

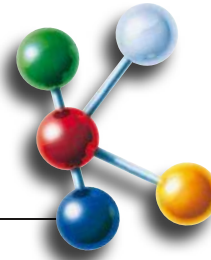
# today

The ARBURG magazine

Issue 44

2010





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## MASTHEAD

today, the ARBURG magazine, issue 44/2010

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Achieving more: hand-in-hand. ARBURG presents itself as a strong partner for efficient injection moulding at the K 2010.

**ARBURG**



## Dear Readers,

A great deal has happened since the last K exhibition. The entire sector declined sharply from lofty heights in 2009. Fortunately, the situation has improved considerably for us now and we have hit the ground running with our team. Moreover, we have done so with our accustomed strength, having overcome the crisis without personnel cutbacks. ARBURG has thereby once again proved itself as a tower of strength and a reliable partner upon which employees and customers alike can always depend. Partnership is also one of the keywords for us at the K 2010. Here, you will find out how more can be achieved "hand-in-hand" through efficient co-operation, which must above all be characterised by simplicity and dependability. This applies just as much to business co-operations as it does to the machines, applications and control technology. One excellent example is our unique

SELOGICA control system, which we are developing further on an ongoing basis. From the outset, our philosophy was to make the control of complex processes both simple and reliable. The list of milestones is long and ranges from sequence programming and real-time plausibility checks through to implementation of the SELOGICA user interface in six-axis robotic systems and of course the SELOGICA "Set-up Assistant" module, which is celebrating its premiere at the K 2010. Find out more in the following pages about our exceptional control system, further innovations and trade-fair highlights, as well as about the ALLROUNDERS in practical use.

I hope you enjoy reading our new issue.

Michael Hehl  
Managing Partner & Managing Director



# Glimpse into

ARBURG  
UNDER 920 H   
5000-4600  
HIDRIVE



One such development is a global innovation, the new SELOGICA "Set-up Assistant" module for quick, simple and reliable set-up of the ALLROUNDER injection moulding machines (see page 6). Visitors can see how the set-up assistant works for themselves on one of the exhibits.

The second premiere is the new hybrid ALLROUNDER 920 H with a clamping force of 5,000 kN, with which ARBURG is expanding the successful HIDRIVE machine series upwards while also extending its large machine range. A high-performance, cost and energy-efficient machine concept enabling fast operating cycles is thus now also available for higher clamping forces. The high-performance hybrid machine features a newly-designed servo-electric toggle-type clamping unit for fast and highly precise movements. Combined with a hydraulic, size 4600 injection unit and adaptive hydraulic accumulator technology, the new HIDRIVE machine is presented at the K 2010 with a packaging sector application featuring sophisticated core slide technology. This exhibit is also equipped with a new MULTILIFT SELECT robotic system as well as the new additional ARBURG Mobile SELOGICA control panel.

By way of contrast to the large machine, advanced micro-injection moulding can also be seen at the K 2010. The electric ALLROUNDER 270 A operates with the ARBURG micro-injection module (see page 10) and producing



**A**RBURG is presenting its broad range of application-oriented and energy-efficient injection moulding solutions with ten sophisticated exhibits at the K 2010. Taking centre stage at the exhibition stand are two world premieres: the SELOGICA "Set-up Assistant" module and the hybrid ALLROUNDER 920 H with a clamping force of 5,000 kN.

Traditionally, the leading international "K" trade fair is the major platform for presenting global innovations, new introductions and future trends. As always, almost everything at ARBURG is new. Almost – because there is one thing that visitors to the fair are certain to recognise in 2010: The company maxim "ARBURG for efficient injection moulding" is living practice. In addition to the two global premieres, complex production cells featuring innovative detail solutions and a variety of high-tech application and mould exhibits for the cost-effective production of complex parts. All the exhibits also demonstrate the performance and flexibility of the unique SELOGICA control system, which ARBURG develops further on a continuous basis.

# the future



a micro clamping frame weighing 0.005 grams. These parts are removed using a specially-equipped MULTILIFT H robotic system and set down separated by cavity. An enclosure with ionisation ensures the necessary draught-free, antistatic environment.

The potential offered by a Kuka six-axis robotic system with SELOGICA user interface is demonstrated by the fully-automatic yet flexible encapsulation of cables on a vertical machine. On the one hand, the injection moulder is able to program the robotic sequences himself via SELOGICA, the set-up and training requirements are greatly reduced and cycle times are effectively shortened. On the other, no manual operations are required as the robotic system is able to insert the pliable cables in several cavities at freely-selectable positions, whereby the length of the cable loops can be determined in an extremely flexible manner.

Innovative mould and application technologies are the key to cost-efficient production. In this regard, ARBURG is presenting three impressive examples from the field of multi-component injection moulding. On show worldwide for the first time is the production of a rotary encoder, which is made on a three-component ALLROUNDER in a single production process. (see page 8). A cube mould and a mould featuring SCPS (Servo Cavity Positioning System)

or paternoster technology are presented on large two-component ALLROUNDERS (see page 9).

Overall, the main emphasis for the exhibits is on the hybrid HIDRIVE and the electric ALLDRIVE machine series, which bear the ARBURG „e<sup>2</sup>” energy-efficiency label. This also includes the high-speed packaging application from the field of in-mould labelling: This production cell comprises the high-performance hybrid ALLROUNDER 570 H with a clamping force of 2,000 kN as well as a 6-cavity mould and an IML system from Hofstetter.

An electric ALLROUNDER 520 A with a clamping force of 1500 kN is equipped especially for use in the medical technology sector. Machine features include white powder coating of the machine surface, encapsulated clamping unit with stainless steel enclosure, coated clamping surfaces, raised machine base and clean-room module above the clamping unit.

The way in which thermoplastic and liquid silicone (LSR) can be processed perfectly in combination is demonstrated by the production of a so-called coupling cushion on an electric two-component ALLROUNDER 570 A with a clamping force of 2,000 kN. Here, a MULTILIFT robotic system transfers the components inside the 4+4-cavity mould from Rico, as well as removing the finished parts, which are subsequently laser-engraved.

The programme at the K 2010 is rounded off by the topic of Product protection,

ARBURG is introducing global innovations and more at the K 2010 as well as presenting itself as a partner for efficient injection moulding.

including a variety of practical solutions, as well as by presentation of the service, training and production optimisation departments. Add to this the competent, customer-specific consulting and support provided by the ARBURG experts. These aspects are essential because efficient injection moulding is increasingly characterised by customised solutions.







# 5 – 4 – 3 – 2 –

**T**he complete injection moulding process in just five menu steps: Thanks to the new SELOGICA “Set-up Assistant” module, installation technicians can now for the first time set up ALLROUNDER injection moulding machines simply, quickly and reliably without prior specific knowledge of the control system. The set-up assistant accompanies the installation technician throughout the set-up process – from installation of the mould through to automatic initial calculation of the parameters and the finished sequence.

Once again, ARBURG has set new standards in terms of simplified and comprehensive control technology. Unique due to its very simple human/machine interface, the SELOGICA “Set-up Assistant” module now offers supervised set-up, or “teach-in”, functions for the entire machine sequence. Installation technicians are actively supported during set-up and are literally “led by the hand”. It takes only five menu-guided steps to create a complete sequence:

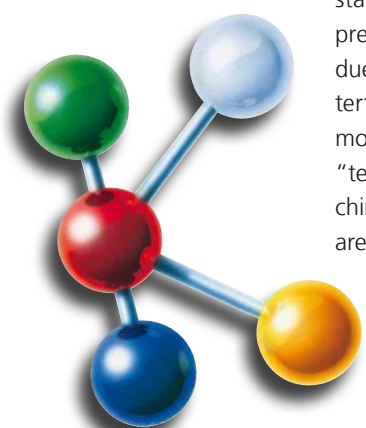
**Step 1** serves to select all the necessary machine functions with which the ALLROUNDER is to operate, such as ejector, core pull or sorter unit. The available selection options depend on the machine equipment.

**Step 2** provides active support during mould installation. The optimum se-

quence of operating steps is specified by the set-up assistant. These only need to be consecutively performed and confirmed. Sub-sequences, such as referencing (zeroing) of individual machine axes are selected in a central screen page and started at a single push of a button. The control system then performs the relevant task automatically. A schematic display acts as an additional guide and no parameter entries are required.

**Step 3** prompts the installation technician to enter the most important data for the injection moulding process. This includes the screw diameter, material, mould type, projected area of the moulded part, shot weight, wall thickness and flow paths. Very little product data is thus necessary in order to have all the processing parameters such as temperatures, pressures or speeds calculated automatically by the SELOGICA control system. An extensive embedded database is used for this purpose.

