

today

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ARBURG

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IMPRESSUM

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Individualised rocker-type light switches: At the Hannover Messe 2015, ARBURG presented a fully networked process chain including Industry 4.0. High-volume products were turned into one-off items through the combination of injection moulding and additive manufacturing.

ARBURG



Dear Readers,

Our global ARBURG network has been growing continuously since the establishment of our first foreign subsidiary in France in 1985. Our US subsidiary is now already the third to celebrate its 25-year anniversary. The fact that growth is also reflected in the expansion of the individual locations is evidenced in the Czech Republic and the US, where new premises have been inaugurated in recent months. My father, Eugen Hehl, who set off on the road to successful internationalisation, has impressively received two awards for his life's work this year. His induction in the SPI "Plastics Hall of Fame" was a very special honour for him and for our entire company. It confirmed our innovative strength and vision.

Our Managing Director Technology & Engineering, Heinz Gaub, reports on how we are preparing for the future in this regard.

A decisive success factor for ARBURG is its high level of vertical integration. This of course also applies to the freeformer, which is now available worldwide, and the serial production which we are reporting on in this issue.

Furthermore, our articles feature such topics as how unusual ideas can be implemented cost-effectively in practice using ARBURG technology, whether they involve liquid silicone (LSR) or thermosets and whether they relate to the optical, packaging or medical technology sectors. You will doubtless find some inspiration for your own efficient production in the current issue of our magazine. We would be delighted to receive your feedback.

I hope you enjoy reading the new issue.

Michael Hehl
Managing Partner

Cong

Eugen Hehl: A lif



Congratulations!

Eugen Hehl's work – two awards in 2015

Over the decades, Eugen Hehl has been bestowed numerous awards for his life's work, his innovative capacity and his entrepreneurial vision. This year alone, he has received two: In March 2015, ARBURG's Senior Partner was inducted into the SPI "Plastics Hall of Fame" in the US. Two months later, he also accepted the German Baden-Württemberg Competence Prize for Innovation and Quality.

Previous "Plastics Hall of Fame" inductees include such illustrious figures as Leo Baekeland, the inventor of Bakelite, George Eastman, the founder of Eastman Kodak, and Earl S. Tupper, the founder of the Tupperware Group. "I feel extremely honoured at my inclusion and would like to express my deepest gratitude," said Eugen Hehl, sending his greetings remotely on the eve of the NPE 2015. As he was unable to personally make the trip to Florida, he had prepared a special video message which was played back live during the evening celebrations.

Pioneering achievements

In his address, the ARBURG Senior Partner explained that his recipe for success was hard work, deep commitment, technical sophistication coupled with clever and sometimes astonishingly simple solutions, as well as two open ears for his customers' requirements. "With the invention of the ALLROUNDER and of the freeformer, we have made technological history – a history that we

would like to build upon significantly in the future."

In May 2015, Eugen Hehl also accepted a further award for outstanding innovation, entrepreneurial vision, social commitment and sustainability, the individual Baden-Württemberg Competence Prize for Innovation and Quality.

Exemplary entrepreneurship

Together with his brother Karl Hehl, who passed away in 2010, Eugen Hehl turned the family-run company, which is now in its third generation, into a leading global machine manufacturer for which he was the driving force in sales and internationalisation for over six decades. To this day, the 86 year-old Consulting Partner is actively involved in continuing the ARBURG success story in an advisory capacity.

Outstanding inventions include, for example, the ALLROUNDER principle (1961) and the first machine worldwide to feature microprocessor control (1975). Pioneering process engineering achievements made by ARBURG include multi-component injection moulding, powder injection moulding and the processing of liquid silicone (LSR). In 2013, the freeformer for industrial additive manufacturing celebrated its world première.



Award-winning entrepreneurship: In the spring of 2015, ARBURG Senior Partner Eugen Hehl was inducted into the "Plastics Hall of Fame" (photo on left) and was awarded the Baden-Württemberg Competence Prize (photo above).



Greetings
film



Ongoing

USA and Czech Republic:

ARBURG Managing Partner Michael Hehl (centre) opens the new building in Rocky Hill with Managing Director Helmut Heinson, subsidiary manager Friedrich Kanz, SPI President and CEO William R. Cardeaux and Managing Director Heinz Gaub (from left to right). On this occasion he presents a commemorative sculpture to Friedrich Kanz (photo below).



Photos: Jeff Yardis

company, ARBURG has invested in its international sales and service network on an ongoing basis.

Successful in the US for 25 years

Founded in 1990, ARBURG Inc. was one of the first subsidiaries and the US is ARBURG's largest foreign market. Accordingly, the inauguration of the new headquarters and the 25-year anniversary were celebrated in style. On this occasion, the ARBURG Inc. customers also enjoyed a special anniversary event. With Michael Hehl, Spokesperson for the Management Team, Managing Directors Heinz Gaub (Technology & Engineering) and Helmut Heinson (Sales), a high-ranking delegation from



Mission accomplished: the two latest ARBURG buildings have been completed and officially inaugurated by the Managing Partners and Managing Directors. The extension in the Czech Republic was followed by the building for the relocated ARBURG US headquarters in Rocky Hill, Connecticut. Here, there were two reasons to celebrate: the inauguration and the 25-year anniversary of ARBURG Inc.

In order to provide international customers with the same first-class support that is on offer at the German parent



expansion

Managing Partners officially inaugurate new ARBURG buildings

the parent company was in attendance. During the Open House held the following day, 245 guests were able to learn about current topics such as industrial additive manufacturing with the freeformer and lightweight construction through presentations and exhibits, as well as view the extensive facilities available to them at the new premises in Rocky Hill.

2,500 square metres for US headquarters

The new ARBURG building covers a total floorspace of 2,500 square metres and boasts state-of-the-art infrastructure. At its heart is the showroom, which provides space for seven ALLROUNDER injection moulding machines intended for testing and training activities. The building also features a comprehensive spare parts store, a machine store, as well as areas for turnkey systems and the freeformer.

