

today

The ARBURG magazine

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IMPRESSUM

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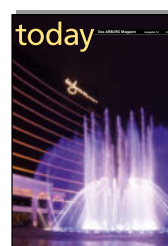
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Impressive water feature entertainment from WET: Performance Lake in front of the five-star Wynn Resort in Macau, China. The plastic components for such water feature experiences are produced with ALLROUNDERS.

ARBURG



Dear Readers,

At ARBURG, we have always believed that “if you stand still you go backwards”. Without this philosophy, neither the first ARBURG injection moulding machine nor the ALLROUNDER principle, which made multi-component injection moulding possible for the first time almost six decades ago, would have been invented. Read an exciting review of the success story of this process in this issue of “today”. To this day, multi-component technology continues to offer high innovation potential. In this context, you can find out more about the new reverse cube technology from Foboha in combination with the ALLROUNDER CUBE – a highlight at K 2019.

Our arburgXworld customer portal, which we are continuing to expand, was also met with great interest at the leading international trade fair in Düsseldorf, Germany. In addition to the continuous, focused

development of our digital products and services, our arburgGREENworld programme continues to grow. Visitors to our Technology Days, to be held from 11 to 14 March 2020 in Lossburg, will be able to check out current progress and obtain an outlook on the topics of digitalisation, the conservation of resources and circular economy. But that is by no means all. Our guests from all over the world can look forward to another debut, when we will be opening the doors to our new training centre for the first time.

As you can see, at ARBURG, things are moving forward dynamically – even in challenging times. And as we have demonstrated on several occasions in the past: with us you can count on an innovative and reliable partner to successfully master the challenges of the future.

We hope you enjoy reading this issue of “today”.

Renate Keinath
Managing Partner

Around

arburgXworld: Customer



Everyone is talking about digitalisation. But it only makes sense to use it if it offers added value and makes life more efficient. The arburgXworld customer portal meets this requirement, as evidenced by the great interest shown at the world's leading trade fair K 2019 and the consistently positive feedback from users.

"Numerous customers in Germany are already using our portal, where it has been available since March 2019. The digital products have been very well received," comments Gerhard Böhm, Managing Director

the world!

portal for more production efficiency

Sales and Service. On the occasion of the K trade fair in October 2019, the green light was given for the international launch of arburgXworld in 18 languages. "The positive response at the fair proved that customers all over the world had already been waiting for this portal," says Gerhard Böhm. By February 2020, customers from 22 countries had registered. "At the trade fair, there was also great interest in the new apps and functionalities," adds Jürgen Boll, Managing Director Finance, Controlling and IT.

Six new apps and packages

In practice, the MachineCenter, ServiceCenter, Shop and Calendar apps have already been in use since spring 2019. Six more apps were added in October, significantly expanding the customer portal's range of benefits and services.

The Configuration and MachineFinder apps provide assistance when purchasing new machines. In the Configuration app, the new ALLROUNDER 270 S compact can be configured and ordered online at predefined conditions. When it comes to finding the best ALLROUNDER for a specific application, the MachineFinder app can provide valuable information – including for efficient use of the existing machine fleet. It can, for example, calculate the optimum cylinder module based on process and material data.

The VirtualControl, ProcessDashboard, MachineDashboard and DataDecoder apps provide valuable help in organising production.

With VirtualControl, customers are able to stream the machine

control system on the basis of the current software status, for example to create data sets, optimise processes, implement cross-site support or to train employees. The ProcessDashboard and MachineDashboard apps allow production processes to be documented and status information as well as performance indicators for individual machines to be displayed live. The DataDecoder enables key parameters from a machine data set to be displayed in a legible way and saved as a csv or xlsx file.

In everyday production, the SelfService app supports operators in analysing machine malfunctions and downtimes themselves in order to get production up and running again quickly.

To make it easier for customers to get started with the customer portal, we have put together various arburgXworld packages. The free Basic package as well as the fee-based Premium and Premium Plus packages cover the entire machine fleet, while the Connect package applies to individual ALLROUNDERS.

Save time, increase efficiency

"The feedback from users confirms that using the apps delivers significant added value," comments Gerhard Böhm. One machine operator, for example, was able to use the SelfService app on a Friday evening to analyse a machine malfunction in detail and quickly correct it himself, thereby enabling production to continue over the weekend without any problems. For another company, where more



The arburgXworld customer portal was in great demand at K 2019 and has been available internationally in 18 languages since the fair.



arburgXworld
brochure



WET: Creating the world's most iconic water feature experiences

We do just about everything in-house," says Mark Fuller, CEO of WET, the US-based design and engineering company behind the world's most iconic water feature entertainment. "Everything" includes moulding the thousands of plastic components used in WET projects. And, for a company obsessed with quality and magical design, it's also not surprising that they use ALLROUNDER injection moulding machines since they started their in-house moulding operation in 2015.

Every day, thousands of people stand in awe of WET creations.

Steven Spielberg once described the dancing fountains of the Bellagio Hotel in Las Vegas, Nevada, as "the greatest single piece of public entertainment on planet Earth." With dueling XtremeShooters® (high-performance jet nozzles) and Oarsmen® water robots, the Dubai Fountain is the largest water feature in the world. And, the new Rain Vortex in Singapore's Jewel Changi

Airport, designed and engineered by WET with world renowned architect Moshe Safdie, is the tallest indoor waterfall on Earth.

For one of its recent fountains, WET used 15,000 lights supported by 45,000 bracket arms, every one of them moulded on WET's ALLROUNDER 1120 H, which features a clamping size of 6,500 kN.

Moulding LED lights

"We're still in the process of learning which parts are best suited to moulding on the machine," explains Frank Lichorobiec, WET's Molding Manager. "Right now, we're using it to produce three components for our line of LED lights."

These include large and small clear domes (30.4 and 25.4 centimetres), the support arms mentioned above, and an electrical junction box that requires a 760 gram shot of a glass-filled engineering polymer.

In addition to offering the tonnage and shot size required to mould these large components, the ALLROUNDER 1120 H also gives WET's team precise control over

injection pressures and speeds, needed to develop the optical clarity in the light domes, and the critical surface finish where the parts seal against water intrusion.

WET also benefits from the injection compression capabilities of their smaller ALLROUNDER 370 S machine, which they use to produce high-quality TIR lenses (Total Internal Reflection) required for their lights.

Quality and flexibility

Doing everything in-house gives WET control over total quality assurance and the flexibility to manage both long and short runs. "To produce a run of a thousand parts using an outside contract moulder, the set-up charges alone would result in a high piece-part price," Frank Lichorobiec explains.

"On the other hand, our team here can run both the higher production parts and the smaller, quick-turnaround jobs, making for a really good balance that is cost effective." Modular mould inserts make it easy to switch between similar parts in a matter of minutes for manufacturing efficiencies.



