

# today

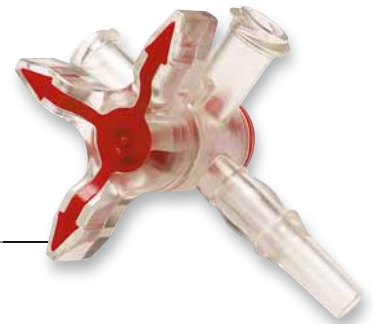
The ARBURG magazine

Issue 30

Autumn 2005



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## MASTHEAD

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A glance at the internal workings of the electric ALLDRIVE: The electrically driven injection unit with planetary roller screw drive and electric dosing motor.

**ARBURG**



Dear readers,

To begin with, I would like to say that it is a great pleasure for me to be introducing myself as one of the editorial writers contributing to

our customer magazine, "today". As managing director, I have been responsible for all sales activities in the ARBURG group since the start of the current year.

Regular readers will know that the three managing partners and three managing directors of our company contribute alternately to this column, offering their views on business and technical issues related to ARBURG, as well as on topics which concern our entire industry.

The highlight of the trade fair season this autumn will be the Fakuma in Friedrichshafen, Germany. At this trade fair, renowned throughout Europe and beyond for its appeal and charm, ARBURG will once again shine with world premieres of its new technology (pages 4-5). Our "ARBURG Expertise Centre" in Friedrichshafen will also demonstrate our intention to further expand our already

wide range of customer-oriented services on a continuous basis. The "ARBURG Expertise Centre" has already managed to surprise even long-standing ARBURG customers during our Technology Days in April and our Specialist Days in June with the breadth of what it has to offer.

Our reports on INOXCROM of Spain (pages 8-9) and Telegärtner Kunststofftechnik GmbH in Germany (pages 14-15) demonstrate how our customers can enhance their success with know-how of this nature.

We hope you enjoy reading our latest issue.

Helmut Heinson

# Opening t

**T**raditionally, ARBURG has always taken the stage at the Fakuma to make a major appearance. Though there may not be a gala event complete with evening wear, visitors will be infected with premiere fever at the 1,200 square metre, two-story ARBURG exhibition stand, where the new 470 U and 175 V ALLROUNDERS will be presented to the international trade public for the first time. With the presentation of these two machines, ARBURG (which, incidentally, has been exhibiting at the Fakuma since it began in 1981) again highlights the significance of this trade fair on the shores of Lake Constance for the international plastics industry.

New introductions and additions to the U series have followed one after another in the last two years. Following the premiere of the ALLROUNDER 170 U at the Fakuma 2003, the ALLROUNDER 270 U at the K 2004 and the introduction of the ALLROUNDER 370 U this spring at the in-house Technology Days event, the new ALLROUNDER 470 U will now be presented. 470 U. With clamping forces of 800, 1000 and 1100 kN complemented with a choice of 170, 290 and 400 series injection units, the new 470 U is currently the largest machine in our "universal" series.

In Friedrichshafen, the new ALLROUNDER 470 U with a clamping force of 1000 kN and a 400 series injection unit will be on view.

Yet another world premiere at the Fakuma will feature the fully-hydraulic,



# he curtain for the premiere

vertical ALLROUNDER 175 V. This vertical machine is the first special machine, designed for encapsulating inserts, to be available as a standard model. The Allrounder 175 V is designed as a free-space system with an impressive degree of freedom around



extends seamlessly through to after-sales service provided by ARBURG experts. The following technology and service sectors will be presented at various consultancy areas in Friedrichshafen: multi-component technology, mould design, projects, elastomer, silicone and thermoset, training courses, Customer Service and International Technical Support (ITS), whose international services range from telephone support to customer visits and on-site training courses.



on display, the universal U-series will also be represented at the Fakuma by the small ALLROUNDER 170 U 150-30 and a 2-component version of the ALLROUNDER 370 U 700-30/30, which will produce a planetary gear set for the company Oechsler using the micro-assembly injection moulding process. Representing ARBURG's higher clamping force range, there will be an ALLROUNDER 820 S 4000-3200 configured as a fully-equipped accumulator machine along with an ALLROUNDER 630 S 2500-1300/150 configured for a two-component application.

The spacious exhibition stand thus conveys ARBURG's comprehensive expertise as well as their natural focus on the benefits for each individual customer, in a variety of ways.

the mould. In addition, its small footprint means that it is ideal for integration into production processes. The Fakuma exhibition will feature the new vertical ALLROUNDER 175 V with a clamping force of 125 kN and the small 30 series injection unit.

Even though the focus of visitor interest will be on the world premieres of the ALLROUNDER 470 U and the 175V, this does not mean that the seven other machine exhibits will be any less interesting. The all-electric A machine series will be represented by an ALLROUNDER 320 A 600-170 with the LSR equipment package and an ALLROUNDER 420 A 1000-400 which will be configured as a high-speed machine. An ALLROUNDER 520 C 2000-800, featuring a wide range of peripherals and the newly-developed MULTILIFT V vertical robotic system, will be representing the C-series. This machine will produce an ABS handle for a hose. In addition to the new ALLROUNDER 470 U

Regardless of the achievements in machine technology on display, the focus of ARBURG's presence at the trade fair will be its overall expertise in machine construction and the services it provides. The 2005 Technology Days event saw the inauguration of the ARBURG Expertise Centre at the company's headquarters at Lossburg. Arburg's exhibit at the Fakuma includes a "stand-in-stand" concept where, in addition to the latest machine technology, visitors will find the Expertise Centre, offering comprehensive know-how in consultancy.

Our emphasis on service and customer benefits begin before the sale with the individual machine-requirements analysis and

The international plastics industry meets at the Fakuma in Friedrichshafen. The ARBURG exhibition stand in hall A3 is always a magnet for visitors. One of the highlights this year is a two-component version of the ALLROUNDER 370 U (below).





