

today

The ARBURG magazine

Issue 64

2017





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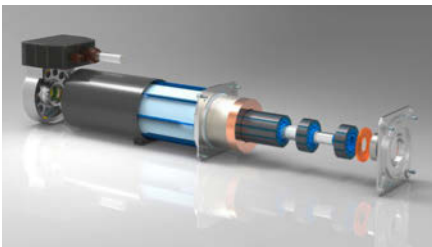
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IMPRESSUM

today, the ARBURG magazine, issue 64/2017

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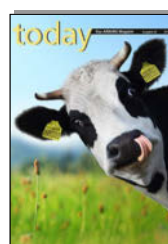
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The ear tags, which are manufactured as a hard/soft combination on two-component ALLROUNDERS, have to last a lifetime and must meet the appropriately high standards.

ARBURG



Dear readers,

After celebrating its big premiere at the K 2016 in October, it went on to delight more than 6,700 visitors from 53 nations at

our Technology Days in March 2017: our new “flagship”, the ALLROUNDER 1120 H with a clamping force of 6,500 kN.

In recent months, however, it hasn't just been basking in the limelight. Behind the scenes, it's also been the object of a great deal of hard work aimed at bringing it to production maturity. In this issue of “today”, we provide insights into the so-called “stress test”, which, incidentally, our “big” machine passed with flying colours.

Once the first pilot series machines have been sold to customers, the next step will be the sales launch of the ALLROUNDER 1120 H at the Fakuma 2017. And we are confident that like many ARBURG machines in the past, it will be a resounding success.

One of these machines, decades ago, was the legendary C4b. Among its greatest fans is 84-year-old Hans Lausecker, who has been restoring these machines to the present day. Find out more about him and his eventful life in the plastics industry in this issue.

Furthermore, we report on innovations in ARBURG Plastic Freeforming as well as on interesting products, innovative applications and exceptional production solutions. These include ALLROUNDERS which are completely integrated in fully automated production lines as well as developments in the fields of lightweight construction and electric mobility.

Find inspiration in our articles and make your company fit for the future.

We hope you enjoy reading our “today”.

Michael Hehl
Managing Partner



Bullseye!

Efficiency Arena and Industry 4.0: Networked production, practical

This year's motto for the Efficiency Arena at the Technology Days was "Industry 4.0 in practice – knowing what counts!". Here, ARBURG and selected partners once again provided new insights as to how customers can implement Industry 4.0 and make their in-house production more efficient. Another popular topic was Industry 4.0 in the area of service.

"Only those who are able to fully control the entire process chain in terms of production and IT technology, including the manufacture of single-unit batches, can provide the comprehensive Industry 4.0 expertise that our customers need," says Heinz Gaub, Managing Director Technology & Engineering, explaining ARBURG's approach.

"Smart" luggage tags

This was demonstrated in practice at the Efficiency Arena based on the example of the spatially distributed and IT networked production of "smart" luggage tags as single-unit batches. In this case, the customer-specific individualisation of these high-volume parts ("mass customisation") is achieved by combining injection

moulding with additive manufacturing. Using the ARBURG host computer system (ALS), each individual part can be traced (see today 62, page 10).

Practical Industry 4.0 stations

In the Efficiency Arena, ARBURG also demonstrated jointly with partners how digital networking creates transparency and consistency as well as ensuring optimum capacity utilisation, particularly in the case of small batch volumes and frequent product changes. The pragmatic Industry 4.0 solutions included:

- Reliable material verification for traceability from finished part to granulate
- Online monitoring for quality assurance purposes
- Systematic energy data acquisition and evaluation for certification according to ISO 50001
- Extensive integration of peripheral equipment in the machine control system for greater operating convenience

Further examples included ALS modules for order-based allocation and visualisation of energy data ("energy visualisation") and batch changes ("material staging interface").

Remote maintenance service tool

The new remote maintenance tool, which was presented on a hybrid ALLROUNDER 370 H in the service area, facilitates fast and reliable online support.

In order to use this "smart service", the machine is equipped with a service router and an integrated firewall. Once the operator has actively enabled the relevant machine, the ARBURG experts can access the customer machine remotely from the Lossburg headquarters via an encrypted data connection in order to find a solution. This reduces unnecessary waiting times, machine downtimes and therefore costs.



Photo: BASF



4.0 industrie
powered by Arburg

stations and online service



Numerous guests at the ARBURG Technology Days 2017 took the opportunity to find out all about Industry 4.0 at the Efficiency Arena (photo above). “Smart” luggage tags as an example: the data stored in the integrated NFC chip can be called up at any time (photo on right page). A “tangible” example of Industry 4.0 in the turnkey area were individualised hand exercisers produced according to the person’s hand strength (photo on right page).

Remote access is terminated as soon as the on-site operator ends the connection.

Individualised hand exerciser 4.0

A further “tangible” example of Industry 4.0 was the production of individualised hand exercisers: for this purpose, visitors first measured their hand-grip strength and were allocated to one of three available tension-force levels. Three different spring-element inserts made from POM with glass-fibre contents

of 5, 12.5 and 20 percent were provided to cover all the force levels. The visitors were issued a QR code which they could use to place their “personal” injection moulding order. A MULTILIFT V robotic system removed two spring elements for the appropriate force level from a drawer system and inserted them into the mould. An electric ALLROUNDER 370 A then moulded a TPU handle onto them. The hand exerciser was then assembled manually.



Health – worldwide!

B. Braun: Historical evolution of international development

A traditional, family-run company with locations around the world and a high degree of in-house production, which developed within the medical technology sector from modest beginnings – these attributes characterise the globally renowned company B. Braun, which is headquartered in Melsungen, Hesse, Germany. ARBURG has contributed towards this outstanding reputation with its ALLROUNDER machines.

B. Braun's portfolio today encompasses some 5,000 products, of which 95 percent are produced in-house. This is a challenging task because production is no longer concentrated merely at the headquarters, but is distributed worldwide. The range is complemented by comprehensive service and consulting offerings.

Decentralised structure

"Each market has its individual characteristics," points out Dr. Andreas Herold, Head of the Braun Technology Center of the Hospital Care division at B. Braun in Melsungen. He goes on to say that market-specific approvals, which have to meet

different requirements in each country, are a matter of course today.

"We produce in a decentralised manner," continues Dr. Andreas Herold, "because this approach allows us to work much more economically." This of course relates primarily to the direct manufacturing costs. However, for certain product groups, the priority is also to save on logistics costs.

The establishment of B. Braun Research and Development facilities also follows the principle of decentralisation. Dr. Andreas Herold explains: "Our product departments, which we refer to as Centers of Excellence or CoEs, are located in Germany, France, Switzerland, the US and Malaysia, in other words, where we produce and where our products are developed."

The product departments work with profit responsibility for the markets worldwide, while the the Global Marketing & Sales department bears the overarching responsibility for marketing. This means that the product departments work and coordinate at the global level, but the products are created regionally. Speciality products for sale worldwide, for example, are developed and produced in Malaysia.

Malaysia one of the largest locations

Today, Malaysia has become one of the company's largest locations with more than 7,000 employees. This subsidiary has a total of three sales and production facilities, as well as a Center of Excellence in which research and development for the Asian region is concentrated. Mass products such as intravenous infusion sets have long been produced in Malaysia.

Unconventional ARBURG contributions

"B. Braun especially values the unconventional ideas that ARBURG regularly provides in order to solve our production problems," says Dr. Andreas Herold. "Our technological cooperation has grown continuously since the 1960s and is doing so particularly intensively at the moment. The cost effectiveness of the systems is one of the most important considerations that the product departments always take into account."