Brno ATC extended to over 1,660 square metres

The extended premises at the Brno ATC were officially inaugurated on 21 April 2015 in the company of Managing Partners Eugen, Juliane and Michael Hehl,



Photo: Jan Kolar

as well as Managing Director Sales, Helmut Heinson. By expanding the usable floorspace by 615 to more than 1,660 square metres, sufficient space is now also available for automation solutions and turnkey systems. Moreover, there is a dedicated area for the freeformer and additive manufacturing.

Official inauguration of the new premises in Brno (right to left): Subsidiary manager Dr. Daniel Orel, ARBURG Managing Partners Michael, Juliane and Eugen Hehl, as well as Managing Director Sales Helmut Heinson.



The future

Hannover Messe 2015: ARBURG impresses



begins now!

with fully networked process chain

As an exclusive partner of the Additive Manufacturing Plaza, ARBURG made a lasting impression at the Hannover Messe 2015. The trade visitors were amazed at the fully networked process chain along which they were able to individualise “rocker-type light switches”, turning them into one-off items. Renowned experts expressed their delight and praised the impetus that ARBURG has provided for the entire industry with its practical implementation of Industry 4.0.

“We have shown the technology of the future at the world’s largest industrial trade fair and have evidently tapped the spirit of the times. By combining the Industry 4.0 process chain and the individualisation of high-volume parts using additive manufacturing, we have presented ourselves convincingly and generated a great deal of interest. This is what we had hoped for in the run-up, but not to that extent,” said Managing Partner Juliane Hehl, adding, “We have bundled all of our in-house expertise and have demonstrated what

we are able to achieve jointly with excellent partners.”

In the plastics world, ARBURG has been known for decades as a trendsetter that develops innovative machines and the corresponding control system in-house.

ALS – the key to Industry 4.0

Back in 1986, ARBURG presented the first fully-automated injection moulding system worldwide, which was controlled via the ARBURG host computer system (ALS) and was therefore far ahead of its times. Today, ALS plays a central role in the topic of Industry 4.0 and the traceability of individual parts. With ALS, machine and production data, for example,

can be networked and process parameters uniquely assigned.

As an exclusive partner of the special “Additive Manufacturing Plaza” exhibition at the Hannover Messe 2015, ARBURG presented a fully networked process

chain, based on the example of a rocker-type light switch, which extended from product design and order entry through

injection moulding, industrial additive manufacturing, automated packaging of the individualised product and display of the process parameters on a part-specific web page.

Project partners included Gira (product and mould construction), Trumpf (laser labelling), Fuchs Engineering (quality inspection) and FPT Robotik (automation).

Systems for networked production

“We have been working on the topic of Industry 4.0 for a considerable time now and, with our fully automated ALLROUNDERS, the freeformer and IT solutions, are increasingly developing into a production system provider for networked production in the digital factory of tomorrow,” explained ARBURG Manager Technology & Engineering, Heinz Gaub. He went on to explain that ARBURG had demonstrated at the Hannover Messe how the freeformer could be seamlessly integrated into an automated production cell. Furthermore, he added that ARBURG had made it clearly evident that the system for industrial additive manufacturing is also ideal for the enhancement of high-volume parts.



- 1** Product design: Rapid production of prototypes with 3D CAD data and the freeformer.
- 2** Order entry: Visitors select individual symbols and names for the light switches.
- 3** High-volume production: ALLROUNDER produces rocker-type light switch, DM code is applied by laser.

- 4** Individualisation: freeformer additively enhances part with symbol/name combination.
- 5** Packaging: Box is individually printed in accordance with the relevant light switch.
- 6** Data retrieval: Part-specific web page can be called up via code using mobile device.



Shining example

ERCO: Efficient production of high-quality LED technology has

ERCO Lichtfabrik, which is based in Lüdenscheid, Germany, is a leading specialist for architectural lighting using LED technology. Since the autumn of 2014, the company has been using an ARBURG production cell for the fully-automated manufacture of large-surface, thick-walled high-tech lenses. The special feature here is that the six-axis robotic system not only performs moulded-part handling, but also carries out other tasks during the residual cooling phase.

“By investing in fully automated production and by linking several process steps, we have succeeded in further optimising both the quality and the price/performance ratio of our lights,” explains Holger Thomas, Department Manager Production and Mouldmaking at ERCO. The company has specialised in digital architectural lighting, a sector in which it sees a sustainable future for itself. The production cell built around a hydraulic ALLROUNDER 720 S with a clamping force of 3,200 kN is in continuous operation at

ERCO. Currently, it is mainly being used for the production of a compact LED lens system made from PMMA for use in ceiling-recessed luminaires for offices and shops.

One system – multiple product variants

On this system, ERCO produces a number of lens variants and so-called collimators which bundle the light rays. Depending on the product, the cycle times vary between around 1 and 18 minutes.

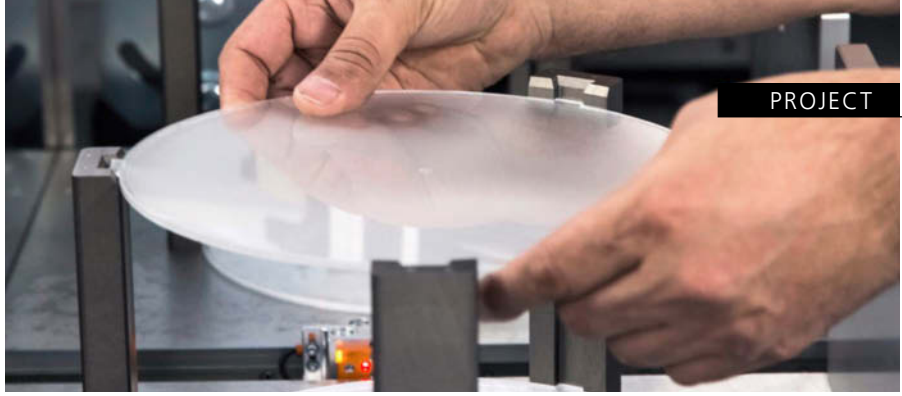
Part handling is performed using a six-axis robotic system featuring the SELOGICA user interface, which can be programmed in a relatively straightforward manner using the familiar control philosophy from injection moulding machines. The gripper can be easily and quickly adapted to the relevant product variant by means of interchangeable plates with product-specific fixtures.