# Machine inspection

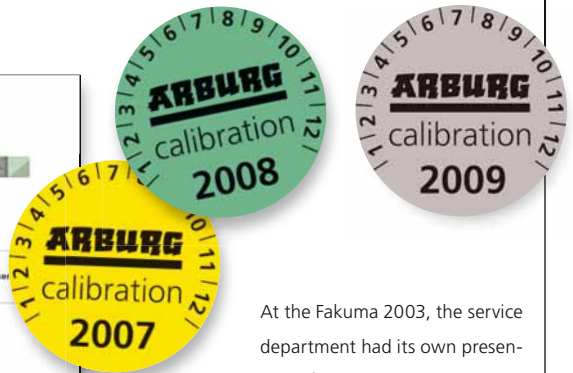
# and certification

**I**n addition to the machine exhibits at the Fakuma, ARBURG will also be presenting its complete range of services at its stand-in-stand. The new inspection contracts, which include a certificate and an inspection stamp of approval, are the focus of our technical service. Thanks to the modular structure of the service, the inspection intervals and the scope of inspection can be determined individually according to the requirements of the customer.

Because inspection plays an important role in many certification processes, ARBURG has been offering its customers inspection contracts for a number of years now. As outlined in these contracts, ARBURG service technicians check all key elements of the machine for wear, correct function and safety at defined intervals. This also includes the inspection and, if necessary, recalibration of all machine and control parameters that relate to quality.

In order to offer its customers tailor-made solutions that meet a variety of quality standards, the new inspection contracts are designed in a modular format.

The basic inspection includes the calibration of parameters relevant to the injection moulding process and can also include the recording of actual values as an option. Additional options include an evaluation of displacement measurements, an inspection of the mould platens for parallel alignment, with or without recording actual values in each case, testing the



At the Fakuma 2003, the service department had its own presentation forum within the ARBURG stand (above). Among other items to be presented here in 2005 will be the new inspection contracts (right).

pressure inside the mould as well as the temperature measurement chain inside the cylinder and also in the mould, calibration of auxiliary control valves, a general inspection, a check of the protective guards and also an oil analysis by an independent laboratory. Approval tests can also be performed at the factory for new machines.

These inspections can be performed in intervals of one or two years, depending on the requirements of the customer. The customer then receives updated digital documentation for each inspect-

ed machine, in which the results and measured values for up to five inspections are logged and documented in detail. Within the scope of certification, for instance, this can serve as proof of preventive maintenance. In future, customers will also receive an official ARBURG inspection certificate as well as inspection badges for each machine.

In order to further illustrate the inspection process for visitors at the Fakuma, a service technician will explain the various inspections and measurements live on an ALLROUNDER 170 U.



# Everything under control?

**W**hen cooling water problems occur, the oil temperature increases, the shut-down threshold is reached and the machine performs an emergency stop. After that, the oil must cool down first before production can resume. However, there is no need to reach that stage. Those who want to play it safe can equip their machine with a water distribution manifold, which is integrated into the SELOGICA control system and provides precise control over each of the individual cooling circuits.

Depending on customer requirements, up to 15 ALLROUNDER cooling water circuits can be adjusted manually or controlled automatically through integration into the SELOGICA control system. This kind of temperature control and monitoring offers a high level of production reliability and reproducibility. The various temperatures and their corresponding tolerances can be entered with little difficulty using

the SELOGICA user interface. In this way, the operator has all current temperatures in clear view during production and is notified by an alarm when a temperature falls outside its tolerance range, allowing action to be taken before the machine switches off automatically.

The temperature of the oil can be controlled using an oil cooler, which guarantees an optimum constant operating temperature of 45 °C. The tolerance is +/-10 °C, which ensures that the alarm is given well before the shut-down temperature of 65°C is reached.

Temperature control of the housing prevents the material from adhering around the feed zone. This temperature varies depending on the material being processed and can therefore be changed accordingly. On ALLROUNDERS with electro-mechanical dosage drives, the electric motor is temperature-stabilised to 35 °C via a heat sink in the control cabinet. The cooling water circuits of water-cooled pump drive motors are also integrated into the SELOGICA system. Additional cooling

water circuits are also available for cooling moulds and for external temperature control units, or for cooling the second housing or cylinder when processing LSR in multi-component injection moulding applications for example.

Through their actuation by the SELOGICA control system interface, the relevant valves are opened automatically when the main switch, motor or mould heater are activated. This not only makes the ALLROUNDER easier to operate, but above all increases production reliability as well.



The integrated water distribution manifold (left) allows for the precise regulation of individual cooling water circuits via the SELOGICA user interface.



**E**ven in the age of e-mail, text messaging and mobile phones, people continue to use pens for jotting down short notes, writing shopping lists, making sketches and taking telephone numbers. That pen may well be a product made by INOXCROM, Spanish manufacturers of writing implements. Producing approximately 200 million metal and plastic writing implements each year, INOXCROM is one of the largest manufacturers of such items in the world, and they rely on ARBURG technology.

# Beautiful writing

This international success story began in Barcelona in the year 1942 and continues to this day, when the company has an annual turnover of Euro 65 million as well as approximately 600 employees in Spain, France, Britain, Italy, Germany and the USA.

INOXCROM is represented by its trading partners in a total of 72 countries, thus guaranteeing a tightly-woven sales network in the company's chief markets, which are Europe and the USA.

Company founder Manuel Vaqué created a robust yet attractive stainless steel pen – a fact which helps explain the origin of the name INOXCROM, as inox is a

term referring to stainless steel. Thanks to strategic marketing and the highest technical standards, INOXCROM became one of the world's largest companies specialising in individualised writing implements.

