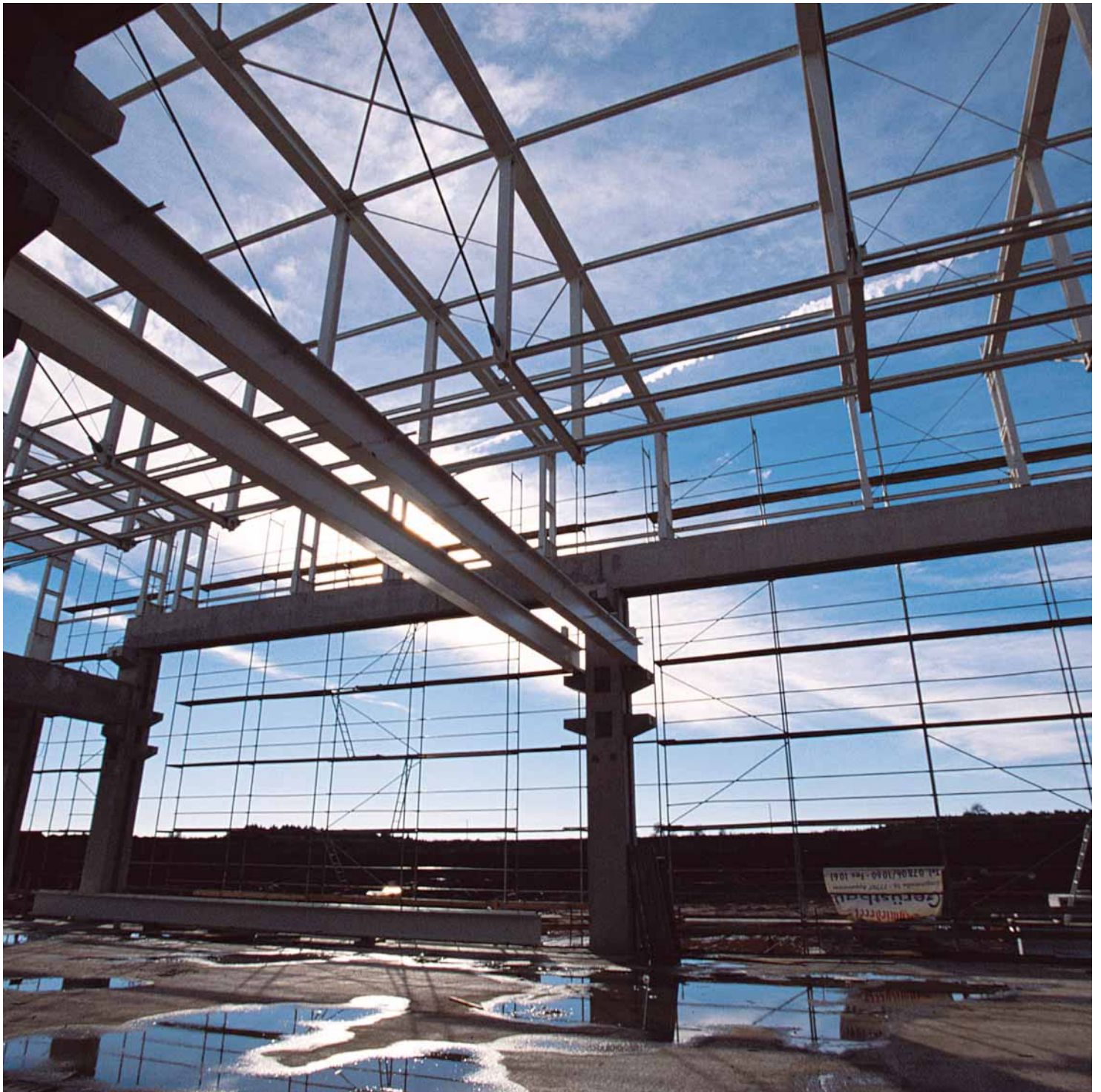


New dimensions at ARBURG



ARBURG event Visit by the Minister-President	3
ARBURG customer report RKT: Development and production as an integrated process	4-5
ARBURG technology ALLROUNDER 630 S and 320 K	6
ARBURG event Biker convention at ARBURG / No handicap at all	7
ARBURG architecture Behind the scenes	8-9
ARBURG technology Moving into new dimensions	10-11
ARBURG exhibition Fakuma: ARBURG redesigned	11
ARBURG customer report Bauser: Professionals in gear technology	12-13
ARBURG interview The new dimension	14
Tech Talk The integrated clean-air hood Latin American agents' symposium	15
ARBURG subsidiaries Belgium – customer satisfaction comes first	16

PRINTING INFORMATION

ARBURG today,
Issue 13 / Spring 2000
Customer magazine of the ARBURG Group

Published by: ARBURG GmbH + Co

Editor:
Dr. Christoph Schumacher (Editor in charge)

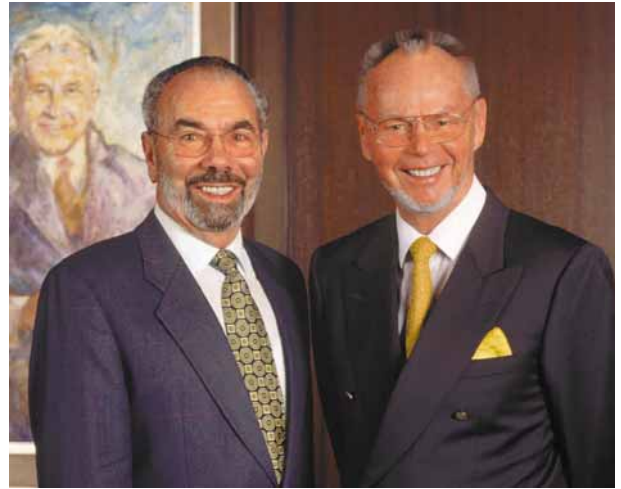
Editorial team:
Juliane Hehl, Martin Hoyer,
Roland Paukstat, Bernd Schmid,
Jürgen Schray, Renate Würth

Contributors to this issue:
Uwe Becker (Text), Markus Mertmann
(Photos), Martina Schrenk (Graphics),
Marcus Vogt (Text)

Editorial address:
ARBURG GmbH + Co
Postfach 1109
72286 Lossburg

Tel.: +49 (0) 7446/33-3149
Fax: +49 (0) 7446/33-3413
e-mail: today_kundenmagazin
@arburg.com
www.arburg.com

Reproduction – including partial –
subject to approval.



Dear Reader,

After the much-talked-about New Year came in so unspectacularly, we now have the opportunity of returning to the discussion of more important matters.

ARBURG has devised an all-embracing, programmatic concept for 2000. Using the slogan "ARBURG – The New Dimension", we hope to explain our intention to make decisive advances this year, both in expanding our clamping forces and also in our modular handling system and the expansive development of our production capacity at the Loßburg site.

It goes without saying that this will all reflect the standard of quality for which ARBURG is renowned and for which our production process and products are so rigorously monitored. We need not emphasise the fact that our traditionally impeccable know-how in applications technology will also be taking the leap into the new dimension.