Photos: WET

into magic

Playing with water is WET's global business. Impressive are the fountains in front of the Bellagio in Las Vegas (left) and tallest indoor waterfall in the world at Jewel Changi Airport, Singapore (above).

with ALLROUNDER power



Frank Lichorobiec, Molding Manager at WET, proudly presents the clear dome produced on the large ALLROUNDER 1120 H.

"ARBURG operates very much as a partner and they are very good at coming up with solutions whenever we get into a challenging situation." WET also points to training programs available in its area, and the fact that the machines are easy to operate. "The controls are really very user friendly and easy for our operators to learn and use," Frank Lichorobiec notes.

For WET CEO Mark Fuller, however, the answer is far simpler. "At WET, we always buy the best equipment in the category.

Through considerable study, we have found that ARBURG is the best, and we have validated that belief over the several years we have owned and operated ARBURG." Thanks to WET's in-house moulding operation, he says, "we have the capacity to generate more work, at faster delivery times, and at better price points – all of which lead to increased happiness from our clients and therefore, increased revenue and profitability."

"We always buy the best"

Asked what they like about running ARBURG machines, Frank Lichorobiec says they really appreciate the support they get,

INFOBOX

- Name:** WET
- Founding:** 1983
- Locations:** Los Angeles, USA, Dubai, UAE, and Beijing, China
- Employees:** 350 total; seven in moulding and mouldmaking
- Products:** more than 240 experiential entertainment features
- Machine fleet:** twelve injection moulding machines, three ALLROUNDERS
- Contact:** www.wetdesign.com



Always

Technology Days: Huge

The ARBURG Technology Days are considered a unique and the largest in-house event in the plastics industry worldwide – for over 20 years! More than 93,000 invited trade visitors have attended over the years and been impressed by the varied programme and smooth organisation. One question that always comes up is how such a big event lasting four days can be managed without interrupting day-to-day operations and with production running?

A look behind the scenes provides the answer. As early as nine months beforehand, managing directors and managers from the application technology, marketing and sales departments meet to determine the programme for the next event. "It is an advantage that the core team has been working together for years or even decades," explains Juliane Hehl, who as Managing Partner is responsible for marketing. Everyone knows exactly what needs to be done, what is most important and how new employees can be brought on board quickly.

2020: Think tank for the topics of the future

During the Technology Days 2020, to be held from 11 to 14 March, the focus will be on arburgXworld and arburgGREENworld –

Experiencing future topics live: The Technology Days always provide a comprehensive overview.

worth the trip

industry event with a personal touch

i.e. on the subjects of digitalisation as well as resource efficiency and circular economy. "These are not two worlds, but two perspectives on one world," emphasizes Gerhard Böhm, Managing Director Sales and Service. "The goal is always to increase our customers production efficiency." ARBURG presented this approach for the first time at K 2019 and will expand on it for the Technology Days 2020.

The well-established Efficiency Arena provides an overview of the activities surrounding arburgXworld and arburgGREENworld. Since its "invention" by ARBURG, the Efficiency Arena has consistently addressed

and to offer a glimpse into the future through innovations.

Numerous stations

The event will extend across the entire company. The distance from the entrance of the customer centre to the most distant exhibition area, the turnkey area, is more than one kilometre. "But it's really worth covering the distance," promises Andreas Reich, Head of the Turnkey Department. In addition to

freeformers on show, their entire range of parts – all available for hands-on inspection – and we offer an outlook," says Lukas Pawelczyk, Head of Freeformer Sales.

Around 600 employees in action

"Our brand promise 'Wir sind da.' can be felt at every turn throughout the Technology Days," says Juliane Hehl. In order to look after about 6,000 guests, around 600 employees will be working during the event, with many more active behind the scenes. And this year, the official opening of the training centre will be held on the day before the Technology Days start. "But



arburg**GREEN**world

the relevant event topic in an informative and engaging manner.

Around 50 exhibits make for a wide range of applications

In expert presentations and with the aid of the various exhibits, visitors can also learn how these concepts can be put into practice. Dr Thomas Walther, Head of Application Technology, describes the mammoth task of his team as follows: "For us, it is important to put together an exciting mix of applications on the dozens of ALLROUNDER exhibits and present them live." The aim is to cover the entire range of injection moulding machines, to include all industries and processes,

ARBURG's own turnkey solutions, which are used to highlight trends

and innovations, the latest automated customer systems will also be on display.

Along the way, visitors can stop in the service area. "For us, the Technology Days are always a perfect opportunity to talk to the people who work on our machines every day," says Eckhard Witte, Service Divisional Manager. The highlight in 2020 will be the arburgXworld customer portal, which has a lot to offer in terms of service (see page 4).

Current and prospective customers in the field of additive manufacturing will also find it worth a visit. "We will have all



arburg**X**world

thanks to a well-oiled team, we can easily handle a double event like this," says the Managing Partner confidently.



Magic cube

Hermann Hauff: 40 percent faster thanks to new reverse cube technology

What Foboha, Hermann Hauff and ARBURG have jointly achieved in the packaging segment was a main attraction at the K 2019 exhibition: the new reverse cube technology. With this cube application, a single ALLROUNDER CUBE can replace three machines including assembly systems. With up to 40 percent shorter cycle times to boot.

Hermann Hauff has been producing two-component lower rack rollers for BSH dishwashers for some time. Previously, the individual parts were produced on three injection moulding machines and assembled separately. A new solution was needed for a new roll variant and to increase the annual production volume by around 20 percent. And this is exactly what Foboha Managing Director Rainer Armbruster, who has been involved with cube technology since 1995, found when sharing ideas with Jörg Vetter,

Technical Director at Hermann Hauff: Why not “simply” inject from two sides and then, just like with a Rubik’s Cube, rotate an upper and a lower cube half against each other and finally assemble the part directly in the mould? With this, reverse cube technology was born.