Tight overmoulding of infusion containers

Special machines from ARBURG are used, for example, to overmould flexible infusion containers with tight seals, which are produced in millions of units worldwide, 20 million in Melsungen alone. Dr. Herold describes the process: "To automate the assembly injection moulding for these components, we, jointly with ARBURG, developed an injection moulding machine with a special clamping unit that makes it possible to overmould up to 24 bottles with a maximum volume of 1000 millilitres per cycle."

Before tight overmoulding (photo on right): the drip chambers of the infusion sets are overmoulded fully automatically with the characteristic green ring (photo on left).







Photos: B. Braun



The finished drip chambers are connected to the infusion tubes and packaged in a downstream operation (photo above). For special solutions such as the manufacture of tubes for intravenous drip therapy, the ARBURG injection moulding technology is integrated in a production cell at B. Braun.

because the responsible personnel at the various CoEs of course always discuss procurement matters. And companies who work reliably are always given the opportunity to extend their cooperation within B. Braun's global network".

Here, the bottle caps with the two spike ports are fitted onto the already filled and sealed bottles on the conveyor. The area of the bottle neck onto which the cap is fitted features a collar which is tightly overmoulded with a PE ring. Depending on the capacity requirements, the injection process takes place in on one or more 6 or 8-cavity moulds, which require particularly wide clamping unit mounting platens due to the bottle dimensions.

Overmoulding of cage geometries

In 2016, an ARBURG injection moulding machine featuring vertical clamping and injection units was integrated in a rotary table provided by B. Braun in order to overmould a filter tube with a complex cage geometry to create a filter insert in an automated process. The assembly system for this is located in Hanoi, Vietnam. With this application, the fabric is welded to form a tube, which is then cut to length, pulled onto cores and the seams are tested. Four filter sleeves are

then overmoulded in the mould in a single step to create the filter insert. Optical inspection of the parts takes place at the last station of the rotary table system before the filter inserts are passed on for assembly of the infusion sets.

Moulding connectors onto tubes

In order to mould connectors onto coiled, flexible 200 or 300-cm PVC tubes, the rotary table and injection moulding machine operations are coordinated. The two tube ends are inserted into the mould, where the connectors are moulded on. The tubes are for connection to Perfusors (syringe pumps) for continuous infusion therapy applications.

These examples demonstrate that the cooperation between B. Braun and ARBURG certainly also extends to unconventional areas. Regarding the global cooperation, Dr. Andreas Herold says: "Word of the technical quality, innovative strength and inventiveness of our partners such as ARBURG always gets around

INFOBOX



- Name:** B. Braun Melsungen AG
- Founded:** 1839 as a chemist's in Melsungen
- Locations:** Fully-owned subsidiaries in 64 countries
- Turnover:** Around 6.5 billion euros (2016)
- Employees:** More than 58,000 worldwide (2016)
- Products:** Products, system solutions and services for the medical and pharmaceutical sectors, in-house mould and special machine manufacture
- Machine fleet:** Around 350 ALLROUNDERS for the worldwide production facilities since the early 1960s
- Contact:** www.bbraun.de



Stress test? Passed!

ALLROUNDER 1120 H: Large machine approaches production readiness

With the global premiere of the hybrid ALLROUNDERS 1120 H at the K 2016, ARBURG has entered into a new dimension. The large machine with a clamping force of 6,500 kN in a new design and featuring the visionary GESTICA control system also represents a great leap forward in technology. With the "stress test", followed by operation by pilot-series customers, it is being comprehensively tested and brought to production readiness.

Many features of the ALLROUNDER 1120 H could not be scaled up from smaller models, but required comprehensive re-engineering. In order, e.g., for the large machine to be transported dismantled into two parts, the developers had to redesign and reposition entire components, design electric and hydraulic connections as well as extensively adapt the cooling circuit.

Hot phase up to production readiness

To achieve production readiness, the newly developed machine now has to be subjected to in-depth testing. For this purpose, the development departments are working in close collaboration. "During improvement of the prototypes, we follow a firmly defined testing plan, which also



involves applications under high loads," explains Jan Lachhein, Team Manager Application Trials, who was also involved in the heat/stress test: "For this series of tests, we covered the ALLROUNDER 1120 H in a heat tent made from of 500 square-metres of plastic sheeting. The ambient air and water supply were heated up to the permissible temperatures and beyond using heaters and temperature-control devices in order to simulate unfavourable climatic conditions. Around 50 external temperature sensors, more than 400 metres of cabling and a thermal imaging camera, as well as extensive additional measuring equipment, were used to record and monitor the performance data." Martin Krötz, Team Manager Mechanical Trials adds: "We had the prototypes produce packaging items under these extreme conditions for several days and tested the mould axes to the limit using a ten-tonne dummy.



The ALLROUNDER 1120 H (top photo) was covered in plastic sheeting in order to test it in a heat tent at temperatures in the limit range (photos above).

Experts unanimously satisfied

The team is highly satisfied with the results so far. The stress test was passed with flying colours. Soon, the first pilot series customers will receive an ALLROUNDER 1120 H and provide further valuable feedback over the course of the year.

Tags for life

ZTOWN Development: 20 million livestock ear tags produced

The unique identification of livestock is achieved in accordance with international standards using plastic ear tags with integrated chips or laser-inscribed barcodes. The Kazakh company ZTOWN Development, which is based in Astana, produces high-quality ear tags as two-component moulded parts for the entire market of this the ninth largest country on earth – with the aid of ALLROUNDERS.

In the vast semi-deserts and deserts of Kazakhstan, livestock farming is of great importance. All farm animals have to be individually identified. Owner and Managing Director of ZTOWN, Adilzhan Rayimkilov, explains why: “All the breeding animals are subject to mandatory identification for supervision purposes and the monitoring of regular medical treatments. This assists with the prevention and diagnosis of disease. Unique identification by means of ear tags is a prerequisite for receiving an animal health certificate,

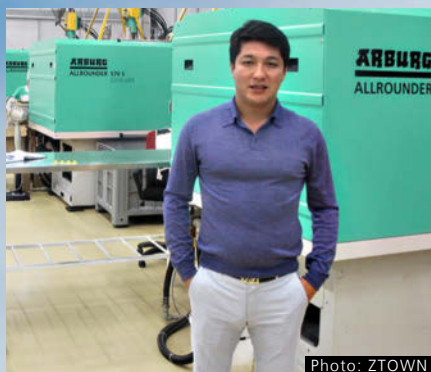


Photo: ZTOWN

which documents and assures the quality of the meat. The plastic tags are so strong and durable that they last for the animal’s entire lifetime.”

Expansion planned

With its annual production of around 20 million ear tags, ZTOWN currently only serves the Kazakh market. However, expansion is already planned: in the medium term, the company intends to expand into Kyrgyzstan, Russia, Belarus, Ukraine as well as into Europe.

ICAR-certified ear tags

The ear tags are produced using the two-component injection moulding process and are certified by ICAR, the International Committee for Animal Recording. This represents the highest level of registration and quality that can be achieved at the international level. As an ICAR registered and certified company, ZTOWN meets the same high technical standard as European manufacturers. The requirements here include the use of high-quality raw materials (PP, PU, PA) and 100-percent visual inspection, for example.