ARBURG is not talking about a new millennium, it is simply making a dynamic break into new dimensions. So, just as it was wrong to talk about a new millennium on the eve of the year 2000, it would be equally wrong of us to rest on our laurels. Because, as always, the success of our customers is close to our heart.

This success can only be guaranteed through dynamic development. ARBURG – The New Dimension!


Karl Hehl


Eugen Hehl



The young management generation Juliane (middle) und Michael Hehl welcome the Minister-President.



Karl Hehl (2nd from left) is very pleased about Erwin Teufel's visit; in the background there are the managing directors Herbert Kraibühler (left) and Michael Grandt.

Visit by the Minister-President

ARBURG not only has an excellent worldwide reputation in the plastics industry but it is also one of the most important employers in the north of the Black Forest.

It was for this reason that Baden-Württemberg's Minister-President, Erwin Teufel, brought a delegation to visit the engineering company and witness at first hand the dynamism and carefully planned development of the company.



Chairmen of the company, Eugen Hehl and Karl Hehl, greeted the Minister-President and introduced the other board members.

Erwin Teufel, who comes from the region himself, was visibly delighted at "one of the best examples of creative enterprise in our Federal land". Because, according to Teufel, although

Baden-Württemberg is the land of the middle-class, self-employed entrepreneur, there are few businesses with a history like ARBURG's.

"I have come across the name of your company during my trips all over the world!", were the words of praise given to the management of the Loßburg engineering company by Minister-President Erwin Teufel during his visit.

After a few introductory words by Eugen Hehl, partner Michael Hehl briefly outlined the history, expansive development and current position of ARBURG.

A particular focal point of the visit was, of course, the presentation of the new construction project, "ARBURG II". Board members Michael and Eugen Hehl gave a summary of the progress and status of the project, which will represent an investment in the Loßburg site running into three-figure million deutschmarks



at least. During a brief tour of the company, the technical director, Herbert Kraibühler, explained the complex production steps, the high standard of know-how and internationally acknowledged efforts towards quality assurance.

During the tour, the Minister-President showed himself to be completely in touch at grass-roots level, making regular stops to talk to staff – a trainee here, a machine operator there.



Eugen Hehl (left) and Minister-President Erwin Teufel.



An interested Minister-President follows the company presentation given by Eugen (left) and Karl Hehl (far left of photo).



Keeping in touch with everyday life: Erwin Teufel used the tour to look behind the scenes in the training workshop (top photo) and production (bottom photo).

Development and production as an integrated process

Over the years, many former specialists in plastics production have diversified, as today's customers increasingly regard their orders as a single job and allocate them as such. As a result, an ever-increasing number of companies is not only manufacturing moulded parts, but also at the same time planning and producing the moulds used in their manufacture.

However, there are also companies that go that crucial stage further. Take RKT Rodinger Kunststoff-Technik, for example. Here, the processing of a customer order is regarded from the point of view of optimum process organisation. This integrated approach not only produces the best possible quality, but also a reduction in costs and improvement in logistics. Coupled with many years' experience in mould manufacture and plastics injection moulding, this can only be to the customer's benefit.

"From the concept to the product", RKT takes its customers right through the planning and mould selection process, through preliminary tests, optimisation and sample moulding as far as series-production and assembly of the moulded parts in the attached injection moulding plant. This involves the interaction of the development/design divisions, finance, logistics, project management/sales, quality assurance and DP as a network, in order to provide the customer with the best possible advice and support at each stage of the project. The north-east Bavarian company has special know-how not only in the manufacture of micro- and thin-walled parts, but also the combining of hard/soft materials, for example by the injection moulding of TPE seals to certain moulded parts, of integrated circuits such as push-buttons, of inserts or functional elements, and also in the bringing-together of several of these techniques in

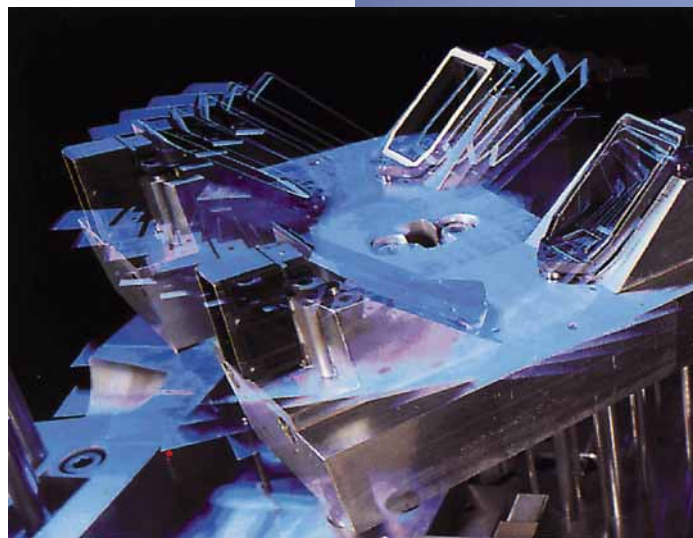
so-called "multi-functional systems (MFS)".

Detailed planning base

RKT's experienced team plans and develops innovative products with its customers according to defined quality characteristics. The company's project managers are constantly at the disposal of their customers as reliable contacts, saving the customer time and irritation.

Since 80% of the original costs of moulds are fixed in the planning phase, it is particularly important here for the most economical solution to be found. Yet the most economical need not, of course, be the cheapest. The main concern is achieving the optimum price/performance ratio, so that the manufacture of production moulds can also take place in a financially suitable framework.

The culmination of the initial planning and execution phase is fully developed injection moulds produced using the very latest



working methods, such as simultaneous engineering and total quality management (TQM) in the independently operated profit centre. 85% of the order volume is accounted for by outside customers.

An important core element in the development process is the identification of problem solutions

that work. At RKT this also includes advice on plastics design and mould technology. In this particular area, RKT places great importance on close, early collaboration between the company and the customer, in order to disseminate know-how on both sides and therefore eliminate unplanned delays due to a failure to coordinate interests. RKT customers therefore have the opportunity of working through alternative mould designs and production processes in the form of FMEA analyses and selecting the best approach. The company makes available its experience in the construction of several thousand moulds, day-to-day moulded part production, including in the multi-component and cavity sector, 2D and 3D computer-aided design and the actual production of prototype moulds for new series. The equipment involved in mould production ranges from CNC machines, through high-speed processing centres to computer and video-aided measuring machines in a measuring room with a constant temperature. In the technical division, customers can use existing machine technol-

ogy or install their own injection moulding systems, in order to run joint process optimisation and thereby reduce the length of time before the products are launched onto the market.

Integrated EDP

The efficiency of the working processes at RKT is maintained even after the planning and development phase. The link between these two divisions that facilitates this is called integrated data processing (DP). The direct transfer of data from design to production by CAD and CAM/CNC connections not only reduces throughput times, but also restricts the potential for errors and reduces production costs. A PPS system can be used at any time to determine the stage reached in processing a particular customer's order. This way of working is not only highly efficient, but it also ensures that the highest quality criteria are met.