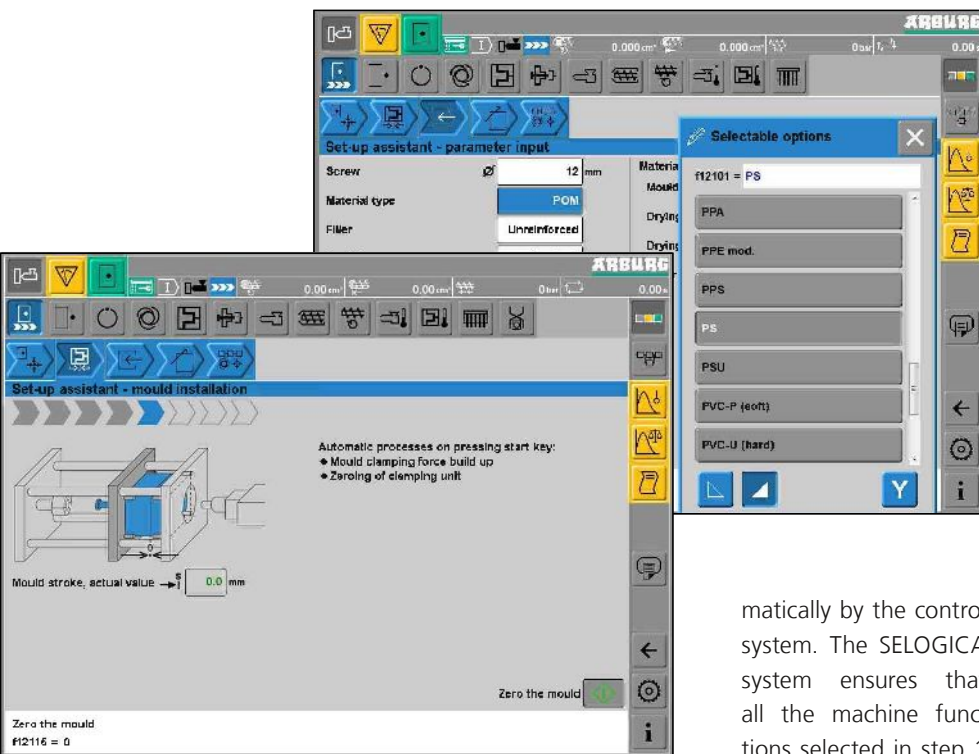
**Step 4** is required to determine which parameters the control system is to calculate automatically. Here, modular selection options make it possible to, for example, change only the injection unit temperatures when changing materials. All the other parameters can remain unchanged. Furthermore, on this set-up assistant screen, all the available monitoring and log functions can be automatically initialised “at the click of a button”. The usual entry of parameters in different of





# 1 – Go!

The SELOGICA "Set-up Assistant" module provides active support in setting up the ALLROUNDER, making the installation technician's life significantly easier.



ALLROUNDER. Two main advantages of the SELOGICA "Set-up Assistant" module are of prime importance: the installation technician no longer needs expertise in the control system in order to set up the entire injection moulding process. Moreover, preparation of the ALLROUNDER for production is much faster than previously thanks to the high flexibility of the set-up assistant and the automatic functions which run in the background.

The new SELOGICA module is therefore a further, well-conceived ARBURG milestone towards the truly simple operation of injection moulding machines.

screens and the selection of various monitoring and log functions "in the depths of the control system" is thus completely dispensed with.

**Step 5** finally serves to "teach-in" the machine sequence, which can be set up serially via the menu guidance. In other words, all the installation technician has to do is move consecutively to the required positions and confirm them. All the parameter entries, as well as completion of the machine sequence is performed auto-

atically by the control system. The SELOGICA system ensures that all the machine functions selected in step 1 are taught-in. During the accompanying set-up procedure, protection mechanisms, such as the position for mould protection are determined. The "teach-in" process renders programming of the machine sequence completely unnecessary.

Once all five steps have been completed, preparation for use of the ALLROUNDER is virtually effortless.

Because each partial function can also be used individually, the installation technician is effectively supported during every mould change and set-up operation on the





# Three into one

**The combination of intelligent mould solution and integrated automation forms the basis for the cost-efficient production of complex parts. What has become possible today is demonstrated by ARBURG at the K 2010 based on a highly-complex production cell featuring innovative detail solutions.**

The exhibit shows the production of a rotary encoder with inserted sensor, which is highly complex in terms of application technology. The three-component part comprises a magnetic disc made from ferrite-containing PA, a carrier plate with an encapsulated sensor made from PBT with 30% glass fibre content and a protective cap made from MABS. An ALLROUNDER 370 S with a clamping force of 700 kN and three (size 30, 70 and 30) injection units are employed for producing the device. The injection mould was designed and built by Oechsler, who also developed the component concept in collaboration with the Chair of Plastics Technology of the University of Erlangen. The companies Günther Heißkanaltechnik (hot runners), Kiki (gripper) and Xenon (separating station) are also involved in this project.

During production of the rotary encoder, several processes take place simultaneously in the three mould cavities. At the first mould station, the PA material containing ferrite components is already positioned and magnetised within the mould during injection moulding. The disc is then transferred to the second station on the ejector side by the longitudinally-arranged MULTILIFT V robotic system, which simultaneously inserts a sensor into the mould on the opposing nozzle side. Next, the disc is

encapsulated with a carrier plate, which also acts as a moving mounting for the magnetic disc. Both parts are thus joined to one another via assembly injection moulding. In the third mould station, the protective cap for the magnetic disc is produced. Finally, the MULTILIFT V removes the moulded parts and assembles them to form the finished rotary encoder.

This innovative mould concept thus combines the following processing steps: injection moulding of the magnetic disc, encapsulation of the sensor with a carrier plate, including the shaft upon which the mag-



netic disc is mounted, as well as production of the protective cap. As a result of the partial tasks of the robotic system – inserting the sensor, transferring the magnetic disc in the mould, part removal and final assembly – fully functional rotary encoders are produced in a single production process.

The entire production cell is controlled via the SELOGICA machine control system. The three injection units, the robotic system and all the mould functions are fully integrated in the SELOGICA system and can be programmed in the same way as additional machine functions. For users, this means maximum flexibility during set-up. All movement sequences can be perfectly coordinated and comprehensively synchronised.

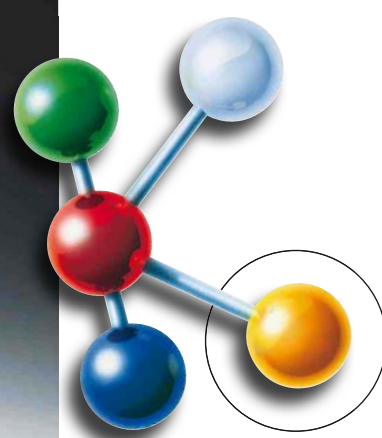
The rotary encoder consists of several individual parts (below) and is produced in a single process. A three-cavity mould is used for this purpose (above).

Through the combination of injection units and the robotic system in a central sequence, the operator also has direct access to all the processing parameters and can e.g. compare the parameters of the three injection units in detail by means of the freely-configurable process graphics.

This application impressively demonstrates how complex parts made from several components can be produced smoothly using insertion and assembly steps thanks to perfectly harmonised mould, machine, robotic and control technology.







The ARBURG micro-injection module combines an 8-mm injection screw (illustration below) with a second screw for melting the material.

# Small is beautiful

**T**he smaller the moulded parts, the more challenging the manufacturing process. This accurately describes the requirements with regard to the production of miniature and micro parts with shot weights of less than one gram. The ARBURG micro-injection module comprehensively meets these requirements.

Minute quantities of melt must be homogeneously prepared and must not of course be subject to the slightest thermal damage. Consequently, the dwell time in the plasticising and injection units must be short and the level of shearing during preparation must be correspondingly low. It is also desirable that not only special materials, such as e.g. micro granulate can be processed, but also the entire spectrum of "normal" plastics. And finally, the low injection volumes have an effect on the screw movement, which must be extremely precise.

To meet these requirements, ARBURG has developed a special micro-injection module which does not, as do many alternatives on the market, operate with a combination of screw pre-plasticising and piston-type injection, but with two screws that "divide up", so to speak, the task of

preparation, dosage and injection of the material.

First, a servo-electrically driven pre-plasticising section, which is installed at 45 degrees to the horizontal injection screw, ensures optimum preparation of the standard granulates. In terms of screw channel depths, the plasticising screw used is similar in design to a conventional three-zone screw.

The molten material is then transported from the pre-plasticising stage to the injection screw. This screw, used purely for material transport, has a diameter of only eight millimetres, is fitted with a non-return valve and operates according to the screw/piston principle. It enables high-precision implementation of even the tiniest shot weights. At the same time, the perfect interaction between the two systems ensures excellent, gentle material processing. The melt is continuously fed forwards from the material inlet to the tip of the injection screw. The first-in-first-out principle is also fully observed.