Making up 65 percent of company sales,



Photos: INOXCROM

Photo: A. Heinzelmann





promotional items are the cash cow of this Spanish company. These items can be divided into the categories of mass giveaway items, higher-quality advertising gifts and exclusive presentation gifts. INOXCROM also produces its own product lines for direct sale via specialist shops, although this involves smaller margins. This includes high-value, light hearted and youthful designs as well as designer product lines created in conjunction with well-known Spanish artists such as Ágatha Ruiz de la Prada, Jordi Labanda and the Kukuxumusu art label.

INOXCROM's aim of guaranteeing per-

steel tips and tungsten-carbide ball points allow for neat writing actions. The large-capacity cartridges guarantee a pen that can write for more than five kilometres, which means that they last three times as long as a standard cartridge. Extraordinary in the industry: in addition to its writing implements, INOXCROM also produces its own cartridges. A comparatively high rate of in-house production guarantees superior and above all consistent product quality while reducing dependence on suppliers. The excellent quality of INOXCROM products is based on the use of modern production



At the central production facility in Barcelona, 35 ALLROUNDERS produce writing implements of all kinds.

*The Writing Obsession!*  
**INOXCROM**

# implements from Spain

fect, long-lasting individualised printing on its writing implements requires ABS moulded parts of outstanding quality along with extremely high levels of printing expertise (screen printing and pad printing). Printing onto the individual parts of the pen is done before assembly in order to obtain the best possible printed image. INOXCROM's specialties in this area lie in the photo realistic reproduction of images and the perfectly-aligned 360° printing method.

"If a colour exists, it can be reproduced" - a promise delivered by INOXCROM in impressive and wide-ranging fashion, as evidenced by its highly prominent array of international customers. The company has produced high-quality, aesthetically pleasing promotional items for customers such as McDonald's, Strenesse, ZDF, Nestlé, Sony, Hewlett Packard, Puma, BMW, Levi's, Vodafone and a number of other big players, each time creating items that are in perfect harmony with the corporate design of the respective customer. Of course, the internal workings meet the same high standards as the casings. Cartridges in the international Parker format with stainless



methods and guaranteed by comprehensive quality management at the company's central production facility in Barcelona. No product leaves the factory without passing stringent tests. What is more, scheduled production monitoring is made possible by the use of SAP. Production is carried out on a total of 62 injection moulding machines with clamping forces ranging from 150 to 1,300 kN. In 1985, the first ALLROUNDER was introduced into the machine fleet. Now there are 35 ALLROUNDERS in the Barcelona plant, nearly all of them providing 1,000 kN clamping force. Robust process quality through precision, reproducibility, reliability and uncomplicated maintenance are decisive arguments in favour of the ALLROUNDERS. High throughput with little downtime in two-shift mass production is an absolute must for this Spanish global market leader. The company has been thoroughly impressed with the quality of ARBURG machines. The specific production challenges that face the company arise

from the wide range of colours offered, the high print quality required for promotional items and the short delivery times. All of these are process parameters which make it essential to have a reliable machine supplier.

## INFOBOX

**Founded:** 1942

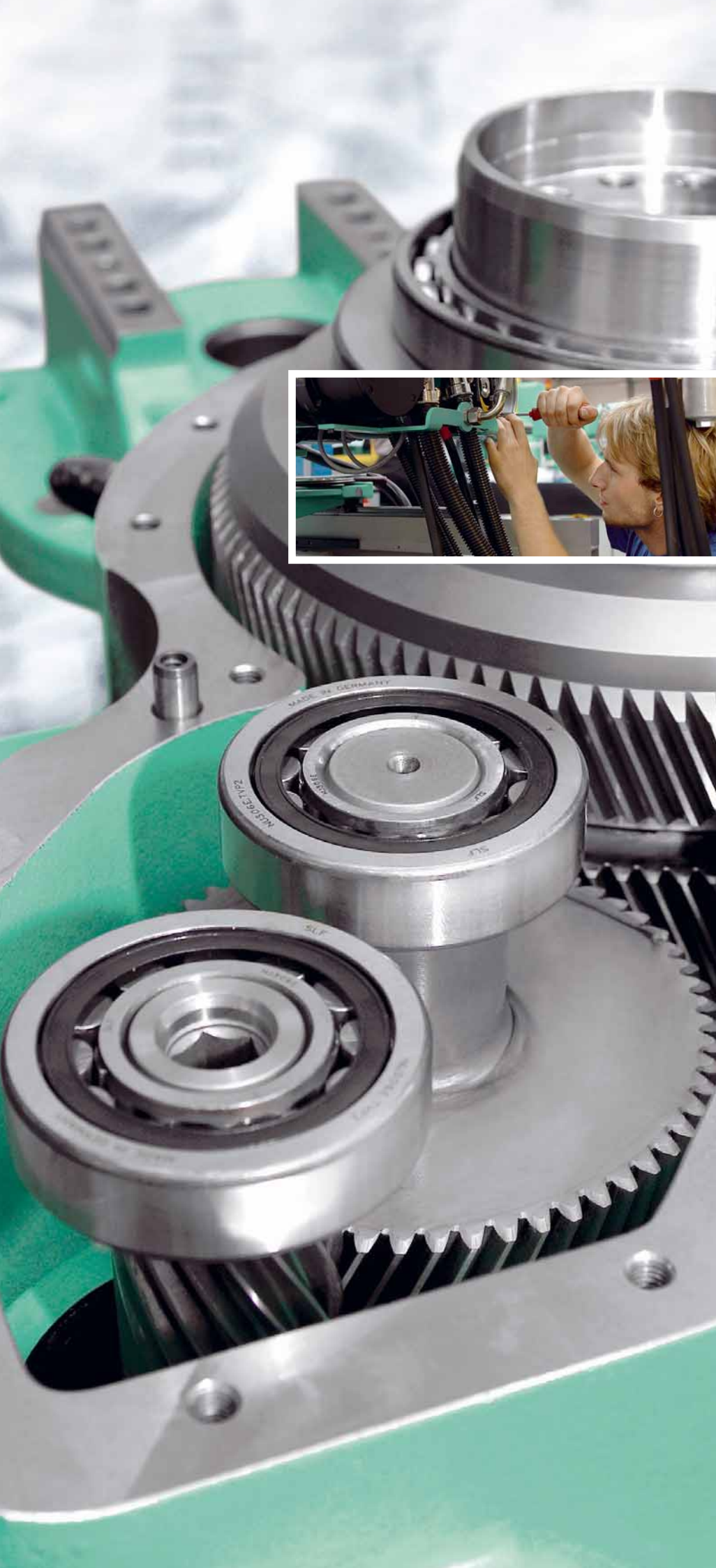
**Employees:** approximately 600 worldwide

