Nuremberg, Germany	27.06. - 30.06.2022	*www.dkt2021.de*
Plastics Live	Coventry, UK	05.07. - 06.07.2022	*www.plasticslive.co.uk*
Achema	Frankfurt/Main, Germany	22.08. - 26.08.2022	*www.achema.de*
Indoplas 2022	Jakarta, Indonesia	31.08. - 03.09.2022	*www.indoprintpackplas.com*
2nd Intl. IKV Symposium	Aachen, Germany	05.09. - 06.09.2022	*www.ikv-aachen.de*
31st Intl. IKV Colloquium	Aachen, Germany	07.09. - 08.09.2022	*www.ikv-kolloquium.de*
Drinktec	Munich, Germany	12.09. - 16.09.2022	*www.drinktec.com*
Inovaplastic/Feiplastic	Sao Paulo, Brazil	13.09. - 16.09.2022	*www.feirainovaplastic.com.br*
Kunststoffen 2022	s-Hertogenbosch, The Netherl.	14.09. - 15.09.2022	*www.kunststoffenbeurs.nl*
Colombiaplas	Bogota, Colombia	26.09. - 30.09.2022	*www.colombiaplast.org*
Powtech	Nuremberg, Germany	27.09. - 29.09.2022	*www.powtech.de*
Fachpack	Nuremberg, Germany	27.09. - 29.09.2022	*www.fachpack.de*
Taipei Plas	Taipei, Taiwan	27.09. - 01.10.2022	*www.taipeiplas.com.tw*
K 2022	Dusseldorf, Germany	16.10. - 23.10.2022	*www.k-online.com*
SPS	Nuremberg, Germany	08.11. - 10.11.2022	*sps.mesago.de*
Compamed	Dusseldorf, Germany	14.11. - 17.11.2022	*www.compamed.de*
Formnext 2022	Frankfurt/Main, Germany	15.11. - 18.11.2022	*www.formnext.de*
Vietnamplas 2022	Ho Chi Minh City, Vietnam	23.11. - 26.11.2022	*www.chanchao.com.tw/vietnamplas*

Swiss Plastics Expo	Lucerne, Switzerland	17.01. - 19.01.2023	*www.swissplastics-expo.ch*
Plast India 2023	New-Delhi, India	01.02. - 05.02.2023	*www.plastindia.org*
Interpack	Dusseldorf, Germany	04.05. - 10.05.2023	*www.interpack.com*
HanoiPlas	Hanoi, Vietnam	08.06. - 11.06.2023	*www.chanchao.com.tw/hanoiplas*
Compounding World Expo	Essen, Germany	13.06. - 14.06.2023	*eu.compoundingworldexpo.com*
Moulding Expo	Stuttgart, Germany	13.06. - 16.06.2023	*www.moulding-expo.com*
Plast 2023	Milan, Italy	05.09. - 08.09.2023	*www.plastonline.org*
T-Plas 2023	Bangkok, Thailand	20.09. - 23.09.2023	*www.tplas.com*
Interplas	Birmingham, UK	26.09. - 28.09.2023	*www.interplasuk.com*
Fakuma	Friedrichshafen, Germany	17.10. - 21.10.2023	*www.fakuma-messe.de*
Plast Imagen	Mexico City, Mexico	07.11. - 10.11.2023	*www.plastimagen.com.mx/en*
IPF Japan 2023	Chiba, Japan	28.11. - 02.12.2023	*www.ipfjapan.jp*

Illustration: Lapp

Lapp has a flexible system of rectangular, circular, and solar connectors made of plastic and metal.

Connectors at the limit – why?

Modularity and performance compression challenge connector manufacturers

The Lapp Group develops and produces cables, connectors, and accessories up to fully integrated connection solutions. As a global market leader, the family-owned company generated sales of EUR 1.128 billion in the 2019/20 financial year with 4,575 employees. On the occasion of a virtual trade press day at the injection moulding machine manufacturer Sumitomo (SHI) Demag, K-PROFI spoke to Dr.-Ing. Georg Stawowy, board member at Lapp responsible for innovation and technology.

K-PROFI: Mr Stawowy, why a trade press day at a machine manufacturer?

Dr.-Ing. Georg Stawowy: Sumitomo has been a customer and partner of Lapp for many years. We handle the complete assembly of cable harnesses for various machine parts for the all-electric injection moulding machine of the IntElect series there. Using the concrete application at Sumitomo-Demag, we have shown how we can better integrate connectors into application environments, how we can assemble them and how we can still plug them into the tightest of spaces. The M12L connector that we have now presented is smaller than competitor products and can carry more current at the same time. It will go into the field in large numbers.

The motto of your trade press day was "Connectors at the limit". Why is that?

Connectors must go to the limit because machines and installations are also going to the limit – with more modularity, a wider variety of applications and increasing power compression. It is not crucial in all applications that connectors are very small, but in some they are.

This applies to all types of connectors, regardless of whether they are made of metal or plastic?

You can look at connection technology and ask yourself: why do we still need connectors at all if we have contact interfaces, mobile radio and 5G? But of course, cables and connectors are just as indispensable for fast and trouble-free communication in industrial processes as they are in power supply for drives. But in many applications the

installation spaces are becoming ever tighter and the performance densities ever higher. For such particularly compact designs, especially small connectors are needed. At the same time, connectors need to be robust, and despite the need for standards, there is a trend towards miniaturisation. We must resolve these contradictions in terms of development and create smaller, but at the same time more powerful connectors.

How can plastics improve the situation?

I see two courses of action here – the design and the choice of materials. For industrial connectors, both probably offer potential. In industrial applications we have more connectors made of metal, in automotive and solar technology more of plastic. From the viewpoint of connector development, this means for the plastics industry: there can definitely be more plastic in connectors. But performance compression also means: the machine elements and components are getting hotter, temperature resistance is becoming even more important, and flame protection on components with thin walls is becoming more significant. Weight reduction through plastic is not so relevant in stationary applications; here, shielding, EMC and media resistance are in the foreground. In mobile applications, the weight advantage of plastics plays an important role.

Do plastic recyclates have a chance in connectors?

Of course, recyclability is becoming more and more important as a design goal, also in electrical engineering. With plastics, however, it becomes somewhat ambivalent: their thermal recyclability is super, but the real question is whether plastic from a connector can become a connector again in terms of material. I'm sceptical whether it doesn't rather come down to downcycling for such sophisticated safety products.

What solution do you see?

In chemical recycling, we are at the very beginning today. Maybe that is the key to upcycling to new materials.

What contributions to the solution would you like to see from plastics producers and compounders?

Better materials for 3D printing. As in many other domains, 3D printing is still seen as a means for prototyping, but not as a tool for mass production. If developers realise how they can use additive manufacturing to create genuine new joining solutions, that would be the real revolution. Even if 3D printing machines stay more or less as they are, but the variety of materials grows, I believe there are great opportunities for connector production. Unfortunately, we in the connector industry are not yet at the point of understanding the true benefits of 3D printing for our customers.

Mr Stawowy, thank you very much for your comments.


Photo: Lapp

Georg Stawowy studied mechanical engineering at RWTH Aachen University and the University of Southern California in Los Angeles. Before joining Lapp as CTO in 2013, he managed a strategic business unit at what is now Freudenberg Sealing Technologies.

Music in the head

How a laser-welded loudspeaker withstands all challenges on a motorbike helmet

Cruising through the countryside on a motorbike, immersed in music - that's what the helmet loudspeaker from Headwave in Berlin makes possible. The helmet itself becomes a sound body without compromising on safety. The rider can still hear the ambient noise of engines, horns, or ambulances. The device connects wirelessly to the mobile phone via Bluetooth. The helmet speaker is attached to the helmet with a special adhesive pad, which prevents it from flying off even at 300 km/h. According to Sophie Willborn, Managing Director of Headwave, waterproofness is important: "The speaker sits on the outside of the helmet and is exposed to the weather. Moisture must not penetrate under any circumstances, otherwise the electronics would be damaged."

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

The correct connection of the TPU loudspeaker tray, which contains the electronic inner workings, and the cover on top of it, also made of TPU, is the be-all and end-all to give the sound miracle a long life. After initial attempts to glue the two TPU halves together, Willborn looked for another joining method: "We were looking for a way to join the two halves cleanly, with high strength and tightness. The loudspeaker may be exposed to high mechanical stresses - if the helmet falls off or due to the airstream at very high speeds."

Laser welding meets these requirements. With Evosys Laser Service GmbH from Erlangen, Willborn brought a partner with laser welding expertise on board. Stephan Nickisch, Managing Director of Evosys Laser Services, recalls: "Since the component was originally designed for a bonding process, we still made small adjustments to the design of the welding bar and then worked out the appropriate parameters for the process." Because the small loudspeaker is tough. The welding bar is flat, not built according to the tongue-and-groove principle. It is melted flat during the welding process. Other challenges: The material is soft; the electronics inside must not be damaged by the joining process. The choice fell on contour laser welding. "This enables us to control the energy input in such a way that the flat web is melted in a defined way and the electronics are protected," describes Nickisch.

Photo: Headwave

"We were looking for a way to connect the two halves of the speaker cleanly, with high strength and tightness," explains Sophie Willborn.

Photo: K-PROFI/Schneider

Ready to go: The EVO 1800 is ready for the welding process of the speaker.

Ideal interaction required

Four contract laser welding systems stand in the halls of Evosys Laser Services. One of them is the EVO 1800, a stand-alone system in action for Headwave. In the tools, the bottom tool holds the tank, the top tool holds the lid. After loading the system, the lower tool moves upwards and the system checks whether the start position of the component, the so-called 0-point, is correct. If this is within the specifications, the welding process starts. The laser beam scans the contour twice. A diode laser with a wavelength of 980 nm, a power of 250 W, a feed rate of 400 mm/s on the front sides and 500 mm/s on the long sides welds the sound wonder with a cycle time of 12 s. The clamping force is 250 N.

"It takes a lot of experience to find the ideal interplay between power, feed rate, clamping force and the respective material. We benefit from the fact that all of us here have been working in the industry for many years and have already welded many interesting materials and components," Nickisch illustrates. Because depending on the material, component geometry and additives such as flame retardants, colour pigments and laser additives, it is always necessary to find the right welding parameters. The material must not burn, the cycle time should be as short as possible, and the weld seam should be strong and tight at the end. The contract manufacturer produces 5,000 loudspeakers a year for Headwave. Willborn makes it clear: "It's not worthwhile for us to have our own laser welding system for these quantities."

Bob makes a career

Series of 100 components per year up to 50,000 components per month pass through the halls of the Erlangen-based company. It is not uncommon for a customer to initially have a product welded on a subcontract basis and then finally invest in their own welding system. This is what happened, for example, with the cartridge for a one-person dishwasher - the Bob model from Daan Tech in Paris. Bob has become a popular companion for campers, one-person households, boat owners and the like. Detergent, rinse aid and salt are contained in the plastic cartridge, which lasts for 30 rinses and is then refilled by the manufacturer.

The cartridge body is made of PP. The lid welded onto it is the laser-transparent counterpart, which is also made of PP. "When the product came on the market, we welded the cartridges as a small series of 500 pieces per month at our company. Then demand gradually went through the roof and we ended up with 50,000 units per month. That is then the point where it definitely pays off for the customer to have his own welding system," Nickisch gives an insight into the company's business. At this point, the parent company Evosys Laser GmbH stepped in and built the system – in Daan Tech's case, a turntable system that can easily handle the increasing quantities.

"We want to grow further"

Originally, the service organisation was responsible for maintenance and commissioning as well as emergency support. In 2018, the contract welding segment was added. The four plants in contract manufacturing can all be flexibly

Stephan Nickisch affirms: "Finding the ideal interplay of power, feed rate, clamping force and the respective material in laser welding requires a lot of experience."

Photo: K-PROFI/Schneider

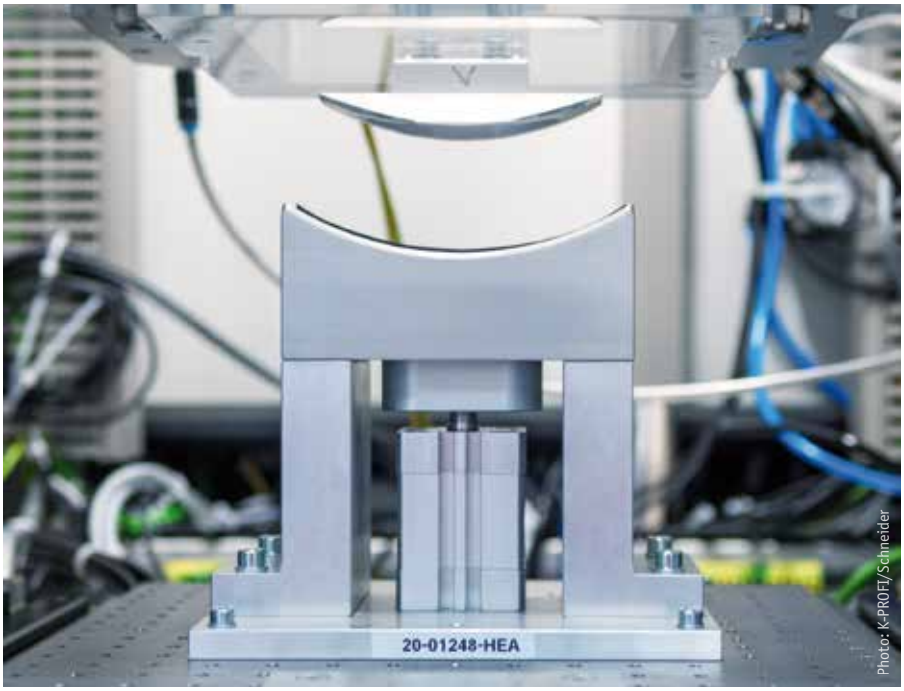


Photo: K-PROFI/Schneider


Photo: K-PROFI/Schneider


Photo: K-PROFI/Schneider


Photo: K-PROFI/Schneider


Photo: K-PROFI/Schneider


Photo: K-PROFI/Schneider

Upper and lower tools are loaded: The lid and tray of the speaker are ready for the welding process.

