

Injection moulding
technology and
market developments

ARBURG

today

Issue 4

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■ Optimum interaction
between innovation,
quality and
top design



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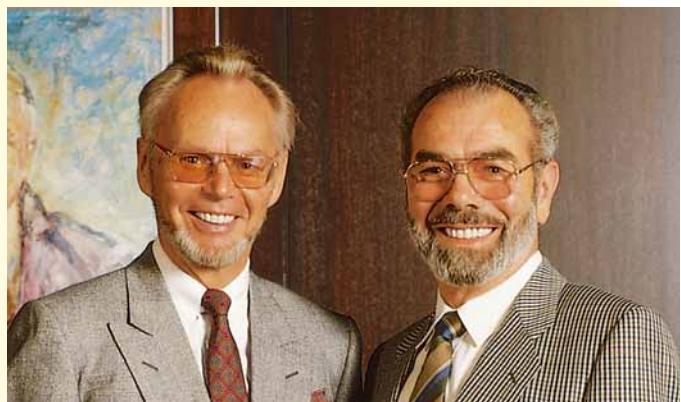
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**UK subsidiary well out in front - not just
with ISO 9002!***ARBURG subsidiary now certified to ISO 9002.*

IMPRINT

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EDITORIAL



Economic recession looming on the horizon and gloomy prospects for the future generally mean a new onslaught of cut-throat pricing policies for machine manufacturers. In times like these, customers expect not only innovation but also cheap conditions. Naturally including free qualified advice and an efficient service back-up.

Seen in the long term, we believe that this type of tendency can only be detrimental. Innovative technical developments cost money, as do comprehensive advisory and back-up services.

And on this front, our customers' opinions differ not in the slightest from our own.

Anyone aiming to manufacture high-quality products today has no alternative but to produce using high-quality, sophisticated facilities. When we talk about comprehensive advisory and service back-up at ARBURG, we mean for example useful things like our application-oriented advice, our project planning, our Technology Center, our international servicing network, our computer-aided spare parts service, our training programs or our telephone service.

It is only when all these factors form part of a purchase decision that we at ARBURG envisage scope for cooperation with our customers which is truly profitable for both sides. Because we aim to go on enjoying our present level of success together with you.

Cheap machine technology is just as costly in the long run - once the necessary support, spare parts or service back-up are found to be missing. And progressive technology can only be implemented with input of the necessary financial resources to drive the wheels of research and development.

For us, a company only operates in its customers' best interest where a healthy balance exists between the factors price, technology and servicing. This paves the way for technologies and services which our customers can rely on, which are good, solid value for money, and which form a foundation for a partnership with a future.

Best regards,

Eugen Hehl

Karl Hehl

Allrounder 270 and 320 S with higher output

The latest ARBURG machine series has been extended not by one but by several new variants in one go. The Allrounder S will be available with effect from the Friedrichshafen show also in the form of the 270 and 320 S with 350 and 500 kN clamping force respectively. On the injection unit side, the two sizes 60 and 150 are being supplemented by the 350 injection unit.

This new addition provides further scope for combination of hydraulic and control systems, injection and clamping units. The Allrounders 270 and 320 S will be available both in the two different clamping forces and also with all three injection units.

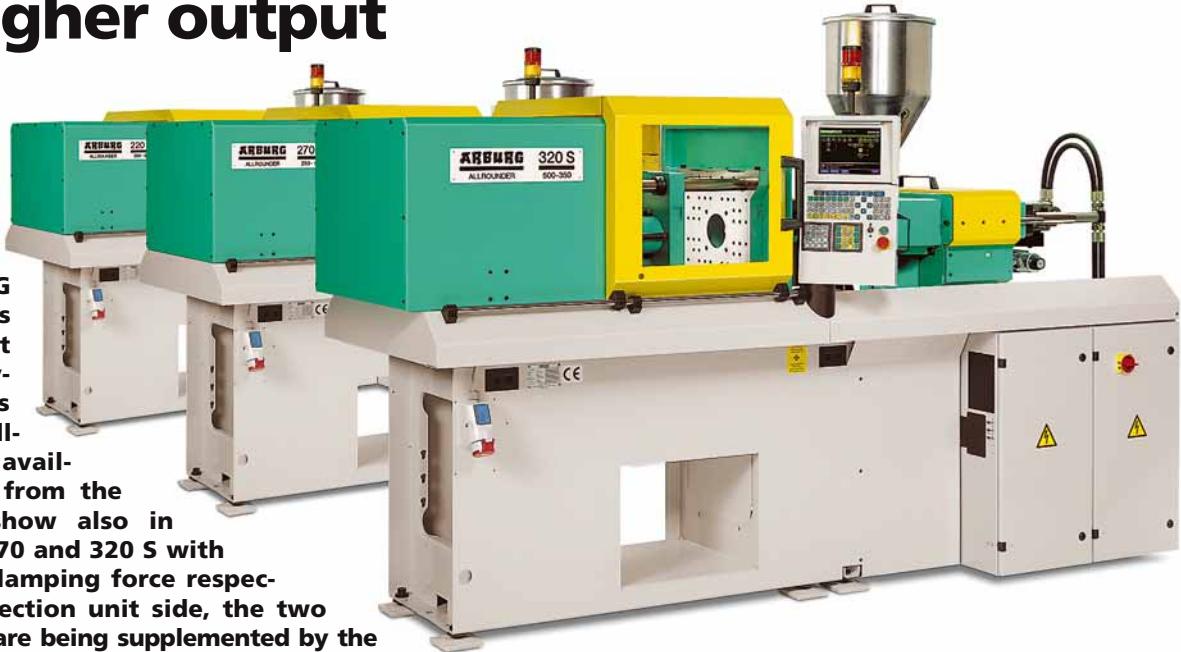
Greater scope for choice

By extending its machine series, ARBURG has now made available new cylinder modules. The standard diameters now range from 18 to 45 mm. The top-of-the-range 350 unit can be fitted with modules offering a 35, 40 and 45 mm screw diameter.

For machines with a clamping force of 500 kN and combination with the biggest injection unit, there are two enhanced-performance hydraulic drive systems with 15 and 18.5 kW on offer.

Upgraded, selective modular design

All the remaining selective modular upgrading stages have been retained in full in the new machine variants. The hydraulic system can be



fitted optionally with a high pressure pump alongside the main pump, or with a further main pump for the execution of simultaneous movements.

Every one of the Allrounder S series machines is fitted as standard with a manually adjustable cooling water manifold with four free connection points. A regulated version with a maximum of 10 free cooling circuits is available as an additional upgrading stage.

The Selogica machine control system with monochrome flat monitor also forms a standard feature of the Allrounder S. Alternatively, a colour monitor and the «extended monitoring functions», «extended movements», «production control», «order control», «optimization», «quality control» and «documentation» software packages are also available.

The injection units can be precisely adapted to the relevant application requirements using the offered cylinder modules. Alongside the standard thermoplastic cylinder, assemblies are available in all the necessary

sizes to allow the processing of elastomers, silicone and thermoset plastics. As well as the standard version, all the modules are also available in a wear-resistant and high wear-resistant configuration. The basic injection regulation system is now accompanied by two interesting options: Position regulation and injection process regulation.

The extended scope for combination with the new

sizes and output classes presented at the Fakuma permits far more universal coordination between the S machine series and specific production requirements.

NEW ARBURG SUBSIDIARY

New subsidiary founded in Turkey

In August, ARBURG launched a brand new subsidiary in Istanbul. The high technical standard prevailing in Turkey and its proximity to the EU make this a highly promising venture. The total of 400 sq. m. available to the new subsidiary comprises a spare parts warehouse, a showroom, a training centre and an office complex complete with an integrated EDP network which is due to be connected online to ARBURG in Loßburg over

the course of the next few weeks. Managing Director Selim Tankut will be operating in future with a staff of four for ARBURG in Turkey.

The new organization, which is fully controlled by ARBURG, aims both to provide a top quality servicing backup and also to safeguard the supply of spare parts for already installed Allrounders. ARBURG is also intending to expand its position as a partner to Turkish injection moulding firms.