**Products:** writing implements

**Machine fleet:** 62 injection moulding machines, including 35 ALLROUNDERS with clamping forces of 150 to 1,300 kN

**Contact:** INOXCROM, S.A.

Torrent Estadella 46-54,  
08030 Barcelona, Spain  
[www.inoxcrom.com](http://www.inoxcrom.com)



# All

**W**ith our all electric models, everything runs like a well-oiled machine. This applies not only to the demand for the all-electric ALLDRIVE machines, but also to their production-line manufacture. The compatibility of the all-electric ALLROUNDERS with the hydraulic versions results in decisive advantages, not only with regard to manufacturing but also regarding the use of ALLDRIVE equipment at customer facilities.

During the development of the all-electric ALLDRIVE machines, compatibility with hydraulic ALLROUNDERS took high priority. This involved performance, mechanical dimensions of the mould tool in relation to the distances between the tie-bars or mould height the cylinder modules as well as the uniform operating system in the shape of the central SELOGICA control system. From the customer's point of view, this meant that the electric machines should be able to accommodate existing moulds and cylinder module sizes, and that the operator will already be familiar with a control philosophy that is the same as that featured on the hydraulic machines. In addition, components used on both hydraulic and electric ALLROUNDER machines can also be series-produced in large quantities, in familiar ARBURG quality and at an optimum price-performance ratio. Moreover, these tried-and-tested components, including those such as the

# ALLDRIVE

Assembly of the ALLDRIVE equipment calls for know-how and a great deal of care. The temperature control unit for the closed cooling circuit is integrated into the machine base of the ALLROUNDER A.

## along the line

electro-mechanical dosage drive, have been proving their practical worth in everyday operation for many years now. MULTILIFT H robotic systems can also be used on ALLDRIVE machines with no difficulty.

Also, from an assembly point of view, our customers will benefit from our years of experience with hydraulic machines and the ability to build the all-electric machines in currently two production lines. The machine base, clamping and injection units are built simultaneously and then assembled together. Additional components are added down the assembly line.

The ALLDRIVE machine base incorporates not only a small hydraulic accumulator system (not included in the fully-electric version) but also an integrated temperature control unit with a closed cooling water circuit. This consists of an regulated cooling distributor which is supplied as a standard feature.

The coolant in the closed cooling water circuit, water with anti-freeze and anti-corrosive agents, is temperature-controlled via an internal heat exchanger, thus providing a constant temperature level for the electric drive motors and servo controllers for the three main axes, as well as the gearbox for the injection unit. By presetting a temperature between 35 and 40°C, the formation of condensation inside the motor can be eliminated. Furthermore, the closed system prevents any problems resulting from foreign particles entering the cooling water.



tinuously during initial commissioning to ensure that no foreign particles are subsequently found in the closed system.

The pre-assembly, commissioning and adjustment of the ALLDRIVE equipment requires specific know-how and great care, such as when assembling the gearbox for the injection unit, which itself contains a number of gear wheels. This is why the work must only be performed by persons specifically qualified for ALLDRIVE servicing.

During commissioning, precise adjustments are made to the machine which include the machine base, the clamping and the injection units. The platens are also measured and aligned so as to be perfectly parallel and on-centre. Force distribution is measured and adjusted via the four tie bars of the clamping unit using ring-type strain gauge sensors. The clamping and injection forces are determined using strain gauges and are then entered into the control system. Parameters for the motors and for communication with the frequency converters are set next and the closed gearbox system of the injection unit is filled with oil. The oil is filtered con-

### INFOBOX

**Series:** ALLROUNDER A (ALLDRIVE)

**Sizes:** 320 A, 420 A, 520 A with clamping forces from 500 to 2,000 kN

**Design :** modular drive technology: main axes with servo-electric drives (opening and closing the mould, injection, dosing), auxiliary axes (ejection, moving the nozzle, mould functions) with either electric or hydro-mechanical drives

**Technology:** electrically-driven five-point toggle system for high positional accuracy and rapid machine movements, small hydraulic accumulator for hydraulic movements

**Benefits:** rapid simultaneous movements, low energy consumption, high precision, high reproducibility, low noise emissions

# Chinaplas in Guangzhou

**T**he Middle Kingdom, explosive growth markets, the most populous economy in the world, the Great Wall: there are many clichés about China, and as is often the case with clichés, they are all correct to a certain extent, but they don't really represent the whole picture.

Yet the boom in the Chinese plastics market is no cliché. At Chinaplas, which was held for the very first time in Guangzhou from 21-24 June, 2005, 52,000 visitors had a chance to find this out for themselves. In future, this trade fair will take place every two years in Shanghai and in the intervening years it will alternate between Peking and Guangzhou.

Chinaplas is promoted by Hong Kong-based organiser Asdale in cooperation with Messe Düsseldorf, and is used by



Photos: G. Ziegler

A, representing the all-electric ALLDRIVE series and also the universal, fully-hydraulic ALLROUNDER 270 U.

It was a great success. "We were very satisfied with our exhibition at Chinaplas this year, and also with the response we received." Helmut Heinson, Managing Director of Sales, attributed this positive summary of events in particular to the quality of the visitors and to the high amount of visitor traffic at the ARBURG stand. One particular surprise was the large number of international, and especially European, customers who displayed a great deal of interest.

