

# today

- Pulverized material clamped with piezo technology

- Part carrier movable on three axes  
- Homogeneous material preparation with short three-zone screw and precisely  
- Processing of two components with a second material processing unit

- Hot compact interface (DC/AC)  
- High-performance industrial PC with multi-touch screen  
- Intuitive operation by means of gestures



**AIPI**  
Associazione Italiana  
Progettisti Industriali



Premio Internazionale  
Leonardo da Vinci  
ed. 2016

Progettista straniero  
Team ARBURG





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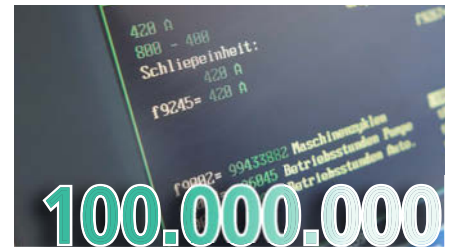
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## IMPRESSUM

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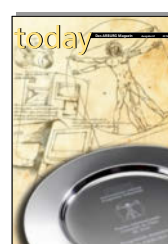
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In March 2016, the freeformer for additive manufacturing received the international “Leonardo da Vinci” Award from the Italian Association of Industrial Designers (AIPI).

**ARBURG**



## Dear Readers,

It's not long since you received our "Special Edition 2016" of "today", which we published to coincide with the presentation of our new GOLDEN ELECTRIC machine series, the inauguration of our new assembly hall and the subsequent Technology Days. We hope you enjoyed the special edition!

Since then, we have been especially delighted at receiving the Leonardo da Vinci Award in the homeland of design, which also inspired the present issue's unusual cover design.

This exciting year then continued in the same eventful manner: the Chinaplas, the Hannover Messe, our subsidiary in Taiwan, the subsidiary building in Poland, the ARBURG Innovation Center in Karlsruhe and many more dates that filled up both your and our calendar. But this, of course, is far from everything! Despite having created a big stir with the surprise launch of our

ALLROUNDER GOLDEN ELECTRIC machines, there's still more to come from us this year. Once again, this is reflected in the present issue of "today", which is filled with interesting insights, fascinating technology reports and exciting glimpses of the future. We told you it was all happening!

With the K in October, the next important event is already on the horizon. It won't be long before we all meet up in Düsseldorf at "our" leading international trade fair. We look forward to seeing you and warmly invite you to visit our stand "13A13". Without wanting to give away too much – it'll be worth your while, we promise you that!

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

Michael Hehl  
Managing Partner

# The art of

Vorwerk: Turnkey system





# cooking made easy!

## Systems for challenging Thermomix® parts

**Only ten months after the market introduction of its multifunctional Thermomix® TM5 kitchen appliance in September 2014, Vorwerk, had already delivered a million of these smart kitchen aids. With the design and implementation of two turnkey systems at the Vorwerk Elektrowerke production site in Wuppertal, ARBURG also played a part in this success story.**

According to Vorwerk, the Thermomix® has been delighting its users for more than half a century. With digital technologies such as recipe chips, a touch screen and a guided cooking function, however, the new Thermomix® TM5 makes cooking even easier.

### **A bowl, a blade and twelve functions**

This multifunctional kitchen appliance can not only stir, blend, mix and mince, it can also boil, steam, weigh, grind, knead, beat, heat and emulsify. The Thermomix® cooks for its users virtually automatically – all they need to do is add the ingredients according to the instructions.

The important connecting parts between the drive and the mixing bowl, the so-called blade bearing shafts, are produced on the two ARBURG turnkey systems that the Project department in Lossburg designed and implemented jointly with Vorwerk. These are built around two vertical ALLROUNDER 375 V machines with 4-cavity moulds, one of which operates with a rotary table.

The systems also include a KUKA six-axis robot, a singulation unit, a preheating and transfer station, as well as a conveyor belt and a roller conveyor.

### **Soft components ensure running smoothness**

The parts produced are a metal insert, which is mounted on the rotating blade of the Thermomix® mixing bowl. At the other end, the two vertical Allrounder V machines mould on gears made from two different materials in order to produce the detachable connection between the removable bowl and the motor of the appliance. It is precisely these soft components that ensure the particularly smooth running of the Thermomix®.

### **Six-axis robot saves time**

The central handling device is the six-axis robot from KUKA featuring the SELOGICA user interface. With its highly complex gripper from Barth Mechanik, this moves the metal inserts at the start of the operation, as well as the finished, overmoulded workpieces, perfectly in sync between a singulation unit, the two ALLROUNDERS as well as a pre-heating, a transfer and a set-down station. During the ongoing process, the

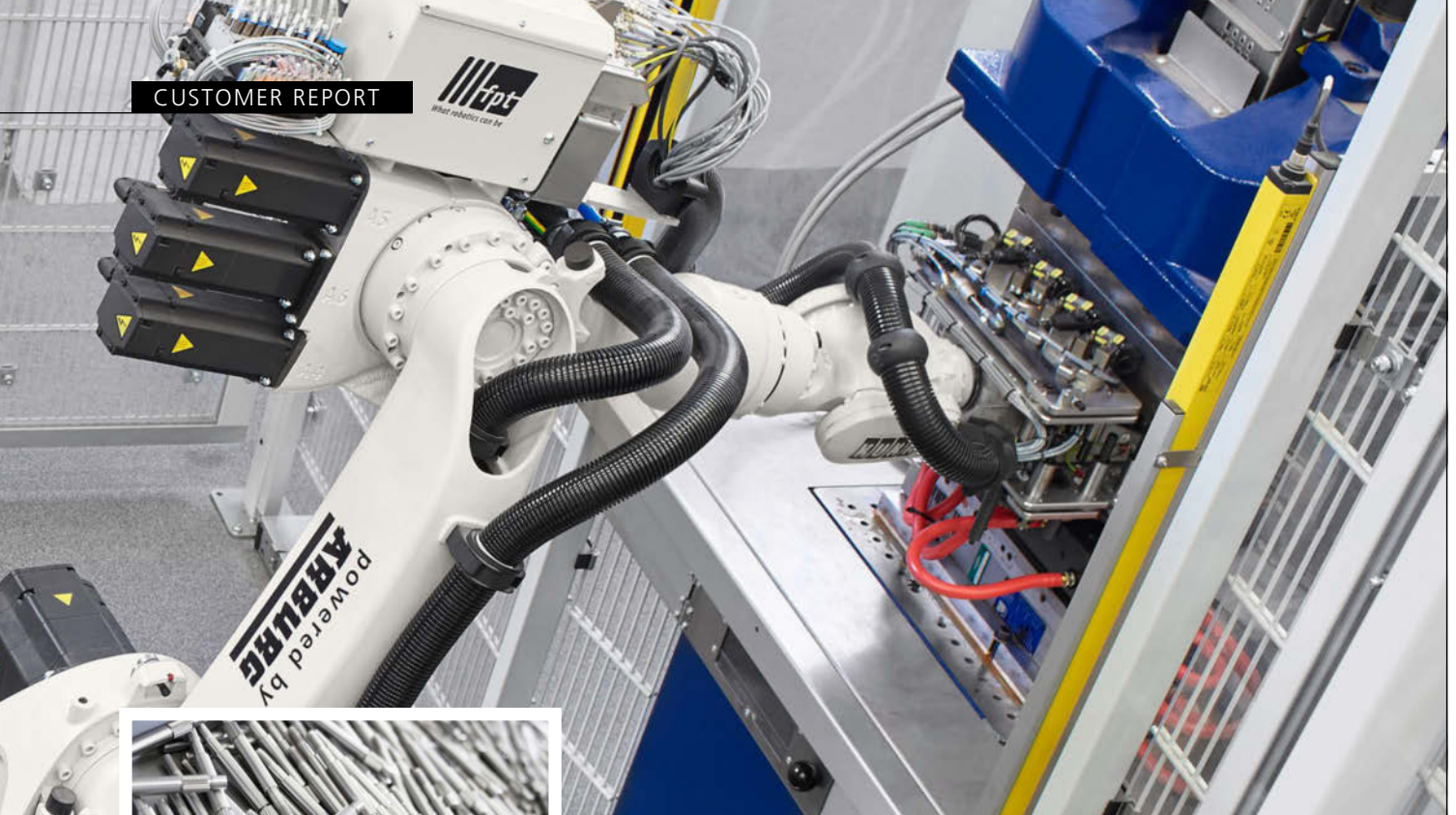
workpieces need to be rotated several times through 180 degrees to ensure correct positioning at the respective downstream stations and for transport of the finished blade bearing shafts on pallets for further assembly. Above all, use of the six-axis robot saves time. The rotation technology is far simpler than would be the case with a linear robot. Two photo-