In order to achieve even melt transport, the pressure at the transfer point between the pre-plasticising screw and the injection screw is monitored and regulated. A homogeneously prepared, newly dosed melt is thus always available for every shot. This keeps the material dwell times

correspondingly short, preventing thermal damage.

The micro-injection module is designed specifically for use on electric ALLROUNDER A machines with a size 70 injection unit. Like all ARBURG cylinder modules, it can be changed rapidly and used on a number of machines. This also means that the range of machine applications is not limited to micro-injection moulding.







Photos: Fa. Siemens-W.G.



Even when moulding the demonstration parts with a wall thickness of 0.2 mm (below) during the development stage of the combination drive (left), it became evident that the linear motor would open up completely new dimensions in the field of thin-walled applications.

# Full speed ahead

**The centrepiece of the innovative injection unit for electric ARBURG injection moulding machines is the linear motor for rapid and highly dynamic injection. It opens up completely new dimensions in the thin-walled moulded parts sector.**

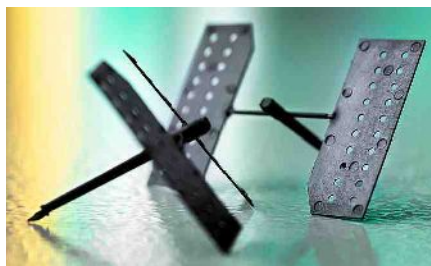
Some time ago, both Siemens and ARBURG toyed with the idea of using a linear motor for the injection axis on electric machines. By combining their expertise, this common vision has been translated into reality. The result is an innovative combination drive which comprises a linear motor for the injection movement and a rotary motor for the dosing movement. This is used on an electric ALLROUNDER 370 A featuring an 18-mm screw. The solution can also be implemented on larger ALLDRIVE machines.

With the combination drive, the linear and rotary motors are combined in one housing. Thanks to the direct drives, only few mechanical components are required for the injection unit, which minimises wear and the maintenance requirements. The same also applies to the linear motor, which has few moving parts and is therefore wear-free.

This is also the highlight of the innovative injection technology, which brings decisive advantages. The high acceleration capability is the result of the direct connection of the linear injection motor with the screw, as well as the low moment of inertia ratio. This means that extremely high speeds can be achieved, while the

motor remains controllable at all times. Furthermore, the drive is absolutely play-free so that maximum precision and reproducibility are guaranteed. The positional accuracy is under 0.01 mm. The high acceleration capability and high injection speeds are not only beneficial for producing very thin-walled parts. This injection technology also opens up completely new, previously unrealisable applications in the thin-wall sector. Significant potential is also provided by the increasing miniaturisation of components, for example storage enclosures and connections for the electrical/electronics sector.

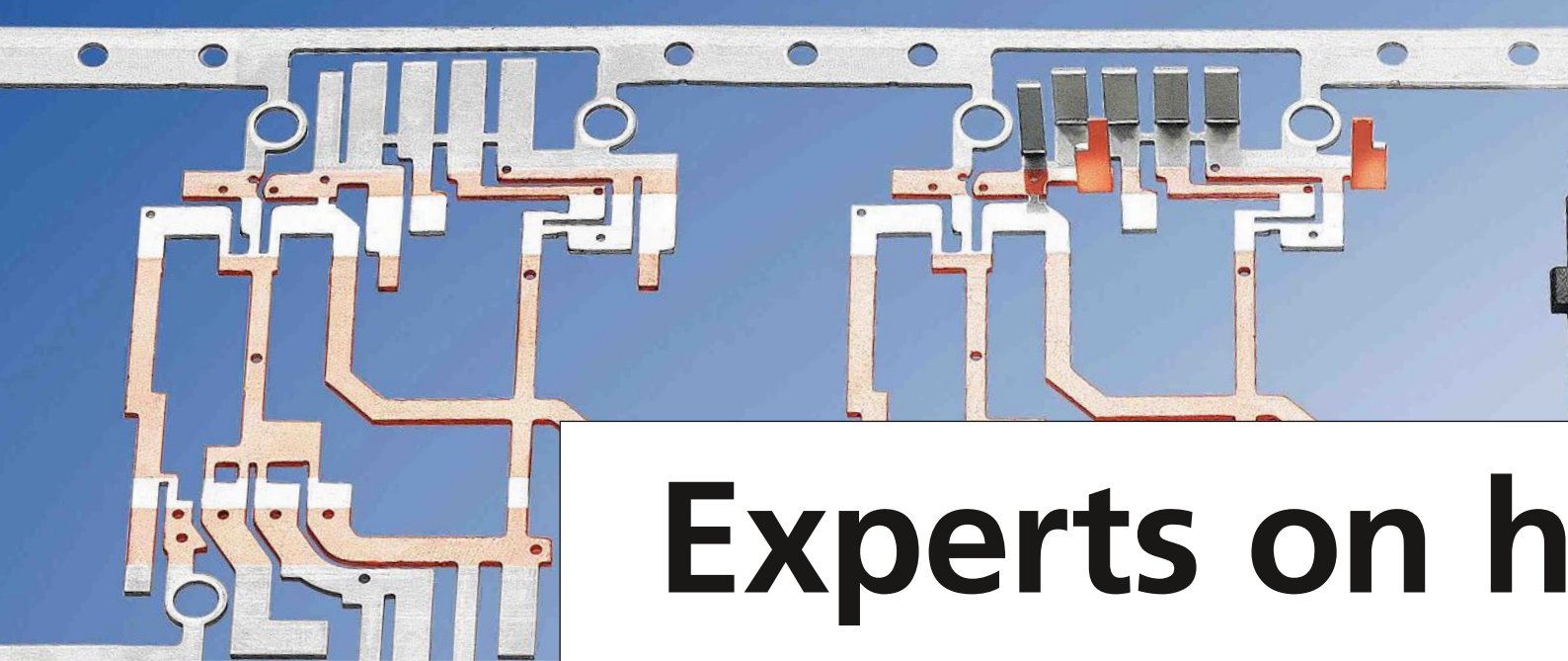
At the K 2010, the joint innovation will



be presented to the international trade public for the first time at the Siemens exhibition stand. Together with customers and partners, for example from the materials sector, ARBURG intends to exploit new application areas for this technology, which is unique on the market, in the future.

## INFOBOX

- Controlled injection at extremely high speeds and accelerations
- Even thinner moulded parts with a flow path/wall thickness ratio of between 200:1 and 300:1
- ALLROUNDER 370 A with 18-mm screw
- Acceleration rate of 8 g (12 times higher than on a standard electric machine)
- Maximum injection speed of 2,000 mm/s



# Experts on h

**A**s a precursor of the innovative, highly integrated progressive injection moulding process, Kummer GmbH + Co. KG, based in Ötisheim, Germany, has developed an alternative to reel-to-reel injection moulding to production readiness. The technology leader has successfully used this process for many years in the production of hybrid components made from metal and plastic. The relevant injection moulding technology is from ARBURG.

“Over the past twelve years, the company has developed from a tool and die manufacturer to a development partner and producer of metal/plastic composite parts with integrated electronic components,” says Jens Hofmann, one of the company’s two owners, describing the road to Kummer’s success. In future, the intention is to further expand the development partnership, without neglecting the company’s existing expertise in toolmaking and stamping.

Günter Klappich from the Plastics department at Kummer explains the progressive injection moulding technology: “Progressive injection moulding has been fully developed in-house and demonstrates the innovative strength of our company. For our customers, this solution represents higher process reliability combined with low overall costs. Our development engineers have purposefully further developed the reel-to-reel injection moulding process. With progressive injection moulding, the stamping and injection moulding machines are not arranged consecutively in a production line. Instead,



Photos: Fa. Kummer

the entire stamping, bending and injection moulding process is combined in a single machine. This saves time and costs. Currently, our company is the only one in the world capable of offering this process. We are therefore the innovation leaders in this field.”

The problem which occurs with decoupled reel-to-reel injection moulding is that the relatively slow injection moulding cycle determines the production speed of the entire line. With progressive injection moulding, in contrast, only one central machine is used, which stamps the sheet metal parts from the strip, then bends and shapes them before finally encapsulating the

worked product with plastic. Using this process, high-quality parts can be produced reliably and at low cost in small, medium and high unit volumes. Economy and speed of production are increased while maintaining the same or even higher quality levels. Kummer is delighted to share these advantages with its customers, who are primarily based in Germany, Europe, North America and Asia and are mostly involved in the electric and electronics, automotive, communications sectors, the furniture industry and medical technology.