The finished component is removed manually.

Manager Contract Manufacturing Michael Pillipp looks again at the contour and the parameters.

The welding process is completed, and the lid is firmly attached to the tub.

The process can be followed exactly on the display of the system.

Michael Pillipp shows the tub and the lid of the loudspeaker before the joining process.

Above: Beautifully packaged, the precious piece then goes from Headwave to the end customer.

Right: Firmly attached to the helmet, the loudspeaker ensures that the rider is surrounded by music.

converted. Quick-change systems and slide-in cassettes for the upper tool allow quick changes. Simultaneous, quasi-simultaneous, radial and contour welding can be realised. The tools all have RFID coding so that the systems "know" which welding programme they must call up for which component. Nickisch emphasises, "Of course, customers who purchase a system from our parent company for their own production also get all these features." In 2022, a new turntable system will move into contract manufacturing. This will expand the company's capacities by another 30 %. Nickisch explains why: "Demand is high and we want to continue to grow with this division over the next few years."

Most of Evosys Laser Services' customers come from Germany and the surrounding area. Nickisch sums up the reasons for contract manufacturing: "Mostly it's about getting started with laser welding technology without a big investment or small quantities." Sometimes, however, force majeure is at play. For example, Nickisch and his team took over the most important welding jobs for six weeks for a company whose entire production was flooded during the flood disaster in the Ahr valley. It is also helpful to rely on a backup via the contract manufacturer when rebuilding existing production lines or when a plant comes to a standstill. "In fact, some companies use this. We have the tools stored here and if the customer needs support at short notice – for whatever reason - we can step in immediately," Nickisch outlines the business model.

On its equipment, the laser welding specialist can join components with maximum dimensions of 300 x 300 mm. The tools for series products are made of steel, those for prototypes of aluminium. Nickisch never tires of emphasising the advantages of the process: "Laser welding is particle-free, we work without contact and achieve mechanical load capacities and tightness that meet the IP69 protection class. This means that liquids do not penetrate the welded components even under high pressure and at high temperatures." These are good arguments for the medical technology, electronics, or automotive industries, because cleanliness and tightness are increasingly a must.

www.headwave.de
www.evosys-services.de

Mini dishwasher Bob with the cleaning cartridge.

Collecting old toys and doing good not only for the environment

How toy manufacturer Mattel is building a closed material cycle with partners

The "Sammeldrache" (literal translation: collection dragon) strikes again. After printer cartridges, now toys: At around 100 schools and kindergartens in Germany, collection boxes for defective or no longer used toys have recently been set up. Whether Barbie, Matchbox and Hot Wheels cars or Fisher-Price toys - all brands of Mattel GmbH from Frankfurt are part of the PlayBack programme, with which the toy manufacturer wants to close the material cycle and prevent valuable raw materials from ending up in residual waste. Important partners for this pioneering campaign are the "Sammeldrache" initiator Interseroh and the service provider HolyPoly GmbH from Dresden, whose founding member Fridolin Pflüger explains the project in a little more detail to K-PROFI.

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

"In Germany, toys have to be disposed of in household waste and then usually end up in the incinerator," Fridolin Pflüger reports, "changing this is absolutely uncharted territory and not very easy to realise. That is why it is a challenge for HolyPoly and Mattel, but also an affair of the heart. We want to show new ways to act sustainably, to lead by example and create awareness and interest both among the population and other companies to break thought patterns and tread new paths." The aim is to recycle toys and use them as a source of raw materials for the production of new play equipment for children. The plan is to create a unique circular playground. The selection process is currently underway for a charity to which the playground will be donated. HolyPoly will organise the design and construction of the playground equipment together with this institution, playground builders and Mattel. The objective is to use as much of the collected material as possible - according to its availability and properties.

And this is how it works: Apart from the "Sammeldrache" campaign run by Interseroh Product Cycle GmbH from Melle in schools, consumers from all over Germany can send in their used toys to Bral Reststoff-Bearbeitungs GmbH, Berlin. To do this, the consumer simply has to create a free return slip on Mattel's PlayBack website and bring the package with the toys to the post office. "Mail-in return channels of this kind are rather unknown so far, but Mattel clearly wants to establish them for its closed material loop PlayBack," Fridolin Pflüger knows. The recycling of the collected toys starts with

At HolyPoly, the toys sent in are currently still sorted by hand.

All photos: HolyPoly

Fridolin Pflüger, a founding member of HolyPoly, hopes that recycling systems like the PlayBack programme will become established.

a manual disassembly, sorting and removal of electronic components and ends with the regranulation of partly colour-sorted fractions of ABS, PP, PE and PS. “We are still at the very beginning with our ambitious plan and are currently testing the recycled materials for their suitability,” reports Fridolin Pflüger, who also hopes that the project will provide a clear gain in knowledge for many future projects.

Interseroh's “Sammeldrache” campaign has been well established for a long time and has been collecting used printer cartridges since 2000 in order to save them from residual waste and at the same time support schools and kindergartens. In Germany alone, more than 120 million printer cartridges are used every year, of which it is estimated that more than 80% end up in the residual waste after a single use. To counteract the waste of resources, Interseroh developed the collection system for refillable printer cartridges and, according to its own figures, was able to save around 6,300 t of greenhouse gas emissions and 13,100 t of primary resources in 2017 alone by recycling 1.4 million used toner cartridges. After all, a remanufactured toner cartridge would use around 47% fewer resources, produce 60% fewer greenhouse gases, and save 50% of the materials. The highlight of the collection campaign is that it not only does something good for the environment, but also for educational institutions. Together with sponsors, schools and kindergartens collect the cartridges and printer cartridges and receive so-called Green Environmental Points (GUP), which they can redeem for high-quality prizes such as sports equipment, learning and craft materials, books, IT and technical equipment or toys. Together with sponsors, the institutions can thus improve their equipment and thereby their educational opportunities.

The toys, which have been pre-sorted by hand and freed from electronic parts, "wander" via an assembly line into the granulation plant.

www.holypoly.com, www.interseroh.de
www.mattel.de

In its patented 'Lithographics' technology, Hübner-KTB partially hardens differently coloured lacquers on the blank, where the contour-sharp and backlit image is to be after electroplating.

"Subconsciously it clicks: High quality!"

Why the merged Hübner-KTB Oberflächentechnik focuses on more than the galvanisation of injection moulded parts

Hübner Oberflächentechnik GmbH in Marktoberdorf and Kunststofftechnik Bernt GmbH (KTB) in Kaufbeuren have merged to form Hübner-KTB Oberflächentechnik GmbH at the beginning of 2021. With similar competences in product development and toolmaking, injection moulding and electroplating of plastic parts, the partners serve the automotive, sanitary and consumer goods business segments. A look at synergies in the alliance, innovations in plastic chrome plating, diversification in surface finishing and efforts to improve sustainability.

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

The former Kunststofftechnik Bernt GmbH specialises in the production of galvanised plastic parts, mainly for the automotive industry, with toolmaking, plastic injection moulding, electroplating and laser technology. At the KTB site in Kaufbeuren, more than 300 employees recently generated a turnover of more than 25 million euros.

The former Hübner Oberflächentechnik GmbH focuses on toolmaking, plastic injection moulding, plastic electroplating, and physical vapour deposition (PVD) on the development, production and surface finishing of injection-moulded components and assemblies for sanitary technology, household appliances and vehicle construction. Before the merger, the approximately 200 employees at two Hübner sites in Marktoberdorf (toolmaking and injection moulding respectively electroplating, assembly and logistics) achieved sales of around EUR 20.7 million.

Patrimonium Private Equity, previously a majority shareholder in Hübner, holds the majority of shares in the merged company, but all of the former shareholders of Hübner and KTB are also represented as shareholders in Hübner-KTB Oberflächentechnik with relevance. In addition to an increase in market share, the players expect a significant increase in order volume from the bundling of forces. With the broader range of technologies, services are to be better tailored to customer-specific needs and the customer portfolio more strongly differentiated. The managing directors of the new company are Dr.-Ing. Carsten Brockmann and Dr. Lars Wiegmann, the long-standing managing directors of the former KTB.

Complete process chain under one roof

Like the two individual companies before, the new company focuses on presenting all steps of the value-added chain independently and consistently within the company and on securing the sensitive know-how. As a development partner of OEMs from various industries and Tier 1 automotive suppliers, the chain begins with consulting and moulded part development and extends through design, mould construction and injection moulding to the complete finishing and assembly.

The toolmaking departments at Hübner and KTB are equipped in such a way that they can manufacture all the shaping parts and, to a large extent, the know-how-intensive tools weighing up to about 5 t in-house. The tool superstructures come from standard component suppliers. The toolmaking capacities are balanced between the two locations and the competences of both locations are combined.

Photo: Hübner-KTB

Dr.-Ing. Carsten Brockmann, Managing Director of Hübner-KTB, focuses on process competence in electroplating, diversification in surface finishing and the improvement of sustainability.

Keeping capacity utilisation constant in the project business is not easy, but it is better with two locations than with one alone, as Carsten Brockmann points out.

The 25 injection moulding machines each at Hübner and KTB are mainly from Arburg and Sumitomo-Demag. Two KraussMaffei machines have recently been added to the larger clamping force range – each with 6,500 kN and 2K equipment. Their main advantage is the small footprint of the two-platen clamping units. All multi-platen machines at Hübner-KTB run in three-shift operation. Quality-critical parts are subjected to a 100% inspection directly at the machines using camera technology. The removal handling system manages the flow of moulded parts from removal to inspection to placement in stackable trays. The aim is to achieve a production process that is as fully automated as possible and requires as few people as possible.

Better than its reputation: chrome-plating of plastic parts

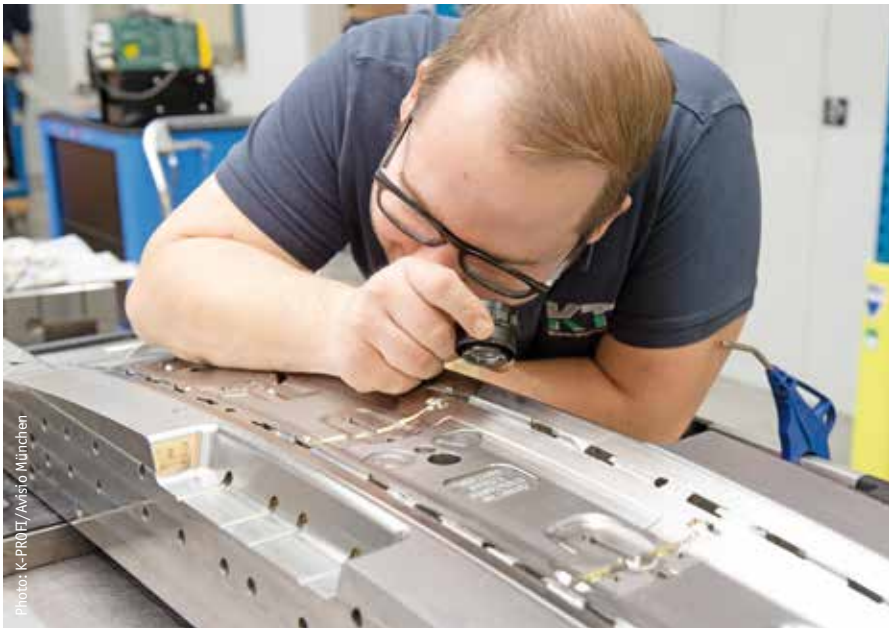
"Metallic feel, high-quality surface and low product weight – these are the most obvious advantages of chrome-plated plastic components," enthuses Carsten Brockmann, "they are durable, and the customer perceives them as high-quality." In applications where the look is most important, but nothing is touched, for example behind glass, printing, lacquering or the in-house PVD can certainly be used: "But my experience is: where the customer can touch, he notices immediately whether it is metal, i.e. electroplating, or plastic, i.e. lacquer or foil. Due to the effect that they can't assess the weight of assembled parts, they think it's metal. And that's when it subconsciously clicks: High quality!"

The pitfall of the business: electroplating is the last and most expensive step in adding value to the chrome plating of plastic parts. At the same time, the chrome layer mercilessly reveals possible defects on the plastic part, such as surface imperfections or slight burrs: "Chrome parts highlight every flaw," says Carsten Brockmann. "We see ourselves at a rather high-quality level, trying to make the difficult parts and supply the high-quality premium vehicle brands. So, we are happy that Daimler, Audi and Porsche are the main revenue drivers in the vehicle business." Part of the quality strategy is that all moulded parts are 100% inspected, in some cases using camera-based equipment.

Chrome in different shades

Beyond chrome plating, Hübner uses vacuum-based physical vapour deposition (PVD) to produce precious metal shades on galvanised products. These colours are popular in white goods, sanitary technology, or household appliances, but are very rarely found in vehicles.

