

Information on
market and technology
of injection moulding

ARBURG

today

A publication
of the ARBURG group

Issue 18

Autumn 2001

Special feature

Global innovations at the K 2001

Best perspectives

Sales and technology



ARBURG
ALLROUNDER 720 S
3200-2100

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The time has come again: Three years have practically flown by and the K in Düsseldorf is about to begin.

As ever, the leading international show for plastics processing offers many superlatives: new halls, a tremendous onslaught of visitors, important and interesting impressions in the hurly-burly of this magnificent event.

Staying faithful to the slogan "ARBURG - The New Dimension" we will also be providing superlatives. The increase of the clamping force range up to 3200 kN, the first machine with modular drive technology, the expansion of our MULTILIFT robotic system and many major developments in our product range – we are offering all this at stand 13 A 13.

In this special issue of ARBURG today for the K 2001 we will provide you with an overview of our innovations. Then, after the exhibition you will also be able to read up on important facts or simply review your visit to the ARBURG stand.

Happy reading!

Michael Grandt

Michael Hehl

IMPRINT

ARBURG today, Issue 18 / Autumn 2001 Customer magazine of the ARBURG Group

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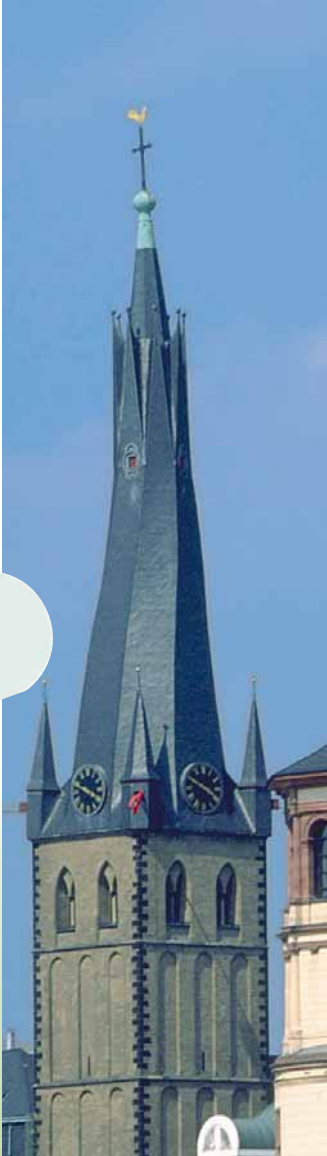
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ARBURG has important new developments to announce to the plastics world at the K 2001 in Düsseldorf: the greatest new development, although by no means the only one, is the new large ALLROUNDER 720 S with 3200 kN clamping force and a 2100 series injection unit.



International capital of plastics



tal of plastics" for everyone involved in the processing of this material.



ARBURG traditionally uses this international platform to present important innovations. This year – due to the fact, as mentioned above, that the first K in the new millennium will have a particular focus on the future – innovations from the peripherals sector will be displayed, in addition to a new size of ALLROUNDER with its new technology. The following pages will describe exactly what customers and anyone else interested will get to see at the ARBURG stand 13 A 13.

The plastics exhibition in Düsseldorf is opening its doors for the first time in the new millennium. A special date for the whole world of plastics. The K is always regarded as a very special showcase for future visions of the entire sector.

Thus, between 25th October and 1st November Düsseldorf will be more than just the city that has the largest Japanese community in Germany, a very well-organised and detailed plastics museum – a tip – for visitors, the longest bar in the world and appropriately also the largest selection of dark beers; it will also be the "International capi-



The ALLROUNDER

The largest machine in the ARBURG range will celebrate its pr

Clamping force of 3200 kN, maximum shot capacity of 1300 g PS, 2100 series injection unit and 720 millimetre distance between tie bars – these are the vital statistics of the new large ALLROUNDER 720 S which ARBURG will be launching at the K 2001.

Expanding the machine range towards a clamping force of 4000 kN: ARBURG set itself this target and with the ALLROUNDER 720 S it is almost there. The 720 S with a clam-

ping force of 3200 kN and a maximum shot capacity of 1300 gPS replaces the ALLROUNDER 630 S as the largest machine in the ARBURG range.

Tried and tested features

The ALLROUNDER 720 S has retained all of the outstanding features of the ARBURG S-series machines: proven modularity, energy-saving and rapid hydraulics systems, easy-to-change injection unit as well as a powerful clamping unit guided on four tie bars with box-type platens and supports on the machine bases.

Technical detail solutions were required, however, to be able to operate the large ALLROUNDER as conveniently as its smaller counterparts. These had already been developed for the first representative of the large machine class, the ALLROUNDER 630 S. Key aspects in this context are mould height adjustment and the fixed routing of cooling water circuits along the fixed and movable mould platens. These new features have already successfully passed the trial in practice in the 630 S and will now be utilised in the new 720 S.

Mould height adjustment provides flexibility

The mould height adjustment allows the fully hydraulic clamping unit to adapt to the mould height as well. The stroke is only needed for opening the mould and not for compensating large differences in mould height, and this results in

less energy consumption as well as shorter cycle times.

The distance between the fixed and the movable mould platen is adapted to large differences in mould height by a drive unit at the support plate. This provides the ALLROUNDER 720 S with a variably adjustable, maximum mould/platen distance of 1000 to 1400 millimetres. The travel can be programmed using the central SELOGICA control system. This setting option has also enabled a more compact construction of the mould clamp and therefore of the entire ALLROUNDER. Accessibility to the mould from the machine's operating side has been improved further.

The temperature control circuits are fixedly connected to both mounting platens using rapid connect couplings and can be optionally expanded, providing a clearer overview, greater safety and faster accessibility. This allows the mould to be reconfigured more quickly and easily.



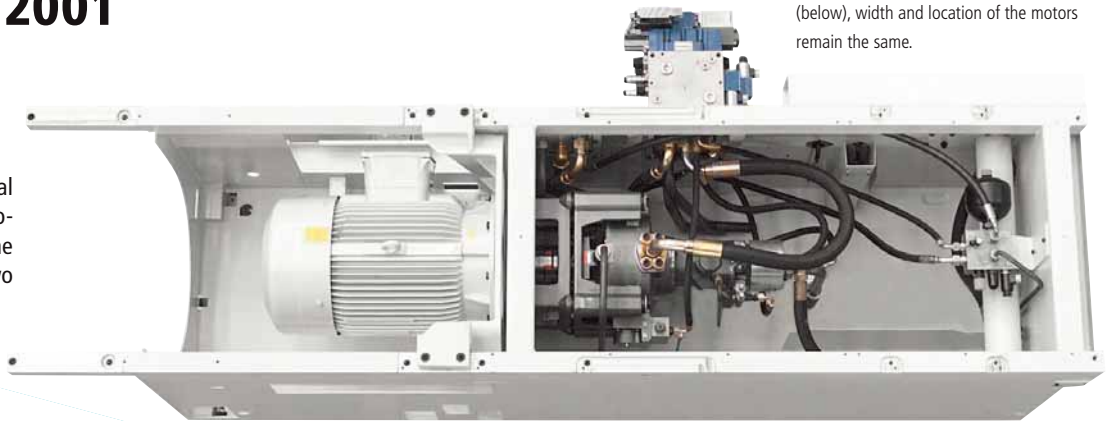
720 S has arrived!

Premiere at the K 2001

The machine base of the 720 S is only 800 millimetres longer than that of the 630 S (below), width and location of the motors remain the same.

Central water supply

Water is supplied to the ALLROUNDER 720 S via a central connection. This supplies the cooling water circuits for both the machine and the mould. The two distributors for the mould are positioned under the machine guard so that all of the mould's supply lines can be fixedly attached. The temperature can be set outside the



Interesting details of scale: drive unit for mould height adjustment.

guard when the machine is operating.

This is similar for the core pulls. Their supply lines are also connected to the movable mounting platen using rapid connect couplings. All the supply connections are therefore located directly on the mould. Chafing hoses, long lines or complex conversion operations are therefore things of the past.

