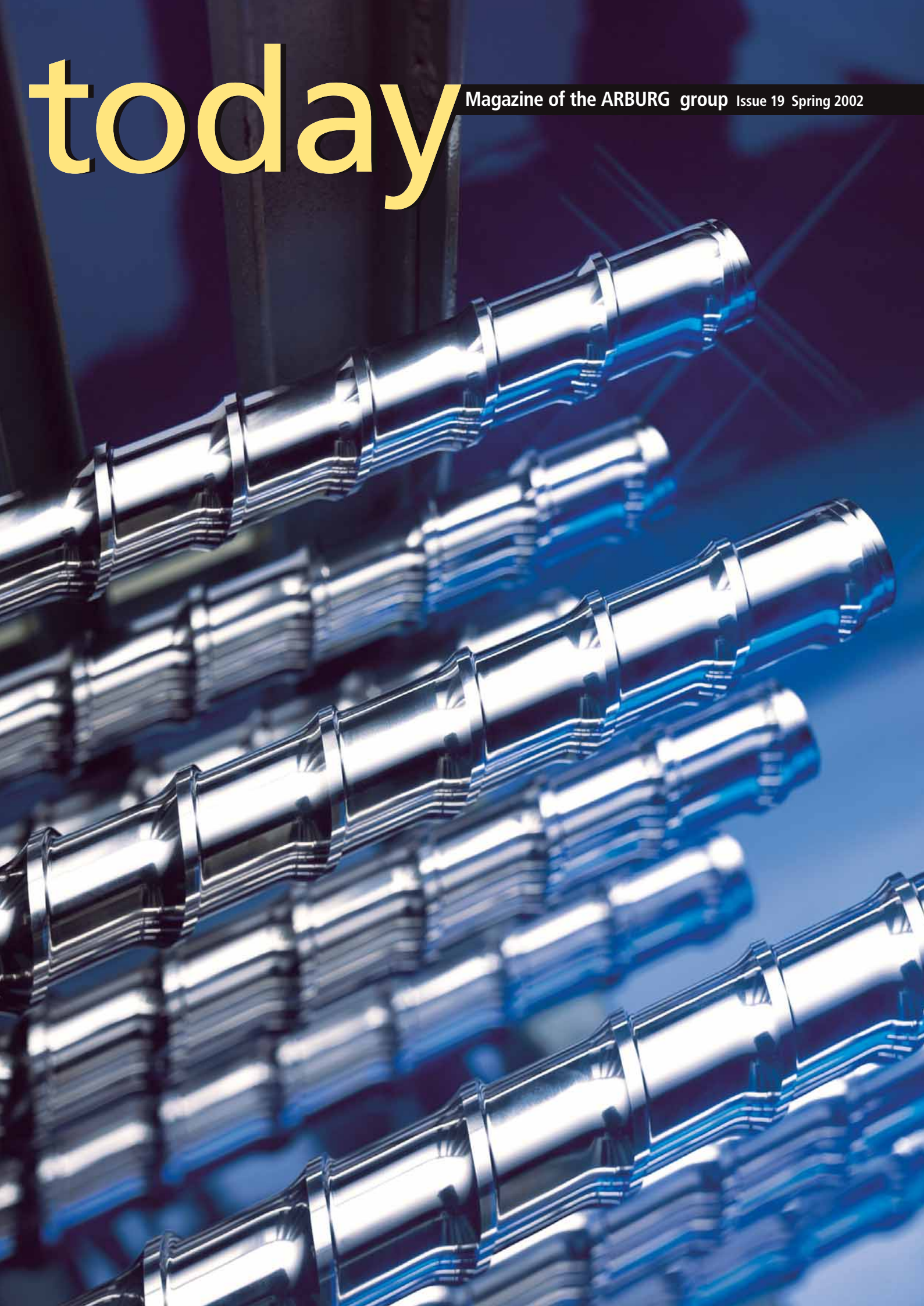
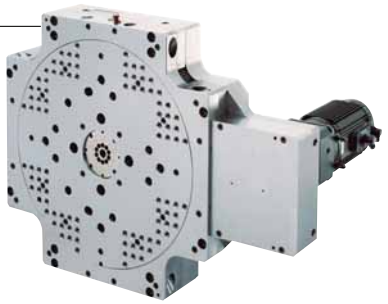
today

Magazine of the ARBURG group Issue 19 Spring 2002





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Altogether ARBURG produces around 60% of machine components – including all plasticising screws – exclusively in-house in Lossburg. For when it comes to product quality, the company sets itself the highest standards.

ARBURG

Dear Reader,

If you have been receiving our magazine for any length of time, you will have spotted it straight away: This copy of Today has a completely new look. As part of a comprehensive process known in the business as a relaunch and at the suggestion of the management team, the experts in our Corporate Communications department have given our customer magazine a new modern image. From the style of the cover and page layout right down to the smallest details which readers might not often notice, our "press team" Susanne Wurst, Peter Zipfel and Dr. Christoph Schumacher have created layouts that reflect modern trends and have put into practice the latest journalistic expertise. But the end result they have achieved is not one which will have to be revised again in a year because the layout has already become outdated.

Modern, generous, visually attractive, reader-friendly, informative – that's the kind of magazine we are presenting to you today. But one whose style is very much in keeping with that of an international vehicle of communication published three times a year in five languages with a total circulation of around 35 000. With a circulation of this size, Today is one of the most important publications of the plastics industry – and is streets ahead of many commercially-produced specialised publications in terms of circulation and distribution.