In spring 2021, KTB presented a process for the production of dark chrome parts (brand: "Exclusive Dark") – with a surprisingly positive response. Carsten Brockmann: "Good capacity utilisation is expected by 2023. The dark chrome gives vehicle parts a stylish look and significantly enhances the interior. These exclusive chrome and colour variants are particularly in demand in the premium segment. The dark chrome is made possible by another trivalent chrome bath. Like all previous chrome layers, the new shade can be combined with technologies for day/night designs."



Slide guides in a cascade injection mould for decorative strips are closely inspected in the mould making department.

25 smaller injection moulding machines supply the plating shop at the Marktoberdorf plant mostly with moulded parts for sanitary technology and consumer goods.

Day/night designs with galvanised parts

Many components at Hübner-KTB have to do with light, for example they are designed as day/night illuminated components. Here, they are pre-treated up to chemical nickel. The subsequent partial lasering of this nickel layer prevents further galvanic coating there. Two fully automatic systems with TruMark lasers from Trumpf or Foba lasers process the moulded parts tray by tray. Many of these components are covered on the back with polycarbonate, which has light-scattering properties and a specific thickness profile that ensures a uniform light and colour impression. This requires many multi-component injection moulded parts, which is why four 3K and eleven 2K machines are in use in the group.

Hübner-KTB is pursuing four automation projects to further increase efficiency: In addition to insertion and removal during injection moulding, these are the loading of the racks that are indispensable for the dipping processes in the electroplating shop, the rapid laser cutting of larger batches and the optical inspection of critical moulded parts, applied markings and finished surfaces. Nevertheless, optical final inspection by the human eye will still be necessary as a "firewall".

Innovations by and with electroplating and chrome

The new "ChromeTouch" technology turns interior chrome trim in the vehicle into a touch-sensitive control unit without annoying switches. As with conventional touch surfaces, KTB uses projected-self-capacitive

In Kaufbeuren, 25 machines up to 6,500 kN mainly inject automotive parts. The 1K machines are gradually being converted to fully electric models.

The assembly of racks for electroplating is one of the automation challenges Hübner-KTB is working on.

sensing, which triggers a switch by simply touching or bringing a finger close to the surface. "But we wanted to go one step further here, because both the obvious surfaces and those that are in the background can be switched via the projected capacitive sensing surface." For example, the back sides of painted components can be equipped with capacitive switching in a cost-effective and process-safe manner by means of a galvanically deposited sensor surface. Proximity function, transillumination, colour change and slider effects can be integrated. One development is a dome light in the vehicle whose brightness can be adjusted with a finger via slider effect. "This is a visually attractive alternative to back-moulded foils with capacitive sensing."

The second current innovation is strips that look like plain chrome in the daytime design but have a full-length grid structure that can be illuminated at night. Precision lasers create 200 x 200 µm small windows with 50 µm spacing on large surfaces. The very precisely lasered areas remain uncoated during the final matt chrome plating. Interrupting the electroplating process for the lasering is time-consuming.

KTB therefore looked for alternative processes to partial electroplating and found an answer in coloured and UV-curable lacquers, which constitute the third of the latest innovation: UV lacquer is applied to the moulded part, partially cured via laser and the remaining lacquer layer is washed off. This makes it possible to achieve a contour sharpness that can compete with the previous laser process. This process is carried out with a correspondingly coloured lacquer for each desired colour. This creates the same effect as when the nickel layer is lasered, except that there is no need to interrupt the galvanising process with drying of the moulded parts

Hübner-KTB operates two electroplating lines in Kaufbeuren (photo) and one in Marktoberdorf.

Control elements for the vehicle interior are typical components that are chrome-plated and, if necessary, further refined in the electroplating shop.

One of the two lines in Kaufbeuren (photo) as well as the one in Marktoberdorf are already equipped with modern chrome(III) baths.

Independent of automated optical inspections, all finished moulded parts undergo a final check by human eyes.


Photo: Hübner-KTB

The fully automated camera-based surface inspection of high-gloss chrome parts is an important step in quality assurance.


Photo: Hübner-KTB

Button sets for the centre console of passenger cars are assembled fully automatically in Marktoberdorf.

and lasering. "Chrome parts can be printed well," explains Carsten Brockmann, "but the print does not last. Nothing really holds well on chrome. With our patented 'Lithographics' technology, we print directly onto the blank where the image should be. And that can be backlit well. The effort is comparable to pad printing, but the edge sharpness of that in the image wouldn't be precise enough."

Substitution of chromium(VI) by chromium(III)

The group of companies operates two electroplating plants in Kaufbeuren and one in Marktoberdorf. In the multi-stage electroplating of plastic parts, chromium(VI) has been used for decades – in two of the many process steps, once at the very front of the process in the pre-treatment for etching and then at the very back of the process for chrome plating. Chromium(VI) is produced from CrO_3, is cell-permeable and classified as a hazardous substance. Accordingly, work on its substitution has been going on throughout the industry for years, but it is not easy, as Carsten Brockmann points out: "Trivalent chromium is only an alternative for the last step, we are not there yet for the pre-treatment."

KTB has already been in series production since 2019 as one of the first coaters of plastic parts with trivalent chromium-plated components that match the shade of a hexavalent chromium plating. "Today, mixed plating of chromium(III) and with conventional chromium(VI) parts is possible, which has enabled us to make conversions in ongoing series. Three years ago, this was unthinkable because of the slight yellow tinge at the time." Since the introduction of chromium(III), the consumption of chromium trioxide at Hübner-KTB has been falling continuously.

Following the conversion of a plant in Kaufbeuren at the end of 2019, all mechanical work has already been completed in Marktoberdorf for the changeover to chromium(III), which is scheduled to take place during the course of this year. "Hübner has more non-automotive customers. They are more after chrome(III) than the automotive industry," reports Carsten Brockmann. Nevertheless, the conversion of current articles such as steering wheel switches has also been successful at KTB.

For the conversion of pre-treatments to chromium(III), first promising series trials with different processes are underway, but still only certain parts of the spectrum can be pretreated chromium(VI)-free. Moreover, it is not yet clear exactly which alternative process will win the race. "We expect that changes will also occur in pretreatment from 2024 onwards, and we want to submit the relevant applications and put a first chromium(VI)-free pretreatment into operation in 2024," announces Carsten Brockmann, "Daimler and other large customers are driving the development. The decision on how long we may continue to use chromium(VI) without submitting a new application is still open in the EU Commission. We assume that we will have completely converted by 2028/2029. The customer requests are there. We initially switched over without having any orders. In the meantime, we are continuing to convert because the customer demand is there. 2029 is also the year in which our authorisation would expire if the EU Commission would rule as recommended by the chemicals agency ECHA. We would then no longer submit a new application for chromium(VI) in chrome plating."

Upgradable recycling of galvanised parts

"The recycling of galvanised plastic parts is worthwhile because the metal components are not so small," explains Carsten Brockmann and describes the status of recovery: "The surfaces are elemental chromium. But in many cases the plastic is burnt, and the metals are recovered from the combustion residue, mainly copper and nickel." There is a lot to be said for mechanical recycling, because plastic and metal can be continuously separated with 99 % purity in a melt filtration system, recovered and further processed in a targeted manner. "If we

With PVD, Hübner-KTB achieves colour variations of chrome actuator plates for dual-flush toilets ...

could feed the plastic back into the process right here, that would be optimal. We would even take back chrome parts and perform this process with returns from the market. Because PC or ABS regranulate from moulded parts in particular can be reused for electroplated parts with up to 20 % addition without impairing adhesion in injection moulding," explains the Hübner-KTB head. Discussions with OEMs are ongoing, and up to 25 % regoods are being discussed.

Even compared to lacquering, galvanisation as a finishing process does not have to hide. Painted parts are often considered to be more ecological, but he thinks this is a misconception. Because the paint layer cannot be removed, only downcycling is possible in mechanical recycling. Also, in view of the often considerable, double-digit reject rate, painting techniques with a matt-metallic look are economically risky. In addition, the paint processes require a lot of energy, criticises Carsten Brockmann: "Dryers the size of a single-family house using the paternoster principle with a temperature of 80 °C, the use of solvents, up to 80 % overspray and considerable reject rates – electroplating has a clear advantage here." In terms of costs, a two- to three-layer coating is comparable to electroplating, but film-back spraying is significantly more expensive. In addition, the foil is made of a different material than the base material.

CO_2 reduction only through concerted measures

The members of the German Association of Galvanised Plastics (Fachverband galvanisierte Kunststoffe e.V. (FGK)) have committed themselves to climate-neutral production by 2030. By 2023, the ten electroplaters want to add a product-related CO_2 balance to their articles and are therefore creating a CO_2 database on industry-specific purchased products – a task with a "huge question mark", as the managing director admits, "but we want to attach not only a price tag but also a CO_2 tag to our products by 2023."

Hübner covers 40 % of the electroplating plant's electricity needs with a combined heat and power plant (CHP), and a heat recovery system from the spray shop and tool shop covers 98 % of the site's heat needs. At KTB, a CHP unit supplies 30 % of the total electricity demand. A 400 kWp photovoltaic system on the roof covers about 7 % of the total electricity demand. "With another 400 kWp in 2022, we would then produce 44 % of the electricity demand ourselves," Brockmann looks ahead. The remaining CO_2 emissions could then only be reduced by purchasing green electricity or acquiring certificates. "Investments in own power generation make sense not only from a CO_2 point of view, but also because of price developments in the market," he sums up, but is aware of the limitations: "Over time, we will reach 50 % own power production, but higher shares will definitely be difficult."

Synergies and future plans

"It is not only for capacity utilisation control in project-driven toolmaking that two similar locations are helpful. KTB is very automotive-heavy, Hübner has relatively a lot of sanitary products on order. Together we now have a broader and more secure set-up. We have not been able to compensate for all the recent losses of orders from automotive customers, but we have been able to compensate for some of them. In electroplating, it is relatively easy to have a process problem that takes days to resolve. Three independent electroplating plants under one roof give us security. Hübner has smaller injection moulding machines, KTB larger ones. Hübner is a little further ahead than KTB in the automation of injection moulding," says Carsten Brockmann, characterising the current situation of the newly "married" companies.

He has clear goals for the joint future: "We will integrate the locations more strongly. We will have joint sales, joint purchasing, and uniform IT, but the production locations are not up for discussion," affirms Carsten Brockmann, "both locations can grow spatially. We rather want to expand the product range. In the automotive sector, we are trying to position Hübner's technologies – especially PVD and assembly know-how. If the customer wants painting today, we call in outside companies. But we want to expand the competences in electroplating, PVD, marking and lasers, complement them with options in painting and strengthen the surface competence as our essential asset overall."

www.huebner-ktb.de, www.huebnergmbh.de
www.ktbernt.de, fgk.zvo.org

... or of cascade injection moulded and chrome-plated decorative trims for vehicle interiors.

With AI to the injection mould

How the Toolplace platform wants to make the procurement of moulds easier

Toolplace GmbH, founded at the beginning of February 2022, is developing a platform that will initially connect suitable toolmakers with injection moulders and, in the medium term, simplify and handle the entire procurement process for high-quality injection moulds.

Since spring 2021, founder Christian Götze has been taking his idea to mould makers and buyers in the plastics processing industry - more than 40 so far: he is validating his concept, talking to potential users, acquiring demo projects, and testing basic functionalities. The first step is a service that connects injection moulders with suitable manufacturers of injection moulds. This matchmaking service has already been launched but will not be available as an online solution for several months. The platform is to be launched in the third quarter of 2022 and offer the full functionality of a completely digitalised purchasing process in the course of 2023.

As an advantage for toolmakers, Christian Götze points out that they do not have to establish their own sales department in order to be able to compete internationally. This would also give them more visibility: "The toolmakers in the DACH region are good, really good, but too small to each operate and maintain good sales structures on their own. A 50-person company cannot assign three people to sales. The aim should be to get orders onto the platform that are suitable for local toolmakers. It's about participation in markets as an opportunity for small mould makers." As a concrete example, he sees processors in the USA who are often unaware of the opportunities that smaller European toolmakers offer them. "One or the other injection moulder has told me: if I get the 100 % matching supplier suggested to me that I don't know yet, that in itself is a super offer."

The advantage for plastics processors should be a simplification of procurement: "Today, an injection moulder asks five toolmakers by default. One employee must analyse, compare and evaluate all incoming offers in terms of technology and costs. These steps can all be digitised and enable multi-factor comparisons." The basis for the enquiries will be PDF and CAD data. Compared to a conventional request for quotation, the effort for processors initially remains about the same, while comparisons, follow-up and change management and finding suitable suppliers are significantly simplified, explains Christian Götze. The platform's process advantages should also be available to injection moulders with an existing supplier portfolio. In addition to the enquiry to the known toolmakers, Toolplace wants to use an artificial intelligence (AI)-based algorithm to match these enquiries with the most suitable toolmakers from the DACH region and suggest them, so that they can then offer their products and services as a supplement.

Christian Götze worked at Georg Kaufmann Formenbau AG in Remetschwil/Switzerland from 2012 until the beginning of 2022, most recently as Sales Manager. Now he is driving the realisation of Toolplace forward full-time. Contact: Tel. +49 173 6645123; c.goetze@toolplace.de

www.toolplace.de

Photo: GK Tools

Christian Götze wants to equip his platform with full functionality by 2023.