"We want to bring some order to the ever-increasing number of regional and local trade fairs, to the benefit of the larger fairs", says sales manager Heinson while explaining the objective which is to become the focus of ARBURG, especially in the growing Asian and, in particular, Chinese markets. "With regard to these key aspects, we want to get even more involved in future at a level that is in line with our global significance," said Heinson, laying out the company's course. "Our global strategy is clear. Large key markets require us to maintain a prominent presence," said

Heinson, emphasising ARBURG's intention by offering its well-known and highly regarded standards of after-sales service in the Chinese market.

And if the Chinese market continues to grow, this strategy leaves ARBURG with every opportunity to pursue further expansion. As we all know, at ARBURG that is not just a cliché...



Photo: ADSALE Publishing Ltd.

ARBURG as a key focal point within the highly competitive Asian trade fair-market. This is why ARBURG used this venue to present two ALLROUNDERS in China for the first time: the ALLROUNDER 420

Considerable interest in ARBURG: even Chen Shi-neng (3rd from left), high-ranking member of the National People's Congress and president of the China National Light Industry Council, and Liao Zheng-pin (right), president of the China Plastics Processing Industry Association (CPPIA), visited Managing Director Helmut Heinson (2nd from left) at the ARBURG stand.



# Five "Specialist" days

**E**ven in the area of injection moulding there are special applications, as could be seen at ARBURG over a period of five days from 13-17 June. At a one-day presentation held during the ARBURG Specialist Days event, approximately 370 delegates from 13 countries were on hand to find out more on the topic of "machine concepts for the processing of cross-linking materials".

Production requirements for thermoset, silicone and elastomer processors formed the central focus of the event. Running on a total of 13 machine exhibits, special applications were presented and explained in detail with particular references to material, moulded part weight, cycle time and machine accessories with the aid of in-depth process recommendations.

Many visitors were amazed that no special machines were used for the special applications demonstrated, but that only application-specific modifications to proven ARBURG ALLROUNDER technology enabled reliable production with all the different processes.

The range of applications on display was quite diverse:

On an ALLROUNDER 370 C, a belt pulley with a part weight of 90 grams was produced from pourable thermoset. An ALLROUNDER 570 C was used to produce an insulating rail from moist polyester with a part weight of 295 grams in a cycle time of 80 seconds. On an ALLROUNDER 420 A, an inflatable seal with a part weight of 10 grams was injection moulded using LSR in a cycle time of



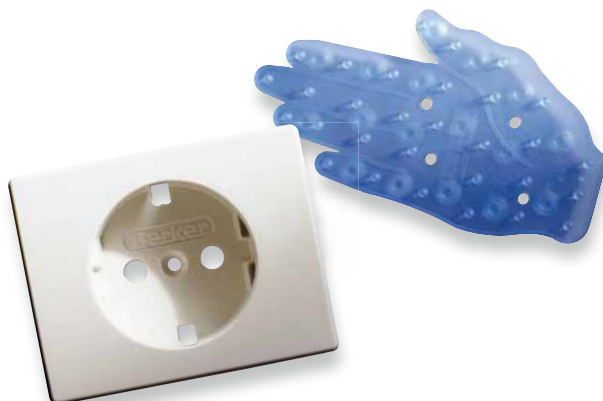
40 seconds. In addition, there were three two-component applications for processing thermoplastic and LSR. A sample elastomer application was provided by an Allrounder 420 C, which produced a damper with a part weight of 1.2 grams from EPDM or optionally NBR.

Also particularly impressive was the powder injection moulding of a knife blade with a part weight of 7.55 grams on an Allrounder 320 C and the production of a table tennis bat as a multi-component application from ABS and TPE on an Allrounder 630 S.

The big advantage of the Specialist Days: this special event represents an ideal supplement to the thematically more comprehensive Technology Days, which attracted large numbers of visitors to ARBURG in April this year.



Using a variety of applications, ARBURG presented the processing of thermoset, elastomer and LSR on its ALLROUNDERS, also as a two-component process combined with a thermoplastic.





# Excellent process



**C**reating added value through reduction: Telegärtner Kunststofftechnik GmbH was able to do just that by combining various process steps in the production of a four-way valve for medical applications. For the innovative redesign of this moulded part, which had been previously produced in several production steps, the company, which belongs to the international Telegärtner Group, was presented with the TOP 100 innovation prize.

Founded in 1973 as Teleplast Beyer und Gärtner GmbH with five employees, the company quickly grew beyond its origins in the production of electronic and communications technology. Reducing dependence on particular industries by focussing

on process technology solutions is the successful business model which allowed Telegärtner to achieve turnover of Euro 4 million in 2004. Along with sales growth, the need for additional space grew as a consequence. In 2004, the company moved into new offices.

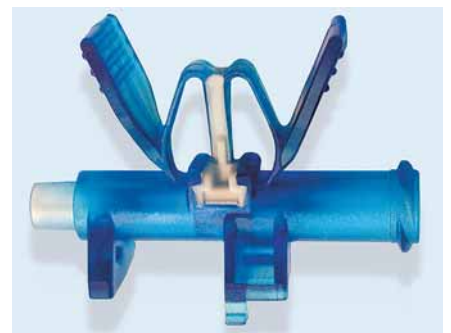
Based in Steinenbronn, Germany, not far from Stuttgart, and with 35 employees, the company has been serving customers from the medical technology and biotechnology industries, the automotive sector and also the pharmaceuticals and cosmetics industries for a number of years. Germany and Europe are the main sales markets for Telegärtner's products, which are made exclusively from thermoplastic and ceramics.

Special processes are nothing out of the ordinary at Telegärtner: multi-component injection moulding, in-mould assembling, in-mould decorating (IMD) and in-mould labelling (IML), ceramic injection moulding, clean room technology and ultrasound welding are a matter of course. In addition to its special processes, Telegärtner's special expertise in processing complex material combinations is the major plus point of this German award-winner for innovation.