Content wise nothing has changed, this has always been very well received in the past: We will be bringing you important innovations concerning the technology and organisation of our company, interesting customer reports, as well as hints and tips for plastics processing - tackled always from a serious angle. Trade fair reviews and historical topics complete the whole informative package.

We hope that you will rate the new format as highly as we do and that you really enjoy reading the new today.

Yours truly

Juliane Hehl

An

ARBURG's appearance at the internationally renowned K 2001 exhibition in Dusseldorf was a complete success and more than worthy of this year's catchphrase and exhibition slogan: "ARBURG – The New Dimension" Every day of the exhibition saw people flocking to the ARBURG stand, the star of which was the large ALLROUNDER 720 S with a clamping force of 3200 kN.

The ARBURG management team was more than satisfied with the way the K 2001 went. The company spent eight days demonstrating to visitors what lay behind the year's catchphrase and exhibition slogan: New dimensions as far as the eye could see – from the exhibits across the 1 450 square metre, the lavishly designed, raised stand to the totally coordinated and fully comprehensive publicity material with its striking external advertising, compact

stand folder and multimedia image brochure.

The external advertising was a real "eye-catcher" consisting as it did of a pair of eyes showing amazement, the sign "13 A 13" and the ARBURG logo, which together pointed visitors in the right direction: Towards the

all-round success

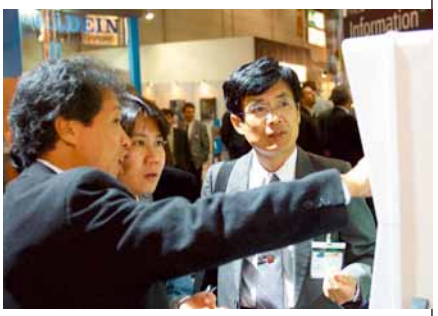
ARBURG exhibition stand, which was situated in Hall 13 at number A13. Once there, interested visitors were able to locate "their" machine precisely by using the first ever stand folder to be produced for this exhibition, which included a clearly colour-coded chart corresponding to the machine displays.

In addition, the K 2001 also provided an opportunity to officially launch the new ARBURG multimedia image brochure, printed in seven languages. Consisting of a brochure and integrated CD-ROM, it provides comprehensive information about the company, with the two forms of media complementing one another. Not only do the contents deal in detail with the company's technology and history, but also with visions for the future and with image components.

Trade visitors were able to experience the latest in ARBURG technology live in action at the exhibition stand. Among the numerous trade visitors there were many long-standing customers from almost every country of the world, who had come to Dusseldorf to learn about the innovations of the K-exhibition on site. The central focus was the ALLROUNDER 720 S, whose clamping force of 3200 kN makes it the largest machine in the product range. Equipped with the new vertical MULTILIFT V robotic system, this meant that two innovations could be demonstrated at once. The large 720 S was used to produce a footstool weighing around 900 g, which from the very first day proved a highly desirable collector's item. Just like the other two, the third innovation also met with great interest. This was the ALLROUNDER 420 A 800-400, the first example of the new ALLDRIVE series machines, which feature modular drive technology. The ALLROUNDER A comes in a basic electrical version – with conventional axis drive equipment –, which is capable of driving all the remaining axes hydraulically. However, it can also be upgraded to a fully electric version of the same machine type.

The production of mobile phone covers on a two-component ALLROUNDER 630 S 2500-1300/150 also caused a bit of a stir. This machine was equipped with a three-station rotary mould made by the Esslingen-based firm, Weber. Covers were injected at the first and second stations, and at the third station they could be removed with the mould closed.

The remaining aspects of ARBURG's appearance at K 2001 consisted of applications relating to the following areas: micro injection moulding; the MuCell procedure; PET preform production; LSR processing; gas injection moulding technology; interval and sandwich processes; insert encapsulation and energy optimisation during the injection moulding process.



New Dimensions at K 2001
Impressive stand elements, such as the enormous glass mounting panels (left), and striking outside advertising such as that placed at the northern entrance to the Dusseldorf exhibition centre (centre left) (Photo: Dusseldorf exhibition centre), large crowd around the ARBURG exhibition stand with the 720 S forming the highlight at the centre (centre right) and animated discussion by experts from among the international trade visitors (top).

Better value for customers

When it comes to making purchasing decisions customers are placing more and more emphasis on the services available. And it is not simply a matter of minimising downtimes by means of effective services focusing on the machines. Rather, it is a question of putting together a comprehensive support package for customers, which, starting with advice from the moment of purchase to the point of delivery, also covers commissioning, training, maintenance and a spare parts service, and as far as possible leaves no demand unmet.

Better value for customers is a major priority: Busy working on it are (from left to right) the new area manager Eckhard Witte and the two departmental managers Roland Paukstat and Wolfgang Umbrecht.

In pursuit of this ambitious goal, ARBURG has now moved one step closer by strategically enhancing its service sector. Eckhard Witte, an area manager with extensive inside experience of the company will be coordinating all the functions of the new services department. He will be assisted by departmental manager Wolfgang Umbrecht, responsible for the coordination of services provided and matters of quality, and Roland Paukstat, head of customer services, responsible for the replacement parts and operational services.

According to Eckhard Witte, the aim of the restructuring measures is to bring ARBURG even closer to its customers and to increase customer satisfaction with regard to services as a whole, by providing more efficient customer support. Roland Paukstat and Wolfgang Umbrecht's approach is, of course, even more closely related to production. "Customer production must be able to take place, that's the bottom line. We will do everything we can to achieve this goal by putting into action the most effective and fastest means available – exchange, part substitution, replacement or repair – to best suit the circumstances."