Series-produced modular technology is the name of the future



Herbert Kraibühler
Managing Director Technology

Kraibühler, who in his capacity as Managing Director Technology, is responsible for design, development and production as well as purchasing and quality management, explains how current technological developments at ARBURG are based on the new machine series „Allrounder S“ and the „Selonica“ control generation. Both these developments are characterized by a high degree of flexibility building on a uniform basic equipment package, but with a modular design which goes considerably further than previously available machine or control types.

One of the underlying characteristics of the Allrounder S models is first and foremost their new design and the changed colour scheme. The nerve centre of the machines is

To implement the company motto „Allrounders for economical injection moulding“ in daily development and production is the primary objective of all the developmental work performed at ARBURG. The aim is innovation through foresight, and maintaining a cutting edge in the market ahead of the competition. With this objective in mind, ARBURG has been involved in the development of modular injection moulding systems since its early days. According to Managing Director Technology, graduated engineer Herbert Kraibühler, this philosophy will help ARBURG secure its position as a machine manufacturer in the future.

formed by the Selonica control system, whose highest upgrading stage has already been available for a period of three years in the Allrounder V series. It features graphic sequence programming with integrated process management.

The mechanical concept of the Allrounder S was aimed at reducing the external dimensions of the machine to as compact a size possible, and at achieving the lowest possible working noise by separating the machine base from the hydraulic unit. The new clamping unit works without hoses, offers generous clamping dimensions and a high degree of accuracy, rigidity and accessibility.

Production philosophy

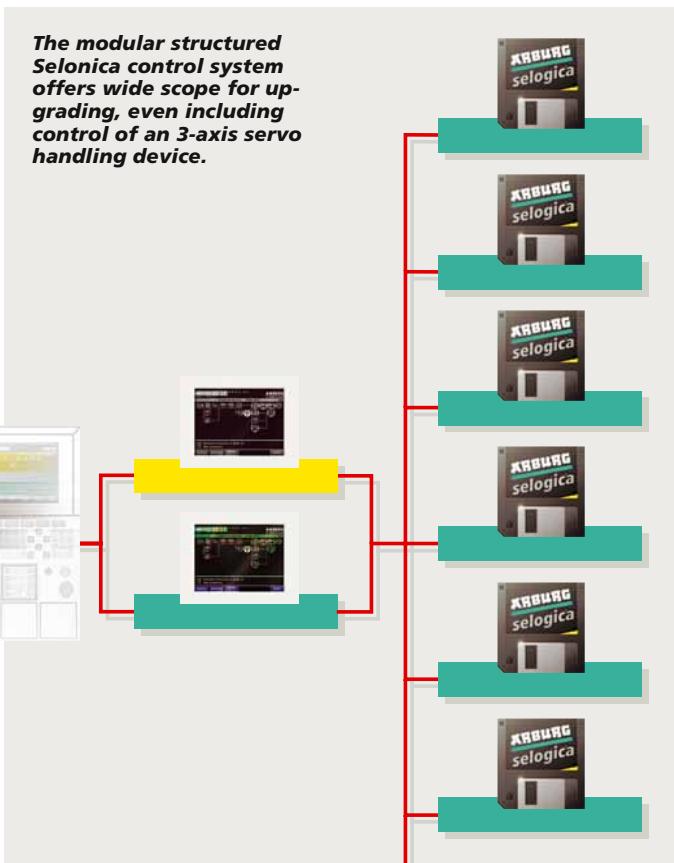
The production philosophy is also reflected, to quote Herbert Kraibühler, in the design of the new Allrounder S. The expertise which has been gathered over years of customer orientation and practical application engineering has been channelled into the implementation of a truly modular machine structure. A program of ongoing improvement and practical orientation have made it possible to utilize a large number of identical modules. For customer, this means an ideally adjustable engineering concept which combines quality and safety with optimum availability



The cycle prescribed by the mould is generated on the monitor in the form of a program with graphic symbols. The machine sequence and inputs are configured in the background.



The modular structured Selonica control system offers wide scope for upgrading, even including control of an 3-axis servo handling device.



and economy as a result of series production.

Development strategy

ARBURG's complete injection moulding and machine engineering expertise is concentrated at its Loßburg headquarters. Not only mechanical engineering but also control systems are developed by the responsible planning team. It was with this concept that the Selogica machine control system project was launched several years ago. Based on twelve years of experience with monitor controls, the Selogica control concept marked the transition to the hierarchical user interface and a move away from the use of input images of equal priority.

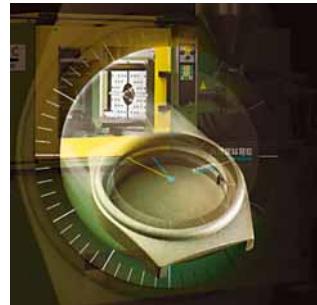
Conforming to market demands: Special injection moulding techniques

The Selogica control philosophy allows special injection moulding techniques to be implemented more comprehensively, clearly and simply. According to Herbert Kraibühler, one field to benefit particularly from the Selogica concept is that of multiple-component injection moulding.

Another interesting area is ARBURG's CD machine range. On the basis of an Allrounder 270 C, an injection moulding unit was developed which ideally addressed the special demands of CD production. It is not only highly efficient, its regulated functions also guarantee a high degree of repeat accuracy. The integration of a mechanical handling system also cuts cycle times to a minimum. Application engineers with specialized expertise in the field of CD production are available to offer customers optimum support in the planning and implementation of this type of system.

Another highly specialized field of application is that of powder injection moulding. Kraibühler recalls work starting in this

field at ARBURG some five years ago. Today, the company can lay claim not only to a comprehensive fund of expertise on powder processing, but also to extensive production and testing facilities for assessing the material properties of powders and binders and for material preparation. Production, debinding and sintering of powder-based parts as well as preparation of materials are all possible in the company's own laboratory. This facility allows ARBURG to make a qualified statement on the entire process chain and so provide customers with comprehensive information. This is an endeavour which, according to Kraibühler,

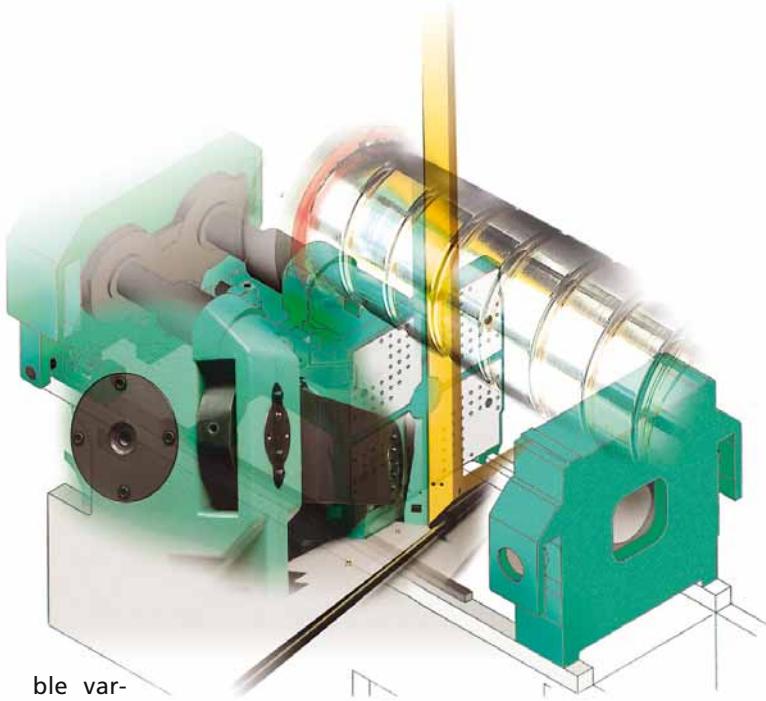


is firmly rooted in the company's philosophy.

Alongside extension of the Allrounder S series, further development of the electrical machine study first presented to the specialized public at the K'95 also enjoys priority status.

