

# today

The ARBURG magazine

Issue 70

2019





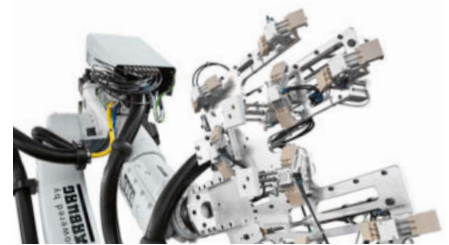
**4 Road to Digitalisation:**  
ARBURG sets “smart” milestones

**6 West Contract Manufacturing:**  
Search for Industry 4.0 solutions  
at K 2019



**8 deller plastics:** Fibre direct  
compounding creates worldwide  
competitive advantages

**10 New construction project:**  
assembly hall for turnkey systems and  
large ALLROUNDERS



**12 The FuPro project:** ARBURG  
develops gripper technology for  
lightweight system solutions

**14 Kendrion:** ATCM pilot  
customer focuses on automation and  
traceable production



**17 AM Factory:** Turnkey system with  
IT-networked freeformer

**18 Samaplast:** Additive manufacturing  
as a supplementary technology for  
prototypes and small batches



**20 Wilhelm Weber:** Optical LSR fibres  
ensure pinpoint brightness

**22 Elcam Medical:** Expert for infusion  
system components



**24 Gotmar:** From delicate technical  
parts to high-quality packaging items

**26 Tech Talk:** Digital transformation:  
Unique identification of  
machine components

## IMPRESSUM

**today, the ARBURG magazine, issue 70/2019**

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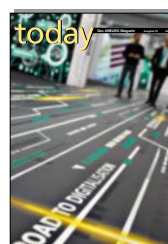
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The focus of the Technology Days was on the “Road to Digitalisation”. It also took attendees through the Efficiency Arena, which provided an overview of the current status of digital products





## Dear Readers,

The countdown has begun: In just over three months' time, the world-leading trade fair K 2019 will open its doors in Düsseldorf to reveal where the plastics industry is heading in the future.

One of the central topics is digitalisation, which is a theme we are consistently advancing with our "Road to Digitalisation". In this issue of today, you can read more about the digital innovations on display at our Technology Days in March 2019. The next milestone will be K 2019! This is a date that the experts at West Contract Manufacturing are looking forward to as well. They will travel from the US to Düsseldorf to visit our stand in search of inspiration for digital transformation in their company. Other articles and features also deal

with various aspects of digitalisation. You can spot these articles by looking out for their "Industry 4.0 – powered by Arburg" label.

We also illuminate other topics from different angles: Including medical technology and turnkey projects involving injection moulding as well as ARBURG Plastic Freeforming. In the context of lightweight construction, we present a research project plus a practical application of our "Fibre Direct Compounding" lightweight construction process.

So as usual we have put together a colourful bouquet of topics for you.

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

Michael Hehl  
Managing Partner



# New digital solutions

## Road to Digitalisation: ARBURG sets “smart” milestones

**I**f you came to the Technology Days in March, you should be up to date in terms of digitalisation. Along our “Road to Digitalisation”, which ran through the entire company, 6,000 specialist visitors were able to experience our entire range of digital products and services first-hand. The new “arburgXworld” customer portal was one of the highlights.

The Efficiency Arena provided an overview of ARBURG’s digital components. In addition to the new “arburgXworld” customer portal, this included practical examples of augmented and virtual reality (AR/VR) and the digital assistance packages for the SELOGICA and GESTICA control systems. Many guests gathered detailed information about the innovations and received comprehensive advice on how to use the products and services profitably in their companies in the future.

“Our approach of making digitalisation a top priority has paid off. We combine the

know-how of our experts in interdisciplinary teams, and in this way we are able to quickly find practical digital solutions to the benefit of our customers”, stresses Jürgen Boll, ARBURG Managing Director Finance, Controlling and IT.

### **New “arburgXworld” customer portal**

“The best example of this is our new ‘arburgXworld’ customer portal, which has been available to customers in Germany since the Technology Days 2019”, adds ARBURG Managing Director Sales Gerhard Böhm. “We are bundling our digital services in this new cloud-based service marketplace and will gradually expand them.” arburgXworld was launched with four free-of-charge central applications (apps): The “MachineCenter” brings transparency to production, reduces organisational effort and enables central access to resources such as spare parts catalogues. In “ServiceCenter”, customers can start service tickets around the clock. Open tickets, the

current processing status and the planned deployment of service technicians are clearly displayed. In “Shop”, spare parts for the machines displayed in “MachineCenter” can be ordered online – whenever and wherever you want. Interactive navigation and clear 3D previews make searching easier. And then there is also the “Calendar”, in which upcoming maintenance and other tasks are clearly displayed.

### **Connectivity for digital services**

The networking of injection moulding machines and all of their peripherals via OPC UA interfaces plays a key role in digitalisation. One example of ALLROUNDERS with networked peripheral equipment is the integration of LSR dosing systems into the machine control system. In addition, OPC UA is used for the online provision of process information to higher-level systems. The prerequisite for this solution is “basic connectivity”, which also includes an IIoT gateway (IIoT = Industrial Internet



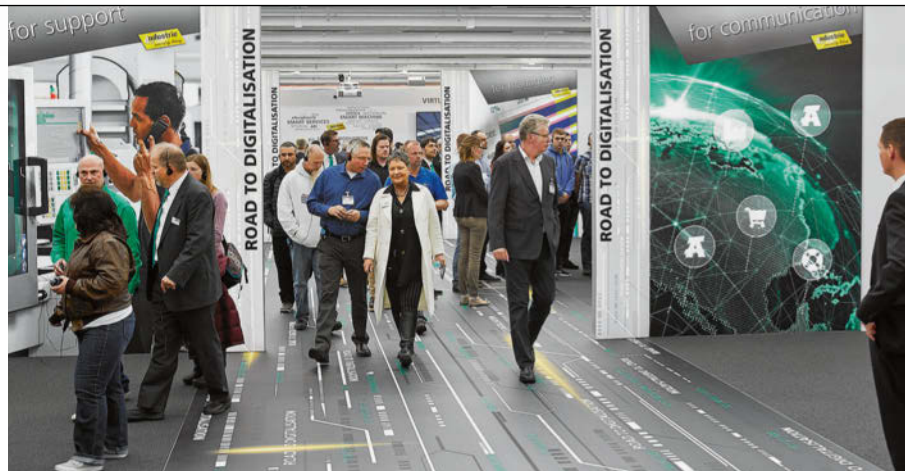
One of the highlights at the Technology Days 2019 was the new "arburgXworld" customer portal (left). The Efficiency Arena provided specialist visitors with an overview of ARBURG's digital components (below).

ns

of Things). This combination offers great flexibility for the implementation of various digital services. It includes ARBURG Remote Service (ARS), the ARBURG Turn-key Control Module (ATCM) for collecting and providing process data, the ARBURG host computer system (ALS) and, in future, a link to the apps of the "arburgXworld" customer portal.

### Filling simulation integrated in GESTICA

A new feature is the use of simulations directly on the machine controller. Together with partner Simcon, ARBURG demonstrated the potential of a filling simulation integrated into the GESTICA control system. The new tool was used on a hybrid ALLROUNDER 920 H at the Technology Days 2019 and visualised the correlation between filling level and screw stroke. The next step in the filling simulation will revolve around the machine recognising the component and will be on display at



K 2019, taking place from 16 to 23 October in Düsseldorf. The future expansions of "arburgXworld" will also be presented at the event. But that is by no means everything ARBURG will be presenting at the world's leading trade fair for plastics processing!



Video  
Plas.TV

# The goal



# is digitalisation

## West Contract Manufacturing: Search for Industry 4.0 solutions at K 2019

**C**ompanies in the pharmaceutical, biotechnology and medical products industries rely on West Contract Manufacturing for high-quality and technologically advanced pharmaceutical packaging and drug delivery solutions. Scouting for technologies that could contribute to the digital transformation of the company, a delegation will visit K 2019 in Düsseldorf and will also come to see ARBURG.

