

today

The ARBURG magazine

Issue 73

2020





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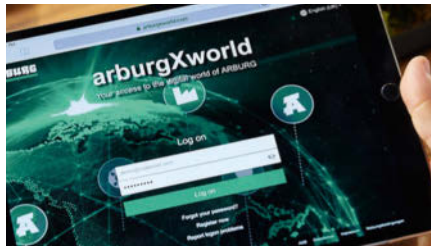
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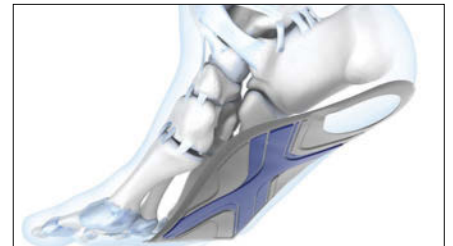
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IMPRESSUM

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Responsible: Dr Christoph Schumacher

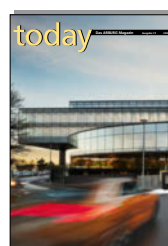
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The ARBURG training centre in Lossburg combines aesthetics, functionality and sustainability. In terms of training, customers can expect the most advanced offering in the industry.



Dear readers,

Almost everything is different in these times, but luckily, some things never change. Our brand promise – Wir sind da – has become even more

important during this global coronavirus pandemic.

One of the first serious decisions we took in relation to COVID-19 was to cancel our Technology Days and the international opening ceremony for our training centre in March. We had a fantastic program lined up for both major events, but the health of our customers, partners and employees was more important to us.

It was also an obvious decision for us to produce various items of protective equipment on our machines in Lossburg.

Especially in such difficult times, we are more committed than ever to looking positively into the future and showing you efficient solutions. And that is the second thing that never changes: Our “today” magazine brings important and interesting news and information to you all

around the world! One example from arburgGREENworld is the HolyGrail 2.0 technology, which we present to you in detail in this issue. Prof. Hans-Josef Endres explains how, together with ARBURG, he will advance research in the fields of biomaterials, recycling and the circular economy, and users report on the advantages offered by the arburgXworld customer portal. You will also learn how ALLROUNDERS can be used for the efficient production of millions of filigree LSR parts for irrigation systems or shoe inserts in a variety of designs.

Ingenious model maker Sascha Rücker demonstrates the terrific level of enthusiasm that ARBURG machines can inspire on occasion.

Even though times are hard, we hope you have fun reading the colourful mix of topics in this issue of “today”.

Michael Hehl
Managing Partner



Know-how helps!

COVID-19: Production of masks and safety glasses in Lossburg

Nothing is the same as it was a few months ago. And yet the pandemic is making one thing very clear: a lot of companies are willing and able to provide swift help. ARBURG is working hard to support medical and nursing staff in the region and is producing mouth and nose masks and safety glasses in high volumes on ALLROUNDERS.

The company is involved in various aid initiatives and has initiated a variety of projects to develop, produce and provide protective equipment free of charge.

Certified safety glasses

ARBURG initiated the project to manufacture safety glasses that protect eyes and conjunctiva from infection with COVID-19, and realised it in conjunction with specialist chemical supplier EMS-CHEMIE and UVEX, a manufacturer of protective and safety glasses. ARBURG had already produced sunglasses with these partners at the K 2019 trade fair. Flexible and informal discussions between

the parties revealed that the same mould, and consequently the same design, could also be used to produce safety glasses.

After EMS had agreed to the use of the mould and UVEX had offered to make the glasses suitable for their new application by means of rapid certification, ARBURG built a turnkey system around an electric ALLROUNDER 570 A and a six-axis robotic system in Lossburg.

Injection moulding of an initial batch of 20,000 glasses made from transparent Grilamid TR (PA12) began in mid-April. With a Packmat packing station, each pair of glasses is manually packed in an individual tubular film bag together with safety and information sheets, and the bags are then CE marked. ARBURG and EMS-CHEMIE shared the first 20,000 pairs of safety glasses and distributed them free of charge to hospitals, retirement homes and civil protection organisations in Germany and Switzerland via official channels.

Multifunctional masks

The second project started in May: the series production of multifunctional mouth

and nose masks that can be sterilized easily and used several times. They consist of a soft LSR mask, which is put over the nose and mouth, and a rigid PP shield with loops for fastening elasticated straps. In the middle is a standardised connection with a hole. To prevent infection in everyday life, the opening is sealed with a flow gate. In the next expansion stage, a filter housing will be able to be attached to the opening, so that suitable FFP2 or FFP3 filters can provide reliable protection to doctors and nursing staff, for example. ARBURG is working with Wilhelm Weber (moulds), GÜNTHER (hot runner technology), Kufner (filters), Herrmann Ultraschall (welding technology) and Packmat (packaging technology) to produce this component.

ARBURG developed the high-quality, sustainable masks made from flexible LSR and PP in-house and produced initial prototypes with freeformers using additive manufacturing methods. In a record time of around five weeks, Polar-Form and Foboha worked in partnership to build the corresponding injection moulds for the LSR and PP components, so that series production could be started quickly



Rapid assistance in the fight against COVID-19: ARBURG is producing multifunctional mouth and nose masks and safety glasses (photos above). ARBURG Managing Director Sales Gerhard Böhm (left) hands over the first 1,200 pairs of safety glasses for hospitals and rescue services in the Freudenstadt district to District Administrator Dr Klaus Michael Rückert (photo on left).

in Lossburg. The LSR component and tool simulation was carried out using SIGMA Engineering's SIGMASOFT software. EWIKON (cold runner) and männer (hot runner) were also involved in realising the mould technology. Other partners included Barth Mechanik (gripper) and Packmat (packaging technology). The raw material for several tens of thousands of masks was donated by the chemical group Wacker and Borealis. The LSR masks are produced on an electric ALLROUNDER 570 A with a 4-cavity mould, an LSR dosage system from ELMET and a six-axis robotic system

from KUKA. At the same time, the associated PP shields are being produced by an ALLROUNDER 470 E GOLDEN ELECTRIC with a 2-cavity mould and a MULTILIFT SELECT robotic system. The PP shield is then positively locked into place on the LSR mask by hand, the corresponding elasticated straps are added, and everything is packaged up. Around 3,500 of these multifunctional high-tech masks can be produced in this way each day.

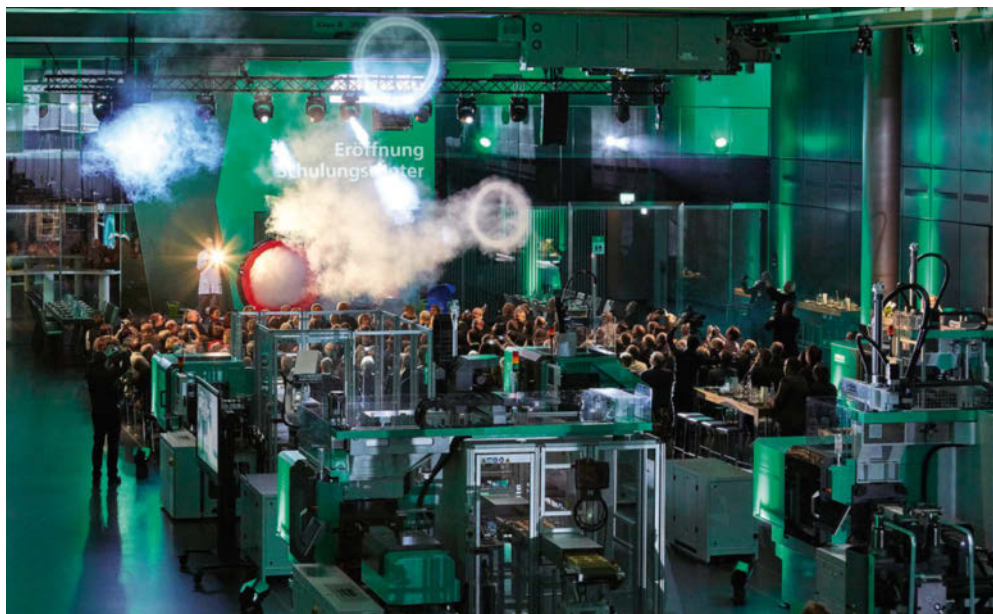


On to new dimensions

Training centre: More space, increased digitalisation, closer to our

In early March 2020, it was finally time for the ceremonial opening of our training centre. Due to the coronavirus pandemic, this was celebrated at a regional level. ARBURG is setting standards worldwide with its new building. Customers will benefit from modern, digital training technology combined with a comprehensive range of machine equipment. And the building itself is a showpiece in terms of aesthetics, functionality and sustainability.