Photos: Vorwerk

At the start of the injection moulding process, the complex gripper of the six-axis robot picks up the metal inserts (above).

electric barriers at the clamping units of the machines ensure safety during operation. The moulds can only be closed once the robot has fully moved out of the



operating area of the ALLROUNDER V. The singulation unit provides the shafts, correctly aligned, as inserts for pick-up by the robot. The conveyor belt and roller conveyor are positioned one above the other. The operating personnel is only required for placing empty pallets onto the conveyor belt and for removing the full ones.

**Production-efficient, high-volume production**

The highly automated turnkey systems enable Vorwerk Elektrowerke to not only produce the overmoulded blade bearing shafts quickly and with high precision in the required unit volumes, but also to do so cost-effectively. Thanks to the integration of upstream and downstream

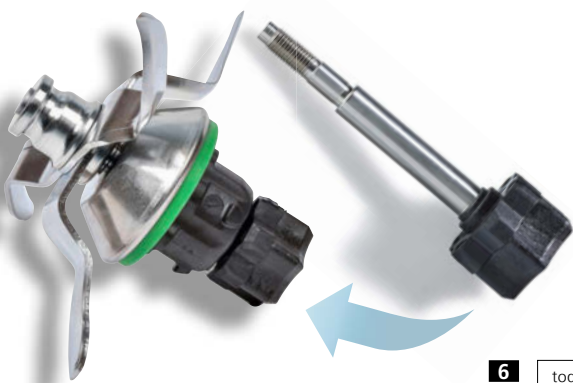
operations, the combination of injection moulding with other processes – including via a central ARBURG host computer system (ALS) for the acquisition of important production data in line with Industry 4.0 – turnkey systems provide a high degree of production efficiency. Dr. Eng. Jan Henseler, Head of Injection Moulding Production at Vorwerk Elektrowerke, explains: “Through close consultation between ARBURG as a primary contractor, the mould manufacturer and Vorwerk, the system was rendered productively operational in a very short time.”

The blade bearing shafts (bottom photo) are made by overmoulding metal inserts (centre photo) with two plastic components. First of all, the six-axis robot inserts these into the mould on the vertical rotary table machine, where the hard plastic component is moulded on.

**INFOBOX**



**Company:** Vorwerk & Co. KG  
**Products:** Domestic appliances (i.a. vacuum cleaners, kitchen appliances, tools, water filters), cosmetic products, floor coverings, financial services  
**Infrastructure:** In-house research and development and an in-house design department  
**Employees:** Around 625,000 employees 613,000 of which are self-employed sales consultants and 12,000 salaried employees  
**Production locations:** Germany, France, China and Mexico  
**Contact:** <http://corporate.vorwerk.com/en/home/>





# Top design

## freeformer: Winner of the “Leonardo da Vinci” award

**D**uring the MEC SPE trade fair in Parma (Italy) ARBURG received the international “Leonardo da Vinci” Award in March 2016. With this award, the Italian Association of Industrial Designers, AIPI (Associazione Italiana Progettisti Industriali), acknowledged the design of the freeformer.

“I’m delighted to accept this coveted award in the name of ARBURG Italy. Our freeformer is unique – both in terms of its design and on account of the wide-ranging possibilities it offers in the additive manufacturing of functional one-off parts and small-volume batches,” said Adriano Carminati, Managing Director of ARBURG Srl, at the prize-giving ceremony held on 17 March 2016.

### International award

The international “Leonardo da Vinci” award, which was instituted by the Italian AIPI association in 1981, is bestowed every two years to individuals and com-

panies who make a valuable contribution to design and technical innovations for industry. In addition to ARBURG, the Italian engineer Aldo Costa, who has previously designed 32 Formula 1 racing cars, the helicopter division of Finmeccanica and bicycle manufacturer Victoria also received awards.

### Impressive industrial design

In 2014, the freeformer had already received the renowned Red Dot Award for “excellence in product design”. Examples of how aesthetics and functionality have been united include an easily accessible build chamber via a pivoting glass front, simple operating options and a fold-out PC with multi-touch screen mounted on the side. The clear, soft lines of the housing are reminiscent of modern telecommunications devices and fit in well with use in a design studio or laboratory environment. The fact that the overall concept is successful in visual terms is evidenced by the positive feedback from existing and prospective customers.

The Italian Association of Industrial Designers (AIPI) presented the freeformer with the “Leonardo da Vinci” Award in March 2016.

AIPI  
Associazione Italiana  
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# An exciting year –

## Partner interview: Insights and outlooks on the K year 2016

**W**hat can the industry expect in the K year? What will the highlights be? What will be happening at ARBURG? These and other questions were put to the ARBURG Partners Juliane Hehl (at centre in photo), Renate Keinath and Michael Hehl by the “today” editorial team.

**today:** 2016 marks the return of a K year. Is this trade fair the absolute highlight of the year in your view?

**Michael Hehl:** As the leading international fair and innovation driver, the K is of course a grand event and very, very important for us and the industry. So you could certainly say that it's a highlight. But I deliberately say “a” highlight, because this year we will also be providing many other important impulses.

**today:** What will these be?

**Renate Keinath:** Well, with the introduction of our GOLDEN ELECTRIC machine series at the Technology Days and the grand inauguration of our new assembly hall in March, for example, this year began on a high in mood if not in calendar terms, which will not, of course, end with the K in October.

**today:** In other words, you're viewing and planning the K year as a whole and not “only” in relation to the K trade fair.

**Juliane Hehl:** Exactly. I'd like to respond with a quote from one of our Technology Day press conferences, which has since almost become famous: Injection

moulding is our trade – and we have mastered the art of perfect dosage. As my brother already said: The K is of course a very important focus for us in relation to our planning activities.

**today:** Are you satisfied with how 2016 is progressing so far?

**Michael Hehl:** Let's begin by looking at 2015: Last year, at 596 million euros, we achieved the best operating profit in our corporate history. To date, this year is looking just as good – and we're not anticipating any change in this regard. So, as we Swabians would say: It could be worse (laughs).

**Juliane Hehl:** And as we've already suggested, we still have quite a bit in store for this year.



**today:** Perhaps you could give us an example?

**Juliane Hehl:** As you know, we pursue a different approach than our competitors. And this has been proven to be highly successful. One central production location worldwide, in which outstanding quality is produced at highly competitive prices. This is our trademark, so to speak.

So the inauguration of our new subsidiary in Taiwan, for example, or that of our new Polish domicile in April, fit in just as well with our overall planning as do the launch of our GOLDEN ELECTRIC series or the inauguration of our new assembly hall for automation solutions and turnkey systems in March.

**Renate Keinath:** Our planning always adopts a comprehensive perspective. Our outstanding workforce also plays a crucial role in this regard. With our recruitment stand at the Fakuma 2015, which was an absolute first in the industry, we really introduced an innovative concept: recruitment at trade fairs! Our K exhibition stand will once again provide an opportunity to enter into contact with us as an employer.

**Michael Hehl:** Or in terms of infrastructure, where our numerous construction projects demonstrate our investment in our long-term future. And this applies around the world - at least around the ARBURG world.