At ARBURG, better value for customers takes pride of place, as always. The restructuring follows this guiding principle by establishing a faster, more intensive partner support programme. And this not only applies to all our customers but also to ARBURG's subsidiaries and representatives around the world. In this area, too, ARBURG wishes to become better and even more effective. Ultimately, the company that can serve its partners faster at an international level, will score points with its customers in those countries.

Faster processing of replacement parts ordering thanks to sophisticated logistics: >From order placement (left) to order picking in the warehouse (2nd from left) and dispatch of replacement parts (below).

Pulling out all the stops...

When somebody requires a replacement part, they usually need it as a matter of urgency. In the past ARBURG has already achieved a great deal in relation to this, but we are not simply going to rest on our laurels. On the contrary, we are constantly striving to further improve our spare parts service. And this includes all the areas that affect spare parts logistics.

When an order for spare parts is processed, a number of internal stages are involved–From receipt of the order, order entry, release for order picking in the warehouse, division of the task between the warehouse areas (high-shelf storage, small part and paternoster warehouses), transportation to shipping, and order picking in the individual warehouse areas, to packaging and dispatch of the spare parts.

All the departments involved in dispatching spare parts must therefore work closely together so that the required part reaches the customer as quickly as possible.

The mainstays of spare part dispatch are the availability of the spare part and shipping quotas– and the objective is to see these improve continually.

For example, it has been possible to improve spare parts availability considerably, by constantly updating spare parts planning. In addition, the ordering service has been significantly extended: Since October 2001 German customers have been able to order by internet, as well as by phone or fax, and from the second half of 2002 this method will also be available to numerous international customers.

Moreover, modernisation of the high-shelf storage area, enabling continual storage and, in turn, faster provision of parts, has also delivered benefits for spare parts logistics. Equally beneficial have been the improvements made to internal transport. Many transport tasks formerly carried out by forklift trucks are now performed automatically using conveyor systems.

And various changes have also been made to shipping, benefiting spare parts dispatch. As well as the increased floorspace, the bringing together of machine and spare parts shipping produces advantages that are particularly worthwhile when it comes to delivering spare parts to subsidiaries.

Furthermore, the introduction of staggered working hours has ensured that, if the spare part is ordered before 15.30 and is available in the warehouse, the supply chain does not get interrupted at shipping. Instead the part can be on its way to the customer on the last HGV that very same day.

At every twist and turn, then, improvements have been made which help to consistently increase spare parts availability and shipping quotas, thereby ensuring that the spare parts reach the customer as quickly as possible.

Photo: KBS

Advances in plast

Above: quality control: comparing the moulded part against the drawing.

Below: With the creation of KBS-Spritztechnik CH in St. Antoni, Switzerland, an additional production site has now existed since 2001. (Photo: KBS)

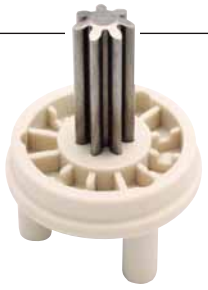
Above right: Back home in the Black Forest: the new KBS parent factory in Schonach began operations in 1999.

Below right: complex technology: mould for injecting a POM cog around a metal axis with spindle drive.

The key principle is summed up by the word "range". KBS-Spritztechnik manufactures engineering moulded parts, generally of a kind that must operate with particular precision, and which, in terms of quality, must therefore measure up to the highest customer expectations. The type of products in question include cogs, screws, spindles, rack-and-pinion devices, housing units and belt wheels. In short, plastic parts that enable vehicles, machines, optical equipment, medical technology, domestic appliances or building technology to keep moving.

KBS-Spritztechnik is a sister company of SBS-Feintechnik. Since being founded, the group headquarters has been located in Schonach in the south of the Black Forest.

The company slogan "What drives us" is a fairly accurate description of the group's activities: These cover the development, production and assembly of metal and plastic parts, but first and foremost customer-specific system solutions for gears, gear motors and mechatronic tasks.



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From conventional metal working to tool and mould making, equipment design, prototyping and injection moulding, as well as to component and system assembly, what the group has to offer its customers is a total wide-ranging support package from a single source. According to the managing partner Thomas Burger, "What SBS manufactures in metal, KBS produces in plastic". Naturally, this also includes insert technology, which combines metal and plastic.

Examples of the group's products are those related to cars and lorries, floor cleaning and garden equipment, dialysis machines and building automation. The company strategy of this successful family firm (which has been in existence for six generations) is characterised by product diversification, substantial depth of production and complete solutions.

KBS is now synonymous with high precision moulded parts that have part weights of between 0.01 and approx. 300 g, and it has firmly established itself within the field of drive technology by building an international customer base.

The CAD assisted "Expert Gear System" application (EGS) developed by SBS for developing computer-optimised cog designs makes the group a particularly valuable and integrated development partner for the industry.

In Schonach a total of 16 injection moulding machines are in operation with clamping forces of between 250 kN and 1 600 kN. Thermoplastics and elastomers inclusive of all filler and reinforcing agents are processed there, are partly modified to improve sliding properties and are integrated into plastic-metal combinations. The material supply and cooling systems are computer-controlled, featuring comprehensive visual display systems. As part of its modern quality management, host-computer controlled machine data acquisition ensures efficient documentation of all the process parameters.

In Switzerland 20 ARBURG ALLROUNDERs with clamping forces of between 250 and 1 000 kN are used for production. One of the main tasks both here and there is the encapsulation of metal inserts, a specialist area, in which ARBURG has also made quite a name for itself since our very first purpose-built machine was developed. Cooperation with ARBURG stretches back to 1979, when the first machine, an ALLROUNDER 170, was delivered.