As a fully-automated production process, progressive injection moulding utilises the clamping force of the injection moulding machine to





# Hybrid components

shape the metal inserts as well as for injection itself. Consequently it not only processes the plastic, but also stamps and bends the inserts without incurring additional costs. An additional quality control feature can be integrated, which ensures that the necessary production level is maintained. Only one mould is required for the entire process, significantly reducing set-up and machine times. Furthermore, the entire process



is more reliable as no losses in quality arise through the linkage of several processing systems and production tolerances can be minimised.

Progressive injection moulding is integrated in Kummer's K'Tecsystem, a system service which draws on the expertise of the Toolmaking, Plastics, Stamping and Assembly departments. The modular system approach affords the customer considerable freedom of choice with regard to which K'Tecsystem module is used. Although the four departments can be drawn on individually, it is only in combination that their considerable efficiency and productivity advantage can be exploited to the full. The sooner the Kummer developers are involved

in a process, the greater the possibilities. Moreover, thanks to its very high degree of vertical integration, the company can respond quickly, independently and flexibly. The entire production process is continuously monitored and optimised, without incurring any time or flow losses.

This is ensured thanks to in-depth expertise as well as a state-of-the-art machine fleet, which Kummer has built up and expanded jointly with ARBURG since 1998. It comprises a total of nine vertical ALLROUNDERS for the encapsulation of inserts and more machines are planned. The clamping force range is between 800 and 2,000 kN and production takes place in three shifts.

Both ALLROUNDERS in their "classical" form, as well as specially-equipped progressive injection moulding machines with the appropriate moulds are integrated in production. The principal requirement for progressive injection moulding in addition to vertical clamping units are large mounting surfaces because the special moulds require ample space due to the integrated functions. One machine is equipped with a robotic system for fully-automated production. The metal parts are bent, stamped, encapsulated and separated reel-to-reel, then automatically removed, checked and set down.

Jens Hofmann assesses the co-operation with ARBURG in all areas as excellent: "Especially positive for us is also the SELOGICA machine control system, in which all the machine and peripheral sequences are centrally integrated without requiring any extensive programming or training. The price/performance ratio of the ALLROUNDER is very good, as is its availability." These state-

*Präzision mit System.*

**Kummer**

Owners Jens (left) and Wolfgang Hofmann are proud of their company's innovative strengths and their technological leadership in progressive injection moulding.

ments bode well for the future co-operation between the two companies.

## INFOBOX

**Founded:** 1970 by Herbert Kummer, 1977 takeover by Wolfgang Hofmann  
**Production area:** 8,000 m<sup>2</sup>  
**Employees:** 150  
**Products:** Composite metal/plastic parts and assemblies using PA66, PA6T, PBT, LCP and PPS  
**Contact:** Kummer GmbH + Co. KG, Enzberger Straße 26, 75443 Ötisheim, Germany  
[www.kummer-gmbh.de](http://www.kummer-gmbh.de)



# Tubes



Photos: Fa. C-Pack

**H**ow does a packaging specialist gain an ideal market position and achieve year-on-year growth of 40 percent? The Brazilian company C-Pack shows how it's done: with first-class quality thanks to innovative design and with technically sophisticated machines from ARBURG, which guarantee availability around the clock. Today, C-Pack produces up to 100 million plastic tubes a year according to these principles and is the Latin American market leader in this sector.

C-Pack specialises in plastic tubes, which are filled with a wide variety of substances. In January 2002, the Brazilian company, which counted some 30 employees, began producing coextruded multilayer tubes with injection moulded closures, initially for the cosmetic industry. Business soon prospered. Only eight years later, staffing levels have increased eleven



fold to around 330 employees. This year, the company with Brazilian/Swiss capital is set to achieve a turnover of 26 million euros (60 million reais). "We are experiencing sustained growth of 40 percent annually on average," says company founder and CEO Luiz Gonzaga Coelho regarding the success story of C-Pack. He adds that, "With the production of around 100 million units per year, we have been the market leader in Brazil and throughout Latin America since 2009. Further major sales markets include Mexico, the US and Canada."

In addition to cosmetics and food companies, customers from the industrial and pharmaceutical sectors are becoming increasingly significant. The product range extends from beauty creams and honey to lubricants and adhesives. Customers such as Nivea, Avon, L'Oréal, Ox, Medley and 3M fill their products into C-Pack tubes. No wonder, because the packaging specialist has high qual-

ity demands, not least for reasons of hygiene. All the raw materials and additives are examined mechanically and chemically in the laboratory during incoming goods checks. In production, the relevant customer requirements are strictly monitored by means of random sampling.

What sets C-Pack apart from many of its competitors is its innovative strength and speed of development. "Our in-house experts develop customer solutions with high-quality designs in the shortest time," says Luiz Gonzaga Coelho naming one of the company's strengths. The products should be as light, flexible and above all as practical to use as possible. The spectrum ranges from antibacterial agents or dispenser tubes for highly viscous media through to pinpoint tubes with a pointed silicone valve which allows creams and fluids to be applied with extreme precision.

The closures are produced on eleven injection moulding machines in the clamping range from 600 to 3,200 kN, including nine ALLROUNDERS. "We purchased the first injection moulding machine from ARBURG in 2006", says Luiz Gonzaga



POST-CONSUMER RECYCLED  
**PCR**



**C-Pack**  
Creative Packaging

# galore

Coelho, "and have relied on quality 'Made in Germany' ever since." The machines employed are primarily hydraulic injection machines with clamping forces up to 1,500 kN, including the ALLROUNDER 520 S. The high performance of the hybrid HIDRIVE series ALLROUNDERS can be fully exploited in the packaging sector. They ensure highest productivity and short cycle times. At C-Pack, the machines operate around the clock, seven days a week



and 24 hours a day. Important criteria are therefore availability and service.

The plant at São José is sited in an area of 35,000 square meters with production currently taking place on approx. 11,000 square meters. The multilayer tubes are coextruded. In order to ensure long-term durability of the substances, the copolymer EVOH (ethyl vinyl alcohol), which reliably prevents diffusion, is added as a barrier material. The so-called shoulder, with a moulded thread if required, is injected and the closure attached. This may be, for example, a moulded PP screw cap or a flip-top cap.

Environmental considerations are taken extremely seriously during production. C-Pack consumes around 50 percent less energy and raw materials than conventional packaging companies. This is made possible both through a reliance on solar energy as well as the use of recycling plastics for eco-packaging. The company's own logistics arm, C-Log, ensures swift distribution of the finished products.

Sufficient space is available at the São José location for the expansion of the production facilities. "The future begins today," is the company's motto. Accordingly, concrete plans for expansion are of course already under way: By early 2011, production is set to almost double from the current nine to approx. 16 million tubes per month. Moreover, C-Pack has recently entered into a joint venture with Orange Products Inc. from the US and will enter a new business segment – the production of balls for deodorant roll-ons. A further segment is closure caps for third-party products. So what would make more sense than to use more ALLROUNDERS in the future?



C-Pack in São José produces tubes around the clock at a rate of 100 million per year. Decisive criteria when opting for ARBURG ALLROUNDERS were the high availability and excellent service.

## INFOBOX

**Founded:** 2002 by Luiz Gonzaga Coelho (CEO) and Philippe Glatz (President of C-Pack and PIDJI SA)

**Locations:** São Paulo and São José

**Employees:** 330

**Turnover:** 26 million euros, annual growth of approx. 40 percent

**Products:** Primarily tubes and caps for the cosmetics, pharmaceutical, food and industrial sectors

**Machine fleet:** Eleven injection moulding machines, of which nine are ALLROUNDERS with clamping forces from 600 to 3,200 kN

**Contact:** C-Pack Creative Packaging SA, Rua Dr. Gentil Leite Martins, 168 Jardim Prudência, São Paulo, Brazil, [www.c-pack.com.br](http://www.c-pack.com.br)



# Well-proven



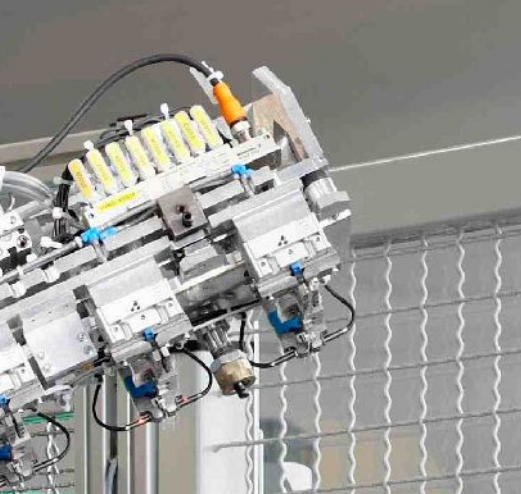
**P**rogramming six-axis robotic systems without programming expertise? No impossible task, as is evidenced by four ARBURG customers who are doing precisely that with growing enthusiasm. With the graphic sequence programming of the SELOGICA control system, setting up robotic systems of this type, as well as entire systems is almost child's play.