From PE and PP via CO_2 to new PP

Prof. Dr. Bernhard Rieger advocates the incineration of polyolefins and the conversion of the resulting carbon dioxide with green hydrogen into a precursor for new polypropylene.

The K 2022 Scientific Council comprises eight university professors. The expert panel supports Messe Düsseldorf in implementing the guiding themes of resource conservation, energy transition and climate neutrality at the trade fair in mid-October. K-PROFI asks the individual professors about their heartfelt topics, their view of the World Fair and their wishes, especially for the plastics processing industry. For the second interview this is Prof. Dr. Dr. h.c. Bernhard Rieger, head of the Wacker Chair for Macromolecular Chemistry based in Garching and director of the Institute for Silicon Chemistry at the Technical University of Munich.

K-PROFI: Which topics are close to your heart?

Prof. Dr. Dr. h.c. Bernhard Rieger: The future of the plastics industry is driven by the environmental problems of polymer materials. The EU wants to be the global pioneer with new technologies - and that is a good thing. In my research, topics on a “circular economy” of plastics, especially the plastics family of polyolefins, have occupied a central position for more than two decades.

One focus of the work of my department at the Technical University of Munich is on the recycling of carbon dioxide into the material cycle of polymers. In contrast to polyesters and polyamides, which can be recycled well by hydrolysis, polyolefins such as polyethylene (PE) and polypropylene (PP) are thermodynamically too stable for clean depolymerisation into the monomers. Therefore, I advocate incineration of used polyolefins using the high enthalpy of combustion (“cut-resistant petroleum”) of this material class, which is the largest by volume. The resulting CO_2 can be catalytically converted with (green) hydrogen to methanol and this further to the propene monomer. Both individual steps are commercially available and not only provide an interesting approach for the rapidly developing family of polypropylenes. Polymers such as polyacrylic acid (keyword superabsorber) and polyacrylonitrile (keyword CFRP and lightweight construction) are also based on the same building block.

A second focus of my work is on recyclable polyesters, especially the fascinating polyhydroxybutyrates (PHB). They have been discussed as a biogenic and especially biodegradable class of materials for a long time, as they have properties close to those of polyolefins. However, their biotechnological production is too expensive, especially in comparison with polyolefins produced catalytically and without solvents. In my eyes, however, PHB is a "hidden hero" if cost-effective access can be achieved. We are now very close to a catalytic solution to this problem, moreover with CO_2 as a carbon source.

Why should the plastics industry, especially the processing companies, concern themselves with your heartfelt topic? What concrete benefits do you see in this? As a scientist, what ideas would you like to see from the processing industry?

In the last few years, we have been researching our core topics in close cooperation with leading international industries. Unfortunately, in most cases the courage to implement industrial innovation was lacking. In the meantime, however, the political pressure for a circular economy of plastics in the EU has grown strongly; moreover, we are experiencing a shift of research and production to Asia. However, I am sure that an industry with about 1.5 million employees in Europe and a turnover of more than 350 billion euros has recognised the signs of the times and is in the process of restructuring. A promising sign is the growing interest in green

Photo: TU München

Prof. Dr. Dr. h.c. Bernhard Rieger has been a professor at the Technical University of Munich since 2007, head of the Wacker Chair for Macromolecular Chemistry based in Garching and director of the Institute for Silicon Chemistry.

materials, not only on the part of manufacturers, but now also on the part of processors, even if these are not yet accessible in large quantities.

In your opinion, what urgent task is not receiving enough attention in the plastics processing sector? And what need for action can be identified as a result?

At the turn of the millennium, there was a high level of interest among plastics producers in new material properties from known monomers ("drop-in technologies"). This subsequently changed to a strategy of cost reduction in order to remain internationally competitive. In the meantime, interest in circular economies has come to the foreground - at least in the western world. Many large customers of manufacturers are asking for green materials, the cost argument almost seems secondary - at least in the development labs.

In my view, the demand for green technologies will also increase strongly internationally. Ultimately, it is we consumers who will decide which concepts global companies will use to be successful in plastics production and processing. Awareness and responsibility for our environment are increasing. To be economically successful in the future is the great challenge for plastics producers as well as for processors.

What do you expect from the next generation of scientists?

The training of our young scientists must also be geared to these profound, global challenges. And this does not only concern the question of which research topics we tackle. Of course, a thorough basic education is necessary, also to be able to correctly assess the often emotional public discussion. In Garching, I attach particular importance to training beyond the boundaries of one's own subject: it is not only the perfectly executed synthesis and knowledge of polymerisation kinetics that counts.

Just as important is the processing of the materials, as well as the ecological and economic evaluation. We get the expertise for the latter from the industry, with which we cooperate closely not only in research but also in teaching. In addition, "lived" internationalisation is important. That's why I particularly appreciate the instrument of the DFG's international graduate schools.

Corona or no Corona: What will make the K Fair unique again in 2022? What inspiration, what insights and what signals are you hoping for?

Many countries in the world have recognised the plastics industry and its potential value for the development of their economies. There, the processing sectors in particular are developing rapidly. For these new markets, but of course also for the supplier industry, "K" is the leading trade fair. I therefore expect a high level of interest and also a strong influx from these countries. As a member of the Scientific Advisory Board of K 2022, I am of course looking forward to the Science Campus and am curious to see what response the topics of the "Circular Economy" will find there.

www.k-online.de
www.ch.tum.de

With an expert's eye, the employee checks the product for inclusions or other defects.

All photos: K-PROFI/Hauptmann

"I am not aware of any other company besides us that offers the combination of screen printing, thermoforming, machining and assembly with our range of part and batch sizes," affirms Peter Breer.

"We seek the challenge"

How Borsi has perfected the combination of screen printing and thermoforming, opening up ever new areas of application.

Who doesn't know the round Warsteiner illuminated advertisement with the golden logo? It marked a milestone at Borsi GmbH in Schutterwald in 1988. When you visit the company, your eyes fall on huge backlit signs of almost every imaginable car brand or brewery. Names such as Lidl or Netto in XXL also shine brightly. Next to them are covers for industrial machines or solariums, interior panels for caravans or bonnets, mudguards and co of the street scooter. Borsi combines two competences under one roof: screen printing and thermoforming. Peter Breer, Managing Director, affirms, "I'm not aware of any other company besides us that offers the combination of screen printing, thermoforming, machining and assembly with our range of part and batch sizes."

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

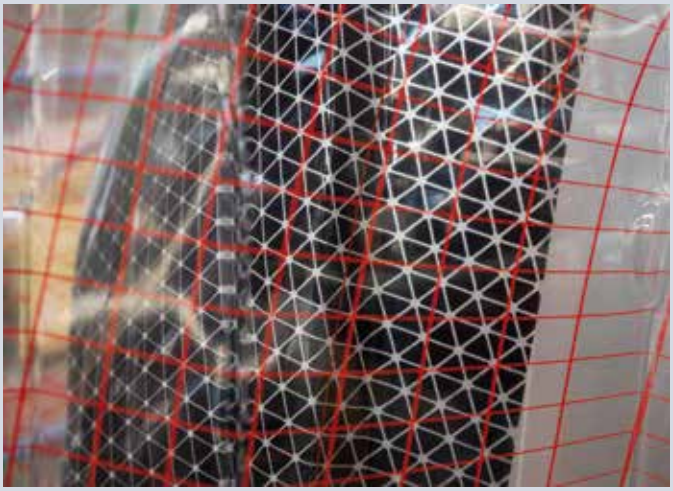
It all started 200 years ago with church windows. Coloured glass panes, encased in lead, were the beginning of the company that Wilhelm Schell founded in 1821. In 1900, printing technology moved into the business. In the 1950s, Fritz Borsi took over the company and gave it his name. Since 2018, it has belonged to the Breer couple and is still a family business, just as it was 200 years ago. The product range changed from church windows to shaping and printing advertising mirrors, radio scales, goods display stands and finally illuminated advertising in the 1980s. "This was the beginning of golden years in the truest sense of the word," says Breer.

For Borsi developed the technique of applying a translucent gold coating to a PMMA semi-finished product and then shaping it as a sign for illuminated advertising. Warsteiner had financed the development and held the exclusive right to the backlit gold signs for five years. Then the other breweries followed suit - the company could not save itself from orders. The automotive industry did not want gold, but backlit chrome. "Thanks to these two industries, we were able to firmly establish ourselves as a supplier in the illuminated advertising industry," Breer recalls.

"We have reinvented ourselves again and again".

With the consolidation in the brewery industry, demand declined. In 2006, the company was still generating 80 % of its sales with illuminated advertising; today it is only 20 %. "We have reinvented ourselves again and again. Today we are much more diversified and use our know-how to open up completely new applications with our customers," Beer describes the development. This can involve printing functionalities such as conductor tracks or sensor technology and then moulding the component. Or printing wood decorations on semi-finished products for caravan interior panelling or complex patterns on the cover of solariums or, or, or.

After the printing process, the semi-finished products must dry completely before going to the thermoforming department.



Printed line grids on the subsequently formed semi-finished product form the decision-making basis for the final lithography of the distortion print.

Above: Slow and controlled heating before the forming process is indispensable to avoid damaging the print.

Right: With the help of the folding frame, the formed component is discharged from the T8 and checked for quality at the light table.

Above: Interior trim for a caravan is currently running on the BR5 from CMS.

Left: The T8 has been in service at Borsi for many years. A T10 is just a few steps away.

135 employees generated a turnover of EUR 17.2 million in 2021. Six thermoforming machines from Geiss, three from Illig and one from CMS are installed in a built-up area of 12,500 m². The clamping frame sizes range from 280 x 240 mm to 3,000 x 3,000 mm. Six machines are equipped with automatic sheet loading. Finishing is handled by eleven CNC machining centres, ten of them from Geiss and one from CMS. Five EMM screen printing machines with maximum print formats from 1,300 x 1,000 mm up to 4,200 x 2,700 mm complete the machinery. Today, the focus is on technical parts for a wide range of industries, which account for 80% of sales.

Excursion into screen printing

Screen printing technology makes it possible to apply precisely defined quantities of paint, adhesive or other functionalities to the flat, unformed semi-finished product. In this way, conductive tracks, sensor technology, haptic surfaces, masking and much more can be realised reliably and in series. The mesh thickness of the screen, the viscosity of the ink, the pressure applied to the screen and the speed of the squeegee determine the amount that reaches the substrate. In printing, one screen is required per colour and motif. For this purpose, the screen is coated with a UV-sensitive emulsion and exposed to lithography. The emulsion hardens down to the motif, the part that has not hardened is washed out so that the ink passes through the screen onto the substrate at these places. Depending on the number of colours and the composition of the motif, several screens and thus also printing processes are necessary.

What sounds so simple is actually very complex. After all, once the thermoforming process is complete, the motif made of conductive track, sensor technology or adhesive must sit exactly where it belongs on the moulded component. Not a millimetre too far up or down, right or left. The motif on the moulded part must not look distorted, and the conductor path should also run in orderly tracks. In addition, the paint must not burn during thermoforming and must not flake off during and after moulding. Breer explains: "The paint is elastic. We formulate the colours from the supplier's raw colours in-house. For this purpose, we have a colour database of over 2,000 shades. The composition of the ink systems and solvents depends on the substrate and the required stretching. That's where we draw on our decades of experience."

The viscosity of the ink and the mesh size of the screen influence the amount of ink applied just as much as ...

The true beauty is only revealed after deformation

Walking through the print shop, huge stacks of printed semi-finished products resting on pallets catch the eye. Here they dry out for up to 24 hours after a print run before the next layer of ink is

... the speed and pressure of the squeegee.

After machining in the CNC machining station, an employee labels the interior cover of a caravan.

applied. The attention is caught by a wild grid of smaller and larger squares on a transparent component. Breer explains: "We want to create our customer's pattern evenly on the thermoformed component. To do this, we print a line grid on the semi-finished product, deform it and work out the printed image on the flat PMMA semi-finished product based on the distortions of the grid." With the help of suitable software, experience and two to three iteration steps, the so-called distortion print is created on the flat semi-finished product, which only reveals its true beauty after deformation.

A sure instinct is needed

From the print shop it's on to the thermoforming halls. The first encounter is a Geiss T8 with automatic plate loading and a maximum clamping frame size of 3,000 x 3,000 mm. This is where the illuminated advertising for Wacker Neuson, a manufacturer of construction machinery and equipment, is produced. The printed PMMA semi-finished product measures 1,500 x 1,500 mm and has a thickness of 4 mm. The corporate design colours of the company: black and red. "It is important in the corporate identity business to hit the colour tones spot on - backlit and also not backlit," says Breer, describing the challenges of illuminated advertising. In the case of the Wacker Neuson logo, behind the first layer of colour on the back of the semi-finished product, which is visible during the day, there are further layers of colour with different tones and other special features. Only then does the colour scheme of the illuminated advertising fit in all situations.

The machine operator manually aligns the panel again in the machine before the forming process. Every millimetre counts, so that the print and the edge of the formed advertising medium fit exactly. Then the temperature is slowly raised to 165 °C; the heating time is 78 seconds. This ensures that the print is not damaged. The total cycle time is 270 seconds. A folding frame ejects the formed component from the machine. Then comes the quality control. The machine operator lays the illuminated advertising on an enlightened surface and checks whether there are any inclusions, light spots or other irregularities. Even the smallest dirt particles in the ink become visible and would be rejects. He also checks the dimensions of the logo. Everything fits, the component can go to the customer.

Above left: Here, too, a folding frame ejects the interior trim from the machine so that the employee can remove it easily.