West Contract Manufacturing offers solutions from a single source: from the idea for a product to its production and all the way to packaging.

### More than just injection moulding

But there is more. The complete automated lines do not only include injection moulding machines. Downstream assembly, welding, labelling and packaging processes are also integrated, as are other operations that go well beyond the production of moulded parts. So when the specialists from West visit K 2019 in October to learn more about digitalisation, they will not only be looking at ARBURG's product range.



Kurt Knoertzer, Automation and Continuous Improvement Engineer at West in Walker, Michigan, is looking forward to K 2019 and inspiration for West's "Road to Digitalisation".

### Seeking a single digital solution

Depending on which facility you're in, or even in which part of that facility, you will see West manufacture medical components, assemblies or final products. There are currently operational areas in which powerful data acquisition systems are already in place, but there are also areas in which no more than a log of good part/bad part production is created. That's why the team is primarily looking for a system that can be efficiently used in combination with all machines. At K 2019, the focus will therefore be on a system that collects process data and presents it in a usable form fast enough to increase production efficiency.

### Considerable interest in ALS

Decision-makers at West have many positive things to say about ARBURG. They use ALLROUNDERS at different locations and have already gathered information about the ARBURG host computer system (ALS). In terms of digital transformation, the standardisation of interfaces is of particular importance to them. In their view, the introduction of Euromap 77 and the standardised OPC UA communication protocol is the right way forward. The experts are also pinning their hopes on the coming Euromap 79 standard for robotics and Euromap 82 for peripheral equipment: This will allow an MES (Manufacturing Execution System) such as ALS to function as a central hub, since injection moulding machines and peripheral equipment will speak the same language.

But there are more requirements. The technicians are also asking themselves how a system such as ALS – developed for injection

moulding – would be able to handle pharmaceuticals. These are some of the challenges the company will be facing in the future, but which have always been discussed very openly with ARBURG. For this reason, the team is looking forward to seeing what ARBURG will present at K 2019 and how it could help West drive its digital transformation.



Image video  
West

### INFOBOX

**Name:** West Contract Manufacturing  
**Founded:** 1967 as The Tech Group  
**Locations:** Grand Rapids, Michigan, and six more global locations  
**Products:** Pharmaceutical packaging and medical products  
**Machine fleet:** 40 injection moulding machines, of which 27 are ALLROUNDERS  
**Contact:** [www.westpharma.com/services/contract-manufacturing](http://www.westpharma.com/services/contract-manufacturing)

# Lightweight construction made easy

deller plastics: Fibre direct compounding creates worldwide com

**T**he introduction of fibre direct compounding (FDC) at deller plastics Uwe Braselmann in Breckerfeld, Germany, was driven by tangible economic and competitive advantages. The lightweight construction process is used for manufacturing cable drive housings for operating electric power windows in car doors.

“Employing a healthy mix of the new and the proven, we have always been innovative”, says Jann Braselmann, who runs the family business together with his brother Nils and their father Uwe Braselmann. “Needless to say, the material requirements of our customers play a part in determining the extent to which we eventually embrace innovations. Considerable effort is often required, but for FDC we can only report positive results so far.”

## Competitive thanks to FDC

Nils Braselmann puts it in a nutshell: “Following implementation of the FDC process, we are able to continue production in Germany while remaining internationally competitive. We reduced our product and manufacturing costs to such an extent that we were able to offset our global logistics expenses.” The reason for this is simple: By using glass fibre rovings, which are cut to an adjustable length in a lateral feeder and added directly to the melt in the injection unit, compounding made it possible to achieve greater individuality and to do without expensive ready-to-use materials.



“The system enables us to increase the length of the glass fibres in the component by an average of 50 percent and to match them precisely to the product and its stability”, explains Nils Braselmann. “This increases flexibility in development and production. Our customers can specify more individually which original materials are to be used and can combine them according to the component requirements. In this way, longer fibres in the component can be used to achieve higher strength with thinner walls, for example.”

deller plastics has been using fibre direct compounding in high-volume injection moulding since February 2018, making it one of the first companies to include ARBURG’s lightweight construction process in its portfolio.

## Weight monitoring ensures quality

Cable drive housings made of PP with a glass fibre content of 30 percent are manufactured on an ALLROUNDER 630 S in an 8-cavity hot runner mould. A bonding agent also acts as a colouring agent for the moulded part. The MULTILIFT SELECT robotic system removes the cable drive housings and sets them down on a scale to check the actual weight and thus the correct glass fibre content and forwards the components to the production data acquisition (PDA) system of the injection moulding machine. This ensures that each shot weight is assigned to the relevant cycle and documented with all parameters. If the parts are OK, they are picked up and placed into customer-specific part carriers in a conveyor station. At a quality control



# uction



## petitive advantages



Uwe, Nils and Jann Braselmann (from left) are delighted with their FDC system (images on left). It manufactures parts such as cable drive housings made of PP with a glass fibre content of 30 percent.

The even distribution of the fibres is confirmed by an incineration test (top).



FDC application video

station, 8-fold shots for sampling and quality checks can be taken at any time during the running process. Series-accompanying testing includes incineration tests, visual and gauge tests as well as torque-monitored screw-on tests.

### 80 kilometres of fibres per day

About 193 kilograms of glass fibre rovings are processed to manufacture around 20,000 parts per day. At a length of about eleven millimetres, this corresponds to about 80 kilometres of glass fibres daily.

"We are convinced of the great potential offered by the FDC process, not only using glass fibres, but also natural or carbon fibres", says Nils Braselmann. "In addition, ARBURG's extensive technological expertise and comprehensive

support extending to process, technology and software details has been valued by this company for 50 years. That is why the second FDC system will be commissioned in September 2019."

### INFOBOX



**Name:** deller plastics Uwe Braselmann

**Founded:** 1959 by Peter and Hardy Braselmann

**Location:** Breckerfeld

**Industries:** Automotive, domestic appliances and electrical industry

**Products:** technical plastic parts with different processes, e.g. FDC, GIT, insert and multi-component technology, assembly, finishing and logistics

**Employees:** approx. 180

**Machine fleet:** 50 injection moulding machines, of which 43 ALLROUNDERS

**Contact:** [www.dellerplastics.de](http://www.dellerplastics.de)



# Moving forward

## New construction project: Assembly hall for turnkey systems and

**A**t ARBURG's headquarters in Lossburg, things are moving at a rapid pace: Even before the "Training Center" construction project has been completed, another one begins: The new assembly hall 23. In our interview, Michael Hehl, who as Managing Partner is responsible for plant development, explains the construction activities.

**today:** It seems like there is always some construction work going on at ARBURG in Lossburg.

**Michael Hehl:** That is true. Never before in ARBURG's history have there been so many construction projects in such a short space of time as in the past ten years: The Customer Center, assembly hall 22, the

car park, the exhibition logistics hall, the Training Center and now another assembly hall – as you can see, we're keeping ourselves busy (laughs).