As "masters of movement", six-axis robotic systems are interesting for complex handling tasks. The programming requirements, which often even necessitate external specialists, represent a barrier here. There is another way, however: Jointly with system integrator FPT Robotik, ARBURG is the only manufacturer of injection moulding machines to have implemented the SELOGICA user interface in the control system of the Kuka robotic system. This enables injection moulders to program

even complex robotic sequences without specialised knowledge, according to the same principles used for the machine sequence itself. This in turn reduces the set-up requirements significantly. This solution also makes it easier to comprehensively synchronise movement sequences in order to, for example, effectively reduce cycle times. Furthermore, numerous additional functions for day-to-day operation, such as the removal of random samples, are available. Since the roll-out of this innovative solution, these robotic systems are increasingly proving themselves in practice.

Examples include Schnoor Plast ApS in Hobro, Denmark. In order to significantly improve the flexibility of his production and to be able to manufacture larger moulded parts for his customer, the company's founder and managing director, Kjeld Schnoor, invested in a fully-automated production cell. It consists of a





# in practice

large hydraulic ALLROUNDER 920 S with a clamping force of 5,000 kN and a size 4600 injection unit, an integrated Kuka six-axis robotic system with SELOGICA user interface and a pallet chain conveyor.

According to Schnoor, the deciding factor for purchasing the production cell was the simple programming and control of the entire injection moulding process, including the peripherals. "Following a one-week training course, I as a non-expert was already able to program the

fact that it opens up a completely new range of applications compared to linear robotic systems. The problem, however, according to Böing-Meßing, is the programming, for which – even in the case of minor corrections – a programmer from the manufacturer had to be called in, which was both expensive and time consuming.

Detlef Eckmann, head of product and process development at BÖ-LA, explains the problem, "To train in-house employees only makes sense if they subsequently program a system at least once a week, if not on a daily basis. Otherwise, the knowledge acquired is soon lost." He speaks from experience, as he has himself attended the relevant programming courses. He added that for outsiders, the experience is similar to working with a PC: If complicated programs are not used frequently and regularly, you soon run into difficulties.

Accordingly, both Eckmann and managing director Roland Jürgens were thrilled when ARBURG announced the implementation of the SELOGICA user interface on the robotic control system. The first time they actually saw the system in action was at the ARBURG Practical Automation Forum held in Lossburg in December 2009. "It's simply fantastic", says Jürgens, impressed. Not only is it comparatively simple to set up the system because the intuitive SELOGICA graphic sequence programming is already familiar, but the minor corrections, which are always necessary, no longer pose a problem and can be dealt with in a matter of minutes.

basic movements myself. Once this task is completed, the entire production process can be managed directly via the central SELOGICA machine control system."

BÖ-LA Siebdrucktechnik GmbH, Radevormwald, Germany, in contrast, already had some initial experience of a six-axis robotic system from a previous project. Managing partner Mike Böing-Meßing believes the system's main advantage lies in its freedom of movement and

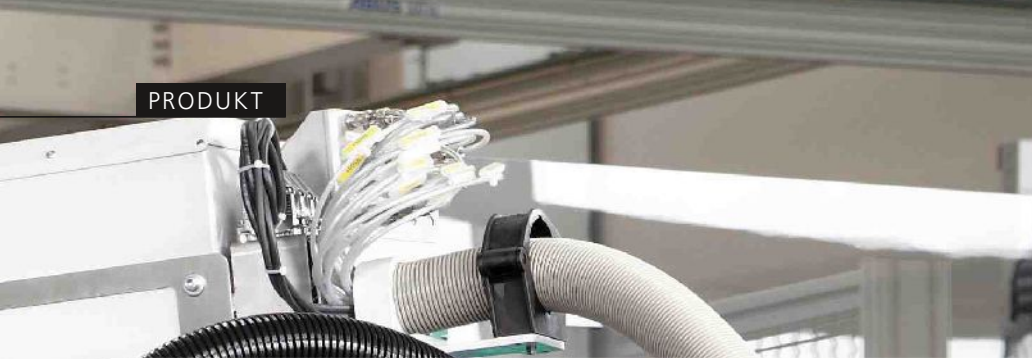
Photo, left: Kjeld Schnoor from Schnoor Plast and ARBURG subsidiary manager Lars Nygaard (from left) show their satisfaction with the Schnoor Plast system. Photo, bottom: At BÖ-LA, the six-axis robotic system is integrated in a clean-room production cell.

Evidently, the demonstration at ARBURG was convincing. For the produc-



tion of a special display, during which a thin film was first encapsulated in crystal-clear PMMA and then provided with a frame made from ABS, BÖ-LA invested in an ARBURG clean-room production cell built around an ALLROUNDER 570 S and a Kuka six-axis robotic system. Originally, a completely different production solution had been planned.

In this context, Eckmann mentions the compact and space-saving design of the

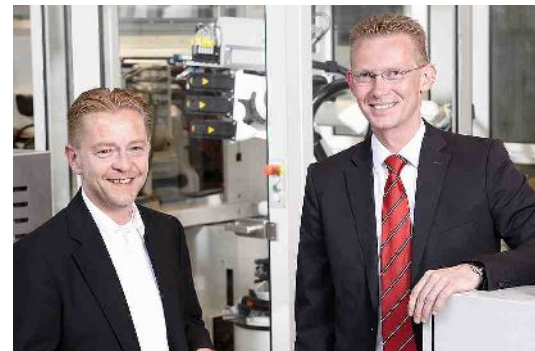


robotic system as a further plus. It means that the clean room can be built smaller, which makes the processes running within more controllable. Particularly during the production of components with high-gloss surfaces, it is vital that dust is prevented effectively. It therefore comes as no surprise that the two men fully agree that they will favour the ARBURG solution for the relevant new projects.

Linden GmbH & Co. KG in Lüdenscheid has also purchased their first ALLROUNDER with a six-axis robotic system. The company uses the new production cell for manufacturing paintable two-component moulded parts such as trim panels in the steering wheel area. "With the six-axis robotic system, we are not only able to combine cross-process steps, but also shorten throughput times and minimise process risk," explains production manager Christian Nolte. He also praises the standard user interface for machine and robotic system, which makes it easier for employees to independently program the robotic



cover plates for plug sockets are produced on a 32-cavity mould, which are then assembled at fully-automated stations at a speed of approx. 3,500 units per hour. The plastic parts must therefore be extremely precise. In order to prevent the loss of a complete production batch in the event of a defect in a single mould cavity, the plastic parts are removed separately and set down according to cavity. Here too, the simple programming of the robotic system impressed the technicians, as the head of the Gira plastics centre, Gerhard Jacobi, confirms. "After only a three-day training course, our employees were able to set up the system on their own." In light of the frequent mould changes required, the flexibility of the robotic system plays a decisive role in addition to its simple operation, adds Rainer Stein, technical manager of plastics production. The ARBURG concept was so convincing that Gira soon afterwards invested in their next robotic combination for clean-room production in the context of a replacement for another machine.



Photo, left: Christian Nolte is impressed by the first six-axis robotic system at Linden. Photo, top: From the outset, Rainer Stein and Gerhard Jacobi from Gira (left to right) were convinced by the ARBURG concept, which they are now also using in the clean-room area.



Photo: Tom Schleicher/vor-ort-foto.de

system. It is therefore hardly surprising that a further six-axis robotic systems are to be employed at Linden in future.

At Gira Giersiepen GmbH and Co.KG, Radevormwald, Germany, expenditure on the first ALLROUNDER with a six-axis robotic system had technical reasons. Small



# Basis for individual calculations

**W**ith the steady rise of energy costs in recent years and the generally more responsible management of energy and resources, energy consumption has increasingly entered into the focus of attention of customers and machine manufacturers alike. In order to ensure an evaluation based on comparable data, the EUROMAP 60 guideline has been revised under the direction of the of the German engineering federation, VDMA.

The recommendations for determining the specific energy consumption of injection moulding machines provides basic data for the comparison of machines. In practice, however this must be individually verified through consideration of further detailed machine parameters. The objectives for the recommendations revised by the VDMA in 2009 are as follows:

- comparison of consumption of injection moulding machines, independent of the type of drive system
- determination of energy consumption regardless of moulds and processes, as well as
- options for the representation of energy consumption values for injection moulding machines in brochures

The energy consumption of an injection moulding machine with defined axis movements and a simulated injection process is measured through injection into free space via a defined nozzle. During three different test cycles, which represent a high-speed thin-wall application, technical parts and thick-walled items with long-

er cycle times, the performance categories of the machines is also to be taken into consideration.