New dimensions

The first ALLROUNDER 720 S is equipped with the new injection unit size of 2100, which features technical solutions

that have already proven themselves in the 1300 series injection unit. Screws are available in the diameters of 60, 70 or 80 millimetres.

Injection control comes as standard in this large machine class. As an option, a hydraulic accumulator can be installed, doubling the injection flow of the injection unit.



The last assembly operations on the first ALLROUNDER 720 S.

Easy access

The cover can be moved in two parts in the area of the nozzle. The unit has sufficient stroke to extend far enough out of the range of the fixed platen to ensure that the nozzle is readily accessible and work can be carried out easily in this area.

The plasticising cylinder can be inserted centrally. All electrical con-

nections are coupled and uncoupled automatically when removing and installing. The entire injection unit is supported on a central, rotatable plate to facilitate changing of the cylinder or screw. After moving back and securing the assembly, the unit can be rotated forwards by hand and the cylinder or screw can be removed without difficulty.

Electro-mechanical dosage drive

The ALLROUNDER 720 S 3200-2100 functions with a position-controlled screw and two core pulls. An important feature of the 720 S is the electro-mechanical dosage drive which forms the core of the modular ARBURG drive system. This dosage drive has been developed specifically by ARBURG, it has been part of the range for some time and shows its best advantages here. In addition to potential cycle time reductions, electrical dosing also provides energy savings of up to 20 per cent based on the entire cycle due to simultaneous drive movements and by treating the material with greater care. Furthermore, the electro-mechanical dosage drive combines maximum output with minimum installation size, which is becoming increasingly more significant particularly with larger machines in terms of their overall dimensions.





"A" stands for ALLDRIVE

Whether the term **ALLROUNDER**, which with its universal variations has revolutionised the world of injection moulding? The new **ALLROUNDER A** is setting similar standards, particularly with respect to the hybrid machine concept which will expand the possibilities of the **ALLROUNDER** to include electro-mechanical drives. "A" stands for "ALLDRIVE", derived from the term **ALLROUNDER**.

For some years now, ARBURG has been moving towards the development of modular components with electro-mechanical drives so that it can offer individual **ALLROUNDER** axes as either hydraulic or electric versions. Electro-mechanical dosing is just one example. This concept is now being augmented by a complete machine series with a number of such alternative drive options.

In continuing this well-acquainted modularity, the gradual expansion of these machines is now also entirely feasible. With all the **ALLROUNDER A** models in future, it will be possible to combine selectable drive alternatives, depending on the operating requirements. In other words, with this machine series customers will have the option of combining hydraulic and electro-mechanical drives in a practical way, depending on their injection-moulding requirements.

In the basic equipment version, the A series with the axes "Close mould", "Injection" and "Dosing" has three electro-mechanically driven main axes. The hydraulics of the auxiliary axes, such as "Ejector movement" and "Setting up nozzle", are supplied as standard by a small hydraulic accumulator unit.

420 millimetre clamping dimension, 800 kN clamping force

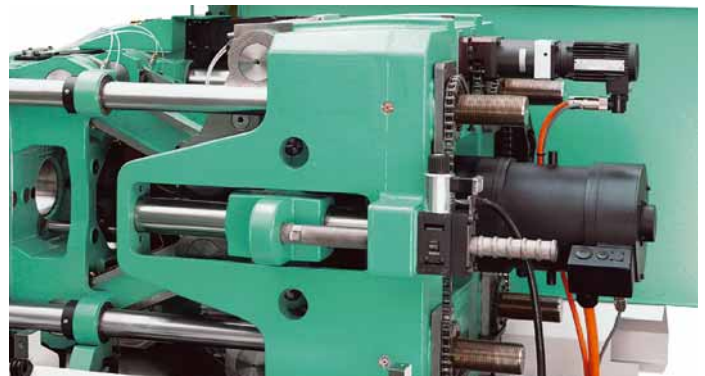
The first machine in the new series with a clamping dimension of 420 x 420 millimetres and a locking force of 800 kN will be on display at the K 2001. A special speed-optimised 5-point toggle lever combined with a high-power spindle that has been integrated into a liquid-cooled hollow shaft motor provides a space-saving arrangement of the clamping unit. The ejector has a correspondingly generous stroke of 150 millimetres, as in previous **ALLROUNDERS**. And as for the accessibility of the ejector coupling, here the familiar **ALLROUNDER** qualities come to the fore.

The hybrid technology optionally permits the unrestricted use of moulds with hydraulic or electro-mechanically driven core pulls or unscrewing units. The nozzle contact force is generated hydraulically in this exhibition model. A two-stage spur gear provides the necessary torque transmission between the servomotor and the plasticising screw. A spindle unit adapted to the feed force converts the rotational movement into a translational movement,

thereby permitting the full injection force over the entire injection stroke.

An electric conveyor belt with cover and special drop shaft has been integrated, in addition to the specific equipment in terms of mould heating circuits and control circuits as well as cooling circuits. With a needle insert, the 72-fold hot channel mould used produces a medical product that is typical for hybrid machines, whereby utmost precision and the adherence to the highest standards of hygiene are essential during the production of this type of product.

they are required. They have the highest electro-mechanical accuracy and reproducibility coupled with economic energy consumption wherever feasible for the production task. This also makes the latest ARBURG **ALLROUNDER** generation an extremely flexible production system that always allows the customer to equip the machine within a financially optimum cost/benefit framework and at the same time adapt it exactly to the prevailing production requirements.



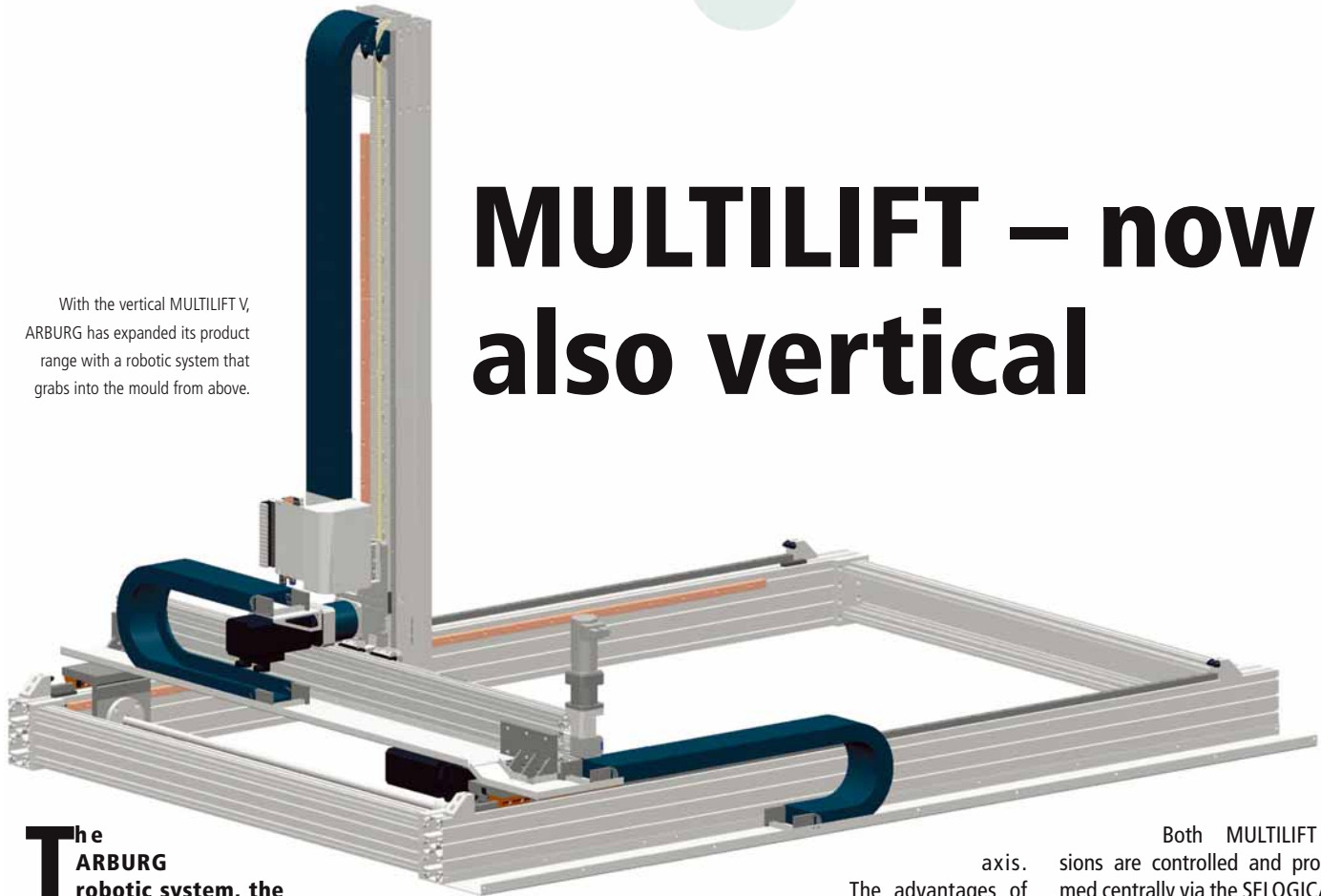
Speed-optimised 5-point toggle-lever: compact design, fast operation, as well as robust and economic.