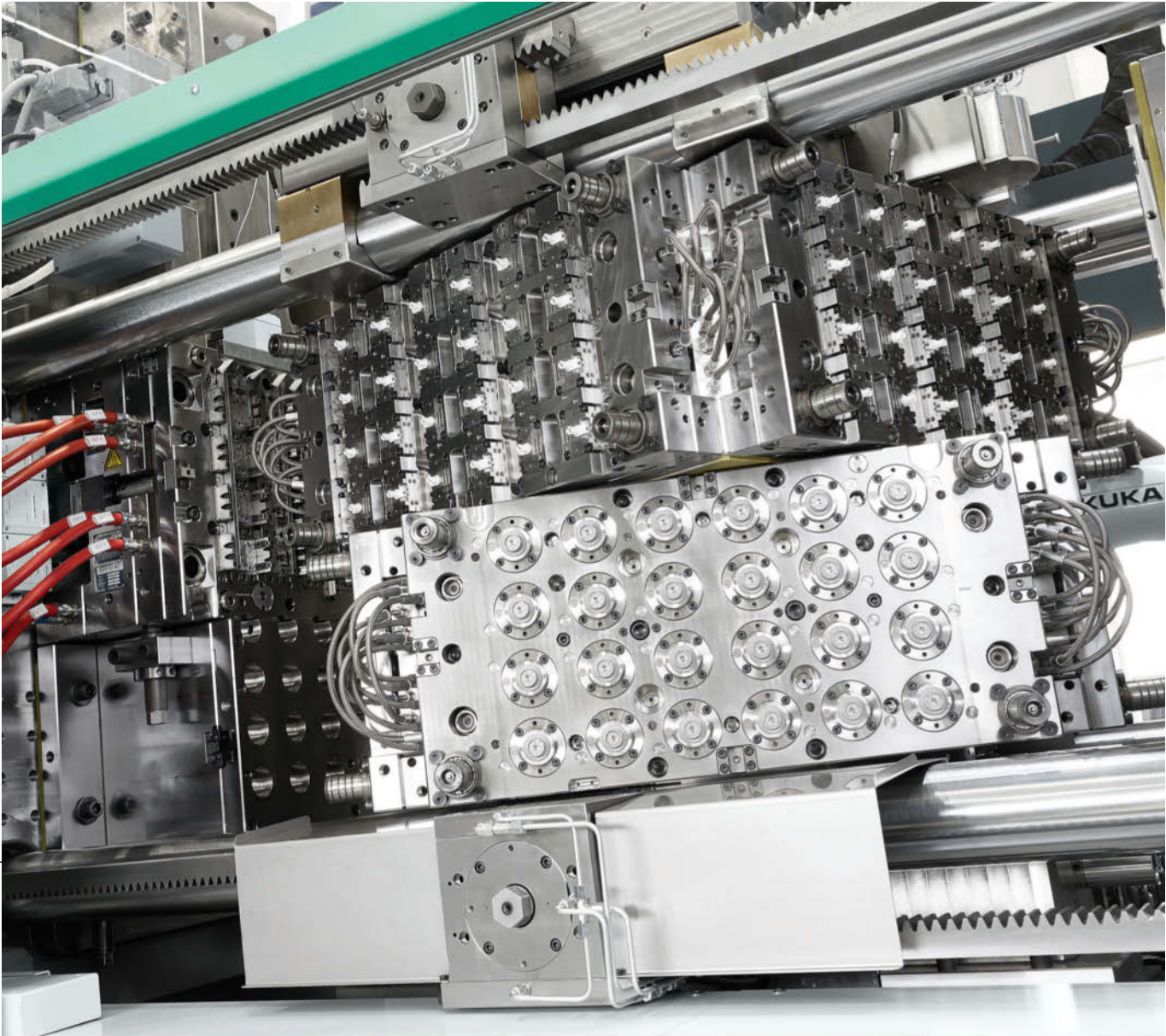
When it comes to cubes, Foboha relies on ARBURG

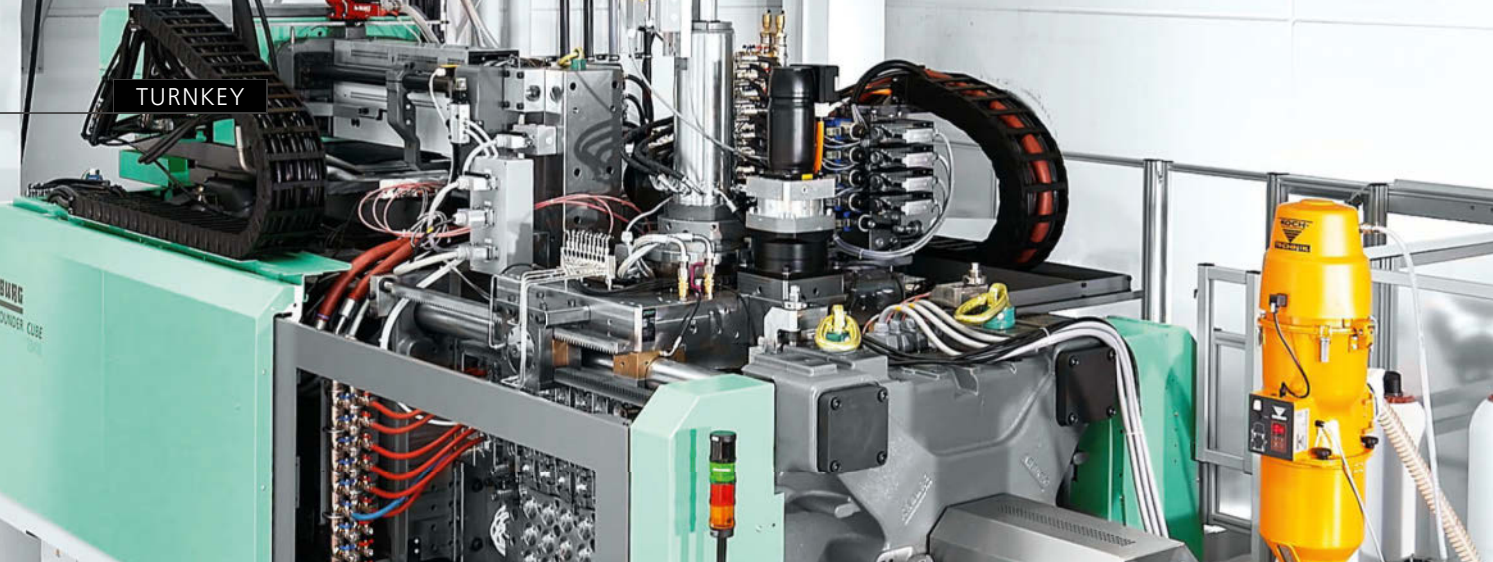
To implement the challenging project, ARBURG was chosen as the machine partner with whom Foboha would realise all its cube applications. Today, the reverse cube system can only be used on ALLROUNDER CUBE injection moulding machines, which have been further developed for this task. This includes the adaptation of the software, automation, and QA evaluation. Hauff operates a modified ALLROUNDER CUBE 2900 with a clamping force of 2,900 kN and one horizontal injection unit

plus one size 1300 injection unit mounted on the moving side. The two servo-electric drives for the counter rotation of the cube halves are installed on top of the machine. All mould axes are freely programmable and integrated in the SELOGICA control system. It took around seven months to complete the turnkey system.

While the PP component for the rollers is injected into the bottom of the cube, the associated POM bushings are produced on the top. One challenge was the thermal separation of the 24+24-cavity mould, since for processing PP, the mould has to be cooled to 15 degrees Celsius, whereas

Reverse cube technology with ALLROUNDER CUBE: Two components are injected, cooled and automatically assembled directly in the mould at the same time (right). Hermann Hauff uses this process to make rollers for dishwashers (top).





Proud of their joint project (left): FoboHa Managing Director Rainer Armbruster (right), who invented the reverse cube technology, and Jörg Vetter, Technical Manager at Hermann Hauff, who manufactures rollers for dishwashers on an ALLROUNDER CUBE (above).

for POM it must be heated to 90 degrees Celsius. Process monitoring and 100-percent part inspection is automated using Priamus sensor technology, while the hot runner valve gates from Otto Männer are monitored by a Gammaflux temperature controller.