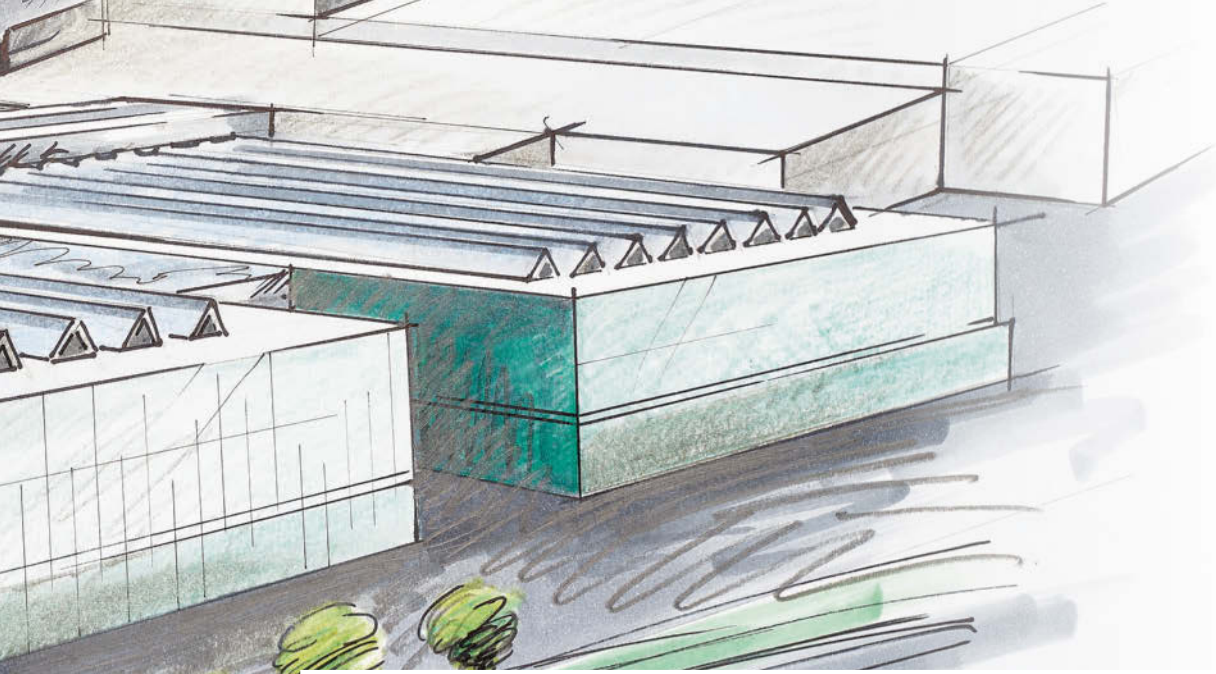
**today:** What will the new assembly hall look like?

**Michael Hehl:** From the outside, the new two-storey building resembles the existing glass assembly halls and will be seamlessly connected to them. But there are innovations in the details, for example in the energy-efficient air conditioning, where we not only use photovoltaics, but also geothermal energy. We have collected ample experience with this technology from the Customer Center.

**today:** What is the current status and what are the plans?

**Michael Hehl:** We started preparatory work for the assembly hall in March 2019. The ground-breaking ceremony on 16 May 2019 officially marked the start of construction. Now everything is moving along at full speed. The plan is to move into the ground floor of the building during the second half of 2020. The total usable floor space of the new building is around 28,500 square metres. Of this space, 21,900 square meters are available for production and administration; the remaining areas are reserved for technology and traffic. After completion, we will therefore have a total usable space of around 200,000 square metres in Lossburg.

**today:** Which departments will move into the new assembly hall?



## large ALLROUNDERS

**Michael Hehl:** As an addition to assembly hall 22, which opened in 2016, we will use the space to further expand our capacities for large ALLROUNDERS and turnkey systems, as the number of enquiries in these segments continues to rise and we need a sizeable amount of space to cope with this demand. This is because we fully assemble all customer-specific production cells, including their peripheral equipment, and thoroughly test all processes. This means that the turnkey system can be put into operation quickly on site at the customer's premises.

**today:** Is construction activity focused solely on the parent factory?

**Michael Hehl:** Not at all. Building extensions are also planned, or are already

under way, in ARBURG Technology Centers (ATC). These locations will be expanded by around 50 percent at locations in Germany (Rednitzhembach), Italy (Peschiera Borromeo near Milan) and in the US (parent company in Rocky Hill, CT) in order to further strengthen customer service in these important markets. These numerous investments serve to reinforce our long-term plans and to set the course for securing our future.

The ground-breaking ceremony officially marked the start of construction for the new assembly hall (from right): ARBURG Managing Partners Renate Keinath, Juliane Hehl, Eugen Hehl and Michael Hehl together with the architects Siegfried Schmelzle and Claus Matt of architecture firm Schmelzle + Partner and Christoph Enderle, Mayor of Lossburg, as well as Reinhard Geiser, Deputy District Administrator of the district of Freudenstadt.

# Tangible success

## The FuPro project: ARBURG develops gripper technology for light

**W**hen it comes to research and future topics, ARBURG is among the pioneers. This also applies to lightweight construction. One example is the FOREL research project FuPro, in which ARBURG was initially involved as a machine supplier. When the demanding handling process for thermoplastic composite sheets also required a new type of gripper technology, experts from Lossburg were again called upon.

FOREL is a nationwide, open platform for the development of high-tech lightweight system solutions in multi-materi-

al designs for the electric vehicles of the future. Numerous partners from industry and research are participating in the FuPro research project (<https://plattform-forel.de/fupro/partner>). Jointly, they develop designs and processes for functionalised multi-component structures with complex hollow sections. Fibre-reinforced thermoplastics are a promising option for weight reduction in this application; they also offer high manufacturing efficiency and extensive recycling possibilities.

ARBURG has already produced pre-series hybrid injection moulded structures from thermoplastic composite sheets on ALLROUNDERS. FuPro is now focusing on closed hollow profiles with continuous fibre

distribution, combined with thermoplastic fibre-plastic composite structures.

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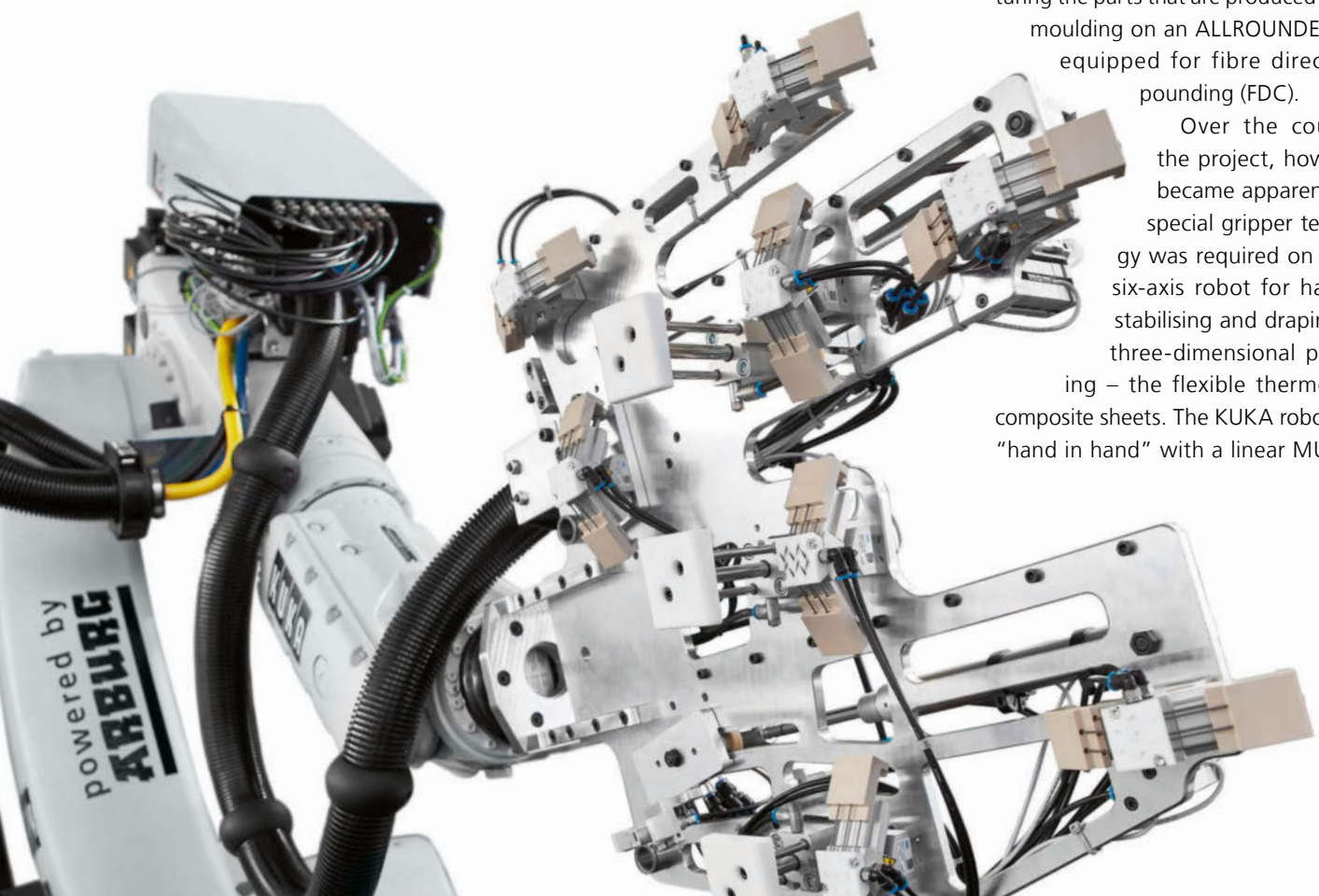
### FDC production cell for high-volume production