The functionality and requirements of the ear tags are stipulated by ICAR. These have different dimensions depending on the type of livestock and they comprise two parts: the larger, label part features an overmoulded socket, its smaller counterpart an overmoulded bushing. The two parts are clipped onto the animal’s ear and must be inseparable – even under major strains outdoors. The properties of the tags in the temperature range from



annually

-40 to +60 degrees Centigrade, as well as their tensile strength are further important testing criteria.

Two-component ALLROUNDERS

A total of four moulds are used on four hydraulic two-component ALLROUNDER 570 S machines with a clamping force of 2,200 kN and size 290 and 170 injection units. Two machines produce the tags for large animals such as cows, while two produce tags for smaller ones such as sheep and goats.

In a first step, the black bushings and tips are inserted into the 8+8-cavity mould and injection moulded from the hard component. Next, a hydraulic rotary unit turns the mould half by 180 degrees. The resilient yellow front or back of the ear tags is then moulded from the soft component. The laserable finished parts of the tag are then removed by a horizontal MULTILIFT H robotic system and set down onto a conveyor belt. The ALLROUNDERS



achieve the fast cycle time of 22 seconds thanks to accumulator technology. Downstream, each of the front parts of the ear tags is provided with an individual barcode, which is unique for each animal, at a laser station.

These plastic items are produced around the clock on a total of 330 days a year.

Recent, successful cooperation

Contacts with ARBURG have existed since 2014, when ZTOWN added its own production facility to its purely sales activities. Adilzhan Rayimkilov comments: "The cooperation is excellent and we've received comprehensive support from the outset. In addition to the technology, we also value the reliability of the ARBURG employees. This helps us maintain our high quality standards. Having established a completely new production site

ZTOWN owner and Managing Director Adilzhan Rayimkilov (photo on left) is proud of the high-tech production of ear tags (photo above), for which he has relied on ARBURG injection moulding technology from the outset.

in Astana in 2016, we're now planning to expand further in the field of medical technology by 2018, with an additional production hall."

INFOBOX

Name: ZTOWN Development Company

Founded: Start of production in 2014, owner and Managing Partner is Adilzhan Rayimkilov

Locations: Astana (headquarters) and Almaty, Kazakhstan

Divisions: Production and sale of livestock ear tags and test tubes for blood samples in veterinary medicine

Employees: 80

Machine fleet: Eight machines with clamping forces from 1,000 to 3,000 kN, including four ALLROUNDERS

Contact: www.ztown.kz



Rapid production of prototy

ARBURG Prototyping Center: freeformer capacity expanded

Since the spring, the new ARBURG Prototyping Center has been operating at the German headquarters in Lossburg. Six freeformers are available here for the production of sample parts in response to customer requests virtually around the clock. Each machine processes a different plastic granulate. The advances made in ARBURG Plastic Freeforming (APF) and in material qualification were impressively demonstrated by ARBURG at the Technology Days 2017.

“Interest in the freeformer is increasing steadily. Individually produced plastic parts for consumer goods, medical implants and functional spare

parts are only three of the many areas of application that are predestined for our open additive manufacturing system,” says Eberhard Lutz, ARBURG divisional manager Sales freeformer. “Our new Prototyping Center is equipped with six freeformers featuring different qualified materials in order to rapidly produce sample parts. This means that our technology consultants can now respond even more promptly to customer inquiries because we verify precisely in advance for customers whether the freeformer is in fact suitable for producing the required part in the appropriate material. Ultimately, the

findings of the APF experts and the data sets optimised at the Prototyping Center benefit all of our existing and prospective customers.”

Additive parts from original material

The focus of applications with the freeformer is the industrial additive manufacturing of functional parts. A great advantage of the APF process is the ability to use qualified original materials. At the Technology Days in March 2017, parts from a PC approved for aerospace applications, electronics parts from flame-proof PC/ABS, as well as implants from medical PLA were produced. A freeformer



Impressive product examples include the electronics connector from flame-proof PC/ABS, the gripper from PA and TPE as well as the smartphone shell with an optimised surface finish (from left to right).



pes

Lutz. This support material is easy to process and thermally stable according to Lutz. It has very good droplet formation and adhesion properties, as well as excellent edge definition with respect to the build material. One additively manufactured functional part produced with it is a smartphone shell, which is characterised by an optimised surface finish.

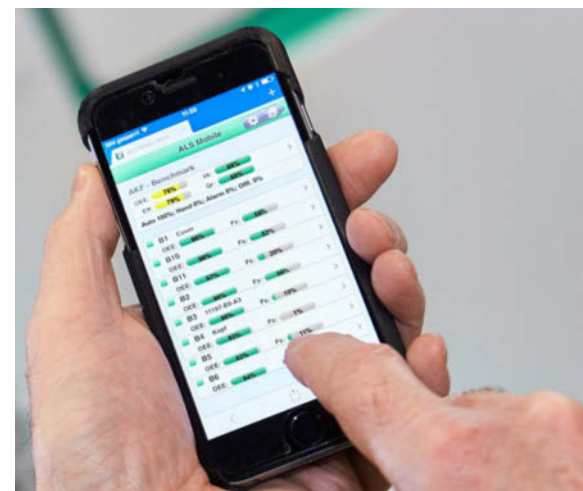
Sample parts are produced rapidly in a variety of qualified materials on six freeformers at the new ARBURG Prototyping Center in response to customer inquiries.

Production planning via ALS

“We have networked our freeformers with the ALS host computer system at the Prototyping Center and at other locations in Europe,” adds Eberhard Lutz. “This means that the additive manufacturing of sample parts can be planned,

produced grippers as a two-component part made from a rigid PA and a soft TPE as an example.

In May 2017, small boxes with pliable hinges were produced from PP and a specially developed support material for the first time at the RAPID + TCT trade fair in Pittsburgh, Pennsylvania, USA. A PP application will also be on show at the Fakuma in October 2017. This popular material will in future extend the range of available materials for the freeformer.



New armat 21 support material

The freeformer is equipped with two discharge units as standard. Support structures as a second component are used where complex geometries need to be achieved. ARBURG is continuing to extend the range of support materials for the freeformer. “In addition to the water-soluble armat 11, the new armat 21 material, which is soluble in a sodium hydroxide solution, will additionally be available from May 2017,” says Eberhard

optimised and utilised with virtually the same efficiency that our injection moulding customers involved in large volume manufacturing are accustomed to.” Using their smartphones, the ARBURG freeformer Sales staff can see the current status at any time and know when which freeformer is scheduled to have produced what sample part.

Eberhard Lutz, ARBURG divisional manager Sales freeformer, and his team have an overview of ongoing production at all times via smartphone thanks to ALS.



(Bio)logical!

Heinrich Kipp Werk: Operating elements “Made in Germany” from

Heinrich Kipp Werk in Sulz am Neckar, Germany, which is famed for its “Kipp clamping lever” is not only close to ARBURG in geographical terms. The family-owned and run company also places great emphasis on quality products “Made in Germany”. It produces its plastic operating elements, standard elements, clamping devices and special solutions in Germany using high-quality ALLROUNDER machine technology. A new mainstay and an example of sustainability are the “Nature grip” operating elements made from wood polymer.

Kipp stands for reliable and high-quality operating elements. “With ‘Nature grip’, we have added a new product line into our range, which we produce free of fossil resources,” says Andreas Roth, Director of Marketing at Kipp. “For us, this is also a logical step with regard to our activities in the area of sustainability.”

Sustainable: wood instead of oil

The “Nature grip” is based on renewable, native beechwood, the fibres of which, mixed with resin, are compounded into a biopolymer. A PEFC certificate confirms that the processed wood fibres are procured from sustainably managed sources.