After injection, the two cubes rotate in opposite directions by 90 degrees. The two following stations are for cooling. Finally, the two components are positioned one above the other on the fourth cube side at the rear of the machine and are ready for assembly and removal. These tasks are performed by a six-axis robot with a complex Kiki gripper integrated in the control system. It removes the rollers from the lower half of the mould and assembles them with the bushings at the top to form the ready-for-use product with no impact on the cycle time.

Fast, automated and compact

The sophisticated mould technology, including cooling stations

and assembly, has made it possible to reduce the cycle time from more than 14 to around 9.5 seconds. The new cube machine runs six days a week in three shifts.

“What previously involved three injection moulding machines plus assembly stations and complex logistics, we can now do 40 percent faster, fully automated and on 60 percent of the previous floor space,” says Jörg Vetter, Technical Manager at Hauff, praising the advantages of the new reverse cube technology. The annual production volume is expected to be around 60 million units in the future.

But Jörg Vetter goes one step further: “We use Robomotion to automate the downstream packaging process. A second six-axis robot unfolds the boxes and fills them with the parts. This is followed by sealing, labelling and setting them down on pallets ready for shipping. The system can work a complete shift unmanned. As a result, we can increase production efficiency, no longer need

intermediate storage and can easily extend production times.”



Video
FoboHa

INFOBOX



Name: Hermann Hauff GmbH & Co. KG
Founded: 1966 by Hermann Hauff
Location: Pforzheim
Business areas: Precision injection moulding and mould construction
Employees: Approx. 50
Machine fleet: 39 injection moulding machines, of which 19 ALLROUNDERS
Contact: www.hauff.de, www.foboHa.com



A permanent fixture

Formnext 2019: Bigger stand, more exhibits and visitors

Bigger, better, more visitors than ever before. This is true for Formnext 2019 in general and for ARBURG's showing at the fair in particular. With close to 35,000 visitors from 99 countries, the German event in Frankfurt am Main has established itself as the world's leading trade fair for additive manufacturing (AM).

"Visitors had 360 square metres in which to experience our innovations and parts at first hand. We received extremely positive feedback and our international APF team was very busy throughout," summarises Lukas Pawelczyk, Head of Freeformer Sales at ARBURG.

The prototype of a freeformer 300-4X attracted a lot of attention. A four-axis part carrier with a new rotation axis and a fibre feed unit is at the heart of the system. Processing of externally fed continuous glass or carbon fibres to produce resilient functional components was presented as a technology outlook. The application example was a hand orthosis locally reinforced with carbon fibre.

A freeformer 300-3X, whose build chamber can be heated up to 200 degrees Celsius, was another new product on display.

New high-temperature build chamber

Using Ultem 9085 – an original material approved for the aerospace industry – as an example, ARBURG demonstrated how cog wheels and other complex components can be manufactured from high-temperature materials.

The special exhibition area for medical technology was another highlight. Here, visitors were able to see how bioresorbable and sterilisable FDA-approved original plastic granulates can be economically processed using ARBURG Plastic Freeforming (APF) to produce individually adapted orthoses or implants, for example. An innovative resorbable material from Evonik was processed on a freeformer 200-3X to demonstrate the advantages of the APF process. The composite Resomer LR 706 S β -TCP was used to produce implants that mimic human bone and later dissolve in the body.

At Formnext 2019, ARBURG presented four freeformers, a special medical technology exhibition area and numerous parts. The prototype of a freeformer 300-4X met with great interest.



Video
Formnext.TV

At the fourth exhibit, a refined freeformer 200-3X, trade visitors were able to take a closer look at the technology. Numerous functional parts were also on display, some of which could be tested at interactive stations. Two additional freeformers were on show on the stands of partner companies 3D-Labs and IMS.

Wood you like a cup

rezemo: Start-up with organic coffee capsules made of wood and

Many people have good ideas and intentions. Few have the courage and determination to put them into practice. The young rezemo entrepreneurs Julian Reitze and Stefan Zender are one successful example. In 2019, some three years after their start-up was founded, the company was already producing well over one million compostable coffee capsules per year. A number that is growing rapidly. For the capsules, a compound of wood and plant fibre (PLA) is processed on ALLROUNDERS.

The rezemo success story began with a coffee maker in a shared flat in Stuttgart, Germany. Julian Reitze and Stefan Zender were studying industrial engineering and management in Stuttgart, and during stays abroad had taken a dislike to carelessly disposed of consumer pack-

aging. Coffee capsules made of aluminium or plastic, of which around 60 billion are produced worldwide every year, were a particular irritation.

100 % biodegradable capsules

"We wanted to produce 100 percent compostable coffee capsules made from renewable raw materials and offer an ecological alternative to Nespresso products. By using waste wood as a basis, we are able to create an additional value-added stage," Stefan Zender, who is currently responsible for marketing and sales as Managing Director, explains the basic idea. Julian Reitze, who is responsible for technology and finances in the same position at rezemo, adds: "During our studies, we had access to an ALLROUNDER at the Institute of Industrial Manufacturing and Management (IFF) and at the Fraunhofer Institute for Manufacturing Engineering and

Automation (IPA). That's where we taught ourselves the process of injection moulding. With the intuitive SELOGICA control system and the help of a thick operating manual, it was basically easy." In order to transform wood into a granulate suitable for injection moulding, it is embedded in a matrix of PLA made from plant starch. The entrepreneurs tried out different compounds and optimised the process, as the granulate needs to melt homogeneously, without burning the wood content. In the beginning, the students made frequent use of the ARBURG hotline and have also visited Lossburg several times.

Since then, they have continuously improved the capsules and the injection moulding process. rezemo now cooperates with a mould maker and injection moulding company near Lake Constance, which also uses ALLROUNDERS. The aim is to increase the percentage of wood fibres and to further reduce the layer thickness



of coffee?

plant starch

of currently 0.4 millimetres at the thinnest point. Another objective is to avoid sprues as far as possible by using hot runner moulds, thereby also reducing material consumption.

Regional proximity

rezemo places emphasis on regional proximity, not only when it comes to injection moulding technology. The company purchases its coffee from a roasting plant in its home region. The base material for the capsules, food-grade wood shavings from sawmills, comes from domestic forests.

The coffee capsules are sold in an online shop and through regional coffee houses. Retailers and hotels are also showing increased interest. "There is enormous demand. Many hotels have Nespresso machines in their rooms and there is a great deal of awareness for sustainable products," says



Stefan Zender. The young entrepreneurs are currently exploring the international market. "For the coming year, we are planning for a production volume in the double-digit million range. In addition, we aim to position ourselves more strongly as packaging experts. This is because other disposable products such as cosmetics jars or containers for cleaning products could also be produced from our material, making them carbonneutral and 100 percent biodegradable," says Julian Reitze.