“We think ahead and are known for our first-class range of services and our customer proximity,” said ARBURG Managing Partner Michael Hehl in his inauguration speech, adding: “Whether we’re developing products and processes or constructing buildings, we combine functionality with aesthetics and bring together the latest technology and innovation with the prudent use of resources and sustainability.”



The training area alone takes up two floors of the 13,700 square metre new build, in which tens of millions of euros were invested. The three other floors con-

The inauguration of the training centre was celebrated in the machine hall with some 170 regional guests.



sions!

The training centre in Lossburg sets new standards in training, architecture and sustainability.

customers

tain open-plan offices for administration and the new ARBURG Health Centre for employees.

"Smart" courses

ARBURG offers customers and interested parties the most advanced range of training courses in the industry, with interactive and networked learning in an area covering a total of 2,200 square metres at its Lossburg headquarters. The centrepiece is the 1,160 square metre machine hall on the ground floor, which will in future host 15 ALLROUNDERS representing a cross-section of all sizes and versions. For automated and digitalised production, each injection moulding machine is equipped with a robotic system and an IIoT gateway and connected to the ARBURG host computer system (ALS). A freeformer is also available for training in additive manufacturing.

The new training centre brings theory and practice even closer together. Each of

the eleven training rooms on the first floor is equipped with a modern smart board. In addition, all course participants work on their own touchscreen PCs with simulated controls. The PCs are networked for interaction and screen or application sharing, i.e. for the transmission of screen contents and joint work on a document. Data can be transferred from the smart board in the classroom to a smaller board on the relevant machine on the ground floor.

Aesthetics and conservation of resources

The new building is also an architectural master stroke by ARBURG. The cantilevered plane – i.e. the protruding part of the building – begins at a height of almost nine metres, overhanging the road by up to 13 metres. Another highlight is the glass façade with curved panes on the ground floor. The total glass area over all floors, including the aluminium

cladding, covers approximately 7,200 square metres.

When it comes to conserving resources, the new building is equally impressive. Examples include the energy-saving façade with double glazing, and the proven air conditioning system with low-temperature utilisation and full climate control. Rainwater and waste heat are also collected and reused.

However, COVID-19 will determine when training can begin on the customary scale.

Full speed ahead!

Institute of Plastics and Circular Economy: Cutting-edge research

Last autumn, Leibniz University Hanover opened its Mechanical Engineering Campus. And in March 2020, the new Institute of Plastics and Circular Economy (IKK) started its practical work there. In this interview, Institute Director Prof. Hans-Josef Endres talks about his main areas of focus and how he wants to work with companies such as ARBURG to advance cutting-edge research in biomaterials, recycling and the circular economy.

today: You have been working with bioplastics for quite some time, and are now focusing more strongly on the circular economy. What are you aiming to achieve in this respect at IKK?

Endres: With biobased plastics, recycling works quite naturally and is carbon neutral. Whereas with petrochemically produced polymers, you have to close the cycles with technical measures. In turn, biodegradable plastics are particularly interesting if they create additional functionality or if the plastic is intentionally released into the environment. I am thinking here of resorbable implants and compostable biowaste bags, as well as mulch films that can be ploughed into the soil and seed coatings in agriculture. At IKK, we optimize recycling processes, develop and process high-quality recyclates, and evaluate the sustainability of materials and processes.

today: What are the important factors here?

Endres: IKK supports industry in developing sustainable and recyclable products. To this end, we work with manufacturers of analytical, recycling and processing sys-



Photo: Marie-Luise Kolb/LUH

tems, are involved in standardisation activities and prepare life cycle assessments.

today: Everyone is talking about the circular economy – is this a big trend?

Endres: Yes, I think there is no alternative to circular economy when it comes to plastics as a resource. So far, the plastics

Inauguration of the Mechanical Engineering Campus: Prof. Hans-Josef Endres, Institute Director IKK, and Juliane Hehl, ARBURG Managing Partner, value the trusted industrial partnership.

in cooperation with ARBURG

industry has thought in a way that is too linear and focused on optimizing profits. However, the recyclability of a product or material should also play an important role. We must also redevelop the material and waste flows right back to the manufacturer. Germany in particular can and should live up to its pioneering role here.

today: How can ARBURG help with this?

Endres: Manufacturers such as ARBURG have done a perfect job and developed intelligent machines capable of processing virtually all polymer materials. For bioplastics and recyclates, the challenges lie in incomplete material data specific to processing, fluctuating recycle qualities and smaller processing windows. These issues must be solved jointly by the material, mould and machine manufacturers and the processors. ARBURG could also contribute to the circular economy with new business models, such as recyclable modular, leasing and service concepts or retrofitting for old machines. In addition, in-house recycling concepts could be developed for the injection moulding machines themselves and sustainability could also be increased in production.

today: What topics are you currently collaborating with ARBURG on?

Endres: We want to find out whether repeated thermomechanical stress causes recyclates to change, and if so, how. We are using an electric ALLROUNDER 470 A to characterise the processing behaviour of recyclates, new types of bioplastics, and biocomposites. This machine also produces various test specimens for further material analyses. Using the hydraulic dual-component Allrounder 920 S, we are developing combinations of recyclates

and so-called “virgin materials”. The focus here is on “Design for Recyclate”, and technical aspects relating to the process and material. We are also evaluating the sustainability of materials, processes and machines and providing support by means of polymer chemical analysis.

today: What do you particularly appreciate about your collaboration with ARBURG?

Endres: The people! I have found ARBURG to be a successful machine manufacturer with a shared understanding of future-oriented issues. During my work at plas.TV, I got to know the responsible people at ARBURG very well and appreciate their openness, straightforward manner, and cooperation in a spirit of trust. As a university, we benefit from application-oriented research that ensures the transfer of technology to us. And as an industrial company, ARBURG receives support in research and development topics and finds potential employees and future decision-makers among our students.

I hope that we will overcome many exciting challenges together in the future.

INFOBOX

Name: Institute of Plastics and Circular Economy (IKK), Mechanical Engineering Campus, Leibniz University Hanover

Founded: September 2019, Director: Prof. Dr.-Ing. Hans-Josef Endres

Location: Hanover, Germany

Employees: Approx. 25 including doctoral students

Focus: Sustainable plastics, circular economy, recycling

Contact: www.ikk.uni-hannover.de



Lord of the bricks

Sascha Rücker: ARBURG machines made from LEGO bricks

Sascha Rücker, born in 1972, is head of the injection moulding department at Gebr. Potthast. But he dives into another world in his spare time, when he builds “dreams out of LEGO”, as he describes it. This is because MAGICBRICKS, individual model making and the sale of spare parts are his passion – and anyone who thinks that playing with LEGO bricks is just for kids is sorely mistaken.