In terms of its structure and, primarily, of its technology, KBS is a young, innovative and ultra-modern company. That is why KBS always has the latest generation of ARBURG machine installed at its production plants. The latest, a total of eight ALLROUNDER S machines were delivered to Schonach and St. Antoni as recently as November 2001. And the next batch, we are assured by Thomas Burger, will follow soon, since the company wants to gain further ground within multi-component technology. Precision, speed, service and value for money have been, and remain, the decisive factors for KBS-Spritztechnik in its long-standing cooperation with ARBURG.

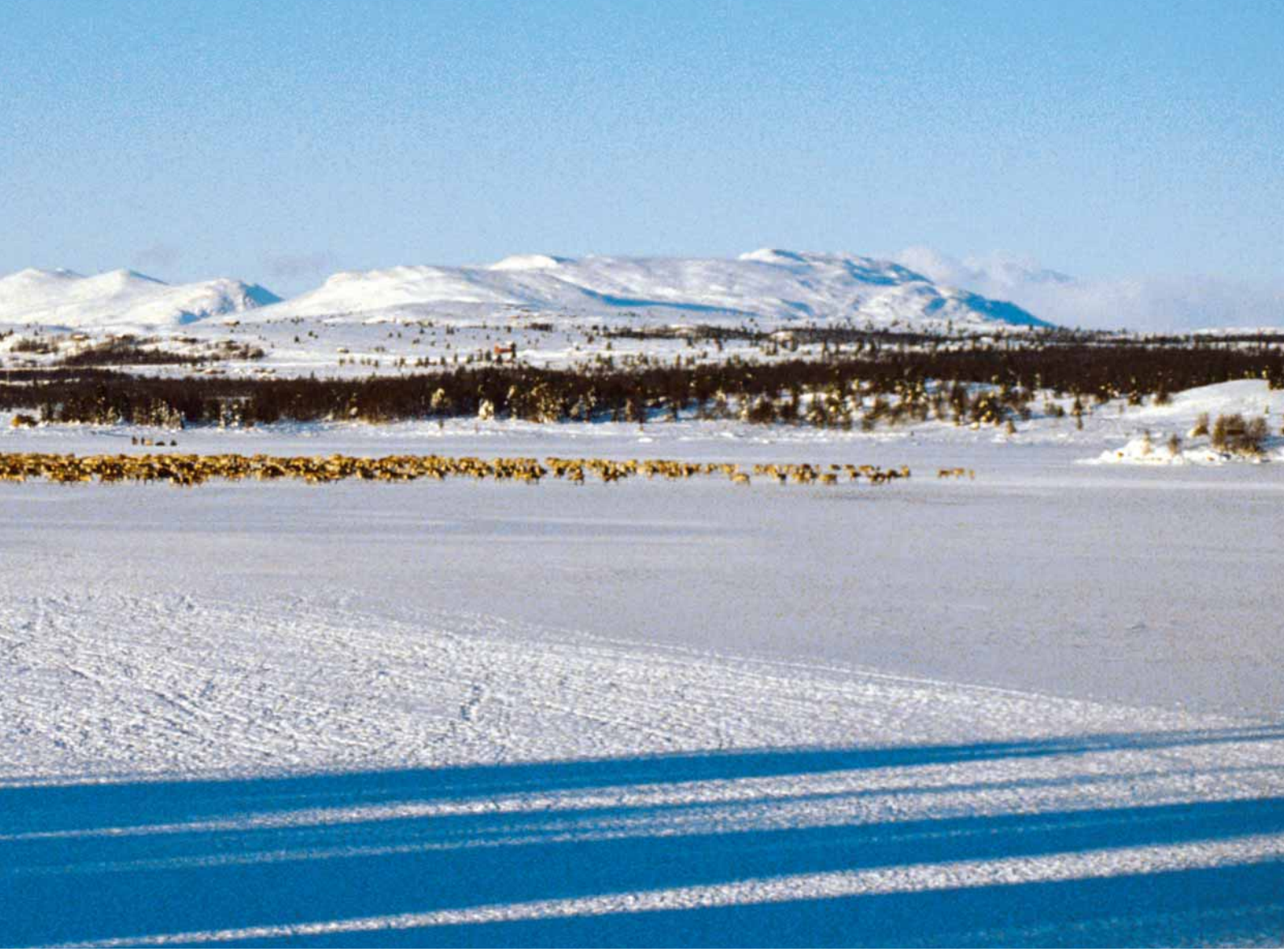
KBS-Spritztechnik INFOBOX

Company group: KBS-Spritztechnik is sister company to SBS-Feintechnik
Established: 1896 by Josef Burger sons, SBS-Feintechnik followed in 1953, and in 1993 KBS-Spritztechnik **Employees:** 340 (SBS and KBS) plus another 50 at its supplier SBS-Mechatronics (assembly works) **Sites:** Schonach, Southern Black Forest, Germany and St. Antoni, canton of Fribourg, Switzerland

Photos: M. Zipfel

More than ju

Right: It is transparent just like ARBURG II, but the centrepiece of the B&O headquarters in Struer (known as "The Farm") also stands on stilts.
Unique in design and function: HiFi equipment from B&O in Denmark. (small image), (Photos: B&O)



ıst the midnight sun

Scandinavia stands for the midnight sun, elks, stave churches, expansive untouched countryside, cross-country skiers, sledges and... high-tech industry, telecommunications, information technology in one of the most economically expansive areas of Europe. Scandinavia is certainly much much more than simply holiday homes, Laplanders and fjords. Let's now take a closer look with some information about ARBURG's business partner.