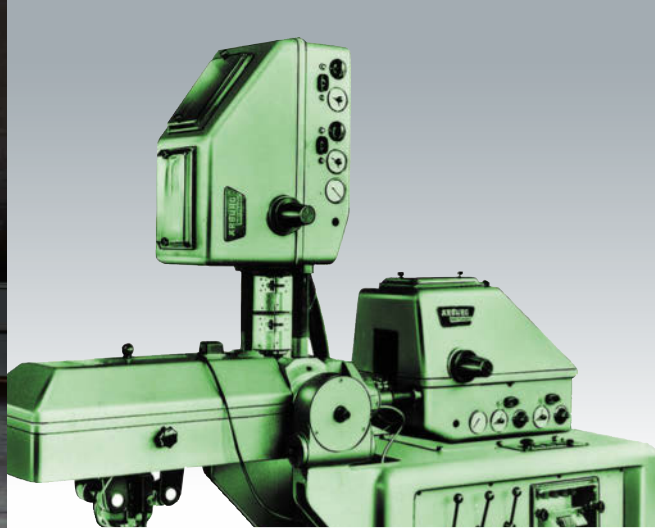
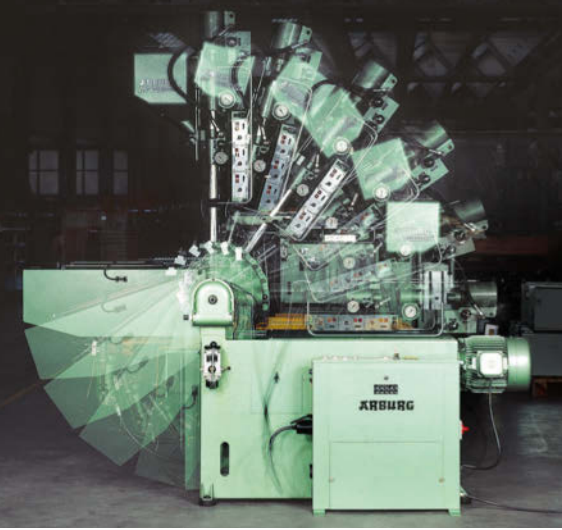
Julian Reitze (left) and Stefan Zender have made their idea for 100 percent ecological coffee capsules a reality. Their start-up began with a used hydraulic standard ALLROUNDER.



Photo: rezemo

INFOBOX

Name: rezemo GmbH
Founded: 2016
Location: Stuttgart
Business area: Packaging technology
Employees: Eight (2019)
Products: Coffee capsules and in future other wood-based packaging
Contact: www.rezemo.de



Pioneers

Multi-component injection moulding: Blazing a trail for almost

As leading lights in multi-component injection moulding, ARBURG pioneers worked intensively on machine and mould technology as well as the processing method. Worldwide and with great success to this day. The catalyst was the ALLROUNDER principle patented in 1961. With its swivelling clamping unit and interchangeable injection unit, it became possible to use two injection units on one machine for the first time.

The first multi-component moulded part to be produced using a mechanically operated stack mould was a typewriter key with the "A" from the ARBURG company logo – a development which was also patented in terms of mould technology. By 1962, a telephone dialling disc could be produced fully automatically by rotating the tool insert. This dialling disc caused a sensation all the way to Asia, especially in Japan.

Demand for multi-component parts skyrocketed in the following years and resulted

in the rapid, worldwide spread of the process, whose fundamental technological approach remained basically the same.

Further advances then enabled the production of higher-quality articles in greater volumes and the use of up to six injection units for automated part production using ALLROUNDERS. Specialised processes evolved, such as overmoulding of inserts, the use of rotary table machines with several stations, interval injection moulding, sandwich injection moulding, marbling and also cube technology.

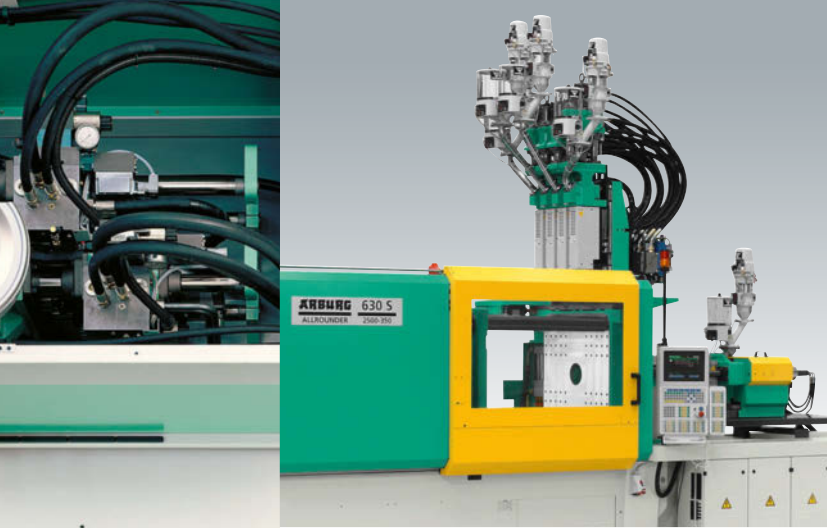
Milestone SELOGICA

Other important stages in the development of multi-component technology include the processing of liquid silicone (LSR) with the separation of "cold" and "hot" mould parts, the use of rotary units via core pull control and the introduction of specialised machine control programs. "A significant milestone was the introduction of SELOGICA in 1992," says Dr Eberhard Duffner, Head of Development. "This con-

trol system has greatly increased flexibility, as up to eight core pulls and four injection units can be integrated in a common sequence." Today, assistance systems help to make even complex manufacturing processes easy to set up and operate.

Nowadays all processes in multi-component injection moulding are usually automated, including pre- and post-treatment. An example of this is a turnkey system for colour-sorted injection moulding of toothbrushes as a hard/soft combination and in four colour combinations. Innovations across all industries are also increasingly moving towards turnkey systems. Christian Homp, Group Manager of Application Technology Consulting, says: "In terms of automation, the flexible arrangement of injection units is playing an increasingly important role. Our portfolio ranges from classic horizontal-vertical configurations to L and parallel positions and piggy-back configurations."





OUR COMPANY

six decades

Expert know-how for innovation

Added to this is application-specific support, e.g. in order to make full use of time advantages when using cube technology with a travelling injection unit for three-component processing, or to carry out assembly tasks while at the same time ensuring operational safety and precision. One of the most recent success stories is Foboha's reverse cube technology, which can only be used with ALLROUNDER CUBE machines (see page 8).

Sandwich injection moulding is also gaining in importance again: Using recyclates helps to conserve resources – for example when it comes to products with high-quality, haptically sophisticated surfaces and cores made of recycled material. These are frequently found in the automotive industry.

Other topics of the future include simple transfer applications using robotic systems

integrated into the machine control system, multi-component injection moulding with two micro injection units and shot weights of less than one gram, and the production of complex multi-layer lenses. This means that the potential of multi-component technology is far from exhausted.