**today:** So please allow me to ask a little more specifically: what can the industry expect from ARBURG at the K?

**Juliane Hehl (Laughs):** Well, you and the industry should know us well enough by now. Of course we won't be revealing to you today just what we'll be presenting at the K trade fair in October. You'll simply have to leave us the pleasure of keeping up the suspense until then. It certainly worked in 2013 with the presentation of our additive manufacturing system, the freeformer, didn't it? We've heard from many quarters that there's rarely been a



# once again!





ARBURG Stand 13A13 at the leading international K trade fair: This year, visitors can once again count on numerous innovations and highlights.

surprise to compare with it in the business.

**Renate Keinath:** But there is one thing that we can already tell you now: a visit to our K exhibition stand will definitely be worthwhile.

**Michael Hehl:** We would therefore today already like to warmly invite the plastics world to visit us in Hall 13 in Düsseldorf. For those who need to know exactly where: the stand number is A 13 – but it's impossible to miss us in the hall.

**today:** In your opinion, what will "the" central topic be at the K 2016?

**Juliane Hehl:** I've already said this once publicly elsewhere and am pleased to repeat myself: the pragmatic, practical implementation of Industry 4.0 is important. Our assessment is that our customers are uninterested in theoretical discussions or impressive charts and diagrams. They want to know how they can do good business tomorrow and the day after. And we support them in achieving this. As we always do!

**Renate Keinath:** Precisely, that's what we've always done. And that's why the topic of "Industry 4.0" fits so well into our overarching considerations regarding production efficiency.

**today:** Is the perception that ARBURG took up the topic of "Industry 4.0"

at an early stage an accurate one?

**Michael Hehl:** Based on our – let me call it "injection moulding tradition" – we explored this topic in depth and were one of the first in the industry to do so, because we are convinced that our customers hope for the appropriate answers from us. Just as we supply ALLROUNDERS and freeformers, turnkey solutions or robotic systems because our customers need them to do good business, we also deliver the knowledge they need to digitalise production in our industry without anxiety.

**Juliane Hehl:** That's right. And we always do so pragmatically and in line with our customers' operational practice.

**Renate Keinath:** Industry 4.0 is also referred to by the technical term "cyber-physical system", i.e., the interaction between hardware and virtual digital components. As a take on this, you could say somewhat tongue-in-cheek that the expertise and technology we deliver is in itself a sort of "cyber-physical system".

**today:** And how are the preparations for the K currently progressing?

**Juliane Hehl:** We've been thinking, planning and working on it for around a year now. For us, our presentation at the K trade fair is an all-embracing artwork. All the cogs, whether large or small, must intermesh efficiently.

**Renate Keinath:** You can look forward to an exciting trade fair!







# Creative turnkey minds

## Automation: ARBURG experts from around the globe meet in Lossburg

**M**ore than 40 turnkey experts from the ARBURG headquarters and the subsidiaries worldwide met to share their experiences for two days at Lossburg in April. Important ideas for the further development of products and processes relating to automated injection moulding production resulted.

"In future, ARBURG will intensify its turnkey business and expand it internationally," explains Oliver Giesen, Head of the Project department at ARBURG. "Our aim is to be an expert partner for automated injection moulding applications to all of our customers, regardless of their location."

The automation specialists came from Europe as well as from overseas countries such as the US, Mexico, Brazil and

China. The primary objective of the first international meeting of turnkey experts in Lossburg was the exchange of experiences.

### International knowledge transfer

Each employee from the Lossburg Project department provides support to one or two partner countries. During the event, the colleagues from around the world devised new methodological approaches, optimised processes, discussed specific projects and generally took advantage of the opportunity for the transfer of knowledge.

### Impetus for the future

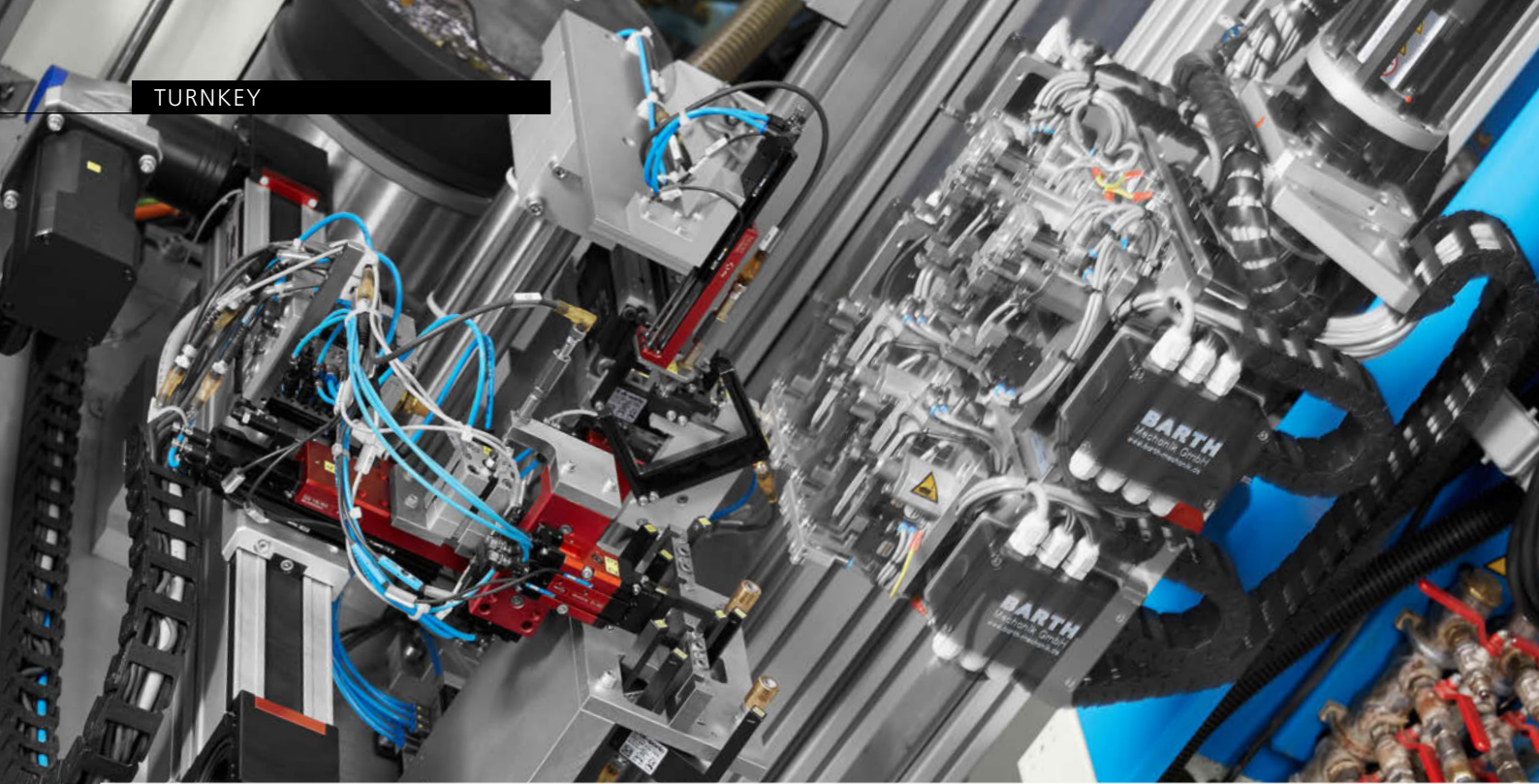
In addition to the theory and presentations, plenty of practical activities were also on the agenda. The group, for ex-

ample, examined the current turnkey systems, which had been set up in the new assembly hall.

Oliver Giesen, Head of the Projects department: "The exchanges with our worldwide ARBURG turnkey experts (large photo) significantly exceeded expectations."

"The exchange between our more than 40 highly creative experts offers huge potential," says Oliver Giesen with certainty. "It also provides key impetus for the further development of our products and new customer solutions. In that sense, this event significantly exceeded our expectations."