Left: The interior trim enters the assembly area via CNC machining. Here, the employees fix inserts into the cladding with the help of glue and ultrasonic welding.

Above: The fully automatic ultrasonic welding system from Sonotronic is used for the simultaneous joining of various reinforcements and components on vehicle door panels.

The age of thermoforming

In the next hall, the BR5 with automatic sheet loading from CMS is forming the interior trim for a caravan from a 2,100 x 1,400 mm thick, grained ABS semi-finished product. Unlike the illuminated advertising, there are still a few assembly steps to follow. Two people place the interior trim in the component holder provided and carefully clean the surface. Double-sided adhesive strips in defined areas and inserts that are glued and additionally fixed at 20 points by means of ultrasonic welding ensure that the caravan manufacturer can hook the cladding into the vehicle and fix it in place with a flick of the wrist.

Unmistakably the colour of the StreetScooter: bonnets, mudguards and other exterior components are ready for further transport.

A few steps further on, exterior components of the Street Scooter shine in typical yellow colour. An employee carefully glues the interior reinforcement into the bonnet. The company produces component holders and prototype tools in-house from Ureol. Aluminium tools for large series are supplied by a partner company. The batch sizes vary from 150 to 500 parts for illuminated advertising to 15,000 or 20,000 series for technical parts. “A lot has happened in thermoforming in recent years. In the past, the break-even point was at batch sizes of about 5,000 pieces. If there were more, it went to injection moulding. That is completely different today. Today we are facing the age of thermoforming. Individualisation, variety and extremely advanced materials and machines make this possible,” Breer is convinced. The committed entrepreneur also sees many other possibilities: “We have the know-how with crystal-clear components through illuminated advertising, we produce printed images that fit precisely to the hundredth of a millimetre after shaping. Now we are looking for new challenges together with our customers.”

www.borsi.de

All photos: Gealan

The modern recycling plant in Tanna gives Gealan more flexibility in terms of incoming goods flows.

Automated and flexible recycling

How the PVC window profile manufacturer Gealan ensures a closed material cycle

Scarce material flows and ever higher recycling quotas - two problems that are often diametrically opposed and difficult to reconcile. Gealan Fenster-Systeme GmbH, headquartered in Oberkotzau, Upper Franconia, has now found a solution. It has long operated a recycling plant for in-house waste at its production and logistics site in Tanna in Thuringia and has now modernised and automated it. "This not only gives us maximum flexibility, but also allows us to work more efficiently and thus more economically," is how Dr Michel Sieffert, Head of Research & Development, and Jörg Fickenscher, Research & Development/Process Engineering, summarise the advantages of the investment and explain this in more detail in an interview with K-PROFI.

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

The Gealan Group processes about 100,000 tonnes of PVC per year into profiles for windows and doors, using about 33 % PVC recyclates. Profiles with recycled content are often neither visually nor mechanically distinguishable from those made from 100 % virgin material, if the recycled material is well prepared and incorporated into the profile core. "As a partner in the Rewindo recycling initiative from the very beginning, the topic of PVC recycling is very close to our hearts," says Dr Michel Sieffert. The chemist with a doctorate is pleased that the post-consumer recycling of discarded PVC profiles has become so well established throughout Europe since Rewindo was founded in 2002 that enormous quantities are now being returned and the image of the material has improved significantly.

He also considers VinylPlus, the voluntary commitment of the European PVC industry, to be very important and worthy of support. It aims to recycle 900,000 tonnes of PVC by 2025, including 420,000 tonnes of window material, and at the same time reduce emissions from PVC and additive production. Gealan also has recycling targets and aims to increase the recycling rates in its own products to up to 50% in the next few years. A prerequisite for this is, of course, that sufficient quantities of recycled material are available. This is one of the reasons why Gealan is expanding and developing its recycling facilities. This includes, on the one hand, the expansion of the plant in Tanna, but also a new granulator and new silos in Tanna and Oberkotzau, which will be installed in the near future.

Responding to scarce material flows

"We basically process two types of recyclates: Post-industrial goods from our own production sites and post-consumer goods from Rewindo sources," explains Jörg Fickenscher. With both material flows, the profile manufacturer knows exactly which material he is receiving and can reuse it without any problems. The situation is different with post-consumer waste from other sources. Nevertheless, Gealan has recently had no choice but to use these materials as well. Dr Michel Sieffert explains: "In order to be able to maintain the recycling quotas we set ourselves in our products, we had to buy in external materials last year due to the shortage of materials." At the same time, it was important to remain 100% true to their own quality standards. "We bought pre-sorted

and already prepared recyclates from selected recyclers and then co-processed them in our state-of-the-art plant here in Tanna."

This was made possible by the new procedure in the fully automated plant, which has been built in Tanna over the past three years and has been in operation since last year. Gealan built the new plant, which can grind and separate up to 2 t/h of residual materials, together with its partners, which include Hamos from Penzberg. "Hamos adapted the plant exactly to our needs and spatial conditions," emphasises Dr Michel Sieffert.

Focus on high separation efficiency

In contrast to the conventional procedure, which has also been in use in Tanna up to now, the new plant no longer requires manual pre-sorting and mechanical separation into different fractions. "All residual materials arriving at our plant immediately go into the large mill and are crushed to a grain size of 10 to 12 mm," Jörg Fickenscher begins by describing the process. The large central mill is followed by a metal separator before the ground material is transferred to an active mixing silo. "The mixing silo is equipped with a screw that ensures constant mixing of the material, which in turn increases efficiency in the subsequent steps," Jörg Fickenscher explains further.

From here, the residual materials go through three steps: The first is dedusting, in which not only dust and fluff but also the smallest particles are removed. In the second step, rigid and flexible PVC are separated from each other before the regrind is differentiated into "white" and "coloured" in the third and final step in an optoelectronic sorting system with the help of two colour cameras. "Two colour cameras are required to examine each piece from both sides," explains Dr Michel Sieffert. This is the only way to detect white PMMA-coated particles and sort them into the "coloured" fraction, if necessary. While the white fraction can be directly transferred back into the extrusion process for profiles, a large part of the coloured fraction is first turned into granulate before it is used again. Theoretically, the coloured fraction could also be further separated into its colours, but this is not necessary due to the use of recycled material in the profile core.

Automation gives flexibility

"We are very satisfied with the new fully automated plant. It is much more efficient and lessens the workload of our employees, as the manual effort is significantly reduced. It also gives us maximum flexibility in the procurement of raw materials," says Dr Michel Sieffert happily. So far, about two-thirds of the total volume processed comes from profiles and one-third from post-consumer applications. "We want to successively increase the share of post-consumer materials in the coming years and thus achieve our goal of increased recyclate use of up to 50 % in our profiles," says Jörg Fickenscher. Thanks to the new plant, this is possible because "the different input materials can now be processed together and equally". The boom in the use of PVC windows began in the 1960s. Assuming a typical life cycle of 40 to 50 years for window profiles, larger waste streams are expected in the coming years, it is anticipated. "We are now well prepared for increasing input volumes," Dr Michel Sieffert and Jörg Fickenscher are pleased to report.

www.gealan.de

Output streams from the recycling plant are a white fraction, which can be fed directly back into the profile extrusion process, and a coloured fraction, which is first regranulated.

Without separation or mechanical preparation, the coloured profiles go directly into the large mill, are crushed and then processed further.

Dr Michel Sieffert, Head of Research & Development, (left) and Jörg Fickenscher, Research & Development/Process Engineering, are convinced of the performance of the new plant.

Learning from experience – and converting it into efficiency

How BSH uses lessons learned to replace a tool for material savings, component, and production optimisation

BSH Hausgeräte GmbH produces around 13,000 dishwashers a day at its Dillingen site. A heat exchanger is an essential component in almost every appliance. This is a large flat component whose upper and lower parts, made of polypropylene, are tightly welded together. After eight years of operation, BSH designed new injection moulds for the outer shells. Hubert Groll, Head of Manufacturing Engineering, and production planner Christoph Rau were not only able to implement their "lessons learned", but also realise additional component and production optimisation. Together with hot runner partner HRSflow from Frankfurt and mould maker Siebenwurst from Dietfurt, those responsible gave K-PROFI an insight into the project "2+2 stack mould for heat exchanger upper part".

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

Photo: K-PROFI

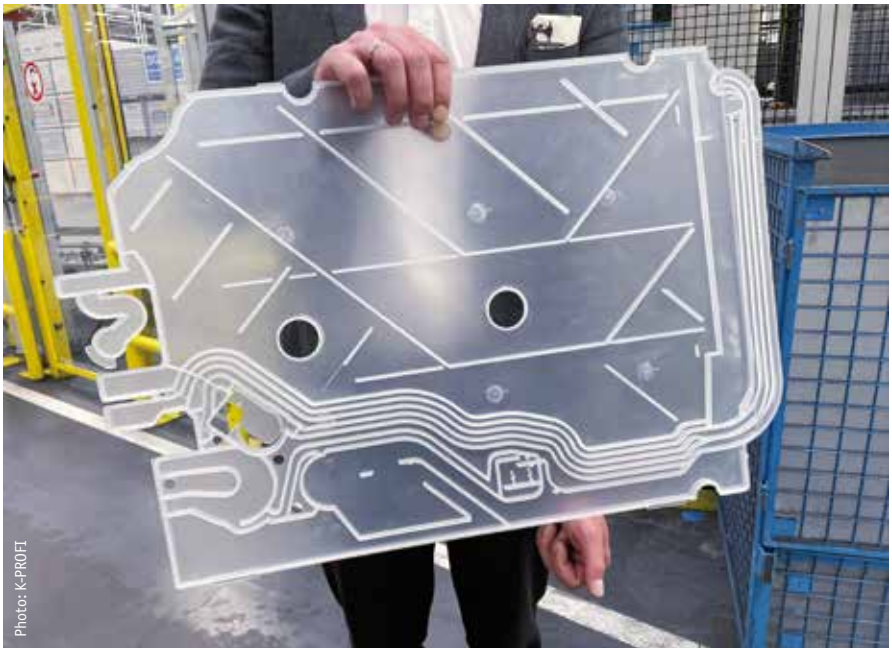
Hubert Groll, Head of Manufacturing Engineering: "Here in Dillingen we develop and plan the production processes for BSH's global dishwasher manufacturing."

With the production of more than two million appliances a year, the Dillingen site, which specialises in dishwashers, is the largest plant for this product category in the BSH manufacturing network. BSH also manufactures dishwashers in Poland, Spain, Turkey, the USA and China. "Dillingen is the main development location and competence centre for production," says Hubert Groll, classifying its status. "Here we develop and plan the production processes for global dishwasher manufacturing. Among other things, we qualify all injection moulds that are used either in other BSH factories or by suppliers. Our core competence lies in the prefabrication of plastic and sheet metal components. Other locations do not have such a high level of vertical integration as here in Dillingen."

For consumers, the energy label is an important decision-making tool when buying these appliances. Since March 2021, a new EU label has applied to dishwashers, with the energy efficiency scale ranging from A to G instead of the previous A+++ to D; the plus classes are no longer applicable. The key parameters for dishwashers are electricity and water consumption, indicated on the label in kWh per 100 cycles respectively in litres per cycle of the energy-saving programme. The heat exchanger plays a crucial role for efficient dishwashing and thus for the classification. "It is able to temporarily store the waste heat unused in the previous rinse cycle in a reservoir holding several litres of water. In subsequent cleaning phases, preheated water can be fed to the unit instead of cold tap water," says Hubert Groll, describing the principle of the heat exchanger, which BSH introduced back in the 1980s. Drying is also more effective and energy-saving than using self-heating alone. Moist air condenses on the cold heat exchanger, cooled air warms up on the warm dishes and absorbs water again there.

The heat exchanger is located directly behind the left-hand side wall made of sheet steel and takes up its entire surface. It combines several hydraulic functions, has connections for the fresh water, the softening system and the hose leading to the wastewater pump. Inside the component are several chambers and channels. An impeller meter in combination with a circuit board and a rocker switch measures the water inflow. A pipe interrupter prevents backflow into the drinking water pipe. The pipe interrupter is a permanent opening or interruption of the supply channel by which a negative pressure in the drinking water pipe or a possible overpressure in the downstream part of the channel can be relieved and a backsiphonage of water already in the dishwasher can be prevented. This protects the drinking water in the supply network from contamination.

Hubert Groll demonstrates the position of the heat exchanger, which is installed in more than 96 % of the appliances produced in Dillingen.



Not trivial in terms of plastics technology: the large flat heat exchanger upper part has thin-walled areas as well as material accumulations on the ribs and webs that form the watertight channels after welding.

"As a water-carrying component, the heat exchanger is one of the most complex and largest plastic components in the dishwasher. The challenge during injection moulding is the dimension of the two large-area lower and upper parts and their tendency to warp during shrinkage. During the subsequent mirror welding process, it must be possible to weld not only the outer contours but also the inner channels tightly. This requires very flat surfaces, exact geometries, and distances," Christoph Rau formulates the requirements for the two outer shells. Even when removing them from the injection mould and placing them in a grid box, accuracy in the mm range is important. "Stacking is done very precisely according to a guideline so that the parts shrink in an orderly fashion."