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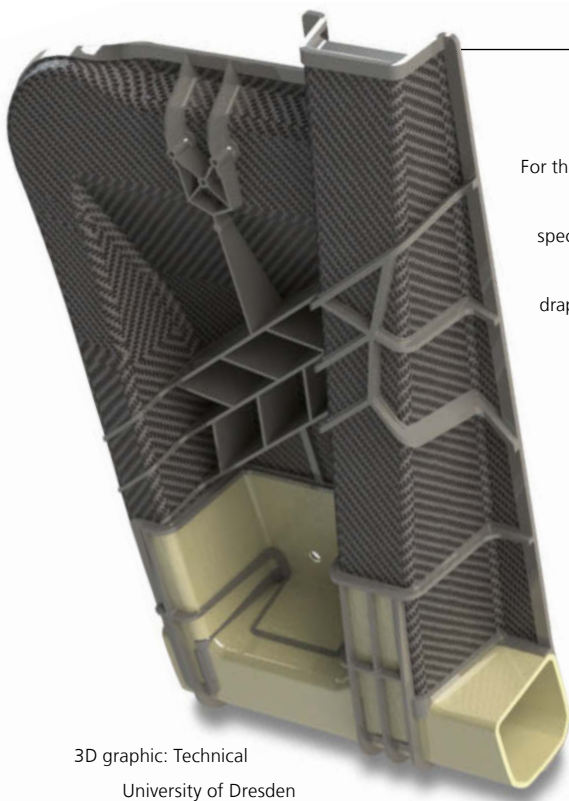
The objective is to create a modular concept for a fully automated overall production system for the cost-effective high-volume production of these kinds of structural components. In this process, sheet-like basic structures with hollow profiles made of fibre-thermoplastic composite materials are to be produced and linked to primary shaping and forming process steps.

During the implementation phase, ARBURG initially had the task of manufacturing the parts that are produced by overmoulding on an ALLROUNDER 920 S equipped for fibre direct compounding (FDC).

Over the course of the project, however, it became apparent that a special gripper technology was required on KUKA's six-axis robot for handling, stabilising and draping – i.e. three-dimensional preforming – the flexible thermoplastic composite sheets. The KUKA robot works "hand in hand" with a linear MULTILIFT



# weight system solutions



3D graphic: Technical  
University of Dresden

For the automated production of the “backrest” demonstrator (left), ARBURG developed a special gripper technology (bottom left) which enables safe handling, stabilisation and draping of the thermoplastic composite sheets.

which produced the majority of the aluminium parts.

The result was a gripper combination made of aluminium and additively manufactured components. It can safely handle, prepare, insert and drape the flexible thermoplastic composite sheets so that the overmoulding process runs smoothly.

## Backrest as a demonstrator

Ultimately, the tube-like components in combination with the thermoplastic composite sheets are to be used to create a demonstrator for a rear seat backrest, which was designed by project partner Brose Fahrzeugteile GmbH & Co. KG.

robotic system, whose vertical axis is made of carbon fibre for speed and stiffness. Close cooperation with the Institute for Lightweight Engineering and Polymer Technology, ILK Dresden, was required to design the vertical axis, as well as the gripper and layout. The entire system was set up at the ILK site to run tests. In addition to the external project partners Schmalz GmbH (textile-compatible gripper technology), ILK (project coordination) and ElringKlinger AG (mould technology), various ARBURG departments were also involved: starting with Applications Development and Technology as well as Design, through Turnkey, Trials, Work Preparation and ARBURG Plastic Freeforming to the Training Department

## STATEMENT

**Prof. Dr.-Ing. habil. Maik Gude,**

Professor of Lightweight Design and Structural Assessment, Member of the Board of the Technical University of Dresden, Institute for Lightweight Engineering and Polymer Technology:



Photo: A. Scheuner

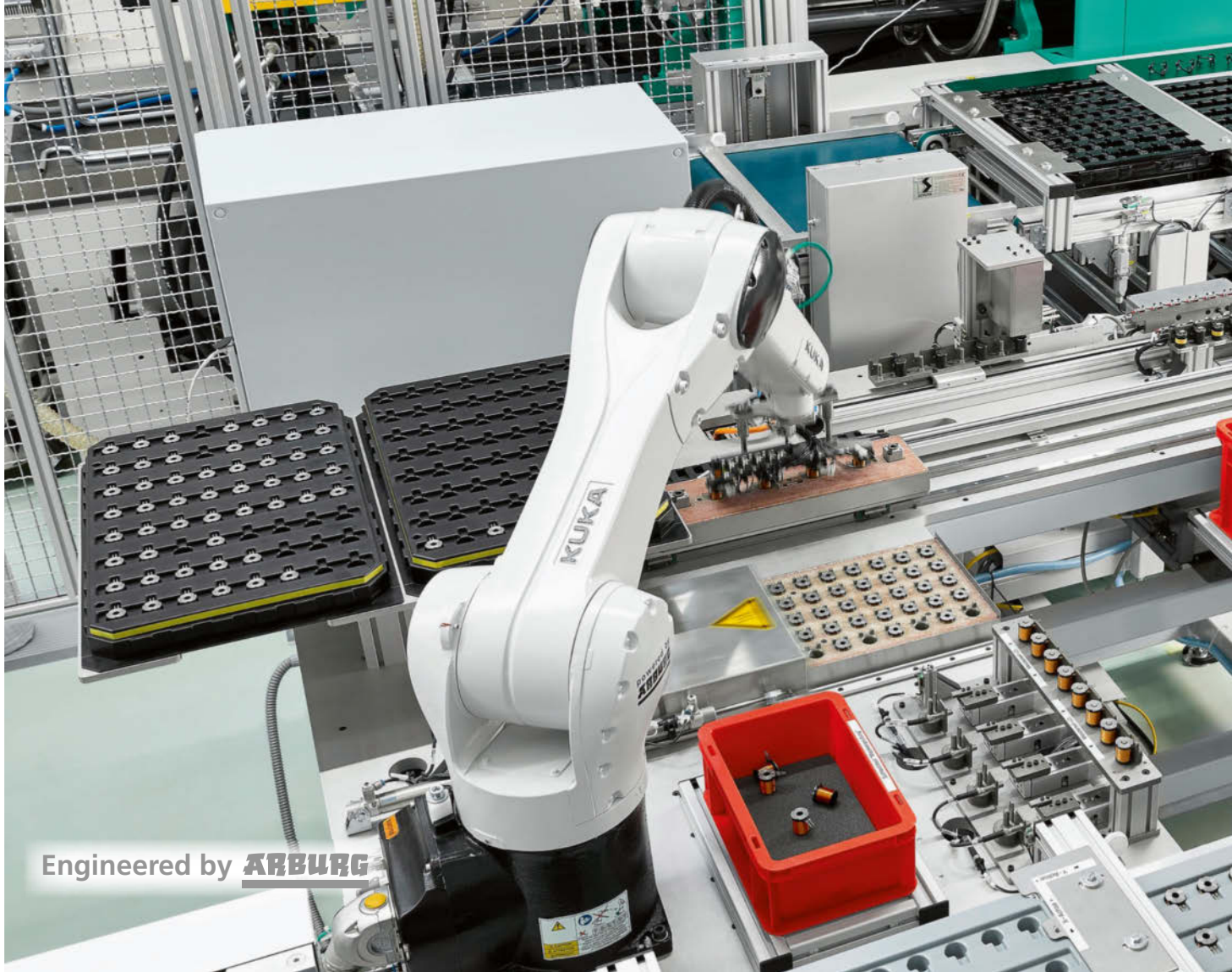
“The objectives of the FuPro project are the development and analysis of an innovative, high-volume-capable manufacturing process for multi-component structures made from complex FRP hollow sections, thermoplastic composite sheets and injection moulding compounds. This enables significant weight reductions in electric vehicles. In the future, the project results will make it possible to provide multi-component structures for electromobility applications in a short time. The continued development of injection moulding, handling and gripper technology, including projects in which ARBURG is involved as a project partner, offers immense potential for increasing the degree of automation and thus the cost-effectiveness for the entire textile, plastics and fibre composite processing industry.”