Of course, this expertise is also officially certified: Telegärtner is ISO 9001:2000

and also TS 16945 certified and will also be receiving the ISO 13485 certification in the near future.

Let us go back to the award-winning four-way valve: this part, conventionally produced using individual components which were later assembled, is now produced in one process step which includes the assembly of the individual components. Here, in an 8+8+8 impression hot-runner mould with integrated handling, three-component injection moulding and in-mould assembly are brought together. Thanks to optimisation, this patented process enables a sizeable reduction in costs while at the same time achieving an improved and safer function. The requirements are strict: the casing, union nut and plug (the movable inner part of the valve) all come into contact with the liquid medium. It must be possible to turn the plug, yet at the same time the plug must form a tight seal. The casing, union nut and plug





# flow



In Steinenbronn, various products including medical components are produced on ALLROUNDER machines. During his visit to Lossburg, Managing Director Frank Heinzelmann met Juliane Hehl, one of the Managing Partners at ARBURG.



## Telegärtner

KUNSTSTOFFTECHNIK GMBH

are parallel injected using two materials, transferred in the mould and encapsulated with a third component which gives the part its colour. With the optimised process, Telegärtner was now able to produce parts for other industries. This innovative process made it possible to reduce the production costs of a sunlight sensor for a motor vehicle by 60 percent.

Ideas make all the difference and lead to new beginnings. "Ideas, design, process, product": these are the steps Telegärtner employs for its process technology solutions while always keeping an eye out for process cost reduction and production optimisation.

ARBURG has been a reliable partner of Telegärtner since 1973, a fact that Telegärtner's Managing Director Frank Heinzelmann again emphasised during his last visit to ARBURG headquarters in Lossburg, where he was very appreciative of the cooperative relationship between the two companies.

The more than 30 ALLROUNDERS found at Telegärtner are by no means there by chance, rather their presence is the result of systematic expansion efforts as well as an excellent business relationship dating back over three decades. This is why ARBURG machines make up the bulk of the machine fleet in clamping forces ranging from 250 to 1,200 kN. The machines operate in three shifts. Seven of these are used as two-component machines. Minimal downtime, optimal reproducibility and superior precision are the primary requirements which the ALLROUNDERS fulfil. Telegärtner's decision to produce their award-winning, highly complex four-way valve on ALLROUNDER machines is a sure sign of the company's faith in ARBURG technology.

### INFOBOX

**Founded:** 1973

**Employees:** 35

**Industries:** Medical technology, biotechnology, automotive, pharmaceuticals and cosmetics, electrical and communications technology  
Sales: Euro 4 million in 2004

**Contact:**

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[www.tg-kunststofftechnik.com](http://www.tg-kunststofftechnik.com)



# Complete

**E**ndress+Hauser Conducta, Gesellschaft für Mess- und Regeltechnik mbH+Co.KG, is one of the leading companies in the world specialising in analytical and sensor equipment for the environmental and process industries. Their systematic strategy for growth is based on constant technological innovation and the optimisation of internal processes, which also includes the increased automation of production. For their latest product, an inductive sensor for conductivity measurement, the company has invested in a production cell based around an ALLROUNDER 420 C with an extensive array of peripheral equipment which is completely integrated into the machine control system.

The product range of Endress+Hauser Conducta includes sensors and self-contained systems for determining pH-value, conductivity, oxygen and chlorine content, turbidity and solids content, ammonia, nitrate and phosphate content as well as that of other chemical substances. The company's products are used in various processing industries.

With an extraordinarily high level of R & D together with a great deal of vertical integration, the company offers its customers the latest technologies and therefore a high degree of quality, performance, safety and efficiency.

A large number of awards for innovation testify to the leading technological position of Endress+Hauser Conducta.

One of the newest products is the Indumax H CLS54, a sensor for the inductive measurement of fluid conductivity to be used in the foodstuffs and beverage industry which will be released in Autumn 2005. This sensor is available in two different entry depths (lengths) and in a total of 34 different versions, which vary in terms of materials and connection to the process.

The demands placed on the sensor are high: direct contact with aggressive solvents, temperatures from  $-10\text{ }^{\circ}\text{C}$  to  $+120\text{ }^{\circ}\text{C}$ , pressures of up to 12 bar at  $20\text{ }^{\circ}\text{C}$ , up to 8 bar at  $120\text{ }^{\circ}\text{C}$  and vacuums down to 0.1 bar absolute pressure. For sterilisation, temperatures of up to  $150\text{ }^{\circ}\text{C}$  and pressures of up to 5 bar are reached for a period of 60 minutes. For this reason, the sensor is completely encapsulated with PEEK. This material features good chemical and thermal resistance characteristics and it fulfils hygiene and cleaning requirements

due to its smooth surface. To meet these requirements, the sprue section which forms during injection moulding must also be subsequently milled over.

The Indumax H CLS54 is manufactured on a system centred around an ALLROUNDER 420 C 100-350, for which there is a single-cavity mould available for each entry depth. Additional components that form the production cell are a MULTILIFT V robotic system with special gripper, a rotary table with two work-piece carriers for 48 inserts each,

a pre-heating oven, a milling station as well as a conveyor belt system with trays for the finished product. Thanks to the full integration of the peripheral equipment (robotic system, rotary table, pre-heating oven and milling station) into the SELOGICA machine control system, the individual process steps are coordinated with one another in an optimum sequence.

The overall production sequence begins with the loading of the outer rotary table station. At the same time the inserts are picked up from the inner station by the MULTILIFT V and deposited into the pre-heating oven. From there, the robotic system removes the pre-heated parts







**Endress+Hauser**   
People for Process Automation

# integration



and places them into the hot runner mould, which is temperature-stabilised to 200 °C. After the injection moulding stage, the sprue picker integrated in the handling system first removes the sprue before the encapsulated part is picked up and deposited into the milling station for finishing. The shavings are vacuumed out immediately while the sprue section is being milled. In the last step, the finished product is laid in the trays of the palletising system.