Quality management

RKT works in compliance with DIN ISO 9001, QS 9000 and VDA 6.1 and manages development and production quality methodically through the interdisciplinary cooperation of all departments. The aim here is to analyse and improve the product in relation to the planned production and assembly process, so that the parts finally produced fully meet customer requirements. The respon-



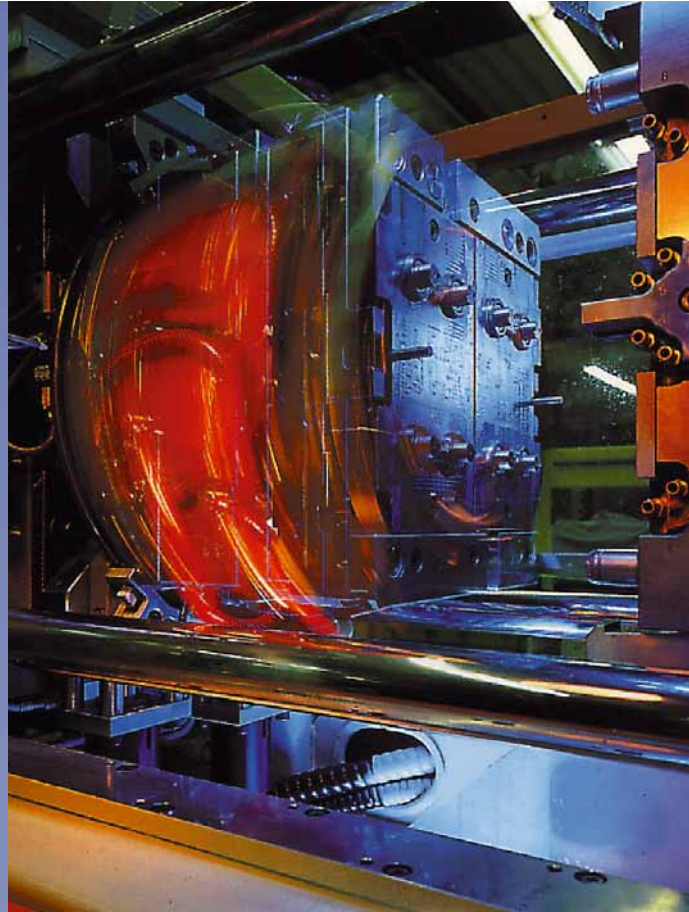
sibility for consistently high quality is carried solely by RKT through continual improvements in quality management.

Two concepts are of primary importance in the company's quality philosophy: total quality management (TQM) and integrated preventive service (IP-SERVE®). Total quality management is not limited to the search for and identification of quality defects in the end product and subsequent optimisation or elimination of the identified weaknesses. What is more important is the preventive discovery of potential error sources with the aid of QFD (quality function deployment) or DOE (design of experiment) tools or else the Ishikawa Strategy and not simply influencing the manufacturing process. So the motto is preventive action first rather than reaction later. This produces time and cost benefits, both for RKT and the customer.

This procedure is supplemented by RKT's patented integrated preventive service, as a system of internal company measures that guarantees prompt delivery with consistently high series quality. IP-SERVE® brings together the logical use of the very latest planning, development and design tools (material databases, 3D CAD, Moldflow, Rapid Prototyping), the use of various methods of error prevention (parameter design, etc.) and the "traditional" elimination of

existing defects by detailed optimisation. In this way, it is not only possible for the prescribed tolerances to be observed during production, but also for reliable, process-based predictions to be made on the target value deviation of individual moulded parts. This makes it possible to offer the customer series-production with a ppm-error share, while just-in-time production to the highest quality standard is also achievable. In-house employee training courses on the subject, as well as TQM workshops with RKT customers ensure that this philosophy is firmly anchored within all centres important to production.

Here, too, RKT works on the basis of an integrated approach.



the very latest generation of machines, the ALLROUNDER series 'S' and a particular plus here is the ease with which the SELOGICA control system is operated. What is also interesting is that four 2K ALLROUNDER's are suitable for the manufacture of parts from two colours or materials – a discipline in which ARBURG has traditionally led the market.

Over the 25 years since its formation, RKT has grown from precision mould manufacturer to system supplier. In only four years, company owner Rainer Groth has completed his mould production expansion by introducing plastic parts manufacture. Series-production began in Roding in 1982 with 20 machines. With the opening of the Tralee works in 1997, the company's activities on the international market were strengthened, with a stronger commitment not only to Europe, but the USA and Australia too. A total of 220 staff, over half of them in mould production, see to it that the comprehensive quality criteria are observed throughout the entire process chain. The consistent use of an integrated approach in mould manufacture and injection moulding is RKT's trademark, contained within the company motto "Qualitas – Tempore – Optima".

Experience has shown quite clearly that it is worth integrating all the variables influencing production in the creation of new products, so that the best possible result can be achieved for customers.

Injection moulding machines: ARBURG the focal point

Achieving these objects and goals without problems requires, not least, a correspondingly high standard of hardware. When it comes to injection moulding production, RKT has for some time relied on ARBURG. RKT's Roding plant has a total of 54 injection moulding machines, 36 of them ALLROUNDER's. In Tralee in Ireland, RKT's international base, seven ALLROUNDER injection moulding machines have been moulding parts since July 1999. Precision, reliability and comprehensive service back-up are what the Roding employees really value about the ALLROUNDER injection moulding technology. The technical range extends as far as



Above: Rotating plate mould for manufacturing a part with a hard/soft joint. Photograph: RKT

Left: Mould for manufacturing a housing part with an integrated seal in the inside of a vehicle door. Photograph: RKT

The big boys are coming!

630 S

The ALLROUNDER 630 S 2500 with a 675 or 1300 injection unit has a number of features that make the new size just as safe and easy to handle as the rest of the ALLROUNDER range.

The mould height adjustment is a feature already familiar from toggle-lever machines. The mechanism can be used to adjust the entire clamping unit to the respective mould height. As a result, the stroke is only needed to open the mould and not to align the mould too. This means lower energy consumption and shorter cycle times.

The adjustable mould platen can be moved in a predefined way by an electric motor and gears. The power transmission is across a thread at the ends of all four tie bars of the clamping unit. The maximum stroke of the moving clamping platens is 600 mm. The adjustment facility also permits a more compact mould closure design. The stroke positioning can be programmed via the SELOGICA control system.

The asymmetrical safety guard at the back of the machine provides space for the two cooling water distributors on the fixed and moving platen, as well as a

conveyor belt that can be positioned beneath the protective guard. This means that the entire parts removal can take place within the protected machine environment.

The water supply comes from a central distributor block, which feeds three cooling water distributors. The manifold at the machine end sits close to the consumer at the back beneath the fixed mould platen. The two distributors at the mould end are positioned beneath the machine guard, so that all mould supply lines can be permanently connected. The temperature is set from outside of the guard. The temperature control circuits can be connected to both clamping platens so that they are stationary via quick-connect couplings and can be optionally extended. This arrangement makes it significantly easier and quicker to fit the moulds.

The core pull supply lines are also connected up to the moving platen by way of quick-connect couplings. Not only the front, but also the rear section of the moving platen is vertically supported by the machine base and firmly guided.