“As a pioneer in our industry, we always like to try out new options,” emphasises Michael Röhrle, Authorised Signatory and Technical Director at Kipp. “When the oil prices kept rising in 2013, we had the idea of using the wood polymer. When the issue of how best to process this material into hand knobs and other operating elements arose, the experts from ARBURG

A hydraulic ALLROUNDER 370 S produces the “Nature grip” product at Kipp (photos above). Michael Röhrle (left), Authorised Signatory and Technical Director at Kipp, is committed to high quality. Gerhard Schmid is his contact for material drying.





m wood polymer

provided us with optimal support. We spent many hours at the Customer Center in Lossburg, where we ran numerous tests until we were all satisfied with the results."

Since the autumn of 2016, a hydraulic ALLROUNDER 370 S has been operating in serial production. Similarly to ARBURG, the Sulz-based company has a high level of vertical integration and places great value on product quality and its own core competencies. The 4-cavity mould, for example, was made at its in-house mould construction shop. The metal inserts for the hand knobs are produced at the company's turning shop.

For the peripheral equipment, Kipp relies on Motan-Colortronic, because the company also meets the highest quality standards. This is because perfect material feed and drying are essential for the processing of biopolymers. If these conditions are met, the wood material can be processed as successfully as e.g. conventional PA6.

Efficiency, even for small quantities

"At our plants, we operate three shifts with 14 ALLROUNDERS. Owing to our enormously broad product range, production is geared towards small and medium batch sizes from around 50 units upwards," says Michael Röhrle. In order to produce flexibly and to ensure fast changeovers, the metal threaded pins,

which are overmoulded to produce the finished hand knobs, are inserted manually. "We were amazed ourselves that we are able to offer 'Nature grip' at a price that's only a few cents higher than a comparable operating element made from a standard plastic," says a delighted Michael Röhrle. The feedback is equally positive among customers, who are increasingly turning to the wooden alternative for design reasons when installing hand knobs on furniture, sports equipment and gardening tools, or for machine manufacturing, for example.

INFOBOX

Name: Heinrich Kipp Werk KG

Founded: 1919 by Christian Kipp

Location: Sulz am Neckar, Germany

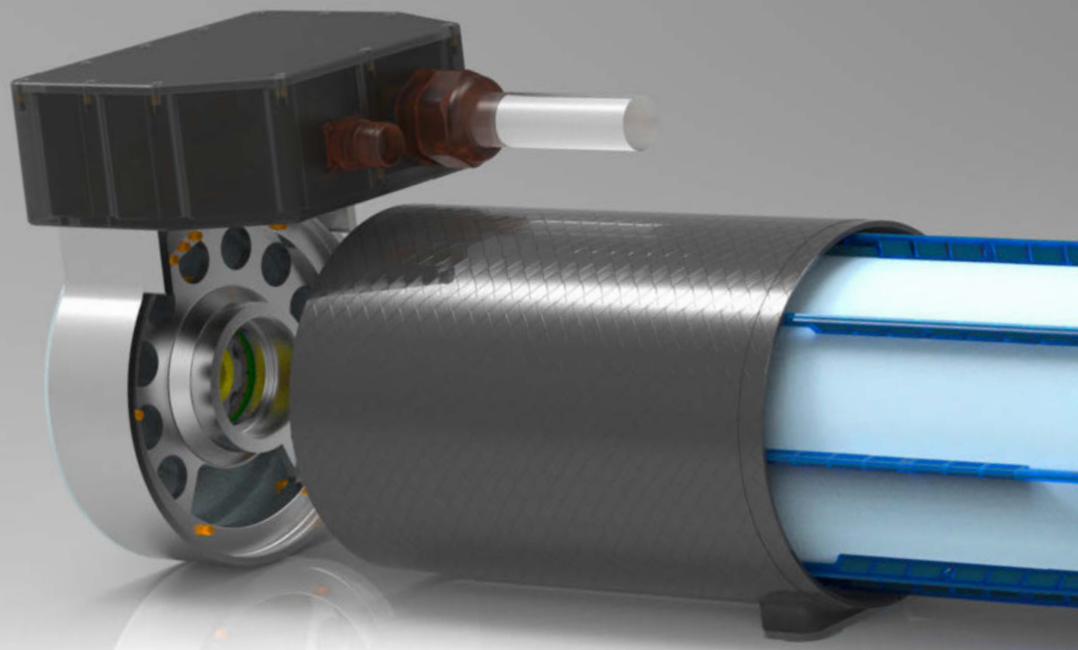
Employees: 350 in Germany, 750 worldwide

Industries: Automotive, machine manufacturing, furniture industry, sports equipment and gardening tools

Products: Comprehensive range of 25,000 different operating elements, standard elements and clamping devices, as well as customised solutions

Machine fleet: 14 ALLROUNDERS

Contact: www.kipp.com



Electric motor prod

Project ProLemo: Innovative production strategies for mass prod

Electric single-axis drivetrains for the electric mobility mass markets or machine manufacturing require innovative high-volume production and lightweight construction technologies in order to use the motors cost-effectively. The ProLemo project is concerned with production technologies for efficient lightweight motors for electric vehicles.

The project is being organised by the German Aerospace Center (DLR) with funding from the German Federal Ministry for Economic Affairs and Energy. The project partners, who are cooperating across the entire value chain, are the companies Wittenstein Cyber Motor, Index-Werke Hahn & Tessky and Aumann, as well as the Karlsruhe Institute of Technology (KIT) as the research body, together with the wbk Institute of Production Science and the FAST Institute of Vehicle System Technology. As the supplier of the necessary multi-component injection moulding technology in the form of an automated electric ALLROUNDER 520 A, as well as complex material and mould

technology, ARBURG participated in the manufacture of the necessary lightweight parts.

The product-relevant project objectives included the mass production of parts made from iron-filled polymers, the use of lightweight materials in the rotor and rotor shaft, as well as production of the motor housings from fibre-reinforced materials. The aim of these measures is to reduce the mass moment of inertia and the overall mass of the motors. The rotors are made lighter to enable higher rotational speeds as well as equal dynamics with lower power consumption.

High flexibility, low unit costs

The project focused on the construction of an electric motor capable of generating the typical power requirement for an electric vehicle of around 90 kW (approx. 123 hp) at a maximum torque of 260 Nm. An important production objective was to keep the manufacturing costs low while maintaining high flexibility in terms of unit volumes.

