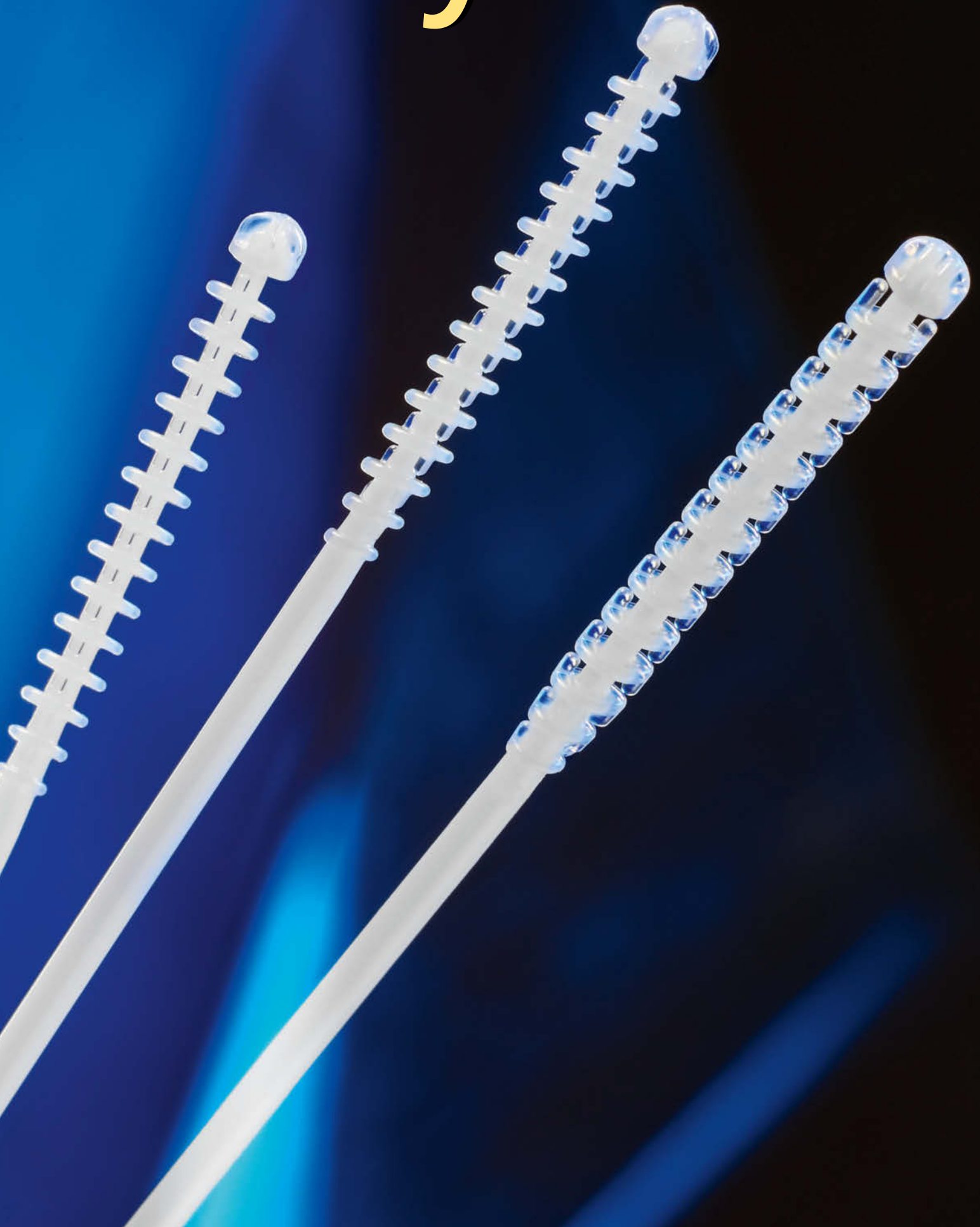


today

The ARBURG magazine

Issue 74

2020





4 Molded: 30,000 coronavirus swabs for the Netherlands each day

6 Guido Frohnhaus: Focusing on high-tech and communication



8 Harbec: Carbon, water, and waste-neutral production

10 KRUG: FDC process for more flexibility and increased resilience



12 Goerlich: Turnkey system replaces several machines

15 tesa: freeformer for novel bonding applications



18 Schlaeger: Efficiency boost reduces energy consumption per part by 44 per cent

20 Packaging: Broad product range for high performance applications



22 KURZ: IMD technique – versatile, efficient and future-oriented

24 Reynera: ALLROUNDERS ensure high cost-efficiency and sustainability



26 Tech Talk: Bionically optimized pressure control increases reproducibility

IMPRESSUM

today, the ARBURG magazine, issue 74/2020

Reprints, including excerpts, only with express permission

Responsible: Dr. Christoph Schumacher

Editorial advisory board: Christina Hartmann, Christian Homp, Martin Hoyer, Lukas Pawelczyk, Jürgen Peters, Andreas Reich, Birgit Roscher, Bernd Schmid, Wolfgang Umbrecht, Dr. Thomas Walther

Editorial team: Uwe Becker (text), Andreas Bieber (photos), Dr. Bettina Keck (text), Markus Mertmann (photos), Susanne Palm (text), Oliver Schaefer (text), Peter Zipfel (layout)

Editorial address: ARBURG GmbH + Co KG, Postfach 1109, 72286 Lossburg, Germany

Tel.: +49 (0) 7446 33-3149, **Fax:** +49 (0) 7446 33-3413

E-mail: today_kundenmagazin@arburg.com, www.arburg.com



With the help of ARBURG, Dutch start-up company Molded managed to start production of coronavirus swabs within just two weeks.

ARBURG



Dear Readers,

2020 has been a very challenging year so far. An already tense global economic situation was compounded by the coronavirus pandemic,

which has significantly curbed our private and business lives and will continue to be with us for some time.


During swells like these, a strong steamship that follows its route safely and purposefully is more important than ever. Our company has often been described in this way and sometimes sneered at, for example when other companies have opened production sites worldwide or outsourced production steps. However, our central production site offers decisive advantages – especially in such difficult times – as our new Technical Director Guido Frohnhaus explains in an interview.

Reynera's strategy for success in Mexico is also to rely on tried and tested products while simultaneously driving innovation. This and other companies presented in this issue clearly show how our machines, systems and processes conserve resources and permanently increase production efficiency. The fact that "steamship ARBURG" has no problems even at high speeds is shown by our report on the Dutch start-up Molded, which got production of corona swabs up and running within just two weeks with our help.

Why not take inspiration from our articles? Whatever you're planning: "Wir sind da." – even in stormy times.

We hope you enjoy reading this issue of "today".

Juliane Hehl
Managing Partner



Ready for production in only 14 days

Molded: 30,000 coronavirus swabs for the Netherlands each day

In April 2020, the government of the Netherlands decided to have COVID-19 swabs produced domestically in order to counteract global bottlenecks during the coronavirus pandemic. They chose the fledgling company Molded. The start-up was incredibly fast: With the support of ARBURG, series production got underway in Rossum in just under two weeks.

“As an innovative start-up we are very flexible. We were confident that we could easily produce several million swabs for coronavirus tests in our own country. The only question was how quickly we could start. ARBURG has been a great help in this respect,” explains Martijn van de Ven,

who founded Molded together with Jeroen Rajmakers and Jeroen Compen as recently as February of this year. An ALLROUNDER has been producing the swabs since May 2020. The materials are sponsored by the chemical company DSM, which initiated the project.

Rapid support from ARBURG

“We are also helping in the fight against coronavirus whenever possible – even at short notice and in very pragmatic ways,” remarks Gerrit Hazeleger, Managing Director of ARBURG BV in Utrecht. “When the inquiry from Molded came in, we mobilized an existing machine from our showroom within just a few days.” With the

help of ARBURG’s application engineers, a hydraulic ALLROUNDER 420 C GOLDEN EDITION with the associated MULTILIFT SELECT robotic system was delivered and adapted to its new task in just two days.