In the entire production process for the Indumax H CLS54, of which 6,000 - 7,000 pieces are to be produced annually in future, around 60 percent of the added value is attributable to the ARBURG production cell. Due to the large number of different versions, reconfiguration is frequent, which is where the ARBURG rapid clamping system comes into play. Also beneficial are the separate data entries for individual versions, which can be quickly entered into the SELOGICA control system during reconfiguration.

“One key consideration in our decision to purchase an ARBURG production cell was the ability to completely integrate all of the peripherals into the central SELOGICA control system. Another was the reliable performance of our ‘old’ ALLROUNDER, which we have been using for around 15 years to produce high-quality, technologically sophisticated items.” says Andreas Siedler, project head in the Research and Development department at the headquarters of Endress+Hauser Conducta in Gerlingen near Stuttgart. Also important for Mr. Siedler is the ability to keep a constant eye on the plant, which is located nearly 500 km away in Waldheim (in the German region of Saxony) as well as the ability to access machine and production data immediately when necessary. For these reasons, the machine also has the optional ARBURG Remote Service (ARS) and the ALLROUNDER@web machine interface, which allow production data, screen pages and data records to be accessed remotely via the internet.

The MULTILIFT V performs all handling operations (top right): the insert (top left) is picked up, deposited into the pre-heating oven and inserted into the mould, the moulded part is removed, deposited onto the milling station (centre right) and finally, the finished part (centre left) is set down.

## INFOBOX

**Founded:** 1970 in Stammheim, Germany, part of Endress+Hauser Group since 1977

**Employees:** over 400 worldwide (2004)

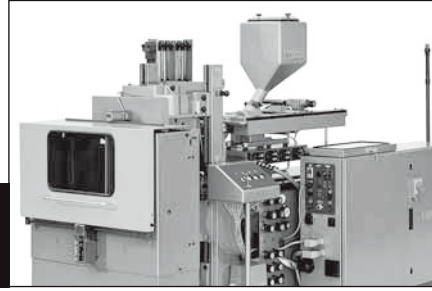
**Production facilities:** Waldheim (Saxony, Germany) and Anaheim (California, USA)

**Products:** sensors and self-contained systems for determining pH-value, conductivity, oxygen and chlorine content, turbidity and solids content, ammonia, nitrate and phosphate content as well as that of other chemical substances

**Customers:** processing industries such as chemicals and petrochemicals, pharmaceuticals, foodstuffs, water and sewage, paper and energy

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# MILESTONES



**W**ith all of the development milestones established by ARBURG in the past 50 years, the benefit to customers of our products has always been the driving force behind our innovations. Practical usefulness, simple operation and economical manufacturing in particular, have always been key objectives for us. A perfect example of this is the Bimat sliding table. First introduced in 1975, this was a forerunner, so to speak, of the modern rotary table machines.

In essence, the Bimat was a peripheral device which could only be used in conjunction with an injection moulding machine, in this case the ALLROUNDER 221, for the purpose of encapsulating inserts. Although it was possible to retrofit a machine with the Bimat, doing so was a very costly and lengthy process. When used with the Bimat, the machine maintained its manufacturing flexibility. Processing could be carried out with both horizontally and vertically arranged injection units.

The Bimat's method of operation was simple, yet effective. Initially pneumatically operated, and later available with hydraulic operation, the sliding table was attached to the clamping unit of the machine. One of the two movable mould halves would first be loaded with inserts and moved into the clamping unit for encapsulation. At the same time, the second mould half could be loaded at an adjacent loading station. On completion of the first encapsulation process the mould half would retract from the clamping unit and then slide to the va-

cant station which could either be on the left or right-side loading position. There, the finished parts would be removed and the mould half could be reloaded. Similarly the second movable mould half would have moved in and out of the clamping unit to the other loading station. Here, the finished parts would again be removed and then new inserts loaded, whilst new parts were already being encapsulated on the first half of the mould. Though the description may sound complicated it is nothing more than moving each mould half forward in and out of the clamping unit and sideways left and right for the unloading and reloading operations.

The most important advantage of the Bimat was the separation of the insertion and encapsulation processes, which resulted in a much faster production sequence. The ALLROUNDER T rotary table machines later made use of the same principle, although this featured a rotary transfer table instead of a sliding table.

Even today, our ALLROUNDER T machines still use the rotary table principle which, in association with a down stroking clamping unit, rotates either 180° in a forwards and backward movement (two stations) or by 120° clockwise movement (three stations). With the latter version, it is possible to automatically load and remove encapsulated parts which can also be realised with the two-component process. As with all today's ALLROUNDER rotary table machines, fully automatic part production can be carried out which is completely integrated into the SELOGICA system.



The Bimat sliding table (above) was a forerunner of the modern ALLROUNDER T rotary table machines (below).



## TECH TALK

Jürgen Schray, Depart. Manager, Applications Technology

### Reduced cycle times on all electric machines

**I**n addition to energy consumption, cycle time and fast machine movements are the main arguments nowadays in favour of all electric injection moulding machines. On ALLDRIVE machines, the reduction in cycle time is the result of the combined speed-optimised toggle and independent electric drive axis.

The electrically driven five-point toggle system of the ALLDRIVE has been specially configured for the dynamic behaviour of the electric drive, allowing for rapid, highly accurate movements resulting in the reduction of the cycle time. Due to the functional principle of the toggle, it is possible to dispose with the pressure build-up time which is necessary in the case of hydraulic

mould clamping to compress the oil during the build-up of clamping pressure.

Thanks to their independent operation, in conjunction with the flexible programming and control possibilities of the SELOGICA system, the ALLDRIVE electric axis drives offer greater potential for optimising the reduction of cycle times.