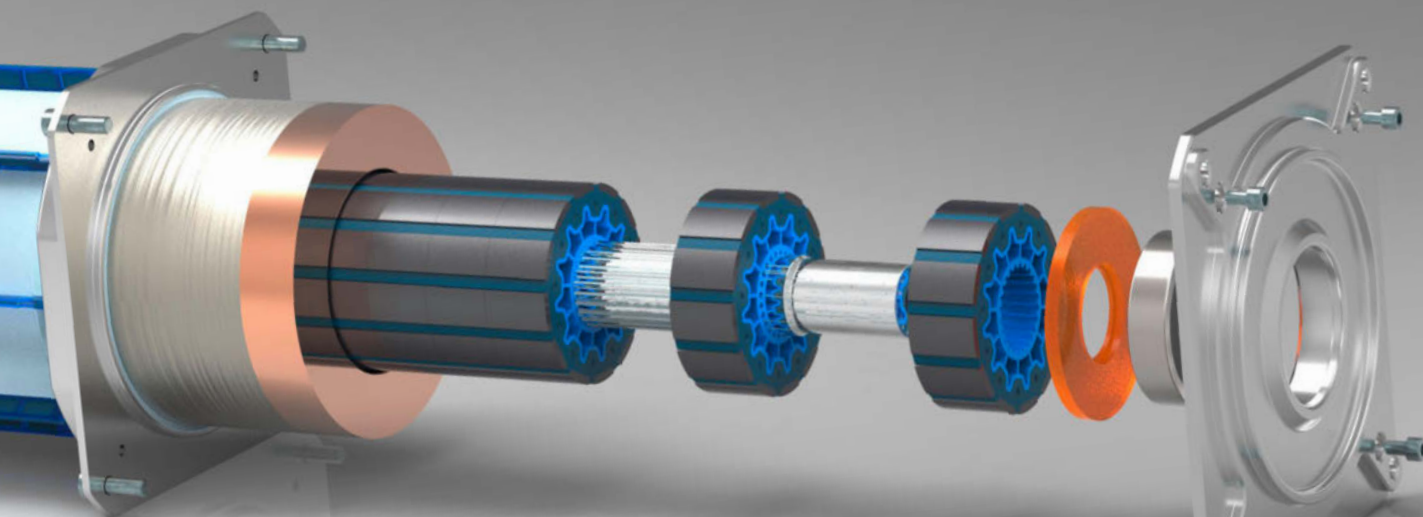
As a basic material for the production of rotor segments, a so-called Soft Magnetic

Composite (SMC) was selected, which consists of the matrix material PA6 and is highly filled with a Permalloy Fe8Ni92 alloy. The advantages here were that eddy current losses were reduced to a minimum and the heat generated was lower than in conventional laminated rotors. In addition to the selection criteria of flow path length, magnetic and electrical properties, the unit costs and the automation capacity in production were important factors.

The modular, engaging discs for power transmission with magnet holders made

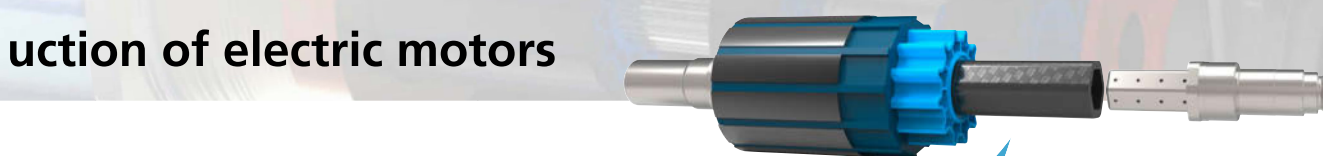


from SMC, in which the magnets are inserted, enable the use of simple, pared-down and more compact machine technology. The flow paths were made shorter – a high-priority consideration because this meant that the quality could be kept at the highest level during high-volume production.



Production made easy

Production of electric motors



Moreover, thanks to the disc structure of the rotors, power graduation of the motors becomes easier to implement. Due to the torque connection of the discs via fibre-reinforced plastic, reductions in mass were achieved. Power is transmitted to the shaft via the thin centre webs.

One system for two versions

By changing mould inserts, the production of two rotor versions is possible using a single mould. The exterior part of the rotor, which is made from SMC is the same for both versions. Only the in-

terior contour, which is embedded in the SMC and meshes positively with the shaft, is designed as a splined version or as a low-stress hexagon version.

More than nine kilos lighter

The rotor discs are produced on an electric two-component ALLROUNDER 520 A with a clamping force of 1,500 kN. A MULTILIFT V robotic system ensures precise removal. The cycle time is four minutes. This means 360 rotor discs per day for a production of 16,425 motors per year.

The overall weight of the ProLemo drive with a hollow steel shaft was reduced by more than nine kilos, which corresponds

Thanks to lightweight components, the overall weight of the ProLemo drive was reduced by more than nine kilos (top photo). The drive includes rotor discs with different internal contours, which can both be produced on an ALLROUNDER (centre photo).

Photos: wbk - Manuel Peter

to an improvement in mass moment of inertia of 14.1 percent. As a machine manufacturer, ARBURG may well also have a use for these drives. Durability tests for assessing the quality of this drive technology under high-volume production conditions are already planned.



Small eminence

Hans Lausecker: Eventful life in the plastics industry

There it is, in his workshop in the Württemberg town of Frickenhausen near Nürtingen, Germany: a C4b from ARBURG, lovingly restored by Hans Lausecker. Only rarely has the tradition of the Swabian tinkerer been so perfectly embodied by anyone. Hans Lausecker dedicated almost his entire working life to plastics.

Today, Hans Lausecker is 84 years old and has always been extremely enterprising. He has always been a free spirit, which is also where his nickname, the "small eminence" originates, as he explains. From the beginning of his work as a trained tool-maker at the Stribel plant in Frickenhausen and his evening job at Tamme, his activities have extended to training engagements in China through SES, the Senior Experts Service of the German Foundation for German Business, when he was in fact already in retirement.

Working in the industry since the 1950s

"I got my first sniff of plastics at Tamme," remembers Hans Lausecker. That was in the late 1950s. "And even back then, they already had an ARBURG injection moulding machine. However, it wasn't really suitable for the parts that Tamme was producing at the time." Not a great start to a collaboration that nonetheless did take a happier turn when Hans

Life-long connection: the C4b from ARBURG and Hans Lausecker, whose product highlights include an indicator light for trams that is used to this day.

Lausecker joined Stribel at the start of 1961. At the time, Stribel was an automotive supplier with 200 employees, which later reached peak staffing levels of 2,000 employees and was heavily involved in the production of plastic parts for car manufacturing. Here, Lausecker was tasked with building up a mould construction shop and injection moulding facility.

Indicator light in use to this day

He had ideas that he succeeded in implementing. This resulted, for example, in the production of an indicator light for public transport, which has been in use on trams in Dresden and Stuttgart from the 1970s until today. "The ARBURG machines were perfectly suited to the production of small precision parts," says Lausecker regarding his first machine order from Lossburg. "The C4b always worked precisely and reliably. Later, I was even able to convert the machine so that I could operate unmanned shifts, for example to produce our switch relays. A stroke of luck at the time was also that I met Leonhard Merkt, the first ARBURG application engineer, who provided me with a huge amount of support. Up to a clamping force of 150 tonnes, ARBURG is the only manufacturer I've used since those days. This has resulted in the purchase of a total of around 30 injection moulding machines during my 34 years at Stribel, which I procured for the Frickenhausen plant, but also, for example, for the company's facility in Ireland."

High level contacts to China

His affinity for China dates back to Lausecker's training activities at Stribel. "In 1994, I spent two weeks in Shanghai.

At the time, we were commissioning injection moulding machines with moulds that we'd supplied and were training the local personnel to work with the technology."

Today, he still maintains a particularly close relationship with his first Chinese "delegate", Zhao Bin, whom he welcomed and instructed in Germany: "His career has taken him to the position of CEO of SAAE, the Shanghai Aerospace Automobile Electromechanical Co., Ltd., a Chinese aerospace enterprise and secretary of the board of the Chinese aircraft manufacturer Comac, the Commercial Aircraft Corporation of China Ltd., Shanghai." Lausecker has travelled to China on numerous occasions as a consultant in the service of the SES. And how did he communicate there? Quite simple: "If someone wants to know something you always find a way."