Taking up the story, Martijn van de Ven adds: “We have further improved the functionality of the swabs so that they can now be manufactured entirely from plastic and injection moulded more efficiently. At the same time, we have set up the new production line. And all this in a record time of only 14 days, instead of the usual several months.” An advantage was that Molded was positioning itself in the field of rapid manufacturing, offering everything – from design, mould design and construction, to injection moulding – from a single source.

Molded founders Jeroen Raijmakers, Jeroen Compen and Martijn van de Ven (right, from left to right) realised the automated large-scale production of coronavirus swabs (left) with an ALLROUNDER and their own mould (below) within a very short time.



Photos: Marc Bolsius



Production around the clock

Since early May, the Rossum site has been operating virtually around the clock, producing 30,000 swabs a day. To achieve this, the ALLROUNDER is equipped with an 8-cavity mould from Molded. The three young entrepreneurs take turns in three shifts. Swabs are packed in batches of 1,000 and sterilized at another company. The sets are then ready for use. RIVM, the Dutch Ministry of Health, uses the swabs to take nose and throat samples for coronavirus tests. Each moulded part, weighing

only around 0.66 grams, is equipped with barbs at its flexible tip for this purpose. After removal, the upper part of the swab is separated from the handle via a predetermined breaking point and packed in tubes. From May to July, an initial 2.8 million units were produced and CE certification and FDA approval have been applied for. The company also plans to deliver the swabs to the USA later this year.

INFOBOX



Name: Molded BV

Founded: 2020 by Martijn van de Ven, Jeroen Raijmakers, and Jeroen Compen

Location: Rossum, Netherlands

Business areas: Rapid prototyping, in-house mould design and manufacturing, injection moulding of technical plastic parts

Production area: Around 500 square metres

Employees: Six (2020)

Machine fleet: Three ALLROUNDERS

Contact: www.molded.nl



Finger on the pulse

Guido Frohnhaus: Focusing on high-tech and communication

Since the beginning of the year, Guido Frohnhaus has been responsible for production and manufacturing, development, materials management and technical processing as Managing Director Technology and Engineering at ARBURG. After his first six months in the job, he spoke to the today editorial team about his career, the challenges he faces, and his philosophy.

today: Which areas have you worked in to date?

Frohnhaus: I worked for many years for the Turck Group, which is one of the world's leading corporations in the industrial automation sector. In my last position as Managing Director at the Group's headquarters in Germany, I was responsible for development and production. Before that, I was Vice President of Technology at Turck's national

subsidiary in the USA for about five years and worked for several years on the management board of an automotive supplier.

today: How did you progress to management level?

Frohnhaus: Basically I'm a practitioner. I trained as a mould maker and then studied mechanical engineering, specializing in production technology, at the University of Wuppertal, Germany. I started out on the path towards management by setting up a production plant in the US as Managing Director, and by earning a Masters in Business Administration (MBA) at Capella University in Minneapolis, Minnesota, during my time working there.

today: What attracted you to the position of Managing Director Technology and Engineering at ARBURG?

Frohnhaus: I already knew the name ARBURG because I helped establish injection moulding production and mould making for Turck in the US. In addition, I have a strong affinity for mechanics, digitalisation and Industry 4.0 – all of which are important topics at ARBURG. I viewed the company as a hidden champion in the SME sector with a unique shareholder presence. And precisely this combination of high tech and people fits me and my philosophy perfectly.

today: Can you describe this in more detail?

Frohnhaus: With pleasure. "Management by walking around" is my motto. I don't like sitting in the same place for very long. Instead, I'm in the office and out and about with customers as often as possible, because this is the only way to keep my fin-



Hitting the ground running from day one in the company: Guido Frohnhaus immediately headed for production in January 2020 to look at important details (left) and discuss them with Head of Production Siegfried Finkbeiner (right, below).



ger on the pulse. I work according to the principle of “channelling, prioritising and communicating” in order to strengthen my employees’ self-reliance and commitment, drive technological goals forward, develop the product range with a clear focus, and openly communicate challenges.

today: Talking of challenges: shortly after you joined the company, the difficult economic situation was exacerbated by the coronavirus pandemic. What was that like for you?

Frohnhaus: The situation was and continues to be not easy at present, that’s for sure. But it is precisely in times like these that the strengths of a company become apparent. And at ARBURG they are formidable!

today: Can you give us an example?

Frohnhaus: It’s hard to limit myself

to just one example, but I’ll try (laughs). The advantage of Lossburg as a central location has become very clear. We have often been laughed at for pursuing a strategy of manufacturing exclusively in Germany as a technology location with local supply chains.

today: What are the advantages of this strategy?

Frohnhaus: This centralised approach enables direct exchange and easy coordination in all areas: from supply, R&D, design, production and quality assurance to consulting and after-sales service. The short distances and decision-making paths offer a high degree of flexibility. For example, we can promptly integrate the latest findings into our product range and production strategies – and the know-how remains within the company.

today: Are there other positive aspects?

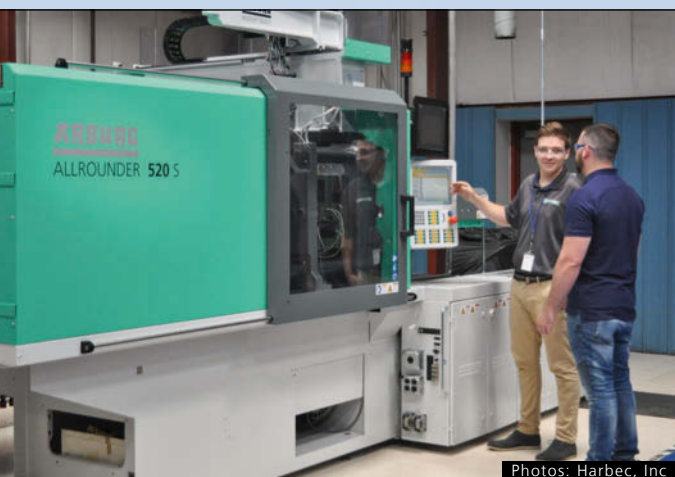
Frohnhaus: Yes, centralised production is also advantageous in terms of our carbon footprint and digitalisation.

today: It’s very clear how passionate you are about ARBURG.

Frohnhaus: Yes, that’s true. The concentrated power that I experienced here in the first few months was and is unique. And I’m looking forward to the future!

Aiming high

Harbec: Carbon, water, and waste-neutral production



Photos: Harbec, Inc

Four of Harbec's five ALLROUNDERS are electrically driven. A hydraulic ALLROUNDER 520 S with the ARBURG energy-saving system (AES – pictured left) is the optimum technical solution for the injection compression moulding of optical lenses (right).

ing and air-conditioning needs. We have already saved hundreds of thousands of dollars." From 2021 onwards, Harbec will generate additional solar power, which will be supplied by a photovoltaic system (175 kW) on the roof of the new building. The company buys carbon offsets to compensate for energy from non-renewable sources, such as its vehicle fleet's diesel consumption. The same applies with respect to water.

Sustainable practices in demand

The next challenge for Harbec is to become a "zero waste company" by 2022. "Many companies talk big but do actually very little in the way of sustainability. ARBURG is a major exception here – both in terms of production and products. I saw this for myself at the Technology Days a few years ago. And that's why I like to buy ALLROUNDERS that are 'made in Lossburg'," explains Bob Bechtold.

Every new purchase is also evaluated according to its expected energy consumption and the savings are factored into the purchase price. Energy-efficient electric injection moulding machines are purchased where it makes sense to do so, and these also generate little waste heat. For injection compression moulding applications for optical components, however, high-quality hydraulic machines have proven to be the

Harbec sees itself as a pioneer in the US when it comes to sustainability. The company has been carbon-neutral since 2013 and water-neutral since 2015. Production is also expected to be completely waste-neutral by 2022. For its machine fleet, Harbec relies on energy-efficient hydraulic and electric ALLROUNDERS.

Since 2009, Harbec company founder Bob Bechtold has been actively committed to sustainability as a matter of conviction. As the plastics processing firm has a high energy requirement, the first challenge he took on was the issue of its carbonfootprint. Harbec has been certified for its energy management under ISO 50001 and SEP

Platinum (Superior Energy Performance) since 2013, meaning that energy savings are quantified in annual audits. In order to be water neutral as well, the majority of the company's needs are met by its own rainwater retention basin.

