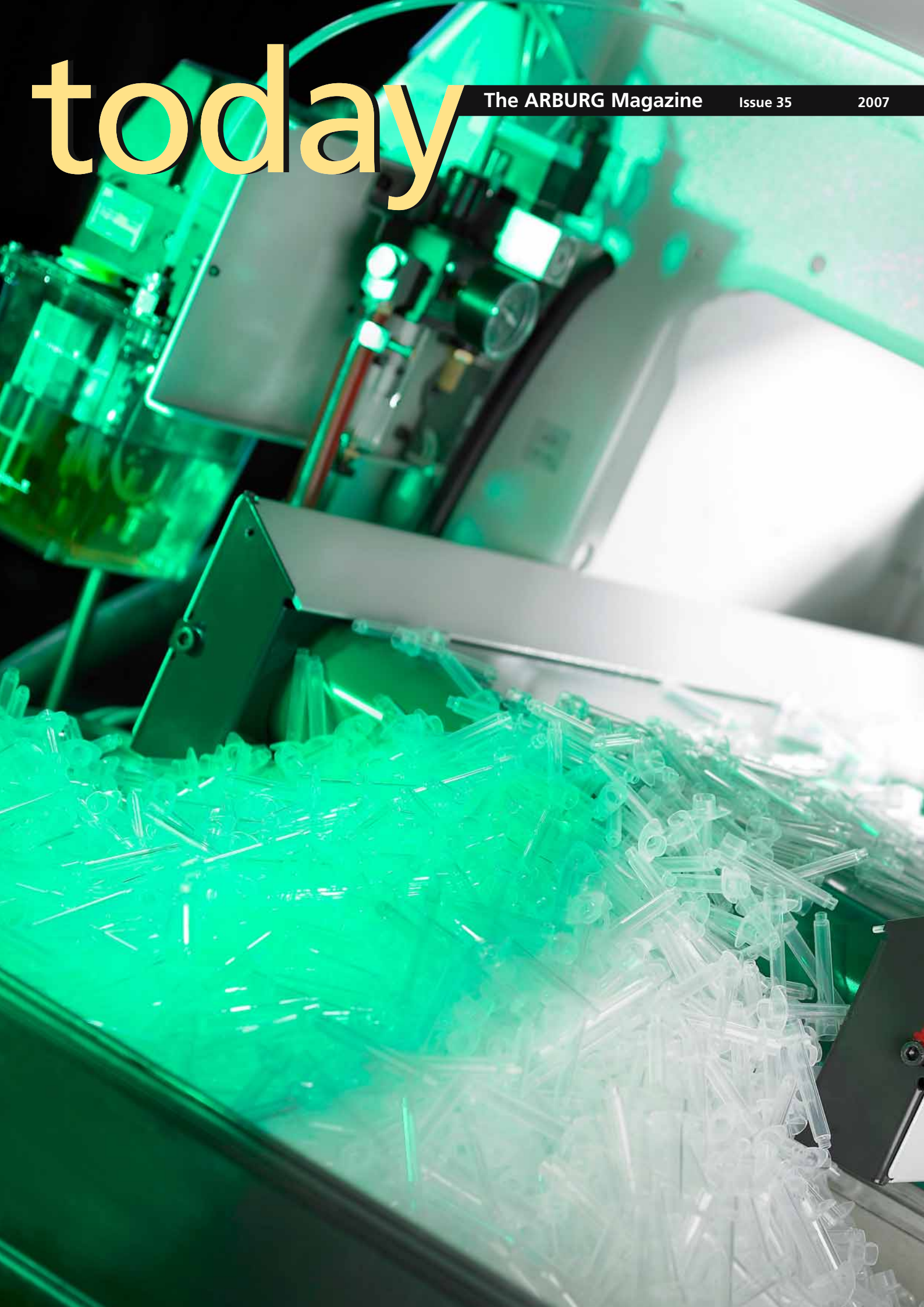


# today

The ARBURG Magazine

Issue 35

2007



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**MASTHEAD****today, the ARBURG magazine, Issue 35/2007**

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A medical technology application on an electric ALLROUNDER from the ALLDRIVE machine series in a very special light.

**ARBURG**



## Dear Readers,

After the exceptional anniversary year 2006, our success continues this year.

For instance, a visitor-record was set again at our Techno-

logy Days in March, with some 3,500 guests in attendance from 41 countries.

The often very long and difficult journey undertaken by our international guests demonstrates the great interest in this event worldwide. This was also evidenced by the consistently positive feedback from the visitor questionnaire.

Over 40 exhibits with interesting machine equipment as well as various injection moulding applications and materials, through to complex automation solutions were in great demand. The initial steps in the injection moulding of leather compound also attracted much attention.

A particular highlight of the first half-year was the Society of Plastics Engineers (SPE) event in Cincinnati, at which Karl and Eugen Hehl were presented with the "SPE Business Management Award 2007" for their life's work. In the success story of these two entrepreneurs and consequently that of ARBURG, the adage that "standstill means regression" has applied, and continues to do so today. Accordingly, we refrain from resting on our laurels and continuously develop further. A clear sign of this dynamic development is the recent start of construction on a new Customer Centre in Lossburg.

Happy reading!

A stylized, handwritten signature in blue ink that reads "Kraibühler".

Herbert Kraibühler  
Managing Director, Technology



# Visitor record



the Netherlands and Poland. The annual motto "Allrounder International" could not have been more apt.