However, in order to compare the complete spectrum of injection moulding machines with widely differing drive technologies and equipment, all parameters influencing energy consumption should be taken into account. Unfortunately, this is neglected in the vast majority of cases. In these cases the specific energy consumption values determined according to EUROMAP 60 are only comparable to a limited extent. Two examples serve as an illustration:

- Only electric and hydraulically powered movements are included in the energy consumption calculation – a pneumatically powered nozzle contact movement, for example, is not taken into account.
- Only maximum stroke and speeds are taken as the basis for the respective machines. However, machines which permit a larger opening stroke owing to their high degree of flexibility, for example, are at a disadvantage during the energy consumption calculation because the longer stroke inevitably leads to a higher machine energy requirement.

ARBURG's conclusion: EUROMAP 60 represents a basis, but comparisons between injection moulding machines of the same size and with the same equipment only become realistic in terms of their energy



Only tests with customer moulds can deliver accurate energy consumption figures and therefore realistic comparison values. ARBURG also provides individual consulting.



consumption when the respective customer processes are measured. In other words: Realistic comparison values can only be obtained when identical measurements are performed on the machines being compared using the same mould and the same process data. Considering the individual brochure values of each machine alone will not provide the results which customers and machine manufacturers hope for in terms of comparability.



# Excellent research

**W**hen Scientific Specialties Inc. (SSI) was founded in 1989, it counted exactly four employees. Just how booming the injection moulding sector in which the Californian company quickly positioned itself with the production of plastic components for biomedical research applications turned out to be is evidenced by the key figures: Today, SSI has 115 employees and the average annual growth rate is between 12 and 15 percent.

SSI particularly benefited from the expertise of its co-founder, biochemist Dr. Kenneth Hovatter, who was well-versed in this highly specialised market, in which he remains an expert. "Our main activities relate to the product design, mould construction and manufacture of test tubes made from PP, PC, PE and ABS, as well as stands and frames for storing these articles," explains Dr. Hovatter, describing the work of SSI. Further products include analysis and sealing strips, various tubes for microcentrifuges, screw-capped tubes, pipette tips and analysis tips for a variety of

automated microbiological testing, as well as PCR plates. Product design and mould construction complete the spectrum.

Polymerase Chain Reaction (PCR), one of the most important and accepted methods in modern molecular biology, is used for a broad range of purposes in laboratories, including the detection of hereditary diseases and viral infections, for creating and checking genetic fingerprints, for cloning genes and for DNA testing. The articles produced by SSI, some of which are patented, are mainly used for biomedical research and are sold in more than 30 countries world-wide. The company achieves 45 percent of its turnover outside the USA. Its products are distributed exclusively through wholesalers.

The scientific research and medical technology environment in which SSI operates requires an appropriately high level of quality control. This begins during manufacture of the moulds with high-precision forms which render the use of contaminating release agents superfluous. The use of machines whose performance meets the mould requirements is also a matter of course for the company, as this is the only way to ensure optimum surface quality, product properties and performance. Furthermore, random samples are taken from running production and inspected on an hourly basis. Functional tests are also carried out to determine whether or not the sampled items and consequently the entire batch can be sent for packaging

or not. Incidentally, SSI does not need to manufacture under clean room conditions because the moulded parts are subsequently further processed, packaged and sterilised.

The first of a total of more than 60 ALLROUNDER injection machines were purchased back in 1991. "It's always been important for us to have modern technology at our disposal in our injection moulding plant to ensure smooth and high-quality production. That's why today we only use ALLROUNDERS with the SELOGICA machine control system. All of the machines also feature position regulation, for example for injection profiles, and many also have an injection accumulator to ensure the necessary high performance at all times," explains operations manager Anthony McCracken.

The advantages of the ARBURG machines, which operate 24 hours around the clock, seven days a week, were outlined as follows by the company's owner, Dr. Hovatter: "The advantages of position-controlled machines using accumulator technology are particularly evident when it comes to the production of thin-walled



Photos: Fa. SSI





# partners



During the production of their high-quality products, which are primarily intended for use in biomedical research, Dr. Kenneth Hovatter (left) and Anthony McCracken have relied on ARBURG technology for 20 years.

parts, which we supply to our customers in the PCR analysis sector. The combination of the SELOGICA quality assurance functions with the options provided by the ARBURG selector unit helps us during quality control and the separation of reject parts that fail to meet our stringent quality requirements. We've already completed up to 22 million cycles on our ALLROUNDERS and are highly satisfied with their performance capabilities."

SSI's machine fleet now also includes nine electric ALLROUNDER ALLDRIVE machines on which up to seven million cycles have already been run. These electric ARBURG machines are particularly valued for their high precision and accuracy in producing high-tech parts using complex mould geometries. In addition to the simple operation via SELOGICA, a significant advantage of the control technology is the transferability of data records from one machine to another. All that is then required are fine adjustments, which are subject to an automatic plausibility check. This allows part production to be planned extremely flexibly and the training requirement with regard to employees is negligible.

Investment in the areas of multi-component processing and automation at SSI is also forward-looking. For the rapid and convenient stacking and set-down of the plastic parts, many of the machines have

already been equipped with robotic systems. TPE is used for multi-component injection moulding, for example during the injection of O-ring seals directly into the screw caps for test tubes.

"Further co-operation with ARBURG is also envisaged in the future," says Dr. Hovatter, for whom comprehensive service was another important criterion for using ALLROUNDERS in his company virtually from the outset.

## INFOBOX

**Founded:** 1989

**Employees:** 115

**Products:** Test tubes made from PP, PC, PE and ABS, stands and frames, PCR plates, analysis and sealing strips, tubes for microcentrifuges, screw-capped tubes, pipette tips and analysis tips

**Machine fleet:** 41 injection moulding machines with clamping forces between 350 kN (40 US tons) and 2,200 kN (240 US tons), including 38 ALLROUNDERS

**Contact:** Scientific Specialties Inc.  
1310 Thurman Street, Lodi,  
CA 95240, USA  
[www.ssi-plastics.com](http://www.ssi-plastics.com)

1985

1990

1995

# Global ARBURG

## 25th anniversary of French subsidiary

**F**ounded in 1985, ARBURG France was the company's first-ever international subsidiary. "With its establishment, we laid the foundation stone for our global sales and service network with fully-owned organisations," said Managing Partner Juliane Hehl on the occasion of the 25th anniversary celebration at Aulnay-sous-Bois.

The celebration took place on 15 June 2010 in the presence of Partners Eugen and Juliane Hehl, Subsidiary Manager Marc Schuh and European Sales Manager Stephan Doehler (from left to right).

ARBURG France has an exemplary record in implementing the company's sales and service philosophy, based on the principle of providing all customers with a comprehensive, fast and local serv-



ice. The subsidiary had been built up by Serge Cannito, who was employed as an application technician in 1987 and managed the subsidiary from 1996 onwards. In 2009, he was succeeded by Marc Schuh, who has assumed responsibility for ARBURG S.A.S. ever since. The staff of

23 includes five sales specialists and seven service technicians. Thanks to the strategy of prioritising customer satisfaction and being faster than the competition, ARBURG is the market leader in France.

## ATC inaugurated in Hungary



Photo: E-Z Fotó Kft

**S**ince the beginning of this year, the Hungarian subsidiary has moved. On June 24 2010, Managing Partner Michael Hehl inaugurated the new building in Budapest.

He emphasised the great significance of customer proximity both in physical and mental terms, which represents a top priority at ARBURG. Training, spare parts, service, consulting and sales are now all housed together at the 450 m<sup>2</sup> premises. "Investing in an attractive location ensures the ideal conditions for continuing to provide our customers in Hungary with first-

class support," said Michael Hehl, congratulating Subsidiary Manager Gabriella Hollik (photo).

During an open house event held at the ARBURG Technology Center (ATC) the next day, the current product and service range, as well as information on current trends in injection moulding were presented. In the demonstration room, which contained three machines, customers were able to test new moulds, receive help with applications and participate in practical training courses.



2000

2005

2010



# family celebrates

## Ten years of ARBURG Brazil

**O**n 15 September 2010, the Brazilian subsidiary celebrated its ten-year anniversary. Managing Partner Renate Keinath and Managing Director Sales Helmut Heinson took part in the celebrations.

"The exceptional development of ARBURG Brazil has only been possible thanks to the commitment shown by our employees on-site," said Renate Keinath (4th from left), expressing her thanks as she handed the certificate and anniversary sculpture to Subsidiary Manager Kai Wender (3rd from left) in the name of the entire workforce. She also honoured three long-serving employees: Jeziel de Oliveira, Elizabeth Gasperek and Joelson da Silva Freitas were part of the original six-person

team during the founding year.