SPONSORED BY THE



**Federal Ministry  
of Education  
and Research**

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Engineered by **ARBURG**

# Everything under

## Kendrion: ATCM pilot customer focuses on automation and trace

**K**endrion, based in Villingen-Schwenningen, Germany, operates a complex turnkey system to produce what is known as excitation systems, which are used in the oil circuit of combustion engines. The world's leading manufacturer of electromagnetic components is a pilot customer for the new ARBURG Turnkey Control Module (ATCM). Each finished part is marked with a code and tested inline. The ATCM collects the process and test data and enables 100 percent traceability.

In order to expand its expertise in plastics processing and become more independent of suppliers, Kendrion (Villingen) GmbH has its own injection moulding division. Previously, many plastic component assemblies had been purchased externally. Only spare parts were produced on an ALLROUNDER built in 1984 and on an ALLROUNDER 221 K.

### Know-how expanded to include injection moulding

A complex turnkey system built around a hydraulic ALLROUNDER 470 S with a clamp-

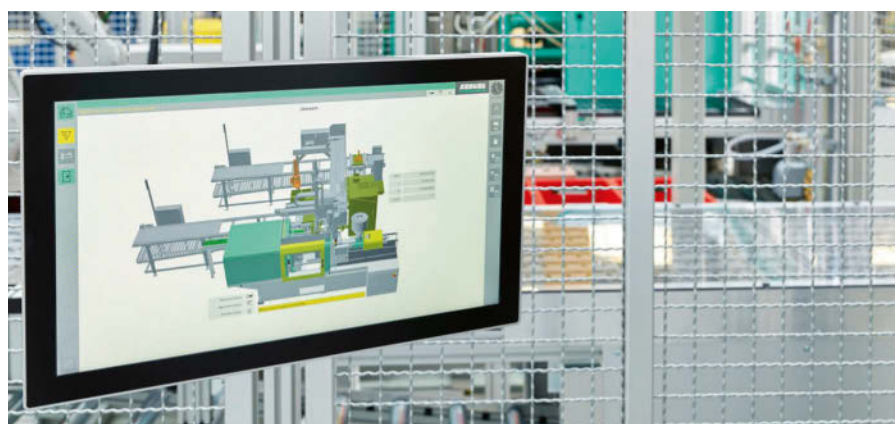
ing force of 1,000 kN is the technological foundation for the company's first steps in injection moulding. It allows the electric coils, which are also produced in-house, to be overmoulded to form the finished "excitation system" product and to increase the internal added value. The end products are valves for internal combustion engines in cars.

"We are very happy with the project handling", says Werner Schleicher, who is responsible for process development at Kendrion, commenting on the close cooperation. "Our central ARBURG contact implemented our requirements competently and on schedule with his team."



Kendrion runs a complex turnkey system in which electric coils are overmoulded and tested (main image).

The ATCM visualises the entire system and records the process and test data (below).



# control

## able production

Before now, Kendrion had only produced the electric coils, consisting of a pole disc, coil body and winding plus two pins, at their winding centre on site. The new ARBURG turnkey system, which was placed directly adjacent, now overmoulds the electric coils with glass-fibre reinforced PA. "Both the inserts and the finished excitation systems are tested inline", explains Werner Schleicher. "The interaction of the individual components within the turnkey system functions flawlessly. The MULTILIFT V for inserting and removing components is integrated into the central SELOGICA control system and linked to the six-axis

robot by an iO connection. The process for the inspection system is also managed centrally by the SELOGICA, with process and inspection data eventually recorded by the ATCM."

### Simultaneous overmoulding and testing

The electric coils marked with a DMC (data matrix code) are supplied in trays. A KUKA six-axis robot takes four coils at a time and forwards them for mask testing to ensure that the pins are straight. Bad parts are removed, and four good parts at

a time are heated to around 100 degrees Celsius in a preheating furnace and placed in a heated preheating platen. The preheating platen then moves into the operating area of a MULTILIFT V, which takes over further handling. The linear robotic system places the inserts in a Straberger 4-cavity mould, where they are overmoulded with PA4.6 (GF30). After removal, the sprues are discharged via a conveyor belt and the finished parts are placed on a test trolley. The excitation systems are then fed individually through the testing unit, which reads the DM code containing information such as shot number and date, subjects each part



Werner Schleicher, Process Developer at Kendrion (top), is highly satisfied with the fully automated production of the excitation systems. The overmoulded electric coils are tested 100 percent inline. (left).

to an electrical test and separates out bad parts. The good parts are placed in trays and conveyed out of the system.

#### Fully traceable with ATCM

The ATCM visualises the entire system and clearly displays the injection moulding process data and the parameterisation of the electrical test, as well as the special sequence used to qualify and test the measuring equipment itself at regular intervals.

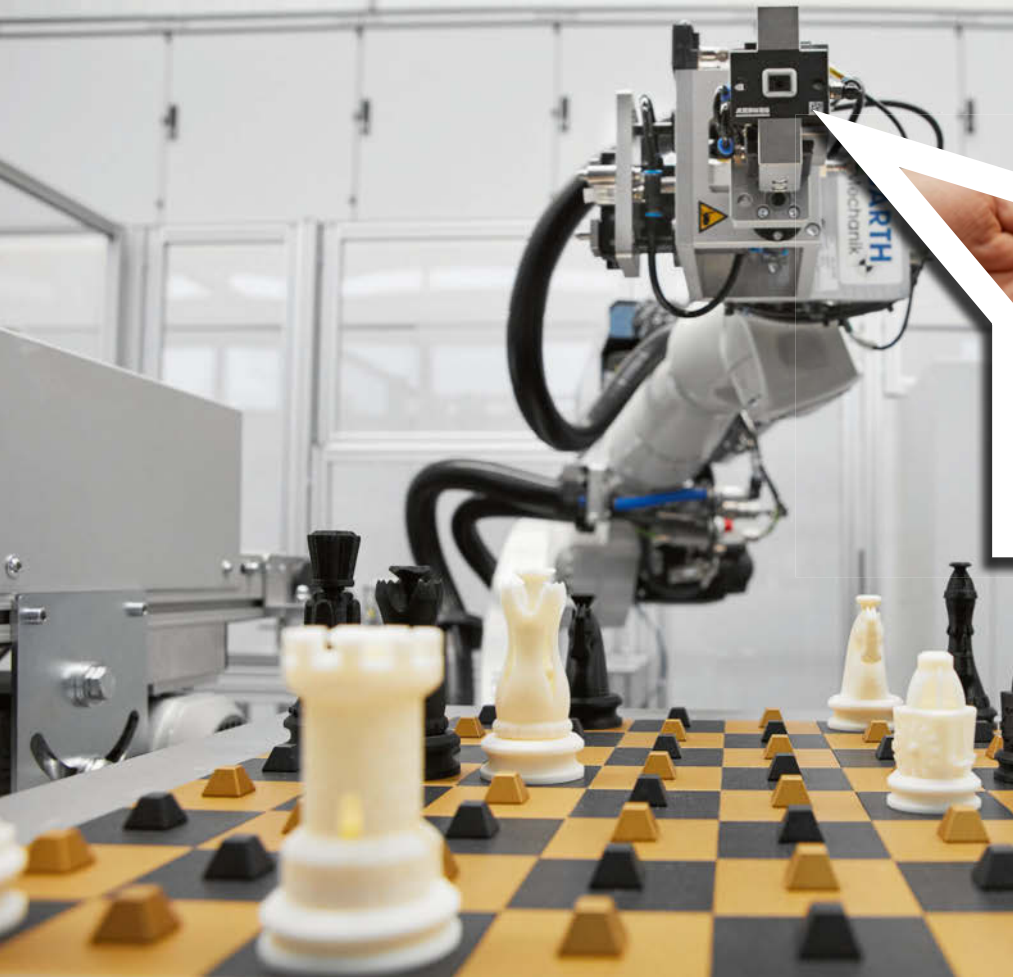
“With their demanding requirements for process traceability and test data down to individual part level, Kendrion was the perfect pilot partner for us. In addition, factors such as their close proximity and flexible contact persons with whom we were able to discuss and optimise all details openly were also important”, says Matthias Vollmer, Project Manager at ARBURG, commenting on the fruitful partnership. “The collected data is transferred to our database and a separate data set