In demand for additive manufacturing

Herbert Kraibühler, former Technical Managing Director of ARBURG, makes another interesting point: "ARBURG Plastic Freeforming demonstrates just how important multi-component processing continues to be today. The first freeformer already featured two discharge units. Today it is also possible to process three components, for example to create hard/soft combinations with support material. And at formnext 2019, we even saw fibre-reinforced parts being additively manufactured. This means

that ARBURG remains a pioneer in multi-component processing – in any field."



An all-round winner

RKT: Discs for rapid analysis will save lives in future

RKT Rodinger Kunststoff-Technik GmbH based in Roding, Germany, is a subsidiary of Alfmeier Präzision SE and has been manufacturing plastic products for medical and industrial technology for 45 years. Discs for the rapid analysis of multi-resistant hospital germs are a lighthouse project within the sophisticated product portfolio.

As a one-stop system service provider, RKT supports its customers with expert information and activities along the entire value chain. Everything from development and design, mould construction, injection moulding and finishing up to quality control, assembly and contamination-free packaging – all comes from a single source. To this end, the company not only uses ALLROUNDER injection moulding technology, but also makes intensive use of ARBURG's know-how in application and service technology.

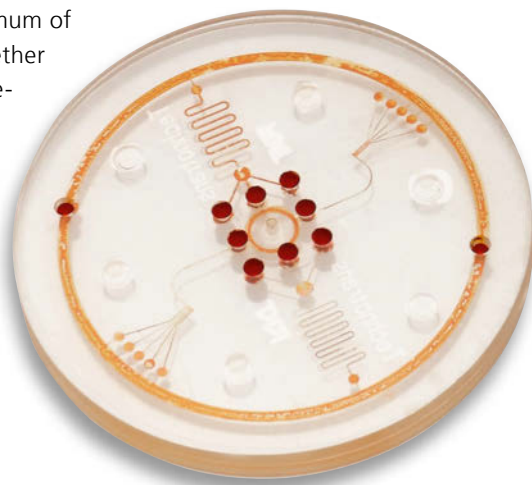
Rapid analysis of germs

Diagnostic discs, manufactured by RKT for start-up company Spindiag from Freiburg im Breisgau, are a current and outstanding example from the field of medical technology. With this innovative product, it will soon be possible to rapidly determine, within a maximum of 45 minutes, by smear analysis whether a patient is infected with multi-resistant hospital germs. Whereas complex laboratory analysis is required at present, the disc provides an immediate result. This will allow for quick decisions regarding the admission of patients, which can be vital for survival.

Channels measured in microns

The requirements for components and quality assurance are very demanding as a result. The Spindiag discs have recesses and contours to hold the respective laboratory chemicals. Such complex geometries are a speciality of RKT. "These products feature microfluidic channels in the micron range," emphasises Dr Dieter Pfeifle, Business Development Manager at RKT. "We process COP and COC plastics, which are relevant to medical technology, as inert materials with high light transmission values in an inert gas atmosphere to prevent oxidation."

During the new product's initial phase, the discs are produced on an electric ALLROUNDER 470 A with a clamping force of 1,000 kN, which is docked to a clean room. The machine is equipped with a laminar-flow box, a laminar airflow system and a single hot runner master mould from RKT with inserts. The moulded parts are removed by a six-axis robot and transported into the clean room with air lock system and access control. It meets the requirements of clean room class 7 according to ISO 14644-1 and also has to be free of contamination and without any foreign DNA entry (free of analytes). In this clean room environment, the parts are fed into a



For Josef Hofmann (left), Head of Technology, and Andreas Persch, Head of Sales and Projects, maximum cleanliness is a priority (right). For this purpose, RKT has several clean areas and clean rooms (above) in which the analysis discs are produced (below).

Bagmatic tubular bag machine, which double packs the parts free of contamination (bag-in-bag).

They are then transported to another ISO-7 clean room for further processing. In a production line, the chemicals are introduced by pipette, dried and atmospherically sealed with a plastic film.

A lid is then applied to protect the film, the unit is sealed in an aluminium bag and packed outside the clean room in secondary packaging ready for shipping.

Established cooperation

According to Andreas Persch, Head of Sales and Projects, the sophisticated work



Photos: RKT Roding

The injection moulding cell for the discs has an electric ALLROUNDER 470 A docked to an ISO 7 clean room (above).

process itself has proven to be the most economical for the customers. "We generally build our entire production lines according to customer requirements," Persch continues, adding that RKT has created a dedicated Process Development department for this purpose.

RKT has collaborated with ARBURG since it was first founded in 1974. All ALLROUNDERS – including the multi-component machines – are equipped with linear and six-axis robotic systems and can remove the moulded parts according to cavity. Some of the machines are integrated in a clean area (ISO-8 equivalent) or operate into an ISO-7 clean room. As Andreas Persch says: "Such close connections ensure first-class service and competent application technology advice, enabling us to jointly realise new ideas."

INFOBOX



Name: RKT Rodinger Kunststoff-Technik GmbH
Founded: 1974
Location: Roding, Germany
Employees: 250
Products: Healthcare products such as disposables, insulin pens, biotechnical products, and products and assemblies for the automotive, electronics and communication industries
Machine fleet: 80 injection moulding systems, of which 75 are ALLROUNDERS
Contact: www.rkt.de

The best of bo

MoPaHyb project: FDC lightweight construction pr

Lightweight construction is becoming increasingly important, especially in automotive engineering, and is a subject of numerous research projects. The joint MoPaHyb (Modular Production Systems for Hybrid Components) project demonstrates the high potential offered by ARBURG's fibre direct compounding (FDC) technology.

Plastics offer ideal properties for reducing weight in automotive engineering.

At present, large structural parts are often only used in the form of thermoset fibre composites. However, thermoplas-

tics offer clear advantages, for example with regard to processing and recyclability.

Porsche is a pioneer

Sports car manufacturer Porsche has already taken the first step towards thermoplastic hybrid parts. The brake pedal for the Porsche 918 super sports car was the first such product.

To produce hybrid parts economically even in smaller production volumes, modular production systems are required. And this is exactly what the MoPaHyb project, which was funded by the German Federal Ministry of Education and Research (BMBF), was about. Contributors to the project included Dieffenbacher, Adient, ARBURG, ARaymont, KUKA, Porsche, Schmalz, Siemens, Trumpf, Vitronic as well as Fraunhofer ICT, the wbk Institute for Production Technology of the Karlsruhe Institute of Technology (KIT) and the VDMA (German Engineering Federation).

Modular concept for individual systems

The aim of the project was to develop a modular system consisting of different machine concepts and lightweight construction technologies that would allow rapid configuration and implementation of individual, OPC UA networked systems for the series production of thermoplastic hybrid parts.

The pilot system – jointly developed by the partners – combines a specially developed size 4600 FDC injection unit with a vertically operating 3,600-ton transfer moulding press from Dieffenbacher. To prove the system's performance and flexibility, two complex CFRP (carbon fibre reinforced plastic) products were manu-



th worlds

ocess in combination with transfer moulding



Photos: Dieffenbacher

From research straight into practice:
The vertical transfer moulding presses from Dieffenbacher are available with FDC injection units from ARBURG.

factured as demonstrators – a seat back and an underbody.