80 per cent energy self-sufficiency

Harbec covers around 80 per cent of its energy requirements itself. 60 per cent comes from two wind turbines, which together supply 1,100 kWh of electricity. A further 20 per cent is generated by a gas-fired combined heat, power and refrigeration plant of which Bob Bechtold is proud: "Our 530 kW plant generates electricity from natural gas and also covers our heat-



technically better solution. So for example an ALLROUNDER 520 S produces plano convex lenses from optical PC for medical applications. The associated MULTILIFT SELECT robotic system, temperature control unit, core pull, and pressure and temperature sensors for monitoring the mould are integrated into the SELOGICA control system.

Energy-efficient machine technology

Thanks to extensive programming functions, the processes can be adapted exactly to Harbec's requirements. This ensures short cycle times and high part quality – and in this case, stress-free lenses. Thanks

to the ARBURG energy-saving system (AES), the hydraulic machine operates energy-efficiently, as the speed and power of the water-cooled pump motor are adapted to actual requirements. This also reduces noise and wear.

For "contract moulding", Harbec uses four electric ALLROUNDER 370 E machines, which operate around the clock in three shifts. "We have been a partner of ARBURG for ten years. The high quality of its products, excellent application technology advice on site coupled with expertise in automation, and a corporate philosophy that is a perfect fit for us were all factors in winning us over," comments Bob Bechtold.

"We can still learn a lot from ARBURG. This will keep us on the road to success in the coming decades."



INFOBOX



Name: Harbec, Inc.
Founded: 1977 by Bob Bechtold
Location: Ontario, New York/US
Turnover: USD 20 million (approx. EUR 17.3 million) on average
Production area: approx. 5,600 square metres
Employees: 150
Industries: Medical, aerospace, industry
Machine fleet: 30 injection moulding machines, of which 5 ALLROUNDERS
Contact: www.harbec.com

Love of all things au

KRUG: FDC process for more flexibility and increased resilience

The KRUG Group, a mould maker, parts producer and supplier of complex complete assemblies headquartered in Breidenbach, Germany, is closely linked to the automotive industry as well as to the electrical and electronics and white goods industries. The company has built up considerable industry expertise in these areas and is investing among other things in innovative future technologies such as fibre direct compounding (FDC).

Jochen Krug, Managing Director of the KRUG Group, remarks that: "As one of the pioneers in the industry, we have an excellent reputation that we would like to build on." Rüdiger Braun, Head of Customer Management, elaborates as follows: "Ultimately, we are Europe's largest manufacturer of fans and frames in terms of volume. These are installed behind the front

grill of cars to accommodate the engine's ventilation unit. One of our long-standing Tier 1 customers is Brose Fahrzeugteile SE & Co. KG from Coburg, who drew our attention to the FDC process. We then approached our partner ARBURG, with whom we have been collaborating since 2000, to find out more."

First ALLROUNDER 1120 H with FDC

Manuel Wöhrle, Senior Sales Manager Lightweight at ARBURG, supports KRUG as an FDC customer: "In particular, the combination of a hybrid ALLROUNDER 1120 H with GESTICA control system, large 4600 injection unit and additional FDC equipment was also a first for us." KRUG has equipped a total of three machines for this process. The two automated ALLROUNDER 1120 H machines will be used at the Meerane site for the planned production of large-format components for engine heat-

ing. A hydraulic ALLROUNDER 820 S also produces automotive parts in Breidenbach as part of another planning project.

The use of the FDC process, in which 30 per cent glass fibres are added to the PP melt, offers benefits in terms of resilience in addition to the flexibly adjustable fibre length. In order to verify the function of these components, initial trials were carried out at the Institute for Lightweight Engineering and Polymer Technology at the Technische Universität Dresden. Jochen Krug was very satisfied with the entire collaboration: "We are always looking for innovative solutions for tomorrow's requirements and ARBURG offers us these. Thanks to the sound advice and support we received, we were al-



tomotive



Photo: KRUG Group

Jochen Krug (above), Managing Director of the KRUG Group, is convinced of the potential of the FDC process.

The first large ALLROUNDER 1120 H machines with FDC features (left) went to KRUG.

ways sure that we were on the right track with the FDC process.”

Fully automated manufacturing

The two ALLROUNDER 1120 H machines were specially fitted with the options for the FDC process. In the future, identical turnkey systems will complete the components downstream in a fully automated process. A fully integrated KUKA multi-axis robotic system with an ARBURG user interface manages the parts handling. There is also a thermal imaging camera and a scale whose values are recorded in the GESTICA

machine control system to document the long glass fibre percentage. An additional KUKA multi-axis robot integrated into the system assembles the flaps, and an optical camera monitors the complete assembly. In the final expansion stage, several highly complex moulds with hot runner and needle-type shut-off nozzle plus a maintenance-free Orca temperature control system from Enesty should ensure smooth production with optimum cycle times, high reliability and availability.

Advancing with innovations

KRUG is working on innovations in all sectors. One indicator of these constant development endeavours is the ongoing search for and use of innovative processing technologies, such as the FDC process. For this reason, KRUG is viewing the upheaval phase in the automotive industry positively and with great interest. “We produce moulds for our customers as well as for our in-house production,” comments Rüdiger Braun. “Another factor is that our products are often used independently of the drive train, which makes us fit for the future, including e-mobility.”

INFOBOX



Name: KRUG Group

Founded: 1972 by Kurt Krug

Locations: Breidenbach and Meerane, Germany, and Miskolc, Hungary

Turnover: EUR 54 million (2019)