“The system’s benefits are clearly to be found in the precision with which we can now produce our optical elements,”

says Holger Thomas. The complete production cell is controlled centrally via the SELOGICA control system. Reject parts, the costs for transport and storage, and consequently the overall production costs, have been significantly reduced.

A majority of the lenses produced have a thickness of 30 millimetres and a diameter of around 80 millimetres. Following injection moulding, the six-axis robotic system removes them from the 2-cavity mould and first sets them down in a turning station with the sprue facing upwards. It then picks up the moulded part by the underside with its vacuum suction pads and positions it into the laser-station device with the sprue facing downwards. Using a freely programmable laser beam, each lens is freed from its sprue and a demoulding aid. The latter are collected in a container in the laser station.

Finally, the robot removes both lenses and the sprue before setting them down on a conveyor belt, which removes the parts from the production cell. The system is equipped with a second conveyor



promising future

The cycle time for lenses with a thickness of 30 millimetres (large photo) is up to 18 minutes. During this time, the six-axis robot continues to feed products for laser cutting (photos at top right and centre). The robot can be conveniently programmed and converted for other product variants (photo below right).



belt for the purpose of random quality-assurance sampling.

Cooling phase efficiently utilised

Particularly ingenious is the solution of utilising the residual cooling time in the injection moulding process for further tasks. Here, a drawer system is first manually loaded with so-called micro-prism lenses. Once the thick-walled lenses have been separated from the sprues, the robot sets down each of these disc-shaped LED lenses into the laser station, where various geometries are cut out as required to create up to three circu-

lar and four square parts. The lenses are then set down on the conveyor belt and the off-cuts disposed of via a chute. This additional task can be repeated several times, depending on the cycle time. This ensures that the robotic system and laser station are optimally utilized despite the long cycle times for the main product.

INFOBOX



Name: ERCO GmbH

Founded: 1934 as a family-owned company by Arnold Reininghaus

Core competencies: Leading specialist for architectural lighting using LED technology

Employees: 880 worldwide, of which 540 in Lüdenscheid, Germany

Machine fleet: 15 injection moulding machines, of which seven ALLROUNDERS

Contact: www.ercos.com

A finger on the pulse

Heinz Gaub: Strategically advancing tomorrow's technologies

Jointly with universities, research institutes and partners, ARBURG engages actively in research and development projects on an ongoing basis today in order to advance the technologies of tomorrow. The "today" editorial team spoke with Managing Director Technology & Engineering Heinz Gaub on the major current topics and on ARBURG's strategy.

today: One significant industry trend is lightweight construction. What is ARBURG's involvement here?

Gaub: We are currently involved in a number of projects. The aim is, for example, to produce complex yet lightweight structural components. Lightweight construction processes, the development of which we have already completed jointly with partners, include Particle-foam Composite Injection Moulding (PCIM) as well as the fibre direct compounding and ProFoam processes.

today: In which other fields is ARBURG involved in research and development activities?

Gaub: In addition to the previously mentioned lightweight construction processes, the main emphasis of our current research projects lies in energy efficiency, Industry 4.0 and additive manufacturing. Together with lightweight construction, these were incidentally, four of the five key topics at this year's Hannover Messe, which, as the leading global industrial trade fair, showcased how the production technology of the future will look. We're therefore spot-on with our development priorities and our timing is perfect. Moreover, they complement one another to form an integrated technological and strategic concept.

today: ARBURG was prominently represented with Industry 4.0 and additive manufacturing in Hanover. How was the response?

Gaub: With our fully networked production chain (see page 8), we presented the potential of our freeformer in the individualisation of large-volume parts and above all also succeeded in turning the abstract topic of Industry 4.0 into a tangible experience based on this striking practical example, which unanimously garnered us a great deal of praise.

today: This emphasises the fact that IT unrelentingly continues to gain in importance for production. What does that mean for ARBURG as a machine manufacturer?

Gaub: That much more is needed than to simply deliver machines. Today, production technology is already inextricably linked to IT and the two must mesh. With our machines, automation modules and the ARBURG host computer system (ALS), we offer sophisticated and modular solutions from a single source. We are thus developing into a production system supplier for networked production in the digital factory of tomorrow.

today: When did you embark on this journey?

Gaub: Back in 1986, ARBURG already presented a fully-automated injection moulding production cell that was controlled via ALS. This remained a pilot system as we were simply ahead of the times with that development. At the time, the market wasn't ready for a fully automated and networked production line because no standardised interfaces or sufficient processing power were available – and



se of the times

today



there was no Internet. But the work was nevertheless worthwhile. Since then, ALS has been progressively developed further and sold many hundreds of times. Today, it forms the basis for Industry 4.0 in our range of offerings.

today: With Industry 4.0, the emphasis is also on the individual production of personalised products as one-off parts or in small unit batches. This is where additive manufacturing comes into play, with which ARBURG really hit the mark.

Gaub: You can say that again. The machine, technology and timing simply couldn't have been better. For the development of the freeformer and ARBURG Plastic Freeforming, however, a great deal of fundamental research was required. It consequently took around ten years from the very first idea to full production-readiness. In between times, there were also some development freezes due to the financial crisis for a few years.

today: Is the development of the freeformer now complete?

Gaub: Absolutely not. This innovative technology still has a great deal of potential. In order to fully exploit this and to further develop the process in the context of promotional work, we are cooperating with universities and research institutes, for example, some of which have purchased their own freeformers. The focus of the development activities is on construction speed, special materials, control technology and the man-machine interface (MMI).



Efficient high

Cube mould technology: ARBURG supplies

Cube mould technology enables high-quality injection moulding in large unit volumes. Output, for example, can be more than doubled. This applies above all to two-component items. In close cooperation with Foboha, ARBURG has implemented a variety of applications that demonstrate the potential of this innovative mould technology.

Around 80 percent of ALLROUNDERS with cube moulds are two-component machines. The large injection unit operates horizontally, while the small one is in a horizontal arrangement and is mounted on the moving mould mounting platen.

Just what cube mould technology is able to achieve is demonstrated by the example of two-component juice bottle closures made from PP and HDPE. These are produced as fully functional parts on an electric ALLROUNDER 720 A with a clamping force of 3,200 kN and two, size 800 and 400, injection units. A 12+12-cavity cube mould featuring hot runners on the nozzle and ejector side is used. The process and rotation of the centre block through 90 degrees in each instance, are also driven electrically in this case. With the comprehensive use of servo-electric axes, even greater dynamics, precision and speed are achieved during the injection moulding process with cube moulds.