# Award-winning and

## JESA: Turnkey system reduces production time for LED lighting

**I**t is through the production of individualised, custom-made ball-bearing solutions that Swiss company JESA AG became involved in the injection moulding of technical plastics. One highlight here is the automated production of a dynamic adjustment mechanism for multi-directional LED lighting units for the automotive industry. Thanks to the turnkey system designed and implemented by ARBURG, the assembly time for this product was reduced from one and a half minutes to ten seconds. This achievement was honoured with the Canton of Fribourg's Innovation Award 2012/2013.

The centrepiece of the turnkey system is a MULTILIFT V robotic system, which simultaneously positions several inserts in an injection mould. This means that they can be joined fully automatically in an overmoulding operation using a technical plastic so that ready-for-use actuators with integral

ball bearings leave the turnkey system. With the combined overmoulding and joining operation, the assembly time is reduced by dispensing with five manual assembly steps, from one and a half minutes to ten seconds – a world of difference in injection moulding, where time is money.

### Several million hybrid parts per year

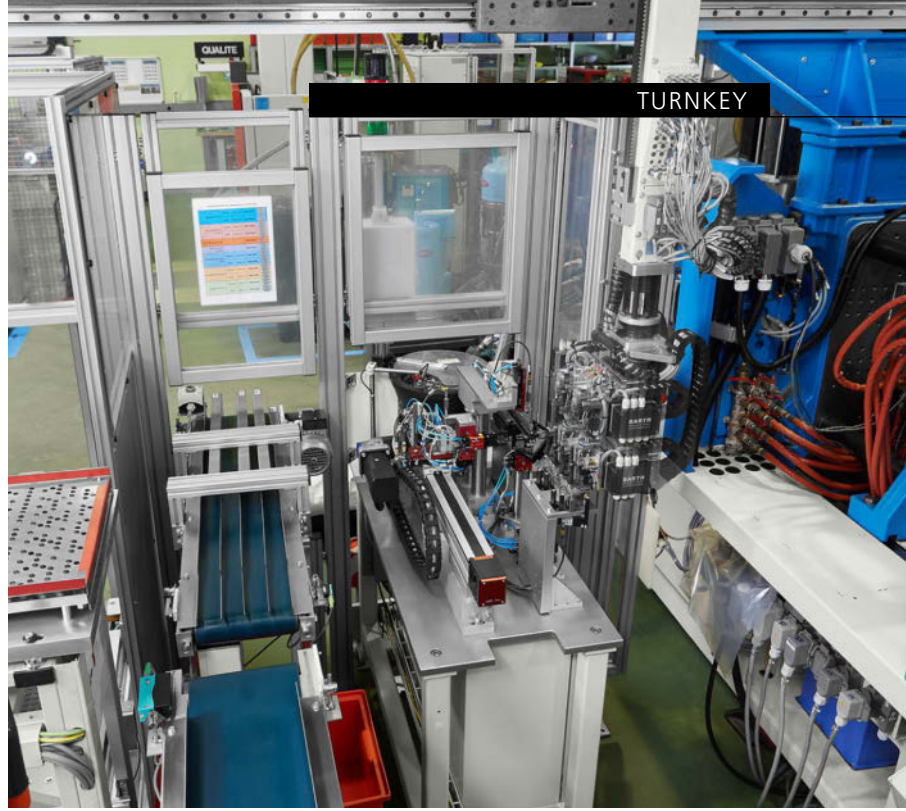
The result: the cost-effective manufacture of several million complex components made from metal and plastic per year for worldwide use. Through the use of robots, JESA can now keep up with low-wage countries and secure the future of its production location.

In addition to a hybrid ALLROUNDER



Swiss company JESA's turnkey system is highly complex yet compact (photos at centre and top right). The complex gripper holds 16 inserts (photo at top left), which are placed in the 4-cavity mould. Only the loading operation and the downstream visual inspection and storage are performed manually (photo at top centre).





# super-fast

units by almost 90 percent

470 H with a MULTILIFT V robotic system, the turnkey system comprises a palletising station and a conveyor line from Schuma, a feed and singulation unit from Afag Automation AG and a complex gripper from Barth Mechanik.

## Turnkey system

ARBURG sourced, set up, commissioned and delivered all the technical components as a turnkey system for JESA based on a functional specification.

In order to produce the dynamic adjustment mechanism, the pneumatic gripper on the MULTILIFT V with extended Z-axis picks up four inserts at two different loading positions (3+1) and places them into the 4-cavity mould in a precise alignment for overmoulding. A total of 16 inserts are thus held in the gripper.

Following removal, the robotic system sets the finished parts down in a metal tray. A conveyor system then channels the transport trolleys with the trays out of the system. Filling of the inserts into

the trays as well as the downstream visual inspection and storage are performed manually.

Of the eleven injection moulding machines in Switzerland and another four in China, two are ALLROUNDERS at each location.

## More than 20 years of partnership

During the joint work on the turnkey system, it was particularly important for JESA that there has been one single ARBURG contact person for engineering and customer service, who the company has been able to fully rely on for more than 20 years. Particularly the individual support provided by the ARBURG subsidiary in Switzerland and the Project department in Lossburg during the aftersales phase is always praised by the persons responsible at JESA as being extremely reliable, fast and conscientious, with well-founded expertise.

## INFOBOX



**Company:** JESA SA, a subsidiary of the Polygena Group, St. Gallen, Switzerland

**Founded:** 1969 by Joseph and Rolf Egger

**Plants:** Villars-sur-Glâne, Switzerland and Wuxi, China

**Products:** Custom-made ball bearing solutions, turned and stamped parts in conjunction with technical plastics

**Industries:** Industry, automotive, furniture and construction, consumer goods and medical technology

**Certification:** ISO 9001 and ISO TS 16949

**Contact:** [www.jesa.com](http://www.jesa.com)

# Implants promote h

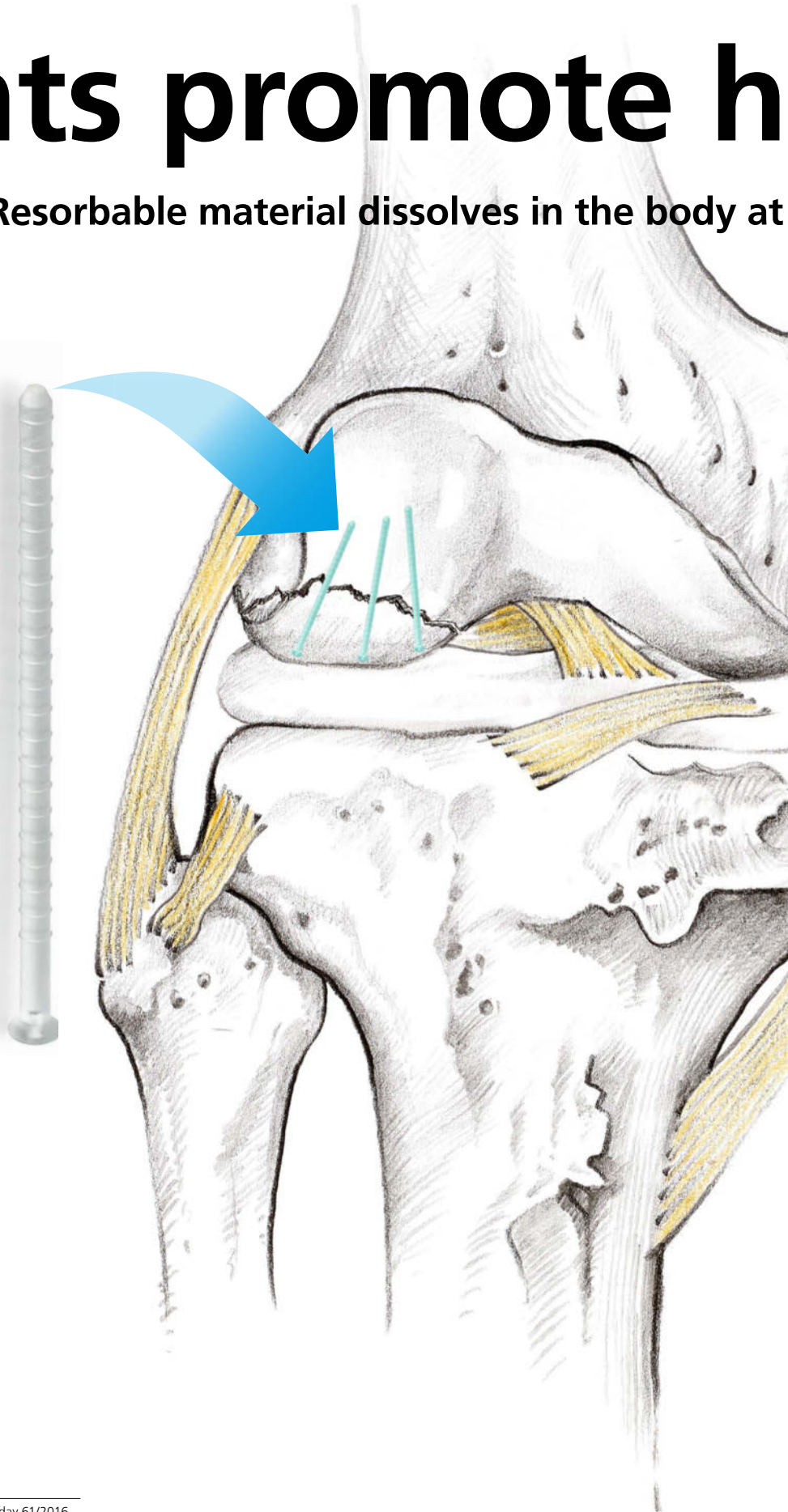
**Medical technology: Resorbable material dissolves in the body at**