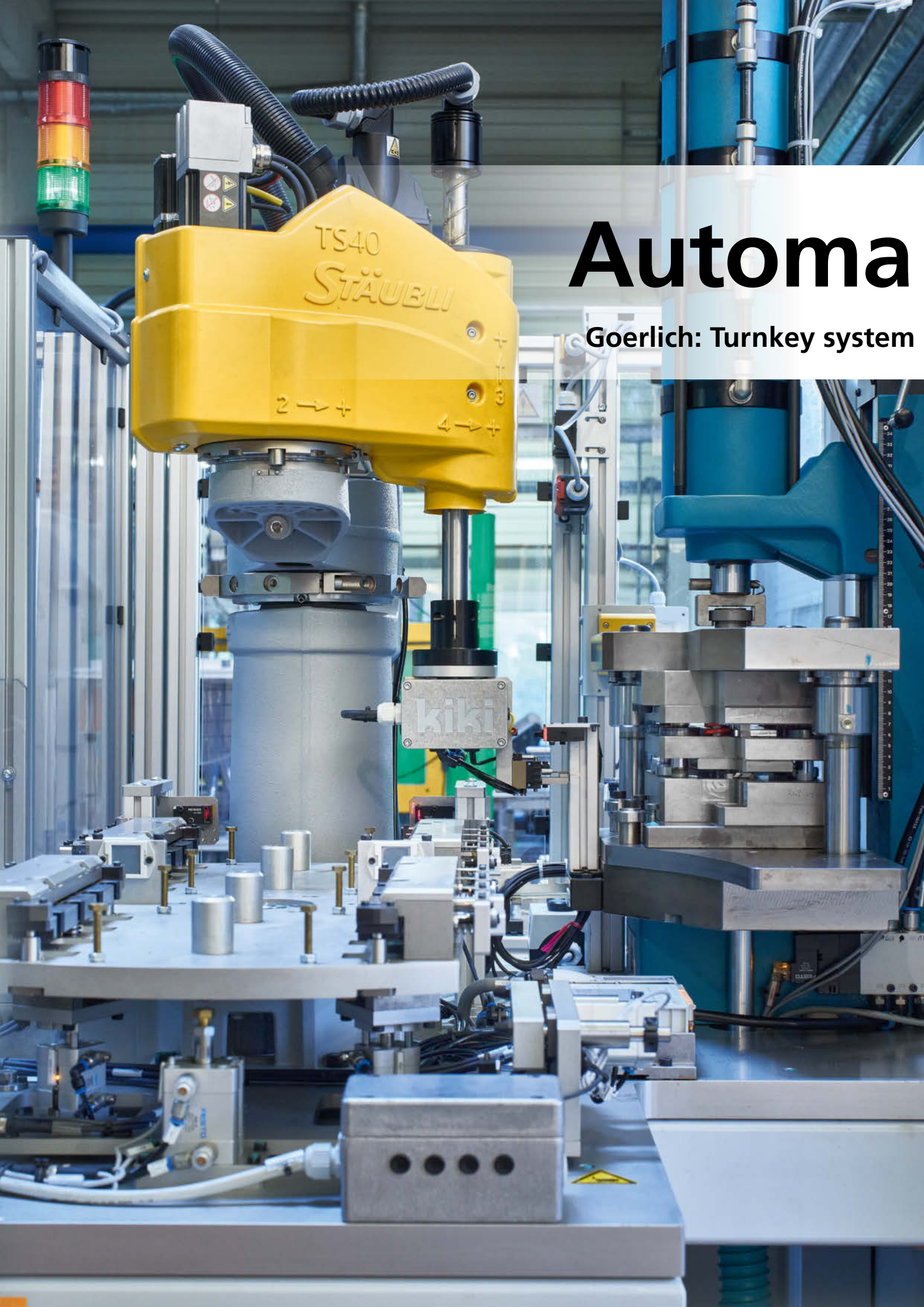
Employees: Around 300

Industries: Automotive Tier 1, electrical industry and household goods

Products: Fans and frames for engine cooling, controller housing, chassis and power distribution components

Machine fleet: 45 injection moulding machines, of which 19 are ALLROUNDERS

Contact: www.krug-breidenbach.de



Automa

Goerlich: Turnkey system

tion upgrade

replaces several machines

The aim of the project was clear: A highly automated turnkey system must replace several decentralised, operator-guided machines in order to be able to mass produce enclosures for a vacuum sensor with three inserted pins in a way that is smooth, automated (and therefore faster), and error-free. The right partner on the path to greater production efficiency: ARBURG.

Goerlich relies exclusively on ARBURG for its injection moulding production. The 34 ALLROUNDERS, including two-component and vertical machines, process special plastics such as PEEK, PSU, PEI, and LCP.

One-machine strategy

When asked why the company was pursuing this one-machine strategy, operations manager Thomas Ehrlich answered: "The ALLROUNDERS are reliable machines with which we can produce our portfolio for our customers in excellent, high-quality continuous operation. There is no reason for us to change or add anything, quite simply because we have been very satisfied with ARBURG, its range of machines, and its service since the beginning of our work-

All upstream process steps are integrated in a very small space: After the pins have been punched out (right), a Scara robot places them in the correct position on a loading plate (left) so that the MULTILIFT V robotic system can pick up 24 pins and insert them into the mould.

ing relationship in the 1980s. The smooth implementation of the turnkey system has once again confirmed our strategy."

Fast and flexible production

The enclosure for the PBT GF 30 vacuum sensor has three metal pins integrated in it. In future, the fully automated turnkey system will be able to produce three variants by changing the appropriate mould inserts. Andreas Armbruster from ARBURG's Turnkey Project Planning team explains the extensive specifications that the system had to meet: "The biggest challenge was implementing the various production steps within the required short cycle time. Above all, the feeding of the 24 very delicate pins from the punching strip to their insertion into the 8-cavity mould is correspondingly demanding." According to Armbruster, what is special about the system is that the many sub-processes can be implemented in a very confined space with straightforward technology. Without this automation solution, the annual production volume would only be achievable by deploying considerably more staff.

Complex mould technology

The mould was developed and built in Goerlich's mould shop. In addition to a hot runner with cold sub-distributor, it is also equipped with hydraulically operated sliders for precise pin pickup. The gold-plated plug contacts are fed to the conveyor upstream and separated.



Goerlich manufactures enclosures for vacuum sensors efficiently and flexibly with its compact turnkey system.

Automated parts testing

A Scara robot places these on a loading plate with rotary drive in the correct position for pickup by a MULTILIFT V robotic system. The pins are inserted into the mould slides without force, as is the removal of the eight finished parts on the ejector side of the mould. After the contacts have been overmoulded, the four sprue sub-distributors are first demoulded and ejected into the machine stand. The robotic system places the eight connectors on a testing device with slide and NC axis for exact positioning. By moving the slide to different positions, a continuity and high-voltage test with 1,000 volts and a light test are carried out in succession, followed by the marking of the OK parts. Finally, a turntable distribution system that rotates back and forth through

180 degrees ensures that parts are ejected into PE bags using separated cavities.

Smooth project flow

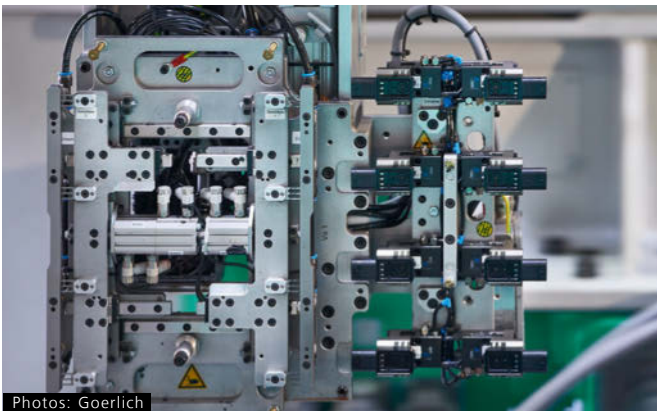
A hybrid ALLROUNDER 470 H with a clamping force of 1,000 kN and size 290 injection unit is used in the turnkey system, which is equipped with several core pullers and special signals. The combination of an electric toggle-type clamping unit and a dynamic injection unit enables simultaneous movements. This results in time advantages in series production. The SELOGICA control system is highly valued because it supports communication between the various plant control systems, thereby ensuring fully coordinated production processes.

Thomas Ehrlich is very satisfied with ARBURG as a system supplier: “With this turnkey system in particular, ARBURG’s project management team ensured that there was thorough and rapid communication and coordination between the suppliers, and hence a solution-oriented approach to the project. And in general, we have found that ARBURG’s customer support and services always function quickly and smoothly in the event of a problem.”

INFOBOX



Name: Goerlich Kunststofftechnik GmbH
Founded: 1978 by Rudolph Görlich
Location: Wilsdruff, Germany
Turnover: EUR 10.3 million (2019)
Employees: 94
Industries: Automotive, industry and electronics
Products: Technical moulded parts, connectors and plug contacts, enclosures and gear wheels, multi-cavity moulds, development and prototyping
Machine fleet: 34 ALLROUNDERS with clamping forces from 350 to 2,200 kN
Contact: www.goerlich-verbindet.de



Photos: Goerlich



Thomas Ehrlich (right), operations manager at Goerlich, is delighted with the increase in efficiency that the turnkey system brings to his injection moulding production. The tasks of the gripper (above) are extremely varied and demanding in this application.