At the Technology Days 2015, ARBURG presented the production of closure caps using a two-component ALLROUNDER 920 S with a 32-cavity cube mould. The cycle time was only around ten seconds and the material throughput was 120 kilogrammes per hour.



-volume production

complete production systems

All four production steps run simultaneously in a cycle time of 5.4 seconds: the pre-moulded parts are produced in the first station and cooled in the second one. The second component is injected at the third station. This is followed by a further rotation to eject the finished parts, weighing 1.8 grams, while the mould is closed for the next injection operation.

Large closures for five-gallon water bottles are produced by a hydraulic two-component ALLROUNDER 920 S with a clamping force of 5,000 kN and two, size 3200 and 1300 injection units. For these plastic parts made from HDPE and LDPE, weighing 10.7 grams, a 32+32 cavity cube mould from Foboha is used.

The cycle time is around ten seconds, the material throughput is 120 kilogrammes per hour.

Cube mould system centrally controlled

The mould functions and the rotary system from Foboha are integrated in the SELOGICA control system. Additional time can be saved through central control of the closing, opening, rotating, locking and ejection movement sequences.

"Owing to the unit volumes alone, cube mould technology is predestined for packaging and personal care items," says Andreas Reich, Senior Sales Manager Packaging at ARBURG.

"Depending on the conditions, this innovative concept is however also highly interesting for medical-technology or automotive-industry applications. For efficient high-volume production, I recommend remaining open to alternatives and to bear cube mould technology in mind." ARBURG individually compares a variety of concepts and then offers the customer the most efficient production system for his application (see page 26).



Impres

Silcotech: One stop sh

Silcotech from Bolton, Ontario, Canada, implements integrated engineering solutions jointly with its customers. Innovation at the NPE 2015: eight silicones with different Shore hardnesses and colour pigments overmoulded with a ninth silicone in a two-station rotary mould for production of a smartphone bumper case. Exclusive Silcotech machine partner since 1998: ARBURG.

The implementation of the smartphone bumper case is illustrative of many other conceivable applications, for example in the field of medical analysis. Applications with silicones containing a variety of chemicals or hormones are conceivable here.

Since the year of the company's foundation, Silcotech has been working exclusively with ARBURG. This has good reasons, which the company's President and co-founder Michael Maloney is happy to list: "ARBURG is a reliable partner with the right amount of expertise that we require on their side. This made the decision to purchase the 50 ALLROUNDERS that we now own easier." The mechanical structure of the ALLROUNDERS is a further point in favour of ARBURG according to Maloney, who goes on to explain that the Silcotech moulds are adapted for operation on four tie-bar machines, which makes their use and production easier.

Examples of great innovative strength

Two further customer examples vividly demonstrate the innovative strength of Silcotech. These are LSR diaphragm rings, which are used in pairs for an LED luminaire. As soon as the light is switched on,

silcotech solutions

Op for complex silicone parts



Photo: John Cox

the two rings begin to vibrate and the diaphragms “breathe”. The resulting air-flow cools the luminaire.

Silcotech developed an equally advanced technology for the individual adaptation of hearing protection ear plugs. The body of the ear plug, which is subsequently overmoulded with a self-adhesive silicone (Shore hardness of 10), is made from PA 6.6. A membrane with an O-ring attached by means of a retainer is also moulded on and pushed over the main body of the ear plug prior to subsequent fitting of the hearing protection. The ear-plug blanks are inserted in a special headset before being “inflated” with RTV silicone to create a perfect fit in the inner ear of the individual wearer.

Automation is a must

“We’ve always used robotic systems for the handling of our parts because air-blow and brush removal are unsuitable for use with medical products,” explains Michael Maloney regarding his company’s automation strategy.



To date, Silcotech has purchased six electric machines in order to meet the requirements in terms of performance and precision even more precisely. These were of course also supplied by ARBURG.

Isolde Boettger and Michael Maloney, Vice President and President of Silcotech, are driving forward innovative elastomer developments. These include ear plugs that can be adapted via a headset (photo on right), diaphragm rings for LED luminaires (centre photo) or the latest Silcotech innovation: a 9-component silicone smartphone bumper case (photo on left).



INFOBOX



Name: Silcotech North America Inc.
Founded: 1998 by Michael Maloney and Isolde Boettger
Plants: Canada, USA and India
Employees: Around 130 worldwide
Products: Proprietary and customer-driven engineering solutions for mass-produced items made from silicone
Industries: Medical technology, healthcare, automotive, packaging, electronics and consumer goods
Machine fleet: More than 50 hydraulic and electric ALLROUNDERS worldwide
Contact: www.silcotech.com



Photo: John Cox

Launch complete!

Market introduction: freeformers ready for action worldwide

Orlando (USA), Milan (Italy), Guangzhou (China) – the freeformer exhibit has been a crowd magnet at international trade fairs in recent months. In May, ARBURG completed its market introduction in America, Europe and Asia; serial production is now fully underway (see page 19). Customers around the world can now enter into the world of industrial additive manufacturing. In this endeavour, they receive intensive support from the ARBURG experts.

The sales launch began in Germany at the Fakuma 2014. During a continent-by-continent market introduction, the freeformer was then shown live at numerous trade fairs and ARBURG events around the globe during the first half of 2015.

freeformer versatile in use

It produced, for example, bellows made from soft TPE, key fobs with an articulated ball joint, mobile phone housings and a gear card featuring complex geometries. At the Hannover Messe, the individualisation of mass-produced items by combining injection moulding and additive



The Managing Directors of ARBURG USA and China, Friedrich Kanz (photo on left) and Toni Tong (photo below), reported lively interest in the freeformer at the NPE (photo at top) and Chinaplas trade fairs.

manufacturing was demonstrated (see page 8).