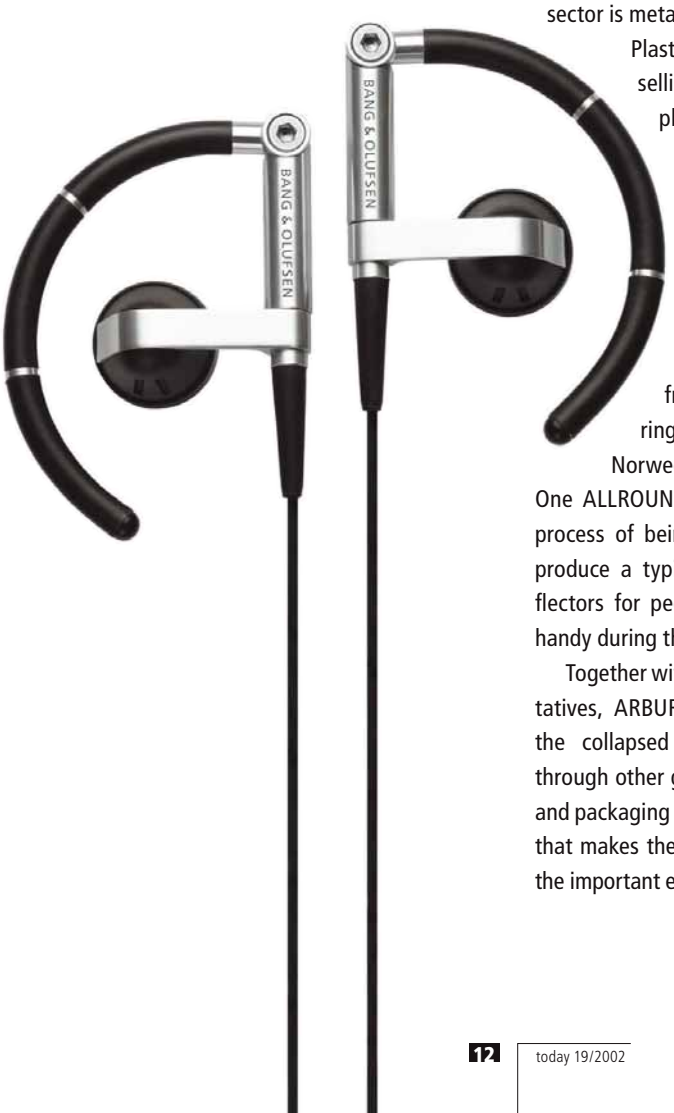
Since about the middle of the nineties the Scandinavian economy has been continually booming, which has more than a little to do with Finland and Sweden entering the European Union. It is mainly on account of its IT industry that the region is gaining strength in the international arena. Natural resources such as oil, fish and wood constitute other outstanding economic areas, for which Scandinavia has become internationally renowned. These are the basic facts. But what is the picture of the "distant North" from ARBURG's perspective?

The company is now present in all the key markets right across the board, which began with the setting up of our subsidiary in the Danish town of Hvidovre, Copenhagen. This step was taken in 1997, having been made both wise and necessary by prestigious customers such as LEGO and Bang & Olufsen.

ARBURG has a number of representatives in Finland, Sweden and Norway. Since 1996 EMKONE OY, based in Kerava near Helsinki, has been looking after the company's interests in Finland. The economic sectors within which the ALLROUNDER machines and associated peripherals are becoming more widely used are the electronics industry, medical technology, and telecommunications. Plastico, who manufacture injection-moulded parts for the sensors used in weather balloons, is one of our high-end customers in Finland. Other noteworthy ARBURG customers are Perlos and Eimo.

Left: A timeless classic of Scandinavia's injection moulding industry: the LEGO building block system. (Photo: LEGO)

Right: What Scandinavia is renowned for: attractively designed high-tech products such as the BeoLab 4000, combined with BeoSound 3000 from B&O (Photo: B&O)



It was way back in 1974 that the father of the present MD, Stefan Folkesson, and his partner, became ARBURG's representatives in Sweden. >From their base in Mariestad, there are currently five people with responsibility for this market. ARBURG machines are primarily used in medical technology, the automotive industry and wherever there is a need for engineering parts. In Sweden a further growth sector is metal powder processing.

Plastmaskiner A/S in Oslo have been selling ALLROUNDERs and peripherals on behalf of ARBURG in Norway since 1970. Customers installing Lossburg machine technology at their plants not only include those from the automotive industry, and electronics and medical technology sectors, but also from the furniture manufacturing industry. One of the biggest Norwegian customers is Microplast. One ALLROUNDER machine, currently in the process of being delivered to Norway, is to produce a typical Scandinavian product: reflectors for pedestrians. These come in very handy during the long winter nights.

Together with its subsidiaries and representatives, ARBURG has managed to recapture the collapsed telecommunications industry through other growth sectors such as medical and packaging technologies. It is this flexibility that makes the company so distinctive within the important economic region of Scandinavia.

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EXHIBITIONS

Scandinavian Open
Hvidovre, Copenhagen, DK
13 - 15 June 2002

Muovi Plastics
Lahti, FIN
30 October - 1 November 2002

Scanplast
Göteborg, S
8 - 12 April 2003

Venting: important for quality of injection moulded parts

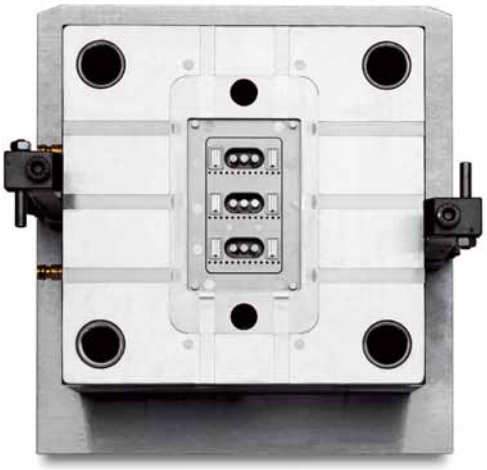
Above: typical moulding defect due to poor ventilation: diesel effect on the flow path end.