Nowadays, the market for LEGO sets and rare parts from these kits that can be purchased is so large that there is even a dedicated internet platform with around one million registered members worldwide and about 12,000 online shops. Most AFOLs (adult fans of LEGO) meet on the largest platform www.bricklink.com to satisfy their requirements for building materials and finished sets or to trade in such “treasures”.

Crazy about LEGO

Many online shops turn standard LEGO sets, which can be bought in different theme worlds such as Star Wars®, into individual pieces. People like Sascha Rücker – who in his own estimation is a bit crazy – buy and sell these individual parts online then combine them to create completely new models.

Rücker uses these individual parts to build ALLROUNDER injection moulding machines and the freeformer. He is influenced here by LEGO and ARBURG in two ways, as in one of his previous jobs, he built injection moulds for LEGO in Billund – the LEGO Group with its worldwide production sites is a major customer of ARBURG. At LEGO and other employers, Rücker repeatedly came into contact with ALLROUNDERS. And at Gebr. Potthast Kunststoffspritzguss GmbH & Co. KG, a moulded parts manufacturer with its own mouldmaking department, he now also works with ARBURG injection moulding technology.



Photos: Frank Peter/vor-ort-foto.de

Setting the ball rolling

The “final nudge” to build LEGO ALLROUNDERS came from one of Rücker’s colleagues on the Chamber of Industry and Commerce’s audit committee. This colleague had come across a rare set from the LEGO Factory Tour 2011, an ALLROUNDER. Rücker, a total injection moulding specialist and ARBURG fan, was strongly of the opinion that although the factory set was good, it completely bypassed the technical realities. “I was pretty sure that the machine technology could be rendered more realistically and created the kit using the parts list.”

In order to build an ALLROUNDER that was as “real” as possible, Rücker obtained the measurements for an initial outline from existing information, then applied this to the dimensions of the dimpled LEGO bricks and constructed a rough build, so that he could also make the proportions true to scale. He procured the available parts in the appropriate colours and necessary quantities through various

In his hobby workshop, Sascha Rücker builds various ALLROUNDERS (right) and the freeformer (left) out of LEGO bricks.





online platforms. This is how he created his own ALLROUNDER for the first time, still in hammered green and rapeseed yellow. Rucker has since built a variety of models: ALLROUNDERS up to size 1120 H, MULTILIFT robotic systems, complete turnkey systems and the freeformer. "The machines' colour change in 2019 threw me a bit though," admits Rucker. "I'd just finished with a few models when the protective hoods and machine stands suddenly came out in mint green and light and dark grey. But I was soon able to reproduce and implement this change."

Professional handicraft

"The online platforms have become so professional," he continues, "that software solutions can produce incredibly good digital renderings to make it easier for the fanbase to select parts and assemble them in real life." The LEGO ALLROUNDERS, for which Rucker needs between two and three months of development and construction time, are the final expansion stage of his hobby.

Contact through an enquiry

Contact with ARBURG at model level was established via Dr Christoph Schumacher,

Head of Marketing and Corporate Communications at ARBURG. Rucker was concerned about the use of the company logo on his models. One of his first "small" freeformers was given a place in one of the parts display cases on the ARBURG stand at K 2019. All his models of ARBURG machines can be viewed at www.magicbricks.de or on Instagram ([magicbricks_lego_mocs](https://www.instagram.com/magicbricks_lego_mocs)) and ordered on request.

Sascha Rucker looks for all the bricks he needs on online platforms and uses them to build completely new models with the aid of 3D rendering software.

INFOBOX



- Name:** MAGICBRICKS
- Founded:** 2005
- Location:** Altenholz, Germany
- Business areas:** Model making and dealing in LEGO parts
- Production area:** 30 square metres and 15 square metre display space in his own hobby room
- Employees:** 1
- Products:** ALLROUNDER, freeformer and ARBURG injection moulding technology in miniature format
- Contact:** www.magicbricks.de



Suddenly labels are alive

HolyGrail2.0: Digital passport with watermark

It would have been one of the highlights of the Technology Days: the HolyGrail2.0 application – IML labels with “Digimarc Barcode”, a digital watermark for separating plastic products by type. COVID-19 stopped us from presenting this innovative technology to the trade live, but a video from the customer centre reveals its potential.

With its arburgGREENworld programme, ARBURG is committed to the circular economy and resource conservation. The company is also working with prestigious partners on innovative technologies for a closed circular economy - from marking, sorting, processing and recycling through to the re-use of plastics.

The fact that ARBURG injection moulding machines can also process single-type recyclates was demonstrated by a hybrid ALLROUNDER 1020 H in Packaging version at the K 2019 trade fair. It produced thin-walled IML cups of consistently high quality from 70 per cent new PP mixed with 30 per cent single-type post-indus-

trial recyclate (PIR). This application proves that if it is possible to collect plastics in a sensible and safe manner and sort them according to type, they can be returned to the value chain.

Digitalisation closes the loop

But how can you sort plastics by type? With the HolyGrail2.0 technology, for example. Digital watermarks, which allow information to be “invisibly” deposited on a label, are the key feature here. In this way, the product receives a “digital passport” with relevant information on single-type recycling in order to ultimately increase both the quantity and quality of recyclates. The label is peppered with “Digimarc” barcodes over a large area, so that a fragment of an IML cup is sufficient to retrieve information on the material and its previous use (e.g. whether or not it is suitable for food).



Invisible “Digimarc” barcodes enable IML labels to be separated by type with HolyGrail2.0 technology (photo below). Further product information can be retrieved via AR content (photo above).

The information can be read out by scanners in sorting plants and supermarket checkouts, for example, or by the end user with an app. This can then be used to retrieve a range of information about the product, its use, or disposal – including in the form of augmented reality content.

The cups were injection-moulded with interactive labels on a hybrid ALLROUNDER 820 H in Packaging version. Information on this and other exhibits as well as the presentations for the cancelled Technology Days 2020 can be found at www.arburg.com/info/tt2020.



Video Holy-Grail2.0



Small drops – gre

Azud: Moving into the production of delicate LSR membranes

The AZUD Group is a leading global manufacturer of systems for resource-saving irrigation, filtration and water treatment. LSR membranes play a decisive role in products for drip irrigation. So that it could manufacture these sophisticated components itself at its headquarters in Murcia, Spain, the company set up an in-house LSR production facility in 2017 with the support of ARBURG. Electric ALLROUNDERS were selected for reasons of precision and performance.

“ARBURG is undisputedly the best supplier of LSR injection moulding machines and is therefore our sole partner in this field,” commented José Ochoa, Injection Moulding Plant Manager at AZUD in Murcia. “The ARBURG team’s professionalism, commitment and close connection with its customers show that we opted for the right partner for a strategic collabora-

tion in the manufacture of these powerful, high-tech products.”

With LSR production in-house, AZUD has more control over the process and can achieve even better part quality. “ARBURG provided us with brilliant support during the design and commissioning phase, for example with regard to annealing furnaces, material storage, production equipment and calculating capacities,” added Ochoa.

Precision for micro-irrigation

LSR is mainly used to manufacture the pressure-compensating membranes that are installed in the AZUD PREMIER and AZUD GENIUN product lines. The end products are drip lines for micro-irrigation. The LSR membranes ensure an even flow of water, for which precision in dimensions, homogeneity and stable mechanical properties are of particular importance.