What holds the world together

tesa: freeformer for novel bonding applications

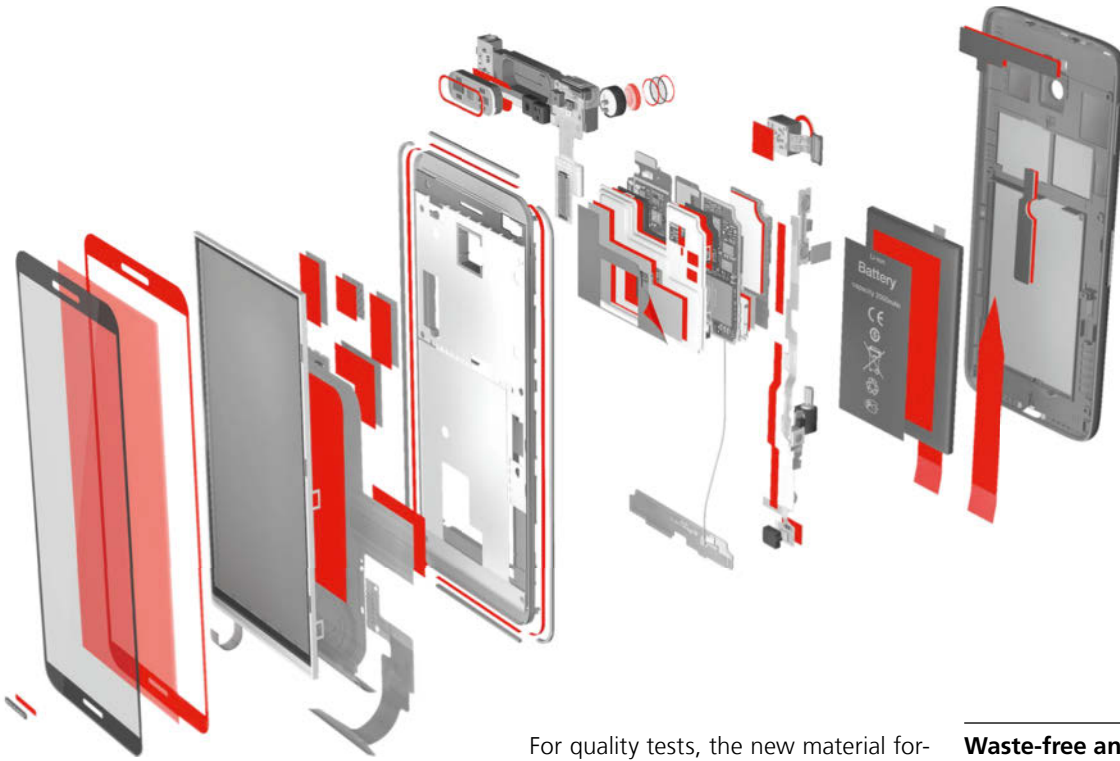
Almost everyone around the world knows the tesa brand and regularly uses the adhesive tape of the same name – Tesafilm. However, around 75 per cent of self-adhesive system solutions are industrial applications. At the company's headquarters in Norderstedt near Hamburg, Germany, around 320 employees work in the Research and Development unit. Among other things, they develop adhesives for smartphone components and investigate the added value that additive manufacturing with a freeformer can bring.

"To start with, nobody knew whether the freeformer could process adhesive compounds as well as plastics. That's why we initially decided on a rental model, and have been working with a freeformer 200-3X in our technology centre since June 2019," explains Frank Virus, Technology and Product Development at tesa. "Our focus is on process development and material certification. The results in pilot production are so promising that we will soon purchase a large freeformer 300-3X."

Frank Virus and Technology Manager Manuel Bendeich have set themselves the goal of making modified natural and syn-

A special kind of APF product: With the frame made of pressure-sensitive adhesive, smartphone glass covers with large surfaces can be bonded securely and without waste. The layer thickness is only about 300 micrometres.

thetic rubbers, which are tacky at room temperature, accessible for industrial additive production. In order to be able to process these materials using ARBURG Plastic Freeforming (APF), important preliminary work was necessary, in that the team had



to find formulations that would allow the adhesives to be granulated. To achieve this, the surface is irradiated and physically deactivated, for example. “We managed to do this surprisingly quickly and well,” says Frank Virus. The freeformer processes the various adhesive granulates extremely precisely and reproducibly.

What’s special, is that the focus is on only one or a few layers. For some products the layer thickness is only about 300 micrometers. Since this requires completely different parameters than the production of conventional plastic components using the APF process, a separate standard for material certification had to be found.

Freeforming reinvented

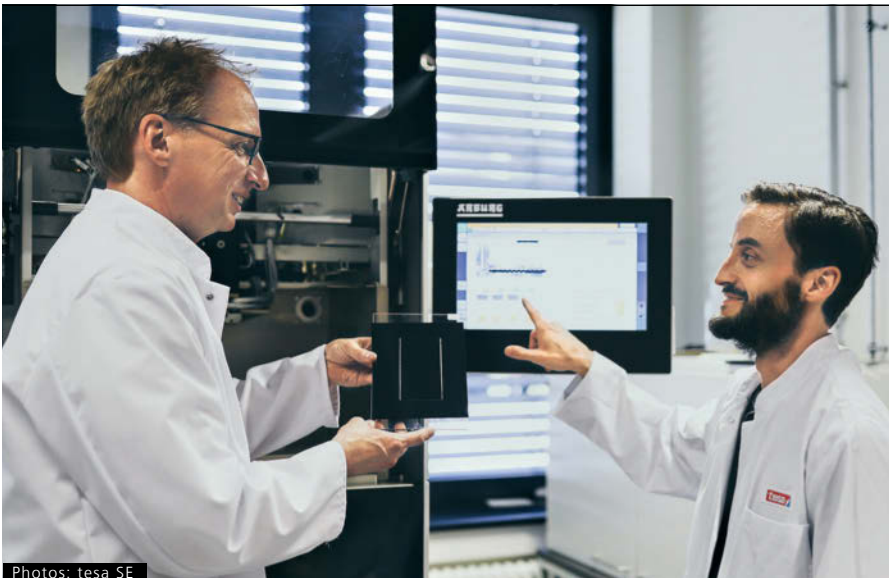
“Unconventional thinking and working is what is driving us forward through the entire project,” comments Manual Bendeich. “The support we get from ARBURG is fantastic! The freeformer experts work in agile teams like we do. There is always someone on hand to help us with advice and creative ideas in application development, meaning that we can develop intelligent new solutions and set up pilot projects on an equal footing.”

For quality tests, the new material formulations are “printed” in narrow strips. After initial quick tests, the force required to peel the adhesive film from different surfaces such as ABS, glass or aluminium is measured with a testing machine at constant speed and peel angle. If the adhesive film is applied to paper, it can be removed without damage and incorporated into products. tesa experts see great potential for additively manufactured adhesive products in the glass cover moulding of smartphones. Traditionally, large, fully coated sheets of a defined thickness are provided for bonding the glass cover to the shell, and frames that are adhesive on both sides are punched out.

Waste-free and shock-absorbing

Over 90 per cent of the source material must be disposed of as waste. Alternatively, if you punched four bars, gaps would be created in which water, dust or light could penetrate. The APF process is a much more sustainable and resource-saving alternative. “It would allow us to use 100 per cent of the adhesive material in the product without any waste,” says Frank Virus, who would also like to create added value with extra functions: “Formulations with foamed layers have a shock-absorbing effect and ensure that the glass doesn’t break as quickly. Sandwich-style tapes with a middle layer of ABS or PLA that me-





Photos: tesa SE

tesa experts Frank Virus and Manuel Bendeich (left, from left to right) process pressure-sensitive adhesive using the freeformer. Peeling off a strip as a quick test (below left) proves that the adhesive test strips adhere excellently to the ABS base plate. Use These types of adhesives can be used, for example, to bond smartphone components without waste (top left graphic)

chanically reinforces the adhesive tape are also conceivable.”

Although the APF process is significantly slower than punching, the time and cost of moulds is eliminated. And because fewer transport routes, logistics and feeding systems are required, the overall process is also significantly leaner. One or more freeformers could instead be integrated directly into the fully automated production line.

Infinitely variable geometries

Besides sustainability, another important argument for industrial 3D printing is the possibility of exploiting the third dimension. Instead of having to work with predefined material thicknesses, the layer thickness and geometry of APF components can be varied as desired, with increments and depressions becoming possible. “This gives our customers a whole new freedom of design,” argues Frank Virus. His vision is for tesa’s customers to integrate freeformers into their process lines themselves and then additively manufac-

ture the desired adhesive products directly on site – with complete system solutions from tesa that are precisely tailored to their respective requirements.

