

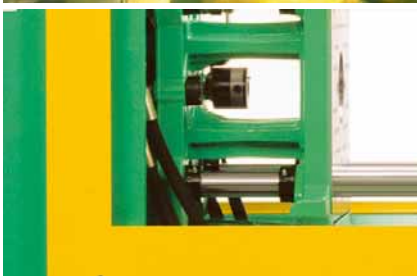
ARBURG

today

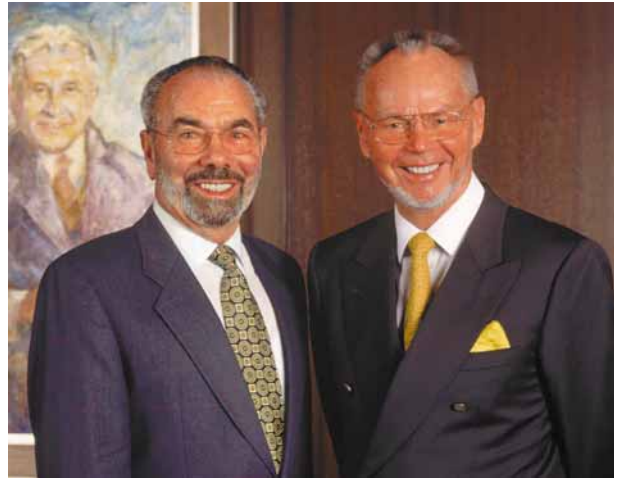
Number 9

Autumn 1998

Special K '98 Edition



K-Special K'98: Let us show you!	3
K-Special Limiting ourselves to the essential Injection on a large scale	4-5
K-Special Logical extension concept THERMOLIFT 100-2 Clean air A "good turn"	6-7
K-Special Modern central control station Excellent cards	8-9
K-Special Specialists in format Quick clamping system Universal application of SELOGICA	10-11
K-Special Interview: "ARBURG is fully prepared"	12-14
Jubilee Family Day	14-15
User report Production that saves lives	16-17
User report Oberhofer: Production at world champion	18-19
Tech Talk 99 Percent of problems solved	
ARBURG subsidiaries España: Proud of its success	20



"K" time is here again already! For the present, the centre of the world (as far as plastics processing is concerned) is without doubt the trade fair halls in Düsseldorf.

Here at ARBURG, in our Jubilee year, we have been working towards this event in a concentrated fashion, and we are quite convinced, on the basis of our long and well founded experience, that we will be able to present to you our very best products during the Düsseldorf fair, with innovations which will continue to demonstrate their usefulness long after the K Fair and the flood of information associated with it.

The fact that ARBURG always arouses interest at the K Fair has long since come to be expected. Visitors to the fair can be sure to find the same this year also: with our current programme, we are moving into a new dimension.

At the trade fair, this will be clearly evident from afar: with our new stand, we are pointing the way to the future, in every respect. Our new machine design and the modern fully co-ordinated colour scheme will certainly catch your eye. At ARBURG, we are certainly "Allrounders for the future"!

So you will see (in the truest sense of the word) that there is much that is new at ARBURG. In this special K Edition, we want to present these innovations for your closer attention – innovations which will certainly repay closer examination both during and after the K Fair.

We hope that you will greatly enjoy the information in this K Edition of "ARBURG today"


Karl Hehl


Eugen Hehl

K '98: Let us show you!

All roads lead to Düsseldorf, where the world of plastics puts forward its best side.

At the K'98 itself, all roads lead to the ARBURG stand, where you will meet the technology of the future. We remain true to this claim in this 75th Jubilee year of the Hehl family company. Judge for yourself!

Naturally, the editorial team of ARBURG today are also geared up to K'98. On the following pages we offer you a compact overview of highlights from ARBURG. Take a close look at our programme innovations, both at our stand and also in "ARBURG today" – you will find it well worth while!

You will certainly be able to use this trade fair edition on many occasions – both for information during your visit to our stand, and as a valuable aide-memoire after the fair.

We hope you will enjoy this edition.

JUBILEE



Limiting ourselves to the essential

At ARBURG, the number of machine series in the programme is constantly being reduced, while the flexibility and individuality of ALLROUNDERS is being increased. How this actually works is shown by the example of the new maximum size ALLROUNDER C JUBILEEs with 570 mm mounting size and the new injection unit (see report alongside). Limiting the programme to machine series with rational extension levels provides more alternatives, not fewer – provided that the combination possibilities of the technical components are “internally” compatible.

Common basis, variable assembly

A larger mounting dimension, increased clamping power and a new, powerful injection unit characterise the 570 C JUBILEE as a new ALLROUNDER class. With this new size, shown for the first time at K'98, the company is moving a step further in the direction of the medium size machine segment. This is a process which has been continuously accelerating over the last ten years, starting with the 370, continuing with the

420 and 470, up to the 520 mounting dimension.

Two different variants are available. The smaller model is offered with 2000 kN clamping force and the tried and tested 675 injection unit, the larger model with 2200 kN clamping force and the new 1300 unit.

Adapted to requirements

In addition to the new platen layout and dimensioning of the clamping unit, together with the increase in clamping force as compared with the 520 size, the hydraulic system has also been adapted to requirements. For lower clamping forces up to 2000 kN, technology level T1 with one regulating pump for serial machine movements and controlled build up of mould clamping force is available as standard, while the larger ALLROUNDER with 2200 kN

operates ex-works with a more powerful hydraulic system (extension level T3) and three regulating pumps for machine movements or maintaining pressure, so that extended simultaneous and rapid movements can easily be carried out.

A new development is the 1300 injection unit, used for the first time on the 570, and available with screw diameters of 55, 60 and 70 mm, enabling moulded part weights of up to 740 g/PS to be achieved.

All machine functions are centrally controlled with the SELOGICA control unit. A range of equipment packages for extended functions provide individual operational performance modifications.

As an alternative to the graphics-based SELOGICA, the known DIALOGICA user shell is also available to customers. This is of



Since the new ALLROUNDER series K, C JUBILEE and S are in practice now only based on one basic machine with modular extension possibilities, the “old” type of structure has largely been abandoned. Thus there no longer exists the special machine with the special mounting surface, injection unit, clamping force and hydraulic system, and instead there are several rationally configurable alternatives made up from these components.

interest to customers who already use other ALLROUNDERS with DIALOGICA in their production systems. Operating ergonomics and options are in principle the same for both SELOGICA and DIALOGICA.

Modular technology makes ALLROUNDERS more flexible

As a result of the "internal" modularity of the current machine programme, a logical streamlining of model series has taken place within ARBURG. With the ALLROUNDER models reduced to three, and a universal control system concept, all customer-specific production requirements can now be met in full. Indeed, they are more than fulfilled: the combination possibilities within each machine series, viewed overall, provide even more individual adaptations to customers' production requirements than hitherto.

The philosophy behind this is clear. Each programme extension provides a multiplicity of possible machine variants, which provide every customer with a choice of equipment hitherto unavailable, and at an economic price. This all goes to show that the old saying "Less is more" has lost none of its relevance.