As well as electrical drive systems, Kraibühler also envisages plenty of scope for further development in the conversion of motor revolutions into machine movements. As work progresses, the company is registering a number of its own patents to safeguard these exciting new developments.

Kraibühler also considers the open space system of the clamping unit, coupled with closing and clamping functions, to represent a successful approach for future developments. By optimizing these and other techniques, the company is working towards a machine alternative for the future which, just like the Allrounder S, makes availa-



ble varied and therefore individual scope for practical application.

Purchasing and production philosophy

The work of the purchasing and overall producing divisions is coordinated in line with the company's production philosophy. The modular, identical structure of the Allrounders means that the necessary parts are generally purchased or produced according to a standard plan. The production plan is drawn up in advance over a six month period, and is taken as a basis for quantity and time frame calculation of the various parts. This procedure permits delivery periods of between four and six weeks to be achieved.

The job preparation and production departments are involved right from the development and design stage, helping to reduce the resulting problems to a minimum.

Individual components are designed taking into account implementation of the overall processing concept, and an attempt is made to process all the parts in a single pass wherever possible. This aim has already been achieved to a large extent for cuboid and rotational parts. Kraibühler is also keen to point out

the importance of the investment policy practised at ARBURG, which paves the way for fast, simple implementation of innovative production ideas. Continuous renovation and improvement of the company's operating facilities ensures state-of-the-art production. Use of the very latest production technologies to manufacture modern machines, argues Herbert Kraibühler, is one of the strengths behind the name ARBURG.

A deep vertical range of manufacture has a long tradition at ARBURG. Production expertise is confined largely within the company. Today, primarily parts requiring high levels of precision and short response times are manufactured internally. Series production and the



Soldering robot used for PCB assembly and the high piece numbers - this allows mean optimum capacity utilization of all production facilities, right through to three-shift operation.

Efficient and compact

Compact design and extreme efficiency are the watchwords of the latest model in the C-class range: The Allrounder 420 C 1300. The clamping system and injection unit of the new model offer all the same qualities as the 470 model series, with the difference that the smaller of the two available injection units is also used on the 420 C with a clamping force of 1000 kN. This clearly highlights the position held by the new machine within the C series. The 420 C 1300 rounds off the upper end of the Allrounder spectrum with a clamping dimension of 420 x 420 mm, so creating an ideal link to the 470 versions.

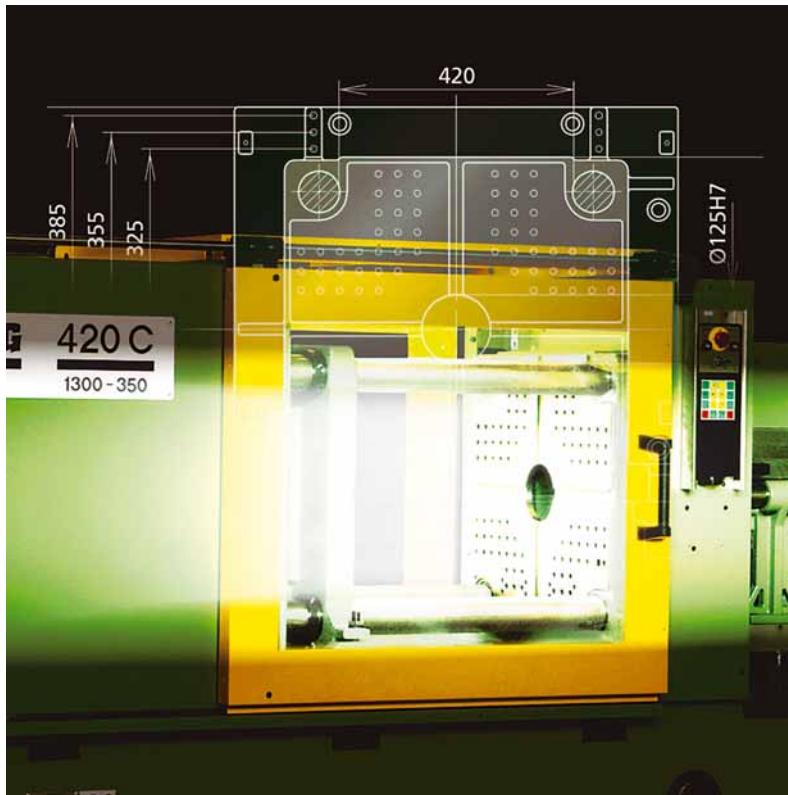
The multi-guided clamp unit lends the machine outstanding stability. The moving platen is supported both horizontally and vertically, and all machine movements are executed with a maximum of precision for optimum energy savings. The clamping force is regulated, and with a clamping dimension of 420 mm the clamping unit is large enough to accommodate even complex moulds and attached peripherals. Despite its generous scope, the machine dimensions are compact enough to restrict space requirement to a minimum on the factory floor. The clamping force of 1300 kN is easily able to cope with the large injection unit 675.



There are two injection units available as standard. The 350 unit can be fitted with screw diameters 35, 40 and 45 mm, the 675 unit with diameters 45, 50, 55 and 60 mm. The maximum achievable moulding weights producable using polystyrene are 194 and 427 grammes respectively. Both units are constructed on a modular basis, meaning that the unit and cylinder as well as all the supply lines can be centrally attached to simplify mounting and removal. Two-stage programmable back pressure is offered for both negative and also positive movements. The adaptable temperature regulation system is monitored by means of preset tolerance bands.

Control system: Dialogica 16 with selective menu technology

All machines of the C series operate using the flexible, ergonomically designed Dialogica 16 monitor control system. The use of se-



lective menu technology allows unwanted parameters to be faded out for fast, selective programming. All data is entered in terms of absolute values, further simplifying the work of the operator. Quality is assured by extensive monitoring functions with preset tolerance values. A floppy disk is able to accommodate up to 100 data records. Programmable inputs and outputs allow peripheral devices such as host computers, temperature control units or AQS systems to be connected.

The hydraulic system operates on the basis of two separate pumps, servo-electric regulation valves and two independently operating hydraulic manifolds for the clamping and injection unit. This design concept guarantees fast, precise machine movements. Even simultaneous movements can be performed. All the im-

portant hydraulic components are accommodated for easy accessibility in or at the machine base and designed to permit simple servicing.

The Allrounder 420 C 1300 thus combines all the outstanding advantages of the large and small C machines. The result is a highly efficient but at the same time reasonably priced machine version offering optimum force and scope for flexibility while ensuring the most economical use of space.



High-speed screws



Streamlining and lean production are the watchwords of the hour. After all, streamlining leads to greater flexibility, and thus greater efficiency in the execution of customer-specific orders. When ARBURG invests in its own manufacturing facilities, then only with a view to improving efficiency. This applies equally right across the production spectrum, from powder coating to plasma-nitriding. The latest department to benefit is the screw production workshop.

Two CNC machining centres custom tailored for ARBURG's special technological and operational requirements have been integrated into the production sequence at an investment input of around 3.5 million DM. The new facilities have been responsible for the manufacture and final production of plastic conveying screws since February and March of this year respectively.

The first of the two production centres incorporates all turning, cutting, drilling and twisting operations. This machine practically transforms cut lengths of solid extruded round

material into the basic contour of the screw with all the necessary features. The only subsequent processes necessary are grinding and heat treatment. For a medium-sized screw of one metre in length with a diameter of 35 mm, the entire machining process is completed in around 25 minutes.

The complete machining of a screw requires 12 turning and drilling tools, six milling cutters and a twisting head for recessing the screw channels. This necessitates the coordinated movement of no fewer than 15 CNC axes. Workpieces are loaded and discharged automatically by a workpiece loader.

After passing through a cylindrical surface grinder, all the screws are clamped in a belt sander, where the screw bodies are fully automatically ground to three different grain finishes. All three grinding units are in operation simultaneously, allowing the screw surface to be fully ground in only a single clamping process.

The complexity of these functions calls for outstanding computing capability. A total of 11 CNC axes have to be interpolated, i.e. their movement sequences offset against each other by the control system.