**S**pecial resorbable implants are used in the form of screws or pins for the fixation of bones or tissue, for example. The advantage of this material, which is based on polylactide (PLA), is that it biodegrades in the body after a defined time period. ARBURG and the company BIOVISION process a PLA material of this kind on electric ALLROUNDER A machines to produce bone pins, for example, for the medical sector.

One advantage of resorbable implants is self-evident: they don't have to be removed surgically once healing is complete. Moreover, the plastic granulate can be charged with anti-inflammatory agents to minimise rejection reactions. In order for the material to dissolve in the body at the correct time, selection of the material type is extremely important. One indicator of this is the so-called inherent viscosity (IV value). The lower this value is, the more the material is biodegraded.

## Complex processing of PLA

"Owing to their toughness, the PLA plastics are complex to process and they require the appropriate injection moulding expertise," explains Sven Kitzlinger from applications consulting for medical technology at ARBURG. "At a purchase price of several thousand euros a kilo, the material is rather expensive, as well as being sensitive to high temperatures and long dwell times. So there's no scope for error during injection moulding." High shearing during preparation would also damage the material and lead





# ealing

## the right time

to premature biodegrading in the body.

### Gentle material preparation

“For gentle material preparation and short dwell times, we therefore use a special 15-millimetre screw with widened flights and a chrome nitride (CrN) coating. This reliably prevents the formation of undesirable deposits and microfretting,” says Sven Kitzlinger.

ARBURG has decades of experience in medical technology and automation. The modular machines and turnkey solutions can be precisely tailored to the customers’ requirements; jointly with partners where appropriate.

At the Technology Days 2016, ARBURG demonstrated the processing of “Resomer L 210 S” from Evonik on an electric ALLROUNDER 370 A. The clean-room machine, equipped with a stainless steel clamping unit meets the most stringent hygiene requirements in compliance with ISO 13485 and according to the FDA requirements and GMP guidelines. An ISO 7 class clean-air module with ionisation above the clamping unit provides the necessary clean atmosphere during running production. “At a shot weight of less than one gram, use of our micro-injection module also makes sense,” adds Sven Kitzlinger. “It can optionally combine either an 18 or 15-millimetre screw for melting the material with an 8-millimetre screw for injection. This ensures gentle processing of the



plastic according to the first-in, first-out principle and compensates for the disadvantages of pure piston injection.”

### Implants can either be injection moulded or manufactured additively

BIOVISION from Ilmenau, Germany, specialises in the injection moulding of resorbable plastics. Using an ALLROUNDER 270 A machine and a micro-module, “PolyPIN®” bone pins with lengths between 25 and 60 millimetres are produced for use during the surgical fixation of fractures subjected to low biomechanical stresses. These implants are biodegraded after around two years.

A further interesting area of application is also the additive manufacturing of individualised implants, which can be designed precisely for the specific patient. The fact that medical PLA can also in principle be processed using the freeformer was already demonstrated by ARBURG at the Technology Days 2016.

Implants that subsequently dissolve in the body: injection-moulded bone pins in the knee (illustration on left) are a reality. Individualised, additively manufactured parts to replace cranial bones (photo above) are conceivable.

Examples here included a facial and a cranial bone. Further investigations into this new field of applications are ongoing.



# Inaugural celebration

## Poland: New ARBURG Technology Center in Warsaw

**W**ith around 110 invited guests, ARBURG Polska Sp. z o. o. inaugurated the new ARBURG Technology Center (ATC) in Warsaw with Partners Michael and Eugen Hehl as well as Managing Director Sales Gerhard Böhm in attendance. The new building covers 800 square metres and allows for even better service to customers.

"The success of our subsidiary in Poland confirms to us that the ongoing, forward-looking investments in our international organisations pay off," stated Partner Michael Hehl in his speech.

He expressed his thanks for the excellent cooperation during the past decades on behalf of the entire organisation: "The construction of the ARBURG Technology Center in Warsaw is an important milestone and reflects the great significance of the Polish market for ARBURG."

"I'm delighted that one of my first

official appearances has taken me to a pearl within the international ARBURG organisation," added Managing Director Sales, Gerhard Böhm.

### **ARBURG in Poland for over 20 years**

In addition to the high-end injection moulding technology, the principle reason for the successful development of the subsidiary, which was founded in 1992, is the excellent customer support provided. The team in Poland now numbers twenty, eight of whom work in Service. Most of these have already worked for ARBURG for ten years or longer, a fact which is reflected in their extensive expertise.

### **Space for up to seven ALLROUNDERS**

"With the new ATC we can offer an even better service," says a delighted Dr. Slawomir Sniady, Managing Director of ARBURG Polska Sp. z o. o.: "The new demonstration room is three times larger

Inauguration ceremony at the ATC in Warsaw (from right to left): Managing Director Sales, Gerhard Böhm, subsidiary manager Dr. Slawomir Sniady, Partners Eugen and Michael Hehl as well as European Sales Director Stephan Doehler.

than the previous one and offers space for up to seven ALLROUNDERS, which can be used for trials with customer moulds and training activities. It also features an extended spare parts store and facilities for training courses and technical seminars. We are also highly professional when it comes to Sales and Operations. Our customers are highly appreciative of this."



# Increased presence in Asia

## Taiwan: ARBURG opens fully owned subsidiary in Taichung



**S**ince April 2016, ARBURG has been operating a fully-owned subsidiary in Taichung, Taiwan. "For us, Taiwan has great significance as an innovative regional market. In order to ensure a strong presence there in the long term, we have decided to upgrade the location by opening a fully owned subsidiary," explains Andrea Carta, ARBURG Overseas Sales Director.

Taichung is situated in an important industrial region that is experiencing strong growth and where many ARBURG customers are based. In addition to the excellent infrastructure, a further argument was to support our Taiwanese customers in their internationalisation efforts with regard to the People's Republic of China and South-East Asia. The important investment decisions in this regard will be made at the Taiwanese company headquarters.

Three Sales and four Service employees have been taken over from the trading partner of many years' standing, C&F Credit & Finder International Corp., Taipei. This means that all customers can con-

tinue to benefit from the well-founded knowledge and especially the familiar contact persons in future.