Right: ventilation channels in the parting line of an injection mould for the production of a floor tile.

Working with various plastics or processing procedures requires optimum ventilation of the sprue distributors and cavities inside the mould. It is all a matter of enabling the gas and air mixture to escape into the open as quickly as possible. ARBURG's Applications Technology division offers hint and tips on mould venting.

When fill rates are high there is often a danger that burned spots will appear (diesel effect). Burn spots manifest themselves as black or brown marks on the moulded parts, and flawless production risks being jeopardised. Reduction of the injection speed is not usually capable of providing the desired countering effect: The consequences of this can be cold displacement in the melt stream resulting in orientation effects and reduced mechanical stability.

The solution is ventilation specifically designed for the material and mould. The easiest and most economical method is the use of a diagonal polished section in the parting line. Where there is depth, success may be achieved by using venting pins or additional mould divisions. The advantage of movable pins is that they are self-cleaning, but this can have a negative effect on moulded parts with high surface qualities. Porous sintered metal inserts and venting lamella have also proved very effective. Venting methods using overflow or sub manifold channels are technically complex and



therefore extremely costly. The overflow channel prevents air-pockets on the flow fronts and in the knit lines. The melt convergence point is simply transferred away from the cavity. Whenever the design of the moulded part, the cooling channels or surface marks associated with the use of venting pins render it necessary, a sub manifold venting channel is used. The typical design of a sub manifold channel consists of a section of tunnel gate with pin-point gating and an ejector.

"Vent controls" and "vacuum" - these are the two methods that are most effective for elastomer and Thermoset processing. The vent controls interrupt the filling procedure, there is a reduction in the locking force, the mould may even open slightly, and this enables the air to escape from the cavity. By sealing the cavities in the parting line, the nozzle of the central sprue channel and the ejector unit, it is possible to evacuate the mould cavities. Both alternatives are also effective for thermoplastics processing.

If the negative pressure produced during stripping cannot be overcome solely by using venting channels around the edge of the stripper, an additional mushroom or disk ejector can produce the desired effect. The ejectors should be equipped with venting facets around the circumference, which also optimises venting during filling of the mould.

Compression injection moulding is another technical process which is very much of interest, being primarily employed for materials with a high viscosity. This involves adjustment of the mould until the two halves reach a set distance from one another, injecting the preselected dosage volume and closing the mould using a pre-set compression force. The mould, which has a moat surround, presses the moulded part into its final shape. The advantages are moulded parts with lower stress, less distortion, higher stability and shinier surfaces.

INFOBOX Gıda Plast

Established: 1998
Turnover: $1, 850,000 (1999), $2, 150,000 (2000) and $980,000 (2001)*
* Reduction due to economic crisis and devaluation of the Turkish lira by around 120 %
Employees: 80 in-house and 500 outside, who carry out work for the company from home or in small businesses.
Production area: 3750 m²
Location: Istanbul, Turkey

Finely

The success of one Turkish firm bears testimony to the fact that what matters when it comes to sweets is not just how they taste but also how they look. This firm is Gıda Plast, which manufactures plastic packaging for the food industry. The star of its product range is its novelty sweet packaging in the form of toys. These toys are marketed by Gıda Plast, together with the sweets they contain, under its own brand name Motto-Candy-Toy.

Abdurrahim Dede, the father of the present MD (Evren Dede) founded Gıda Plast in 1998. Initially, the firm only produced plastic spoons and packaging for ÜLKER, a well-known Turkish manufacturer of chocolate and biscuits. But soon other customers from the food sector appeared on the scene, and a whole host of different types of packaging were produced for them. In addition, in recent years, own-brand products have been developed, which are sold directly to the end consumers.

Higher turnover and the addition of more machines required more space, with the consequence that the company had to move twice, enabling it to increase its production area from 500 to 3,750 square metres.

The product range now offered by Gıda Plast includes grocery packaging, PE-packaging for confectionery and the company's speciality: novelty sweet packaging. In addition to these, the company has its own brand, Motto-Candy-Toy, which is used to sell the complete product, consisting of both the toy and the sweets inside. Currently around 60 per cent of the Motto-Candy-Toy products are exported, and it is therefore hoped that in future there will be a further increase in turnover and the share of exports.

Thanks to this brand, G ıda Plast is recognised in the Balkan States as the number one company: It has sales outlets in 2000 grocery stores in Macedonia, representatives in Bulgaria, Romania and the Czech Republic, as well as contacts with wholesalers in Russia and Belarus. Israel, Palestine and the countries of northern Africa also belong to the Motto-Candy-Toy sales market.

Toys and packaging are also exported to Canada, Romania and Israel.

All Gıda Plast, which offers a total of around 7000 different products and, amongst other things, produces around 15 million toys a month, serves customers exclusively from the food sector: Confectionary, chocolate and biscuit factories as well as confectionary and sugar wholesalers – an industry branch, which has always played an important role in Turkey.