is stored on the hard disk for each part”, adds Werner Schleicher. “In this way, we are able to ensure one-hundred percent traceability. If there are problems in the process, this makes it easy to identify the affected batch and we end up with far fewer rejects. If everything goes according to plan, we will soon be producing around 500 parts per hour with our turnkey system in three-shift operation.”

#### INFOBOX

**Name:** Kendrion (Villingen) GmbH  
**Founded:** 1911 by Wilhelm Binder, part of the Kendrion Group since 1997  
**Location:** Villingen-Schwenningen, Germany  
**Production area:** approx. 10,000 m<sup>2</sup>  
**Employees:** approx. 400 in Villingen-Schwenningen  
**Industries:** Automotive, industrial  
**Products:** electromagnetic components for engine sound, sensors and electronic controls, electrodynamic drives, valve technology, damper systems and engine management  
**Contact:** [www.kendrion.com](http://www.kendrion.com)





In the "AM Factory", the functionality of the individualised gripper plates is tested by moving the respective chess pieces (left). The production and quality data of each plate is 100 percent traceable (top).



Video  
AM Factory

# Smart move

## AM Factory: Turnkey system with IT-networked freeformer

**U**nique: The "AM Factory" celebrated its debut in spring at the Technology Days and was a highlight at Hannover Messe 2019. At its heart is a freeformer 300-3X, which functionally individualises vacuum grippers. ARBURG has made a smart move with this turnkey system, combining its expertise in the areas of additive manufacturing (AM), digitalisation and turnkey.

With the "AM Factory", ARBURG has demonstrated how an IT-networked freeformer creates added value by individualising series products – in a fully automated process that is in line with customer specifications and 100 percent traceable. This is something never seen before in the world of additive manufacturing.

The operating principle: As a first step, the chess piece to be moved with the gripper is selected at the terminal, thus starting the job.

### Fully automated additive manufacturing

The six-axis robot transports an aluminium base plate to the first station, where a data matrix code (DMC) is applied by laser. The insert is then placed on a workpiece carrier and forwarded for plasma treatment. Before it is inserted into the build chamber of the freeformer 300-3X, it is scanned in order to transfer the data of the 3D printing job. Using this information, the freeformer additively applies the functional 3D contour of elastic TPU to the gripper plate: each time with the right geometry for queen, king, bishop, knight, rook or pawn. By scanning again after the component has been removed, the robot determines which chess piece it should use to check the gripper plate. The component is then forwarded to a tactile function test in the manufacturing cell: the desired game piece is picked up via vacuum and moved on the

chess board. This is only possible if the TPE contour matches the game piece exactly.

### ATCM merges data

The ARBURG Turnkey Control Module (ATCM) SCADA system records the part-specific process parameters and the test result, and then merges the data. Each gripper plate is 100 percent traceable via its DMC. Production data such as build time, material, pressure profile and build chamber temperature are displayed on an individual website.

# Production made m

## Samaplast: Additive manufacturing as a

**S**amaplast, a Swiss manufacturer of medical and technical products, uses a freeformer 200-3X to produce small batches or single-unit batches. But the company also deals with combinations ranging from prototype projects to OEM production. ARBURG Plastic Freeforming (APF) is used to manufacture products such as implants made from FDA-approved PCU and resorbable materials like polylactide, or components made from two materials with special geometries.

Thomas Möсли, Assistant CTO at Samaplast, describes his first experiences of working with the freeformer as follows: "Up to now we produced prototypes for our customers on injection moulding machines. We now offer additive manufacturing of components on the freeformer as a supplementary service, primarily in the medical sector." Möсли is confident that this manufacturing process will be increasingly used in certain areas within his company in the future.

Samaplast has been looking into additive manufacturing since 2018 and has already tested other systems. The company is using the technology to manufacture medical prototypes and devices. One example is a permanent implant for the spinal region, which serves to stabilise a slipped disc and is composed of an FDA-approved PCU (polycarbonate urethane) in different degrees of hardness: 90A, 80A, 55D and 65D.

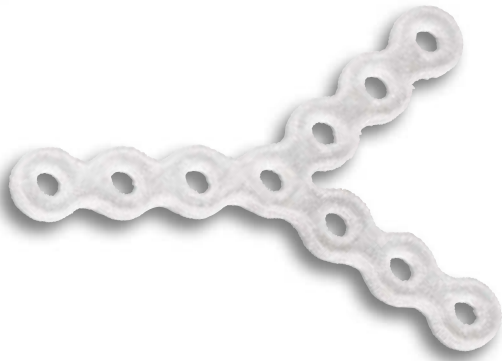


Photo: Heidegger

The freeformer is predestined for medical technology because components made of original plastic can be additively manufactured, such as a permanent spinal implant made of FDA-approved PCU.

# ore flexible

## supplementary technology for prototypes and small batches

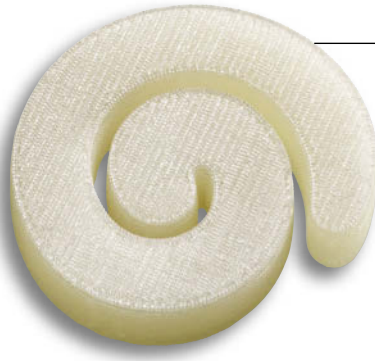


### Convincing APF quality

The additively manufactured parts were compared with approved injection moulded series parts in long-term tests. Tensile, compressive and torsional strength were tested. The results showed that the mechanical properties and the surfaces both met the requirements. The implant is, however, still in its testing stage with the customer. Additional tests dealt with components made of two materials, including a spiral coated in a second plastic, a combination of two rods of different hardness or the production of resorbable implants made of polylactide. This area also showed great future potential.

### New materials, new geometries

All trials clearly demonstrated the advantages of the freeformer. Thomas Möslì says: "We can test new materials and even unusual geometries quickly and at low cost, without having to develop and build expensive injection moulds. Another factor is the high cost of implant materials. The freeformer can be used to manufacture products for testing using commercially available, qualified injection mouldable plastics while saving material in the process. That makes us so much more flexible."



### Implants made of plastic

According to Thomas Möslì, working with the freeformer 200-3X is fairly easy. Products made from one component only require pre-drying of the material. The parts can then be manufactured additively based on the loaded data record, removed from the part carrier and packaged. "Our freeformer uses a 0.2-millimetre nozzle. Four to ten parts are packed on a platform. In this case, the running time is between four and ten hours, with the system also running autonomously at night", he continues. The main materials processed are implantable plastics such as TPU, PCU and resorbable materials which are qualified by Samaplast. "Operation of the control system via its touch screen works well and is easy to understand. The freeformer is also the only system capable of processing standard plastics", summarises Thomas Möslì. The system also offers great advantages in medical technology, as well as in technical areas. But he is also convinced that "there is still more potential in the machine and software, for example with regard to processing PEEK. That is why we would be willing to invest in this future technology again."