Rotating injection unit

The larger the injection unit, the more important are intelligent solutions for operation and maintenance. In the nozzle area, for example, the cover is divided into two for moving or tilting. The unit can be moved away from the fixed platen, so as to ensure that the nozzle is easy to work on. For cylinder removal, the top cover

can be folded towards the back of the machine.

Changing the cylinder is made easier by the fact that the entire injection unit is mounted on a central swivel support. Once the assembly has been moved back and secured, the unit can be swivelled forward manually, allowing the cylinder to be removed easily. Electromechanical dosage is available as an option, enabling cycle times to be reduced through simultaneous movements and to achieve homogenised mix of the material being processed.



Robust, durable and economical: The well-proven ALLROUNDER toggle lever technology

between 200 and 430 mm. The mould protection mechanism works hydraulically and monitors the closing movement.

The minimum amount of space required by the whole machine, an energy-saving toggle system and low oil volume are other pluses associated with the ALLROUNDER. To permit individual working wherever possible – for instance, with the injection unit mounted in the parting line or with vertical handling equipment – there is the option to open the top guard.

Something of interest in relation to the universal application of ALLROUNDER machine technology is the fact that the cylinder modules 100 and 250 in series M and C can also be used on the 320 K. This means that the machine series remains compatible within the ALLROUNDER range.

With the ALLROUNDER 320 K, ARBURG offers a machine for a broad range of applications. This ALLROUNDER effectively combines the high-speed production typical of a toggle machine, simple machine control via the SELOGICA system, safe and efficient technology and an optimum price/performance ratio.

Successor found

320 K

Two of the most successful machines in the ARBURG range, both at home and abroad, have undoubtedly been the toggle-lever ALLROUNDER 305 and 305 ECO. With the launch of the ALLROUNDER 320 K, ARBURG has been able to present the legitimate successor to these legendary machines.

The 320 K has distances between tie bars of 320 x 320 mm, a clamping force of 700 kN and injection units in sizes 100 and 250.

Despite the very competitive introductory price, the 320 K offers an extensive array of standard equipment. Particularly worth highlighting are the injection regulation, hydraulic ejector and automatic central oil lubrication for the toggle-lever system. The mould height is adjusted manually and its mould height is



Biker convention at ARBURG

Customer visits are nothing out of the ordinary at ARBURG. On the contrary – no customer visits would mean no information, no information would mean no sales and no sales would mean no turnover.

Nevertheless, there is the odd exception – whether it's customers who travel from faraway countries to acquaint themselves with the company's latest developments or who choose to travel in a particular way. A good example of this is the Schulmann visit.

Had we not known better, we could have been forgiven for thinking that a biker's convention was being held in Loßburg – a meeting of like-minded motorbike enthusiasts with their machines. The occasion proved to be far less spectacular, however. As part of their annual motorbike tour, seven members of staff from Schulmann, a company in Kerpen, North Rhine-Westphalia, were visiting ARBURG during the Vosges stage.

ARBURG has a long-established history of working with Schulmann. The Kerpen company produces plastic granulates and master batches used by ARBURG in the manufacture of moulded parts at exhibitions or as part of its own production process. Schulmann uses seven 220 M and

221 K ALLROUNDER's for matching and also producing material and colour strips for use. Reason enough for the motorbiking employees to want to get a crafty look at the latest developments in machine technology at Loßburg and to see the company through the ages in the "Evolution" museum. And, of course, the fresh air fanatics did not want to miss out on a demonstration of how the ALLROUNDER's are produced. A works tour with the applications technology manager, Jürgen Schray, and also Stefan Gühring from the technical department shed light on this too.

Michael Hehl, partner of ARBURG and himself an enthusiastic Ducati driver, did not miss out on the opportunity of welcoming the bikers personally. As a small thank-you for the comprehensive technical information and warm welcome from ARBURG, the "Schulmanns" handed over a T-shirt and baseball cap they had had specially made for the tour, bearing their own logo.

*Schulmann and ARBURG always share the very latest machine technology – whether it's ALLROUNDER's or motorbikes.
Photo: ARBURG*



No handicap at all

What could be more British than a civilised golf tournament on a freshly mown green? That's right – very little! So the return of the golf tournament held by ARBURG's English branch office at the genteel Coventry Golf Club met with a very favourable reception.

A total of 54 participants – all of them good ARBURG customers of long standing – met on the green on 1 September 1999 to decide who played off the best handicap. Hard-fought, but even-handed sporting contests with a conciliatory, amicable outcome characterised this day of somewhat different business relations.

And ARBURG Ltd celebrated a repeat champion. Following the tournament's inauguration in 1998, Steve Birtles, sales executive at Louverlite, once again walked away with the much-sought-after victor's trophy. No handicap for the relationship between ARBURG Ltd and its customers.

A total of 39 companies and suppliers had sent their best shots to compete for the victory shield. Special thanks go out from the managing director, Frank Davis, to all the companies that contributed to the success of this sporting contest between friends by sponsoring various prizes.

Some of the customers who were invited have had a working relationship with ARBURG since the 1960's and it is not uncommon for them to have a machine park with over 40 ALLROUNDER's – as in the case of Arcoelectric



Switches, Miles Platts or Hoze-lock. If all the machines that the participants have ordered from ARBURG were to be totted up, the total figure would be around 385 ALLROUNDER's. So this was not only a meeting of golfing enthusiasts, but also genuine fans of ARBURG, who were able to discuss new perspectives, swap ideas and also do a bit of business on the side.

Steve Birtles emerged victorious from the 18th with a score of 40, closely followed by Ben Denley of Cotswold Design & Sales on 39 and Norman White of Reevite Industrial Moulding Ltd on 38. In the Texas Scramble held in the morning, Neil Prady and Chris Ward of Algram and Dave Richmond (John Alan Plastics) and Neil Bowden (Keiron Mould Tools) were the leading putters.

This year's date for the 3rd ARBURG Annual Golf Day has already been set. It will be held on 30 August.

Any of ARBURG's British and Republic of Ireland customers who would like to enter now are welcome to do so by contacting Valerie Heeles.



Behind the scenes

A works expansion such as that currently being undertaken at ARBURG makes its first impression through a successfully designed architectural exterior. In this particular case, the new building complex blends into the landscape, reflecting it in the literal sense through the design of its façade.

But what would even the most spectacular outer shell be without an "inner life" precisely tailored to suit the operational requirements? The key concept here too is harmony – façade, space and infrastructure must all blend together to create an optimum working environment for high-tech, series-production.

So "intelligence" is not only needed in the design and layout of the buildings, in ground, earth and water conservation and multiple energy use, but also in the technical fittings. These must be planned simultaneously with the architectural design, in order to guarantee an optimum material flow to all production stations.

In order to minimise any disruption to production, ARBURG opted for a gradual move into the individual building sections. On the one hand, this left additional capacity free in the existing works halls while, on the other, there was also space available for testing the new installations.

First step – moving the cast-iron coating operation

The first step into the new building was taken with the removal of the existing cast-iron coating plant back in August 1999. A new wet painting plant is currently being added to this unit, which is designed for all special shades as well as the larger

ALLROUNDER parts with individual weights of between 1.5 and 4.5 t. It is expected to begin production over the next few days.