"This outstanding national and international response demonstrates to us each year anew that the concept of the Technology Days is a success and exactly meets

leather fibres which was unveiled to the public for the first time during the Technology Days. The haptics of the injection moulded dice beaker was an unmistakable, typical leather feeling. Various multi-component applications, the processing of liquid silicone, thermoset and a fully

**D**espite the wintry spell, a new visitor record was set at the ARBURG Technology Days: some 3,500 guests from 41 countries visited the three-day in-house exhibition. Michael Hehl, Managing Partner and Spokesperson for the Management Team was enthusiastic, saying, "This phenomenal response once again showed what an important occasion our event is for the industry."

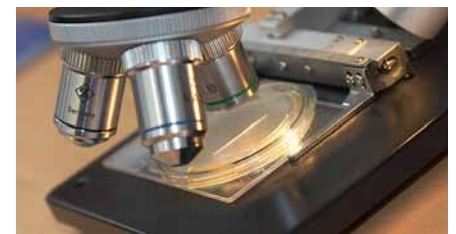


A total of 1,465 foreign guests, who journeyed from as far afield as Australia, Brazil, Hong Kong, Colombia, Laos, Malaysia, New Zealand, Singapore and Thailand took advantage of this unique opportunity to experience the application-technology innovations and the entire ARBURG machine range at first hand. The largest group, with 161 customers and potential customers, came from the USA, followed by the Czech Republic with 136 participants. There were 100 visitors both from

the needs of our customers," concluded Michael Hehl, who is already looking forward to the 2008 event.

With more than 40 exhibited machines and an extremely wide variety of applications, the complete range of ARBURG technology was exhibited. The entire ALLROUNDER machine series was represented, including new big machines: the largest ALLROUNDER 920 S with a clamping force of 5000 kN, the vertical ALLROUNDER 275 V and the large ALLROUNDER 720 S GOLDEN EDITION.

The application technology highlight this year was the injection moulding of



recyclable bio-compound, metal and ceramic injection moulding, the production of optical lenses under clean-room conditions and the production of medical parts completed the range of products on show.



Of course there were also a record number of visitors to Hall 21, where the complex project systems exhibited attracted a great deal of international interest.

A further crowd-puller was doubtless the exhibition area for the large ALLROUNDERS with clamping forces of up to 5,000 kN and the complete production cells.

The ARBURG presales and aftersales service was also presented in a dedicated area. Here, visitors could view the equip-

topic mix was right once again this year was evidenced by the figure of 1,290 international participants over three days.

Guided factory tours provided an in-depth insight into the production facilities. Almost all the visitors from abroad took advantage of this rare opportunity. Around

# at ARBURG

ment of a service vehicle at close quarters and find out more about the wide-ranging training courses. Theoretical matters also received their due: four expert presentations, each held in German and English, provided information on current injection-moulding industry topics. The fact that the

1,400 visitors took part in over 200 German language tours. "Where else can machine technology be experienced more intensively and production seen better in detail than at our Technology Days?" asks Michael Hehl, identifying one reason for the success of the in-house exhibition.



## Highlight - leather

**T**he processing of a leather compound made by Bader created a real sensation during its first public showing at the Technology Days. The appearance, texture and odour of the beakers produced conveyed that unmistakable leather feel and amazed the trade visitors.

The leather material Kollamat (a leather compound consisting of tiny leather fibres and biopolymers in a mixture ratio of 60:40) was injection moulded on an ALLROUNDER 420 C.

No special equipment is required for

the processing of leather, as the material does not feature any abrasive or other special characteristics. "The most important factor is that the processing temperature must be kept constant at 160 °C, whereby the maximum limit by which this temperature can be exceeded is 10 °C. At higher temperatures, the leather in the material would burn and the injection moulding process as well as the result would be permanently impaired," explains Alexander Stoll, Head of the Kollamat department at Bader. The flow characteristics of the melt are also relatively static, requiring an appropriate configuration of the flow

Typical leather feel – even the odour and appearance of the injection-moulded leather beakers were just right.

paths within the mould. Moreover, due to their low strength, Kollamat products are not comparable to conventional plastic parts.



# Society of Plastics Engineers Annual Awards



Place of honour in Lossburg: SPE sculptures awarded to the Hehl brothers in honour of their life's work.



## Award for life's work

**A**s a special honour for exceptional achievement in the plastics industry, the Society of Plastics Engineers (SPE) awarded ARBURG Partners Eugen and Karl Hehl the Business Management Prize in 2007. The award was presented personally at the Annual Technical Conference (ANTEC) in Cincinnati in early May.

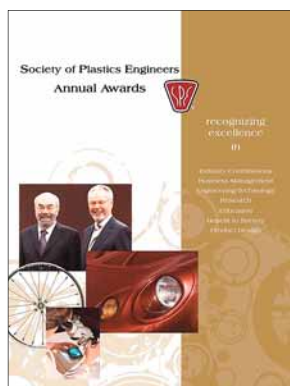
Eugen Hehl had travelled to Cincinnati together with Renate Keinath, Managing Partner & Managing Director Human Resources Management, Herbert Kraibühler, Managing Director Technology, and Friedrich Kanz, Subsidiary Manager, ARBURG USA, in order to express his thanks for the exceptional honour with

a short speech. Renate Keinath accepted the award in place of her father, Karl Hehl, and also expressed her thanks to the renowned SPE.

The award honours the establishment and exemplary management of a globally recognised and leading company in the manufacture of injection moulding machines.

The SPE is an organisation with global activities and some 20,000 members, which endeavours to promote scientific and technical know-how in the plastics industry and machine construction field. The honours are awarded annually to individuals who have made significant

contributions to the plastics industry. SPE President Tim Womer presented the prizes in front of invited guests at an evening event in the context of the conference.