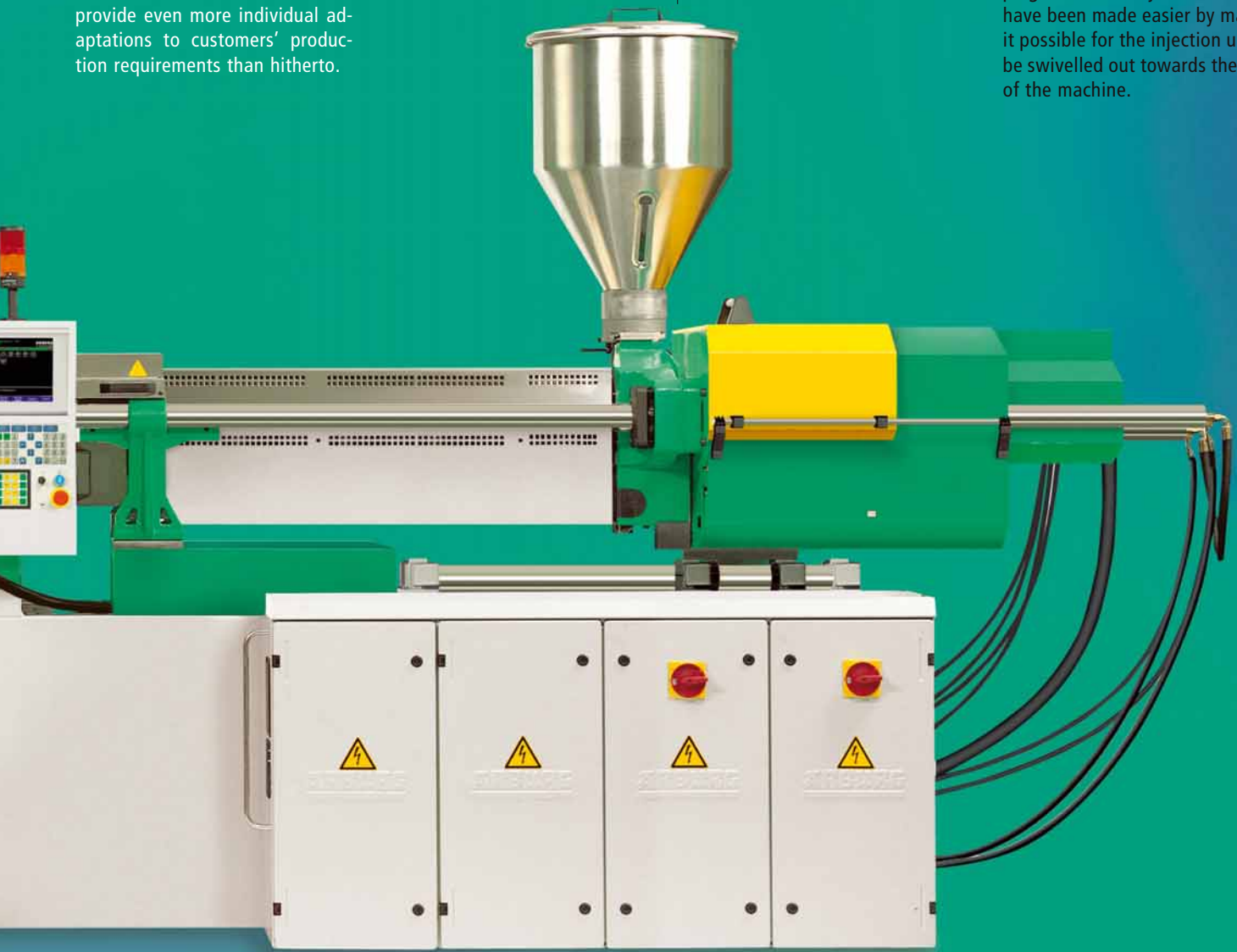
Injection on a large scale

The Euromap size 1300 is the designation used for the biggest and most powerful injection unit in the ARBURG programme.

This size has been developed for the new ALLROUNDER 570 C JUBILEE and is available with screw diameters of 55, 60 and 70 mm, enabling moulded part weights of up to 740 g/PS to be achieved. The remaining features correspond to those of the smaller ALLROUNDER injection units.

There are also three different cylinder modules, several hydraulic extension stages and up to three levels of upgrading for cylinders and screws for the 1300 unit. The standard version has injection control with a closed regulator circuit, and position regulation and injection process regulation are also available as options. In addition, cylinder modules for special injection moulding processes such as Duroplast, LSR or powder material will be available in the future.

The heating of the cylinders is programmable via the SELOGICA and is self-adjusting. The screws of the module are connected with the injection unit via a rapid action coupling, and the supply lines are connected via a central plug. Disassembly and cleaning have been made easier by making it possible for the injection unit to be swivelled out towards the back of the machine.



Logical extension concept

ARBURG is pursuing its logical extension policy in the areas of performance and size as well as in the field of control technology. An outward sign of this development is provided by the presentation of the ALLROUNDER S (the largest yet) at the K '98 in Düsseldorf. With this presentation, ARBURG's future direction as regards modularity will also become clear.

For in this matter also, customer orientation and practicality are the first priorities. This quite simply means that size gradations and modularity are restricted to realistic technical combinations. Not everything that seems to be possible actually serves any useful purpose.

470 S: New size, selective combinations

Clamping forces of 1000 and 1300 kN, combined with mounting dimensions of 420 and 470 mm, characterise this new size 4 of the ALLROUNDER S series, representing the first step in the direction of practicable modular combinations. The remaining features, grouped under the heading "selective modularity" and already realised as a logical development in the other sizes, together with the innovative colour scheme, are naturally retained in full.

Sizes 3 and 4, for example, correspond entirely with each other with respect to the technical levels of the hydraulic system. The standard extension level T1 (hydraulic system with one regulating pump for serial, regulated

machine movements and programmable regulated build up of mould clamping force) is complemented by the optional extension levels T2 with two regulating pumps for regulated machine movements and manually adjustable clamping force and T2 with two regulating pumps and servo-regulated clamping unit. Simultaneous drive movements are possible with both variants. The highest level of equipment in this area is technical level T3, which provides rapid, extended simultaneous drive movements, since up to three regulating pumps can be used.

Clamping unit: New arrangement of the hydraulic system

The two clamping cylinders are arranged in the same way in sizes 3 and 4: the vertical position was selected in order to improve the accessibility of the ejector and the unscrewing device. There is now more space, even for more complex moulds with extensive peripherals.

As far as control technology is concerned, there are no new developments in the big ALLROUNDER S machines. Indeed, this is all to the good, since the highly practical, powerful input concept of the SELOGICA is available on all ARBURG machines from K'98 onwards. Complex production sequences are transparent and therefore easy to operate. The basic version with graphic sequence programming and actual value representation of the injection process can be extended by means of several additional modules depending on the order in hand, so that the control technology of the S machines is also selectively modular.

Three injection units, many combinations

A total of three injection units – 150, 350 and 675 – are available on the 470 S machines. The three units available for size 4 machines can each be fitted with three different screw diameters, several hydraulic system extension levels and up to three wear



resistance grades for cylinders and screws. As an alternative to the central fixed injection position, the horizontally freely displaceable injection unit is optionally available also for the two new machine sizes.



The technical details of the various machine components described above provide a wide variety of combination possibilities which make the big ALLROUNDER S machines just as flexible and individually configurable as sizes 1, 2 and 3. ARBURG offers its customers a modular machine concept throughout its range, offering various technical alternatives where these are really needed and making it easy to implement adaptations of machine configuration to current operational requirements. Fully integrated within this concept is the SELOGICA

control system, which provides an individual user shell for all machine sizes by means of various optional equipment packages.