What are the advantages of hybrid technology?

The ARBURG concept of electrically driven main axes as the basis and optionally freely combinable hydraulically or servo-electrically driven auxiliary axes integrates the advantages of both systems into one machine series. The machines have sufficient hydraulic forces wherever

MULTILIFT – now also vertical

With the vertical MULTILIFT V, ARBURG has expanded its product range with a robotic system that grabs into the mould from above.



The ARBURG robotic system, the horizontal MULTILIFT H, successfully celebrated its debut two years ago. For more complex tasks this is now followed by the vertical version MULTILIFT V which ARBURG will be presenting to the plastics world at the K 2001.

With the MULTILIFT V, ARBURG has augmented its product range



Servo drive: rapid and precise.

with a vertical robotic system which is better suited for more complex loading, removal and set-down tasks compared to the horizontally operating version. Using the

MULTILIFT V, moulded parts can be stacked in one container with intermediate layers, inserts can be taken out of a mould or with parts set-down multiple moulds can be programmed to make optimum use of the set-down area.

Flexibility through modularity

Like the horizontal system before it, the vertical MULTILIFT is also distinguished by the modularity that is typical for ARBURG and allows the robotic system to be designed according to the application. In the basic version, the MULTILIFT V is equipped with three servo-electric axes in the X, Y and Z directions, rotating or folding axes also being available as options.

Depending on the production conditions, the customer can choose in advance whether the MULTILIFT V is to be fitted longitudinally or laterally with respect to the machine

axis. The advantages of installing it laterally are shorter paths and a variety of installation positions for additional peripheral equipment. For applications in which the injection units are arranged in an L-position, installing longitudinally to the machine axis is a space-saving option.

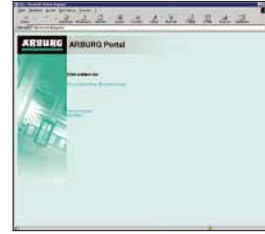
A firm grip on everything

Furthermore, with the vertical robotic system more complex grippers with a weight of up to 25 kg can be used and are primarily used in loading operations. Thanks to the corresponding interfaces, the use of part-specific grippers is also readily possible. Mechanically, a standardised plate for attaching the grippers is available with the pneumatic connections being formed by self-locking rapid connect couplings and the electric connections being formed by multi-pin connectors. The latter permit rapid disconnecting and connecting of all electrical gripper sensors reliably without connection errors.

Both MULTILIFT versions are controlled and programmed centrally via the SELOGICA user interface. A high degree of convenience is guaranteed here both by the operating principle with schematic sequence programming and also the option of saving the respective MULTILIFT's integrated data record together with that of the machine. Furthermore, the complete integration of the robotic systems in the machine sequence ensures optimum cycle times. Reductions in removal and cycle times are brought about by the drive movements synchronised to the ejector and the mould's opening movement.

Additionally of interest is the flexible MULTILIFT V for the field of complete production cells as well in which ARBURG continues to increase market penetration with its own project group and in which MULTILIFT H has already been introduced with success.

Spare parts directly from the internet



At the K 2001 in Düsseldorf, ARBURG will launch its internet spare parts ordering service. As of then, the current spare parts ordering system via BTX will be replaced by the new system in the world wide web. The application is easy to use, very secure and provides a rapid service. Further expansion is planned for the future to make it the standard tool for ordering spare parts.

It is unbelievably easy to use: in the first screen of the spare parts ordering system, the user's e-mail address and his/her personal password are requested. Only by entering these security features can users ac-

cessibility inquiries or order standard wearing and spare parts directly.

Selection via part or machine number

The customer can find out the correct product designation using either the part number of the component in question or its specific machine number. The part number can be found directly in the spare part and accessories catalogue or determined using a full text search function. In the latter case, the user simply enters part or all of a word for the search and then obtains a list of all the matching keywords.

Selecting the part using the specific machine number is even more convenient. Once the user has entered this number, the spare parts available for this machine only are listed automatically. From this specific range, the missing parts can then be selected again using the displayed part number. After making this selection, the user now only needs to enter the number of components required and send off this binding order after checking it.

Availability check

Of particular interest is the availability check which is especially

service-friendly; here customers can inquire whether the spare part for the corresponding machine is actually in stock in the ARBURG warehouse. It is sufficient to enter either the part number or the full text designation of the component required and the system will automatically inform the user of the number of parts available.

The internet order system shows its maturity and capability by the fact that typing errors can be interpreted by the application. As a result, the search using a stored and continuously updated synonym table enables the system to offer a list of possible inquiries despite typing errors, and from this the correct keyword can then be selected.

A link to the ARBURG homepage for information on other areas of the company round off the internet order system.

Fast and secure

The advantages of this new ARBURG service are obvious: customers can clearly view and check the status of their current orders at any time, they can also find out prices and the availability of certain spare parts without obligation and, what is more, they can make orders

easily and securely at any time of the day or night. This makes it possible to process orders correspondingly quickly and also facilitates a preventative order system by the individual machine customers. If the service date for an ALLROUNDER is approaching, the order for the necessary replacement parts can also be made to coincide with this date. Initially this internet-based order system will only be available to ARBURG customers within Germany. All international purchasers will be able to utilise it as soon as possible.



Rapid ordering, rapid delivery via the internet.

cess the secure order platform. Here, they can view a list of outstanding orders which were made during previous visits, start new price or avail-

Mobile phone in three steps

The latest trends and current developments with respect to the market leaders Ericsson and Nokia clearly show what mobile phone manufacturers and their suppliers realised long ago. The market for cheap mobile phones in Europe is saturated and the entire process together with production will consequently be increasingly shifted to Asia.

However, the demand for high-quality communications technology – the keywords here being GPRS and UMTS – will increase and will require new technologies both from the manufacturers themselves as well as from their suppliers, with these new technologies combining the highest quality and the desire for optimum production times.

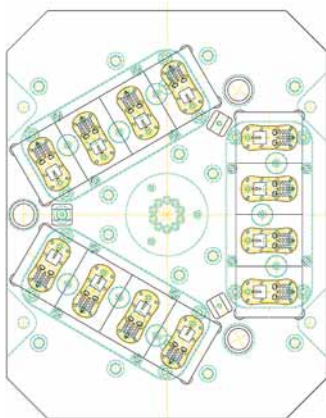
Weber and ARBURG, two pioneers in multi-component injection moulding, in the course of their ongoing research in this sector have developed a mould that operates with three stations and therefore permits completely automated part manufacture as well as the removal and thus direct further processing of these moulded parts.

In-mould film decoration not feasible

The growing requirements made of plastic components for mobile phones makes the previously customary method of in-mould film decoration increasingly impossible. The outdoor qualities which are increasingly in greater demand for mobile phones are one example. This factor together with shorter and shorter model cycles simultaneously require high-quality and correspondingly fast production methods. The co-operation between ARBURG and Weber is heading in this direction.