C4b for Pöppelmann

Hans Lausecker still feels a very special connection to the ARBURG C4b machine. "I managed to procure one of these machines from Stumpp & Schüle in Beuren. That's the one standing in my workshop. I've restored it so that it's ready for operation at all times. The first C4b that I produced moulded parts on went to the company Pöppelmann in Lohne. Now restored, it's on show for presentation purposes in the company's production halls."



A clipped performance!

Roth Plastic Technology: Turnkey system ac



Photos: Roth Plastik

If you want to install underfloor heating, you can get everything you need from Roth: insulation, heating pipes, tacker system and clips for installation, as well as heating controllers. The manufacture of plastic clips for the smart fastening of the heating pipes is the business of Roth Plastic Technology – with ARBURG turnkey systems enabling production-efficient high-volume production.

The first system has been producing since 2011 and the second, fully-automated turnkey system for producing the clips, optimised for even faster cycles, followed in the spring of 2017, as Herbert Blodig, Authorised Signatory and Plant Manager at Roth explains with pride: "Our expertise and the experiences gathered with the first system were taken into account during the technical implementation of the

second project. Now, we can produce the clips in high double-digit million figures with low maintenance costs."

The product: pipe holders

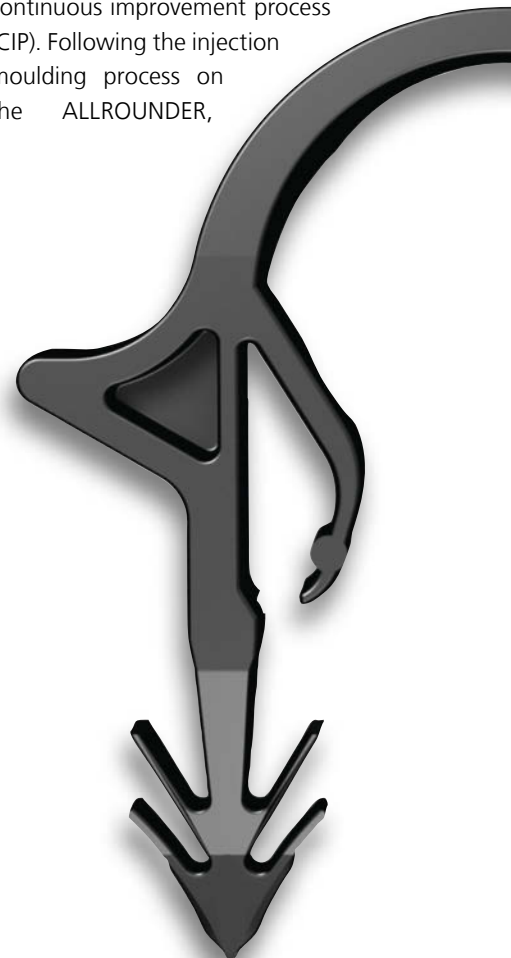
The clips, or "pipe holders" as they are known in the trade, are used to lay heating pipes for radiant heating and cooling systems. The tacker, in which the pipe holders, joined together into strips, are inserted, is a development from Roth. It is positioned above the pipe and pressed down. This causes the tacker to release a clip, fastening the pipe firmly in place on the underlaid insulation by means of double barbs.

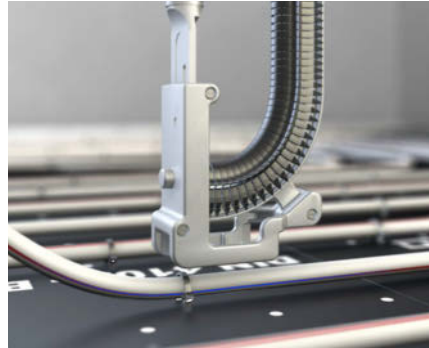
Sophisticated production process

The centrepiece of each of the two systems is an electric ALLROUNDER 570 A with a clamping force of 1,600 kN and a size 800 injection unit. As a primary contractor, ARBURG was able to meet Roth's requirement to source all of the system technology from a single source to the letter.

In injection moulding terms, the clip is a relatively simple item. Its production becomes complex with the fully automated production process. Clips of varying sizes, materials and colours can be produced on the systems.

The ambitious cycle times specified by Roth were achieved from the outset. "In fact, we've been operating the system since 2011, but have progressively achieved significantly shorter cycle times without sacrificing on quality, reproducibility or process stability," explains Herbert Blodig with regard to the optimisation achieved by means of the in-house continuous improvement process (CIP). Following the injection moulding process on the ALLROUNDER,





achieves higher output and energy efficiency

the sprues are separated, re-granulated and reused. The moulded parts are fed to a further facility in bulk where they are grouped into strips of 40 units and joined at a welding station – waste-free and in an environmentally friendly manner. Roth follows the principle of working as efficiently and environmentally responsibly as possible through consistent innovation management and individual customised solutions.

A further specification was downstream processing of the clips on two parallel production lines. This divi-

sion enables flexible assembly to ensure the required capacity utilisation. The 40-unit strips are stacked in sets of five strips and packaged automatically via an integrated carton handling system.

Outstanding cooperation

Herbert Blodig is highly satisfied with the cooperation: "High machine availability was just as decisive a criteria as reliable, highly-automated and cost-effective part production. The project management was based on synergies based on a single, central competent contact partner. The experience gained with the first system resulted in optimisations and ultimately in further cycle time reductions. Thanks to the detailed documentation, spare parts, replicated parts and new designs could be retrofitted onto the first system."

The fully automated system (2nd photo from left) produces the clips (photo below).

The tackers are loaded with 40-unit strips (photos, right to left) in order to fasten the pipes firmly onto the underlaid insulation (photo on left).

INFOBOX

Company: Roth Plastic Technology, a Roth Industries company

Founded: 1974

Location: Dautphetal-Wolfgruben

Turnover: Roth Industries, approx. 260 million euros (2016)

Employees: Roth Industries, approx. 1,250 worldwide

Industries: Automotive, aerospace, renewable energies, hydraulics, medical, transport and traffic, white goods, sanitary, heating and air-conditioning

Products: Full-service supplier for customer-specific plastics systems, container solutions

Machine fleet: 34 machines with clamping forces from 250 to 7,500 kN, of which eight ALLROUNDERS and two fully-automated ARBURG turnkey systems

Contact: www.roth-plastic-technology.de



High-level of

Plastikos: High-end injection moulding for

High-precision and clean - these are the demands placed on production in the electronics and medical technology sectors. US company Plastikos, Inc. based in Erie, Pennsylvania, has developed into a specialist in both areas. Production takes place on electric ALLDRIVE machines and in several clean rooms.

High-precision electronic connectors, some of them optical, for use on printed circuit boards are one focus area for production at Plastikos. The company has an annual growth rate of around five percent. The part tolerances during the production of these components are as small as 0.0025 millimetres. Clean production conditions are therefore clearly vital in order to meet the high quality requirements. The company's portfolio also includes thin-walled and highly complex technical parts.

The cycle times for the high-volume items can be as little as three seconds, with shot volumes as small as 0.5 cubic centimetres. A wide range of materials such as ABS, LCP, PA, PBT, PEI, PC, PVC, TPE and TPU are processed.

Medical technology increasingly important

The medical technology division, which was established and developed

around ten years ago with the support of ARBURG, is experiencing extremely fast growth: in 2016, this exceeded the previous year's figure by between 25 and 30 percent. The components for medical devices are produced in two certified class ISO 7 clean rooms.

Plastikos mainly uses electric machines from the ALLDRIVE series, many of which are automated with MULTILIFT SELECT robotic systems or high-speed, servo-electric INTEGRALPICKER V robots.