Many years of development work at ARBURG have resulted in a modular system which is practice-orientated to the highest possible degree. The system is sufficiently flexible for customers to be able to put together "their" ALLROUNDER with the technical alternatives available, but also sufficiently restricted for impractical configurations to be excluded from the outset. This philosophy is found throughout ARBURG's machine programme, in the SELOGICA control system with its automatic validity check as well as in the C JUBILEE and K ALLROUNDER series.

Thus "selective modularity" is enjoying a corresponding success on the machine market, since it is oriented towards the needs of the producer, offering optimum solutions at an economic price.



Clean air

Low dust levels in the air are essential for the production of various kinds of plastic parts, e.g. in medical technology.

To enable customers to achieve this production atmosphere, ARBURG offers a clean room cover, the Flow-Box, as an accessory for the ALLROUNDER S. The Flow-Box generates a laminar air stream in the interior of the clamping unit by drawing in air from outside through a fan.

The air is fed into the clamping unit through a filter. This leads to a slight overpressure in the clamping unit which effectively



prevents dust particles entering the clamping area of the machine.

The optional cover is simply placed on the machine, the only necessity being divided safety gates. The filter can be changed very easily through the bipartite top with snap closures.

THERMOLIFT 100-2

The THERMOLIFT 100-2 provides the optimum solution for problems such as water absorption or deposition on plastics granulates or pourable ground material for the processing method in question. The THERMOLIFT 100-2 operates on the basis of convection drying with the heated air circulating through the granulate, so that the drying processes can be carried out in the shortest time possible. A dry air unit is available as an option.

A "good turn"

The application of the SELOGICA control concept to all machine series means that the advantages of the SELOGICA can be used on rotary table machines also.



Without the need for any special control unit, the operator is fully in control of this entire sequence via the SELOGICA. Particularly interesting are the clear recognition of relevant machine sequences and the possibility of direct access to special rotary table functions. Both fixed and "travelling" functions (e.g. "unscrewing from station 1 to station 2") can be programmed and monitored.

The rotary table carries two stations with "180° forwards / backwards" movement as standard. However, there is also an optional 3-station version operating by continuous rotation. The horizontal operating position is intended for the series production of inserts.

The safety of the machine operator is guaranteed by two independent safety gates which render access to the moving rotary platen and the working area of the machine impossible. ALLROUNDER rotary table machines have clamping forces of between 400 and 2000 kN with table diameters of 900, 1200 and 1500 mm.

Modern central control station

During the K'98 there will be new ALLROUNDER technology, new machine sizes and special applications to see at the ARBURG stand. A decisive transformation has been carried out with the presentation of the 221 K toggle lever machine

By equipping this series with the SELOGICA control unit, ARBURG now has a control concept throughout its programme which fully covers all technical and customer-specific requirements.

The future of control technology with ARBURG is thus clearly shown: the company is presenting its customers with a universal user shell for all machine series, combining ergonomic considerations, transparency and ease of handling in an optimum form.

The advantages of this unifying measure are clear to see: simple and safe handling of complex machine technology, no more re-orientation on the part of the operator, reduced expenditure on training, a universal database which can be exchanged between different machine series, and more effective service.

221 K: Toggle lever technology with the latest control system

This general unification of control technology has been completed by equipping the toggle lever machines with the SELOGICA control unit, thus providing these ALLROUNDERS also with a clear advantage as regards performance, precision and universality in use. As has long been ARBURG's excellent tradition, the sophisticated technical components on which customers can depend have been retained, such as the hydraulic toggle lever mould closure with central grease lubrication, and the design of the injection units as closed systems with central supply.

The drive concept of the S series, with a regulated variable displacement pump for carrying out serial, regulated machine movements, has been taken over into

the ALLROUNDER 221 K, so that the injection unit is also regulated as a standard feature and the nozzle contact force is programmable. Two different performance variants, with 5.5 or 7.5 kW motors, are available. The free connections of the cooling water distributors are extendable in pairs up to 8, and can either be adjusted manually or, alternatively, are obtainable as regulated.

The mould closure is the same as for the 221 M.

Two machine types

With the injection unit, two performance variants are offered in Euromap sizes 75 and 100, so that the ALLROUNDERS 221 K 250-75 and 221 K 350-100 are available with clamping forces of 250 and 350 kN.

All the known options from the 221 M, including the swivelling



clamping unit (U version) are also available for the new 221 K.



SELOGICA: Advantages with toggle lever also

With the universal control concept, powerful, intelligent, and above all, transparent machine management is now possible throughout all ARBURG machine series. The SELOGICA control system with LCD colour monitor supports the universal use of the toggle lever machines by means of a number of equipment variants, in much the same way as with the ALLROUNDER C JUBILEE and ALLROUNDER S machines.

In all, six option packages are available, making the operation of ALLROUNDER K machines even more extensive and convenient. The "extended monitoring" functions control the position of the mould and the injection pressure. With the "extended drive movements" option package, the number of drive stages for sequences of all kinds (e.g. mould, ejector or core pull) can be freely selected. The extended editor function contained in this package provides more extensive and convenient access to the machine sequence.

With the "production control" package, machines can be individually switched on and off, with temperature reduction and pre-heating and also starting up and terminating automatic production. Greater ease of operation is also provided by the "optimisation / user help" package, which serves to adapt the ALLROUNDERS to the relevant operational requirements and includes freely programmable parameter pages and additional settings possibilities for times and units.

The "quality control" package is interesting. This enables the quality monitoring and process analysis available as standard to be extended. Error evaluation,

automatic reference value determination and extended graphic controls are important key words. The "documentation" package summarises actual values which are relevant to quality and machine-activated changes.

More flexibility with a common control system

The example of the options packages provides a very clear view of the advantages arising from a uniform user shell. Not only do the extended functions have the same names throughout the machine series, but also the handling is in principle the same. Thus the machine operator immediately knows which function keys he has to press to achieve the desired result, whether he is using an ALLROUNDER K, C JUBILEE, S or V. Internal costs of training or courses are thus minimised, setting up processes are carried out more effectively and the control equipment is optimally suited to the current application.

Thus the proverbial versatility of the ALLROUNDER machines will in future no longer be achieved by a variety of control equipment, but rather by a single operating concept covering all machines with features adapted as necessary to machine technology and customer requirements. With these advantages, the system is clearly pointing towards the future with increased flexibility. It says much for the company that this kind of "quantum leap" in the machine programme has been introduced at a steady but gentle pace.



Excellent cards

With the SMARTLINER 800, a total solution from ARBURG and Axxicon Molds, chip and smartcard blanks can be easily mass produced by the injection moulding method.

The manufacturing cell comprises the machine with SELOGICA control unit, removal equipment, conveyor belt, fully automatic storage with alternating system and the mould. 800 card blanks can be produced per hour with this manufacturing cell.

As far as small series are concerned, it is interesting that the mould can be changed in a few minutes simply by exchanging the mould inserts. In addition to simplicity of material handling, the production line has the advantages of minimum space requirement, absolute dimensional accuracy and high reproducibility.

The manufacturing cell is fully automatic, and the cards are removed with a robotic handling device integrated into the machine. This device operates pneumatically and is programmable by the SELOGICA control unit. The entire cycle time is less than 4.5 seconds. At the end of the cooling section is the storage unit with automatic alternation of magazines. Laser inscription, for example, can be carried out on the cooling section.