ARBURG has supplied machines to the USA since 1960. Together with the domestic market, North America counts as one of ARBURG's largest markets. In his acknowledgement speech, Eugen Hehl emphasised that ARBURG will accordingly continue to focus strongly on this important market in future. This is not least evidenced by the two ARBURG Technology Centers (ATC), which are currently being established to provide intensive customer support and are set to open this year.

Hehl expressly emphasised that his and his brother's thanks for the award were directed personally to the members of the Society of Plastics Engineers.

The new and in many respects innovative Customer Centre is set to be completed in autumn 2008.

## Construction at ARBURG



Photo: schmelzle + partner

**A**RBURG is currently building a new Customer Centre in Lossburg, at the heart of which will be a large demonstration room offering sufficient space to house the entire machine series. Reinforced concrete, glass and steel will be the dominant design elements of the modern new building, which features innovative geothermal energy harvesting. With this investment, ARBURG once again clearly demonstrates its commitment to Lossburg as the sole production location.

Michael Hehl, Managing Partner & Managing Director Premises Development, explains the reasons for constructing the new Customer Centre: "Traditionally, first-class, comprehensive customer support has held a very high priority for ARBURG. An important aspect here are the demonstration rooms in which we present our products and their capabilities, as well as carrying out testing on customer moulds.

Owing to the extension of our machine range up to a clamping force of 5,000 kN, the expansion of our product range with our own robotic systems and the resulting complex production cells, our existing premises have become too small." In addition to a large demonstration room, two administration floors and a representative reception area are also planned.

Even with 10,000 square meters of useable floor space and 60,000 cubic meters of interior space, the new Customer Centre will not rise significantly above the existing main administration building and will harmoniously extend the existing front.

ARBURG's awareness of its ecological responsibilities and adoption of a pioneering role in this field was illustrated by Michael Hehl based on the energy concept for the building, "As with our products, we will also tread new paths with our Customer Centre: The energy supply for the entire building will be assured via geothermal power, a technology which in itself is not new. The innovation lies in how

we will utilise it. Not only will we extract heat from the earth, but will also feed the waste heat from the machines back into the system."

The probes for energy harvesting will each be lowered to a depth of 199 meters in 24 bore holes.

The building will be heated and cooled via power storage and the extraction of energy from the upper rock strata. "Calculations have shown that with this type of energy harvesting, we can gain some 600,000 kilowatt hours per year of heating capacity and approximately 400,000 kilowatt hours per year of cooling capacity."



# High-tech for

**I**f you visit the homepage of WEISS Kunststoffverarbeitung GmbH & Co KG, based in Illertissen in Bavaria, and click on "Product examples" under the heading "Range of Services" you will not only find important automotive OEMs; many established German car manufacturers also appear as end customers. This provides a first indication that WEISS places value on the highest quality. However, WEISS is not only well known among manufacturers. The company operates throughout the "technical components" market segment. Most of these high-tech components are produced on highly automated ALLROUNDERS.

At the outset, however, WEISS had nothing to do with plastics. In 1946, the company began with the sale of wire brads, stable equipment and agricultural machines. It was only two years later that the company began with the processing of thermosets. Relocation to the current company headquarters in Illertissen took place in 1955.

The success of an enterprise today can above all be measured by the sales and personnel figures. Consistently good results have been achieved for both.



Fotos: WEISS

Recent years have been characterised by double-digit growth rates. Sales have increased from seven million euros (1994) to 24 million euros (2006). The goals which the company has set for itself are correspondingly ambitious: "For the coming years, we are also aiming at increases in the two-digit range," is how Jürgen Weiss, one of the three Managing Partners described the company's medium-term plans. "In terms of technology, we intend to expand multi-component production and establish a further foothold in the micro-injection segment."

WEISS sees itself as a systems supplier. The company supports its customers throughout the value added chain, from dimensioning and design, mould construction, injection moulding and assembly through to the timely delivery of the parts or assemblies. Bruno Weiss says,

"We even have downstream printing, bonding, welding and surface treatment facilities at our site. Consequently, our customers are always supplied with completely finished articles."

The technical parts, which WEISS also produces using the multi-component process, weigh up to 1,300 grams and are often for use in safety critical sectors. Consequently, high quality and the corresponding production documentation are essential. Order planning and monitoring are performed via a PDA system, material feed is via a central processing system, around two thirds of the injection moulding machines operate with CNC-controlled robotic systems with up to five axes.

"With the exception of PVC, we process all thermoplastics on our machines, for the automotive, sports article and machine construction sectors as well as elec-





The company WEISS from Illertissen sees itself as a system supplier for technical parts. High quality standards apply during production, e.g. for the automotive and medical technology sectors.

# technical parts

trical and fastening technologies. And we are also active in the medical technology sector, where, as in the automotive sector, the demands are exceedingly high," explains Bruno Weiss with regard to the company's product portfolio. The company's principal sales market remains Germany, which of course maintains quality and automation requirements at a high level.

WEISS has been working with ARBURG since 1968, 64 of the 70 injection moulding machines in the clamping force range between 350 and 4,000 kN are ALLROUNDERS. What does the company value about ARBURG? Jürgen Weiss expresses it as follows: "Our cooperation has always worked extremely well. The service is perfect; competent contact persons are available. You notice immediately that ARBURG is an owner-managed company too. As a company operating four shifts, we have to rely on an immediate service in an emergency situation. And with ARBURG, we can do so."

Several of the ALLROUNDERS in Illertissen are additionally equipped with horizontally displaceable and position-regulated injection units for high-precision dosage and injection. Applications on the ARBURG machines include such sensitive parts as belt guides for children's car seats, which are produced trouble-free in

large volumes. The moulded part weight of these items is 50 grams, the cycle time is 40 seconds. The material used is a UV-stabilised polypropylene (PP). The mould slide technology employed is relatively complex, which explains why most of the ALLROUNDERS are equipped with several core pulls.