Samaplast is intensively testing the freeformer for various implants: Examples include a Y-plate made of Resomer LR704 S for facial surgery (left) and a two-component coil made of Bionate 65D and 80A for stabilisation in the spinal region.

### INFOBOX



**Name:** Samaplast AG  
**Founded:** 1960  
**Location:** St. Margarethen, Switzerland  
**Turnover:** 15 million CHF (13.2 million EUR) in 2018  
**Production area:** 7,500 square metres, including 400 square metres of GMP clean rooms  
**Employees:** 85  
**Industries:** Medical technology, technology  
**Products:** Implants, other medical technology and technical products  
**Machine fleet:** Three ALLROUNDERS, one freeformer 200-3X in a clean room  
**Contact:** [www.samaplast.ch](http://www.samaplast.ch)



# Illumin

## Wilhelm Weber: Optical LSR fibres ensure pinpoint brightness

**H**ow can technology be used to illuminate a specific lane on the road? Car headlights that combine LED and laser technology. Light conductors play a crucial role in focusing and conducting the light from 40 light-emitting diodes. These precision parts made of liquid silicone (LSR) are produced by Wilhelm Weber from Esslingen, Germany, for its customer Hella. They are used in cars such as the Audi A8.

Antonio Trinchese, Head of Business Development & Sales at Weber, describes the function of the LSR serial part as follows: "The Matrix LED high beam has 40 small, individually adjustable light emitting diodes per unit, which project the light in two lines." The silicone light conductor collects the light from the individual LED light sources and directs it through the coupling lens system. This allows an increased flow of light to be generated from the overall system, resulting in a greater light output or more defined light distribution.

"The upper and lower sides of the individual silicone fingers must be produced with extreme precision so that they deflect the light beams in a directed and glare-free manner", explains Antonio Trinchese.

For Weber, this meant producing a mould with the highest surface quality and implementing a complex manufacturing cell. Due to the exacting quality standards, precise adherence to tolerances and reliable output are required. With this in mind, the company opted for a fully electric high-end machine from the ALLDRIVE series. The LSR mould has two cavities and two parting lines with a maintenance-optimised cold runner.

### ALLDRIVE meets all requirements

Ulrich Beck, Head of Plastics Technology & SCM at Weber, talks about injection moulding: "Series production is done on an ALLROUNDER 520 A, which combines the maximum positioning accuracy of the electric clamping unit with a high-precision injection unit. The screw features a special geometry for LSR processing; the shot weight is 48 grams.

Because of the requirements for light transmission, the cycle times were optimised for the 'cross-linking time of the LSR' and the 'surface quality of the light conductor.'" The machine processes a two-component LSR with a Shore hardness of 72 A, which is ideal for the production of optical parts due to its high light transmission and good demouldability.

### Mould with two parting lines

After the mould has been closed, a vacuum is applied to prevent air becoming trapped in the part. The two-component LSR is then injected and cross-links in the cavity. The first parting line opens. The part and runner are removed by a gripper, after which the second parting line opens. In this position, the overflow channel is removed, the mould closes and the process starts again.

The "Move ejector to intermediate stop" function for mould breathing can be easily programmed and integrated into the production sequence with the SELOGICA control system. Raimund Jahn, Project Manager at Weber, comments on the demanding demoulding process: "The functional geometry of the undercut light conductors requires forced demoulding, and the LSR component must not be damaged during this process."



Photo: Continental

# ating experience

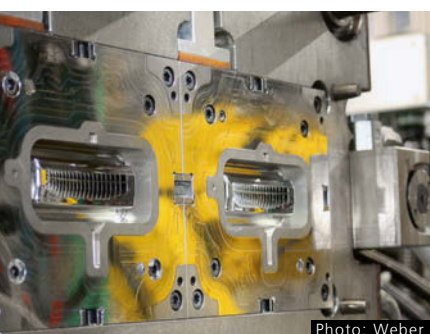
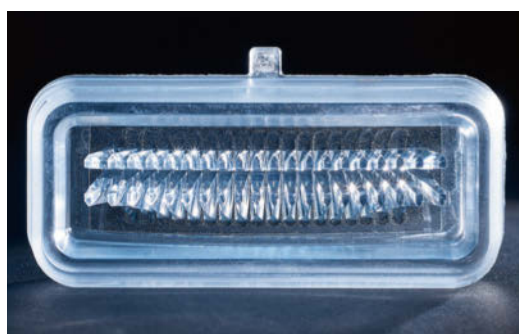


Photo: Weber



Around 150,000 LSR light conductors are manufactured per year for use in the Audi A8 (top). They are manufactured using a two-cavity mould and have 40 "fingers", which collect the light from the individual LED light sources and direct it in a targeted manner (left).

## Traceable via DMC

The following processes take place in the production cell after the injection moulding process: A DMC (data matrix code) is lasered onto the part. The production data acquisition (PDA) system can be used to determine precisely when the individual parts were produced and using which process parameters, down to the individual cavity. This is followed by an optical check using a camera system, and the good parts are placed in tempering trays. Removal of the moulded parts, sprue and overflow is carried out by a six-axis robot with vacuum gripper and a sprue picker.

Weber uses this automated LSR production cell to produce around 150,000 light conductors per year for the Audi A8 series.

## INFOBOX



**Name:** Wilhelm Weber GmbH & Co. KG  
**Founded:** 1925 by Wilhelm Weber and Ernst Eberspächer  
**Location:** Esslingen, Germany  
**Employees:** 118  
**Industries:** Automotive, electronics and medical technology  
**Products:** High-quality multi-component injection moulds, rotation systems, production of parts from liquid silicone (LSR)  
**Machine fleet:** 17 ALLROUNDERS  
**Contact:** [www.weber-esslingen.de](http://www.weber-esslingen.de)



# Medical technology from the kibbutz

## Elcam Medical: Expert for infusion system components

**T**he beginnings of Elcam Medical date back to the year 1970. Founded by members of the Bar'am kibbutz in Northern Israel, the company started business as a mould and tool manufacturer. Nowadays, Elcam Medical is supplying its range of innovative medical technology products to OEMs all over Europe, the USA, and Asia. For complying with the highest quality standards, numerous ALLROUNDERS are being used for clean-room production.

Every year, more than 30 million patients use the products of Elcam Medical. According to its own statements, the company is one of the world's leading manufacturers with the widest range of components for infusion systems. The portfolio includes, e.g., flow control devices like stopcocks and manifolds,

including products with valves that can be swabbed with alcohol, that allows procedures in a closed system and can help reduce contamination risks. Further products are pressure measuring devices like disposable transducers, the so-called Y-Click, a Y connector for coronary cardiovascular treatments, and quick-acting slewing rings, reducing faulty connections and therefore fluid loss.

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### Patents secure advance

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More than 50% of the OEM pressure measuring systems used worldwide include products from Elcam Medical. The company's technical advance is based on several patents. This includes the innovative Marvelous™ stopcock, which allows continuous flushing of drugs and blood residuals. This protects against contamination and increases patient safety.

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### ALLROUNDER no. 1000 in Israel

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The company's four production sites in Israel and Italy produce millions of moulded parts in class 8 clean rooms directly. The machine fleet comprises 45 hydraulic and electric ALLROUNDERS, including a two-component and an LSR machine.

ARBURG machine no. 1000 being sold in Israel, an electric ALLROUNDER 470 E, was delivered to Elcam Medical in 2012. In April 2019, the clean-room production at the headquarters has been increased by 3,450 square metres to a company-wide total of 10,950 square metres, with space for 36 additional machines – further ALLROUNDERS included.

The Technical Director at Elcam, Nitzan Bibi, explains the benefits of ARBURG's machine technology for the company: "The ALLROUNDERS and the SELOGICA control



Photos: Elcam Medical

The patented Marvelous™ stopcock is also used in manifolds (large picture on the left). Elcam Medical manufactures these as well as other medical technology products with ALLROUNDERS in a clean room environment.

system offer us a high degree of flexibility. We can use a range of different moulds on one machine to produce our high-quality products just in time and in line with the market. In addition, the convenient communication protocols and interfaces help us with tools and cavity monitoring.” The ALLROUNDERS are equipped with clean-room packages and special cooling water connections for high-cavity moulds.