The function principle

Design and function of the mould, which will be demonstrated for the first time at the K 2001, are extremely simple in principle. The first and second stations of the four-cavity mould are used to manufacture the two-component moulded part. The third station has an open design permitting unobstructed part remo-



val using a robotic system. The mould halves are rotated by 120 degrees in each case using a rotary platen and this moves the pre-moulded part for final injection and then the complete moulded part to the removal position.

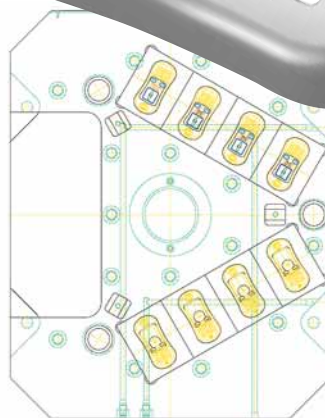
Advantageous design

Because the mould is partly open, the die only needs to be opened for rotating the movable mould halves and not for part removal. The ejection of the injected parts as well as the removal of the moulded part and sprue can take place parallel to the

ongoing injection moulding process, yielding additional time advantages.

The compact shape of the mould and the entire system permits the

Three-station mould for producing and removing high-quality mobile phone shells.



removal of parts and well as set-down toward the rear of the machine under the enlarged machine guard – free access to the mould from the front is completely retained. In addition, the complete cycle time – approximately 15 seconds – is available for removing the parts, which is not the case in other systems.

Finally, it is also conceivable to supplement the injection cycle with an additional loading procedure. In this way, for example, display windows can be inserted easily into the mould.

Machine technology

During the K 2001, the die will be fitted on an ALLROUNDER 630 S 2500-1300/150. In addition to the two position-controlled assemblies, the machine operates with an electric index unit from Weber which keeps the entire cycle short due to fast and precise simultaneous movements. ARBURG's own MULTILIFT H compact module is fully integrated into the enlarged machine guard and is fitted with a servo-electric Z-axis. The finished part is set down on the conveyor belt which also runs under the guard.

Fast, high-quality production – this requirement is met both by the mould and also by the machine and handling technology as a joint development by Weber Formenbau and ARBURG. In this way, high-quality mobile phone components can be manufactured in Europe with a high degree of automation.

In touch with

That is the slogan of Eppendorf AG - an insider tip similar to ARBURG. Almost everyone has had something to do with the products of this company based in Hamburg, at least once, either directly or indirectly, voluntarily or as a result of an emergency. Eppendorf AG is one of the largest suppliers of laboratory technology, particularly in the area of bio-technology, and is therefore active in the large and booming economic sector of health.

Therefore, through this ARBURG customer, ALLROUNDER technology is also active in this sector. A whole range of injection moulding parts is produced in its own plastics plant in Oldenburg since the start of in-house manufacturing in 1975 and these products are used in a wide variety of sectors of the health industry.

Less than a lifetime has passed from the initial application for opening a commercial enterprise shortly after the war in 1945 to the planned stock market floatation in 2001, a rapid corporate development, as ARBURG knows only too well. Currently Eppendorf AG has more than 38 subsidiaries around the world, well over 1600 employees and according to the Chairman of the Board, Klaus Fink, it is growing "every week".

Stock market is useful but not a necessity

The company can take its time with the long-planned stock market floatation. Eppendorf constantly achieves two-digit growth rates – dream figures for many other sectors – and in the year 2000 it achieved revenues of a total of Euro 258.4 million. The effect is clearly apparent. Nobody at Eppendorf really seems to be worried by weakening

economic forecasts - despite the fact that North America has now become the most important earner for the company with a share of 61 (!) per cent.

Production for the world from its location in Germany

Although this giant market share is overseas and manufacturing sites exist in the new world, in terms of value the lion's share of products, 90 per cent, are still manufactured in Germany at its sites in Hamburg, Oldenburg and Leipzig. This is not least due to quality. In the health industry in particular, it goes without saying that the highest production standards must be observed. The company's second important slogan, created for the 50th anniversary of the founding of the company in 1995, refers to this clearly and simply: "Focussed on people".

Medical technology on ALLROUNDERS

The entire injection moulding production is based at the site in Oldenburg. Here, ARBURG ALLROUNDERS also series produce pipettes or safe-lock test tubes and plastic vessels, for example, using



Guaranteed precision: mould alignment.



Eppendorf Polymere GmbH in Oldenburg/H.

Photos: Eppendorf

heavy-metal-free plastic granules and environmentally friendly coloured pigments in the highest quality and numbers.

Eppendorf is particularly concerned with the recyclability of the starting materials because a not inconsiderable proportion of production comprises single-use products, as frequently used in the medical sector. The plant manufactures a billion of these small aids each year.

Adjacent to production is the company's own mould manufacturing plant in which the extremely precise moulds are manufactured and adapted to production. The high-quality requirements mean that all injection moulds are checked continuously to a degree of 0.0023 mm using precision measuring equipment. Special printing, fully automated assembly and packing complete automated parts production. This high degree of automation comprehensively ensures efficient part output as well as the highest levels of production quality. Full automation means a safety bonus particularly for assembling and packing because this guarantees the highest level of hygiene.

ALLROUNDER: reliable and convenient

A total of 51 ARBURG machines, about half of which are from the latest generation of C and S series machines, manufacture moulded parts for Eppendorf Polymere GmbH in Oldenburg/H.

The clamping force of the ALLROUNDERS fluctuates between 500 and 2000 kN. According to ARBURG's machine history, the collaboration goes back to 1976 when the first ALLROUNDER, a 221-55-250, was delivered to Eppendorf. The good personal contacts and the partnership-like collaboration between the two companies in particular have enabled ARBURG to become proportionally Eppendorf's largest machine supplier.

The machines operate around the clock, i.e. three shifts seven days a week, and manufacture standard disposable products, as well as versions that meet sterile, 'biopur' and 'PCR-clean' standards.

The products are injected on up to 64-cavity moulds. The ALLROUNDERS in clean rooms at

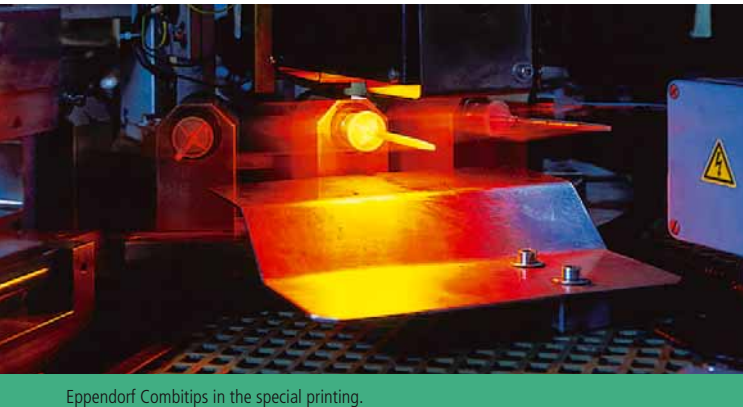
life!



Working for health: dropping pipette and test tube from Eppendorf.



High-quality disposable products from plastic are manufactured in multiple cavity moulds.



Eppendorf Combityps in the special printing.

Eppendorf operate additionally with clean air hoods to absolutely guarantee the requirements of medical engineering. The main materials used are polypropylene (PP) and polyethylene (PE), in addition to polycarbonate (PC).