The long-term, positive cooperation between the two companies has strengthened the impression at WEISS that they will be in good hands with ARBURG in the future. On this subject, Jürgen Weiss says, "The current technology and the price/performance ratio are right at ARBURG, and the latest technologies are also on offer. We therefore see no reason to change anything with regard to this strategic partnership".



## INFOBOX

**Founded:** 1946

**Employees:** 180 plus 60 temporary personnel

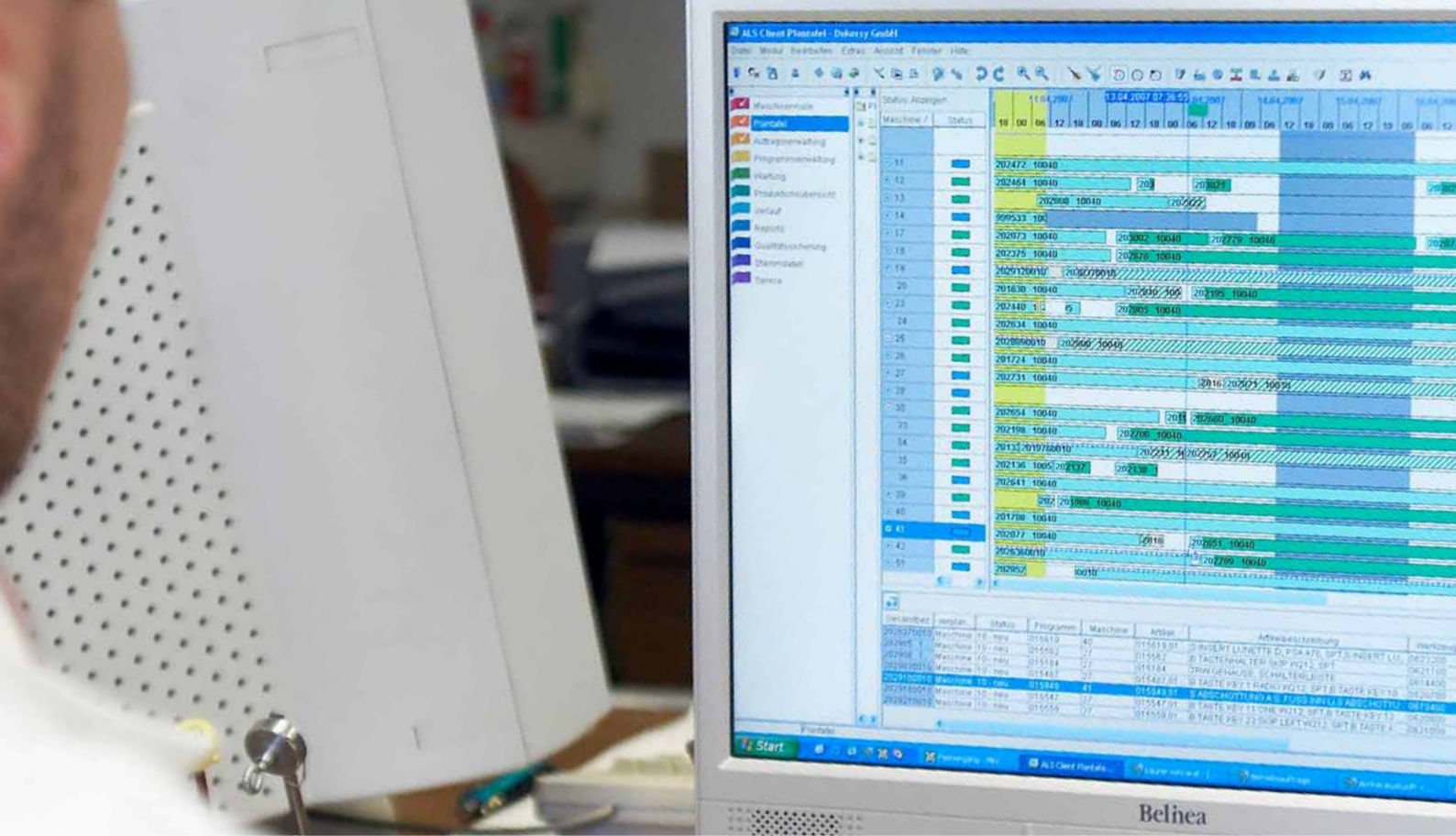
**Turnover:** 24 million euros (2006)

**Products:** Technical parts made from thermoplastics, except PVC

**Quality assurance:** DIN ISO 9001: 2000, TS 16949 and DIN 14001 in preparation

**Machine fleet:** 70 injection moulding machines, incl. 64 ALLROUNDERS

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# Managing production in

**T**he formula for success in global competition is to produce flexibly, rapidly and cheaply. Efficient production planning based on reliable data, however is becoming increasingly significant. Manufacturing Execution Systems (MES), such as the ARBURG host computer system ALS, provide the necessary transparency in the injection moulding plant. The Dekorsy enterprise group – one of the leading global automotive suppliers for air conditioning and navigation system control panels – benefits from the savings potential offered by a direct connection to the production facilities.

Even with the basic ALS module for recording machine and operating data, injection moulding companies have available to them an information system which records the progress of production in real time. Building on this basic configuration, the ALS can be individually adapted to the existing customer requirements in a modular fashion by means of freely-combinable expansion stages.

One of these expansion stages is order management, via which the available production capacities can be proactively planned and managed based on a graphic planning table. In conjunction with the real-time recording, production planning can be planned down to the minute, eliminating delays. Based on the order management, it is also easy to link the ALS to an existing PPS or ERP system. On the one hand, order data can thus be transferred from the planning system to the ALS and on the other hand, actual data can be reported back.