Production takes place around the clock, seven days a week, using twelve-hour shifts and a total of 14 injection moulding machines. The materials processed are polyethylene, polystyrene and polypropylene. The ten ALLROUNDER – four ALLROUNDER 320 K 700-250 and six ALLROUNDER 370 S 800-350 machines – are used in the production of all moulded parts, but are particularly beneficial for those products intended for export or for customers who particularly value quality. As for quality assurance (QA), Gıda Plast has developed its own QA-system with the assistance of ÜLKER, and is currently working towards certification according to DIN EN ISO 9000.

packed sweets

Above: It is mainly ARBURG machines that G ıda Plast uses for production at its site in Istanbul; room has already been made for new ALLROUNDERS. (Photos: Gıda Plast)

Cooperation has existed between Gıda Plast and the Turkish subsidiary ARBURG Ltd. Since the year 2000. And during this time the company has come to swear by ARBURG: This applies alike in relation to machine technology and quality, service, sales conditions and customer interests, or to support for customers experiencing problems. MD Evren Dede is satisfied with ARBURG in every respect. When asked how he rates the relationship, he responds with a single word: "Outstanding!"

ALLROUNDERS can now be used to produce higher quality parts in greater quantities than ever before without wear on the mould. Considerable savings for the company have even been made in terms of staffing. Another bonus is the ease with which the ARBURG machines can be operated, thanks to the convenient SELOGICA control system.

Having worked with ARBURG for two years, Evren Dede sums up by saying: "I now drive ‚a Mercedes'. and I know I'm in safe hands, because with the ALLROUNDERs there's no danger of losing my way." And that is why from now on he has decided only to buy injection moulding machines that have been made by ARBURG.

Conside

Ever since the ALLROUNDER A went on show at the K 2001 exhibition, the ALLROUNDER range of machines has offered all customers the possibilty of using the full array of drive systems in their own moulded part production business, from the standard fully hydraulic machine to the fully electrical version. For some time now, ARBURG has provided the option of using either servo-electric or hydraulic means to drive various standard machine axes.

The ARBURG module most widely used by customers is electro-mechanical dosage, which can result in cycle times being reduced to within seconds, since it allows simultaneous dosage of other machine operations. Other advantages are energy savings and improved material preparation.

At Friedrich Sanner KG, based in Bensheim in Hessen, an ALLROUNDER 630 S 2500-1300 with electro-mechanical dosage drive has been in operation since last November. One of the company's 24 cavity hot-runner moulds is used on this machine for producing the tubes used in test kits. The injection time for a shot weight of 270 g is less than a second and the cycle time less than ten seconds. A maximised dosage phase is ensured right up until the mould is closed, thanks to the ejector stroke, which occurs while the mould is in motion, and the electrical screw drive, which works in combination with a needle shut-off nozzle. This, in turn, achieves a lower screw revolution speed and an appropriate cylinder temperature for the material HD-PE. In addition to reducing

ered design

cycle times, this also means that the material is treated with greater care and avoids overheating of the material through friction.

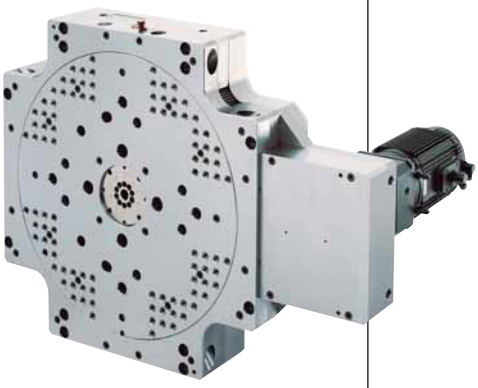
At Sanner, specific mention is made of the unrestricted manner in which individual axes can be simultaneously operated at maximum speed and the resulting benefits this carries for cycle times. What is more, the energy savings are considerable.

Joachim Fulek, manager of inhaler injection moulding and assembly at Wilden Medizin- und Kunststofftechnik GmbH in Pfreimd, recognises that there are similar advantages for manufacturing at his company. The latest machine technology there to incorporate electro-mechanically driven dosage consists of two ALLROUNDER 520 C machines, used to produce lids for AstraZeneca dry powder inhalers. To some degree these large volume parts operate right around the clock seven days a week. The simultaneous drive movements, of which they are capable, are vital to achieve faster cycle times. Furthermore, the electrical dosage drive is also much quieter than the hydraulic version and pays for itself in terms of reduced energy costs.

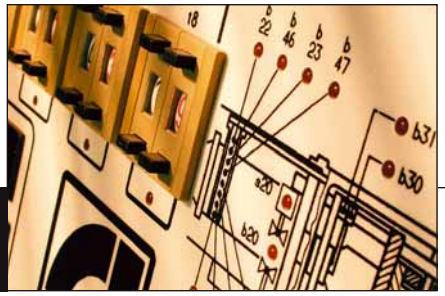
One electrical feature that is practically unique is the one used by Mauer AG in Ubstadt-Weiher. This is unscrewing via the electric core pull control. The use of an absolute measuring system means that it is possible to substantially improve positioning accuracy. And in this area also, simultaneous drive movements are possible with the machine. Other features making it suitable for use with unscrewing units, in addition to the remarkably high level of repeatibility due to positioning control, are a higher maximum torque, higher rev speeds and the option of trouble-free programming for various different steps. This means that intermittent stops, etching of the thread with the mould closed or continuous rotation to the left or right can be programmed directly.

The machine with this equipment was very well received by the company's manufacturing department and, according to the chairman of the board, Klaus Mauer, it has entirely fulfilled their expectations. It is user-friendly and is also proving well-suited to large volume production.