The screws are then heat treated before being inserted in the injection cylinders in the company's module assembly line. A new hardening plant to complete the screw production facility is already on order and awaiting installation. This finishing touch to the restructuring program is due to be in place by the end of the year.

Another positive aspect of the new centralized CNC screw machining systems is their long-term positive repercussions on achievable part quality. The considerable reduction of different machining stages and thus also clamping processes as against conventional manufacturing methods allows

far greater surface and screw geometry precision.

Where no fewer than 32 work stages were formerly required, now a finished conveying screw can be produced from raw material, including heat treatment, in just eight steps. The first machining centre replaces six conventional turning, cutting, drilling and twisting machines, and the CNC belt sander takes the place of three separate grinding and polishing operations.

Savings in terms of both time and costs, coupled with reduced work input and a greater level of achievable precision: These, alongside reduced throughput times, are the most important benefits of the new screw production facilities at ARBURG. And it goes without saying that the customer profits ultimately as a result of the new technology too. In practice, faster production permits a more efficient response to customer demands, and greater flexibility in implementing individual specifications.



Bang & Olufsen: Optimum interaction between innovation, quality and top class design



When connoisseurs of the AV and telecommunication scene get together, one name is bound to come into the conversation when the talk turns to design, ergonomics and aesthetics: That of Bang & Olufsen. For decades, the Danish manufacturer's products have enjoyed an outstanding reputation, not only for sophisticated engineering, reliability and long life, but also for striking design. And those who invest in a B&O system generally consider themselves to be slightly on the unconventional side.

As a sales argument, this conception of the company's products cannot be emphasized enough. But quite apart from external considerations, the hidden inner life of the telephones, TVs video recorders and audio components also has to comply to the very strictest standards. The Allrounders from ARBURG play an important part in guaranteeing that inner quality matches external appeal.



Clear concepts...



...in every sphere...



...of daily life.

The company's history begins way back in 1925, when the paths of students Svend Olufsen and Peter Bang crossed at the Technical University of Denmark. The two budding engineers were united by a common interest in a new, revolutionary medium: Radio. Their decision to establish a small factory for wireless construction came quickly and easily. The strategy they agreed on was to stand out against their competitors by manufacturing high-quality products and implementing new ideas. There was nothing revolutionary in this concept per se. But there can be few companies to date anywhere in world who have succeeded in sticking so closely and purposefully to their principles over the years as Bang & Olufsen. The first development marketed by the two entrepreneurs was fully in keeping with their corporate philosophy. An electri-



cally operated radio instead of the otherwise customary battery appliances. This radio was launched in 1926 and proved a spontaneous sales success. Ever since those early days, the company has held a sensitive finger on the pulse of the market, with a special capacity to take up and develop new ideas. B&O was one of the first entertainment electronics companies in Europe to produce a tape recorder. The first TV left the factory as early as 1950, ready to catch the impending TV boom.

New strategies to open up new markets

The stagnation of the shrinking entertainment electronics market in the sixties and seventies caused Bang & Olufsen to take stock and rechart its course into the future. This process ensured not only the survival of the company, but created a foundation for considerable growth. As part of its new strategy, the company decided to extend the borders of its marketing activity and pursue worldwide sales. Alongside developments in the field of televi-

sion technology, the B&O engineers never lost sight of the audio sector. „Transistor“ and „VHF“ are watchwords which mark the renaissance of the old-fashioned wireless. Here, too, B&O played a pioneering role. And criticism levelled at the general design standard of appliances on the market was a decisive factor in sparking the concentration on aesthetics and design for which B&O is known today. A combination of all these factors led to the successful pursuit of a „market gap strategy“ aimed at world-wide sales, restriction to key areas of competence and unconventional, aesthetically pleasing and user-friendly design. Coupled with a production process conforming to the highest standards of quality, today this philosophy forms the foundation of Bang & Olufsen's success.

Not „normal“, functional

Way back in the fifties, B&O was already effectively demonstrating that functional design does not need to be „normal“. Countless design awards testify to the

feasibility of this underlying assumption. Since 1963, the company's products have snapped up all the major design prizes around the world, bringing the total number of awards in recognition of outstanding B&O design to around 70. In 1955 the company, whose headquarters are in Struer in Denmark, turned over 2717 million DKK and employed a workforce of 2547: Statistics which testify to the innovative force of the company.

Success needs reliable partners

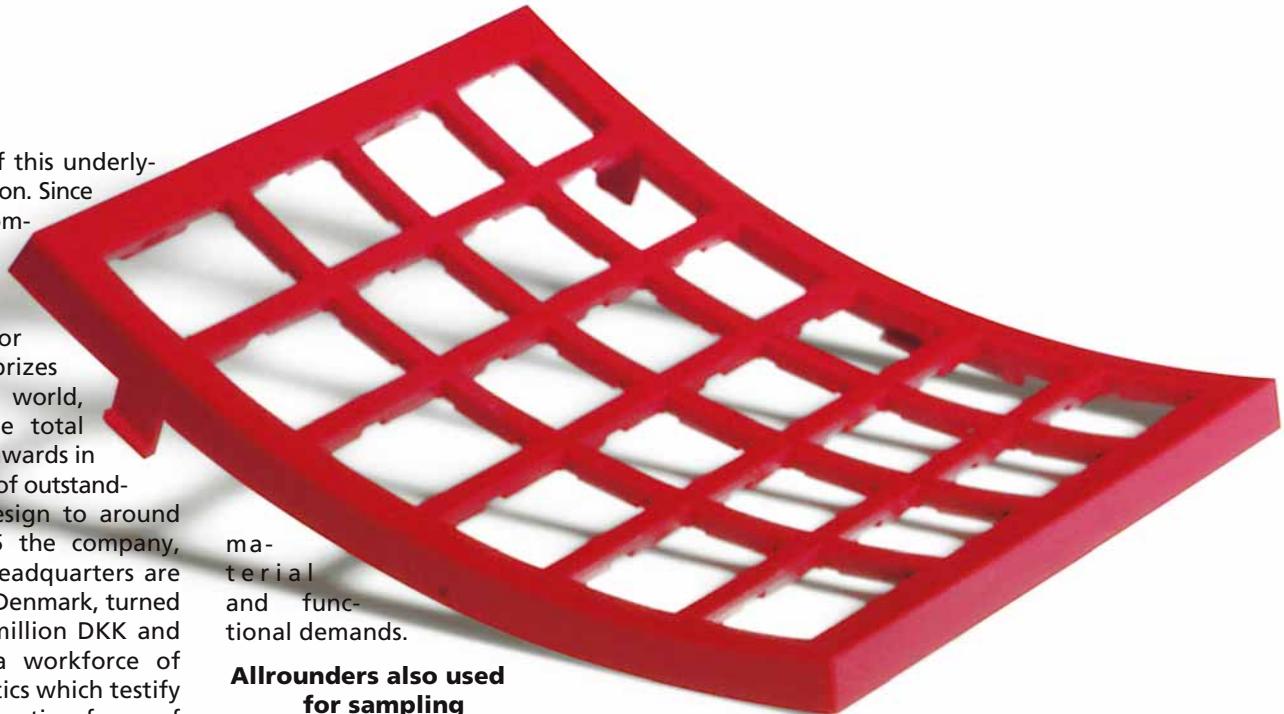
As a high standard of production quality plays a major role in the Bang & Olufsen philosophy, the company is not prepared to compromise when it comes to production engineering standards. For precision and surface parts, increased use is made of plastic components, which are not only economical to produce, but also comply fully with strict wear resistance and quality standards. ARBURG Allrounders feature largely in Struer in the clamping force range to 1600 kN. With 7 out of the company's total fleet of 27 injection moulding machines, ARBURG has supplied just under a quarter of the entire plastic processing machine outfit at B&O. The two companies not only look back on a development pattern which is similar in many respects, but also on a long history of cooperation. Bang & Olufsen's latest product, its BeoSound 9000 audio system, contains no fewer than 75 different plastic components, for instance. Each one is required to comply with the most stringent aesthetic,

material and functional demands.