In Taiwan, numerous ALLROUNDERS are in use in high-end sectors such as medical technology, electronics, metal and ceramic powder processing (MIM, CIM) as well as the manufacture of liquid silicone (LSR) parts.

### Wide-ranging service and application technology consulting

"We will expand the infrastructure in a targeted manner, for example through more wide-ranging service offerings and application technology consulting," emphasised Andrea Carta. "We've enjoyed a good and trusting cooperation with our existing representation C&F since 1981. For the time being, C&F will carry on its activities for ARBURG in Taiwan and continue to provide support to some key injection moulding customers. The new subsidiary will assume full



Michael Huang (photo on left) will manage the new ARBURG subsidiary in Taiwan (photos above).

responsibility for the after-sales service."

Michael Huang, who has a wealth of experience in the plastics industry and has undergone extensive preparation at the Lossburg headquarters (Germany), will assume management of the subsidiary. Regarding his new task at the subsidiary, he comments as follows: "In Taichung, we have a showroom with three machines, an extensively stocked spare parts store and training rooms on a floorspace of 550 square metres. Here, the customers can run trials, perform mould sampling and benefit from our in-depth consulting.

# Customer from the

## INDIA-DREUSICKE Berlin: freeformer closes gap between design

**T**he DREUSICKE Group offers its customers the complete spectrum from product design through to high-volume plastic part production using ALLROUNDER injection moulding machines. Since 2010, the additive manufacturing of prototypes and small volume batches has completed the range of in-house processes. The freeformer has become a permanent fixture in this area and excels in particular thanks to the extensive range of materials it can process.

“The principle of using standard granulates for the additive manufacturing of our prototypes was sufficient reason for me to immediately grab the phone after the product launch of the freeformer at the K trade fair in 2013 and order a machine,” remembers Thomas Dreusicke, Managing Partner at INDIA-DREUSICKE Berlin regarding the company’s entry into ARBURG Plastic Freeforming (APF).

### From design to high-volume production

The Group has been an ARBURG customer since the 1960s and today operates more than 70 ALLROUNDER injection moulding machines. From design and mould construction through to surface engineering and re-working, the customer obtains the complete product creation process from a single source. The range of parts manufactured extends from grippers with vacuum lines through products for heating and air conditioning technology, through to telecommunications devices.

For many years, prototypes were sourced from suppliers. In late 2010, the company entered into additive manufac-

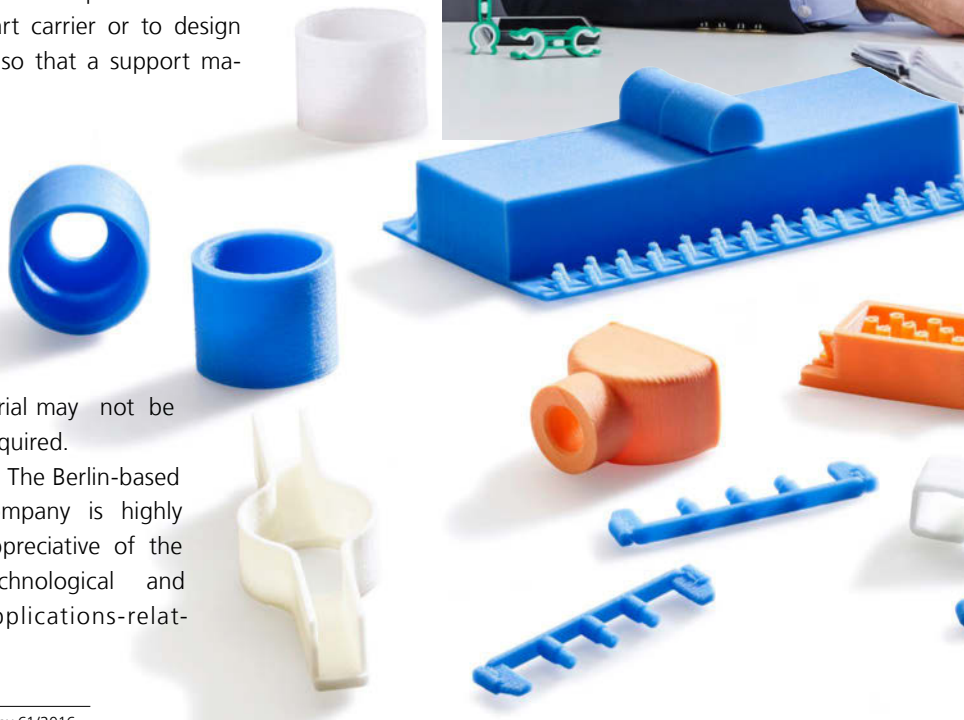
turing and went on to purchase a freeformer in the summer of 2014. Following a lengthy familiarisation phase, all the possible uses for the freeformer in the company have now been explored.

### Flexibility of freeformer impresses

The company’s injection moulding production expertise could be exploited in this context. “Those who are familiar with ALLROUNDERS and the SELOGICA control system will experience no problems when it comes to programming the freeformer,” explains Thomas Dreusicke. “What I think is especially good is that with APF, we can freely program the process parameters.” A further advantage he mentions is that the operator of the freeformer is an engineer with extensive CAD experience. This means he can even independently carry out design changes to parts in a 3D-process-compatible manner, for example in order to optimally place the product on the part carrier or to design it so that a support ma-

terial may not be required.

The Berlin-based company is highly appreciative of the technological and applications-relat-





# outset

## and high-volume production



Partner Thomas Dreusicke (left) appreciates his exchanges with freeformer experts such as ARBURG Plastic Freeforming (APF) Technology Adviser Martin Neff. The company INDIA-DREUSICKE Berlin has already created a wide range of components.

when used in high-voltage applications. He adds that the production of prototypes for medical technology is also a highly interesting notion. This is because, to date, during machining of the parts, up to 90 percent of the material is waste. Costs could therefore be reduced significantly and completely new geometries achieved.

### INFOBOX

**Company:** INDIA-DREUSICKE Berlin

**Founded:** 1929 by Felix Dreusicke

**Plant:** Berlin, Germany

**Turnover:** Approx.

10 million euros (Group)

**Employees:** Around 100 (Group)

**Products:** Additively manufactured prototypes and high-volume injection moulded parts

**Industries:** Telecommunications, technical parts

**Contact:** [www.india-berlin.com](http://www.india-berlin.com)



Teflon (PVDF) as well," suggests Thomas Dreusicke for the future.

#### Prototypes in original material

ed support provided by ARBURG. "It would of course be great if we could combine not only two, but three materials and if we could process

Currently, ABS, PC/ABS blend, PP, TPU and TPE material types are primarily used. Thomas Dreusicke would like to expand the technical limitations where possible: "Our objective is to produce parts in the approved original PVDF." This material exhibits outstanding chemical resistance



# “Industry on Campus”

## University cooperation: ARBURG Innovation Center opens at KIT

**O**n 11 April 2016, a ceremony was held to inaugurate the ARBURG Innovation Center (AIC) at the Karlsruhe Institute for Technology (KIT). During their speeches, ARBURG Managing Director Technology & Engineering, Heinz Gaub and Institute Head at the KIT, Prof. Dr. Jürgen Fleischer, emphasised the importance of the new “Industry on Campus” facility for the cooperation between research institutions and companies.

“As Institute for Production Science of the KIT, the wbk is an excellent research and exchange partner for ARBURG. We were therefore delighted to support the idea of the Innovation Center,” said Managing Director Heinz Gaub in his speech, referring to the smooth cooperation between the KIT and ARBURG, adding: “The new AIC doesn’t just look good – there’s also a great deal behind it.” In the elaborately designed, modern AIC,

two freeformers for additive manufacturing, an ALLROUNDER injection moulding machine, a six-axis robotic system and several workstations and information panels for the employees at the joint facility are housed on a floorspace of around 60 square metres.