Michael Bauer, Finance and Personnel Manager, describes the savings potentials for Dekorsy as follows: "In the past, we had to manually enter all the numbers of produced items separately into the ERP system. The two different data recording media, electronic and manual, often resulted in incorrect entries. Today, in contrast, we can assign our employees to other, more effective tasks. Production planners can then concentrate more fully on their real area of responsibility, which is planning." For Michael Bauer, the ALS also leads to a higher quality of data and ulti-

mately to "added value" in the planning system. "The constantly updated ERP-system can also be actively utilised by other departments within the company, such as Procurement and Material Planning. The number of internal queries has been significantly reduced."

A further option for expanding the ALS functionality is the central management and documentation of settings data. Machine programs can be transferred to the injection moulding machine together with the order data at the click of a mouse. It is ensured that only current machine programs which have been released for production are used. "We have been able to measurably reduce machine downtime as well the number of reject parts and thereby our material consumption," explains Michael Bauer with regard to the result at Dekorsy. All these factors contribute to an extremely short amortisation period for the ALS.

Hidden optimisation potential in production can be uncovered – the "Reports and "Data warehouse" ALS modules assist in this task. With these modules, PDA and MDA data can be archived for



Left: With the ALS planning table, bottlenecks and impending delivery delays can be identified immediately. Right: ALS experts in discussion – Michael Vieth (left), ARBURG, and Michael Bauer (right), Dekorsy.  
Bottom: At the Radolfzell home plant, 33 injection moulding machines are connected to the ALS, 32 of them ALLROUNDERS.

# real time



says Michael Vieth, Group manager for Control Technology regarding his experience. "The co-operation with Dekorsy is a prime example of this."

the purpose of evaluating the efficiency of the machines and moulds. For each mould, for example, the operating hours, shot numbers as well as any alarms can be called up. As a result of order planning, a so-called setup plan can be output. "The tooling department is thus in a position to manage itself," says Michael Bauer on the subject of this ALS feature.

In relation to the benefits, Dekorsy regards the training required for the ALS as negligible. The support required from the internal IT department is also assessed by Bauer as being "less than one day a month".

The extent of satisfaction with ALS at

Dekorsy is demonstrated by the planned introduction of the system at the company's Hungarian subsidiary plant, with access from the home plant at Radolfzell. Furthermore, the ALS, which has been operational there since 2004 is being expanded with connections to the laser, assembly and welding facilities.

For the successful introduction of ALS, a detailed analysis of the required objectives and tasks is necessary. "The more intensively the customers concern themselves with the options provided by the ALS, the greater the potential for integration and consequently the benefits to be expected,"

## INFOBOX

**Product:** ALS 5.0

**System introduction:** 2003

**Installations:** Some 100 customers world-wide have installed this ALS version alone, which corresponds to more than 800 workstations with approx. 2000 connected machines.

**Implemented interfaces:** SAP, sage bäurer, SWP-Irma, r.z.w. cimdata, WEGASOFT, IAS, SoftBrands



# Precision

**S**witzerland and precision injection moulding sound like a typical cliché. But both positive and negative preconceptions usually have some basis of truth. With a success story extending well over 100 years in the field of electrical and optical connectivity technology, HUBER + SUHNER AG, based in Herisau and Pfäffikon, Zürich, proves that the cliché applies. In the best sense of the word, it fits exactly – with precision and high-tech parts for the communications, transportation and industrial markets.

The sector giant and global player of today was established through the merger of two family businesses with rich traditions, which decided to enter into a “marriage of convenience”. Following four decades of growth and intensive structural and locational adaptations, the listed company today employs more than 3,000 employees world-wide. In 2006, record sales of more than 650 million Swiss francs were achieved, 15 per cent above the previous year’s figure.

From its purely Swiss beginnings in the early 19th century, a global corporation with subsidiaries in 15 countries and representations in a further 40 nations has developed. Restructuring at the start

of the present century, communicated via the corporate slogan “Excellence in Connectivity Solutions” and the consistent alignment with the communications, transportation and industrial markets paved the way for HUBER + SUHNER’s continuing success story.

Since autumn 2006, the “injection moulding segment” has also been defined as a core competence within the Group as a result of restructuring measures. Lukas Huber, Injection Moulding Sales/Technology Manager, expects this decision to provide further impulses for this already booming business. With over 30 employees, the injection moulding unit achieved sales of 8.5 million Swiss francs in 2006. The corporate formula of “precision injection moulding of high-performance plastics” states the business unit’s core competencies in a nutshell. Here, high-performance, but also mass-production plastics are turned into high-precision functional parts with strict tolerances for the automotive industry, medical technology, and also for the company’s own connector production. A speciality is the encapsulation of inserts and the assembly of additional components, i.e. the production of complex assemblies.