An electric ALLROUNDER 570 A was jointly identified as the appropriate machine. Today, there are three such ALLDRIVE machines in use. “This decision was absolutely right. And we can also rely on a fast service,” said Ochoa. Each ALLROUNDER is in operation around the clock six days a week and is specially adapted to a single mould. Work is dust-free and temperature-controlled under clean room conditions. The LSR membranes are manufactured with 64 and 128-cavity moulds.





Photos: AZUD

Drip emitters from AZUD (photo below) are used in drip lines for micro-irrigation (large photo on left). José Ochoa (centre), Injection Moulding Plant Manager at AZUD in Murcia, and his team use electric ALLROUNDERS (photo on left) to produce the filigree LSR membranes for the drip emitters.

at expertise

with the aid of ARBURG

350 million membranes per year

This enables a staggering 350 million membranes to be produced each year. All injection moulding parameters, the automatic parts ejection, mould heating and fully electric dosing system are integrated in the central machine control system. SELOGICA also controls the rotating handling system via an interface. "This ensures high productivity, quality and precision and is easy and intuitive to operate for our employees," said José Ochoa, naming a major advantage of the LSR systems.

AZUD also produces the thermoplastic components of the drip emitters itself – as of late on a fully electric ALLROUNDER 630 A. The individual components are finally forwarded as bulk material to a complex assembly system, where they are completed and checked with several cameras. In addition, spot checks for dimensional accuracy and mechanical properties are carried

out in the laboratory. The drip emitters are finally fixed onto the PE drip lines by means of coextrusion and shipped to customers worldwide. Demand: increasing!

INFOBOX



Name: AZUD

Founded: 1989

Locations: Headquarters in Murcia, Spain, and subsidiaries in India, Mexico, Brazil and China

Turnover: €80 million

Business areas: Systems for irrigation, filtration and water treatment

Production area: Over 100,000 m²

Employees: More than 500 worldwide

Machine fleet: Around 40 injection moulding machines, including three ALLROUNDERS for LSR and two for thermoplastics

Contact: www.azud.com



We are... virtual!

Digital customer proximity: First “remote” machine acceptance test

Coronavirus has changed a lot of things since spring 2020, but the global pandemic has also prompted rethinks and accelerated planned steps. The first remote machine acceptance test in Lossburg shows how ARBURG is ensuring customer proximity despite halting all business trips and adhering to social distancing.

19 March 2020: In the ARBURG assembly hall, an electric ALLROUNDER 370 A produces micro parts for medical technology and is ready for final acceptance. Normally, the customer – in this case from Switzerland – would travel to Lossburg and run through the specifications with his/her ARBURG contact right by the machine. Not today.

Instead, ARBURG sales expert Zoran Antoski puts on a headset, picks up his iPad and connects the customer by telephone. A colleague from Application

Technology makes a written record. All requirements can also be checked in this way point by point, by visual inspection.

Connected via iPad and phone

The Swiss customer sees exactly what is displayed on the iPad. In the case of his injection moulding machine, these include the micro-injection module and numerous special options for use in medical technology. “Here you can see the core pulls’ electrical control system,” says Zoran Antoski, and circles the corresponding position on the screenshot with an AR element. And the customer discovers a connection detail that doesn’t quite fit. No problem, this can still be corrected directly in Lossburg without much effort or expense. Following this remote machine acceptance test, the customer receives a detailed record with additional image documentation from the remote machine acceptance test before the ALLROUNDER

During the remote machine acceptance test, ARBURG sales expert Zoran Antoski and his customer go through all the requirements together point by point via iPad and phone.

is finally placed into operation at his premises. After three hours, the conclusion of the customer and ARBURG is as follows: Although the remote machine acceptance test cannot fully replace the function test and personal contact, it is a time and cost-efficient alternative and an exciting option for the future.

Additive investment

German RepRap: ARBURG owners buy start-up

The Hehl and Keinath families see additive manufacturing as a complementary process to injection moulding with great potential for the future. In February 2020, acting independently of ARBURG, they acquired German RepRap GmbH, an innovative manufacturer of industrial 3D systems. The young company will remain independent and located in Feldkirchen near Munich, Germany.

The partners are thus the owners of ARBURG and German RepRap, which both manufacture products bearing the label "Made in Germany". The young company, founded in 2010 as a start-up, has proved to be an interesting addition due to its flexibility and dynamics.

GRR will remain independent

The change of ownership will not result in any operational changes for Managing Director Florian Bautz and the firm's 22 employees. German RepRap will continue to manage the areas of sales, application technology, production and administration independently.

ARBURG will support the company on request and in close contact with its wide-ranging resources.

3D printers for filament and LSR

The technological connecting points are evident: ARBURG's freeformer works with droplet discharge and standard granulate for individual applications, while German RepRap's x500pro uses filament strand discharge for standard industrial applications. Further developments will include the processing of liquid plastics such as liquid silicone rubber (LSR).

While the open APF process (ARBURG Plastic Freeforming) primarily processes commercially available plastic granulates and specially certified original materials, German RepRap develops and manufactures technologies based on FFF (fused filament fabrication) and LAM (liquid additive manufacturing). In the LAM process,



liquid silicone is processed with the L320 machine in the same way that it is used for injection moulding. The x400, x500 and x1000 are designed for the FFF process. Many materials can be used, thanks to German RepRap's open material platform. These include filaments based on ABS, PC, PEEK, PEKK, PLA and Ultem. With its print volume of 1000 x 800 x 600 mm, the x1000 is currently the largest machine.

The product portfolio of German RepRap comprises three industrial 3D systems for filament-based FFF technology and a LAM machine for liquid silicones (from right to left).



Photo: German RepRap

INFOBOX

Name: German RepRap (GRR) GmbH
Founded: 2010 by Florian Bautz
Location: Feldkirchen, Germany
Business areas: Industrial 3D systems
Employees: 22
Industries: Aerospace, automotive
Products: 3D printers, accessories and services
Contact: www.germanreprap.com

Digitalisation a

arburgXworld: Digital portal delights customers

Since the ARBURG Technology Days in March 2019, the arburgXworld portal has been available to customers in Germany. The international market launch took place at K 2019 in October. The following statements document some of the positive experiences that our customers have had to date with this comprehensive digital offering.

Kathrin Gruber,
Managing Director
of Wartenfeler
GmbH & Co.
KG, Hemhofen,
Germany:



Photo: Wartenfeler

"We mainly use the Shop app to quickly research and order parts, and the visual presentation is also very helpful. Machine-specific exploded drawings help save time identifying spare parts. Also, the 'Order history' and 'Invoices' navigation links are useful as a supplementary archiving system."



Tim Övermöhle, arburgXworld key user at Pöppelmann GmbH & Co. KG, Lohne, Germany: "With the portal, our main focus is on maintenance, but also on purchasing and scheduling. The specific apps we work with are the Shop, ServiceCenter, Calendar and MachineCenter apps. These are used both by our commercial staff and our colleagues in Maintenance.