FDC plays an important role

Fibre direct compounding played an important role in manufacturing the seat back. The process is started by placing the metal inserts into the mould of the transfer moulding press. At the same time, a tape consisting of several layers is heated up, pre-formed in the gripper of the robotic system and then inserted into the mould where it is given its final shape. With the mould closed, the FDC injection unit injects the polypropylene melt, to which inline cut glass fibres have been directly added.

In this way, the FDC process offers decisive advantages over the processing of long-fibre granulates: longer fibres in the component and thus improved mechanical

properties, more flexibility in material selection, high material availability and reduced material costs.

By combining transfer moulding with the FDC process, component dimensions and complexities that were previously impossible to produce can now be realised. In addition, new opportunities have emerged for the cost-effective production of locally continuous-fibre reinforced injection moulded parts and of flat components made of tape or thermoplastic composite sheets with integrated functions.

Achieved in practice

The potential of the solution became apparent not long after the MoPaHyb project was successfully completed. In addition to the pilot system at Fraunhofer ICT in Pfinztal, a second system is to be set up in Ulsan, South Korea. The results of the research project were also transferred directly into practice: Dieffenbacher is cooperating with ARBURG and now offers its transfer moulding presses with FDC injection units.

STATEMENT

Prof. Dr.-Ing. Frank Henning,

Deputy Director of the Fraunhofer Institute for Chemical Technology (ICT): “Lightweight construction, electric mobility, digitalisation and Industry 4.0 are



Photo: Fraunhofer ICT

among the megatrends of this decade. Especially in lightweight construction, hybrid systems with fibre-reinforced plastics in combination with metallic materials offer a high potential for conserving resources. Targeted use and economical production are a prerequisite for this. The outstanding cooperation between the project partners of the BMBF MoPaHyb project made it possible to develop and validate a technologically pioneering approach for this purpose. It combines the expertise of diverse players along the value chain and forms the basis for the introduction of such material systems into series production.”

SPONSORED BY THE



Federal Ministry of Education and Research

“This research and development project is funded by the German Federal Ministry of Education and Research (BMBF) as part of the ‘Innovations for Tomorrow’s Production, Services and Work’ programme (funding code O2P14Z040 - O2P14Z049) and supervised by the Karlsruhe Project Management Agency (PTKA). The authors are responsible for the content of this publication.”

3D Print Valley

Röchling: New centre for additive manufacturing

The close proximity to ARBURG is one of the reasons why the Röchling Group has decided to concentrate its global 3D printing activities in Waldachtal, Germany. The new Röchling Direct Manufacturing Center (RDMC) focuses on industrial additive series manufacturing and services such as 3D print-ready design.

Röchling is breaking new ground with its cross-divisional centre for additive manufacturing in Waldachtal. Röchling Medical Waldachtal AG (formerly Frank Plastik AG), a company that ARBURG has successfully cooperated with in the field of injection moulding for many decades, is also located here. Now this cooperation extends to additive manufacturing and the new RDMC, which is led by Jens Harmeling and Dr Axel Höfter, both Managing Directors of Röchling Direct Manufacturing GmbH.

Focus on additive functional parts

“Additive manufacturing has already reached an industrial standard. With the RDMC, we are extending our 3D printing expertise over the entire Röchling Group,” notes Dr Axel Höfter, saying that the intention is to additively manufacture new, complex geometries and enhance new products with extended functionality.

“We will not be a pure parts factory and we do not want to produce mere sample parts,” emphasizes Jens Harmeling. “Instead, our focus is on industrial additive manufacturing of fully functional prototypes in series. That is why we have added

a freeformer 300-3X to our machine fleet. It is ideal for this task because it can process qualified original materials and can also be used in clean rooms.”

Dr Axel Höfter mentions another important aspect: “We aim to create real added value for our customers. In order to fully exploit the potential of additive manufacturing, we apply our expertise in process-oriented design to plastics.” Engineering at the RDMC already started this value-added service well before actual production began.

Röchling purchased the first 3D printer for its site in Lützen, Germany, in 2013. At

Jens Harmeling (left) and Dr Axel Höfter manage the new Röchling Direct Manufacturing Center. Röchling also uses a freeformer 300-3X in its global centre for additive manufacturing.

one point, the plan was to set up a small, separate 3D printing centre at Röchling Industrial in Haren. But then Waldachtal was given preference.



Photo: Röchling Direct Manufacturing GmbH



Future: Additive series production

Alluding to Silicon Valley in California, Jens Harmeling declares: "We have a 3D Print Valley here, as ARBURG and some other players have their headquarters in the immediate vicinity of the Waldachtal valley. This makes it very straightforward for us to exchange ideas." What started with a single machine has now grown into a considerable fleet comprising different machine sizes for various processes, with some of these being fully industrialised systems. According to Dr Axel Höffner,

the first inquiries were already received in December 2019. This is a good indicator that the RDMC is seen as a promising future opportunity even before its actual opening in the first half of 2020.

INFOBOX

Name: Röchling Direct Manufacturing GmbH
Inauguration: 1st half of 2020
Location: Waldachtal, Germany
Production area: 500 square metres
Employees: Ten
Business segments: Industrial, automotive, medical
Contact: www.roechling-additive-manufacturing.com

The future looks like

Caleffi: Digitalisation and automation for efficient production

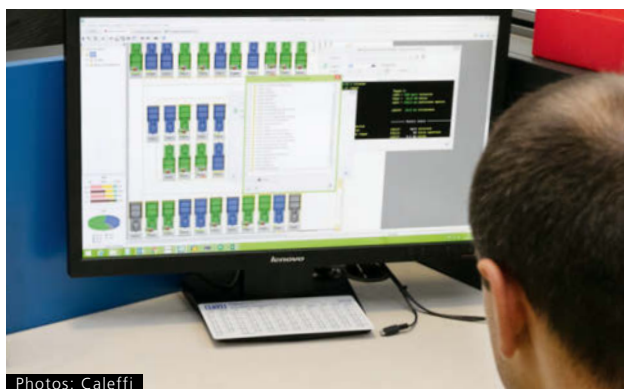
Caleffi S.p.A. from Fontaneto d'Agogna, Novara, is one of the plastics processors in Italy that has already taken pioneering steps in the fields of digitalisation, automation, sustainability and efficient use of resources. At its three locations, the family-run Italian market leader uses automated ALLROUNDERS to produce parts for air conditioning systems, solar panels and heating systems for the global market.

The company has always been forward-looking and innovative in order to meet market requirements in terms of quality, efficiency and design. Ing. Stefano Godio, Purchasing Manager at Caleffi, comments: "We were complete beginners in the field of plastic injection moulding. At the end of the 1990s, we decided to manufacture some of our metal articles in plastic instead and set up a completely new and efficient production facility for this purpose. ARBURG has been part of our success story since we bought the first ALLROUNDER in 1998. There have always been great ideas, which we continue to implement together with ARBURG Application Technology to this day."