The separation of the plasticising procedure from the cooling time can also contribute to a reduction in cycle time. For applications in which the cooling time alone is insufficient for dosing and therefore the dosing time dictates the cycle time, it is possible to perform dosing beyond the cooling time via an independent electric dosing drive without increasing the cycle time. However, in this case it is necessary to use a shut off nozzle. The cycle time

between the mould movements can be shortened with the use of an electric ejector, which ejects parts precisely and dynamically.

The utilisation of the potential offered by electric drives, however, is dependent on its support from the relevant moulding technology. For instance, it is also highly important that moulds are able to support the faster cycles particularly when considering the use of cores and controlling the mould temperature.

## A "pile driver ceremony"

**W**ith the so-called "pile driver", the Dutch equivalent of a foundation stone-laying ceremony, construction of the new building in Utrecht for ARBURG's Dutch subsidiary was initiated last May.

The first pile, a 13.6-metre fir from the Lossburg forest, was driven into the sandy ground by Michael Hehl, spokesperson for the management team. In his function as head of the plant development division, he travelled to Utrecht accompanied by his father, Eugen Hehl and the ARBURG architect, Manfred Wolfer, in order to jointly celebrate the start of construction work with the manager of the subsidiary,

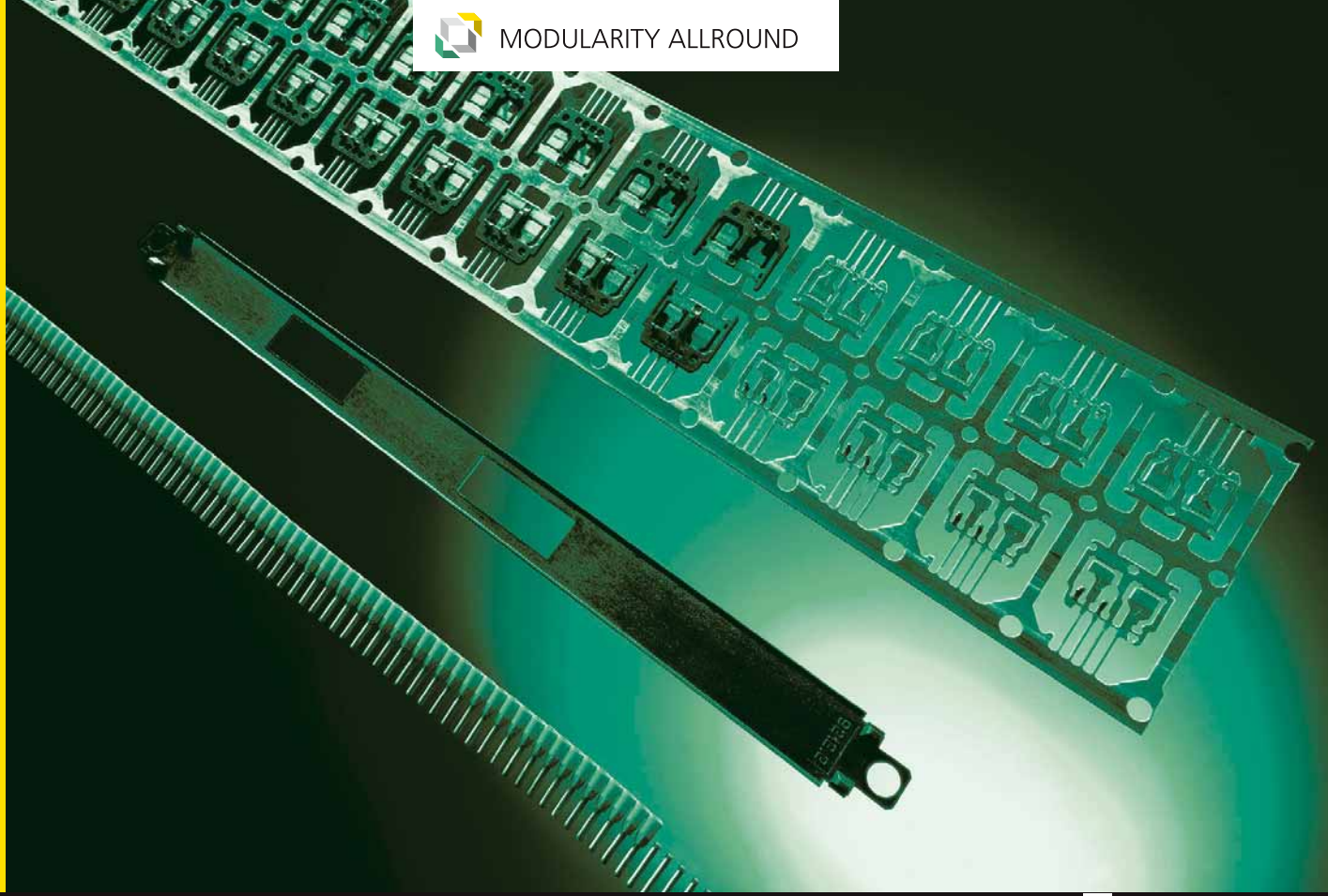
Carlo Brouwer, his team of employees and the Dutch planners.

The original wooden pile from Lossburg will be visible through a glass floor panel in the lobby area after completion of the building. The new L-shaped building will span an area of approximately one thousand square metres, offering sufficient space for the Sales, Service, Spare Parts and Training departments.



Photo: Jan de Kruijf

Michael Hehl took over the controls of the special pile-driving machine and rammed the 13.6 metre long wooden pile into the ground.



# Universal

Today, you need to adapt quickly to ever-changing market demands. At least you have to react quicker than the competition. Get ahead of the competition with the universal hydraulic ALLROUNDER U series: ranging from the 170 U for

micro-components of just a few hundredths of a gram, to the 470 U with a maximum moulded part weight of 232 g, our machines offer economical operation, modularity, flexibility and adaptability. Universally active - with ARBURG.



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