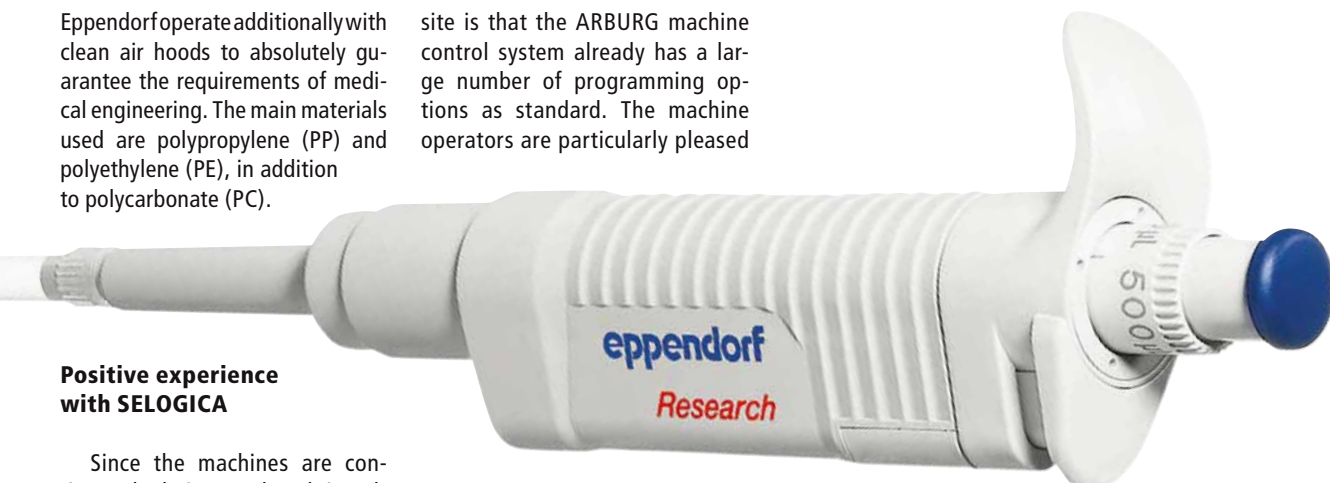
site is that the ARBURG machine control system already has a large number of programming options as standard. The machine operators are particularly pleased

Since the year 2000, the company is also taking a step together with ARBURG towards complete production units. Four ALLROUNDER 470 S 1300-350 as well as two ALLROUNDER 520 C 1600-675 have been purchased since the start of the new millennium, including a MULTILIFT H robotic system with B-axis, so that moulded parts can be produced, removed and fed to a direct further processing operation automatically.

Positive experience with SELOGICA

Since the machines are continuously being replaced in Oldenburg, 14 SELOGICA controlled ALLROUNDERS are now integrated into production. One particular advantage for the officials on

with the simple structure and the intuitive, easy-to-understand sequence control.





Customer service has global



The customer is always right – this wise saying may be old but it is still just as relevant, and previously applied particularly in conjunction with a company's products. A company with its finger on the pulse of time knew what the customers wanted. This was then logically incorporated into considerations for development and manufacturing.

However, during recent years a mega-trend in technology is becoming increasingly more apparent: products have become more and more replaceable, if only on the



ARBURG - a reflection of the times: technical and commercial developments form a unit for the benefit of the customers.



highest level. Differences in quality between the individual companies have become smaller. Following this trend, ARBURG responded early by the expansion of global sales and service structures. Its application spectrum not only in terms of technology but far beyond the machines themselves has been increased and made more efficient.

Global services

A product which is obviously the quintessence of these considerations can only be as good as the services accompanying this pro-

duct. Therefore, ARBURG is nationally and internationally pursuing the principle of „Think global, act local!“. What does it mean to provide all customers with the same comprehensive services, regardless of whether their location is close to Lossburg, in Germany, Europe or in other regions of the world.

For such services to function in practice, close collaboration is needed between the parent factory in Lossburg and all subsidiaries and agencies. Frequent meetings - which serve to optimise the sales structures as well as to provide information on new products and further training - are one way of achieving this. Since last year, for example, the training of service and applica-

tion engineers, which is carried out centrally in Lossburg, has been coordinated and brought to the same standard world-wide. Another contribution is to be able to offer the same level of consultation and maintenance in Latin America or Asia as is available in European countries, for example.

Accelerated by IT

Networking is another important keyword. The majority of subsidiaries around the world are connected to the headquarters via an IT network. This not only facilitates the rapid exchange of sales documentation, such as price calculations or information on application engineering, it is also used for fin-

ding out where urgently needed spare parts are in stock. This has decisive time advantages for customers compared to the customary spare parts service, but it also has a positive effect on the ARBURG image with these customers in particular.

Expansion of the subsidiaries

ARBURG is strategically pushing forward with the expansion of its subsidiaries. The company often takes advantage of frequently long-term contacts with internationally active sales partners, taking over the personnel on site in the subsidiary. The benefits: recourse to existing personalised customer contacts and the comprehensive tech-



priority



nical expertise as well as the employees' knowledge of the local country. This is also one of ARBURG's

the machines and expertly carry out the necessary repairs. A spare parts ordering system with their own

peripherals individually to the respective application.



principles: wherever possible, employees from the respective countries are employed. Linguistic as well as mental aspects are more appropriate. In other words, this is the best way to develop the market.



warehouse for the fastest possible response times and appropriate training areas for training customers on ALLROUNDERS and injection moulding round off the facilities.

Trends in technology

Current trends in technology can be summarised by keywords. The trend is towards complete production cells with all the peripherals, special machines for particular manufacturing tasks, hybrid technology as well as machines with robotic systems from a single source. ARBURG's developments are in line with these trends.

Application spectrum growing

The fact that innovative customer support is becoming increasingly more necessary cannot simply be explained by smaller and smaller differences in quality and products. The entire range of technology is expanding more and more due to progressive specialisation of the particular applications. However, ARBURG was quick to find interesting responses to this too.

Production cells

ARBURG has stocked up its project group to capacity to be able to effectively meet the increased demand in this sector. Customers come to ARBURG with their requirements, specs or parts. The company works on a tailor-made production solution using its entire pool of expertise and implements this as the primary service provider. This also includes the mould, the robotic system and all the peripherals required, as well as the machine. ARBURG sets up and commissions the system and also performs maintenance or mobilises service personnel. For the customers, this means one point of contact for everything from project planning and execution to the complete servicing.

The same effort, the same service, the same facilities

The same equipment must be available if the same services are to be offered. Therefore, the infrastructure of every subsidiary is the same. They each have their own college of technology with up-to-date technology for demonstrations, testing as well as for prototyping moulds, their own application engineers who can assist in all matters relating to ALLROUNDERS and peripheral equipment, as well as maintenance and service engineers who inspect



The far-reaching flexibility of the ALLROUNDER has been expanded and increased time and again in the past years – by the VARIO system, for example. Common to all further developments is the modular design which makes it possible to adapt machines and

Future perspectives



Michael Grandt,
Managing Director Sales
and Controlling:

"ARBURG doesn't rest on its laurels in the area of customer service, and this is demonstrated by the fact that here too, and not just in production, the company is looking at implementing new options. An internet-based spare parts service will be launched at the K 2001 which will also be implemented in the international arena as soon as possible. Almost like going to the supermarket, quickly and securely via a password check customers will find out whether the required spare parts are available, what they cost and can then order them directly. To supplement this, a machine-specific CD-ROM with an electronic spare parts list will be available which will enable an order to be made by placing the components in a shopping basket which is sent directly into the internet via a link from the CD. This preserves ARBURG's high level of service and also logically incorporates the latest technologies into customer care. This has benefits for the customer and for our company."

Special machines

For the fields of PET preforms for bottle manufacturing, smart cards,

Technology for the 21st century



Herbert Kraibühler,
Managing Director
Technology and
Engineering

"With the developments we have made in the last few years, we have not only fulfilled customer requests, we have also set clear trends. We have done this without neglecting our basic philosophy of modularity which is characterised by the key phrase "Allrounders for economic injection moulding". On the contrary, we have transferred the basis of this principle to all our technical innovations. This benefits our customers in particular: It is not just possible for them to select the exact ALLROUNDER they need for their manufacturing requirements from our broad range of products, they can also combine it with the appropriate robotic system, order a configuration from our special machine pool or even design and individually configure entire projects from start to finish. This guides our customers on the right path to a secure future, and us too. With a range of technologies that has yet to find its equal!"

powder injection moulding and CD production, ARBURG has a range of production systems which have been tailored specifically to the manufacturing task. The configuration is fitted out with a handling system, mould, cooling stretches and all the other peripheral equipment in accordance with the principles of project management. ARBURG delivers the entire system ready for production and assumes responsibility for all servicing. Only the performance and equipment of the ALLROUNDER have to be specified in greater detail as this determines the rest of the configuration.