Depositing the card blanks in the magazines enables further processing to be carried out automatically without any problems.



Specialists in format

The ALLROUNDER principle, whereby a machine should be capable of being used for as many different applications as possible, is more relevant than ever at ARBURG. This applies not only to the machine technology, but also to the universal SELOGICA control unit, which provides a rapid and safe solution to complex production orders.

This can be clearly seen, for example, in the latest two-component machine in the ARBURG programme, the ALLROUNDER 320 S 500-150/60, which can be seen on the company stand in Düsseldorf. The basic features of the "S" series, such as modular design, high performance

SELOGICA control system with options packages providing extended functions, small floor area due to compact external dimensions and extensive peripheral integration, are also advantages of machines with two injection units.

Without a doubt, however, one of the most important points is that the SELOGICA control unit does not require any further extension for processing two components. For this reason, increasing the previous range of machine variants to include versions with two injection units was seen as desirable.

The ALLROUNDER 320 S is available in a two-colour design with 350 and 500 kN clamping force. Six different combinations

of injection units can be made up, sizes 60, 150 and 350 being offered for horizontal injection and 60 and 150 units being offered for vertical injection.

Technology following customer requirements

The length of the clamping unit has been increased. There is now space for the entire hydraulic system with two servo-regulated main pumps and an additional

servo-regulated pressure holding pump, which is standard in this design for two-component processing. The hydraulics module and the actual machine base are separate. The moveable mould platen with drive cylinders set back leaves plenty of space in the area of the clamping unit, and is also supported on the machine base, ensuring high rigidity and optimum guiding characteristics of the entire structure. The parting line device for taking up the



vertical injection unit is located on the two upper cross beams of the clamping unit and can therefore be altered by horizontal displacement to suit any mould configuration. Extending the cross beams by 100 mm has made it easy to insert even complex 2K moulds with extensive peripherals.



Two component and modular technology

The ALLROUNDER 320 S provides its users with the latest ARBURG machine and control technology for processing two different materials or colours. This means an advantage not only in terms of versatility in use, but also, above all, in production transparency and overview, due to the simplicity of installation and operation. The selection possibilities provided by the modular systems of the S series, even in two-colour or two-material injection applications, mean that individual machines can be adapted to the requirements of the customer in a meaningful way.

As regards the performance capabilities of the SELOGICA, there is simply no alternative, even when operating with several injection units. Without any additional extensions, the hardware and software are capable of managing even this complex production process, including all the associated peripheral sequences. The optional extended functions packages for monitoring, drive movements, production and order control, optimisation / user help, quality control and documentation are available to the same extent as for the other S machines.

Thus the two component ALLROUNDER machines are no longer to be regarded as special machines, but in principle are integrated within the modular S machine programme. Two facts have made a major contribution to this development: the modularity of the S machines and the performance characteristics of the SELOGICA control unit. The overall result is: highly flexible ALLROUNDERS precisely tailored to production requirements as they arise.

Quick clamping system

Mould refitting times can be considerably reduced with the ARBURG mechanical quick clamping system.

Machine stoppage times are effectively reduced by the clamping system, so that production becomes more economical. The clamping system consists of three components which, however, can also be used as modules independently of each other.

The mechanical quick clamping system ensures rapid alignment and fixing of the mould by means

of 4 x 2 clamping members. The rapid-action coupling for the ejector actuates the coupling of the machine and the mould, and the mould support "pushes in" the moulds from the front or rear sides of the ALLROUNDERS.

The preparation of the moulds for operating with the quick clamping system takes place in accordance with the usual commercial standards. The clamping system is characterised not only by problem-free handling, but also by its ease of installation and simplicity of operation.



Universal application of SELOGICA

The SELOGICA control unit demonstrates its capacity for use in all applications, not only in the standard machines but also increasingly in the field of special processing methods.

Where previously extensive special controls or programmes were necessary, the SELOGICA control system now demonstrates its considerable technical advance. This applies, for example, for ALLROUNDER rotary table machines, multi-component technology and, of particular relevance at the moment, for LSR processing. All machine and peripheral sequences are integrated into the control unit and are centrally managed.

Further assistance is provided by the graphic sequence programming, and also by the logical-selective user prompting, extensive validity checks and the quality control functions already integrated as standard. Optional equipment packages further increase production transparency and convenience of operation.

As a sophisticated control system, the SELOGICA has come to be used on all ALLROUNDERS throughout all series.



INTERVIEW

"ARBURG is fully prepared"

In an interview, Managing Director Technology & Engineering, **Herbert Kraibühler** and Managing Director Sales, **Heinrich Fritz** answer questions relating to future strategy.

How do you see the current competition situation within the injection moulding engineering sector?

H.F.: In comparison with other branches of mechanical engineering, there is very strong competition. This means that there are a great number of manufacturers world wide, and for us this means that we are aware of very strong global competition. Certainly most major manufacturers of injection moulding machines are based in Europe.

In many parts of the world, particularly in Europe, the current economic situation is good. Normally, one would have to assume from this that the situation as regards competition has become more relaxed. However, this is not the case, since acquisition of market shares is important here. In addition to considerable price reductions,



Heinrich Fritz

we have to cope with payment conditions which are sometimes incredible.

In Asia competition is currently even stronger, since we are naturally all fighting as hard as we can for the few orders being placed. As a leading producer in this sector, with a relatively high market share, we naturally often find ourselves in the cross-fire of this competition.

What will be the general technical tendency over the next five to ten years in plastics injection moulding machine production?

H.K.: The trend will be that we will be able to fit machines with different types of drive. This will lead to a new kind of modularity, which will extend beyond modularity of application to modularity of drive. An example of this is the combination of the machine with an electrical dosage motor.

What technological development by ARBURG in the last three years has brought satisfaction to you personally?

H.K.: I have been particularly pleased with the development and introduction of the SELOGICA control unit. The new direction in the operating concept with graphical support of input is certainly an important pointer to the future. With the introduction of our JUBILEE series, we have achieved total breakthrough.

What kind of success has the new C JUBILEE series had?

H.F.: Our already high expectations have been greatly exceeded. With this new machine series, we have penetrated world-wide markets literally overnight. Demand is constant and the orders received form a very significant proportion of our production.



Herbert Kraibühler

Is the economic upturn in mechanical engineering lasting, or do you already see critical indicators appearing again?

H.F.: It is no longer possible to speak of a lasting upturn in mechanical engineering. This does not happen any more. Cycles are becoming increasingly short, with the pendulum swinging increasingly strongly. At present the situation in Europe and North America is still quite stable, particularly in Germany. In England and Italy, however, there are already a few clouds on the horizon. And in the USA also, there is a slight weakening in investment trends. Whether this will lead to an economic recession is impossible to say from our present viewpoint.

What technological direction will ARBURG be moving in over the next decade?

H.K.: The trend is clearly towards machines with higher clamping forces. We will not, however, neglect the smaller machines, but will continue to develop the S series from the small machines to the larger machines, as can be seen at the trade fair.

What is the basis for ARBURG's success secret as a leader in technology?

H.K.: The fact that we intensively address ourselves to customer requirements and combine this with observation of the development of plastics and other materials suitable for injection. All this information is incorporated in our own development programme on a highly intensive basis, and is given due consideration. An important further point for us is that we produce all the major components ourselves in Lossburg, and thus have 100 % control over our components.

How is German mechanical engineering viewed abroad?