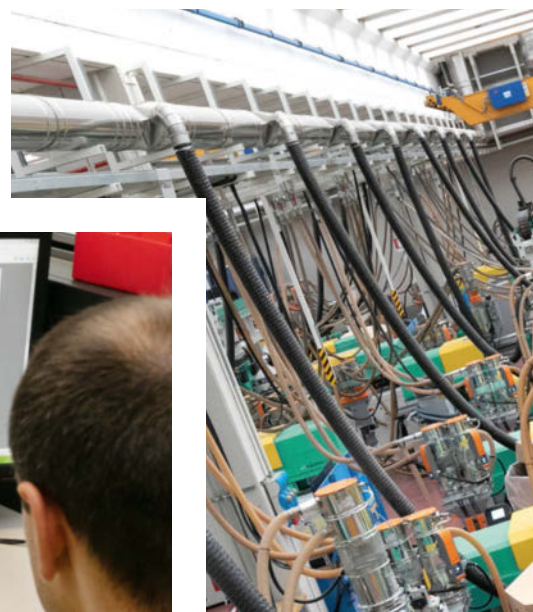
Efficiency through automation

The "Made in Italy" idea is of strategic importance to the Caleffi Group. The company achieves its high quality standards by means of automated and consequently highly efficient production. The quality of all produced parts is fully tested in-house, with more than 2,000 different products being manufactured using around 650 moulds. All ALLROUNDERS, including

two-component machines, use robotic systems such as the MULTILIFT for sprue and part removal. Wherever reliable function, compact installation dimensions and monitored production processes are



Photos: Caleffi



essential, the company uses production cells with ALLROUNDERS, automation and additional downstream peripheral equipment. In this context, the SELOGICA control system offers major benefits such as programming multiple process sequences and integrating complex production tasks into clearly defined control sequences. Since the Caleffi Group follows a "green" production philosophy, the company has for some time only purchased electric ALLROUNDERS for production.

ARBURG as a system supplier

"As a system supplier, ARBURG supports us with a high level of technical know-how", says Ing. Federico Baratelli, Production Manager Plastics at Caleffi. "ALLROUNDERS enable us to fully achieve our objective of producing the highest product quality for our customers. We are

In Caleffi's injection moulding production (top right), all ALLROUNDERS are connected to the ARBURG host computer system (ALS) (top left).

ALS enables high-quality and efficient production of the components needed for the innovative magnetic filter (right).

also interested in the next step in digitalisation that ARBURG is offering with its arburgXworld customer portal."

Caleffi has been using ARBURG's host computer system (ALS) since 2005. The company uses it to monitor and control production by its ALLROUNDERS running in three-shift operation. This includes recording, documenting, evaluating and archiving the data of the setting and production protocols.

this



moulds and hot runner systems with valve gate nozzles for sprueless injection.

ALS ensures quality

To monitor the process parameters, ALS is used to manage the entire manufacturing process, thereby ensuring 100 % quality. Production Manager Ing. Federico Baratelli comments: "ALS enables us to react to customer requests and manufacturing requirements faster, more flexibly, but also in a more standardised way. By connecting all ALLROUNDERS, we are fully within our Industry 4.0 plan."



Magnetic filter is a successful product

The extremely successful launch of a new, compact magnetic filter for domestic water boilers is just one example of the company's innovative strength. This type of filter is installed to keep the boiler and domestic water supply clean, but the available space is frequently the main problem. Due to its unique design, Caleffi's new magnetic filter solves all problems:

it is compact, efficient, high quality and also meets high design standards. Any contaminants are collected in the glass container forming the filter's inner part. The threaded outer part holds this filter glass. The inner part made of PA12 TR55 is produced on an ALLROUNDER 420 C advance, while the threaded outer part made of PPO G30 is produced on an ALLROUNDER 520 C advance. Both machines are equipped with two-cavity

INFOBOX

Name: Caleffi S.p.A.
Founded: 1961 by Francesco Caleffi
Locations: Three in the Novara region, Northern Italy
Employees: More than 1,300 worldwide
Turnover: EUR 329 million worldwide in 2018
Products: Components and systems for heating, air conditioning and sanitary engineering
Machine fleet: 41 ALLROUNDERS
Contact: www.caleffi.com



TECH TALK

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



Great gestures

Intuitive, direct, simple: human-machine interaction

Wipe, drag, zoom and scroll – gesture-based control has become part of everyday life and is finding its way into an ever increasing number of applications. The aim is to make interaction with devices and machines more intuitive, direct and simple. And this is precisely where the GESTICA control system for ALLROUNDERS comes into play. In addition, the operating options can be extended by adding new functions and assistants.

The revised menu navigation is one example. The SELOGICA control system established a structure for each process step following a sequence of “preselection”, “parameter entry” and “monitoring”. With

GESTICA, which is fully compatible with SELOGICA, the related screen pages can now be arranged in sequence. Only a swipe motion is required to switch between the pages with the setting options. It is not necessary to exit either the menu or the selected process step. As detailed knowledge of the control system is no longer required, navigation becomes much more intuitive and faster.

Interactive editing of sequences

Especially when more complex tasks are involved, it becomes immediately apparent how each simplification helps to reduce the number of entries and avoid errors. With GESTICA, an additional dialogue box has been integrated into the sequence editor

that was already successfully introduced decades ago with SELOGICA. It allows direct access to functions for inserting, moving and deleting symbols. In addition, there is the direct plausibility check, i.e. the machine “knows” the symbols required for the process and their meaningful positioning. In combination with this assistance function, production sequences can be edited more quickly – while being certain that no mistakes can be made.

In particular, the idea of “machine knows ...” is a key objective in the further advancement of ARBURG control technology. The filling assistant, for example, uses the previously created simulation model and the component geometry to make changeover and set-up more efficient (see today 71, p. 8).



Optimising material preparation

The plasticising assistant is another example. As an important machine component, the cylinder module is made “smart” by integrating a memory chip. This lets the machine “know” what “its” plastification is. The plasticising assistant utilises the memory chip data to automatically calculate parameters such as plasticising capacity and dwell times. Material processing can thus be quickly assessed and optimised. In addition to this, the plasticising assistant writes module and process history data to the memory chip, for example operating hours or cylinder module throughput. On the one hand, this creates the prerequisites for maintenance on demand – the basis for predictive maintenance. On the other hand,

troubleshooting for service purposes can also be improved in this way.

The plasticising assistant and the filling assistant clearly demonstrate how operating options are extended thanks to digital features. Gesture control contributes to a more intuitive use and makes many things simply easier.

Gestures make filling assistants easy to operate: Installation technicians can interactively compare the results of the simulation with the machine's set filling behaviour.

MORE EFFICIENCY
MORE ALTERNATIVES
MORE EXPERIENCE MORE EXPERTISE
MORE OPTIONS
MORE MODULARITY
MORE INDIVIDUALITY
MORE SOLUTIONS



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