One such assembly is the locking

slider produced for Porsche and Audi. Some half a million units of this steering system component (also known as a “steering lock”) are produced annually

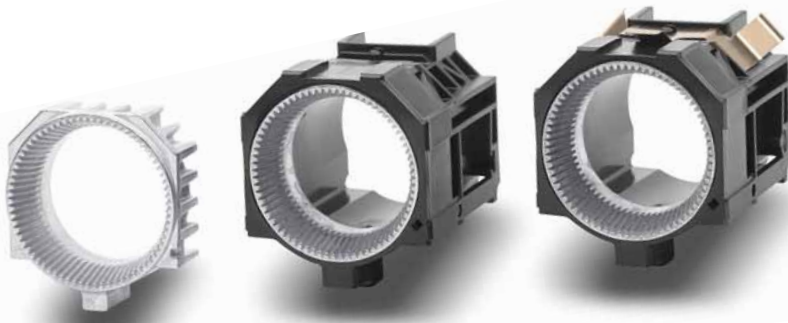


at the Herisau location. The customer is the automotive supplier ThyssenKrupp Presta, which produces an identical steering system for the Porsche Cayenne and the Audi A6. The requirements placed



Photo: HUBER + SUHNER

# - Swiss made



Precise optical measurements ensure the highest standard in the production of a locking slider at the Tiefe factory in Herisau.

on the moulded part are extremely stringent for understandable reasons, a 100 per cent visual check ensures that a high standard is maintained. Quality and

quality, delivery times and service are the decisive factors when vying against international competitors. For this purpose, machines are required which ensure constant temperature control and wear-resistance.

adhered to. In order to assure this, absolutely reliable service from the machine constructor is vital. "Spare parts ordered from the Swiss ARBURG subsidiary in Münsingen are delivered personally at the most four hours later," says Urs Kellenberger, Production Manager, Finished Plastic Parts.

Since the early 1980s, the company has had a close business relationship with ARBURG. As a result, 16 of a total of 21 injection moulding machines, covering a clamping force range of 350 to 2,500 kN, have been supplied by ARBURG. Huber matter-of-factly lists machine data, but then begins to wax lyrical when the subject turns to the process reliability, user-friendliness and sheer quality of the ARBURG machines. "Only the ALLROUNDERS here are equipped for PEEK processing. The guaranteed process reliability is also a big plus for the ALLROUNDERS. We are more involved in precision moulding, and less in high-speed parts," he summarises, again in a matter-of-fact tone.

All the moulded parts produced by HUBER + SUHNER AG are sold within a radius of around 500 kilometres. Further afield, transport would no longer be economical. Close proximity to the customer also ensures that changes to the components can be implemented swiftly.

Delivery times must of course be strictly

process reliability are the top priorities with regard to this complex assembly and its intended use in the Porsche Cayenne and Audi A6.

According to the Swiss company,

## INFOBOX

**Founded:** 1969, merger of the independent companies HUBER and SUHNER

**Turnover:** 2006, approx. CHF 650 million

**Employees:** Over 3,000 world-wide

**Products:** Mainly cable products, HF, LF and fibre optic

**Machine fleet:** 21 injection moulding machines from 350 to 2,500 kN of which 16 ALLROUNDERS

**Contact:** HUBER + SUHNER AG  
9100 Herisau, Switzerland  
[www.hubersuhner.com](http://www.hubersuhner.com)



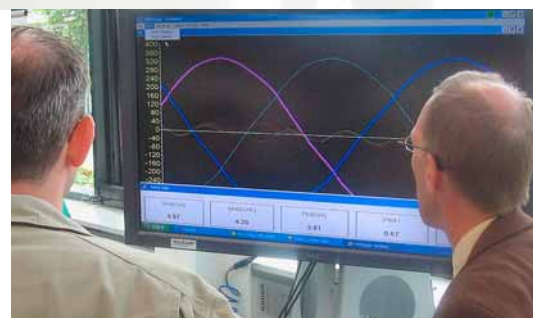
# Focus on energy

**O**n 9 and 10 May, the Dutch ARBURG subsidiary in Utrecht and the energy supplier Eneco Energie jointly held a theme day entitled ALL ELECTRIC. "A wide variety of and unproven assertions and figures relating to energy consumption and savings potential are circulating on the subject of electric machines," explains Subsidiary Manager Carlo Brouwer concerning the reason for holding an event of this kind.



The excellent response confirms that he was correct in this assumption. Participants from 40 companies took advantage of the opportunity to find out more on the subject. In order to gain objective comparative values, the power consumptions of an electric ALLROUND 420 A and of a hydraulic ALLROUND 420 C GOLDEN EDITION (both featuring a clamping force of 1,000 kN and identical moulds) were measured during the production of a 28-gram test rod made from PP. Whereas a consumption of 6.3 kWh was measured for the hydraulic machine, the electric machine achieved 3.5 kWh. "In addition to the energy savings, the shorter cycle times are a further important criterion for the use of electric machines," said Brouwer.

However, the particular application at hand is always decisive, so that no



general recommendations can be made. The situation is different in the field of energy conservation, a subject on which Eneco provided comprehensive information. The focus of this presentation was idle current, its effects and possibilities for its reduction. The event was rounded off with an expert presentation on the electric ALLDRIVE machine series and its drive concept.

**ENECO**  
energie

The values measured during injection moulding of the test rods were displayed prominently on monitors.



# Communication world-wide

**T**he ten employees of the International Technical Support (ITS) department have to communicate a great deal world-wide, and where possible in the relevant national language. In addition to English, which is ubiquitous, Spanish, French, Chinese and Japanese are, for instance, often heard in Group Leader Eduard Stückle's international work group in Lossburg.

The ITS was set up in the early 1980s and has since ensured a continuous transfer of know-how from the headquarters in Lossburg to all international trading partners, subsidiaries and representations. Stückle regards the personal 'allrounder' qualities of the employees as the fundamental capital of his team: comprehensive knowledge of the machines and applications, communication skills, independent and solutions-oriented action, proven consulting and training competence, and much more. In any case the "man at the factory" as these employees are often referred to, act as important ambassadors for ARBURG.

The ITS supports the service technicians in the various countries as well as ensuring that these are always up-to-date with regard to the ARBURG technology. In return, the direct customer contact around the world also allows customer suggestions and constructive criticism to be communicated quickly and directly to the Development department in Lossburg. "We also help many customers to fully utilize the potential of the ARBURG machines, and thereby achieve a competitive advantage," says Stückle, who speaks with years of experience.