### Ready-to-use products

After production, the majority of moulded parts are subject to additional, fully automated processes like assembly, sterilisation and packaging e.g., in blisters. After that, the products are assembled and delivered ready for use. The machines used also perform the processes for labelling, laser cutting, and ultrasonic welding.

The production times are 24/7 with three shifts per day. Due to this work load, the manufacturer’s specifications for servicing the machines are strictly adhered to. All work is documented in the maintenance software with logbook specifically used for this purpose. For every new ALLROUNDER, a calibration certificate is issued by ARBURG. Using a CQC software (Continuous Quality Control) for determination of the optimum operating window, the production processes are fully validated. During production, there is a close tolerance monitoring executed via

the SELOGICA control system and a comprehensive quality control. This ensures the company’s compliance with high-level standards like the FDA certification.

### Close cooperation

Within this context, the Managing Director of Elcam Medical, Igal (Guli) Kohn, points out the following: “We always appreciate the benefits from the support in the field of application technology or the training offers by ARBURG, for example, when introducing our LSR processing. In particular, I would like to stress the extraordinary efforts of the ARBURG trading partner in Israel, Su-Pad, with its constant support and assistance.”

### INFOBOX



**Name:** Elcam Medical

**Founded:** 1970

**Location:** Bar’am, Israel,  
Carpi and Mirandola, Italy

**Turnover:** 100 million USD  
(89.7 million EUR) in 2018

**Employees:** 590 worldwide

**Industries:** Medical technology

**Products:** Disposable products for IV therapy, monitoring of vital parameters, interventional cardiology and radiology and dialysis

**Machine fleet:** More than 100 injection moulding machines with clamping forces from 600 to 2,000 kN, of which 45 are ALLROUNDERS

**Contact:** [www.elcam-medical.com](http://www.elcam-medical.com)

# With ARBURG

## Gotmar: From delicate technical parts to high

**G**otmar Ltd. is the largest moulded part manufacturer in Bulgaria and produces an unusually wide range of products. The portfolio ranges from small parts for white goods through to caps and closures for food packaging and cosmetic jars including lids. When it comes to special products that require high precision and complex processes, only ALLROUNDERS are used.

Gotmar mainly manufactures complex packaging solutions, acting as a system service provider for all steps from design and mould construction all the way through to the finished product. Around 500 million parts were produced in 2018, of which some 370 million were closures for the food and cosmetics industries.

### From high-precision to high-gloss

The tolerances demanded by customers in high-volume production can be as low as 0.05 millimetres for processing fibre-filled materials, for example. Quality parts with high-quality surfaces for the cosmetics sector are made from Surlyn PC 2000 and other special materials. Additionally, the company manufactures small parts for white goods with weights of less than 10 grams. Company owner and CEO Georgi Tuchevev comments on the technical requirements: "To be able to achieve these tolerances and specifications, we have chosen ALLROUNDERS, which allow us to carry out detailed parameter monitoring." In the cosmetics industry in particular, there is an additional requirement

to maintain oil- and dust-free systems in order to manufacture parts with a flawless and clean surface for subsequent decoration by painting or metallisation.

### Reliable process control

"We use ALLROUNDERS whenever things get complicated and high quality is required", emphasises the CEO. Many injection moulding processes require a multi-stage process, as Tuchevev notes: "At the beginning of the process, we operate with a reduced locking force so that any gases produced can escape more easily from the cavities. Towards the end of the injection process, we increase the mould locking force in order to safely fill the product. This is where the extended ALLROUNDER mould locking programme is a great help." The parameters – which can be configured in detail and archived as part of the company's quality control process – as well as the simultaneous programming of two data sets help in process optimisation. With the introduction of the ARBURG host computer system (ALS), Gotmar has also started down the path to digital transformation.

### 20 percent faster cycles

Cycle times could be reduced by up to 20 percent because mould opening and ejection can take place almost simultaneously. "The hybrid HIDRIVE machines with hydraulic accumulator are perfect for our packaging applications as they allow injection at high pressures", explains the CEO.





# , anything's possible

-quality packaging items



Photo: Gotmar

Gotmar produces its high-quality packaging articles (large image, left) and delicate technical moulded parts (below) exclusively on ALLROUNDERS (left).

He is also very happy with the hydraulic ALLROUNDERS, as the position-regulated screw permits a level of precision comparable to that of electric machines. MULTILIFT robotic systems are used for automated part removal and set-down.

## Convincing service and consulting

The ALLROUNDERS are in operation around the clock on 365 days of the year and are serviced on site by an ARBURG service technician. "In addition to the service, we also value the first-class support and technical application advice offered as part of our cooperation since 2015", says Tuchevev, summing up the benefits of working with ARBURG.

## INFOBOX

**Name:** Gotmar Ltd.  
**Founded:** 1992  
**Location:** Saedinenie, Bulgaria  
**Turnover:** 73 million EUR (2018), annual growth of 15 percent  
**Production area:** approx. 65,000 square metres  
**Employees:** approx. 1,100  
**Industries:** complex packaging solutions  
**Products:** PET preforms, closures and handles, packaging for the cosmetics industry, switches, mould construction  
**Machine fleet:** 135 injection moulding machines with between 400 and 4,000 kN of clamping force, of which 53 are ALLROUNDERS  
**Contact:** [www.gotmar.com](http://www.gotmar.com)





## TECH TALK

Oliver Schäfer, Technical Information



# Back to the source

## Digital transformation: Unique identification of machine compo

**Whether it's medical technology, pharmaceuticals or automotive engineering: The unambiguous identification of products and 100% traceability of manufacturing processes are decisive criteria for safety and quality in many industries. A prerequisite for satisfying this requirement is the individual labelling of the components. ARBURG follows this approach for key machine components such as plasticising screws.**

Traceability of individual parts or of screws according to batches requires detailed documentation of the entire production process. Which material and which material batch were the components manufactured from? Which machines were involved in the

production process? When and with which settings did the individual production steps take place? Which results were recorded in test and measurement logs? To achieve this, the data must not only be logically linked, but also archived over a longer period of time. The basis for this process is IT-networked production over the entire value chain, with the aim of collecting and providing access to all important data.

### Serialised screws

During the manufacturing process, so-called serialisation takes place. Each plasticising screw of a batch is assigned a unique ID that is permanently lasered onto the shaft of the screw – both as a number and as a data matrix code (DMC). Serialisation

creates a link between the real product and its virtual image in the form of processable digital data. What's more, using a DMC for identification ensures a safe and efficient assembly process. By scanning the DMC, the screw is automatically assigned to a machine during installation. This provides ARBURG with a reliable and interpretable overview of where individual components or entire batches are in use. The serialisation of plasticising screws is just the first step; further ALLROUNDER components will follow.

### Assured quality

Seamless traceability back to the origin of the used raw materials benefits ARBURG and its customers in equal measure. On



# at any time

## nents

the one hand, the quality can be reliably verified and, in the event of an error, costs can be kept to a minimum. On the other hand, the process enables batches and series to be recalled if required. Identification via numbers or codes is also becoming increasingly important for verifying and proving authenticity beyond doubt. This is particularly important for central components of injection moulding machines such as plasticising screws. These components form the basis for product quality and productivity – especially in long-term operation when processing a wide variety of plastics. In order to preserve the performance of an injection moulding machine and to achieve efficient production, the use of original parts and a detailed configuration of the screws are essential.

This requires a coordinated range of sizes, geometries and wear categories.

The original part is uniquely marked:  
ARBURG plasticising screws can  
be identified and traced via DMC.

ENJOY  
EXPERIENCE  
ADDING VALUE  
**PACKAGING**  
**TECHNOLOGY**  
KEEPING FRESH  
SAVOUR  
SHAPING THE FUTURE

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Satisfied consumers are also the result of perfect product packaging. Producing this packaging reliably and easily in large unit volumes is a challenge you face as a manufacturer. The solution: our special ALLROUNDER Packaging injection moulding technology. This represents maximum productivity with minimum energy consumption.

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