Allrounders also used for sampling

This makes it all the more gratifying for ARBURG that all new parts in the clamping force range to 1600 kN are tried out and accepted using two Allrounders. This can only mean that the machine engineering standard produced by ARBURG complies in every respect with the company's highest quality demands. The spectrum of parts produced using the ARBURG Allrounders includes the keys and rear walls of the various audio system components, the covers of CD players, control panel display parts, precision

components such as gears for the panel opening mechanism and keypads, handsets and housings for B&O telephones. Engineers, designers and machine operators alike particularly appreciate the precision of the Allrounders in the manufacture of optical and display components which - as they are in full view - are required to comply with particularly stringent quality standards. The smallest part produced at B&O on ARBURG machines weighs just 0.1 g. It is used as an infrared lens on the remote control.



Minimal tolerances, visual perfection

Precisely because of their use in producing visible components, ARBURG Allrounders are required to conform to the very highest quality criteria. Only parts with minuscule production tolerances find their way to the assembly department. Added to this is the fact that only a minimal proportion of components are further treated, for example by painting. Wherever

ever possible, for ecological reasons this type of finishing process is dispensed with. The fact that Bang & Olufsen continues to work with Allrounder injection moulding technology from the Black Forest in the face of these extremely tight quality standards is the ultimate proof of ARBURG's ability to fulfil the most stringent quality criteria.



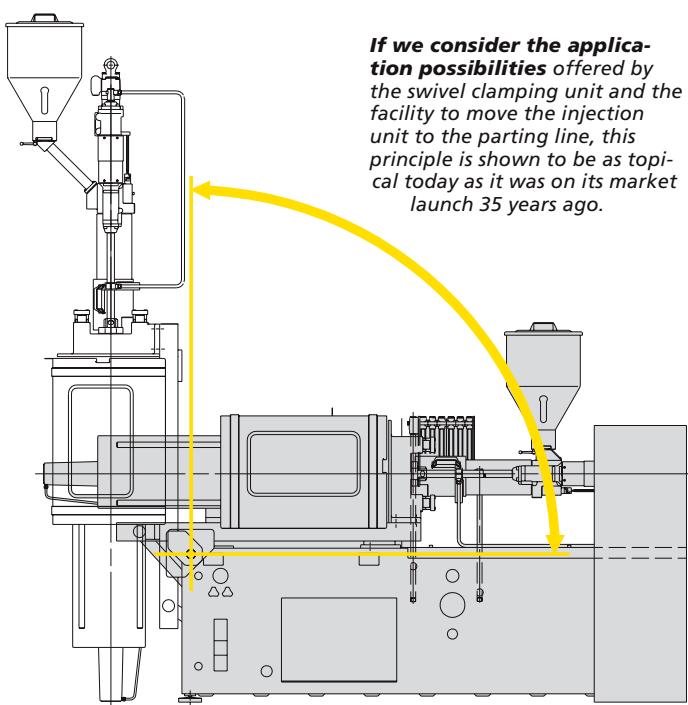
Seven in one

The Allrounder principle creates machine flexibility. Using just one Allrounder, only minimal ancillary costs are required to open up a range of different injection moulding techniques. This makes for greater economy in terms of machines and production, and reduces response times to new production requirements. Particularly for small and medium-sized injection moulding firms required to produce small batch sizes of quickly changing product quantities, an Allrounder U-version is a paying investment.



The name «Allrounder» to describe the ARBURG injection moulding machines was not chosen out of the air. It is based on the «Allrounder principle», which permits one machine to be used to produce a wide range of components in up to seven different «working positions».

If we consider the application possibilities offered by the swivel clamping unit and the facility to move the injection unit to the parting line, this principle is shown to be as topical today as it was on its market launch 35 years ago.

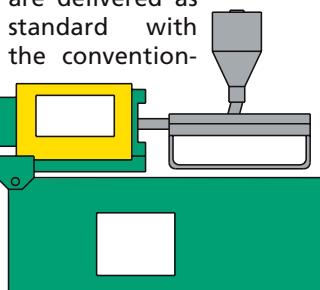


The «normal» working position of the Allrounder C, with horizontal clamping and injection unit and central injection through the fixed platen, can be transformed up to five times with the movable clamping and injection unit plus a further injection unit. A machine optimized in this way can be used to produce injection moulded parts in six different working positions. Added to this is an additional rigid machine construction with horizontal injection unit and a positive vertical closing mechanism. Each one of these working positions offers specific advantages needed

for the manufacture of certain injection moulded parts.

Working position 1

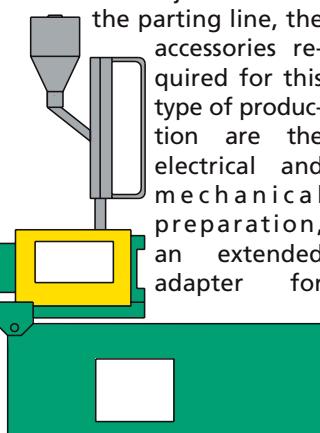
All ARBURG Allrounders are delivered as standard with the conventional



al working position. No further accessories are required for working in this position. All types of plastic materials can be injected using the relevant screw assembly.

Working position 2

Working position 2 with its horizontal clamping unit and vertically positioned injection unit is used for injection into the parting line. Alongside the device

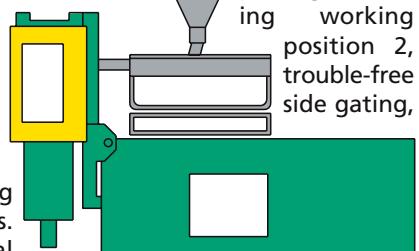


for injection into the parting line, the accessories required for this type of production are the electrical and mechanical preparation, an extended adapter for the granulate hopper and extended hydraulic pipes for the vertical injection unit, as well as the redirection of pipes. The benefits of this working position include simple side gating for long or flat moulded parts, linear mould filling, short gating distances for material savings, lower pressure loss, low-tension mouldings and short de-moulding distances. Anoth-

er important feature is that injection into the parting line generally permits the implementation of a simpler mould structure, which in turn means reduced costs.

Working position 3

The third working position operates with a vertical clamping and injection unit. This position is generally used when working with insert loaded parts. In this case, the material is injected through the fixed platen. This calls for operation with the so-called «U version» of the Allrounder C, whose clamping unit can be swivelled hydraulically around a 90° angle by means of a movable axis. The safety gate remains power-activated



more simple mould geometry, low-tension mouldings, linear mould filling and short demoulding distances. Added to these, the horizontal parting line permits convenient, reliable insertion of parts for coating without the possibility of slippage.

Working position 5

during the swivel movement, after which the fixed platen is located at the top and the moving platen closes from the bottom upwards. As in working position 2, an extended adapter for the granulate hopper is required. A particular benefit is the reliable and convenient insertion of insert loaded parts in the horizontally positioned parting line of the mould. Slippage of the insert loaded parts is not possible when closing the two halves of the mould.

Working position 4

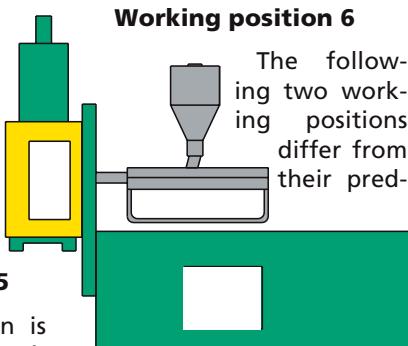
This working position is ideally suited for injection into the parting line when working with insert loaded parts. For this position, the machine needs to be fitted as a U-version, equipped with a lifting table for the injection unit, a device for injecting into the parting line and electrical and me-

chanical preparation for injection into the parting line. The benefits of this method are the same as those for conventional injection into the parting line using working position 2, trouble-free side gating,

wards. This configuration also requires the lifting table for the injection unit, the device for injection into the parting line and the electrical and mechanical preparation for injection into the parting line. The main benefit when working in this position is that the insert parts are loaded in the fixed half of the mould, so eliminating movement as a result of the closing stroke. The other advantages are the same as those for the customary parting line methods.