Photo: Helweg

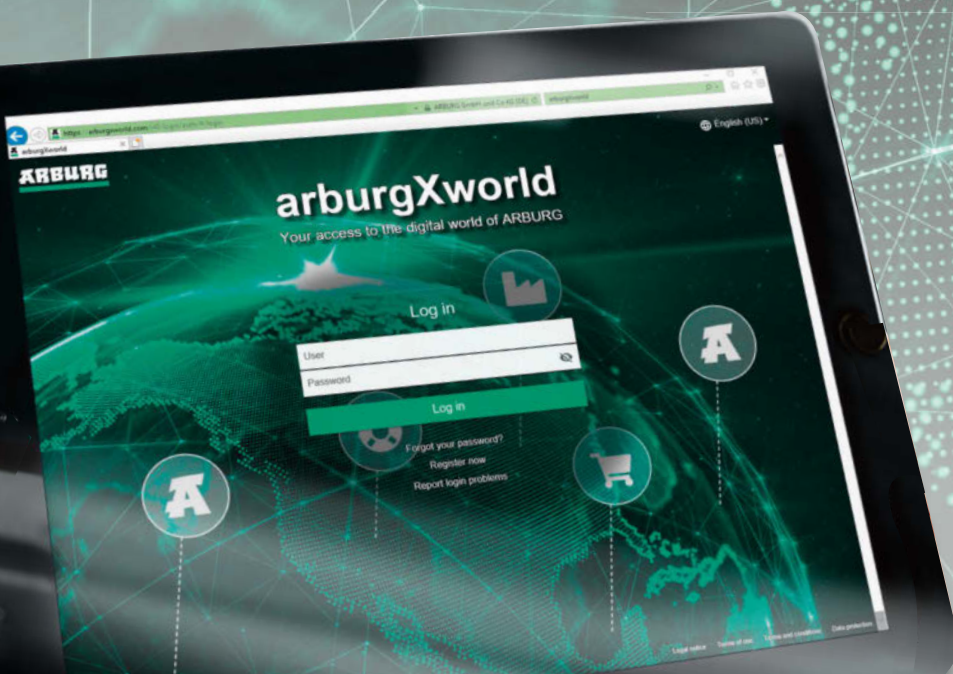
We use the Shop app to place our online orders around the clock. Prices, availability and product data can be called up. We also use the portal to get machine data and machine parts lists, and to post online service tickets and technical queries. This makes the whole process faster."



Photo: Swoboda Wiggensbach

Martin Spelthahn,
Technical Support at
Swoboda Wiggensbach
KG, Wiggensbach,
Germany:

"Our maintenance department uses the machine documentation and spare parts lists in the MachineCenter and Shop. This is also where orders are placed centrally by our purchasing department. The documentation and spare parts lists provided on the portal are very useful for troubleshooting and repairs. I already had the ServiceCenter app for testing, and I found the option to take photos and videos for enhanced understanding to be very helpful."



t its best!



Holger Albrecht, Manufacturing Engineering Plastic Components, Seat Belt Systems, at ZF Automotive Germany GmbH, Alfdorf, Germany: "We



Photo: ARBURG

have been using arburgXworld with the Calendar, Configuration, MachineFinder, ServiceCenter, SelfService, DataDecoder, MachineCenter, VirtualControl and Shop apps very extensively since April 2019. We've been particularly impressed by the Shop app with excellent information on current orders, deliveries and

invoices, plus the spare parts search with availability and costs. MachineCenter is a great option for downloading machine documents. SelfService helps us troubleshoot and repair faults, and MachineFinder helps us check

the optimum injection unit using material and parts data. VirtualControl provides support with component sampling, and Calendar is ideal for information about planned service visits."

Gerd Winter, Head of Injection Moulding at Otto Dunkel GmbH, Mühlendorf a. Inn, Germany: "We've been using the arburgXworld portal since

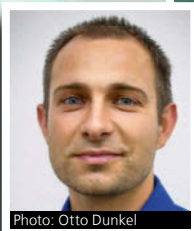


Photo: Otto Dunkel

June 2019, especially the Shop and MachineCenter apps. The documentation of all orders, deliveries, offers and invoices is very helpful. The MachineCenter provides easy access to operating instructions, spare parts lists and circuit diagrams, so our electrical and maintenance departments can get information quickly and easily."



Alexander Wittig, Head on Injection Moulding Maintenance at HK Cosmetic Packaging GmbH, Coburg, Germany: "I mainly use the arburgXworld Shop. If articles can't be ordered online, we

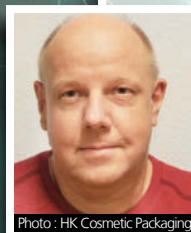


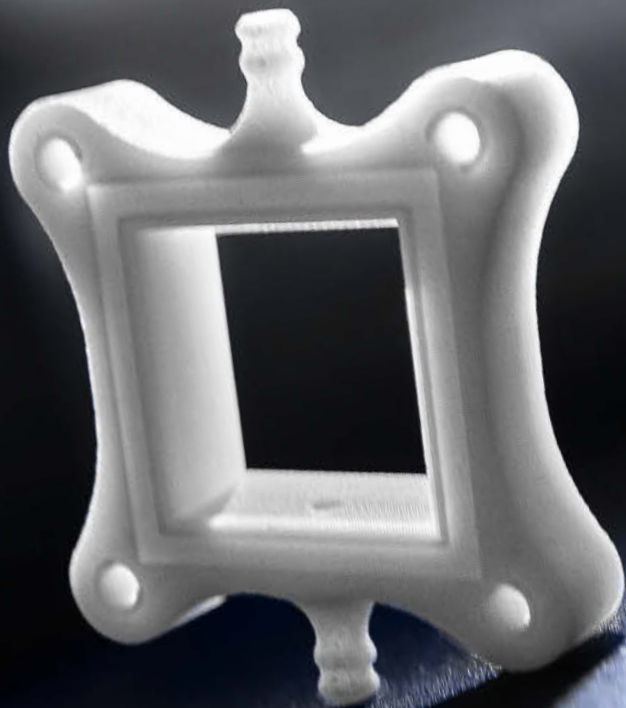
Photo: HK Cosmetic Packaging

arrange for the spare parts service to place an offer there, which I can then move to the shopping cart. Together with the spare parts lists stored in the MachineCenter app, finding and ordering has become much more efficient. It's also worth mentioning that older machines back to 2003 are still maintained in the portal."



Down to the last d

Direct Manufacturing Research Center: Intensive research acti



Basic research, process optimisation, material development and component property characterisation for different additive manufacturing processes – these are topics dealt with by the University of Paderborn’s Direct Manufacturing Research Center (DMRC), which now uses two freeformers in its work.

For more than ten years, Kunststofftechnik Paderborn (KTP) has been researching fused deposition modelling (FDM) as part of its research activities at the Direct Manufacturing Research Center. When the first freeformer was acquired in 2016, KTP’s research activities were expanded to include ARBURG Plastic Freeforming (APF).

André Hirsch, who is a research assistant at DMRC and KTP and works on both additive methods, describes how the cooperation evolved: “In 2016, there was great interest in the APF process as a new type of additive manufacturing technology. As a first step, we gained fundamental knowledge about the process, the boundary conditions of production, a possible way of optimising the process and the resulting component properties.”

Second freeformer in 2020

It was also interesting to identify the capabilities and limitations of the process and to develop the most efficient approach for optimising the process parameters. “Research enquiries from industry led to the purchase of our second freeformer in 2020,” Hirsch continues. “As a result, we can react much faster while simultaneously continuing to work on our research topics.”

etail

ivities with two freeformers

High-quality APF components

KTP's extensive knowledge of plastics technology helps with all investigations, optimisations and material certifications. Hirsch explains the advantages of the freeformer for the production of innovative component structures: "Due to the open system, a variety of thermoplastics can be tested and certified for the APF process. This type of additive manufacturing delivers visually appealing components with high resolution accuracy. The process step of filament production, which is required in the FDM process, is no longer necessary – meaning that the material certification or part production can be started immediately." Since the identifiable parameters would not work in the same way for all components, a current DMRC research project is dealing with production and design guidelines for the most efficient and component-specific optimisation of process parameters. According to Hirsch, the use of support materials is also important for the DMRC in relation to the design freedom of the components.