Kai Wender, who has worked for ARBURG for 20 years moved from Lossburg to Brazil in 2001. After initially assuming responsibility for service and application technology consulting, he took the helm at the subsidiary in 2006. Six years ago, the subsidiary moved into a 700 m<sup>2</sup> building in São Paulo. Here, a large demonstration room provides space for up to four ALLROUNDERS.

"Outstanding technology and the highest quality standards combined with application expertise, reliability, flexibility and our top team have made ARBURG one of the biggest players in the Brazilian plastics industry",



explained Helmut Heinson (left). "You can be extremely proud of what you have achieved over the past decade."

## New structures in Austria

**S**ince June this year, ARBURG has been represented by a fully-owned organisation in Austria. The headquarters is located in Vienna

with sales and service personnel working in the field.

"With the expansion of our involvement in Austria, we are confident that we will be able to provide all our customers with first class support." says Eberhad Lutz, Managing Director ARBURG Austria (right in photo).

The two new employees, Michael Winkler (2nd from left), Eastern Austria sales region, and Markus Heindl (3rd from left), Central Austria sales region, (from left to right) support Stefan Briel (left), the central contact for application

technology matters throughout Austria who remains in place. He also supports customers in the Western Austria sales region. Responsible for technical support is the service technician Alexander Böck, who is supported by three German colleagues from the Bavarian area.





# Seven parts

**K**ieback&Peter GmbH & Co. KG was awarded the "Building efficiency award for building automation" for its MD15 small actuator at the "Gebäude-Effizienz Dialog 2009" convention held in Frankfurt in November. The seven different plastic components for the MD15 small actuator are manufactured on a production cell supplied by ARBURG.

Small actuators such as the MD15 are used for the energy-efficient regulation of room and zone temperature control systems in buildings. In addition to the MD15, the RZ and RWZ zone valves also received a combined award. All three products excel thanks to a well-conceived design permitting easy installation, as well as automatic set-up. Further features include "robust operating behaviour", "high control performance" and "energy efficiency".

Owing to the complex tasks and multifaceted characteristics of small actuators, the requirements placed on the plastic parts and their automated production are extremely high. The principal influencing factors during design of the production cell included the integrated platform strategy pursued by the company both with regard to the mechanical components and software of the actuator. Some sensitive areas of application also mean that highest precision, consistent production quality and consequently an automated and largely autonomous production pro-



cess are required. Moreover, the automation solution had to be extremely cost-effective.

Kieback&Peter knew ARBURG to be a reliable partner for complex assignments of this kind due to the co-operation between the two companies which dates back to 2001. The ARBURG Project Department was thus commissioned to design and implement a production cell jointly with the company's in-house specialists. The highlights of this system, which operates at the Trier plant, are its high flexibility and the achievable level of autonomy. For the MD15 small actuator, a total of seven different items are produced in seven moulds on the system. Despite the complex requirements, the system's autonomy is of up to 16 hours, rendering unmanned production possible.

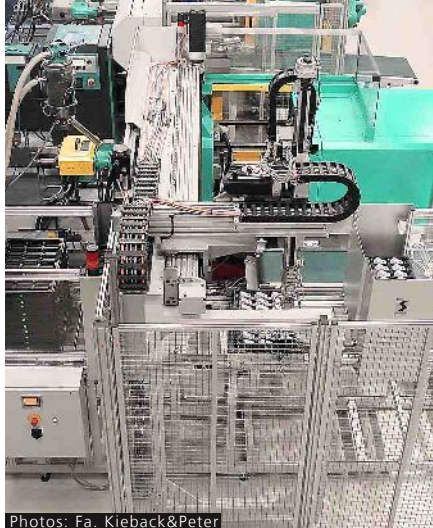
The moulded parts are set down in three different types of trays. The first type has 24 compartments for the lower housing sections, gear plates and upper

housing sections of the small actuator, the second has 72 compartments for the short and long flanges and sleeves and the third type has 72 compartments for the inspection covers.

The lower and upper housing sections of the device as well as the gear plate are each produced in single-cavity moulds, the short and long flanges, sleeves and inspection cover in 2-cavity moulds. The respective machine cycles are programmed such that when ten trays have been filled, five parts from each are removed as random samples and set down on a second conveyor belt. These items are measured and subjected to destructive testing in order to ensure consistent part strength and production quality.

Five different grippers, which can be exchanged quickly and simply, are used for removal of the various parts. A single gripper is used for the long and short flanges, upper and lower housing sections as well





Photos: Fa. Kieback&amp;Peter



# on a single system

## kieback&peter

Technologie für Gebäude-Automation



as the gear plate; double grippers for the inspection cover and sleeves.

During removal of the two flanges, the robotic system operates with intermediate set-down in order to position the items accurately. This version ensures a stable process when stacking the trays. The cycle times are 22 seconds for the lower housing sections, 38 for the upper housing sections, 17 for the gear plate, 23 for the inspection cover and 20 for the flanges.

The parts are produced on an ALLROUNDER 370 S with a clamping force of 700 kN and a size 100 injection unit. This provides sufficient power for optimal operation with all seven moulds. The system is completed by a vertical MULTILIFT V robotic system in a transverse design which permits unlimited synchronous movement of all axes.

Sixteen freely-programmable inputs and outputs are available for the various gripper functions. Further features include two interfaces, each with a total of eight

programmable inputs, and four additional pneumatic valves. This ensures the universal removal, transfer and set down of the respective moulded parts. Thanks to the simple gripper changes and a magnetic clamping system for mould changes, the entire production can be converted extremely rapidly.

Moreover, all the ALLROUNDERS used at Kieback&Peter are connected to the central ARBURG host computer system (ALS) in order to respond preventatively in the event of any process fluctuations or interruptions in production. Detailed evaluation of the data collected during the different time periods in order to support the in-house quality assurance system is a further important aspect.

Kieback&Peter is extremely satisfied with the high flexibility of the system, particularly with the simple programming via the central SELOGICA machine control system. The company therefore also intends to use the same automation solution to produce the components of its future in-house developments using the appropriate trays.

With the ARBURG production cell, Kieback&Peter produces seven different parts in a highly flexible manner in Trier, Germany.

### INFOBOX

**Founded:** 1927

**Employees:** over 950

**Locations:** Subsidiaries in Germany, Austria, France, the Netherlands, Switzerland and China as well as numerous partners in European countries

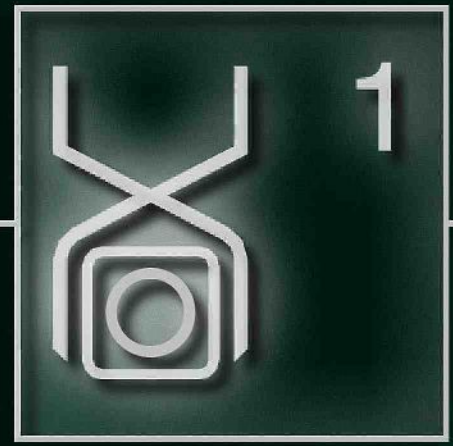
**Products:** Device and system solutions in the heating, ventilation and air conditioning sector as well as in facility management

**Contact:** Kieback&Peter GmbH & Co. KG, Tempelhofer Weg 50, 12347 Berlin, Germany  
www.kieback-peter.de



## TECH TALK

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



# One language

**M**odern machine control systems are required to master increasingly complex processes in an ever more reliable and simple manner. The solution: an integrated control centre which allows the entire injection moulding process to be configured, monitored, controlled and regulated via a single user interface. But what does an integrated system of this type look like in detail and what benefits does it really offer?

A central human/machine interface with a single language for everything is a significant aspect of the SELOGICA control system philosophy. Sequence programming with graphic symbols and immediate plausibility checks provide the basis for this. The ARBURG robotic systems, as well as many other peripheral devices, are directly integrated in the SELOGICA control system and can be controlled in dependence with the machine or mould sensors. The entire production process can thus be configured and optimised without the need to adapt to other systems or user interfaces. Only one data record is required for the entire production unit. This permits efficient working sequences during set-up while also resulting in higher process reliability.

A good example is the integration of mould heating circuits in the SELOGICA control system. Two options are available for this purpose: On the one hand, these circuits can be actuated directly, i.e. the machine control system itself performs temperature control. Separate controllers

can therefore be dispensed with completely. On the other hand, external hot runner controllers can also be actuated without any problems. The following functions are available here: input of temperature setpoint values (stored in the data record), logging of actual values in the form of tables and charts, as well as the monitoring of actual values and error messages. The external hot runner controllers are thus fully integrated in the machine's quality control functions. The same applies to temperature control devices, which feature additional device-specific functions such as the monitoring of flow volumes. Malfunctions in the temperature control system, for example due to a kinked hose can be detected immediately, long before quality problems arise.