INFOBOX



Name: tesa SE

Founded: 1882 by Paul C. Beiersdorf, wholly-owned subsidiary of Beiersdorf AG since 2001

Locations: Headquarters in Norderstedt, Germany, additional production and sales locations in more than 100 countries

Turnover: EUR 1,378.7 million (2019)

Employees: 4,926, of which 2,465 in Germany

Industries: Focus on automotive, electronics, print & paper, building and construction

Products: Around 7,000 different technical adhesive tapes and self-adhesive system solutions for direct industries and trade markets

Machine fleet: Various AM machines, including a freeformer

Contact: www.tesa.com

100 per cent carbon

Schlaeger: Efficiency boost reduces energy consumption per part

For more than ten years Schlaeger, a manufacturer of innovative mechatronic products for the automotive and electrical industries, has been setting itself major goals in terms of energy efficiency and sustainability. At its headquarters in Bayreuth, Germany, the family-owned company's production has been carbon-neutral since 2019. Around 70 ALLROUNDERS that have been geared towards efficiency contribute to the resource-friendly production of parts.

"Since 2006, we have been evaluating every machine investment, including energy aspects. The same applies to building technology and infrastructure," states Anton Fuchs, Technical Director (CEO) at Schlaeger. "To increase energy efficiency, everyone in our company pulls together – from the managing director to the machine assistant." Their efforts are paying off: Schlaeger has managed to reduce energy consumption per produced part by a total of 44 per cent over the past ten years.

Determining energy requirements in advance

When it comes to purchasing energy-efficient ALLROUNDERS, Schlaeger has been receiving competent support from ARBURG energy efficiency expert Martin Hoyer and his team in the Application Technology Development department for over 20 years: "We are involved at an early stage and can precisely adapt the modular ALLROUNDERS to the respective application." The actual energy requirement is de-

termined, for example, by the size of the injection unit, the cooling of the plasticising cylinder, and the choice of the dosage unit. Based on the information on materials, cycle time, processes and mass throughput, the expected energy consumption can be calculated in advance. "This is a valuable contribution, and the results are verifiable and consistent," says Michael Jendyczek, Head of Application Technology and member of the Energy Management team at Schlaeger, in praise of this approach. The energy expert estimates that the plasticising unit and cycle times alone account

for around 40 per cent of total energy consumption. The most efficient design quickly pays for itself. Strict care is also taken to minimise energy consumption in process planning. To avoid load peaks, the ALLROUNDERS are started up sequentially via an automatic switch-on device.

"Efficiency first"

In addition, the company works according to the "efficiency first" principle. The focus is therefore on minimum energy consumption and maximum performance.

The many energy-related details make this task very complex and require considerable expertise. "Over the past ten years, we have completed many projects with ARBURG. In the case of turnkey systems, we jointly exploit the full optimisation potential in terms of cycle time and the footprint of the machine and automation," explains Anton Fuchs, who knows that he can rely on very good advice: "With our open and solution-oriented partnership, we benefit from ARBURG's expertise.

Occasionally we even try

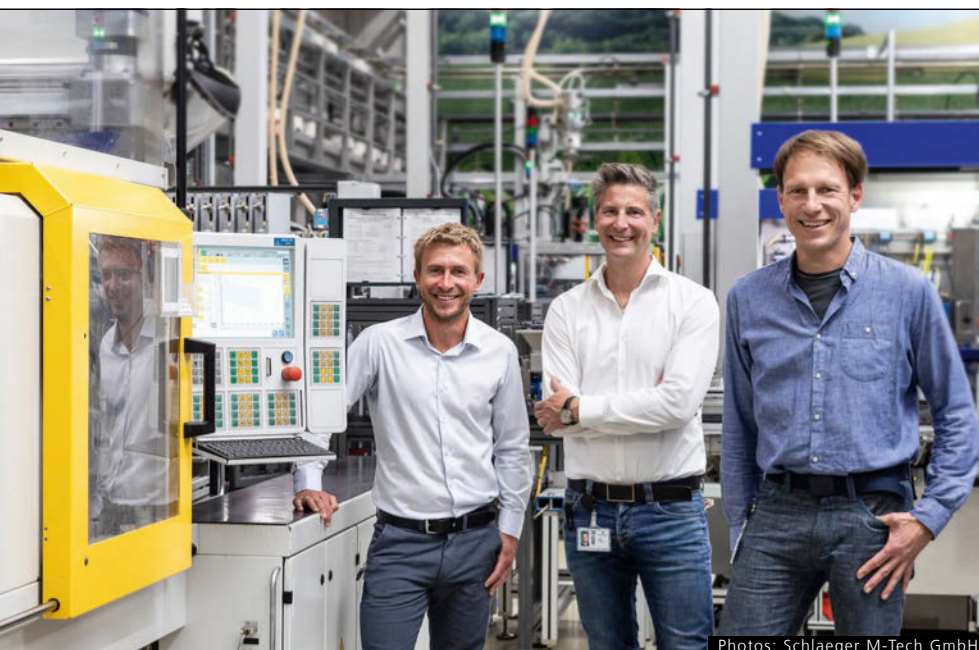
to go beyond the limits of what is currently possible." A special feature at Schlaeger is the subdivision of the production processes into a current total of seven mini factories.



Schlaeger develops and manufactures sub-assemblies for actuators and sensors, including stators for hybrid vehicles, for example.

neutral

by 44 per cent



Photos: Schlaefer M-Tech GmbH

Have geared their approximately 70 ALLROUNDERS towards energy efficiency (from right): Anton Fuchs, Technical Director (CEO), Gunter Gollasch, Plant Manager, and Michael Jendyczek, Head of Application Technology at Schlaefer.

Each factory works autonomously – from incoming orders to production and logistics. In this way, different teams develop different solutions, e.g. for switch-on strategies, which are later evaluated and possibly transferred to other areas.

25,000 tonnes of CO₂ saved

The consumption of the individual mini-factories is made visible in weekly load profiles. By the end of the year, the company, which has been certified to ISO 50001 for its energy management since 2015, aims to have saved around 25,000 tons of CO₂. So with the aid of a heat pump, for example, the waste heat of the machines is used to heat or cool the buildings. 100 % of externally-sourced energy is purchased

in the form of green electricity and eco-gas. Schlaefer also buys carbon offsets as compensation for fossil fuels, which account for less than three per cent of its energy consumption.

INFOBOX

- Name:** Schlaefer M-Tech GmbH
- Founded:** 1965 by Wolfgang Schläger
- Location:** Head office in Bayreuth, Germany, second location in the Czech Republic
- Turnover:** Around 100 million euros (2019)
- Employees:** Around 500
- Industries:** Automotive and electrical industry and medicine
- Products:** Mechatronic solutions for dosing, moving, switching and measuring; in-house product development and mould making
- Machine fleet:** Over 100 injection moulding machines, including approximately 70 ALLROUNDERS
- Contact:** www.schlaefer.com



When it needs to be

Packaging: Broad product range for high performance applications

The ALLROUNDERS in packaging design, marked with a “P” after the type designation, are true “packaging artists”. They are consistently geared towards high performance and energy efficiency, thereby ensuring maximum productivity in series production every day.

“The packaging industry is becoming increasingly important to us,” remarks Gerhard Böhm, ARBURG Managing Director Sales and Service. “We are very well positioned here with our hybrid HIDRIVE machines, which are also available as special packaging variants.” According to Böhm, the response to the high-speed machines has been consistently positive. What’s more, ARBURG has significantly expanded its range upwards with the new ALLROUNDER 1020 H (P). “The high-end technology of our HIDRIVE machines includes planetary roller screws, for example, which we have been using for electric drives since 2001 – making us the first manufacturer to do so,” he states. “Since they play a decisive role in terms of speed, dynamics, reliability, and durability, we also manufacture this impor-

tant component ourselves – something that is unique in the industry!”

The largest model: ALLROUNDER 1020 H (P)

The largest packaging machine to date in clamp design and with GESTICA control system has a clamping force of 6,000 kN. With the injection unit 7000, the largest in the ARBURG portfolio, the maximum shot weight is around 4,200 grams of PS. This is suitable for moulds with a high number of cavities, but also for the production of large packaging containers, for example. For ALLROUNDER Packaging that is precisely tailored to the requirements of the packaging industry, there are additional special features for the production of thin-walled articles and screw caps.