### Industry and science work hand-in-hand

As representative of the wbk, Prof. Dr. Jürgen Fleischer spoke of the long cooperation between the KIT and ARBURG, which began at the turn of the Millennium: “The activity spectrum of the AIC extends from the acquisition of scientific knowledge to the assurance of market viability. Here, science and industry work together professionally, hand in hand.” He went on to express his pleasure at this highlight in the cooperation and joked that he hoped it would nevertheless only be a temporary one.

The KIT, he added, combines the three core tasks of research, learning and innovation. With some 9,300 employ-

At the Karlsruhe Institute of Technology (KIT), ARBURG Managing Director Technology & Engineering, Heinz Gaub (left) and Institute Head, Prof. Dr. Jürgen Fleischer, inaugurated the new ARBURG Innovation Center (AIC)

ees and 25,000 students, this German Institute is one of the major scientific and engineering research and teaching institutions in Europe. The five scientific divisions of the KIT are Mechanical and Electrical Engineering; Biology, Chemistry and Process Engineering; IT, Economics and Society; Natural and Built Environment as well as Physics and Mathematics.





# Experiencing the Smart Factory

## Efficiency Arena: "Industrie 4.0 – powered by Arburg"

**Just how new business ideas can be established with Industry 4.0 and its potential exploited was demonstrated based on two practical examples in the Efficiency Arena 2016: individualised office scissors and batch-specific bulk goods in the form of housings.**

"The 'Smart Factory' of the future will control and optimise itself," says Heinz Gaub, ARBURG Managing Director Technology & Engineering, explaining the two exhibits: "During the production of office scissors, we integrate customer wishes entered online directly into the value added chain, while with the manufacture of batch-specific bulk goods, we present end-to-end traceability from the high-volume product down to the granulate for the first time."

### Individualised one-off parts

A flexible, automated and comprehensively IT-networked production line turned office scissors into one-off items in a live demonstration.

For this purpose, the visitors selected one of eight versions and created individual lettering on a tablet PC. Their IDs were scanned and the digital data en-

tered before being transmitted to the injection moulding cell. Next, serial production started for the specific order "on demand". Plastic handles were moulded onto the stainless-steel blades and an individual data matrix (DM) code was applied via laser. The product itself thus became a data and information carrier and was assigned a dedicated web page in the Cloud.

The injection moulding cell was linked to the additive manufacturing system via a seven-axis robot. A freeformer enhanced the scissors with the desired 3D lettering. Before the finished scissors were stored awaiting collection by the visitors, a quality check and data archiving were performed.

The ARBURG host computer system (ALS) networked the autonomous stations, recorded the production data and test results before transmitting these to a central web server.

### Batch-specific bulk goods

A second electric ALLROUNDER produced housings in small batches. Production, material feed and quality management were networked via the ALS. The individual orders were therefore managed and planned centrally and the order queues clearly displayed. In short running times, the housings were pro-

At the Technology Days 2016, ARBURG presented the concept of the Smart Factory and Industry 4.0. in the Efficiency Arena.

duced alternately in one of three colour versions and the new material was requested automatically at each order change. Simultaneously, the ALS received information on the current batch. The moulded parts were packaged into bags and printed with production information such as date, order number, material and batch thanks to the networked equipment. With each order, the relevant checks were started and the data archived. This enabled end-to-end traceability from the high-volume part to the granulate. The partners for this application were CAQ (quality management), Koch (material control) and Packmat (batch identification).



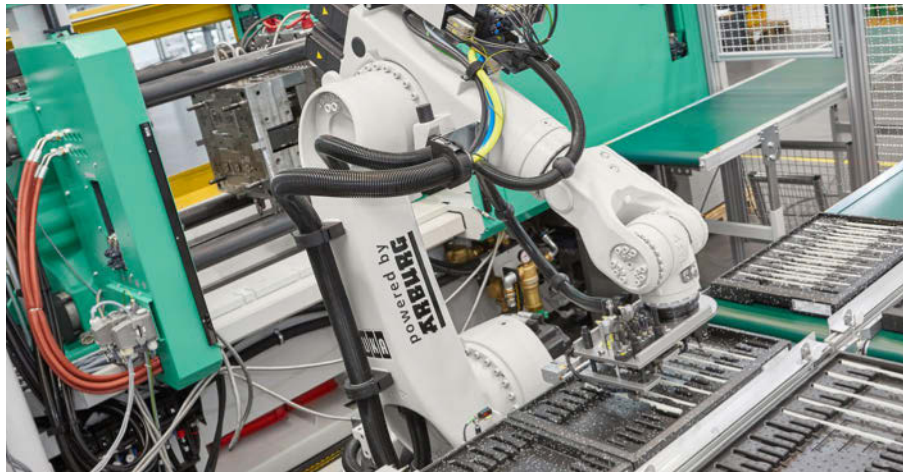


# Flexibility required

**Megatec: Six-axis robot performs complex tasks in “door strip”**

**M**egatec from Lüdenscheid, Germany, is a specialist for high-quality, coated, two-component parts. Ninety percent of its customers are from the automotive industry, including the best-known premium brands. For automated production of a backlit door strip in the Audi A4, a six axis robot featuring the SELOGICA user interface was used for the first time.

“Our customers’ requirements are becoming ever more complex. One good product example are visible strips for ambient lighting in the Audi A4. These flash red as soon as a cyclist or other obstacle is detected in front of the car door,” explains Patrick Ferber, Sales Director at Megatec Kunststofftechnik GmbH. His colleague, Peter Zöllig, Director of Plastics Technology is also highly satisfied with the ARBURG solution: “We’ve jointly implemented an outstanding two-component system in only a few months. We’re working with a single data set to control the entire production cell. Here, we’re also using a six-axis robot for the first time. We only gained the confidence to take this step after having gathered experience in the use of linear MULTILIFT robotic systems since 2015. Operation of the six-axis robot is equally convenient thanks to the standardised SELOGICA user interface.”



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## **Two-component ALLROUNDER produces strips from PC and ABS.**

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The component is manufactured on a two-component ALLROUNDER 630 S with a clamping force of 2,500 kN, the two size 290 injection units of which are arranged horizontally and vertically. With the aid of a 2+2-cavity mould, the pre-moulded part and the finished moulded part are produced from PC and ABS respectively in a cycle time of around 45 seconds.

The six-axis robot removes the moulded parts and sets them down in trays of 18 parts each. “Their positions in the tray are alternately rotated through 180 degrees. Moreover, the two strip versions for the left and right car doors are set down in different trays, which are provided via two

separate conveyor belts. With this task, the flexibility of the six-axis robot can be exploited to the full,” explains Andreas Armbruster from the ARBURG Project department.

In a second plant belonging to parent company Gerhardi, the visible parts are subsequently electroplated. The advantage here is that the chrome layer only adheres to the ABS material, while the PC component remains transparent and can be backlit.

“We’re planning to produce around 65,000 units of this part a month in three-shift operation,” adds Patrick Ferber. He goes on to explain that machine availability is therefore critical. Here, ARBURG also excels by virtue of its first-class service. From the company’s Radevormwald





## project



The two-component door strips (photo above) are produced on a turnkey system featuring a six-axis robot (centre photos).

The system was put into operation by Megatec Director Peter Zöllig (left) with Andreas Armbruster from the ARBURG Project department. Megatec Director Patrick Ferber (photo below) plans to achieve an output of 65,000 units per month.



location, a service technician can be on-site in Lüdenscheid at very short notice if required.

### Central ARBURG host computer system

For order planning and recording the process parameters, Megatec has net-

worked all the machines at its injection moulding production facility by means of the ARBURG host computer system (ALS) since June 2014. This ensures end-to-end traceability as is increasingly required by the automotive industry.