Where necessary, the ITS supports the ARBURG project departments with individual customer consulting in the international environment. Approval and commissioning of the complex production cells fall into their area of responsibility, as do customer training activities. Constant trade fair participation, symposiums, seminars and training courses – even at Universities – complete the scope of activities of the ITS.

Structured annual planning, performed on the basis of market relevance and close consultation with trading partners and



subsidiaries, in addition to the well-organized arrangement of foreign assignments, have resulted in continuous success over two decades. Of course these employees' nearest and dearest have to show a great deal of understanding at times, "because on average we are travelling for ten to 20 weeks per year," explains Stückle. As stated, good communication forms the basis for this task, which is demanding in every respect.

Communication: always in an international context and with the customer directly at the machine.



# Thermoset

**In a clutch system produced for ZF Sachs, a piston made from thermoset is used which is produced on a project system built around an ALLROUNDER 420 C 1000-250 with a MULTILIFT V robotic system at KE in the Black Forest town of Mönchweiler. In the production cell, the piston is not only injection moulded, but also completely finished and visually checked, rendering it immediately ready for installation.**

Owing to the fact that a magnetic sensor for precise positional detection is integrated in this particular clutch system, conventional steel piston could not be used. The Managing Director of Kunststoff- und Elektrotechnik GmbH (KE), Arnold Klausmann, explains: "Comprehensive tests have shown that the thermoset pistons have no disadvantages compared to those made from steel or aluminium. A direct comparison even revealed that thermoset had benefits: The thermoset piston achieved a higher degree of efficiency, the material is also lighter, reducing the overall weight of the assembly." Thanks to the high-quality moulds made by KE in an in-house mould making shop, the thermoset piston produced is completely dimensionally stable and features a smooth, highly polished

surface due to its material properties.

However, the thermoset piston does have to be finished, in order to remove burrs and irregularities resulting from overfeed. In order to nevertheless ensure economic volume production, the entire production process has been automated within a project system in cooperation with ARBURG.

The high-grade surface finish, dimensional stability and durability of the piston require a high compression of the thermoset material. Targeted venting is ensured by means of a precisely-defined overfeed. This injection moulding technique requires a few additional finishing stations. Following part removal, the sprues are separated, a bevel is provided on the moulded parts and overfeed irregularities are simultaneously removed. Subsequently, the burrs on the internal thread are removed and the parts are finally cleaned. In order to prevent damage to the sensitive surface of the piston, the gripper of the robotic system can only hold the item in a precisely defined edge zone. The gripper must also be able to compensate for the

high torques generated during finishing by means of high holding forces. In addition to the ALLROUNDER and the MULTILIFT V with the relevant gripper configuration, ARBURG also integrated all the finishing stations into the production cell. In addition to the four-cavity mould, KE contributed to the overall setup by providing the camera-monitored inspection station and the magazinging facility.

The ALLROUNDER 420 C operates with dual-pump technology for regulated machine processes and features extended tie bars, a special thermoset cylinder, injection pressure increased to 2,500 bar, an air blast unit and additional equipment for compression injection moulding and venting, as well as the ARBURG unscrewing unit. The MULTILIFT V, in a transverse overhead design, can support a maximum load of 15 kilograms.

The production sequence is as follows: Initially, the gripper moves into the mould and removes the four moulded parts. During the demoulding process, a picker removes the sprue and drops it into a container. The mould halves are simultaneously blown out via several nozzles on the gripper.

At the milling station, the parts are consecutively provided with a bevel.







In the complex project system, a four-way gripper (photos on left) performs removal of the injected parts and their further transport to the various finishing stations (photo below). The finished pistons are used in a clutch system.

# replaces steel



Simultaneously, the outer overfeed material is removed. The electric motor of the milling tool runs permanently, the chippings are removed via a connected industrial vacuum.

The burrs on the internal thread of the finished parts are removed simultaneously. Here too, the finished parts are first centred via the mountings. Four pneumatically-moved grinding heads remove the burrs. The insides of the parts are cleaned on a pneumatic station. The lift plate of the gripper in turn positions the finished parts precisely onto the pins of this station. Once again, the industrial vacuum is connected in order to remove the chippings.

In order to prepare for the 100% camera inspection at the last station of the system, the surface of the pistons is

cleaned by means of rotating felt bands on a further station. The robotic system then transfers the finished parts to the inspection station. Good parts are picked up by the robotic system and ejected according to cavity via tubes. Detected reject parts are separated beforehand.

During the development and construction of the production cells, the cooperation between KE and ARBURG was so satisfactory that a change of suppliers on the part of KE is virtually excluded.

## INFOBOX

**Founded:** 1978, member of the Siedle Group

**Employees:** around 90

**Products:** Technical parts, system components and assemblies made from thermoplastics and thermosets for the electro-technical, automotive, semiconductor, consumer goods and medical technology sectors.

**Production cells:** Currently, five systems for the production of thermoset pistons; 34 injection moulding machines, of which eight are for thermoset processing

**Contact:** Kunststoff- und Elektrotechnik GmbH, Fichtenstraße 64, D-78087 Mönchweiler  
www.ke-technik.de

# Two receive certification

**The ARBURG subsidiary in the Czech Republic and the office in Slovakia have been certified according to EN ISO 9001 since January 2007.**

With this quality-relevant certification, ARBURG complies with the increasingly stringent customer requirements in these markets, in particular with regard to the automotive and medical technology sectors, thereby securing market advantages.

Through certification in the field of "Sales and service for injection moulding machines and peripheral equipment" the business activities, which have been successful for many years under the management of Subsidiary Manager Jaroslav Novak, have been optimised.