Hybrid technology

At the K 2001, ARBURG will launch a machine whose main axes can be driven electrically and whose auxiliary axes can be driven either electrically or hydraulically. The new ALLROUNDER machine series is provided with the letter "A" for "ALLDRIVE" and, in accordance with the company's philosophy, can be built up in modules through various servo-electric axes up to and including a completely electric version. The advantages for the customer: an individual machine concept oriented to the task always at an optimum cost/performance ratio.

Machines and peripherals from a single source

With the construction of the MULTILIFT H, ARBURG is further on the path towards complete system supplier. The word 'modular' is of particular significance here too. The different axes of the robotic system can be expanded modularly both in terms of quantity and drive; various axes are available either as pneumatic versions or servo-electric. Three different equipment packages form the basis for the additional modular expansion versions. The range of services offered by the company in this field extend as far as constructing the respective machine handling combination including protective guards and the CE certification if desired.



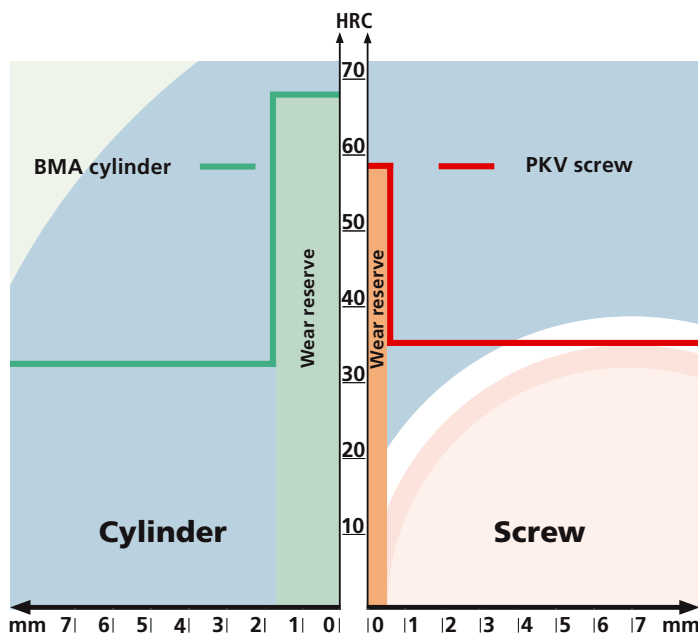
Tougher than steel

Wear is unavoidable wherever components move against each other and material is being conveyed. Obviously this also applies to the plasticising units in injection moulding – with consequences for the individual function parts themselves as well as for the manufactured moulded parts.

Modern construction materials that are used in particular for technical moulded parts are currently adapted to a specific range of properties using fillers and additives. However, these additives increase the abrasive and corrosive wear on screws and cylinders, in some cases quite considerably. High-temperature materials, such as PEEK for example, with processing temperatures at up to 400 °C, also make great demands on the thermal resistance and hardness of the steels used. Cylinders, screws and non-return valves are being subject to increasingly greater stress not only through these wear-promoting combinations of materials, but also due to the short cycle times and intense plasticising.

Powdered metals versus wear

Beyond the boundary conditions – i.e. material and process – wear can only be influenced to a limited extent in most cases. The service life of screws, cylinders and non-return valves therefore primarily depends on the resistance to wear of the materials used. In addition to the low-wear standard versions with nitride surfaces and the wear-resistant ARBID cylinder modules, in which the components' boundary layers are enriched with boron, ARBURG offers extremely wear-resistant plasticising units. Here, screws made from high chromium powder metal steel (PM steel) with hardened boundary layers

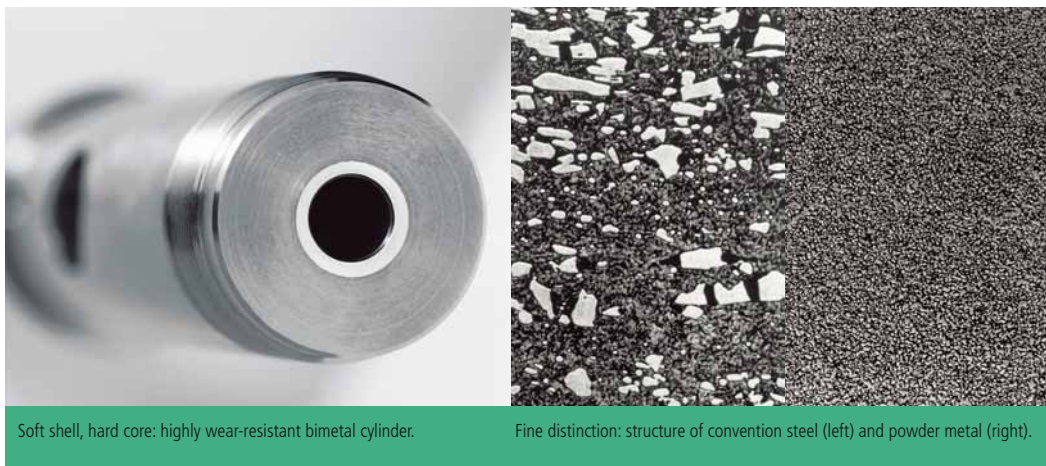


are used and these have a significantly finer structure compared to conventional melt-metal materials. These 'PKV' screws have a high resistance to abrasion in conjunction with their surface hardness of approx. 60 HRC. In contrast to penetration hardening,

tance to corrosion.

The wear protection of the cylinder is similar: with the high wear-resistant bimetal cylinders (BMA), two different materials are combined. A spin hardened alloy is applied in the cylinder tube (carrier

as fluoro-plastics, the highly wear-resistant cylinders are also available with a corrosion-resistant spun layer (BMK).