Another new development, being produced by ARBURG in conjunction with Weber Formenbau of Esslingen, is the electrical indexing unit for use in the manufacture of components in the multi-component production industry. MD Hans Schmiek makes particular mention of the speed with which movements of the rotatable block can be performed. The unit takes just 1.1 seconds to rotate around 180 degrees, and can be moved precisely to any angle in a clockwise or an anti-clockwise direction. The maximum mould weight is 1200 kilogrammes. The use of this electrical drive is an efficient way of reducing cycle time, and enabling high-precision tasks even in the area of two-component injection moulding.



Left and above: Teamwork: Weber Formenbau and ARBURG have developed the electrical indexing unit in close collaboration with one another.



MILESTONES

As machines have developed, the respective technical demands of machines have led to the creation of a number of extremely interesting control units. These provide an impressive account of the changes in technology and the associated increase in complexity involved in injection moulding procedures.

One thing is clear: that the ARBURG control systems have always been at the cutting edge of technology. The starting point of control technology was the CONDUCTRON, a relatively simple, but effective relay control system, which like its successor, made use of a cold cathode tube as a time function element, in order to control sequences such as cooling time and holding pressure time. The relay control systems were adjusted using a potentiometer and remained in use until around 1975.

Various versions of the subsequent POLYTRONICA control systems were produced for the ALLROUNDER 221, and ALLROUNDER 260, and it also functioned as an additional control system for the two-colour machines. However, they were still not yet equipped with a microprocessor, the sequence control consisting of a hard-wired logic circuit, which was indexed using a limit switch or time lapse signals.

By now the POLYTRONICA 2 was already being produced in-house and was C-MOS controlled using quartz timing. The cycle was controlled using a shift register.

>From 1975 ARBURG began installing the world's first microprocessor control system on the ALLROUNDER H machines. The machine parameters were set using decade switches and the hydraulics controlled by means of proportional valves.

The first graphical user interfaces appeared on the ALLROUNDER 305 ECO and ALLROUNDER 170 CMD, and in 1987 the ALLROUNDER HYDRONICA D machines were presented at the Fakuma exhibition, whose control systems were equipped with a multiprocessor and built-in disk drive. The DIALOGICA graphical user interfaces were employed on the ALLROUNDER CMD, C and V machines. These were modular in structure, initially operating using 8bit and later 16bit bus systems. Until 1998 all C machines came with DIALOGICA, at which point the changeover began to the SELOGICA generation of control system.

Further development of the HYDRONICA D control system led to the MULTITRONICA, which had the important added feature of offering a variety of path measurements and adaptive temperature control.

The SELOGICA graphical user interface represents the most recent stage in the evolution of control systems. This has an LCD display and enables graphical process management via icons on flow charts. This control system is now installed on all machine types, and this unified approach to control systems increases operating comfort for all customers.

Now and then: Intuitive graphic sequence programming of the SELOGICA (above) and decade switch for controlling machine procedures on the HYDRONICA (right) .

TECH TALK

Dipl.-Ing. (FH) Marcus Vogt Technical Information

AES: Saving energy with the variable speed hydraulic drive

A good example of how highly efficient drives can be used to considerably reduce energy consumption in hydraulic injection moulding machines is the AES energy saving system option available from ARBURG.

The basic principle behind the machine is not difficult to grasp: For applications with long cycle times the drive power of the pump motor is adjusted to match the reduced energy requirements of the machine during phases when none of the hydraulic axes are active. For example, during long cooling and curing times, the speed, and consequently the output of the pump motor, are adjusted to match the actual amount of energy required, rather than constantly operating inefficiently at the rated speed. Once this "rest phase" is completed, if full output is again required, then the rev speed of the AC asynchronous motor can be increased to its rated speed, thereby bringing it up to its rated capacity. Built into the machine control system is a regulating and control unit, which the AES uses to constantly check the current output requirement. An infinitely variable frequency converter adjusts the speed of the electric motor to suit the actual output required. Consequently, even at low loads, the motor still operates with optimum efficiency and correspondingly low energy consumption.

It makes sense to use the AES with applications, where "rest phases" such as cooling and lag times take up a considerable proportion of the entire cycle. In such cases efficient energy savings can be made by reducing the rev speed. An added bonus is the reduction in noise emitted by the machine when operated at lower rev speeds. In addition, highly efficient drives minimise wear and tear and produce less excess heat, with the result that energy can also be saved when operating the cooling systems.

Whether it is theory or practice, the new training centre offers the ideal conditions.

TRAINING CENTRE:

Central and transparent

The new training centre reflects the high value ARBURG places on training. The entire training division is now concentrated in a central area occupying 1500 square meters.

Already benefiting from the move to the new premises are our 129 trainees and students from technical colleges, as well as the nine people training them. Two relevant items particularly worthy of mention are, for instance, the new operating machinery and the extended lab area, where practical work can be organised even more effectively. New additions to the theoretical training area are the two training rooms, which, if necessary, can be converted into one big one, and the in-house library.

The open design of the new training centre has effectively abolished the physical boundaries between the various training sections. This means that the numerous inter-disciplinary projects can now be better coordinated than ever before. Also conducive to this purpose is the central meeting area, which has been integrated into the training facility and is equipped with tables and chairs. What is more, the glass offices of the training staff, which are centrally located, contribute to the transparency of the entire area. "Thanks to the shorter routes, it is now possible to carry out more intensive training and the quality of communication between the various training sections is now even better". That was how Harald Gnegel, Head of Training, summed things up six months after the move into the new training centre had been completed.

Dimension

The New

3200 kN!*

* Large class? Not a problem with us. With the ALLROUNDER 720 S you can produce products up to 1300 g, with the proverbial ARBURG quality. 3200 kN locking force, 720 mm distance between tie bars - these are the impressive vital statistics of our giant!

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