Medical cell culture segment

On the question of specific components, Prof. Dr.-Ing. Elmar Moritzer, Director of Kunststofftechnik Paderborn, remarks that frequent applications are in the field of prototype or small series production with an original material from injection moulding. He cites a medical cell culture segment measuring only ten by 20 millimetres as an example. Fine flow channels are integrated into this small component. The goal was a fluid-tight design made of a cell-compatible polycarbonate without the use of support material. This was achieved through a component design adapted to



Photos: Kunststofftechnik Paderborn

Dr.-Ing. Matthias Hopp (left), Deputy Director of KTP, and André Hirsch, research associate, use the freeformer (top photo) to produce a gas measuring cell for a novel application in the chemistry industry, for example (photo on left).

additive manufacturing and targeted process parameter optimisation.

From the DMRC's point of view, the greatest advantage of the freeformers and the APF process is that the open system allows certified original materials and self-certified plastics to be processed, as well as particularly soft thermoplastic elastomers. "The optical quality that can be achieved in all these cases is excellent," comments Hirsch.

INFOBOX

Name: Kunststofftechnik Paderborn (KTP) in the Direct Manufacturing Research Center (DMRC)

Founded: KTP 1980, DMRC 2009

Location: Paderborn, Germany

Business areas: KTP: Injection moulding, extrusion, compounding, joining of plastics, simulation;

DMRC: Laser sintering of plastics, laser melting of metals, design guidelines for additive manufacturing, economic assessment, product development

Machine fleet: Two freeformers, 20 industrial and 14 desktop systems (FDM, laser sintering, digital light processing, selective laser melting)

Contact: www.ktp.uni-paderborn.de, www.dmrk.uni-paderborn.de

Mass-produced indi

Bauerfeind: Orthopaedic orthoses with variable plastic cores

The new generation of orthoses from Bauerfeind in Zeulenroda-Triebes, Germany, is called ErgoPad weightflex. Thanks to an innovative plastic core that combines two different polyester elastomers, the orthoses are available in three different degrees of firmness. The core variants are injection moulded on a hydraulic two-component ALLROUNDER 630 S.

The ErgoPad weightflex foot orthoses straighten and stabilize the wearer's feet and reduce unphysiological loads. They are used for symptoms resulting from degenerative processes in the feet. The greatest advantage of these orthoses, which are sold worldwide through specialized orthopaedic shoe dealers and other outlets, is the variable firmness of their plastic core.

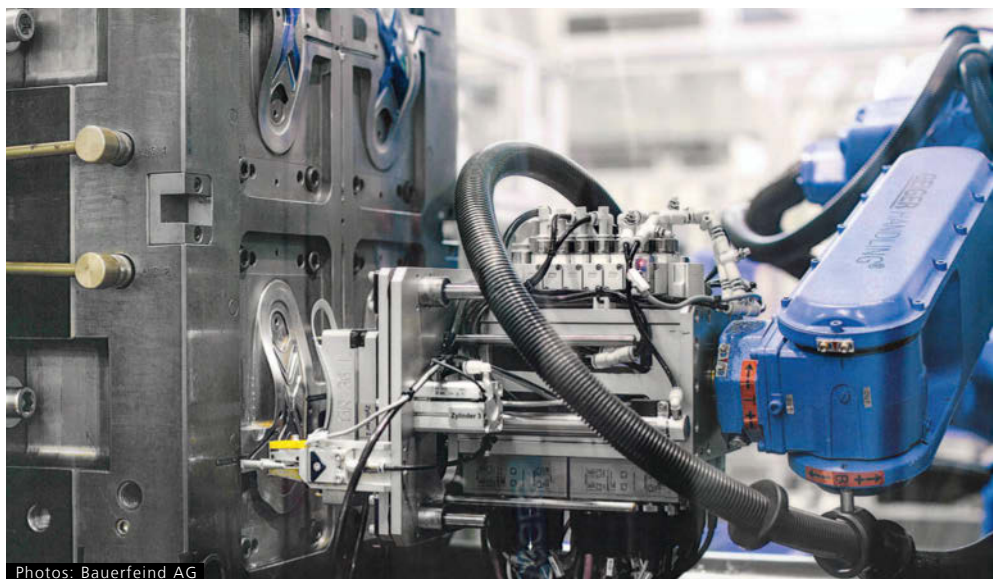
Diversity thanks to injection moulding

Andreas Lauth, Chief Technical Officer at Bauerfeind AG, explains: "The use of multi-component injection moulding enables the extremely efficient, automated combination of two polyester elastomers with different degrees of firmness in a single operation. Both materials in the orthotic core have been specially developed for Bauerfeind. The asymmetrical weightflex-X material in the core can be selected in three different degrees of firmness; added to this is the surrounding material."

The "soft", "medium" and "strong" variants use variable support force to support the feet in accordance with their

condition, the therapy objective and the wearer's body weight. The weightflex technology in the orthotic core promotes natural movement of the feet, supports their dynamics and torsional stability, and optimizes the wearer's gait. As the orthotic core can be easily bent in the front area as well as in the heel, the orthoses

al. According to Andreas Lauth, injection moulding technology was the only viable option for this production process: "The two-component ALLROUNDER 630 S, whose mould height adjustment enables a correspondingly wide mould insert, allows us to produce



Photos: Bauerfeind AG

can be worn in flat shoes or in shoes with higher heels.

Using various downstream processes – such as foaming with polyurethane (PU) – the core that has been produced in the two-component injection moulding process is turned into the finished foot orthosis.