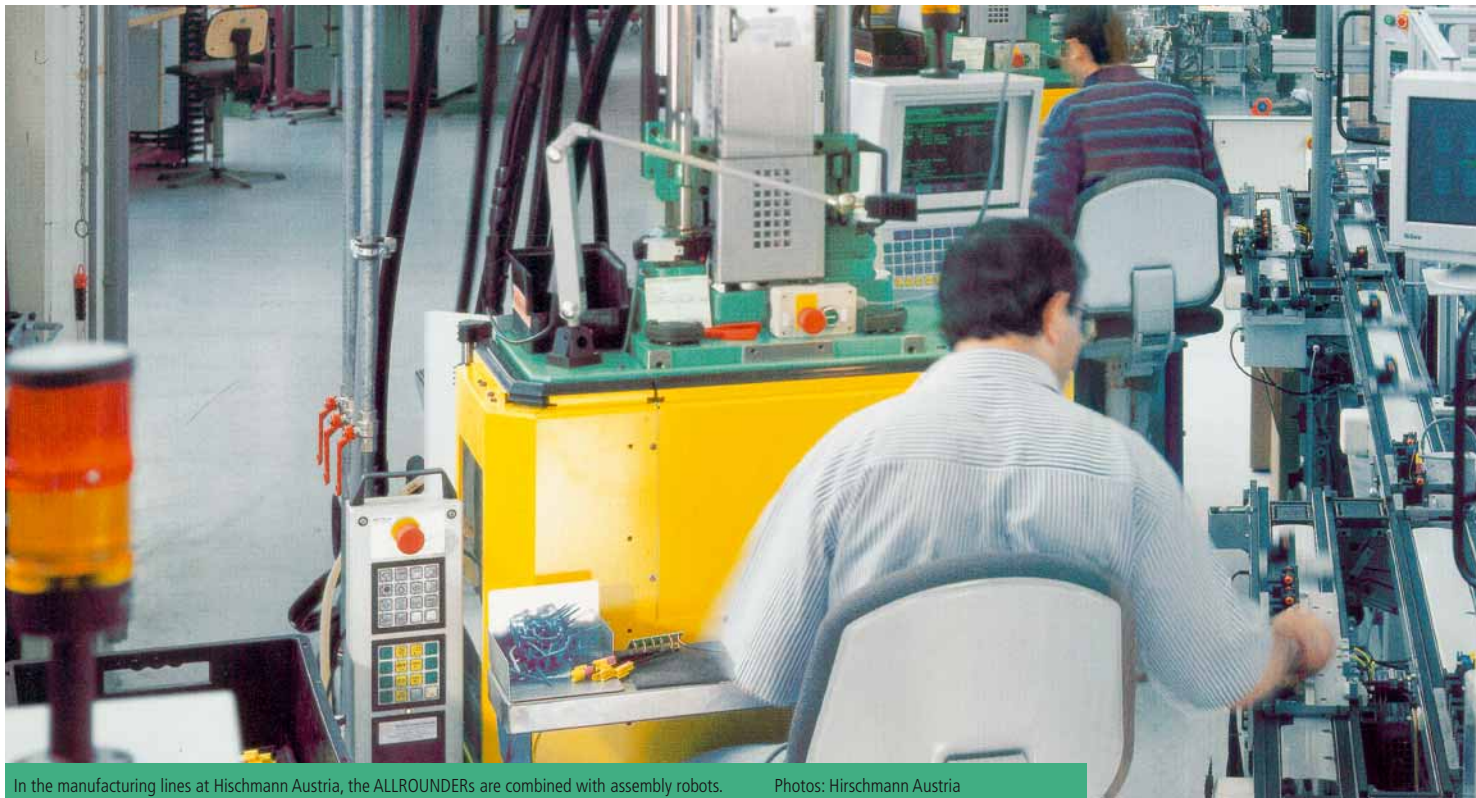


Soft shell, hard core: highly wear-resistant bimetal cylinder.

Fine distinction: structure of convention steel (left) and powder metal (right).

with boundary layer hardening the core remains "soft" and therefore the strength of the PM steel is retained. Excess material to compensate for wear is more than adequately available due to layer thicknesses of 0.2 to 0.7 millimetre. The high chromium content in the powder metal material also ensures the screw's high resis-

tance to corrosion. The wear protection of the cylinder is similar: with the high wear-resistant bimetal cylinders (BMA), two different materials are combined. A spin hardened alloy is applied in the cylinder tube (carrier



In the manufacturing lines at Hirschmann Austria, the ALLROUNDERS are combined with assembly robots. Photos: Hirschmann Austria

In the beginning was

This statement represents the beginnings of two companies that have been working together successfully for many years: Hirschmann and ARBURG. Hirschmann's history started in 1924 with the invention of the „banana plug“. And ARBURG's history as a machine building company, as you may know, started in 1954 with the invention of an injection moulding machine which enabled plastic to be injected around plugs.

A "one-off purchase opportunity in Austria" is how the Frankfurter Allgemeine newspaper described an industrial site in Rankweil/Vorarlberg in 1959. This announcement was the start of the current Hirschmann Austria GmbH which over the past forty years has developed from a pure contract manufacturing operation to a world-leading

supplier for automotive electronics and radio transmission technology.

In 2000 Hirschmann Austria GmbH achieved a turnover of around 1.6 billion schilling, more than 60 per cent of which came from outside Austria. With around 950 employees, the company is the fourth largest employer in Vorarlberg's industrial sector.

Besides Neckartenzlingen near Stuttgart, Rankweil with a production area of 77,300 m² is currently one of the two main locations for the Hirschmann group which has been part of the German technology group Rheinmetall since 1997.

Within the Rhein-

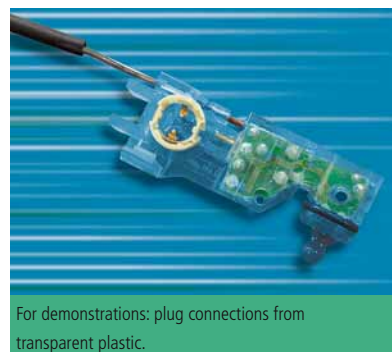


metall group, Hirschmann forms part of the Electronics corporate division that is lead by Aditron AG.

The activities of the Hirschmann group are split into Car Communication Systems (CCS), Multimedia Communication (MMC) and Automation and Network Solutions (ANS). The CCS division, in which Hirschmann Austria is active, is divided into Mobile Communications Technology and Automotive Plug Connections.

From development to series production

Hirschmann Austria offers its customers a full service from development and testing to series production of high-quality plug connections and ready-to-use wiring harnesses. For more than 20 years, there has been a successful partnership between the company and the automotive industry, including re-



For demonstrations: plug connections from transparent plastic.

nowned automotive manufacturers such as Daimler Chrysler, BMW and Audi as well as important system suppliers such as Delphi, Bosch and Siemens.

Comprehensive certification

The quality management system is certified according to the international standards DIN EN ISO 9001, VDA 6.1 and QS 9000. Since 1998, the company has also had a certified environment management sys-



from pyrotechnic seat belt tensioners in personal restraint systems and ABS, anti-slip control (ASR) and brake lining wear indicators (BBV) to electronic parking aids and keyless-entry systems.

As a specialist in this field, Hirschmann Austria has the necessary expertise to develop creative ideas and solutions for complex tasks. Other decisive factors of the company's success are constant monitoring of the market requirements, short development times due to computer-aided processes as well as modern production facilities with optimised manufacturing processes.

ALLROUNDER in U-position

In the field of machine technology, Hirschmann Austria has



plastic is injected around metal contact elements and integrated stranded wires during manufacturing.

Hirschmann Austria also uses ALLROUNDERS to inject pyrotechnic-electric ignition units for inflators of seat belt tensioners or grommets out of TPE-U. The latter are manufactured on hot runner moulds with up to eight cavities. The corresponding ALLROUNDERS are equipped with sliding tables designed by Hirschmann Austria. The ALLROUNDERS are connected directly to the material flow and are in part combined with assembly robots but are not completely integrated into the manufacturing lines.

ARBURG – with good reason

The reason why the company has used ARBURG machines for many years is explained by Christian Kainrath, Head of Plastics Processing: "Good stability and high availability are characteristics of the ALLROUNDERS. They can also be integrated excellently into line manufacturing, permitting fast cycle times in semi-automatic mode as a result of parallel functions."

The excellent collaboration can be seen in particular in technological terms: with special requests relating to the injection moulding machines, their inspection, approval and commissioning, questions on new processing technologies or prototyping dates in the college of technology.

The co-operation between ARBURG and Hirschmann Austria goes far beyond a 'simple' customer/supplier relationship. Together the companies have driven forward developments for screws and cylinders, safety devices, guide elements and machine documentation. "The partners have profited greatly as a result, in terms of process capabilities, availability and therefore also economic efficiency", says Christian Kainrath.

New projects in the starting-blocks

Plans have also been made for the future. Other processing technologies have already been tested in the area of thermoset and ceramic injection moulding and are now planned for future projects. A project with a four-component machine has also already been discussed.



Injecting around ABS plugs.

the plug



Rankweil/ Vorarlberg: one of the two main locations of the Hirschmann group.

tem conforming to EMAS and the environmental standard DIN EN ISO 14001.

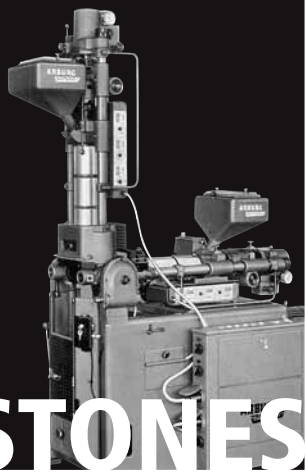
For vehicle safety

Hirschmann Austria's core area of expertise are modules for improving vehicle safety. The applications extend

been collaborating with ARBURG for many years. From a total of 85 injection machines, 55 ALLROUNDERS alone are from the S, C and M series.

Semi-automatic versions in the U-position are used – for example, to inject plugs onto cables or for contact carriers from plastic, whereby

MILESTONES



In the area of multi-component injection moulding, ARBURG can fall back on sound expertise. Two historic dates occur in 2001: the K in Düsseldorf and the 40th anniversary of the first automated production of a multi-component moulded part on an ALLROUNDER. This is reason enough to look back at the technology of the early days of this process.

Experts with a large amount of experience in their field discussed this subject in the previous customer magazine "ARBURG heute". The basic principles of the process and mould technology have not changed greatly even today. This knowledge is therefore also relevant now.