Since November 1999, the spares despatch operation has also been housed in new premises. This division now offers direct vehicle access for collections.

The logistics hall of the goods inward and outward department has special entry and exit gates for lorries. These gates keep diesel fumes and direct draughts away from the inside of the hall, limit heat loss in winter and prevent dampness that is brought in from reaching the adjacent

halls. This means that even large lorries can drive straight into the despatch bay for loading and unloading.

Something with an optimum effect on material flow is the division of the new assembly hall. The basement level houses the storage of machine based assembly parts, with automatic loading and despatch, as well as the component assembly operation, where components that are finally assembled on the ground floor of the hall are assembled. Apart from the complete assembly of various types of ALLROUNDER, final assembly is also provided for with test bench stations, final inspection, packing and despatch.

Material flow concept

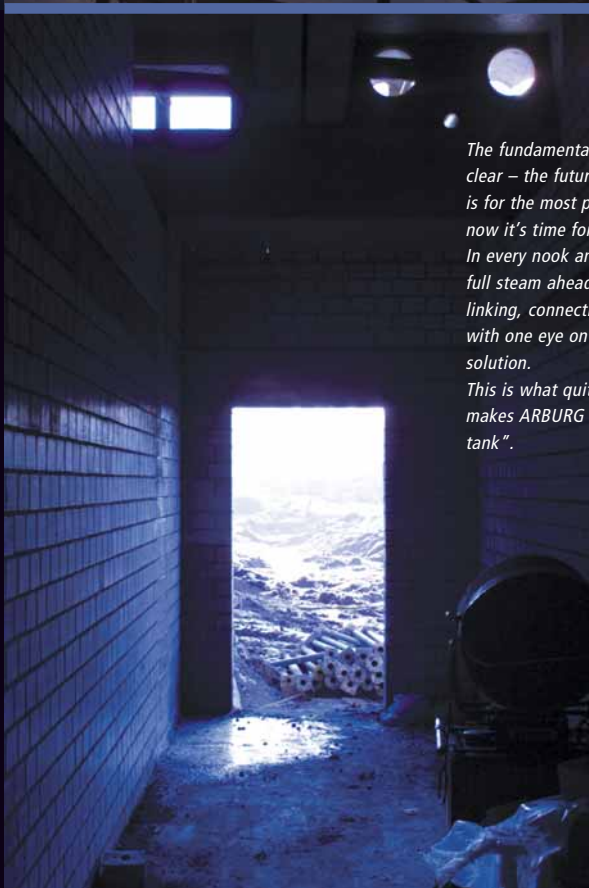
The entire internal transport logistics is based on an ingenious material flow concept, which allows all "normal transport" – in other words, an ARBURG pallet measuring 1 x 1.4 m with a maximum weight of 1.5 t – to be carried on automatic conveyors. Special pallets are also transported automatically. The Power & Free plant installed in ARBURG I will pass on its truck to a delivery station on an electric aerial con-





veyor, which distributes the freight within ARBURG II. A link that is also available for the rest of the transport system, up to lorry loading trips, links the present building to ARBURG II. The automatic transport system is supplemented by stationary conveyor technology, such as roller conveyors, carrying-chain conveyors and lift systems.

All automatic systems are loaded at given intersections by fork-lift trucks or from the high-shelf store. The electric aerial conveyor operates at higher speeds than the Power & Free conveyors and can also convey greater volumes and weights. The transport control system already introduced for fork-lift truck scheduling is being expanded to incorporate other methods of conveyance. In future, the transport control system will work as a central transport computer covering all the individual control systems, so that all transport movements can be managed. Communication between the individual interfaces will also be via the transport control system; orders will come from the host and stores management computer.



The fundamentals are already clear – the future perspective is for the most part defined, now it's time for the detail. In every nook and cranny it's full steam ahead with moving, linking, connecting... Always with one eye on the best solution. This is what quite literally makes ARBURG II the "think-tank".

Although the existing production halls are highly automated and equipped with the very latest technology, in the new premises "technical helpers" are to be found almost everywhere. Automated processes no longer only help the material flow, but also the production sequence and transport and infrastructure handling between the buildings. In other words, ARBURG II is in every respect a reflection of the ALLROUNDER that is to be built there - at the cutting edge of technology. This investment is a clear signal of the competitiveness of the company and its products, its commitment to the Loßburg site and, not least, to jobs within the region.

Moving into new dimensions

When handling peripherals are used, the main consideration is tailoring the components to the application concerned and coordinating the machine and handling system.

Since ARBURG also has extensive know-how in the area of coordinating machinery and parts extraction, it seemed obvious that it should occupy itself with the best possible technology for every extraction task. The fact that this development has culminated in a flexible, modular system by the name of MULTILIFT is actually no more than a logical progression, given the ALLROUNDER's modular design and the broad range of applications resulting from this. It is interesting that thanks to the modular design of the handling equipment, no compromises have had to be made in design and control integration, since the

to be precisely adapted to the requirements of the injection moulding operation concerned, subject only to the limitation of the maximum dimensions available.

Fully modular concept

As a horizontal handling variant, the MULTILIFT H grips from the back of the machine into the clamping unit. One advantage of this arrangement is that the number of axes can be reduced and the strokes remain correspondingly short. The MULTILIFT H only projects slightly above the ALLROUNDER, so that the space required for the configuration relative to the necessary hall height is efficiently reduced.

A further advantage for customers results from the cost benefits derived from the possibility of mixing servo-electric and pneumatic axes, depending on production needs.

The following modules are available and can be freely combined with one another:

- The handling system's longitudinal axis, freely programmable both with servo-electric and pneumatic drives
- All other pneumatically driven axes
- The ejection stroke, either as a total axis movement or simply a pick up movement
- A freely selectable number of rotating and swivelling axes, depending on the application concerned, in which case the swivelling axis has the crucial advantage that it shortens the handling system's longitudinal axis, thereby efficiently minimising the installation space required by the total machine configuration.

Apart from the exploitation of all control synergies, the mechanical integration of the MULTILIFT in the ALLROUNDER is optimally provided for. This makes compact solutions possible that not only permit space-saving assembly in the smallest overall installation space, but also the incorporation of all technical components beneath the main guard of the machine. The size of the production cell can be so precisely tailored to the needs of the injection moulding operation or part that complete production islands can also be ready-made and supplied for production with a CE mark. The motto is "Just plug in and produce".

Fully integrated

The complete integration of ARBURG's handling systems within the machine sequence guarantees optimum cycle times and the simplest operation, based on a common control philosophy. Depending on the application concerned, different positioning strategies, the insertion and removal of parts for injection moulding, random sample and reject parts removal and synchronous stroke movements by ALLROUNDER's and handling systems to optimise pick up times are supported.

The integrated data record for the handling unit concerned can be stored along with that relating to the machine, making data access easier and therefore improving ease of use.

A new development is the efficient Interbus-S system for the input, output and axis functions of the handling equipment; this can be expanded to accommodate up to a maximum of 128 inputs and outputs and is also prepared for the integration of additional peripherals.



entire technology comes from the same place. In addition, starting from a common base, different models can be coordinated for a wide variety of intervention alternatives. When the development work is complete, there should be a fully modular handling attachment available for each machine size. In this case, "fully modular" means that the design and dimensions of the handling system have

MULTILIFT H without its own guarding – the first step towards a modular handling system.