## INFOBOX



**Company:** Megatec Kunststofftechnik GmbH

**Plant:** Lüdenscheid, Germany

**Employees:** 43

**Turnover:** 4.5 million euros (2015)

**Machine fleet:** 23 single and two-component ALLROUNDERS with clamping forces from 500 to 3,200 kN

**Competencies:** Injection moulding, design, mould construction, surface coatings (electroplating)

**Industries:** Automotive, electrical and sanitation industries

**Contact:** [www.megatec-kunststofftechnik.de](http://www.megatec-kunststofftechnik.de)

# Equipped for the future

## ARBURG: Optimally positioned with migration to SAP

**U**nder the supervision of the directors and heads of departments, the project participants from IT department and the divisions have integrated the necessary SAP modules into the routine processes within the company to ensure smooth operations. In an interview with the “today” editorial team, the responsible Managing Director Finance & Controlling, Jürgen Boll reports on the strategic corporate objectives and the opportunities that the new platform offers to the company, customers and partners.

**today:** Mr Boll, how would you describe the task of introducing a new system environment company-wide?

**Boll:** The aim was to transition from an old, established system platform that had reached the limit of its performance capabilities to the latest available technology. We wanted to become even more effective in the core processes of production efficiency and process optimisation, as well as in the supporting and management processes.

**today:** How well were you prepared for the introduction of the new SAP software?

**Boll:** The migration and integration tests were extremely comprehensive and were facilitated through the implementation of more than 2,800 requirements, interfaces and add-ons. Employee training was conducted simultaneously. All of these activities ensured the necessary security and contributed towards confidence in the migration, including among the workforce. I would therefore particularly



Jürgen Boll (left), Managing Director Finance & Controlling, describes the successful introduction of SAP at ARBURG

like to thank the divisional managers and heads of the Information Systems department for their project management, facilitation, coordination, as well as for their patience in solving this Herculean task.

**today:** What is the value of SAP for the company?

**Boll:** In a sense, SAP represents the spine of the entire IT structure. Add-ons and supporting tools can be docked to this, which communicate with one another via interfaces. With SAP, a standardised and overarching information technology has been introduced, which renders functional the entire ARBURG infrastructure. But with the company-wide introduction of SAP, we also had our customers in mind. The software allows us to be even more effective, flexible and faster in all the corporate divisions. Of course, the com-

pletely new introduction of such a system is always a challenge. Our employees were able to operate the old system “blindfolded”, so to speak. But this will also be the case with the new platform if we all embrace it together with the necessary motivation.



# 100.000.000 Cycles

## Allit: ALLDRIVE cracks magical mark

**In March 2016, an item of news at ARBURG created a stir: Allit, a long-standing customer and one of the first users of the high-performance electric ALLDRIVE series ALLROUNDERS had reached more than 100 million cycles with one of its machines. This figure demonstrates just how reliable, precise and smooth operation of the electric ALLROUNDER ALLDRIVE machines has been from the very outset.**

The record machine is one of two identical ALLROUNDER 420 A machines with a clamping force of 800 kN and size 400 injection unit, which have been in production operation at Allit's parent plant in Bad Kreuznach since 2003.

Among other products, the "100-million cycle ALLROUNDER" manufactures elements for closures as bulk goods in the Plastics Technology business unit.

### Fast cycles with all ALLDRIVES

Not without a measure of pride, Karsten Kallinowsky, CEO and Member of the Board, says: "We achieve short cycle times with all of our ALLROUNDER ALLDRIVE machines, which over the total of 13 years during which the machines have been in production here, represents about 477 million cycles.

Because we've known ARBURG to be a reliable partner and machine supplier

over many years, we also had confidence in the company's electric machine technology from the start. Our experience of this technology has shown us that these high-performance electric machines are a perfect fit for us and our requirements. ARBURG will consequently remain our preferred strategic machine supplier in future as well."

### Highly satisfied with cooperation

With ARBURG, the company, technology, consulting and service constitute the ideal package for Allit. "The cooperation between the two companies has developed into a win-win situation that brings benefits to both parties," says Karsten Kallinowsky.

### Second record imminent

On 31 March 2016, the counter on the "marathon ALLDRIVE" indicated a total of 100,224,047 cycles and, at 99,433,882 cycles, the second ALLROUNDER ALLDRIVE was also approaching the magical mark. Breaking the second production sound barrier this year will therefore only be a matter of time.



In March 2016, Karsten Kallinowsky, CEO and Member of the Board of Allit AG, was delighted that a second ALLROUNDER A was soon to crack the 100-million cycle mark (photo above).

### INFOBOX

**Company:** Allit AG

Kunststofftechnik

**Founded:** 1960

**Plants:** Germany, France and China

**Employees:** 480

**Business segments:** OEM market, DIY organisation systems, warehouse and material flow management system elements as well as packaging

**Machine fleet:** 92 injection moulding machines, of which 59 ALLROUNDERS

**Contact:** [www.allit.de](http://www.allit.de), [www.allit-group.com](http://www.allit-group.com)



## TECH TALK

Oliver Schäfer, Technical Information



# Which screw would

## Overview of selection criteria for the plasticising unit

**A**t the core of every ALLROUNDER is the injection unit. This component determines the quality, reproducibility and achievable productivity. During configuration of the optimal plasticising system, a number of criteria need to be taken into account that determine the size, geometry of the screw and its protection against wear. For this purpose, a combination of application and production engineering expertise is required.

The requirements specification for the plasticising unit is extensive: gentle melting and homogenisation of the material for high melt quality, as well as precise injection and holding pressure for reproducible moulded part formation. Moreover, a high plasticising flow rate must be ensured across the widest possible processing spectrum and wear kept to a minimum. The combination of these tasks makes configuration of the ideal plasticising system complex. First off, the correct screw

size is crucial. Significant influencing factors here include the material, shot weight and cycle time.

### Product and operating conditions determine the configuration

There are some recommended values for achieving the perfect melt without air inclusions, inhomogeneities or burn marks. The dosage stroke, for example, should be between 1D and 3D, which corresponds to around 20 to 80 percent of the maximum dosage volume. The same working range

can also be taken as an optimal basis for the plasticising flow rate. This depends on the permissible dwell time of the material. The lower limit is around 30 seconds for standard plastics and about double that for technical plastics. As a rule, the upper limit should not exceed ten minutes. This recommended value, however, depends significantly on the processing conditions. If, for example, PBT is processed in the maximum permissible temperature range, this has a negative influence on mechanical properties after as little as three minutes. In addition to its size, the geometry

Application	Screw geometry
Thermoplastics (general)	Three-zone screw (standard)
Shear-sensitive thermoplastics, e.g. PVC	PVC screw (low-compression)
Semi-crystalline thermoplastics, e.g. POM	HC screw (high-compression)
Self-dyeing	Three-zone screw with mixing section
High-speed parts	Extended screw with mixing section or barrier screw





# you like?

of the screw must be compatible with the product and operating conditions. The range of thermoplastics can usually be covered using three-zone screws with an adapted compression ratio and zone distribution. In the case of higher plasticising flow rates and throughputs, as well as in the case of self-dyeing, this geometry concept, however, reaches its limits. Here, extended screws with L/D ratios up to 25:1 in conjunction with mixing sections as well as barrier screws are used.

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### **Coordinated wear protection ensures optimal utilisation**

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A further important topic during configuration of the plasticising system is wear protection against abrasion and corrosion, which are mainly caused by fillers or additives. The use of powder metallurgy (PM) materials, bi-metal cylinders, hard metals and coatings which are sometimes used in combination, subject to the wear protection required. Where which measures must be taken in this regard depends

primarily on the plastic being processed. During the processing of materials with a high filler content, such as PA66 GF40, for example, hardened screws made from PM steel are employed. If, in contrast, transparent plastics such as PC are being processed, it is important to prevent deposits from forming on the screw by means of a chrome nitride coating.

The plasticising unit must resolve the conflicts of interest between product quality and productivity with regard to a wide variety of materials – and it must do so with respect to long-term operation. This makes detailed configuration and matching of the components necessary. For this purpose, ARBURG offers an extensive selection of sizes, geometries and wear categories as well as providing in-depth consulting. In this context, the use of genuine spare parts is a prerequisite for maintaining the performance of an injection moulding machine and for efficient production.

ARBURG develops and manufactures its screws in-house. Depending on the material and application, a wide range of different versions is available (photo above and table on left).

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