In addition to a universal machine which can be optimised like the ALLROUNDERS by swinging out the clamping unit and repositioning the injection unit as well as by adding a second injection unit in the vertical injection position for two-colour injection, the ARBURG application engineers placed importance secondly on the moulds. The manufacturing process must also be correspondingly taken into account when the moulded parts are designed. With multi-component moulds, higher precision requirements than for single-colour moulds should always be met. Resistance to wear and operating reliability must also be taken appropriately into account.

Main principle: rotation of the movable mould halves

Regardless of whether a rotatable block or a rotary platen is used: the most efficient method for the mould for positioning preforms and

finished moulded parts is to rotate a mould insert in the mould or the movable mould halves as a whole. The alternatives of two-state moulds or laterally moving a mould half are also feasible. However, the rotary platen has ultimately established itself as the standard method.

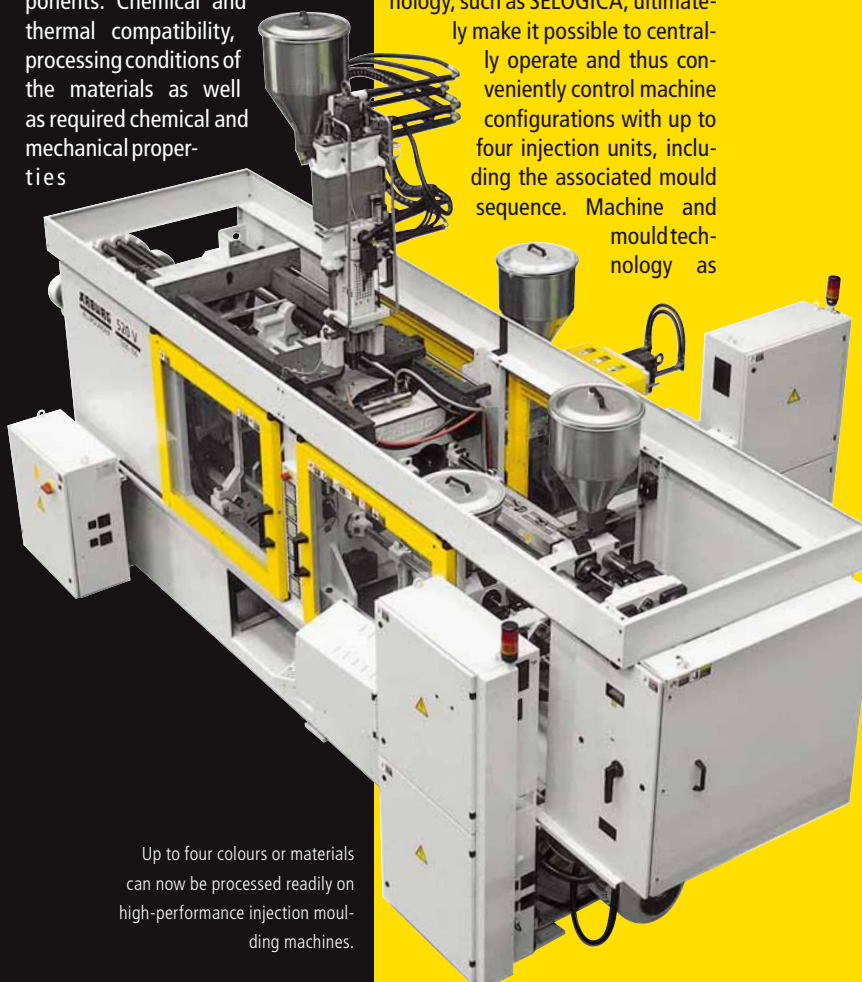
Then, as today, the discussion also involved the design of the moulded parts. Recesses have to be provided, not only to allow the material to flow, for example in isolated „islands“ on the pre-moulded part, but also to ensure the necessary mechanical anchoring between two components. Chemical and thermal compatibility, processing conditions of the materials as well as required chemical and mechanical properties

are further important determining factors in the processing.

Particularly regarding the materials, clear progress has been made over the last forty years. Currently, high-quality hard/soft combinations are gaining increasing importance, for example in automotive construction and domestic appliance technology. The combination alternatives between the different plastics are increasingly more varied, which permits, for example, the injection of TPE onto transparent PMMA. High-quality control technology, such as SELOGICA, ultimately make it possible to centrally operate and thus conveniently control machine configurations with up to four injection units, including the associated mould sequence. Machine and mould technology as



well as materials will also open up other application opportunities for multi-component injection moulding in the future. ARBURG laid the foundations for this forty years ago as a trend-setter with the commercial implementation of two-colour injection moulding.



Up to four colours or materials can now be processed readily on high-performance injection moulding machines.

ALLROUNDER@web:

Remote inquires via internet



Keeping an eye on production at any time with a remote inquiry via the internet.

ARBURG is now offering ARS (ARBURG Remote Service) for machine remote inquires via the internet so that ongoing production can be monitored even from outside the company.

The ARS for remote inquires and diagnosis via the internet is suitable particularly for production in which injection moulding machines with a critical production process are operating, but also for companies with a number of production locations. Using a modem, network or internet connection between the machine and the external PC, the current production status of the machines can be called up at any time and particularly also when on the road.

It is possible to have the screen pages and real time statuses of the machine control system for every individual machine displayed on the monitor of the external computer. Problems can be diag-

nosed quickly even from outside the company, both by the user as well as by ARBURG customer service. If a machine develops problems, the ARBURG service engineer can quickly get an overview via ARS and provide appropriate assistance in order to eliminate the problem – a visit on site is often no longer necessary.

Setting data records from and for machines in production can also be transmitted. However, it is only possible to change the existing data record on the machine itself as it is only possible to view the result – i.e. the part produced – at this place.

The machine status with order data and production parameters as well as the time sequence of completed production can also be displayed. A comprehensive production overview of all the machines with the corresponding set-point and actual quantities as well as the run times can also be called up remotely.

All the current machine data are therefore available in the network using ARS. The system can be expanded to an ARBURG host computer system ALS at any time for long-term analyses, production planning and the central management of configuration data records.



Highly wear-resistant: The non-return valve with hard-metal fittings

TECH TALK

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

Adhesion, abrasion and corrosion – like all parts used for preparing the melts, the individual parts of the non-return valve are also ultimately subjected these unavoidable types of wear. Sintered metal components, used at the neuralgic points of the non-return valve, ensure a significantly longer service life for this critical component.

Wear to the non-return valve occurs near the locking ring at the outside diameter, but also at the end face towards the screw tip as well as at the sealing face to the seating ring. Wear caused by abrasion and adhesion to the end faces shortens the overall length of the locking ring, for example. Direct consequences include fluctuations in the material cushion due to the increased stroke and ultimately the wear of the non-return valve.

With the highly wear-resistant non-return valve, a hard-metal washer is soldered into the locking ring for this reason; it runs against a hard-metal pin which is inserted in front of the blades of the screw tip. The result of the specific material combination is significantly improved mutual running properties of the components and therefore also considerably less adhesive wear. Due to the non-return valve's very good emergency running properties, wear can also be minimised with non-lubricating plastics such as PE or PP.

The locking ring itself as well as the seating ring are manufactured from the high chromium PKV material known from the highly wear-resistant screws and they are pe-

netration hardened. In addition to the drastically improved protection against abrasive wear, another advantage of this powder-metal steel is the optimum corrosion protection for the sealing surfaces of the seating and locking ring.

Production downtimes due to frequent changes of wearing parts can involve not inconsiderable costs for the user. Therefore, the same arguments for the non-return valve with hard-metal fittings also apply to the highly wear-resistant cylinder modules where they are already used in series production: considerably higher service lives and also a greater process reliability justify the extra investment for a non-return valve with hard-metal fittings, even after a relatively short period of time.



The New

2500 kN! *

* If you have great plans for the future, you can achieve this reliably with economic ALLROUNDER technology. 2500 kN locking force and a maximum shot capacity of 820 g/PS are the vital statistics of our new injection moulding dimension.



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