Technical variants

ARBURG supplies additional handling equipment both at the top and bottom end of the product range, providing problem-oriented removal solutions. Vertical sprue extraction and an integral picker that works entirely within the machine guard are available for sprue disposal. A vertical 3-axis linear unit and individually adjustable 3-axis NC configuration, which can be attached either longitudinally or at right angles to the machine axis, round off the top end of the handling range. It is the case with this equipment too that it must be completely incorporated with its own symbols in the cycle routine of the SELOGICA machine control system.

The extruded aluminium sections used for the systematic modular structure are designed with the aid of complex finite element models (FEM) and precisely tailored to both task and machine. They provide the basis for weight-optimised stability, which also permits subsequent attachments to be added, such as mechanical connections to other peripheral components or additional safety devices, without any problems.

In addition to the acknowledged functional reliability of ARBURG's handling equipment, there is the comprehensive service support – from individual design to the commissioning of entire production plants. Design, ergonomics and operator safety are based on the very latest standards, thereby fully reflecting ARBURG's product philosophy.

Fakuma: ARBURG – redesigned

The 13th Fakuma in October 1999 saw ARBURG smash all its own records. With more innovations than at the world's leading K'98 exhibition and a new stand design, the engineering company underlined both its innovative performance and the immense importance of this exhibition in its strategic considerations.

With 35,000 visitors in 1999, the Fakuma organisers claim it was still the industry's largest European trade exhibition. Over the years, the exhibition on the idyllically located ground in Friedrichshafen has developed from a regional event for companies based on and around Lake Constance to an international plastics trade show.



Contrary to popular opinion that after a "K" year no further spectacular highlights or genuine innovations can be expected, ARBURG proceeded to introduce several.

True to ARBURG's motto for this year, the multi-functionality of the SELOGICA machine control system, which is used across the board on all ALLROUNDER's, occupied a lot of space. Control demonstrations were given on the exhibition stand, where visitors had the opportunity of testing the SELOGICA's operating philosophy.

The S machine series, in particular, advanced into new dimensions. The new ALLROUNDER 630 S was introduced to the international public for the first time. A clamping force of 2,500 kN coupled with a clamping dimension of 630 mm – these figures represent the largest ALLROUNDER to date.

However, new dimensions do not necessarily mean "bigger" at ARBURG. This was demonstrated by the ALLROUNDER 220 S 150-35

for the series-production of small precision parts.

With the MULTILIFT H, the first element of a modular handling system fully integrated into the machine control system and machine processes was presented. In future the optimum handling system will be available for every application and every ALLROUNDER.

Another focal point was thermoset processing. Technically speaking, ARBURG's thermoset machines are based on the ALLROUNDER C series. The series was specially extended and adapted for thermoset processing.

The three-component version of the ALLROUNDER 420 C 1000-150/150/60 was also on display for the first time at any exhibition. A production cell with han-



dling system, which once again demonstrated the versatility of ALLROUNDER technology in solving even complex injection moulding tasks.

Top:
The customised pick solution comes into play at the end of the MULTILIFT.

Left:
Fully integrated within the main machine guard: MULTILIFT H on an ALLROUNDER 420 C.

Professionals in gear technology

Since its formation in 1962, Werner Bauser GmbH has been involved in tool manufacture and the production of high-tech precision parts made from thermoplastics. The focus of production then shifted over the years towards gear technology.

The Wehingen company has such a degree of know-how in this field that companies of worldwide repute in the automobile, electrical and clock industry, as well as precision technology, rely on its products. Production and control is based on quality standards DIN ISO 9001 to 9004. And from the very outset, ALLROUNDER injection moulding technology has been used.

The slogan "plastic in precision form" defines the aims that company founder, Werner Bauser, and his son and company director, Michael Bauser, wished to pursue with their business. These involve gear parts, as produced by Bauser, primarily with low-noise output. According to the Michael Bauser, a qualified engineer, "Even the smallest deviations affect the gear's properties, significantly in some cases, and are the cause of this noise. Here at the



company we work to an accuracy of 1/100th of a millimetre. This illustrates the fact that optimum precision is not an exception with us, but the rule!".

For Bauser, it goes without saying that the company works unswervingly to such standards of precision. Since October 1999 the latest "baby" in this sector has been the opportunity of calculating gear designs, including special designs outside the scope of the DIN standard, in addition to gear optimisation. Not least worldwide customer requirements necessitated this step towards service provision.

The way to the industrial company

In 1962 Werner Bauser formed a company for the production of technical parts for the clock and electrical industry. The company's history wholly vindicates his belief in what plastics were capable of. By 1975 there were already 50 employees working at the present company site in a 2,200 m² production area. In 1986 this area was doubled to 4,400 m² and in 1998/99 an extension was added to the works providing another 1,100 m² in the operating phase. Today, the Wehingen works presents itself as an operation absolutely in tune with ergonomic considerations and production

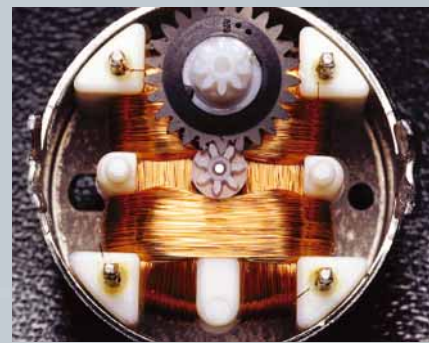
flow and in line with the very latest technological developments.

Quality comes first

Anyone involved in the production of high-precision gear technology will come into direct contact with quality considerations. In Wehingen, therefore, they began as early as 1989 to keep complete quality records. In the plastics test laboratory relevant characteristic variables, such as the melt flow index (MFI)/ melt volume rate (MVR) or coefficient of viscosity measurements, are taken for both the starting material and also end products. This test routine is supplemented by machine-based quality assurance. The production level is monitored based on parts-specific test plans via SPC test stations integrated in the production process. Tests are conducted according to the aforementioned ISO criteria up to the final inspection.

Up to a million plastic parts a day are manufactured in this way at the Wehingen works. The product range currently includes 1,000 different components with item weights of between 0.005 and 100 grams. According to Michael Bauser, the annual average growth rates have never dropped below 5% since 1994.

A total of 125 staff work in production and administration, as well as 55 employees in the injection moulding plant and a further 22 in mould construction, seven in work preparation and design and 18 in quality assurance. 3-shift working ensures that ma-



chines work to optimum capacity. Short-time working has been an alien concept at Bauser since the company was formed.

World perspective and cooperation

Achieving this sort of company result requires once thing above all – a world perspective. It is precisely this common interest that Bauser learned to value from ARBURG and that the company is



Top: 1) Stepper motor gears for car fittings. 2) Semi-spherical gear in window opening module. 3) Throttle detail. Photo: Bauser.