H.F.: Naturally, I can only give you my personal opinion on this. German mechanical engineering is very highly regarded abroad, as it always has been. Particularly in high technology, innovative strength, quality, reliability and length of service life our products continue to be well-regarded, and in many regions of the world are clearly above the capabilities of local suppliers.

At the same time, it is also clear that differences in technology and quality are becoming ever smaller and there are many manufacturers today producing first class technology and very good quality. Nevertheless, customers are willing to purchase top quality "made in Germany" products even at slightly higher prices – in the expectation of receiving first class after-sales service.

Where do you see regional and technological growth markets?

H.K.: We see growth markets, for example, in CD production, powder injection moulding, the multi-component sector and in customer-specific special applications. ARBURG already has an excellent reputation here.

H.F.: I see the biggest regional growth market as being in south east Asia. In the medium term, there is also good potential in Central and South America, and also in parts of Africa, particularly South Africa. We are also interested in excellent possibilities in some eastern European countries, and of course in the long term the entire area of the former Soviet Union. We are already making efforts to gain a presence in these areas and to build up a good reputation on a permanent basis. This is an investment in the future, which will ensure the further development of our company.

What advantage does ARBURG, as a global player, have over its competitors?

H.F.: Naturally, I don't want to reveal too much about our strategy here. However, our consistent long-term philosophy is undoubtedly a factor which has made it possible for us to build on an effective and valued sales and service network which is active world-wide.

Will you extend your sales network in the next few years?

H.F.: I can answer this question with a clear "yes". Our strategy envisages further growth in the export markets and therefore also the globalisation of the entire company. We will continue to extend our close network of branches in major growth markets. To give a concrete example, we are currently setting up a subsidiary in Hungary. This is being equipped



in the usual ARBURG style and will provide our customers in Hungary with sales and service staff, presentation areas and training facilities.

ARBURG is a strong project partner for its customers. Do you wish to retain or extend this service?

H.K.: Yes, we do. We want to extend this service even further in the future. We regard each order as a unique item, a challenge by which we can prove ourselves. We are aided in this by our modular technology carried through into all series and by our presence in the major world markets in the form of our subsidiaries.

What differences does ARBURG perceive between the internal and external markets?

H.F.: Germany as an internal market is very significant, and in our conventional clamping force ranges we are definitely the market leader in Germany. This is the first major difference, since in many foreign markets we are not yet market leaders. The costs involved in a sales organisation outside Germany, and overseas in particular, are very much greater than at home. On the other hand, the growth potential and growth oppor-

tunities are very much greater in other countries than in Germany. Our future growth will therefore come from other countries.

How is ARBURG overcoming the current Asian crisis?

H.F.: The situation is very critical in most countries of Asia: this crisis has hit us directly, and very hard, since we have set up an extensive sales network in south east Asia, with its own branches.

On the long term, this area is the main economic growth area of the world, and we have evolved our sales strategy there also on the long term. We will therefore not alter our commitment within these areas and will fully maintain our service provision and customer services at the very high level which already exists. We want to demonstrate to our customers that we will stick by them even during the bad times, and that we have confidence in these markets for the future. We will therefore demonstrate our presence even more strongly once the crisis is over.

Does ARBURG possess technological advances of which the market is not yet fully aware?

H.K.: One technological advance which is not yet very well known on the market is the ARBURG quality control system (AQC). This can form

an integral component of the control unit and undertake alterations in machine parameters on the basis of models. Other technological advances are, of course, the SELOGICA control unit and our experience in the field of powder injection moulding.

What medium term objectives does ARBURG have in view as regards marketing?

H.F.: Here we are pursuing two objectives: firstly, we want to maintain, and if possible extend, our excellent position in the extremely important German market (we still sell 40 % of our machines here). Secondly, we are accelerating the further extension and strengthening of our worldwide sales organisation. The use of the most up-to-date communication methods is extremely important here. Naturally we want to ensure customer satisfaction and first-class service.



In the context of your development projects, do you take account of what your competitors are doing?

H.K.: In our projects, our primary concern is with the development of the product with our customers. We do not allow ourselves to be greatly influenced by our competitors.

(The interview continues on page 14)



(Continuation of the interview on page 13)



A typical example is the user shell for our SELOGICA control unit, with which we have followed an absolutely independent path which we have been able to use to set ourselves apart from our competitors.

If you could have one wish come true, what would you like to see fully developed and ready for use?

H.K.: *I would like to see an electrically powered machine at the price-performance ratio of the current C JUBILEE series.*

What are your expectations as regards the K '98?

H.K.: *I expect to see the C JUBILEE becoming the standard machine of the future, and then the success of the new outfit, together with the new colour and our overall presentation. Generally speaking, some manufacturers will be new arrivals offering electrical machines, and it will become clear which type of drive will be more successful overall.*



H.F.: *The K Fair in Düsseldorf is the biggest and most important technical fair for our company also. We are fully prepared to present ourselves this year also as leaders in technology and very significant producers. I expect to see a further increase of interest from overseas. In the jubilee year of the Hehl family company, this year's fair will also represent a particularly appropriate and solemn high point and conclusion for our jubilee activities*

Family Day

Lossburg. A positive flood of visitors was seen at ARBURG on its "Family Day", when more than 6,000 guests visited the company. As part of the seventy five year Jubilee celebrations of the Hehl family company, employees and their families were invited to a highly entertaining event.

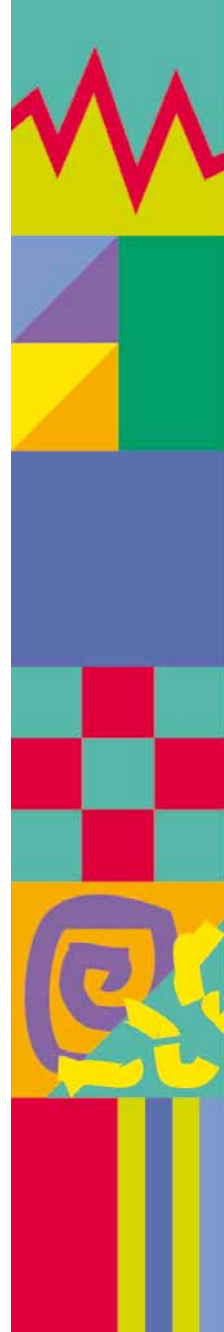
In keeping with the company philosophy, according to which the "family company" always sees itself as a "company family" also, it was clear to those in charge right from the start that the Jubilee would be celebrated primarily with the employees of the company, in a fitting style.

The organisers had set great store by the family based nature of the event and had devised all kinds of attractions and a varied programme for this bright and colourful Family Day. But it was primarily an opportunity for ARBURG employees to show their families their own individual workplaces.

A tour of the company, specially devised to be appropriate for this particular event, had been prepared, and the route decorated with the brightly coloured "Family Day" logos.



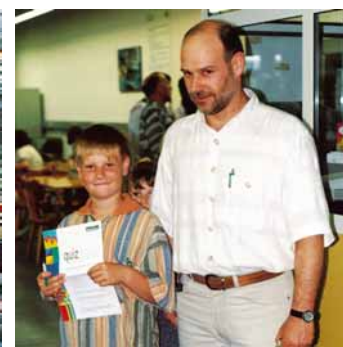
At all points, there were interested visitors and listeners who wanted to form some picture for themselves of ARBURG's rapid expansion.