New mould opens up component optimisation

In dishwasher production, the heat exchanger is an essential component. It is installed in more than 96 % of the appliances produced in Dillingen. The two upper and lower parts are the technically more complex components of the heat exchanger and are manufactured by BSH itself. Production reliability and plant availability have high priority. When BSH noticed signs of fatigue in the injection mould for the upper part, the decision was made to use a new mould. "These signs of wear were simply due to the operating time. We commissioned the 2+2-cavity stack mould in 2012 and produced eight million shots with it by 2020, i.e. around 32 million upper parts. Because we need this capacity to supply our assembly lines, we could not justify the risk of a breakdown. Even our back-up with a 1+1-cavity stack mould here and externally would not be sufficient to cover the daily demand," reports Christoph Rau.

When designing the new mould, the production planner took advantage of the opportunities for optimisation. "In itself, the predecessor mould had no weak points. But in operation you always recognise potential for optimisation, and we wanted to incorporate these empirical values into the new tool." In addition, the component itself was to be optimised, as it "is not trivially designed in

The heat exchanger upper parts are produced more quickly and with less strain on the machine with the new optimised 2+2 stack mould from Siebenwurst.

The 2+2-cavity stack mould runs with an effective clamping force of 9,500 kN on a 15,000 kN injection moulding machine from Engel, the largest of a total of 21 injection moulding machines at BSH in Dillingen.

After welding: the heat exchanger combines a large number of hydraulic functions, has connections for the fresh water, the softening system and the hose leading to the waste water pump.

terms of plastics technology". In some areas it is very thin-walled. In contrast, it has material accumulations on the ribs and webs that form the channels after welding. "We managed to reduce the wall thicknesses by 0.2 mm everywhere despite the required welding areas. This led to a huge material ratio and cycle time reduction," says Christoph Rau.

BSH started the project together with Christian Karl Siebenwurst GmbH. The toolmaker has made a name for itself with complex moulds, especially for the automotive industry. "Stack moulds are one of our main sellers," emphasises Tobias Amler, head of the project management and design department at Siebenwurst. "But the component itself and the industry were rather atypical for us, especially with regard to the project task and the deadline. It took just 22 weeks from order to SOP. In the automotive industry, we receive component data years before production starts."

Faster and gentler injection

Siebenwurst used Moldflow analyses and BSH's previous experience with the component to optimise the position of the injection points, particularly with regard to the tendency to warp. The new nozzle positioning improved the component properties and reduced the injection pressure. Each of the four components produced in one shot with the 2+2 stack mould is injected via six nozzles. "In the old mould, we had many sub-distributors with diameter jumps between 6, 8 and 10 mm as well as longer flow paths on the way from the sprue bush via the transfer system to the individual nozzles. This led to losses during injection. My specification for the new mould was therefore homogeneous diameters in the hot runner," reports Christoph Rau. This optimisation was also successful with the help of the hot runner partner.

HRSflow was responsible for the design of the hot runner for the first time at BSH in Dillingen. "We wanted to get to know a new hot runner technology. HRSflow offered a very compact concept, which we needed due to the conditions with the machine and the hall crane," reports Christoph Rau. HRSflow determined the nozzle sizes via a

Application engineer Mathias Beyrle from the prefabrication department contributed his know-how during the commissioning of the optimised tool.

Photo: K-PROFI

Production planner Christoph Rau: "Bringing the hot runner into the cutout in the centre package and ensuring rigidity was a major challenge."

pressure loss calculation. While the transfer nozzles used for the larger volume flow come from the largest nozzle series A, nozzles from the medium series M could be used for the actual filling of the cavities. All nozzles are equipped with conical valve gates. With a consistent diameter of 8 mm, a more homogeneous mass flow was achieved from the sprue bushing to the 24 mould nozzles. "This has enabled us to reduce the injection time and, above all, the injection pressure from 1,700 to 1,450 bar. We were able to reduce the clamping force from 15,000 kN to 9,500 kN by around 37 per cent and achieved a much gentler machine operation."

A disc for melt transfer

In addition, the hot runner manufacturer Oerlikon HRSflow offers a special feature for the melt transfer from the machine nozzle to the hot runner system, which is generally a critical point in stack moulds. After all, the melt must pass safely from the machine nozzle through the closed mould to the centre stack, from where it is distributed via the hot runner into the four mould cavities. While the classic transfer is "needle to needle", HRSflow uses a so-called disc. Here, there is a disc-shaped undercut in the mould that fills up during the first injection and additionally seals the melt transfer system. "This sealing disc enabled us to reduce the screw retraction by several seconds and thus further accelerate the cycle. Our employees were sceptical at first but are now convinced by this solution." Bernd Hilneder, Key Account Manager HRSflow, adds: "With the classic variant, the transfer nozzles of the machine and the moving mould side always move towards each other. In the long run, there is a risk that melt will get into the parting line. With the disc solution, the nozzle moves onto the sealing plastic disc, which also protects the mould."

Goal achieved: Efficient heat removal

In order to be able to cool the component specifically in the areas with material accumulation on the ribs and webs, BSH and Siebenwurst redesigned the mould cooling system. Firstly, the diameter of the cooling holes was increased to 12 mm – the standard is 8 or 10 mm. Secondly, the holes – not across the entire component as before – have now been positioned to match the geometry, in order to decouple the cooling circuit from the thin-walled sections. In addition, contour-oriented conductive copper alloy inserts from Albromet GmbH, Geretsried, ensure faster heat dissipation from the thick-walled fin packages. Five to ten times better thermal conductivity values compared to tool steel are stated by the supplier Albromet for its conductive copper alloys. "Thanks to the Albromet inserts, the hotspots in the area of the flow section in the heat exchanger have disappeared, the heat distribution is better, and the maximum temperature is 20 degrees lower. These were the essential measures to prevent distortion," says Christoph Rau happily.

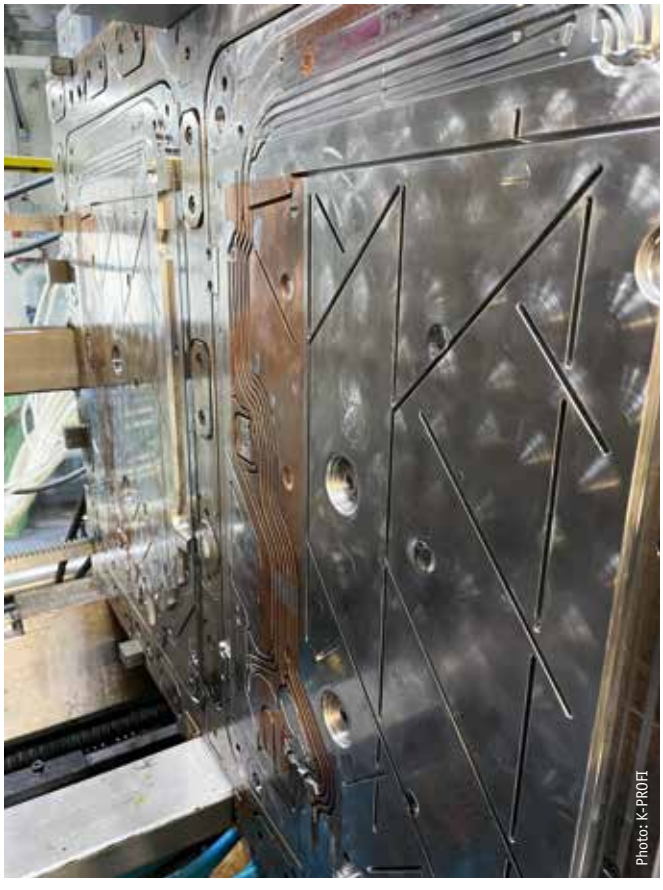


Photo: K-PROFI

Albromet's conductive copper alloy inserts ensure faster heat removal from the thick-walled fin packages and uniform shrinkage.

Bernd Hilneder, Key Account Manager at HRSflow, on the melt transfer: "With the disc solution, the nozzle moves onto the sealing plastic disc, which also protects the mould."

Tobias Amler, Head of Project Management and Design at Siebenwurst: "From order to SOP took just 22 weeks."

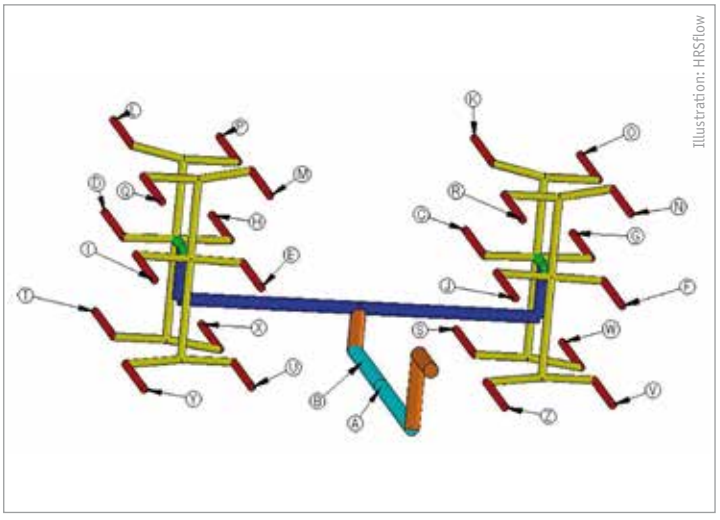
The components were still demoulded at a relatively high temperature. It is important to ensure that the welding plane of the ribs and webs is not damaged. There must be no imprints here so as not to jeopardise the tightness of the areas to be welded on the one hand and not to damage the PTFE release film used for mirror welding on the other, thus avoiding frequent film changes and downtimes of the welding system. For this reason, BSH and Siebenwurst relied on additional finely tuned contour ejectors in the area of the thin wall at this point. "We put a lot of brainpower into this issue. We had little space to place the ejector segments correctly and at the same time not to impair cooling," recalls Tobias Amler from Siebenwurst. "The hot runner is placed in the centre stack of the stack mould. To prevent deflection at this cut-out, the hot runner must be as compact as possible and the mould must be adequately supported," Bernd Hilneder points out.

At the same time, the machine size and the overhead crane limited the mould structure. "In order to insert the hot runner into the cutout and at the same time achieve the required rigidity, we had to make several passes," explains Christoph Rau, and continues: "That was a big challenge." Despite the critical space conditions, it was possible to accommodate the ejector packages, the hot runner, and the cooling holes in such a way that "nothing gets in the way and an optimal cooling pattern is achieved. We worked a lot on the steel, either to create space or to better support certain components," says Tobias Amler.

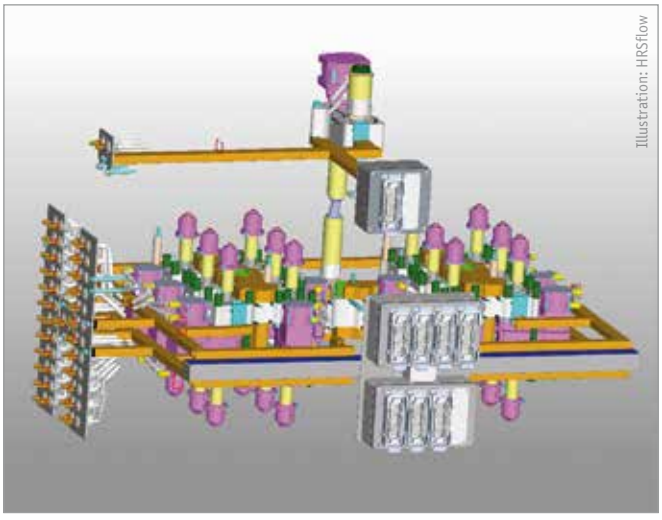
Brief portrait of BSH Hausgeräte

BSH Hausgeräte GmbH is a global leader in the home appliance industry, with sales of around EUR 13.9 billion in 2020 and 60,000 employees. The Group's brand portfolio includes eleven well-known household appliance brands such as Bosch, Siemens, Gaggenau and Neff, as well as the Home Connect ecosystem brand and various service brands, including Kitchen Stories. BSH is a company of the Bosch Group, produces in 39 factories and is represented in about 50 countries.

Robert Bosch GmbH founded the Dillingen site in 1960 as a plant for fuel pumps. Since 1976, BSH has been manufacturing dishwashers here for the whole world. With over 75 million appliances produced to date, BSH in Dillingen is Europe's largest manufacturer of dishwashers and, with over 2,500 employees, the largest employer in the Dillingen district. More than 2,000 dishwasher variants are produced on the flexible assembly lines for consumers all over the world, differing in size, shape, colour as well as technology and equipment. In addition, the global technology centre for dishwashers is located at the site.



A constant hot runner diameter of 8 mm ensures a homogeneous melt flow from the sprue bushing to the 24 mould nozzles.



The hot runner is placed in the centre stack of the stack mould. With HRSflow, the melt is not transferred needle to needle, but via a disc solution.

The result of this joint effort is a 2+2 stack mould weighing almost 11 t, which allows an 8.5 % reduction in cycle time and significantly reduces the injection pressure from 1,700 to 1,450 bar. With an effective clamping force of 9,500 kN, the 15,000 kN Engel injection moulding machine no longer must be operated at the limit. Christoph Rau is highly satisfied: "We have high demands and carefully select high-quality hot runners and mould components. The limited space for the hot runner in the centre stack and the high demands on mould rigidity made the task particularly difficult. This was a very exciting project."

www.bsh-group.com
www.hrsflow.com; www.siebenwurst.de
www.albromet.de


Photo: BSH

View of the logistics centre at BSH's Dillingen site, where up to 12,000 dishwashers are manufactured per day.


Photo: BSH

In continuous operation: During the extensive quality tests, a dishwasher runs around 3,500 times – which corresponds to a service life of twelve and a half years.