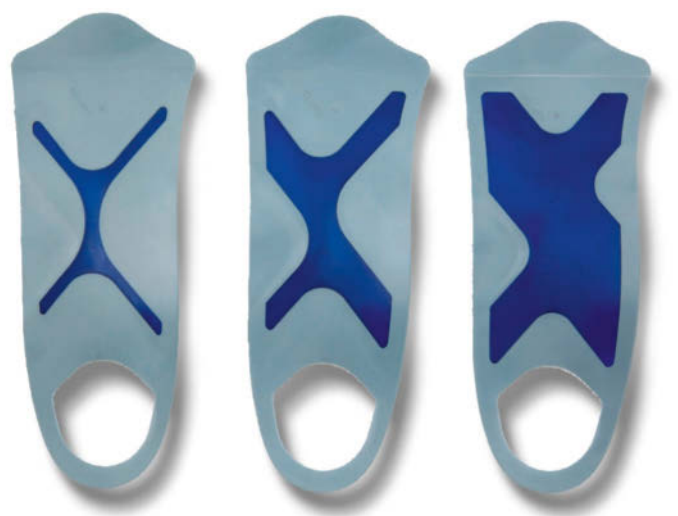
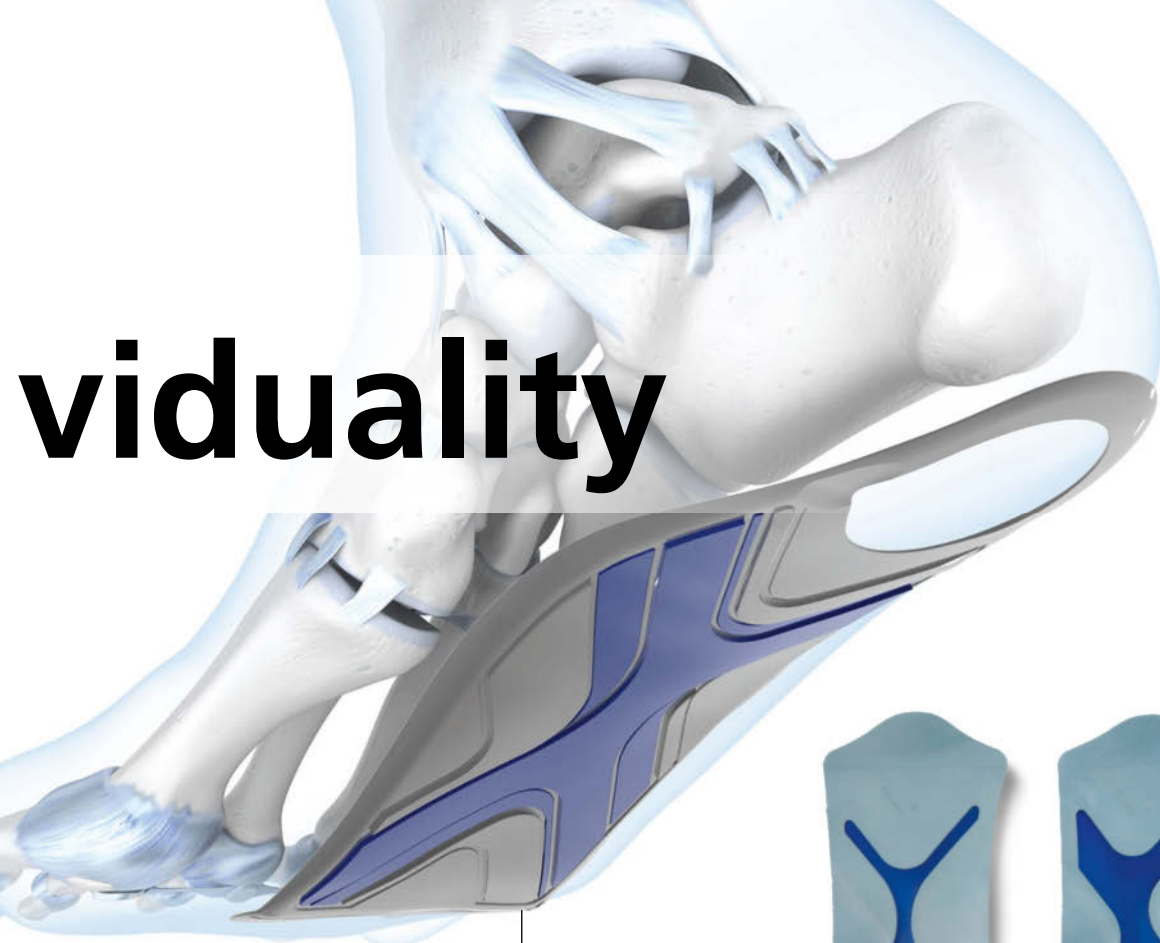
A key feature of the complex high-tech injection moulding process is that the process parameters must be kept extremely stable during the injection of the materi-

al. According to Andreas Lauth, injection moulding technology was the only viable option for this production process: "The two-component ALLROUNDER 630 S, whose mould height adjustment enables a correspondingly wide mould insert, allows us to produce

Family mould for 45 variants

The entire process is very precisely timed. First the weightflex-X component is injected, after which the mould rotates. Then the second component fills the rest of the core. The orthotic cores, each weighing approximately 30 grams, are removed by a robotic system that sepa-

viduality



The ErgoPad weightflex orthopaedic orthoses straighten and stabilize the wearer's feet and reduce unphysiological loads (photo above).

The orthotic cores consisting of two polyester-elastomer materials come in different degrees of firmness (picture right).

The two-component ALLROUNDER 630 S produces the cores using a 1+1-cavity family mould (photo on left).

rates and recycles the excess material. The 1+1-cavity family mould used on a rotary table enables a total of 45 variants to be produced.

Successful partners for 25 years

Bauerfeind has its headquarters in Germany and is represented by subsidiaries in over 20 countries. Its relationship with ARBURG has already existed for 25 years. The machines used are mainly hydraulic ALLROUNDERS with hydraulic accumulators, which operate on a multiple-shift basis with corresponding energy efficiency. These machines are particularly well suited for the production of orthoses, as they offer a wide range of combinations between tie-bar spacing and injection unit sizes.

"We very much appreciate our partner ARBURG," says Lauth. "The cooperation is professional, works smoothly on a personal level and with extremely fast response times. Project enquiries are always dealt with efficiently, and the application technology advice is also very professional. The excellent support and assistance with servicing and spare parts is particularly worth highlighting. Next-day delivery is standard."

INFOBOX



Name: Bauerfeind AG

Founded: 1929 by Bruno Bauerfeind as a specialist company for medical compression stockings

Locations: Zeulenroda-Triebes, Gera and Remscheid, Germany

Turnover: Approx. €300 million

Business areas: Bandages, orthoses, medical compression stockings, orthopaedic foot orthoses and digital measurement technology

Industries: Specialist dealers in the healthcare sector, medical supply stores, orthopaedic engineering, clinics and pharmacies

Employees: 2,100 worldwide, 1,300 in Germany, of which 1,100 in Zeulenroda-Triebes

Contact: www.bauerfeind.com



Made i

“FAIRBecher” cup: Joint

A particularly “fair” project has been realized by Reutlingen University, Germany, in cooperation with Heimsheim correctional facility (JVA). Mechanical engineering students developed a hot beverage cup made of bioplastics and brought it to market maturity. These cups are now being produced in series on an ALLROUNDER by trainees in prison.

The project came into being at the Molding Expo 2017 trade fair in Stuttgart. “We regularly present prison industry (VAW) products and make new contacts at trade fairs,” explains Johannes Schmidt, who is in charge of training at Heimsheim correctional facility. On this occasion, he met Professor Steffen Ritter from Reutlingen University. The two decided to work together on a student project to develop a hot beverage cup. The cup had to be more functional than the very simple metal cups used in prisons until now and so attractively priced that it also aroused interest among end consumers. The idea of the FAIRBecher (which translates as “FAIR cup”) made of bioplastics was born.

Suitable for prison and everyday use

In order to get a feel for which features would make the product suitable for prison and everyday use, the dedicated first-year master students even got themselves locked up in a specimen cell. “This was an important part of the creative process,” affirms Professor Ritter. The outcome of this experiment: the cup should be well insulated, be able to be hung on a shelf or bed with an open handle and be easy to clean. The next stage was to implement these findings and the

n prison

project between university and correctional facility

customer's list of requirements in a structured development process.

Intensive analysis and preparatory work

To start with, the team analysed about 80 cups that were already available on the market. This was followed by initial concept proposals and a total of more than 50 additively manufactured prototypes, which were used to test and further improve the new FAIRBecher cup. As a special feature, the cup was given a "T-cut": a small indentation for attaching a tea bag. The handle was slanted so that an upside-down cup would stand on it at an angle, allowing it to air dry. Besides the user-friendly design, it was very important that the component layout was suitable for injection moulding. To find the optimal insulating rib structure, the students also carried out laborious thermal imaging investigations.

Hot runner mould for training

For the material, the team opted for Arboblend, a lignin-based bioplastic. Its shrinkage behaviour initially caused problems during demoulding, which was finally solved through a high-gloss polish for the mould. For the production of the mould and the design of the hot runners, the team received competent support from partner ProForm from Pforzheim. "The hot runner technology and the bioplastics processing made the project particularly interesting for our training," remarks Schmidt. "ARBURG also supported us a lot with the project. For example, we were able to run trials on the mould with Arboblend at their Customer Center in Lossburg."



Photo: Reutlingen University

FAIRBecher cups available for ordering online

Now around 500 FAIRBecher cups are produced daily by the trainees in prison on an ALLROUNDER 320 C GOLDEN EDITION. The trainees are also highly motivated due to the high demand for the cups. Each prisoner is of course given a cup as part of their basic kit. The cups are also available with individual printing or, on request, with a "Made in prison" sleeve (<https://shop.vaw.de>)

Professor Steffen Ritter (right) and his students from Reutlingen University have worked with Heimsheim correctional facility to bring the practical FAIRBecher cups to market maturity.