... oh happy day! ...



quiz ?



museum ←



rundgang →



kids ←



The company tour ended at the brightly decorated heavy vehicle approach road, several hundred metres in length. Many brightly coloured balloons, large banners, bars, long rows of tables and a huge number of visitors provided evidence of a very happy occasion.

Production that saves lives

The Odenwald and the Black Forest have one thing in common: in both regions, one would expect to find interesting places to visit and places of natural beauty, rather than high tech companies and innovative expertise.

Yet in both these regions there are a large number of highly modern companies, the names of which one might not immediately recognise, but which make products with which we come into contact almost on a daily basis.

Medical technology represents a particularly sensitive area in this connection, since its products must fulfil the most stringent requirements as regards hygiene and purity and also quality.

The company FLEIMA-Plastic GmbH in Mörlenbach/Odenwald has specialised in the production of this type of technical medical product.

The special rules and regulations on which the production of these components is based are found throughout the company, wherever one looks. Hygiene areas, white coats and caps, air conditioned rooms and disinfection points characterise the various work areas in which the injected parts are manufactured, pre-assembled and packaged.

Since FLEIMA exclusively manufactures supply parts, which are finally assembled and packaged by FLEIMA's customers (who include the leading pharmaceutical and medical technology companies of Germany), the hygiene requirements are not based in the sterile area, although the most stringent cleanliness criteria must be fulfilled in the production of these products.

The moulded parts are mostly made of high grade thermoplasts

such as medically approved hard or soft PVC in all Shore hardnesses, polycarbonate, ABS or polyamide, and are mostly highly transparent, so that even very small impurities in the material will lead to these components being rejected, although they have no hygienic or functional significance. Thus the test programme for the production of medical technology items has to start with the granulate as delivered. "Certificates of origin" are of some assistance here, since these state clearly which batch has been supplied by which manufacturer and whether there are any imperfections from the physiological point of view. However, not only the moulded parts themselves, but also the entire production sequence must fulfil the highest hygiene criteria, since subsequent purification of the finished components is an additional cost factor which neither FLEIMA nor its customers are willing to bear.

FLEIMA: A company with a heavy responsibility

FLEIMA has been operating in accordance with these principles since the company was set up in 1974. With 30 employees, medical technology items and technical parts are manufactured in a percentage ratio of about 80 to 20 respectively. The company was formed by Gustav P. Fleischer and Werner Madl. According to the Managing Director Mr. Fleischer the moral obligation not to allow any compromise in purity and quality in this difficult production field has always been of the utmost importance (FLEIMA parts are not infrequently used, for example, in equipment and systems used in hospital operating areas to save human lives). By far the greater majority of the parts come into direct contact with blood or the constituents of blood, which

rules out the use of, for example, stabilisers, recycled material or release agents for removing parts from the mould. Also, the compatibility between material and blood components, and also the toxicity of the basic materials used, must be taken into account. For this reason also, the mass production of items of medical technology in large quantities has been largely abandoned. These items are produced at a more favourable cost abroad. FLEIMA has specialised in carrying out complete projects for the development and implementation of new technologies.

In order to be able to carry out this kind of project comprehensively within the company, FLEIMA not only makes its own injection moulded parts but also makes the actual moulds required. For this purpose, the company has a mould production department with 9 employees and the very best equipment: modern, CNC controlled mould processing machines with mould changing equipment and a standardised clamping system (EROWA/3R) for all mould construction guarantee flexible and rapid processing of orders. Where necessary, mould construction capacity is supplemented by reliable co-production companies.

Theory must be borne out in practice

Projects can be subdivided into various phases in the field of medical technology also, the differences lying particularly in the implementation of theoretical requirements in practical production. Following planning, development and design jointly with the customer, a prototype and, if necessary, a prototype mould is build on request or by agreement, with which extensive tests can be carried out with the relevant product. Only after this test phase has been successfully completed is the mould modified on the basis of these tests and series production initiated. In principle, this procedure already falls within the wide area of quality control, a further point on which FLEIMA puts great value, as indeed it is

obliged to do. Right from the start of the co-operation, important decisions are made with customers. These decisions relate to the nature of the part in question, how mould costs and delivery times can be minimised, what material is needed, how and where the individual parts are to be joined together, whether signs of wear or material-specific fatigue phenomena may cause problems, how the end product is affected by temperature, sterilisation and flow characteristics, in short: how the basic data of the moulded part in question are affected by its end use.

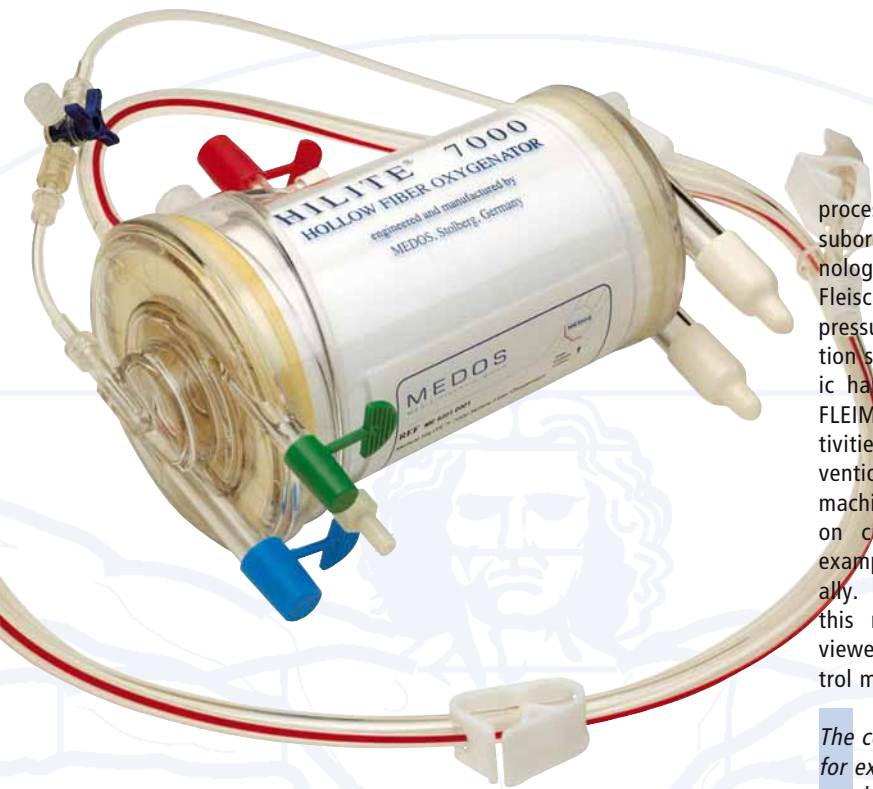
Once these questions have been clarified, the quality control measures associated with production must be defined. In addition to ISO certification, which is a general indication of FLEIMA's high quality standards, test intervals and the depth of quality control depend on the wishes of the customer. Thus both periodic and 100 % quality control is available, as are visual checks and checks based on measurements and quality documentation.

Example: The oxygenator

In the case of a hollow fibre membrane oxygenator, model type HILITE 7000, or "artificial lung", produced for the company MEDOS, all components are subjected to a 100 % visual and dimensional examination directly on the machine. The oxygenator is designed for use in an extra-corporeal circuit in surgical and other treatments on the open heart, in which oxygen concentration and simultaneous carbon dioxide reduction are necessary.