The renowned Czech "Engineering Test Institute" carried out the intensive two-day audit. During the preparatory process, the two ARBURG locations were provided with support from the headquarters in Lossburg, which has already received certification on several occasions. The relevant quality guidelines are also fully based on the long-standing and internationally proven ARBURG quality model.

The certificates awarded to the Czech and Slovakian ARBURG subsidiaries in January 2007 vouch for quality.



# Ten-year partnership in Slovenia



Eugen Hehl (on right in photos) congratulates TERA Managing Director Marjan Leban on the 10-year trading partnership.

**Time flies, yet sometimes you have to reflect: Exactly ten years ago in 1997, the trade partnership began between ARBURG and the Slovenian plastics company TERA.**

Since then, a successful cooperation has developed to work the Slovenian market. A good reason to convey our thanks and recognition to the TERA Man-

aging Director Marjan Leban at the Technology Days 2007 in Lossburg.

Established in 1990, TERA, with its approximately 30 employees, offers proven competence to comprehensively cover the individual consulting and service requirements in Slovenia. Whereas the Slovenians initially still received service support from the Italian ARBURG subsidiary, this became unnecessary only one year fol-

lowing agreement of the trading partnership and all activities have since been performed by TERA on their own account.



## TECH TALK

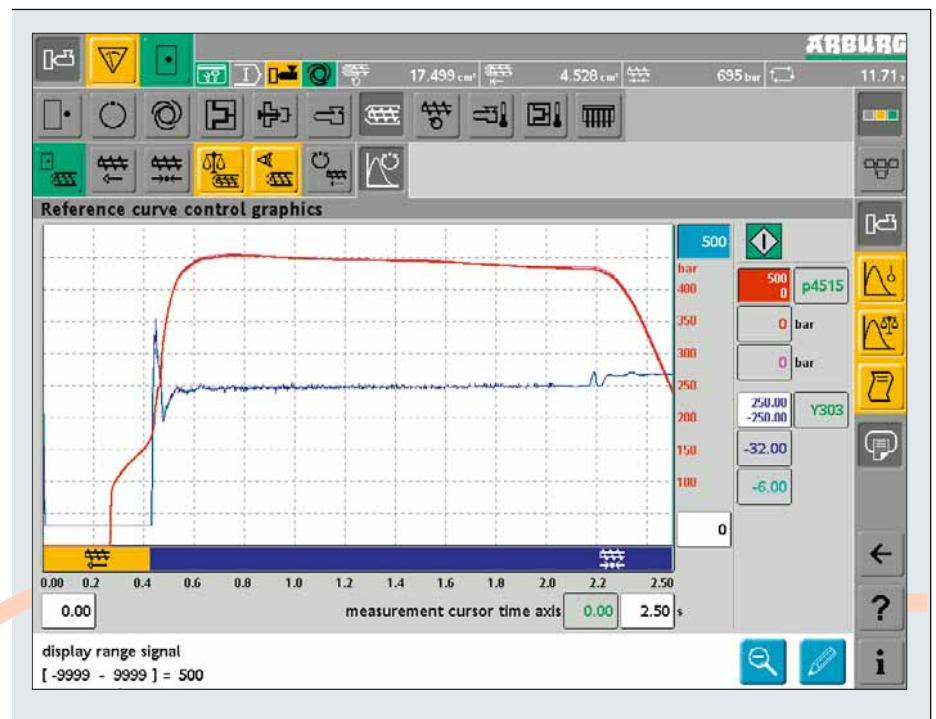
Dipl. Ing. (BA) Oliver Schäfer, Technical Information

# Controlled part quality

**A** prerequisite for consistent part quality is a constant pressure characteristic from shot to shot during the holding pressure phase in the mould. Consequently, in order to achieve optimum reproducibility of part quality, this pressure characteristic has to be controlled. In addition to the familiar "injection process control" implemented on the ALLROUNDERS, a new user-friendly version known as "reference curve control" is now available for this purpose.

During conventional injection moulding, the holding pressure curve is controlled via pressure transducers on the injection axis. Influences such as, for instance, viscosity fluctuations in the melt owing to humidity, lubricants or colour additives, but also screw wear are not taken into account. These influencing variables, however, inevitably lead to pressure losses in the mould and consequently to fluctuations in part quality. In 1988, ARBURG therefore already developed the so-called "integrated injection process control", in which the holding pressure curve was controlled in real time via a pressure sensor in the mould. In addition to improved reproducibility of part quality the number of start-up cycles can also be reduced significantly using this method.

Injection process control operates with base points which are mutually interconnected to form a polygon outline. This also allows a theoretical ideal char-



acteristic to be followed by the machine. The applicability of the target curve determined in this manner, however, depends largely on the parameterisation of the controller. This in turn is significantly determined by the flow paths in the mould up to the sensor. For process optimisation, therefore, a high degree of control technology expertise is required.

The principle of reference curve control is based on the idea of recording the internal mould cavity pressure curve of a moulded part deemed to be of good quality and employing this as a target characteristic. The adjustment curve of the

controller is also recorded. This not only significantly simplifies determination of the target characteristic, the parameterisation of the controller is also facilitated considerably. With this method, the injection moulding process can thus be stabilised quickly and conveniently to produce a specified part quality. From practice for practice – this is the principle of reference curve control.

Adjustment curve of the controller (blue) superimposed on the internal mould cavity pressure curve (red).



**Internationally electric.** Reproducing, precise, fast and energy-efficient. With its fully-electric ALLROUNDER A, ARBURG has just the right solution for all production requirements. The fully-electric ALLDRIVE is available with clamping forces from 500 to 2,000 kN. Efficiency and precision, suitable for international applications.



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