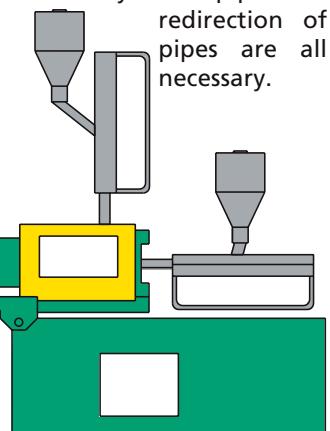
Working position 6

The following two working positions differ from their pred-



ecessors by their use of two injection units, which can also have differing injection capacities. The second injection unit is generally filled with a different material or another colour of the same material type. In this way, mouldings in two colours or two components can be produced in a single machine. In working position 6, the clamping unit remains horizontal. One of the units injects horizontally, the other one vertically into the parting line. Injection accordingly takes place both through the fixed platen and also into the parting line. Alongside the special control system required for processing two colours, here too the device for injecting into the parting line, the electrical and mechanical preparation, the extended adapter for the granulate hopper, the ex-

tended hydraulic pipes and redirection of pipes are all necessary.



Working position 7

Position 7 is used to coat insert loaded parts with two differently coloured plastics or two different materials. The U version of the Allrounder is fitted with a second injection unit, a special control system for two components or colours, a lifting table for the horizontal injection unit, the device for injecting into the parting line, the electrical and mechanical preparation and the extended adapters for the vertical granulate hopper. Alongside work with insert loaded parts, in this Allrounder position it is possible to manufacture pre-moulded parts in two colours or materials.

The Allrounder S in practical operation

Following the positive response to the presentation of the new S series last autumn, a large number of machines have already been supplied to our customers. To ensure a place at the forefront of developments, and to allow important conclusions to be drawn on the practical viability of this new modular concept, the today editing team (TR) decided to carry out an initial survey of customer reactions. A few representative users (*) were asked to fill in a short questionnaire. The answers given are presented to you here.

TR: Which machine size from the S series are you working with and since when have you been using it?

MA: We are using a 220 S.

HA: We have a 220 S 250-60 in use.

RE: We have been running a 220 S 250-60 with a total number of around 1400 operating hours.

RI: A 270 S since January.

TR: What application is your Allrounder S used for?

MA: Large-series technical injection moulding.

HA: Generally for all types of work occurring.

RE: Our application is large and small-scale technical injection moulding, as well as sampling. The machine has proven successful for all three application fields.

RI: For technical parts, sampling and small series.

TR: How do you assess the operating characteristics of the Allrounder S?

MA: Operation is generally good.

HA: Straightforwardly simple due to a very good control system.

RE: Operation is generally convenient and user-friendly. The height of the machine with mould in position is also very pleasant to work with.

RI: New philosophy, but still easy to operate.

TR: Did the machine's modularity and the resulting individual configuration possibilities influence your purchase decision?

MA: Yes, these are excellent!

HA: The machine was put to the test by ARBURG. A definite "yes!" for the future.

RE: We consider modularity and the resulting individual configuration possibilities to be important. It simplified our purchase decision. This is definitely some-



thing that should be retained.

RI: The parting line device is still missing on the machine.

TR: Would you welcome this type of machine concept also in other clamping force categories? Would you then replace your old machines by new ones? Up until which size category do you think this versatility of the machine structure would be useful?

MA: Up to 370 kN. Then we might well replace our older machines.

HA: Definitely! Up to 80 tons.

RE: Other clamping force categories should certainly be implemented. When replacing old machines, a large number of factors play a role, which is why this question is not so easy to answer at present. But you may be interested to know that we are currently in the process of replacing

our old machines for newer models. This is why we have already placed our fifth machine order with you. The size category should range at least between 25 and 150 tons, and should be developed as soon as possible. Our investment program is certainly leaning towards the S machine.

RI: To your first and second question, the answer is definitely "yes". And we also believe that the complete ARBURG range should profit from the same degree of versatility.

TR: What do you think of the new control philosophy and structure? Do you consider machine operation with access to user graphics to be beneficial?

MA: Positive experience with the control system. The user graphics offers a number of advantages such as error detection, integral monitoring, switchover point.



BUKUMA
Kraus & Co
GmbH KG
Boppard
H. Hartmann

*(HA)



Walter Fossler
Techn. Kunststoffspritzteile und Formenbau
Mahlberg
H. Retzlaff

*(RE)



Marquardt GmbH
Geräte und
Mikroschalter
Rietheim-Weilheim
H. Marquardt

*(MA)



Günther Riel
Gmbh & Ko KG
Kunststoffverarbeitung
Oberderdingen
H. Riel

*(RI)

HA: Our first impressions in this brief period are very positive.

RE: Our impression is that the complete control system is extremely easy to operate, clearly arranged and completely in line with the state of the art. However, at present, the user graphics is not used much. Time will tell how this develops in the long run.

RI: Far more user friendly! The user graphics represents a major benefit.

TR: How do your staff assess the new Allrounder S? What is your experience with everyday practically-oriented work with the machines (mould changing, operation etc.)? How many work cycles has your Allrounder S already performed?

MA: Generally a serviceable machine, with scope for further improvement. 400,000 cycles.

HA: My staff are amazed at the versatility of the control and operating possibilities. Resetting is quick and simple to perform.

RE: As the machine has only been in operation in our factory since July, it is too early to make any definite comment. But the general response of our setters is positive. The machine met with an enthusiastic reception. Even during commissioning, we discovered how pleasantly quiet the machine is.

RI: We appreciate the new, more user-friendly philosophy. Initial hesitation was soon overcome.

TR: Tell us what else occurs to you about the Allrounder S: What are your personal impressions and experiences? Do you have suggestions for improvement? Would you like even broader scope for individual intervention and configuration?

MA: The screen dazzles somewhat and takes a while to warm up. Not enough clearance at the nozzle. Manual injection is difficult, manual setting for nozzle contact poor.

HA: I consider this to be a highly successful machine design. I am particularly interested in being able to follow

the injection and holding pressure process at the screen. No need for other intervention or configuration possibilities. A lot of space on the clamping side. Very quiet. I think the control system offers scope for further upgrading.

RE: Despite our very positive impression, we wouldn't want to miss this opportunity to make a few suggestions for improvement: The cover plate under the injection unit should be improved in the area when the hot material is injected (additional thick corrugated sheet). A small opening with lid should be integrated into the cover plate over the oil tank. Currently, the whole lid has to be screwed off to top up the oil. We find the possibilities offered for intervention and individual configuration to be perfectly adequate.

RI: Our personal experiences with the machine are very positive. Our suggestions for improvement: The hoses of the water battery should be displaced; Protection of the nozzle cover; Greater recess in the protection cover (Robby). And particularly important: More extras as standard (e.g. printer interface).

Remarks by the today team:

Needless to say, we have discussed this survey with our development department. We are pleased to be able to inform our readers that many of the suggestions originating from the S users have already been implemented. A new active luminous TFT LC monitor is now in use. There is also an optical solution for the cooling water manifold in the cable channel. The design of the area under the injection unit has already been revised. As you see, we do take your ideas and suggestions very seriously. We would like to thank all those whose constructive criticism helped us turn the Allrounder S into a more user-friendly machine.

TRAINEE PROJECT

Training with team spirit

What is the most best way to bring it home to trainees from different company divisions that interdisciplinary cooperation during order processing leads most effectively to the desired objective? By having them process a joint project in the company as if they were running a small company of their own. A milling machine in the mechanical engineering trainee workshop provided the ideal subject. The objective was to reduce its noise level by means of an overhaul and rebuilding program. The project group was made up of two technical draftsmen, two industrial mechanics, two power electronics engineers and two trainee managers, and worked over a total period of several weeks to complete the task.

Initially, the trainees were presented with a theoretical rundown of the group work concept, and the team organization was defined. The group's task was to detect machine defects under its own responsibility, and to work jointly towards a problem solution.