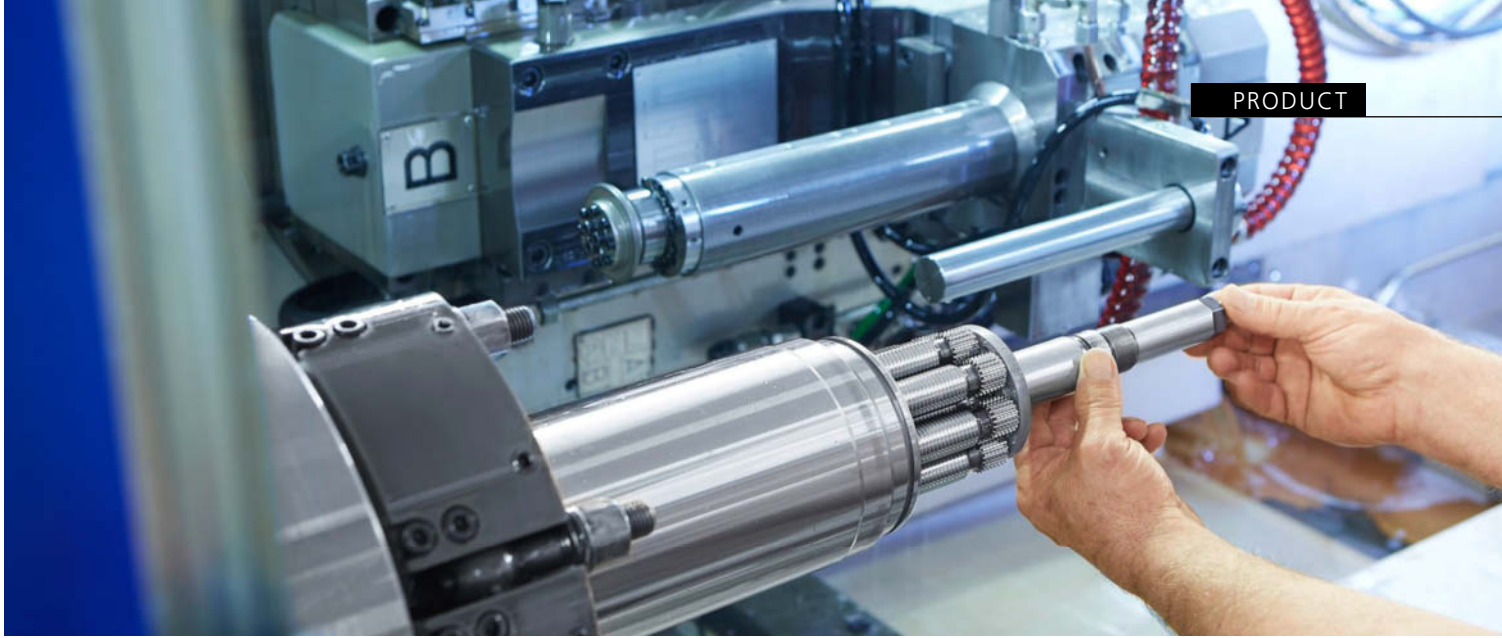
Big events in the US and China

Following the market introduction in North America, Friedrich Kanz, Managing Director of ARBURG USA, had the following to say: "For us, the NPE 2015 was an excellent platform for showcasing the potential of the freeformer in America. We registered high demand from customers who want to enter into industrial additive manufacturing using the freeformer. We have therefore set up a dedicated freeformer lab at our new US headquarters."

The last highlight of the international market launch was the Chinaplas. "Our freeformer is able to do much more than simple 3D print-



ers. The month of May was the perfect time to present the innovative system for additive manufacturing in Asia," says Toni Tong, Managing Director of the ARBURG organisations in China. "Our experts are delighted to really get going with the project now. The central contact point for additive manufacturing is Shenzhen."



“Made by ARBURG”

Machine construction expertise: High level of vertical integration for freeformer

The well-known ARBURG philosophy and a high level of vertical integration is maintained with regard to the modules and assembly of the freeformer. From the outset, ARBURG has developed the freeformer from the point of view of a machine manufacturer. During its manufacture at the Lossburg headquarters, all the experiences from injection moulding machine production have been taken into account.

On the subject of design and production of the freeformer, Managing Director Technology Engineering Heinz Gaub has the following to say: “We can derive a great deal from the development and manufacture of our electric ALLROUNDERS. In concrete terms, this means that we didn’t have to start from scratch because a solid basis for the freeformer specification was already available.”

Components produced in-house

Most of the freeformer components are produced in-house. For this purpose, existing production lines can be utilised. This applies for example to the construction of the control cabinets, which, like the ALLROUNDERS, are manufactured at our factory. The same applies to melt

preparation, cooling, fan assemblies and spindle drives, as well as the monitor bracket, machine frame and cover, as well as the heater assembly. In addition to the machine frame, the guarding is also completely new. It is partly made of GRP components and printed, shaped PC sheets, and is one of the few externally sourced components.

Flow manufacturing for the freeformer

With the new flow manufacturing process, the fully tested and ready-to-ship freeformer is produced in eight individual steps. These include assembly of the machine frame, completion of the machine, electrical connection, commissioning, test run, assembly of the machine guarding, final checking, followed by shipment. During commissioning, the various quality-relevant measurements such as precision alignment of the part carrier are performed.

Before a freeformer leaves the factory, it is subjected to a process test during



All the freeformers undergo extensive testing prior to shipment. Important assemblies and components such as the spindle drive (large photo) are produced in-house.

which it produces a complex approval sample part. Only once this is reproducible and fault-free and the geometric and mechanical parameters have been met, is the freeformer approved for delivery to the customer.



Polished perf

Çiğir Kimya: Advances thanks to all-round efficiency in the

Çiğir Kimya is one of the worlds largest manufacturers of shoe care products, which it sells in 63 countries under the product name Silver. Efficiency is the top priority in every area of production. The company's declared goal is unmanned production. 250,000 items are produced every hour in a high-tech, centrally controlled and monitored injection moulding production facility.

In Turkey, Çiğir Kimya counts among the top 500 companies, is the country's largest exporter with a share of 85 percent, and has the largest production capacity in the shoe care product sector worldwide. "In order to subsist on the long-stagnating global shoe care product market, productivity and efficiency have to be continuously increased while energy and labour costs need to be reduced," explains Managing Director Hayrettin Başar regarding the situation. Both of these can be achieved highly successfully through the use of ARBURG injection moulding technology. The cooperation with ARBURG has been in place since 2001.