ALLDRIVE meets all requirements

"We chose the ALLROUNDER A machines for their reliability, high speed, precision and repetition accuracy," explains Robert Cooney, Manufacturing Manager at Plastikos. Further benefits include the great efficiency and integration capability of the ALLROUNDERS. As an example of this, he points to a complex medical technology application produced in unit volumes of around four million parts per year: "Here, the MULTILIFT integrated in the SELOGICA control system places the ABS pre-moulded parts in the 6-cavity mould and removes the finished parts during the ongoing TPU overmoulding process. This saves us valuable cycle time."

The moulds have up to 32 cavities and are equipped with cavity pressure meas-

integration

electronics and medical technology

uring systems, as well as thermographic and visual camera systems for continuous quality monitoring.

“Our machines work around the clock, five days a week,” says Robert Cooney. “If necessary, we can also continue with production at the weekend. Using our

pressive to see how we’ve grown together with ARBURG and its technology. In the almost ten years since we started collaborating, our machine fleet has grown by 30 percent. 85 percent of our machines are now ALLROUNDERS. In addition, automation and the host computer



Photos: Plastikos



ARBURG host computer system ALS, we record the machine parameters necessary for quality control and documentation and archive all data sets. Thanks to ALS and cavity pressure measurement throughout Plastikos production, we can monitor quality and efficiency on an end-to-end basis and respond well in advance before reject parts are produced.”

High delivery reliability thanks to automation

Together with the comprehensively adapted automation of production, Plastikos has achieved a high level of delivery reliability for its customers according to Cooney, adding that, “It’s really im-

system have enabled us to achieve a higher technical standard.” Plastikos plans to continue on this path with ARBURG into the future.

The electric ALLDRIVE machines produce in ISO 7 class clean rooms (photos on left and right). Craig Huegel, Tooling Engineer, Robert Cooney, Manufacturing Manager, and Ryan Katen, Engineering Manager (centre photo, from left to right) are highly satisfied with the high performance of the ALLROUNDERS.

INFOBOX



Name: Plastikos, Inc.

Founded: 1989

Location: Erie, Pennsylvania, USA

Turnover: approx. 25 million US dollars (2016)

Employees: 140

Industries: Automotive, aerospace, medical technology, electronics, armaments

Products: Electronic precision contacts and connectors, medical technology products

Machine fleet: 36 injection moulding machines with clamping forces from 600 to 2,000 kN, including 29 ALLROUNDERS as well as 18 MULTILIFT robotic systems and INTEGRALPICKERS, ARBURG host computer system (ALS)

Contact: www.plastikoserie.com



For the right bond!

Surface activation: UV light creates bond between silicone and

In the past, those wishing to produce a permanent bond between hard and soft plastics, particularly between silicone and thermoplastic, had to resort to processes such as corona, plasma, or flame treatments. This was the only way to achieve the high surface tensions required for a permanent bond between the materials. At the Technology Days 2017, ARBURG presented an alternative: UV surface activation integrated in the gripper of the robotic system.

ARBURG's project partner here is the Faculty of Plastics Technology at the University of Kassel, with the UNipac Application Center. Here, the scientists are involved with the creation of adhesive bonds, the use of self-adhesive liquid silicones and primer application as an adhesion-enhancing layer between the plastics. In order to automate the production processes in the two-component area, various techniques are available, including rotation by means of a rotary unit or indexing platen, core-back technology, or the transfer tech-

nique demonstrated at the Technology Days 2017.

Robot with integrated UV activation

As an alternative to a multi-component injection mould with an internal transfer device, the pre-moulded thermoplastic parts were fed to the robotic system via a conveyor belt.

Both the insertion process via the robotic system with integrated UV activation unit, as well as the entire sequence are part of the development scope.

UV activation takes place during insertion of the thermoplastic part and therefore within the cycle time. The minimum exposure time is around five seconds so that the manufacturing process is affected to a minor degree.

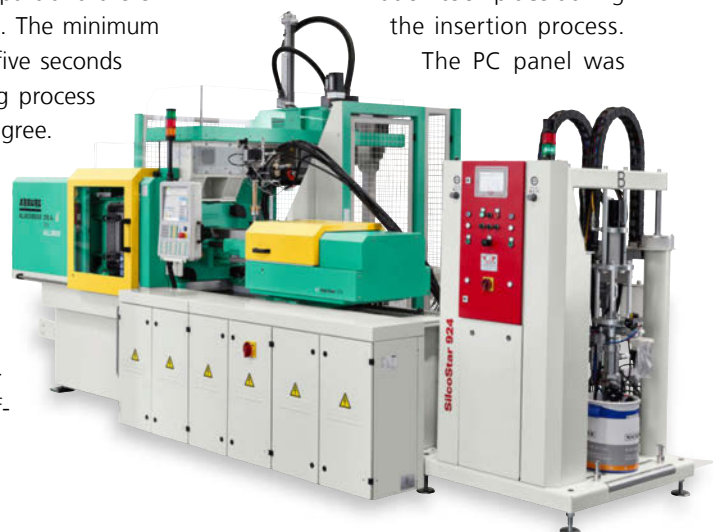
Dr. Thomas Walther, Head of Application Technology at ARBURG, sees great potential in this process: "The UV activation of thermoplastics may prove to be simpler, faster, more cost-

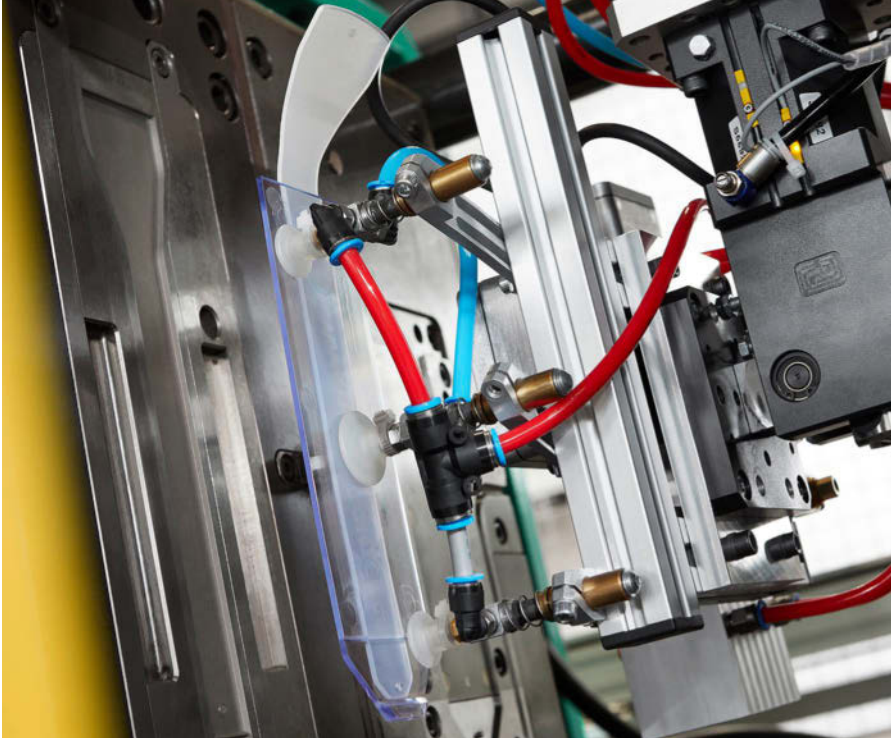
effective and reliable than the other known methods in the future."