After the "machine check", the team recognized that a damaged pulley and a shaft needed to be renewed. To solve the problem, either the old pulley had to be repaired or a new one produced. In addition, the shaft stump required a new cylindrical grinding process.

After recognizing the problem and defining the objectives, the necessary work was delegated among the group members. The power electronics engineers and the industrial mechanics together dismantled the machine, removed the motor and cleaned it. The drive shaft was taken to the grinding shop for cylindrical grinding.

While the industrial mechanics were involved in the production of spares using standard drawings from the technical draftsmen, the power electronics engineers designed an experimental circuit to be used later for testing the motor. Spares which were unavailable were externally ordered by the trainee managers. An overall account was kept of the material and labour costs. Within two weeks, all the spares had arrived, been produced or reworked, and the machine had been reassembled. The group had been highly successful in achieving its objective of reducing the noise level.

ARBURG places particular emphasis on this type of practical planning exercise, which allows trainees to fit in easily with team work situations later in the company. An unbureaucratic, linear-structured system of group activity all around the company creates an ideal basis for trouble-free cooperation. This helps promote fast, efficient order processing, which in turn benefits all ARBURG customers.



CD times two

There is no other field of injection moulding currently developing with the same dynamic impetus as that of CD injection moulding. New methods of impressing and playing the metalized disks are revolutionizing production techniques.

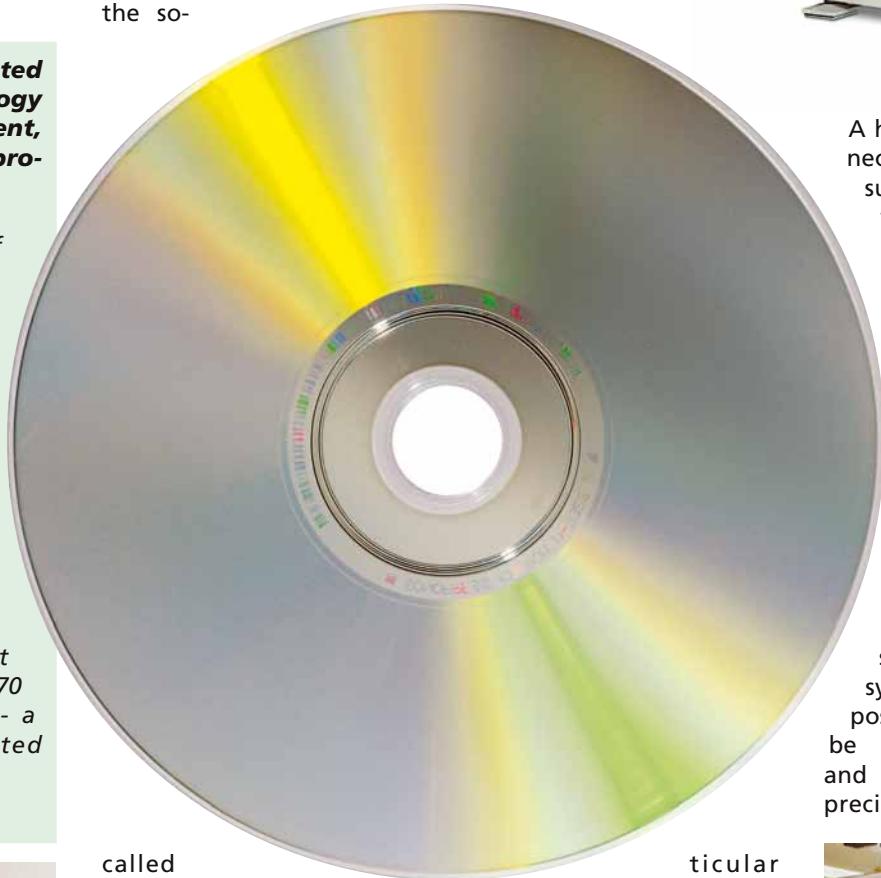
A concrete example of this is the simultaneous manufacture of two CD blanks in a single mould on one machine, the so-

tion» of CDs is used primarily in cases where large piece numbers are required.

A par-

Tried and tested Allrounder technology for highly efficient, precise high-tech productions.

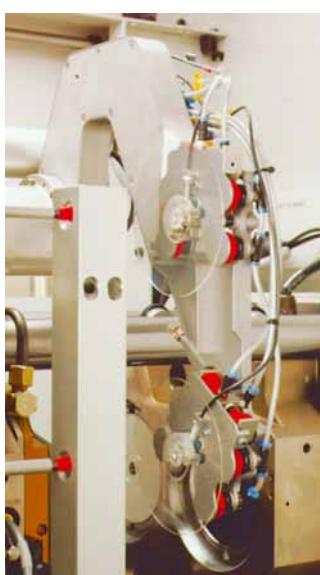
The technology of the latest CD Allrounder is based on the familiar features of the previous single cavity machine. However, the version modified for the «twin cavity technique» is an Allrounder 270 CD 500-200 with a 100 kN greater clamping force and - in contrast to the single cavity 270 CD 400-90 machine - a performance-adjusted injection unit.



called «twin cavity» technique. Some weeks ago, ARBURG delivered the first C Allrounders to operate with this type of twin-cavity mould.

The «twin cavity injec-

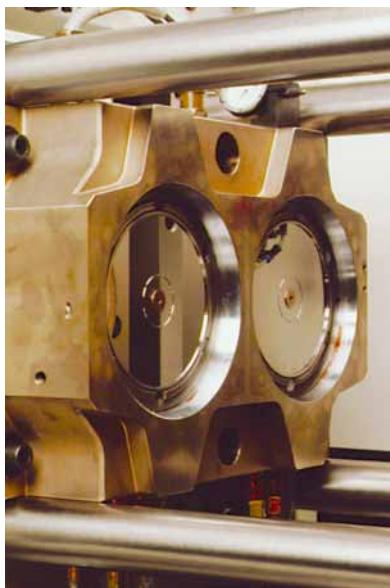
ticular benefit here is that although the total production time of around 5 seconds for 2 CDs is low, the cycle time per CD is increased sufficiently to exert a positive influence on the production quality.



The Waldorf handling system has been fitted with a modified demoulding arm for twin cavity work.



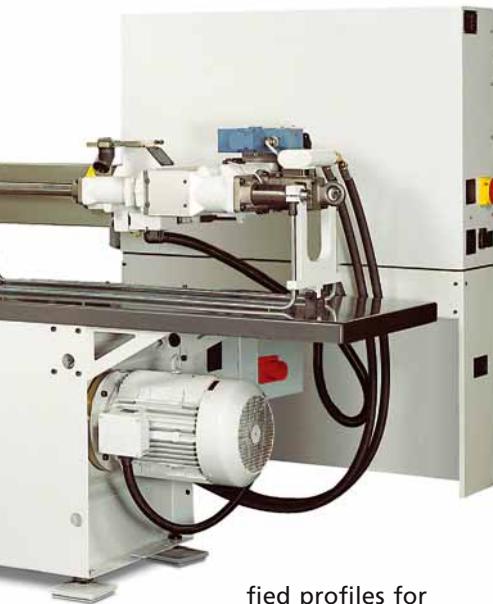
A hot runner system connected to the mould ensures optimum material flow from the injection unit to the cavities. The complete system is regulated by the machine control. The screw of the injection unit is governed by a position regulating system. Pressure is applied to both sides of the injection piston and the screw location ascertained by the stroke measurement system. This allows the position of the screw to be precisely determined and regulated, and also precise adherence to speci-



ARBURG SUBSIDIARIES

ARBURG now runs its own subsidiary in the Czech Republic

ARBURG's branch network in Eastern Europe now boasts another subsidiary: This time in Prague. The new support centre will be serving both the Czech Republic and Slovakia. In view of the current market potential, but more importantly still the potential for further growth in this up-and-coming region, ARBURG realized the urgent need to develop its own efficient sales and servicing structure, including a comprehensive stock of spares, qualified servicing technicians and experienced engineers and consultants on site. ARBURG can call not only on the headquarters in the Czech capital, but also on a technical office in Brno, in order to ensure greater proximity to customers in the south of the Czech Republic and in Slovakia. Alongside a fully equipped spare parts warehouse, the Prague premises also feature a demonstration room containing several Allrounders, a training area and an administrative complex, which communicates online with the Loßburg headquarters. A seven-strong team - two of them service technicians in Prague and Brno - will be looking after ARBURG customers in the two countries. Two service vehicles equipped to a high standard with spare parts and measuring instruments will be available for after-sales servicing work. In line with the importance of this emerging market, a continuous expansion of the workforce is already planned over the coming years.