"Initially, reliable machine technology was our priority, but also comprehensive

production and quality management," adds Hayrettin Başar.

Energy efficiency and speed

Çiğir Kimya was one of the first companies in Turkey to use electric ALLROUNDERS. Eight hydraulic ALLROUNDER C machines, which also operate energy-efficiently thanks to the ARBURG energy saving system, were added to the six existing ALLDRIVE machines.

A total of some 150 hot-runner injection moulds with 8 to 32 cavities are in operation in order to produce containers for shoe care products made from PP, PS and PE. Most of the moulded parts have wall thicknesses under 0.5 millimetres and are produced in a cycle time of between four and five seconds.

"What really counts with our machines is speed and low energy consumption," says Hayrettin Başar. "We consequently take care to ensure high overall plant effectiveness, which is defined by the three factors of availability, performance and quality. Here, the ARBURG host computer system ALS helps us to optimally meet our specifications." All the machines are connect-

ed to the ALS via special interfaces, including machines from third-party manufacturers. Incoming operating data and parameters regarding the current orders are entered and used for comprehensive planning of the injection moulding production.

ALS increases utilisation to 97 percent

Available capacities are fully exploited and production quality maintained at a high level. Following the introduction of ALS in 2012, capacity utilisation at the Çorlu plant increased from 60 to 97 percent. Hayrettin Başar is justifiably proud:





Performance

production of shoe care products



Photo: Çiğir Kimya

Thanks to energy-efficient ALLROUNDERS and the ARBURG host computer system, Çiğir Kimya can produce the containers for the "Silver" brand shoe and leather care products extremely cost-effectively.

"Moreover, downtimes have been significantly reduced through standardised machine programmes. We have limited our operators' access to the machines in order to completely rule out errors."

Fully automated production at night

According to the successful Managing Director, a further example of efficiency is their two-shift production. "Owing to our energy policy, the machines only run at night and the filling and assembly lines only during the daytime. With the introduction of ALS, this transition worked perfectly." Unmanned injection moulding production starts fully automatically at 10 p.m. The only job for the workers now is to sort the products and part

containers. In the event of downtimes, an operator simply shuts down the machine. The engineers then solve the problem the following day.

All these streamlining measures have meant that compared to 2012, 96 employees currently manage three times the unit output.

INFOBOX



Name: Çiğir Kimya

Founded: 1992 in Istanbul by Hayrettin Başar

Plants: Headquarters in Beylikdüzü, Istanbul, system and mould construction in Çatalca, Istanbul, production and assembly in Çorlu, Tekirdağ

Employees: 212

Production area: 25,000 square metres, extension to 75,000 square metres planned by 2017

Turnover: 48 million US dollars (2013)

Products: System supplier of shoe care products; over 800 different "Silver" brand shoe and leather care products, exporting to 63 countries worldwide

Machine fleet: 23 injection moulding machines, of which 14 ALLROUNDERS

Contact: www.new-silver.com

His drive:

Daniele Triva: Pioneer



Innovation

in pre-diagnostics and analytics

Daniele Triva, CEO and General Manager of the Copan Group based in Brescia, Italy, was closely associated with the plastics industry and was one of its innovators in the field of pre-diagnostics and analytics. Daniele Triva, who was involved in cooperation with ARBURG for many years, passed away in 2014 at the age of only 54 after a battle with cancer.

Triva's and his company's relationship with the Italian ARBURG subsidiary was particularly close. The subsidiary manager Björn Norén and especially Sales Consultant Bruno Pezzetti, who lived next door to Daniele Triva, knew him well and are fully aware of his great achievements in the field of medical technology.

Outstanding personality

Björn Norén describes the cooperation as follows: "I knew Daniele Triva for more than 20 years. From the very outset, he was a special kind of entrepreneur who had very clear and long-term ideas on the future of Copan. I'm delighted to have worked together with a personality who built up his life's work in a way that few have succeeded in doing." Bruno Pezzetti was even closer to Triva's family and company: "Great enthusiasm and an extraordinary amount of generosity best characterise Daniele Triva. He was an important customer, but above all a loyal and honest partner and friend. I liked his managerial style, his employees' motivation and the cooperation with his suppliers."

Daniele Triva dedicated his entire career to his life's work, Copan. He assumed management of the company back in 1982 at only 23 years of age.

The good reputation of Copan Diagnostics is due to its pioneering role in the development and production of collection and transport systems for bacteriological and virological use. These include bacteriological swabs, virological transport media as well as molecular transport systems. Owing to its universal properties (chemical resistance, sterility in medical use), plastic is an important base material for the production of these components.

High quality of the transport containers is characterised by the fact that their optimised airflow design ensures that the samples are maintained in optimum condition prior to analysis. With these containers, the so-called venturi effect is exploited, which utilises an internal air pressure differential in order to extend the survival time of the bacteria during transport.

Technical innovation and quality

For Daniele Triva, the main focus was always on technical innovation and quality. Entrepreneurial responsibility and social commitment were always a priority, despite all of his business success. With the Peter Pan Centre, for example, Copan employees have an in-house nursery at their disposal. A further Triva project was his Futura Science Park. Here, he created an integrated platform for new ideas on the development of state-of-the-art, fully automated and digitalised analysis systems in pre-analytics and microbiol-



Photo: Copan

Daniele Triva (photo on left) was closely associated with his life's work, Copan: Thanks to his work, the company (photo above) today counts among the innovators in the field of pre-diagnostics and analytics.

ogy, bringing together science, practice and training into close, cross-discipline interaction. The resulting synergies led to work on innovations, for example hyperspectral detection and identification of a variety of bacterial strains.

Thermoset know-h

Tempco: Cost-effective production thanks to BMC injection mould

According to its own statements, Tempco Manufacturing (S) Pte Ltd from Singapore is the largest moist-polyester or BMC injection moulders in the ASEAN area. The company's philosophy: Tempco takes on projects that are hard to implement, with which no-one is familiar, or that nobody else wants to assume.

Matthew Goh, owner and Managing Director, says: "We always produce to the highest quality and at the best price." From its Singapore base, the exporting company supplies a broad range of industries with products made from thermoplastics and thermosets such as moist polyester (BMC).