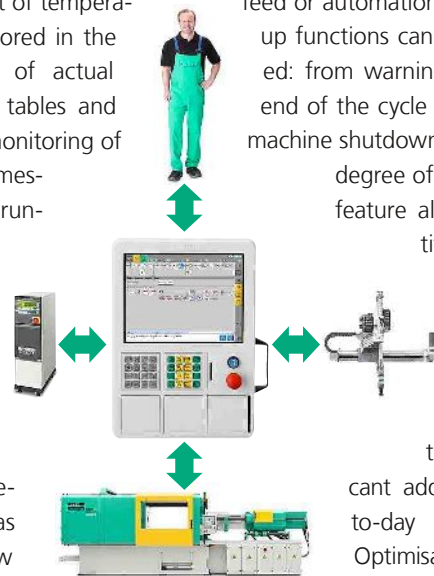
The SELOGICA system also utilises mould signals for both quality and process control. The signal characteristic is recorded continuously and monitoring charts displayed. This allows not only extreme values such as the maximum internal mould pressure to be monitored, but also its precise progression throughout the entire injection moulding process.

A further, frequently useful option is the monitoring of individual alarm inputs, with which any potential-free signals can

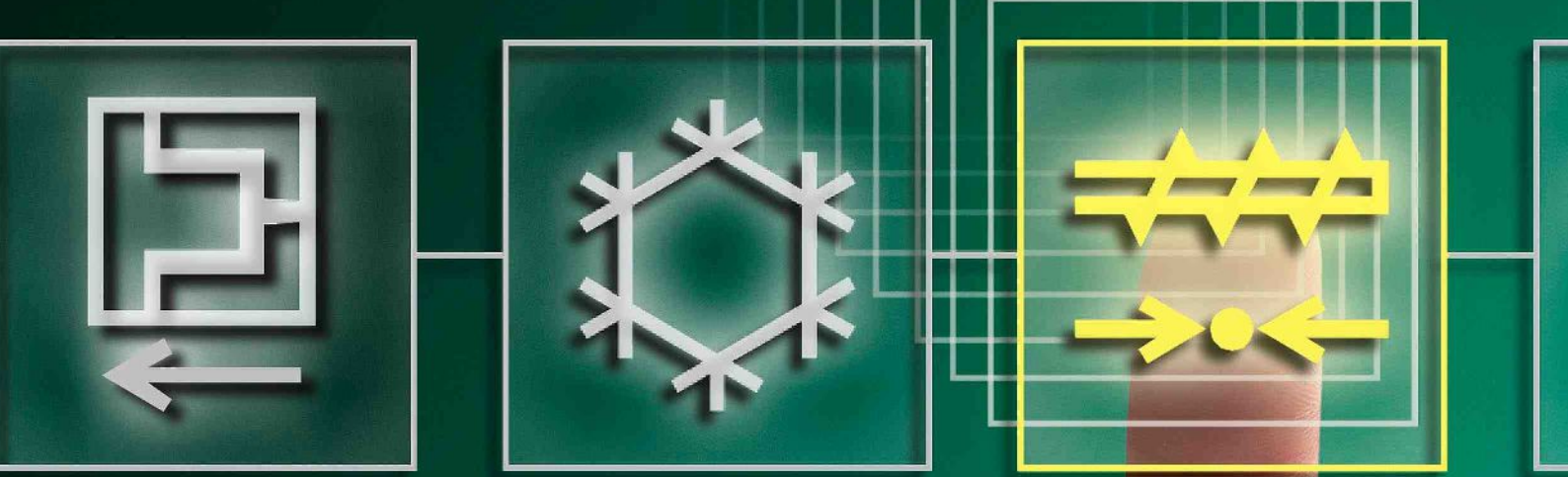
be evaluated by the SELOGICA system. This allows the injection moulding process to be controlled as a function of e.g. the compressed air or water supply, granulate feed or automation components. Follow-up functions can be individually selected: from warnings or stopping at the end of the cycle through to immediate machine shutdown. In addition to a high degree of process reliability, this feature also contributes to rectifying malfunctions rapidly as a clear fault description is displayed.

Having central access to everything provides significant added value during day-to-day production practice. Optimisation potential can be utilised independently, often without incurring additional costs. One illustration of this is the synchronisation of machine and robotic movements. In comparison with a serial sequence, significant cycle time reductions can be achieved here, as the production of a handle shell shows (see diagram): Based on three-shift operation on 288 working days per year and a daily operating time of 22 hours, this represents an annual increase in productivity of more than 66,000 parts.

The active synchronous movement of the robotic system with the ejector is a source of additional savings potential. A pneumatic removal stroke can be dispensed with in the gripper. The gripper de-



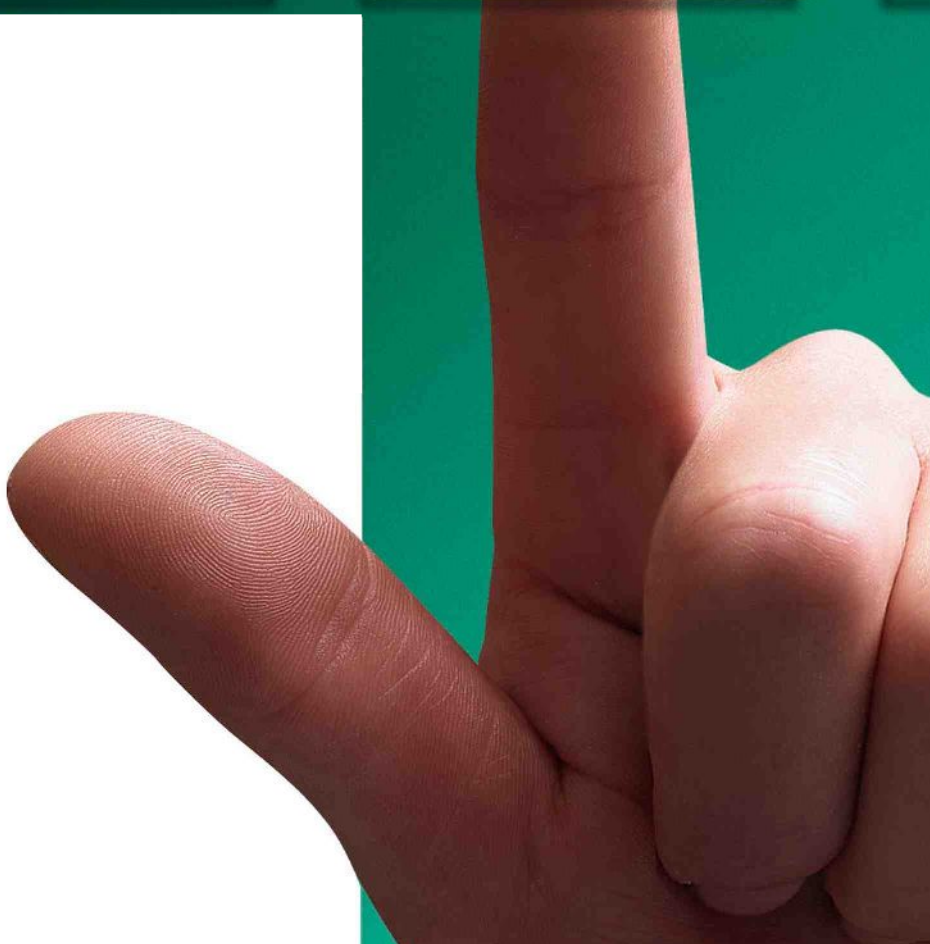




# for all

sign is rendered simpler, more cost effective and more compact. This in turn permits a shorter mould opening stroke.

The SELOGICA control system relies on simple, centralised management of machine and peripherals in a consistently user-oriented manner. In order to enable free configuration and optimal adjustment of the injection moulding process, ultimately resulting in efficient production, the control system offers a virtually inexhaustible variety of functions for daily production practice. Further interesting features will be presented in the next edition of "today".



Easy-to-realise saving potential	
Serial robotic sequence (EUROMAP 67 interface)	20 [s]
Synchronisation of ejector and X-axis	19.6 [s]
In addition: stroke start on Y axis	19.4 [s]
In addition: move ejector to intermediate stop position	18.9 [s]

Controlling the complete injection moulding processes centrally and directly (illustration above) brings decisive advantages in daily production practice (diagram on left).





**The original.** Better than any copy. Our SELOGICA control system does what others only promise: Quick set-up of complete machine sequences. Reliable, graphics-oriented programming. Easy robot integration. Reliable plausibility checks. And now, also perform menu-guided set-up of ALLROUNDER injection moulding machines and moulds in just five steps. Only the innovative SELOGICA controller can do this. The original from the Black Forest, supplied throughout the world.



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**ARBURG**

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