Processing of recyclates

“When we talk about packaging, we naturally also get onto the subject of the circular economy,” says Bertram Stern, Packaging and Circular Economy Manager at ARBURG. “This is an issue that our

company has been actively looking at for some time now. All of our activities in this connection are grouped together in the arburgGREENworld programme.” ARBURG demonstrated various applications at K 2019 – for example the production of thin-walled cups from 30 per cent pure PP recycle and 70 per cent new PP material on a hybrid ALLROUNDER 1020 H (P).

Flagship application by Zott

As a demonstration of the packaging machines’ productivity, Bertram Stern cites the outstanding application of Zott SE & Co. KG in Mertingen, Germany: “The company manufactures its goblet-style yoghurt pots on three fully automated production lines. In addition to all the peripheral equipment for cup handling, each of these incorporates one ALLROUNDER 720 H (P). We realized the turnkey systems with our project partners KEBO and Ilsemann, who supplied the moulds and automation respectively.” Reiner Schmid, Application Manager Packaging at ARBURG, explained the application details: “The pots are produced on three 8-cavity moulds in only 3.4 sec-



Packaging
Website

quick and reliable

onds and printed downstream. What is outstanding, however, is not only the high quantities that can be achieved, but also the high availability and performance of the systems."

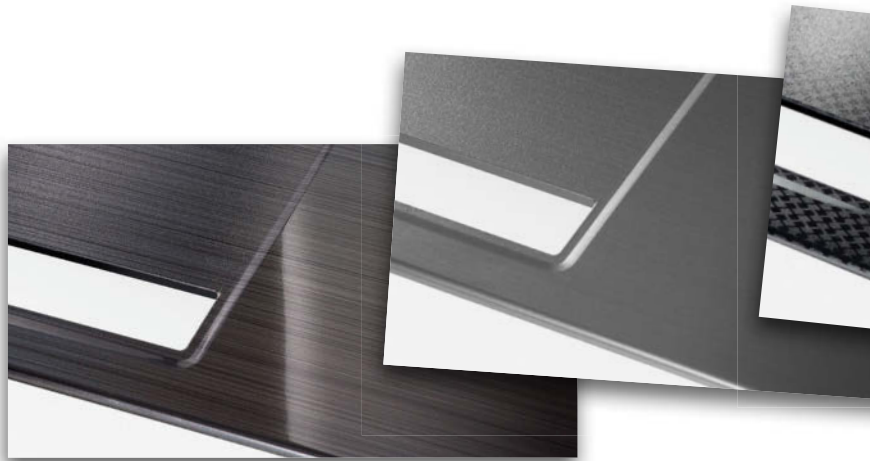
CUBE: designed for cube technology

In addition to the ALLROUNDER Packaging machines, there are the ALLROUNDER CUBE machines that are specially designed for the use of cube moulds and are based on packaging machine technology. The large

installation space and second injection unit above the moveable clamping platen allow production processes to be further optimised. ARBURG is also working closely with cube mould specialist FOBOHA to develop individual complete solutions and new products such as reverse cube technology (see today 72, page 10).

Key data for the largest packaging machine ALLROUNDER 1020 H (P):
1,020 millimetres clearance between tie bars, 6,000 kN clamping force and size 7000 injection unit.





Brilliant prospects

KURZ: IMD technique – versatile, efficient, and future-oriented

When it comes to decorating plastic parts, film technology is of interest to many industries. The possibility of functionalising plastic surfaces is a major source of new product ideas and fields of application. The potential offered by the in-mould decoration (IMD) process is explained by experts from the LEONHARD KURZ Foundation: **Nikolas Wagner, Head of Business Area Plastic Decoration, and Johannes Romming, Process and Technology Engineer.**

today: Can you please briefly explain the IMD technique?

Romming: The IMD technique is a roll-to-roll transfer process, a continuous process in which a paint package is detached from the carrier roll during the injection process and transferred to the plastic part.

today: What are the benefits of the IMD technique?

Wagner: It is a trouble-free, reliable process that is very economical in high volumes. With IMD technology, design changes can be made quickly and efficiently. The process offers an unparalleled variety of designs. Metallisation, wood, carbon, or marble optics are possible, as are soft touch or brushed effects as tactile features. In addition to high-quality designs, special functions can be incorporated. For example, KURZ is developing IMD films

that are noise-reducing, sound-optimising or equipped with special surface resistances such as sun cream resistance.

today: Which IMD products are already being manufactured today?

Wagner: The process has been in use for decades and the bandwidth is enormous: trim strips, panels or central consoles in car interiors, control panels for household appliances, laptop lids, cell phone shells or cosmetic lids, to name but a few. The demand in the white goods sector is clearly increasing. What's more, there is a growing trend towards dead-front effects and partially or fully translucent designs – a trend that is spreading throughout all industries.

today: What are the limits of the technique?

Romming: The realisation of in-mould decorations depends on the part geometry. Strongly 3-D shaped components cannot be decorated using this process.

today: What new or further developments are there in this area?

Wagner: The IMD process has developed considerably in general and is more versatile. Components with greater curvature can now be decorated using the IMD-VARIOFORM® process recently developed by KURZ. There have also been some changes in the size of the single images that can be produced. We can now offer

single-image IMD designs of up to one metre in width. Wear resistances have also been continuously optimised in line with the increasing demands of industry.

today: Which direction are developments heading in, especially with regard to films?

Romming: We have to provide technologies that allow small series and individual features to be implemented economically. A trailblazing example is the combination of the IMD technique with digital printing, which brings together the best of two worlds: high-quality IMD designs in economical mass production and customised using digital printing.

today: Where is the IMD process heading in the future?

Wagner: Touch surfaces are on the advance in all industries. Closed seamless surfaces with touch displays will be the standard. Touch control panels implemented using the IMD technique and touch sensors that can be integrated via in-mould labelling (IML), such as the capacitive sensors of our subsidiary PolyIC, will be found in many series applications. The topic of sustainability will also become increasingly prominent.

today: What are the challenges here?

Romming: The trend will be to use monomaterials wherever possible and to avoid composite materials in order to in-



Photos: KURZ

crease the recycling rates of plastics. KURZ has focused intensively on the topic of sustainability and has demonstrated in studies that components decorated with our IMD technology are recyclable. The extremely thin IMD coating does not affect the recyclability of plastics.

LEONHARD KURZ uses laptop frames to demonstrate the variety of IMD surface designs (above). Nikolas Wagner, Head of Business Area Plastic Decoration, and Johannes Romming, Process and Technology Engineer (left, from left to right), are firmly convinced of the future potential of the IMD technique.

INFOBOX



Name: LEONHARD KURZ Stiftung & Co. KG

Founded: 1899 by Leonhard Kurz

Locations: Over 30 locations worldwide, production facilities in Europe, Asia, and the US

Employees: Over 5,600 worldwide

Products: Business area Plastic Decoration: Transfer products for plastic decoration using IMD, IMD Varioform, IMD PUR, insert moulding, hot stamping, digital printing, inline foiling

Contact: www.plastic-decoration.com

A tidy business!

Reynera: ALLROUNDERS ensure high cost-efficiency and sustain

With over 100 years of success, Reynera is one of Mexico's long-established companies. And is the market leader for cleaning products such as brooms, mops, brushes, dustpans, and buckets. The company relies on ARBURG's technology and expertise to produce efficiently and conserve resources.

In 1918, Reynera was founded with the aim of "producing a durable broom for housewives". This handmade millet broom – which is still part of the product portfolio today – was the starting signal for the company's success story. Today, Reynera's wide range of cleaning products is particularly in demand in Latin America, the US, and Canada.

Rapid growth

General Director Jorge Treviño explained the rapid development of the company: "In the past four years alone, we have increased our sales by 100 per cent. And we expect this growth to continue at the same pace in the future." His brother and deputy director Juan Manuel Treviño adds: "Innovation, quality and sustainability are always our top priority. An important success factor was and is our

collaborative partnership with ARBURG, which began in 2014."

Detailed analysis and planning

The collaboration was further intensified during the construction of a completely new injection moulding production facility, which was put into operation in 2018. Axiomatek, a company based in Monterrey and a trading partner of ARBURG's subsidiary in Mexico, was commissioned with the overall concept.