Its main customers operate in South-East Asia and China. They

are primarily active in the electrical fuse system, industrial motor, renewable energy and biotechnology sectors. Its globally established customers include General Electric, Hager, Terasaki and Hitachi.

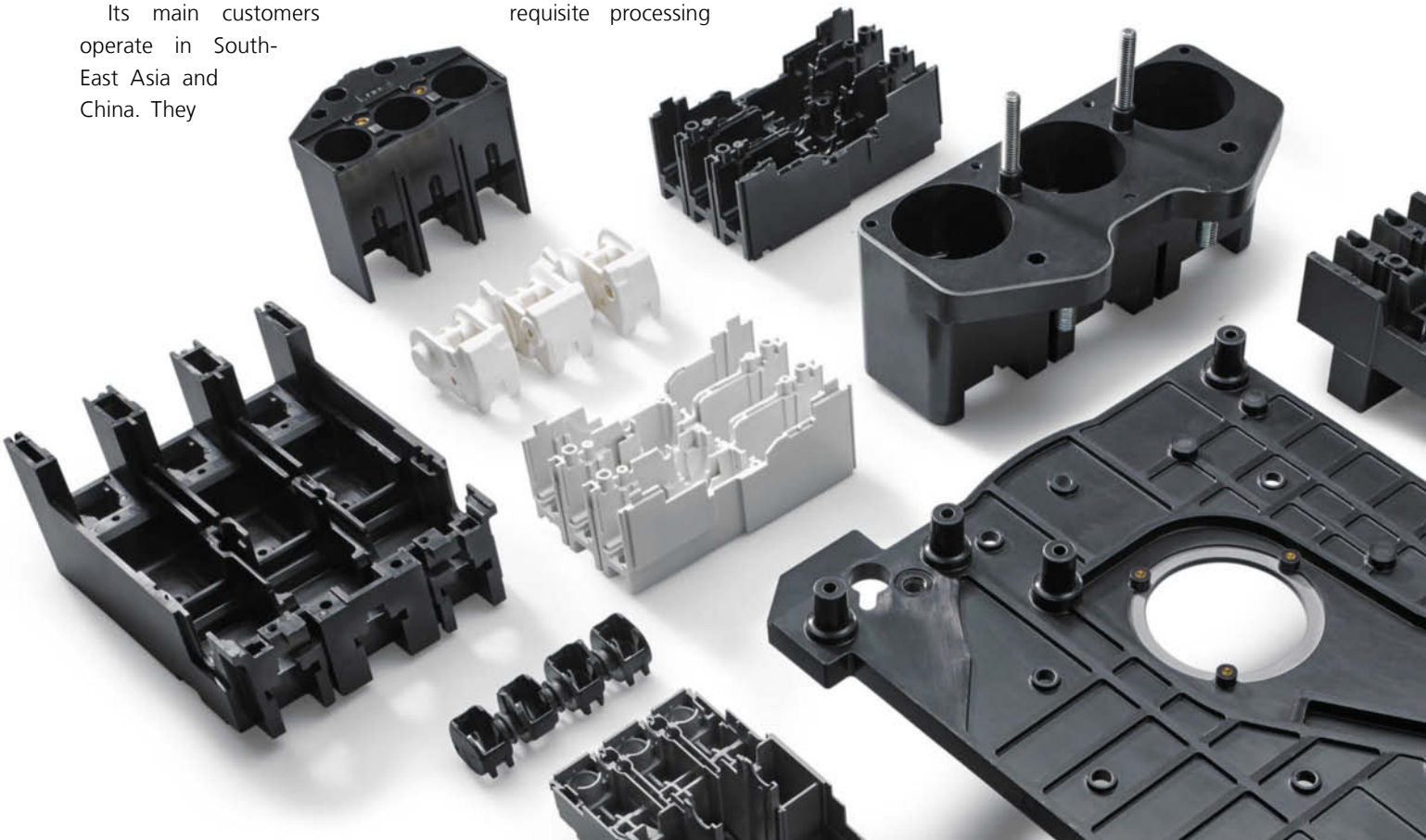
Entire value-added chain

Tempco provides support to its customers as a one-stop shop partner across the entire value-added chain: from selection of the suitable material to product design, mould design and construction, through to serial production.

The company decided to concentrate on thermoset processing because there are few injection moulders in the Asian region who are able to negotiate the entry hurdles and possess the requisite processing



Photo: Tempco



ow for Asia

ding and Singapore office

Tempco owner Matthew Goh (photo above) plans to double his thermoset capacity. The company manufactures products for electrical fuse systems and biotechnology (photo below).

expertise. Because BMC only shrinks very slightly following processing, precise dimensions can be maintained and subsequent finishing operations are completely dispensed with. In this manner, a large number of die-cast parts, for example, can be substituted.

BMC reduces manufacturing costs significantly

Two examples illustrate the significant cost reductions achievable by converting from aluminium die-casting to BMC injection moulding. In the case of a servo motor housing, the dimensional stability of which was

also improved, the part costs were reduced from 23 to 8 US dollars. The production of an optical housing was even 85 percent cheaper, with a cost per unit reduction from 110 to 15 US dollars.

Singapore location advantage

By virtue of being based in Singapore, Tempco also benefits from location advantages. All the base materials can be imported from around the globe without trade restrictions. Moreover, the constant temperature conditions in the city state are ideally suited for processing BMC (a material with a short shelf life) quickly with machines in operation around the clock. This results in stable product prices at a very competitive level, in particular also for China.

Since its foundation, Tempco has worked with ARBURG injection moulding technology. In addition to horizontal hydraulic machines, vertical models are also employed, which are adapted to the production requirements at Tempco. The 50 thermoset ALLROUNDERS feature special equipment for BMC processing, such as special screw geometries and INJESTER tamping devices. The vertical ALLROUNDERS can produce both with inserts or using the injection compression moulding process. The machines are connected to CNC units that automatically de-flash all the parts following injection moulding. Tempco and ARBURG are located in the immediate vicinity of one another in Singapore. This

keeps response times short and joint discussions regarding projects can be held at short notice: a further unbeatable advantage of this cooperation.