PC panel overmoulded with LSR

At the Technology Days, an ALLROUNDER 370 A with a clamping force of 600kN moulded the liquid silicone (LSR) onto the insert via a cold-runner system featuring a needle-type shut-off nozzle. The PC panel was transported into the enclosure of the MULTILIFT robotic system, where it was picked up by the gripper via vacuum and inserted into the safety single-cavity mould. UV activation took place during the insertion process.

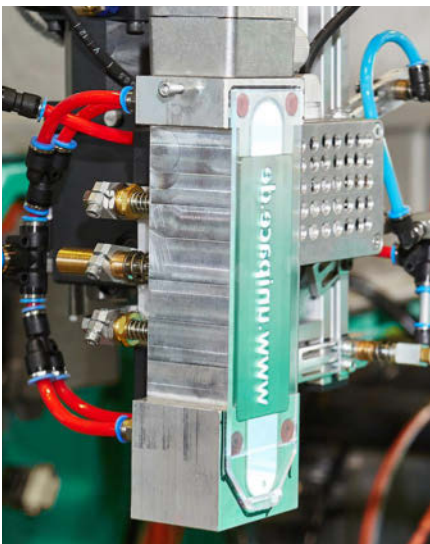
The PC panel was





An electric ALLROUNDER 370 A overmoulds PC panels with LSR (bottom left photo). A MULTILIFT robotic system removes the finished parts (top right photo), after positioning the inserts in the mould. Thanks to UV surface activation during the insertion process (bottom right photo), an extremely strong PC/LSR bond is created, which is very difficult to separate (top left photo).

thermoplastic



accurately brought into position in the mould by a pneumatic slider and held in place pneumatically on the nozzle side. The gripper then rotated through 180 degrees and picked up a PC panel overmoulded with LSR on the ejector side. The pneumatic ejector simultaneously pushed the finished part out of the cavity. The cycle time was 60 seconds and the moulded part

weight was twelve grams. The PC/LSR product, which meets the requirements of VDI 2199 Automotive (standard for adhesion testing), was then set down on another level of the conveyor belt and removed from the enclosure.

Process with future potential

Dr. Ralf-Urs Giesen, Head of Plastics Processing Technology at the Department for Materials Engineering, Faculty of Plastics Technology, at the University of Kassel explains the benefits of UV activation and the current state of the art: "A patent application has already been filed for the 'TP/LSR overmoulding with integrated UV activation' process. We've achieved excellent adhesion values for self-adhesive LSR types on UV-pretreated PC. In addition to PC, we've also successfully tested PC-ABS and PP as UV-activatable materials to date. In contrast to plasma treatment, the material is not subjected to heat with our new process, which means that there's little distortion or visual and mechanical

defects. With PC, the adhesive effect is lasting, which means that the quality of the serially produced parts is good."

Wide range of application areas

Dr. Thomas Walther knows the industries in which multi-component parts with LSR are frequently used: "If the process also proves successful in high-volume production, a wide range of applications would open up for these hard/soft parts in the automotive and medical technology sectors. A third sector is household goods, for example the typical 'lid with integral seal' application".



TECH TALK

Oliver Schäfer, Technical Information

Well-balanced

Even mould filling thanks to SELOGICA function

The machine control system is the nerve centre of every ALLROUNDER. The SELOGICA control system offers numerous practical aids for influencing part quality, reproducibility and productivity. The extent of the settings that can be made is often underestimated. These include the “switch-over via ramp” function, which is particularly interesting in the case of dynamic injection processes and ensures, for example, improved balancing, i.e. even filling of the mould cavities.

Greater dynamics during injection offers great potential. The reproducibility of the injection moulding process is improving. Thinner-walled parts can be produced and high-performance plastics such as LCP can be processed for the first time. With their servo motors, electric machines offer the required dynamics as a matter of course. Nevertheless, equipped with position-regulated screws, hydraulic and

hybrid ALLROUNDERS also achieve comparable results with excellent acceleration values. Dynamic movements, however, are not generally suitable for all processes or moulds.

Dynamic processes require flexible settings

A “hard” switch-over to holding pressure can, for example, exacerbate the problem of uneven filling in multi-cavity

moulds. In this case, active adjustment options are required.

ARBURG recognised these relationships at an early stage and consequently integrated the “switch-over via ramp” function into the control system for the ALLROUNDERS back in 1987. So, nothing new in fact. But in the light of ever more dynamically operating machines combined with increasing numbers of cavities, this practical aid is becoming more and more important. But what exactly does the function involve?

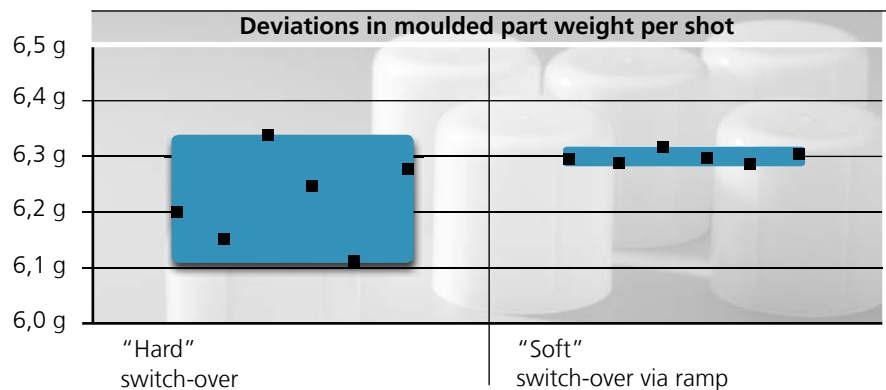




Photo: Adobe Stock

“Switch-over via ramp” enables a smooth transition from the injection pressure to the holding pressure stages. For this purpose, all the operator has to do is define a time frame. With only this additional parameter, programming is correspondingly simple. During this time, the melt compressed in the sprue system ensures that the cavities which are not yet completely filled are filled to a greater extent than those which are already filled owing to the lower counter pressure. With

the pressure regulation during the transition, this effect can be actively influenced and is therefore not dependent on the exerted pressures. The cycle time is not extended thereby because the ramp belongs to the holding pressure phase and can be correspondingly shorter.

“Soft” switch-over improves balancing

A “soft” switchover allows for compensation of the different and fluctuating pressure conditions in the individual cavities. Studies have shown that this applies both to slow as well as relatively fast-solidifying materials. The result is improved balancing, in other words, the even filling of each mould cavity. The injection moulding process is more stable and reproducible. Differences in filling and therefore discrepancies in the part weights from cycle to cycle are reduced. Under-filling and flash formation are prevented. As a consequence, the risk of mould damage is reduced.

The “switch-over via ramp” function is no substitute for a well-balanced mould. But it can help to solve problems during balancing, which would otherwise not be possible to solve by means of mould modifications in a cost-effective manner. Particularly when a compromise needs to be found: greater dynamics for thin-walled areas versus a well-balanced mould. The key here are flexible settings options and automatic control concepts. This is precisely where the SELOGICA control system comes into play and offers a huge variety of functions.

The benefits of the SELOGICA “switch-over via ramp” function is demonstrated by the production of thin-walled aerosol caps with a 6-cavity mould: the weight deviations between the six parts per shot are reduced by more than 80 percent through “soft” switch-over from injection pressure to holding pressure.

FAST REACTIONS
READY FOR ACTION
ALREADY DYNAMIC
ON MY WAY
COMMITTED
RELIABLE
SOLUTION-ORIENTED

WIR SIND DA.

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