Left: Bauser's parent plant in Wehingen covering a total area of 5,500 m². Photo: Bauser.

one of our major customers, with 108 ALLROUNDERS in all. As long ago as 1995, the sale of the hundredth ALLROUNDER was celebrated in Wehingen by way of a joint ceremony.

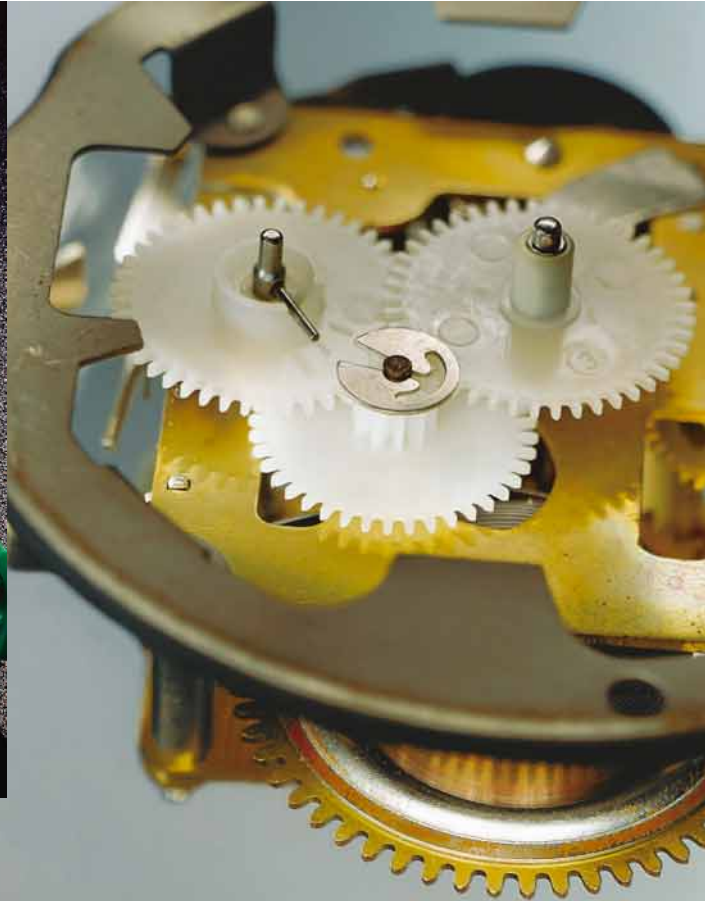
At present there are 90 injection moulding machines in production at the Wehingen works, including machines used for the injection moulding of inserts and complete production cells. "Right from the very outset, we were happy with the engineering and service provided by ARBURG", says Michael Bauser, commenting on the long-standing business relationship. "Even if there were the occasional problems, solutions could always be found that satisfied our requirements in terms of quality and precision". Practical cooperation is evidently usually the best.

Important goals are clear

Werner and Michael Bauser wasted no time in laying the groundwork to enable the company's development to continue as it had over the last 38 years. This was not least thanks to ISO certification, in which the work of Jürgen Bauser, Werner Bauser's second son and head of quality management, was crucial. Today the company is lean and flexible, because most of the necessary adjustments were made at the start of the 90's. Today, full use is still being made of the rationalisation potential available at the works, to enable the company to succeed in this highly contested market.



*Spur pinions are needed in a variety of sub-assemblies for the automobile sector
Photo: Bauser*



Apart from the key phrases TQM and KVP, rationalisation, improved service and greater customer satisfaction as general objectives, there are also special aspects that are to be targeted and achieved in future. Consequently, Bauser intends to become more firmly established on the international market as a niche supplier of technical parts, focusing on gears and gear wheels, primarily through an aggressive new customer acquisition strategy. Bauser is said to have joined the ten leading German gear specialists in 2000.

Who would have thought it when Werner Bauser began production of the first cogs for the Black Forest clock industry back in 1963? That's something else

the Wehingen company has in common with ARBURG – a sensational company success story with no end in sight. So, Michael Bauser is planning to replace smaller machines with larger ones with clamping forces of between 1000 and 3000 kN.

A step that both companies can once again take together. ARBURG is already creating the capacity for extending the ALLROUNDER range at the upper clamping force by increasing their manufacturing potential. Further investment in gear optimisation, measurement and production, such as the procurement of the very latest computer software, has been made or is currently being implemented at Bauser. Thanks to this, the company will

remain competitive into the next millennium. And one more thing... Like ARBURG, Bauser has no intention of making any changes to the ownership structure. "We are and will remain a limited company and therefore a family concern", say the Bausers in unison on the subject of ownership. Which brings us back to the start of the story, because at the end of the day nothing is better for coordinated working than an optimum business atmosphere, a friendly relationship between staff and personal contact between management and personnel by means of short communications paths and horizontal hierarchies. And where better to find this today in its purest form than in a family business!



Electrode and mould processing in the company's own mould construction division. Photo: Bauser

The new dimension

As with all developments at ARBURG, the handover between generations in the owners' families was carefully planned and prepared well in advance. The next generation of entrepreneurs, marketing boss Juliane Hehl and board member Michael Hehl, talked about ARBURG's perspectives and visions in an interview with Dr Christoph Schumacher.

What exactly is behind the motto for the year 2000 "ARBURG – The New Dimension"?

Michael Hehl: We want to make a clear statement on the current expansion of our clamping force range from 150 to 2500 kN. "New dimension" quite simply means that we are planning to build machines capable of up to 4000 kN in the near future.

Juliane Hehl: But that's not all. This year ARBURG II will represent a quite decisive expansion of our productive capacity and will also provide the structural conditions in which our MULTILIFT modular handling system can be produced. ARBURG is entering a "New dimension" with great dynamism.

How are things looking for ARBURG at the start of 2000?

Juliane Hehl: I think things are looking very good. Our new products mean we'll have a good start.

Michael Hehl: ARBURG has been very successful up to now in the 2000 kN and under product range. If we can repeat this success in the next category up to 4000 kN, even if only as a starting point, and I don't doubt we can, then we have a very rosy future ahead of us.

What is going to change?

Juliane Hehl: It's perhaps more important to consider what is not going to change? We will not neglect ARBURG's traditional qualities, such as service and machine and applications technology, but we will move in new directions.

Michael Hehl: We want to continue to take care of the things that have made us strong - anything else would be madness.

ARBURG is a family firm operating in a market with many rival groups. How do you rate ARBURG's chances?

Michael Hehl: We are very mindful of this. But competition from the multinationals only serves to motivate us rather than scare us off. The disadvantages of these companies only work to our advantage and we will be continuing to make very specific use of them in future – flexibility and short decision-making paths.

Juliane Hehl: We are also very mindful of the competition from Asia. We are expecting clear signs of the European offensive anticipated in 2001 at the NPE in Chicago. But, of course, even that simply provides us with greater motivation.

How will the needs of the customer change in the coming years?

Michael Hehl: The customer is quite justifiably demanding an ever more comprehensive service. In future, the quality of the direct injection moulding machine will be only one of the crucial purchasing considerations. The trend goes as far as complete production cells where, apart from machine technol-

ogy, handling, service and applications technology also play quite a crucial role.