INFOBOX

Name: Tempco Manufacturing (S) Pte Ltd

Founded: 1983 by Matthew Goh

Products: BMC overmoulded digital motors, thermoset components for biotechnology and electronics

Employees: 150

Production: Approx. 10,000 square metres at the central location in Singapore

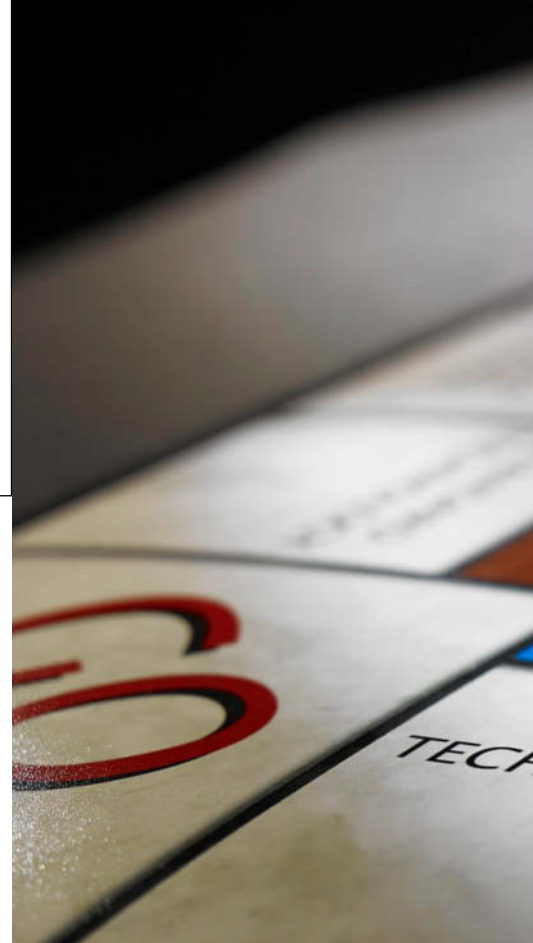
Machine fleet: 105 injection moulding machines, of which 99 ALLROUNDERS in the clamping force range between 150 and 5,000 kN

Contact: www.tempco.com.sg



TECH TALK

Oliver Schäfer, Technical Information



Calculation reaps b

Production efficiency reduces unit costs – cube-mould case study

Decisive for efficient production is that the manufacturing process is continuously reviewed and developed further. In order to identify and assess all the possible alternatives and the potential they offer, overarching specialist knowledge is increasingly required. One good example is the use of cube moulds. A detailed comparison with conventional mould technology can lead to surprising results.

The advantages of cube moulds is clear: the four mould sides usable for production and the two adjacent parting lines (see examples on page 14). Individual production steps such as mould filling, cooling or part removal can run simultaneously and cycle times can be shortened by up to 30 percent. Further process steps such as insertion, assembly and quality assurance can be integrated without extending the

cycle time. Double the number of cavities is available over the same mould mounting surface.

Cube mould technology increases productivity

The required unit volumes can therefore be achieved with fewer or smaller machines. This also reduces machine footprints, as well as energy and cooling costs. The advantages of cube mould technology are however offset by significantly higher procurement costs, including for the machine. So, the question remains: When does this technology pay?

Based on the example of a two-component closure for water bottles, conventional rotary table technology is compared with cube mould technology in the case of multi-component injection moulding (diagram). The basis for calculating the manufacturing costs are

the following framework data and definitions:

- Required annual sales volumes
- Possible system combinations: range of moulds from 8 to 32 cavities and of ALLROUNDERS from 2,500 to 5,000 kN clamping force
- Process-dependent cycle times: 13 seconds for rotary table technology and 9.5 seconds for cube mould technology because cooling and ejection occur simultaneously with the injection moulding process

A graphical representation of the calculation makes it clear when which investment decision is recommendable: as soon as a machine with rotary table mould is no longer sufficient in order to produce the required unit volumes, use of a cube mould begins to make economic sense. In the example, this is the case at an annual sales volume of approximately 45 million



enefits

closures. With increasing unit volumes, there may be jumps in manufacturing costs, which are associated with the number of machines required.

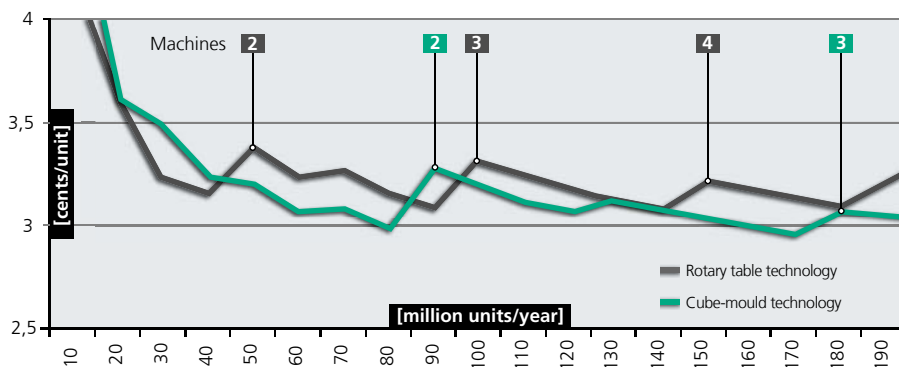
Cube mould technology is ideal for high-volume batches

The level of capacity utilisation also plays a part. The higher this is for a system combination, the more probable it is that

one technology is more cost-effective than another. During the production of large unit volumes, a considerable reduction in production costs can be achieved using cube moulds. This is particularly the case when fewer machines can be used as a result and/or the cycle time can be significantly reduced. The following rule of thumb applies: in the case of parts with cycle times above ten seconds in conjunction with the relevant sales volumes, it is

Increase revenue – with the right strategy (photo above). A detailed comparison of manufacturing costs for a two-component closure (diagram) illustrates the savings potential of cube moulds with rising unit volumes.

worth making the calculations – regardless of the relevant industry.



THE ART OF PRODUCTION EFFICIENCY



Finding the decisive perspective – that is true art. Around 3.5 billion high-quality plastic parts are produced every day worldwide on ALLROUNDER machines. If you want to produce efficiently, we are the perfect choice. We ensure your economic success. And your future perspectives!