TECH TALK

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



Only one side of th

Why injection speed isn't all that matters

Long flow paths, thin wall thicknesses and short cycle times. The demands placed on injection moulding machines in the production of packaging articles are extremely high. Particularly when it comes to the core component: the injection unit. Besides a high plasticising capacity, the key requirement is fast injection, with the injection speed now a characteristic performance indicator. For short filling times the motto is usually "the quicker the better". But is this actually true? Or are there other influencing factors?

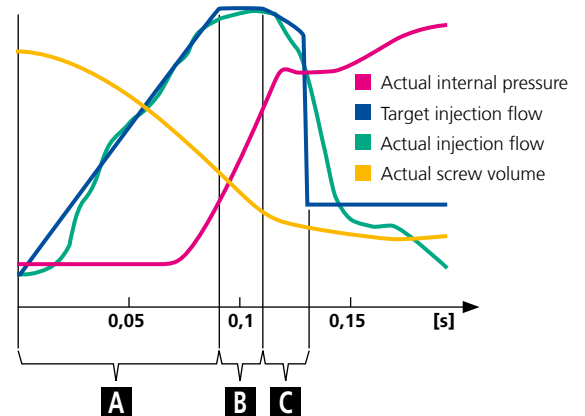
A typical feature of packaging applications is comparatively short screw strokes during injection. These are usually between 40 and 60 percent of the screw diameter. For fast injection with short filling times, the short screw strokes mean that it's not only speed that counts, but

first and foremost high dynamics. And this isn't only the case during mould filling (see diagram, section A), but also when switching to holding pressure (section C).

With the very short distance, high injection speeds can only be achieved by means of steep acceleration and braking ramps (section B).

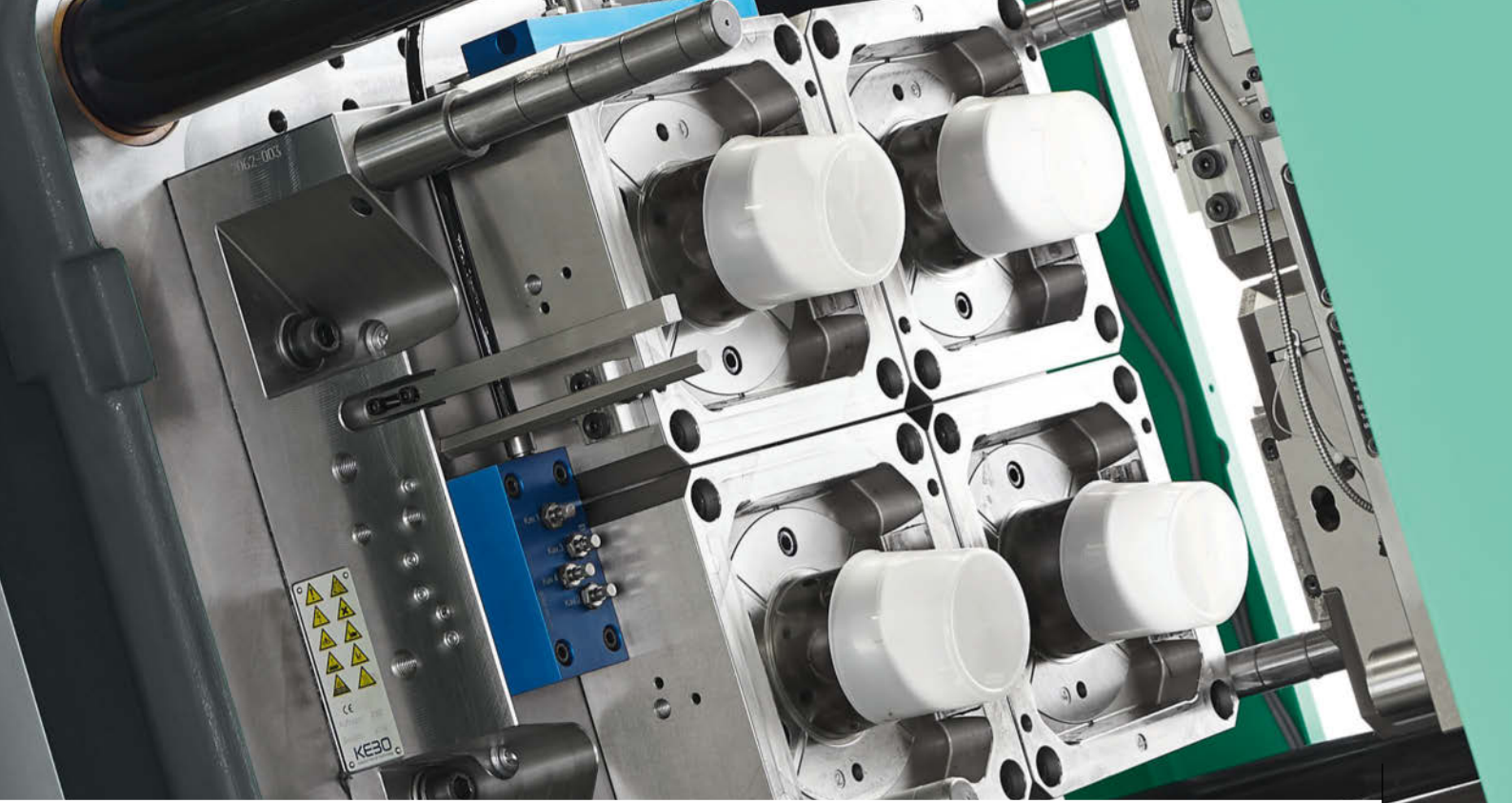
Dynamics bring speed

A comparison with motor sports makes this clear: in Formula 1, a racing car achieves good lap times if it can accelerate quickly after a corner and brake as late as possible before the next one. Transferred to packaging applications: if the set injection speed cannot be achieved on the available screw stroke, the machine operates in "delta mode". This means that an injection profile consists of only one accel-



eration and one braking phase. For processes of this type, the injection speed is not the decisive criterion. On the contrary, it could easily be reduced without having a negative impact on the process.

Besides high dynamics, active braking is also crucial for reproducibility during injection, as otherwise, braking is inevitably dependent on the counter pressure of the melt. Transferred back to racing, this cor-



e coin

responds to a braking process where you only ease off the throttle.

Position control for active braking

Processes of this type cannot be precisely controlled during injection moulding due to fluctuating melt viscosities, among other things. If braking is applied too late here, pressure peaks can occur in the hot runner, which lead to increased wear and tear and thus to damage to the system. Typical faults include leaks in the hot runner. Furthermore, braking that is not precisely controlled makes it difficult for installation technicians to define the right process window – especially for cycles where every tenth is important. The position-regulated screw was developed for ALLROUNDERS decades ago so that the screw could be braked in a targeted manner. Permanent monitoring of the screw position and active pressure control make it possible to run high injection

speeds up to the end of the flow path and switch to the holding pressure in a precisely controlled manner – without having to risk overfilling or damaging the hot runner due to pressure peaks. This plays a particularly important role in thin-wall applications where the pressure ranges are around or even above 2000 bar.

Doing the maths pays off

A high injection speed as a measure of the efficiency of a packaging machine is not completely wrong – but it is only one side of the coin. High filling dynamics and active braking are much more important. For many applications, running processes at higher injection speeds based on the motto “the quicker the better” is of no benefit to the process. It’s also worth doing the maths with regard to investment and energy efficiency.

The production of thin-walled round cups (photo above) with a flow path of 110 millimetres is a clear example of the fact that what counts is dynamics during injection and switching to holding pressure (diagram on the left).



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