Juliane Hehl: The development of our universal SELOGICA control system is not purely a matter of chance. It will be the shining light of our entire programme. And at ARBURG it almost goes without saying that we want to make vital additions to our service provision.

What will be the effect of this?

Michael Hehl: Greater customer proximity, even greater flexibility, greater service, greater dynamism! We can assume from what you say that you have your sights firmly set on what has to be done over the coming years and are in no way intimidated by what the future holds.

"We understand from your comments that the assignments for next year are firmly in your sights and are not a cause for concern when facing the future"

Juliane Hehl: That has always been the case and will remain so. Perhaps we look a little further into the future than others, who have to have their sights set on the next quarterly result.

Michael Hehl: We are in no way intimidated by the future. We know what we have to do and recognise our responsibility to our customers and to our 1,750 employees. We are systematically entering a new dimension!

Making great strides into the future: Juliane and Michael Hehl (left) with Dr Christoph Schumacher.





The integrated clean air cover – entry into clean air technology

The increasing need for high-quality plastic parts for optics, electronics and medical technology is placing ever greater demands on the cleanroom standards of production areas. The aim is to achieve the most particle-free production process possible.

Under normal conditions, the creation of dust particles during a production operation is unavoidable. In fact, it is the human, in other words, the operating staff, that represents the greatest "contamination source". But the injection moulding machine, including the granulate supply, also produces unwanted dust particles through its various working processes.

So how can the problem be addressed? Installing the entire production unit in a clean room requires costly large-room technology and disciplined, trained staff. Consequently, it makes far more sense to create clean air conditions for the actual production area, i.e. the mould area in the case of an injection moulding machine.

As a simple, cost-effective solution, ARBURG's flow-box offers the opportunity of reducing the particle load in the mould area significantly. Purity grades in the 1000 category (according to US Federal Standard 209) can be achieved locally. These are areas in which, for instance, a wide variety of products are made for electrical and medical technology. ARBURG has been successfully using the flow-box for some time in the production of optical data carriers.

The flow-box is either fitted straight onto the protective hood or at the side on the back of the guard. Ambient air is drawn in by a fan and conducted through a high-efficiency submicron particulate air filter lid. The high-grade, purified air is then conducted into the mould chamber as a low-turbulence displacement air current. At the same time, ions are emitted close to the mould closure via an air ionising unit, whereby electrical charges are neutralised. The high-grade, purified air moves in parallel flow lines at a virtually uniform velocity in a downward current (if attached to the back of the protective hood, in a horizontal flow), so that the released dust is transported out of the mould area by the shortest route.

The air intake produces a slight excess air pressure beneath the protective hood, preventing unfiltered air from penetrating from outside. Even if the protective doors are opened on the operating side of the machine, no contamination can take place, since the incoming air flow always blows particles out of the working area. Since the entire clean air unit can be moved along with the associated protective devices, all maintenance and assembly work around the clamp unit can be carried out without restriction.

Justified hopes

Developments in Latin America have been provoking increased scrutiny from ARBURG, not least since the economic problems experienced in the Asiatic region. The company has a network of independent agents there.

The people show great commitment in introducing the philosophy and advantages of the ALLROUNDER to customers and potential customers alike. The primary objective here, too, is of course to consolidate ARBURG's position, particularly since the automobile industry and with it the corresponding component suppliers are heavily represented in this part of the world.

As a result, agents from Brazil, Chile, Guatemala, Mexico and Venezuela met last October at the head office in Loßburg, to get to know one another better, exchange experiences and hear the latest information. The symposium lasted from the 18th to the 20th and involved two days of intensive training with a visit to the Fakuma.

This was the second time an agents' symposium had been held since its inauguration in 1998 and it is to become a regular event in future too. In order to be able to expand the company's market share in Latin America, not only will the link between the commercial representatives and head office have to be strengthened, but partners locally will have to

be provided with the technological means of optimising sales, through information and training.

What is interesting in this connection is, above all, the fact that different market shares in some countries within the region are already higher than in the Asiatic basin, which means

that the focal point will have to be found based on the industrial development in the manufacture of technical products and special applications. This makes intensive consultation and support at ARBURG's end necessary.

Both ARBURG's organisers, Peter Liebe and Miguel Garcia, and all those who attended were agreed on the favourable outcome of the symposium. As a result, plans are already afoot for the next event to be held this year and those agents present in 1999 have promised to attend once again.

Those present at the second ARBURG agents' symposium with partner Michael Hehl (5th from left).



UNITED KINGDOM

Customer satisfaction comes first

Who thinks only of pommes frites, chocolate or beer when they think of Belgium? Yet the clichés are unfounded, just as unfounded as the symbols of sauerkraut, schnitzel and wind instruments in the case of Germany.

Belgium is both home to and user of high-tech, something that is not least symbolised by the Atomium to Brussels. And that it precisely why ARBURG has had a local presence there since 1960. This began with an agent then, as the organisation increased its international profile, it opened its own branch office in 1992.

Holsbeek, a site offering excellent transport communications, being right on the A2 close to Leuven and therefore within the Brussels conurbation, is home to ARBURG's Belgian operation. It is here that managing director, Simon Bemong, and his staff provide advice, sales and service back-up for ALLROUNDER injection moulding technology. However, the catchment area of the Belgian branch extends beyond national boundaries and ARBURG NV is responsible for the Luxembourg market too.

In 1992 Loßburg decided to open its own branch in Belgium as part of a coordinated European marketing strategy. Simon Bemong had previously operated his own agency in the same territory. The growth in staff numbers also shows that the company was right to open a branch office there. Bemong can now call upon a further six members of staff, who work in order processing,

book-keeping, consultancy and service.

All service engineers have fully equipped vans, enabling them to carry out repair and maintenance work at the customer's premises. The entire region can be covered quickly and easily from Holsbeek, since the central location guarantees short journey times.

As in all other branches, ARBURG's Belgian operation also has a demonstration room, a training room and extensive spares store as its "series equipment". The demonstration room is fitted out with the very latest machine technology for customer trials, while the training room serves both as an internal advanced training facility and a centre from which to run training courses for ARBURG customers. Finally, the spares store guarantees a smooth and, above all, quick solution for most technical and maintenance problems.

The online connection to the parent plant in Loßburg and all other international ARBURG subsidiaries guarantees an effective spares supply – usually within 24 hours – even if the part required in Belgium is not actually in stock.

"International cooperation" – a key concept, the meaning of which has a somewhat relative value in a country that requires proficiency in two or three languages, in order to be able to work efficiently. That's just how things are and that's how you work. Consequently, managing director, Bemong, also gives customer satisfaction pride of place

as ARBURG NV's philosophy, "In principle, it doesn't matter where our customer is based. We want to ensure their satisfaction in every case with good sales advice on the ALLROUNDER, an optimum spares supply and complete, comprehensive service!". A philosophy certainly worth drinking to with a good Belgian beer...

Brussel
Holsbeek

ARBURG

FRANCE



Concentrated know-how: Managing director, Simon Bemong (centre) with his team, Leo van Bracht, Luc Alaerts, Nicole Brans and Ingrid de Wel (from left).



A clear perspective: ARBURG's new branch in the Belgian town of Holsbeek.

SPAIN