With other products, only random sample checks at regular intervals are necessary. A further safety factor has been incorporated into production by FLEIMA. With each finished batch, "reserve samples" are retained by the company, so that clear tracing procedures can be carried out if necessary.

The time factor, which is so important in other plastics



processing sectors, plays only a subordinate part in medical technology, according to Gustav P. Fleischer. There is therefore little pressure to make parts of production sequences automatic. Robotic handling devices are used at FLEIMA, but only undertake activities in areas of direct intervention in the injection moulding machines. The assembly, based on customer requirements, for example, is still carried out manually. Indeed, in this connection, this manual procedure can be viewed as a further quality control measure.

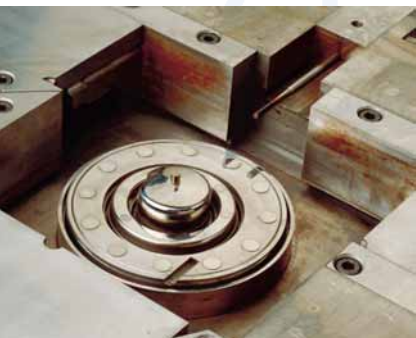
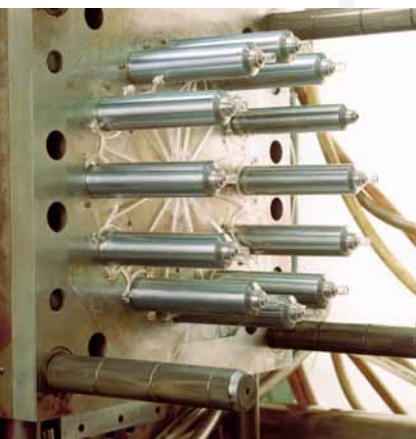
The container for the oxygenator, for example, is made by injection moulding on an ALLROUNDER 470 C, with a mould with an Ewikon hot runner and angled nozzle, the central distributor being positioned in the mould at an angle of 90°.

This configuration represents a new territory for FLEIMA. The successful solution to the problem provides evidence of the company's willingness to embrace innovations, and of the fact that FLEIMA approaches even unconventional procedures by thinking "around corners", in the literal sense. However, cost savings can certainly be made even with such a complex project development as this one. According to Gustav P. Fleischer, there is such a thing as "model care" in medical technology also. For this reason, FLEIMA has a considerable stock of original moulds, which can be modified quickly and cost effectively to new production circumstances, for example by changing mould jaws or mould inserts.

The extensive expertise in medical technology gained by FLEIMA over almost 25 years of the company's history is also reflected in its export figures. Here also, the assumption is that it is quality, not price, which forms the basis for successful business transactions. Export forms between 30 and 40 % of total turnover, mainly with South Africa, South America, Turkey and Europe.

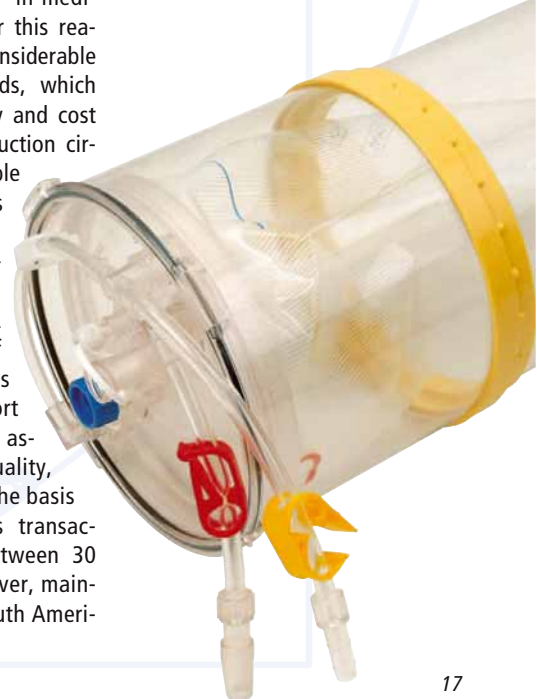
ARBURG: Reliability counts!

What FLEIMA values in ARBURG and ARBURG's ALLROUNDER technology can be summed up in a few significant words. It is firstly the flexibility of the machines, providing highly accurate adaptation to the material and special processing characteristics in question, but also ARBURG's technical reliability, which is absolutely essential for fulfilling the exacting requirements of medical technology, for example with respect to the water-tightness of the hydraulic system. Ultimately, it is not least due to the smooth running of ARBURG machines that sick people and victims of emergencies can be helped, quickly and effectively.



Optimum expertise in the mould sector also: a mould for producing air bubble traps for dialysis machines using a star runner (above).

The mould with sliding bars and core pulls (below) is used at FLEIMA for producing covers for oxygenators.



Production at world champion level

By means of a revolutionary new invention, the German market for non-returnable "party" size barrels is being taken by storm in a completely new way: ARBURG's customer Oberhofer Werkzeugbau GmbH in Wilhelmsfeld, in collaboration with its partner Huber Verpackungen, has developed a fixed tap integrated in the barrel for the Warsteiner brewery, the German market leader in 5 litre barrels.

Technical publications produced by the brewery industry have greeted the invention as "the greatest innovation in the brewery industry in the last 20 years". After more than two years of intensive development, the new product was launched under the slogan "Tap like world champions" just in time for the World Cup in France. The football "Kaiser" Franz Beckenbauer was engaged to take part in the multi-media advertising campaign.

Huber Verpackungen and Oberhofer Werkzeugbau own the patent for the new invention and justifiably expect that this development will provide decisive stimuli for a huge growth market.



Simple and ingenious

According to Kurt Oberhofer, Managing Director of the family company of the same name which has been in existence since 1977, the invention is as simple as it is ingenious. With the new built in "supertap", the incorporation of an external tapping system is no longer necessary. With three manoeuvres, the black and red tap, consisting of a PP component and a TPE element, can be unsealed and removed from the barrel.

After checking that the seal is undamaged, the black tap ring can be pulled forwards, the soft TPE component sliding easily in the PP sheath on a film of lubricant suitable for use with food-stuffs. Once enough beer has been drawn off, the tap is simply pushed back in.

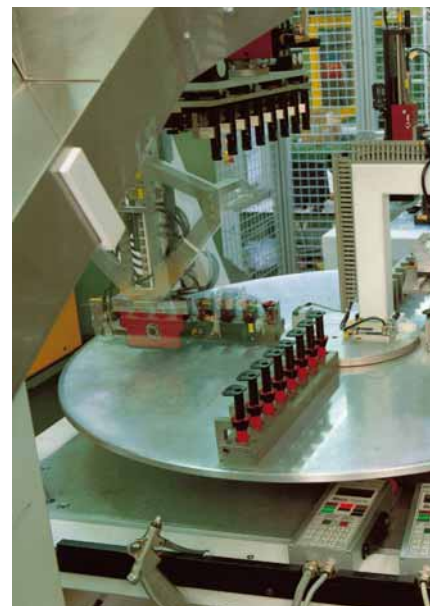
Major technical problem

"One of the biggest problems we had to solve in the project phase was that of the sealing," reminisced Kurt Oberhofer. After this difficult point had been fully resolved with strong support from the specialists from the ARBURG Application Technology Department, the barrel, together with the tap, now fulfils all requirements with regard to stress and water-tightness.

The complete tap is pressed through into the barrel from the front, with rubber sleeves positioned over the deep-drawn metal rings. The barrel is now guaranteed watertight even when filled to 4 to 5 bar pressure and with the tap completely pulled out, while in the filled state it can still tolerate 6 bar internal pressure.