COMMENT

Energy saving, own generation and recycling take on strategic importance

Disrupted supply chains, limited availability, tightened contracts, unprecedented price premiums for plastic materials, all-time highs in freight rates, fuel prices beyond the pale - the consequences of the invasion of Ukraine top the effects of all previous crises on the plastics industry.

All materials - metals, glass, ceramics, stones, earths and plastics - need energy to be extracted, refined, formed or reshaped. Admittedly, more or less. Unlike competing materials, plastics are also materially dependent on the energy sources oil and gas. This gives plastics a high energy value, but makes them doubly dependent - on fossil sources and on energy. The fact that neither the electricity used to produce, refine and process plastics nor the mostly volatile precursors can be stored to any significant extent makes plastics production all the more vulnerable.

A snowstorm in the US Midwest, a Corona-related port closure in China, a severe hurricane season in the Gulf of Mexico, a flood of force majeure notices from producers: all these events have already caused momentous bottlenecks in raw material supplies and price distortions in recent years. In addition, energy prices are expected to continue rising at a high level. Therefore, it is important for plastics processors to reduce dependencies and gain resilience.

Minimised material use through lean construction, design for recycling, consistent use of recycled materials, identification of alternative materials, economical processes such as foaming and in-house recycling are more than ever success factors in their own sphere of influence. In addition, the development of reliable sources of recyclate is essential.

More economical machines, more efficient peripheral and operating technology: in many places there is still room for improvement when it comes to reducing consumption - regardless of the energy source used. In addition, there is the option of self-generation - especially of electricity - via photovoltaics and wind power.

Saving energy, generating renewable energy, recycling and the use of recycled materials are more than ever the order of the day in plastics processing. They are no longer just factors of social responsibility, image building or operational risk management. At the latest now, they have strategic importance, because they can become vital for survival. *Markus Lüling*

Sources of supply/suppliers directory

The A to Z of the plastics and rubber industry

Blow moulding machines

Blowmoldersale UG
Witthof 23c
D-22305 Hamburg
Tel.: +49 163 751 8520
blowmoldersale@email.de
www.blowmoldersale.com
www.flexblow.com
Purchase and sale of blowing machines.
Sale of new reheat machines
Brand Flexblow / Lithuania.

Blown film lines

HOSOKAWA ALPINE Aktiengesellschaft
D-86199 Augsburg
Tel.: +49 821 5906-0
plastics@alpine.hosokawa.com
www.hosokawa-alpine.com

Certification

We certify the plastics industry
Tel.: +49 931 4104-310, Fax: -320
cert@skz.de, www.skz.de

Cleaners

Chem-Trend (Deutschland) GmbH
Ganghoferstraße 47
D-82216 Maisach Gernlinden
Tel.: +49 8142 417 0, Fax: +49 8142 15884
maisach@chemtrend.de
www.chemtrend.de

Cleaning granules

Chem-Trend (Deutschland) GmbH
Ganghoferstraße 47
D-82216 Maisach Gernlinden
Tel.: +49 8142 417 0, Fax: +49 8142 15884
maisach@chemtrend.de
www.chemtrend.de

Coupling systems

RTC Couplings GmbH
Jahnstr. 86, D-73037 Göppingen
Tel.: +49 7161 98796-50
Fax: +49 7161 98796-79
E-Mail: mail@rtc-couplings.com
www.rtc-couplings.com

Cutting mills

Getecha GmbH
Am Gemeindegraben 13
D-63741 Aschaffenburg
Tel.: +49 6021 8400 0
info@getecha.de, www.getecha.de

Hellweg Maschinenbau GmbH & Co. KG
Vennstrasse 10, D-52159 Roetgen
Tel.: +49 2471 4254
info@hellweg-maschinenbau.de
www.hellweg-maschinen.de

TRIA GmbH
Carl-Friedrich-Benz-Str. 1
D-47877 Willich
info@triaplastics.de
www.triaplastics.de

Dosing and mixing systems

Industriestr. 15, D-63633 Birstein
Tel.: +49 6054 9129-0
info@processcontrol-gmbh.de

Drying and conveying technology

WENZ Kunststoff GmbH & Co.KG
Tel.: +49 2351 459040
info@we-ku.de
www.we-ku.de www.we-ku-shop.de

Education and training

Professional training for plastics professionals
Tel.: +49 931 4104-164, Fax: -277
training@skz.de
www.skz.de

Electrostatic systems

Eltex-Elektrostatik-GmbH
Blauenstraße 67–69
D-79576 Weil am Rhein
Tel.: +49 7621 7905-422
info@eltex.com, www.eltex.com

Engineering plastics

MKV GmbH Kunststoffgranulate
Niedertiefenbacher Strasse 2
D-65614 Beselich-Obertiefenbach
Tel.: +49 6484 89250-0
kontakt@mkv-kunststoff.com
www.mkv-kunststoff.com

PRO-plast Kunststoff GmbH
Feldstr. 16 D
D-64331 Weiterstadt /Darmstadt
Tel.: +49 6151 3093-0
Fax: +49 6151 3093-111
info@pro-plast.de, www.pro-plast.com

ROMIRA GmbH
Siemensstraße 1-3, D-25421 Pinneberg
Tel.: +49 4101 706-03
info@romira.de, www.romira.de
ROMILOY®-ROTEC®-LURANYL®-ROMITRON®

Extruder feeding systems

KREYENBORG GmbH & Co. KG
Tel.: +49 2597 93997 0
plastics@kreyenborg.com
www.kreyenborg.com

Extrusion technology

Coperion GmbH
Theodorstr. 10, D-70469 Stuttgart
Tel.: +49 711 897 0
info@coperion.com
www.coperion.com

Extrudex Kunststoffmaschinen GmbH
In den Waldäckern 16, D-75417 Mühlacker
Tel.: +49 7041 9625-0
Fax: +49 7041 9625-22
info@extrudex.de, www.extrudex.de

LEISTRITZ EXTRUSIONSTECHNIK GMBH
Markgrafenstr. 36-39, D-90459 Nürnberg
Tel.: +49 911 43 06 240
extruder@leistritz.com
extruders.leistritz.com

Heating elements

ERGE Elektrowärmetechnik Franz Messer GmbH
Hersbrucker Straße 29 - 31
D-91220 Schnaittach
Tel.: +49 9153 921 0, Fax: +49 9153 921 117
verkauf@erge-elektrowaermetechnik.de
www.erge-elektrowaermetechnik.de

IHNE & TESCH
ELEKTRO-WÄRMETECHNIK

Postfach 1863, D-58468 Lüdenscheid
Tel.: +49 2351 666-0, Fax: +49 2351 666-24
E-Mail: info@itlmail.de
www.elektrowaermetechnik.de

WEMA®

WEMA GmbH
Kalver Straße 28, D-58515 Lüdenscheid
Tel.: +49 2351 9395-0, info@wema.de
www.wema.de

Hot runner control technology

Gammaflux®
A business of BARNES GROUP INC

GF Controls GmbH
Gammaflux
Peter Sander Straße 41a
D-55252 Wiesbaden Mainz-Kastel
Tel.: +49 6134 94890-0
Fax: +49 6134 94890-25
Info@gammaflux.de
www.Gammaflux.com

Hot runner technology

HASCO®
hot runner

Tel.: +49 2351 957-0, www.hasco.com

Hydraulic cylinders

AHP MERKLE®

AHP Merkle GmbH
Nägelseestr. 39, D-79288 Gottenheim
Tel: +49 7665 4208-0
mailbox@ahp.de
www.ahp.de

Infrared dryers

KREYENBORG

KREYENBORG GmbH & Co. KG
Tel.: +49 2597 93997 0
plastics@kreyenborg.com
www.kreyenborg.com

Infrared welding

CEMAS Germany

www.cemas-germany.com

Injection moulding machines

Sumitomo SHI DEMAG

Sumitomo (SHI) Demag
Plastics Machinery GmbH
D-90571 Schwaig
Tel.: +49 911 50 61 0
info@dpg.com
www.sumitomo-shi-demag.eu

Inspection and sorting technology

SIKORA
Technology To Perfection

Bruchweide 2, D-28307 Bremen
sales@sikora.net, www.sikora.net
PURITY SCANNER

Inspection technology

OCS

OCS Optical Control Systems GmbH
www.ocsgmbh.com

Laser welding machines

EVOSYS LASERSOLUTIONS

Evosys Laser GmbH
www.evosys-group.com

Lubricants/Waxes

VOELPKER

Völpker Spezialprodukte GmbH
Fabrikstraße 1, D-39393 Völpke
www.voelpker.com

Masterbatches

ARGUS
Additive Plastics GmbH

Oberer Westring 3-7, D-33142 Büren
www.argus-additive.com

FBW GmbH
Forstweg 27, D-52382 Niederzier
Tel.: +49 2428 9563000
Fax: +49 2428 9563005
kontakt@fbwgmbh.de, www.fbwgmbh.de

Material conveying systems

KOCH TECHNIK

Werner Koch Maschinentechnik GmbH
Industriestraße 3, D-75228 Ispringen
Tel.: +49 7231 8009-0
info@koch-technik.de

WENZ
KUNSTSTOFFPERIPHERIETECHNIK

WENZ Kunststoff GmbH & Co.KG
Tel.: +49 2351 459040
info@we-ku.de
www.we-ku.de www.we-ku-shop.de

Measuring, testing and control technology

SIKORA
Technology To Perfection

Bruchweide 2, D-28307 Bremen
sales@sikora.net, www.sikora.net

Melt pumps

WITTE®
PUMPS & TECHNOLOGY

WITTE PUMPS & TECHNOLOGY GmbH
Lise-Meitner-Allee 20
D-25436 Tornesch
Tel.: +49 4120 706590
info@witte-pumps.de
www.witte-pumps.de

Moisture meters

brabender Messtechnik® ... simply better.

Brabender Messtechnik® GmbH & Co. KG
Tel.: +49 203 99819-0
sales@brabender-mt.de
AQUATRAC®-3E, AQUATRAC®-Station

Nozzles

herzog®

herzog systems ag
Feldhofstrasse 65, CH-9230 Flawil
Tel.: +41 71 394 19 69
info@herzogsystemsag.com
www.herzogsystemsag.com

Panel sizing saws incl. software

HOMAG

HOMAG Plattenaufteiltechnik GmbH
Holzmastr. 3
D-75365 Calw-Holzbronn
Tel.: +49 7053 69 0
info-holzbronn@homag.com
www.homag.com

Plastics machinery

PLASTICO
KUNSTSTOFFVERARBEITUNGSMASCHINEN

Plastico Trading GmbH & Co KG
Vohwinkeler Str.173
D-42329 Wuppertal – Germany
service@plasticotrading.de
www.plasticotrading.de

Plastics machining

Grein GmbH
Service: lasering,
punching, measuring
Tel.: +49 5651 99144-0
www.lets-cut-it.com/RE

GREIN
let's cut it

Polyetheretherketones

BIEGLO GmbH
D-22765 Hamburg
Tel.: +49 40 401130000
www.bieglo.com
www.peek-shop.de

BG BIEGLO

Polyimides

BIEGLO GmbH
D-22765 Hamburg
Tel.: +49 40 401130000
www.bieglo.com
www.polyimide-shop.de

Polyurethane systems

CANNON Deutschland GmbH
Moselstraße 27, D-63452 Hanau
Tel.: +49 6181 50231 00
www.cannon-deutschland.de

Hennecke GmbH
D-53754 Sankt Augustin
Germany
Tel.: +49 2241 339-0
Fax: +49 2241 339-204
www.hennecke.com

Profiles

INNOVATIONS IN PLASTICS
CH-Bischofszell
www.k-profile.com

Quality assurance systems

PRIAMUS SYSTEM TECHNOLOGIES,
branch of Barnes Group Suisse Industries LLC
CH-8200 Schaffhausen
Tel. +41 52 632 2626
info@priamus.com, www.priamus.com

Recycling machines

Next Generation Recyclingmaschinen GmbH
Gewerbepark 22, A-4101 Feldkirchen
Tel.: +43 7233/70107
info@ngr.at, www.ngr.at

Release agents

Chem-Trend (Deutschland) GmbH
Ganghoferstraße 47
D-82216 Maisach Gernlinden
Tel.: +49 8142 417 0, Fax: +49 8142 15884
maisach@chemtrend.de
www.chemtrend.de

Refrigeration technology

INDUSTRIEKÄLTEANLAGEN TIEFTEMPERATURTECHNIK STEUERUNGSTECHNIK

L&R Kältetechnik GmbH & Co. KG
Hachener Str. 90a
D-59846 Sundern-Hachen
Tel.: +49 2935 9652-0, Fax: DW –501
www.lr-kaelte.de, info@lr-kaelte.de

Reisner Cooling Solutions GmbH
Industrial cooling | Control system construction | Service
www.reisner-cooling.de

Note

The supplier directory gives you a compact overview of first-class suppliers and their product ranges. Request your entry form now and send an e-mail with the keyword "supplier directory" to *trinkaus@k-profi.de*.