In order to increase the efficiency of moulded part production, the ARBURG experts performed advance analyses of various factors such as the approximately 140 moulds available, the number of mould changes, machine capacity utilisation, and the individual injection moulding processes (with long cooling and dosage times in some cases).

Shorter cycles, less energy

"With ARBURG's help, we have succeeded not only in improving the quality of many moulded parts, but also in reducing cycle times by up to 25 per cent," says Jorge Treviño, adding that overall, the machine fleet's energy consumption has been reduced by 25 per cent thanks to the hydraulic ALLROUNDERS, which feature the ARBURG energy-saving system (AES) with speed-regulated pump motors, for example. "For machines that produce 24 hours a day, six days a week, these savings deliver a huge increase in production efficiency," he reports proudly. Thanks to its collaboration

Proud of their company's success story: Jorge Treviño (left), Director General, and his brother Juan Manuel Treviño, Deputy Director.





ability

Photos: Reynera



To manufacture the plastic components for items such as dustpans and brooms (above) in an efficient and resource-saving manner, Reynera consistently relies on ARBURG technology (left).

with ARBURG, Reynera has significantly reduced its manufacturing costs per second and has been able to maintain this level for many years.

Around 60 per cent recycles

Reynera is currently working on the implementation of hybrid ALLROUNDER H machines for thin-walled articles and on increased process automation. The aim is to further increase productivity and reduce energy requirements by an additional 20 per cent. Reynera also attaches great importance to the fact that its cleaning products are made of environmentally friendly raw materials. Approximately 60 per cent of the plastic materials and bristles are re-

cycles. In the injection moulding shop, for example, robotic systems remove the sprues to regranulate them. Depending on the application, the recycled content is between ten and 15 per cent.

"ARBURG's systems and expertise significantly help ensure that our products are manufactured to a high standard of quality, while conserving resources and energy," summarises Jorge Treviño.

INFOBOX

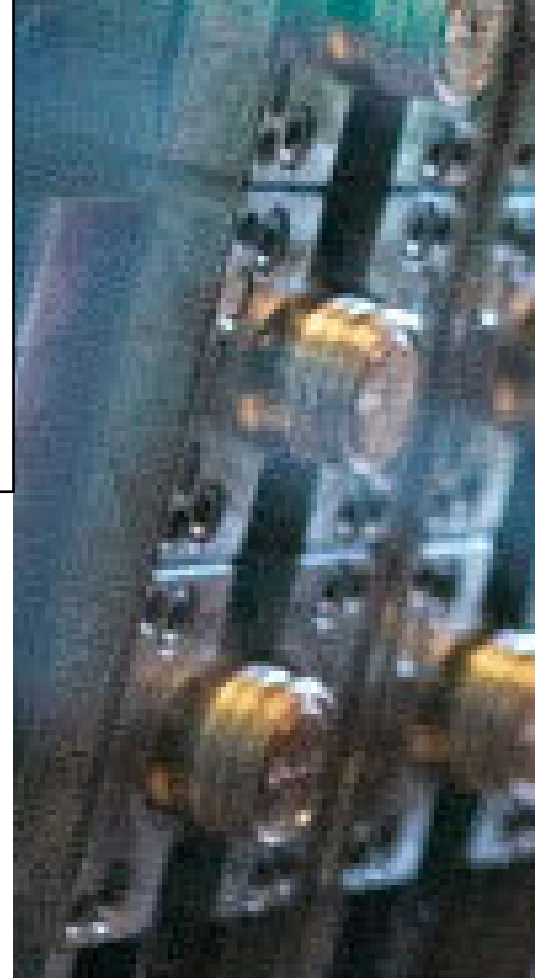


Name: Reynera
Founded: 1918 by Pedro N. Trevio
Location: Cadereyta Jiménez
Turnover: USD 85 million (approx. EUR 73 million) in 2019
Employees: 1,169
Products: Cleaning products
Machine fleet: 26 ALLROUNDERs with clamping forces from 1,000 to 5,000 kN
Contact: www.reynera.com.mx



TECH TALK

Dipl. Ing. (BA) Oliver Schäfer, Technical Information



Simply better

Bionically optimized pressure control increases reproducibility

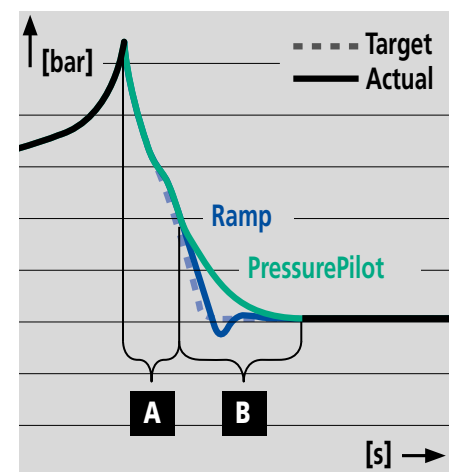
Switching from injection pressure to holding pressure is an important quality feature of the injection moulding process because the pressure curve has a direct effect on uniform mould filling. Bionically optimised pressure control is advantageous here, as it helps reliably prevent flash formation and underfilling. At the same time mould filling is more constant and the balance is improved, especially with higher cavity numbers. With only one parameter, adjustments are extremely easy.

Since 1987, a linearly controlled transition from injection pressure to holding pressure has been possible on ALLROUNDERS using the control function “switchover via ramps” (see Tech Talk in issue 64 of “today”). The result is improved balancing, in other words, the even filling of each

mould cavity. With its new “aXw Control PressurePilot” feature, ARBURG is now going one step further. The abbreviation “aXw” (arburgXworld) denotes ARBURG’s digital products, and “Control” stands for the area of control systems.

Switching without internal pressure peaks

With the “PressurePilot” function, a non-linear, bionically optimized pressure control system enlarges the process window for a robust and reproducible injection moulding process. In this case, “bionically optimized” means that the curve progression, when switching from injection pressure to holding pressure, is based on natural processes. The pressure is first reduced abruptly and then ever more slowly, like discharging hydraulic accumulators, for example – or even more vividly: like releasing air from balloons.



A relatively dynamic and rapid pressure reduction at the beginning is important to avoid internal pressure peaks in the cavities and thus overfilling and flash formation on the components (see graph, area A). In this area, the curves of the two functions “switchover



via ramps" (blue) and "PressurePilot" (green) are basically identical. The advantages of bionically optimized pressure control with the "PressurePilot" function become clear in the last third of the curve (area B).

No pressure drops

The new function ensures a smooth transition. By successively reducing the steep gradient at the beginning of the curve, there is also no undershooting of the target holding pressure. As a result, there are no pressure drops in the distributor system or cavities that could lead to downtimes at the melt front. The bionically optimized profile is automatically created by the control system. All that is additionally required is the specification of a time period. The cycle time is not extended because the transition is part of the holding pressure and can be correspondingly shorter.

Ideal for multi-cavity moulds

The "PressurePilot" function ensures even more precise control when switching from injection pressure to holding pressure. This enlarges the process window for robust and reproducible injection moulding. The effect is most obvious with multi-cavity moulds. The function is not intended to replace a balanced mould, but it can help solve problems during balancing, which would otherwise not be possible to solve by means of mould modifications in a cost-effective manner. Differences in filling and therefore discrepancies in the part weights per shot are further reduced, while underfilling and flash formation can be reliably prevented. As a consequence, the risk of mould damage is reduced. The "PressurePilot" function also helps further process optimize processes for moulds with only one cavity.

The new "aXw Control PressurePilot" feature is ideal for multi-cavity moulds (above): An easily adjustable and precisely controlled transition from injection pressure to holding pressure (graph) is the basis for uniform mould filling.

HEALING
CARING
HELPING
**MEDICAL
TECHNOLOGY**
RELIEVING
NURSING
SUPPORTING



WIR SIND DA.

Medical technology is all about quality, precision and absolute purity, from protective equipment to syringes to implants. This is always true – not just during the COVID-19 crisis. To ensure that all your needs are taken care of, a team of specialists at ARBURG will support you in designing injection moulding machine and clean-room technology for your specific products. This includes analyses and functional tests at our facilities.
www.arburg.com

ARBURG