Key technology from ALLROUNDERS

The main items of the production system are two ALLROUNDER 520 V 1300-150 machines, playing a vital role: the two-component machines produce 4 million taps a year, working round the clock. With production figures like these, the advantages of the SELOGICA control system are clear to see: as well as the synchronous control of the complex

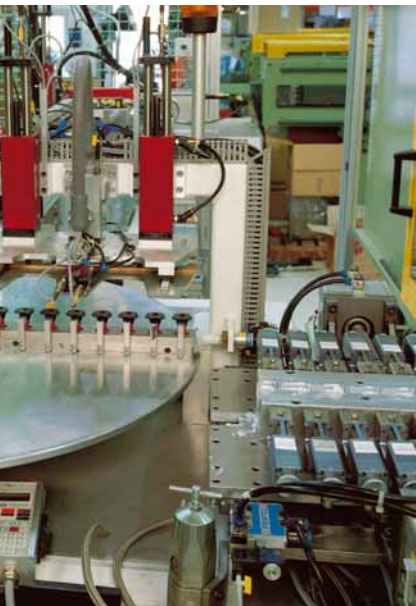


cycle of both machines, Kurt Oberhofer in particular praises the 100 % SELOGICA quality control and documentation facilities.

Complex production

The two ALLROUNDERS are grouped around a 4-station rotary table, on which two robotic handling arms with 8-fold pick-up devices operate, removing the parts from the 8-fold cavities of the two ALLROUNDERS, which are operated with a hot runner. "Everyone advised us not to use such a large number of cavities and told us we should use no more than a 4-fold cavity," says Kurt Oberhofer, "but in the end we achieved our aim!"





The robotic handling system, which includes a further test handling device, together with the rotary table, were supplied by the company Geiger. After the red outer sheath has been produced in the first ALLROUNDER 520 V, it is placed in the first station of the rotary table. In the second machine, meanwhile, the black piston of the outlet tap is moulded and then placed on the second station.

The outlet tap is assembled in the third station, where the lubricated piston is tested by being moving backwards and forwards several times in the PP sheath. The preceding lubricating station was developed and built by Ober-

hofer themselves and incorporated into the total cycle of the rotary table. The finished taps are then tested for sealing with compressed air using a computerised control system, and any defective parts are rejected.

Advantages in mould construction

The company's origins are in the tool-making industry, where the main emphasis of the company's activities still lie: 30 of its 35 employees still work in tool-making, while 5 members of the workforce maintain the injection moulding operation. Oberhofer Werkzeugbau acquired the necessary expertise in injection moulding in the years following 1982,



when it began producing moulds for plastics injection moulding. The company has owned ARBURG machines since this time, and is entirely satisfied with the problem-free operation of these machines. As Kurt Oberhofer says, "Experience is an advantage in competition".

Further extension planned

This is seen only as the beginning, however: the construction of a larger production site in neighbouring Schönau is already planned. Now the lengthy development phase must start to pay off. Oberhofer want to produce sufficient taps to provide all non-returnable barrels made by Huber Verpackungen with the new system – a total of 11 million per year...



"Tech Talk" is intended to address, at regular intervals the practical questions which arise repeatedly in injection moulding. Dipl.-Ing. Peter Mechler, responsible for Technical Information at ARBURG, will be researching useful information and interesting facts for this column. Today he deals with analysing problems with feed characteristics of plasticising cylinders.

99 Percent of problems solved

Producers often have problems with the feed characteristics of plasticising cylinders, which may result in poor quality of moulded parts or incomplete filling. In 99 % of case, however, clarification of the following questions will solve these problems.

- Is the dye material being deposited in the feed zone on the screw? If it is, the melting point of the dye must be taken into consideration and the temperature in the feed zone correspondingly reduced.
- Are the problems caused by mechanical damage, e.g. by a worn non-return valve?
- Has previously processed material (which may have had a considerably higher melting point) been completely removed with the cleaning cycle? With materials such as LCP, PEEK, PPA or PPS, deposits are formed which must be removed by brushing or buffing.
- In principle, with materials such as PA, PC and ABS, dyes should be used which are compounded from the material in question. Etching characteristics under the effect of temperature are an important factor.
- As a basic principle, the screw must be more shiny than the cylinder pipe.
- Are the cylinder fittings old and are there any signs of wear or erosion?
- Is there clogging in the feed area as a result of temperatures being too high or standing times being too long?
- Are the problems caused by condensation water or corrosion in the feed opening as a result of uneven preliminary drying of material or temperatures in the storage container being too low?
- Is more than max. 30 % of recycled material being added to new material?
- Is dye added, and by which method?
- How much dye is added? Between 1 and 2 % is normal for Masterbatch or powder dye, slightly less with liquid dyes.



España

Proud of its success

With the official opening of the ARBURG Technology Centre (ATC) in Madrid in spring, full recognition was given to the very positive development of the market in the Iberian peninsula.

As regards both orders received and turnover, continuous increase is evident. This is reason enough for ARBURG to extend its presence on the peninsula even further.

However, future business activity was not the only decisive factor in favour of setting up an ATC in Madrid. From the new site in the capital city, many customers in central Spain and also neighbouring Portugal can receive much more extensive and intensive service.

The main priority is to be able to offer customers an even better service in the areas of training, spare part supply, sample moulding and technical application advice.

Present in the market since 1989

The history of ARBURG's market presence in Spain begins as far back as 1989. Even at that

time the company recognised the development potential of the Iberian peninsula. The selection of Barcelona as location was based on extensive market studies which confirmed that most plastics processing companies in Spain were based in this region because of its good infrastructure.

Like all ARBURG subsidiaries, this branch has a presentation room with the latest technology, a store with a good range of spare parts, extensive training facilities and all the necessary equipment for carrying out sample mouldings with customer's moulds. The same applies, within a correspondingly smaller framework, for the ATC in Madrid.

And the sales figures speak for themselves: ARBURG Spain is clearly among the "Top Five" markets in Europe – and the trend is rising.

Basis for success: 16 employees in Barcelona and Madrid

A major part has been played in this positive situation by Alfonso Centeno, who has been Branch Manager in Spain since 1st May 1995 and, as an employee of the former ARBURG agency in Spain, was fully acquainted with the technology and the customers. With his many long-standing contacts, he has made a permanent contribution to the success of ALLROUNDERS in Spain and Portugal.

In order that this should remain so, Centeno is constantly on the move between Barcelona and Madrid in a "pendulum mission" in order to ensure the smooth processing of orders at both locations. Centeno is supported in this by 15 additional employees, 5 of these in Madrid, and by the on-line connection via a dedicated computer connection between Barcelona, Madrid and the parent company in Lossburg.

It is therefore possible to process an order for Spain in such a way that delivery of an order takes only slightly more time than it would within Germany. The removal of customs barriers

has made this procedure possible within the EU. This "direct connection" has also had the effect of reducing costs because it has been possible to reduce stocks to an efficient level.



ARBURG had a "special presentation" in store for the opening ceremony of the Madrid ATC: the unveiling ceremony of the ALLROUNDER C JUBILEE machines, which took place simultaneously at various locations world-wide on 5th March, was repeated on March 26th specially for the guests at the event in Madrid. This was a special distinction for a market which, for ARBURG, holds one of the top positions in Europe and internationally.