Weinreich Industriekühlung GmbH
Hohe Steinert 7, D-58509 Lüdenscheid
Tel.: +49 2351 9292-92, Fax: +49 2351 9292-50
info@weinreich.de, www.weinreich.de

Sensor sorting technology

STEINERT GmbH
Widdersdorferstr. 329-331, D-50933 Köln
Tel.: +49 221 4984-0
Fax: +49 221 4984-223
sales@steinert.de, www.steinert.de

Size reduction technology

Herbold Meckesheim GmbH
RECYCLING TECHNOLOGY
D-74909 Meckesheim, Industriestrasse 33
Tel.: +49 6226 932-0,
Fax: +49 6226 932-495
herbold@herbold.com, www.herbold.com

NEUE HERBOLD
Maschinen- und Anlagenbau GmbH
Wiesenstrasse 44
D-74889 Sinsheim-Reihen
Tel.: +49 7261 92480
info@neue-herbold.com
www.neue-herbold.com

TRIA GmbH
Carl-Friedrich-Benz-Str. 1
D-47877 Willich
info@triaplastics.de
www.triaplastics.de

zerkleinern + brikettieren
WEIMA Maschinenbau GmbH
Bustadt 6 - 10, D-74360 Ilsfeld
Tel.: +49 7062 95700
info@weima.com

Special silos

KREYENBORG GmbH & Co. KG
Tel.: +49 2597 93997 0
plastics@kreyenborg.com
www.kreyenborg.com

Standards

Tel.: +49 2351 957-0, www.hasco.com

Meusburger Georg GmbH & Co KG
Kesselstr. 42, A-6960 Wolfurt
Tel.: +43 5574 6706 0, Fax: +43 5574 6706 11
verkauf@meusburger.com
www.meusburger.com

Temperature control accessories

WENZ Kunststoff GmbH & Co.KG
TALKOB® & MOULDPRO®
Tel.: +49 2351 459040
info@we-ku.de, www.we-ku-shop.de

Temperature control units

Weinreich Industriekühlung GmbH
Hohe Steinert 7, D-58509 Lüdenscheid
Tel.: +49 2351 9292-92, Fax: +49 2351 9292-50
info@weinreich.de, www.weinreich.de

Temperature sensors

Tel.: +49 2338 91860
Fax: +49 2338 918640
www.mennicken.de

Thermoplastic elastomers

ALLOD Werkstoff GmbH & Co. KG
Steinacher Str. 3, D-91593 Burgbernheim
Tel.: +49 9843 98089 0
information@allod.com, www.allod.com
ALLRUNA® Werkstoffe

Ultrasonic welding

www.cemas-germany.com

Die nachhaltige Verbindung
Seemoosholzstrasse 14, CH-9320 Arbon
Tel.: +41 71 680 0805
info@swiss-sonic.ch, www.swiss-sonic.ch

Ultrasonic welding machines

Herrmann Ultraschalltechnik GmbH & Co. KG
76307 Karlsbad, Germany
Tel.: +49 7248 79 0
www.herrmannultraschall.com

SONOTRONIC Nagel GmbH, Karlsbad
Tel.: +49 7248 9166-0, www.sonotronic.de
Special and standard machines
Ultrasonic systems

Weber Ultrasonics AG
76307 Karlsbad, Germany
www.weber-ultrasonics.com

Universal high-speed mixers

KREYENBORG GmbH & Co. KG
Tel.: +49 2597 93997 0
plastics@kreyenborg.com
www.kreyenborg.com

Vacuum pumps and systems

Edwards GmbH
Philipp-Hauck-Straße
D-85622 Feldkirchen
0800 0001456 or +49 89 99191856
DEvertrieb@edwardsvacuum.com
www.edwardsvacuum.com

Vibration welding

www.cemas-germany.com

Now this too ...

How well-managed individual measures can reduce risks and losses in companies

Nobody saw the current war situation in Ukraine and its effects on our economy coming. Areas of action such as "ensuring material availability" and "reducing energy consumption" are obvious. The collapse of the supply chains from Ukraine and Russia, as well as these countries as target markets, presents us with as yet unforeseeable challenges.

Dr.-Ing. Arno Rogalla is an internationally active interim manager and management consultant in the plastics processing industry: redaktion@k-profi.de

The cherished freight rail route from China via Russia to Europe, which was gladly used for the cost-effective and relatively fast transport of tools from China, is likely to become a thing of the past. Logistics times and costs are rising not only due to increased oil prices, but also because of the shift back to the sea route, which has been congested since Corona, at exorbitant freight rates.

Cars can no longer be assembled due to missing assemblies. Complete assembly plants are closing temporarily, and suppliers are again faced with havoc. We are in permanent crisis mode. Unfortunately, many companies will not be able to survive this new lean period. Nevertheless, we must not give up. It is important to recognise the signs in time and to act in a goal-oriented manner.

An absolutely trustworthy basis of numbers is indispensable. The controller or commercial manager is in demand. All key figures such as liquidity, cash flow, liabilities, number and structure of staff, current and upcoming projects as well as customer profit and loss statements belong on the test bench and their discussion is part of the daily business in order to make the right decisions for one's own company in a timely manner.

Focus on the basic functions of the company

Consistent action is necessary in all directions. The measures are usually unpopular, labour-intensive, but important. Put simply, one now focuses on the basic functions of the company. Customer deliveries must be ensured, invoices to suppliers must be settled with the newly agreed payment terms, if necessary, "hobby projects" must be stopped and personnel must be adjusted to the absolute minimum.

In this context, knowledge of the mechanisms and prerequisites of relief instruments such as short-time work and also insolvency is indispensable. But this has already been common practice over the last two years. In materials management, the software-supported consumption balance sheet at the production plants helps to cut undefined consumption and waste. For plastics that are becoming scarce on the market, a systematic search should be made for available alternatives. It is important to involve customers and quickly convince them of alternatives. Security of supply is a priority.

Numerous, well-managed individual measures will help to significantly reduce losses in the individual companies. But perhaps it is now time to think about reshoring and a reorientation of the industry in Germany as a whole. It is not only the federal government that is going through a turnaround.

You will read the next issue of K-PROFI international **in July 2022.**

Imprint

**K-PROFI international –
Inspiration for plastics processors**

Editors
Dipl.-Ing. Markus Lüling, Editor-in-Chief (responsible)
Tel. +49 (0)9123 9609-10, lueling@k-profi.de

Dipl.-Chem. Toralf Gabler, Specialist Editor
Tel. +49 (0)9123 9609-11, gabler@k-profi.de

Dipl.-Ing. (FH) Sabine Rahner, Specialist Editor
Tel. +49 (0)711 8877248, rahner@k-profi.de

Dipl.-Ing. (FH) Karin Regel, Specialist Editor
Tel. +49 (0)2433 938941, regel@k-profi.de

Dipl.-Ing. Janne Reisch, Esq., Copy Editor
janne.reisch@gmail.com

Dipl.-Ing. Gabriele Rzepka, Specialist Editor
Tel. +49 (0)6172 8689940, rzepka@k-profi.de

Editorial address
Luitpoldstr. 5, 91207 Lauf an der Pegnitz, Germany
Fax +49 (0)9123 9609-29, redaktion@k-profi.de

Publisher
Kunststoff-Profi Verlag GmbH & Co. KG
Saalburgstr. 157, 61350 Bad Homburg, Germany
Tel. +49 (0)6172 9606-0, Fax +49 (0)6172 9606-99
info@k-profi.de, www.k-profi.world

Personally liable shareholder:
Kunststoff-Fachmedien GmbH
Saalburgstr. 157, 61350 Bad Homburg, Germany

Management
Andreas Hertsch, Markus Lüling

Advertising management
Gero Trinkaus, P.O. Box 31 24, 29231 Celle, Germany
Tel. +49 (0)5141 99 32 026, trinkaus@k-profi.de

Distribution and reader service
Katharina Kolk
Tel. +49 (0)6172 9606-71, vertrieb@k-profi.de

Subscription
K-PROFI international is available to plastics and rubber processors as an ePaper or PDF free of charge upon registration. Registration requires some information about the person and the function in the company. Registration is possible at any time at www.k-profi.world/registration

Design concept and layout
Dipl.-Kommunikationsdesigner (FH) Oliver Schneider
Tel. +49 (0)9123 9609-15, schneider@k-profi.de

Production Sigrid Seffner, Therese Stübinger
Tel. +49 (0)9123 9609-12, produktion@k-profi.de

KI Group

Don’t miss an issue!

How to get your free subscription to “K-PROFI international”

“K-PROFI international” is new. Do you like the contents? If so, get your free copy of the next issues now! You will receive a hint about the next issue via newsletter. Then you can read the ePaper or download a PDF and print it out. If you work in the plastics industry, you will receive K-PROFI international and our newsletter free of charge. We are publishing four issues in 2022.

Please register here:
www.k-profi.world/registration

K-PROFI international effectively supports plastics and rubber processors in industrialised and high-cost emerging countries in their efforts to produce more efficiently, save costs and position themselves successfully in competition. To this end, the modern industry e-magazine combines trends from the plastics and rubber market with innovations in plastics and rubber technology to provide impulses, know-how and solutions for plastics processors. Exclusively researched articles about successful plastics and rubber processors provide the reader with valuable impulses for setting a long-term course, ideas for the active use of trends as well as practical information for their decisions.

You can read the current issue here:

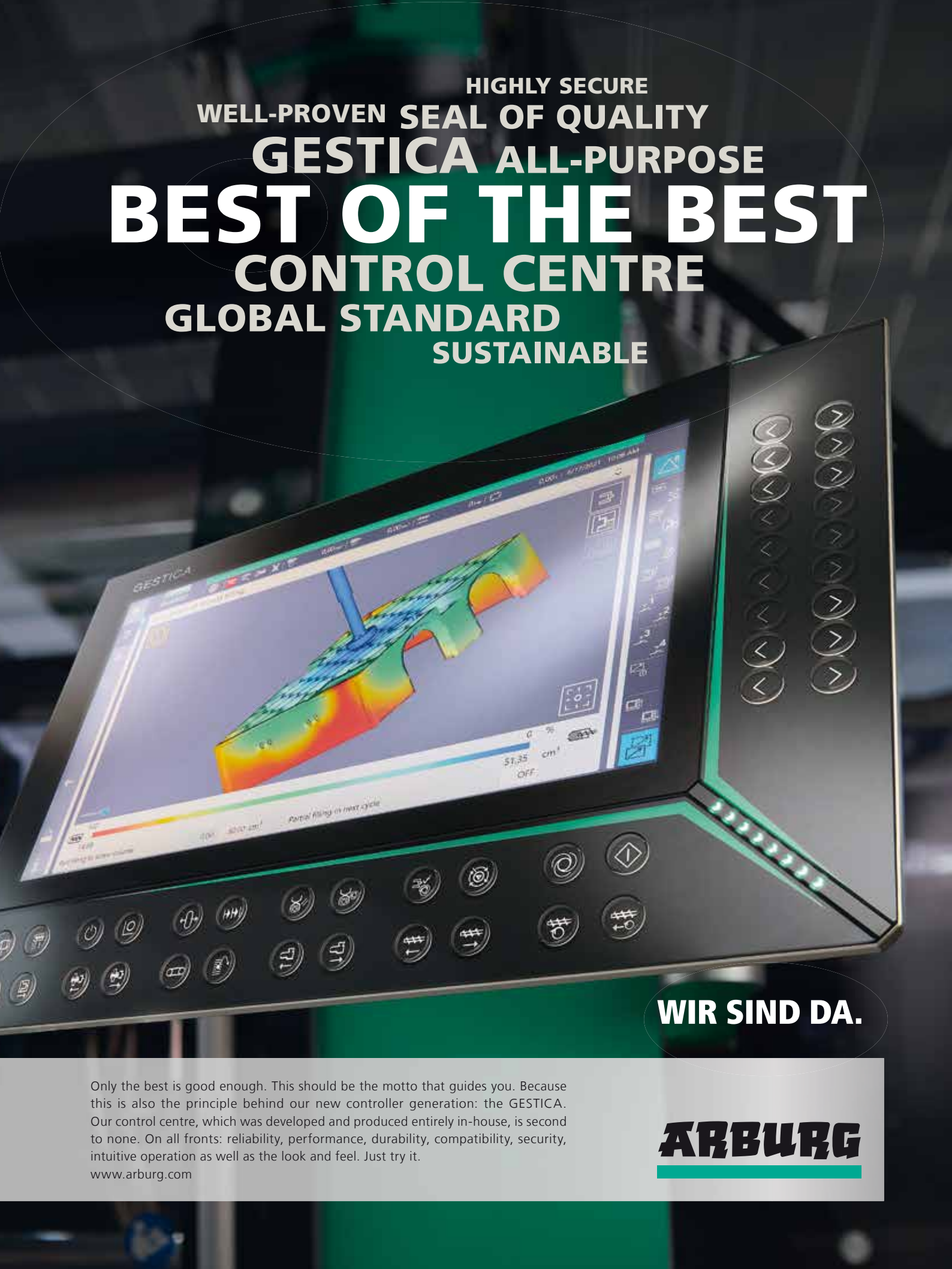
ePaper
www.k-profi.world/issue/220101

Download PDF for self-printing
www.k-profi.world/pdf/2201

You can read the past issues here:

ePaper
www.k-profi.world/issue/210101
www.k-profi.world/issue/210201
www.k-profi.world/issue/210301
www.k-profi.world/issue/210401

Download PDF for self-printing
www.k-profi.world/pdf/2101
www.k-profi.world/pdf/2102
www.k-profi.world/pdf/2103
www.k-profi.world/pdf/2104



Only the best is good enough. This should be the motto that guides you. Because this is also the principle behind our new controller generation: the GESTICA. Our control centre, which was developed and produced entirely in-house, is second to none. On all fronts: reliability, performance, durability, compatibility, security, intuitive operation as well as the look and feel. Just try it.
www.arburg.com

ARBURG