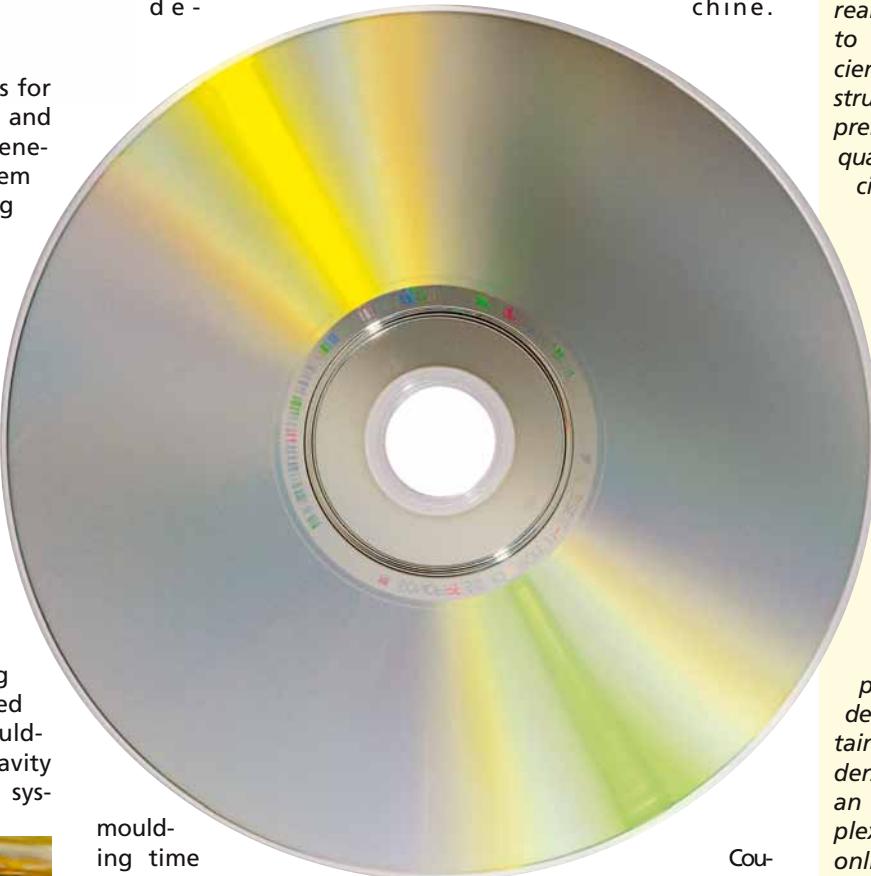
fied profiles for the injection speed and holding pressure. The benefits offered by this system include an outstanding dynamic response and optimum repeat accuracy; factors which are brought particularly to bear in the manufacture of CDs.

Freely programmable inputs and outputs ensure trouble-free operation even when using different moulds. The core pull control can also be used to run other mould functions.

The Waldorf handling system has been fitted with a modified demoulding arm for twin cavity work. The mechanical sys-

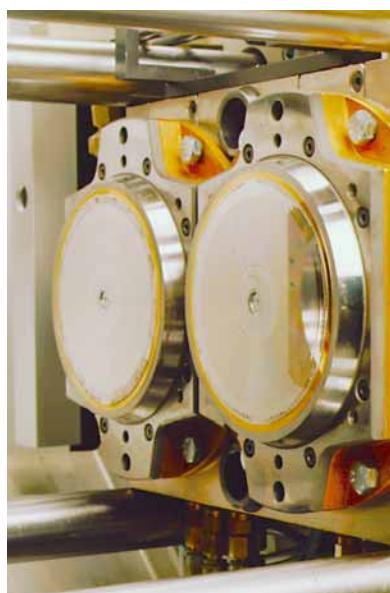
tem operates with a sprue monitor, and swivels around the upper tie bar of the clamping unit. The handling system fits completely under the safety guard of the Allrounder 320 C so compactly that the machine requires only a comparatively small footprint. The de -

the sprues and then drop them via a rail into a storage container. The compact design and relatively small footprint of the Allrounder 320 C are the result of optimum integration of all external components such as temperature control unit, handling and handling control system in close proximity to the machine.



moulding time required for two CDs is around 0.4 seconds. The central sprues are disposed of before further transport of the CDs by means of two suction cups which first pick

Coupled with the fast cycle times which can be achieved, this optimized Allrounder C is ideally suited for top quality, reliable CD production.



Twin cavity injection of CDs is used primarily where large piece numbers have to be produced.

UK subsidiary well out in front - not just with ISO 9002!

ARBURG Ltd. in Royal Leamington Spa was privileged to receive a very special award in March 1995. The English subsidiary of ARBURG was not only the first ARBURG support centre worldwide but also the first English trading company overall in the entire injection moulding machine sector to be awarded the much sought-after certification to ISO 9002. However momentous the occasion, though, ARBURG Ltd. sees this as simply another step towards the goal of safeguarding our market position as one of the most important injection moulding machine suppliers for England and Ireland.

1993 saw the replacement of the previous agent by the company's own subsidiary in Leamington Spa, representing an investment of around 1 million pounds for ARBURG. A sales and service centre was built over an area of more than 17,000 sq. metres, encompassing not only administrative and training facilities but also a state-of-the-art spare parts warehouse and a generous demonstration room with mould test centre.

At the recent opening ceremony, managing director and chairman of ARBURG Eugen Hehl elaborated on the reasons for ARBURG's decision to move into the UK market with its own subsidiary, citing a comparatively large body of regular customers and correspondingly impressive sales figures. This, he stressed, meant that the need for a separate sales structure and efficient marketing was imperative.

ARBURG Ltd. is currently in regular contact with a core of over 800 key accounts, and looks back on total Allrounder sales exceeding the 3,000 machine mark. So it comes as no surprise to hear that English and Irish ARBURG custom-



Subsidiary manager Frank Davis accepts the ISO 9002 certificate

ers everywhere greeted the establishment of an easily accessible outpost in Leamington Spa with considerable enthusiasm.

ARBURG traditionally takes good care of its customers in this part of Europe. The shelves at ARBURG Ltd. are filled with some 2,400 different spares, which arrive at the

customer's premises within 24 hours of an order at the latest. In the unlikely event that urgently required components are not in stock, they can be requested immediately on line from any of the other ARBURG subsidiaries or the Loßburg head-

quarters. The company's own eight service technicians now dotted about the UK ensure an highly efficient support back-up. All the technicians employed have received in-depth training in Loßburg and are intimately familiar with all the

with all the necessary learning equipment, different types of courses are held and hands-on tuition provided at the machine. Information on course dates is available in the annual training schedule. In 1996, this was supplemented, for example, by a separate course entitled "Introduction to plastics processing".

This year, Frank Davis, Stephen White (Finance), Kenneth Dodd (Sales) and Robin Hambrook (Service) of ARBURG UK are intending to cause something of a stir: By participating in the "Interplas '96" in Birmingham from 10 to 14 November, the company will be planting its flag very firmly on the island to underline its position as a leading manufacturer in the field of modern injection moulding technology.



**Frank Davis,
Subsidiary manager**



**Stephen White,
Finance**



**Kenneth Dodd,
Sales**



**Robin Hambrook,
Service**

struments valued at around 30,000 pounds.

A customer training scheme completes the customer service back-up offered by the English ARBURG support centre. In the training centre, which is fitted