Information on
Injection Moulding
Market and Technology

ARBURG today

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ARBURG Group

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ARBURG II: Change-over – step by step

Contents

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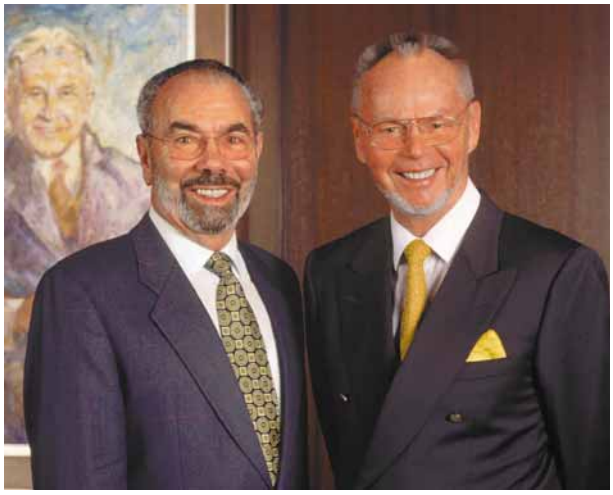


The pace is stepping up as we move towards the year 2000. This move into the new millennium has involved the company in major efforts to convert the computer system. Y2K compatibility is the key word here.

ARBURG's readiness for this and the assurance that this magic date gives us no cause for alarm was confirmed in the very positive result of the audit at the beginning of March by TÜV Rheinland/Berlin-Brandenburg.

Our company did, however, distinguish itself in other ways this year: in an independent market survey on brand image, ARBURG came out streets ahead in first place and was further honoured by Robert Bosch GmbH with the supplier award for 1997/1998.

All this clearly confirms that our company is on the right road. With ARBURG II, we are setting a new, important milestone in our company history on this road.

With ARBURG II, too, complex functions will go hand in hand with appropriate design, remaining true to our ARBURG promise. Bad design is hard to sell.

We hope you enjoy this latest edition of ARBURG today.

Karl Hehl

Eugen Hehl

A double victory for ARBURG

ARBURG has two great reasons for congratulating itself: in the May edition of the specialist plastics magazine "Plastverarbeiter" (PV) ARBURG gained pole position in a survey of the plastic injection moulding machine market that PV-Redaktion was commissioned to undertake. This was followed in July by the second major distinction.

ARBURG was honoured with a supplier award for 1997/1998 by Robert Bosch GmbH "For quality and special services as a Bosch Group supplier". Good reason for both management and the workforce to be especially proud of their company.

The PV market survey was run by Pfenning Marktforschung/ Beratung/Analyse (MBA). The outcome of the brand image investigation could have hardly been better for ARBURG.

Out of the ten competitors named, the company came in a clear first with a total score of 88 out of a possible 100 points.

Particularly satisfactory results were achieved in the management, customer information, confidence and innovation sectors.

ARBURG came first in each case in these. The company came second in machine quality, service quality and troubleshooting. There was no ranking lower than second.

"The traditional index for the strength of a brand is spontaneous recognition", is the view of the market researcher, Winfried Pfenning, in assessing the result as a sign of ARBURG's exceptional market position in his survey. A company's image affects the buying decisions of potential customers because today there are so many companies with similar product services, so this ranking as top company came just at the right time.

The ARBURG management felt that these exceptional marks were the result of joint efforts, to which all employees had contributed in their own particular sector.

The same applies in principle to the second distinction of the year as well, with the quality prize awarded by the Bosch Group. The focal points for scoring were the quality of products and services, flexibility and reliability of supply of Bosch partner companies. The award is of particular value to ARBURG, as for the first time, companies from the capital goods sector and logistics service provider sector were also honoured.

Managing Director Herbert Kraibühler (second from left) and Divisional Head Domestic Sales Eberhard Lutz (3rd from left) accept the award from Dr. Wolfgang Colberg (left) and Dr. Klaus Bolenz (right). Photo: Bosch

Apart from ARBURG, a total of 52 other companies including three other capital goods manufacturers were awarded the sought-after trophy, which is only awarded every two years.

Efforts to ensure comprehensive quality control, implemented at ARBURG with dual ISO 9001 and 14001 certification, are naturally increasingly becoming a feature of general working life, but it is particularly pleasing when these efforts are also recognised and appreciated by customers and business partners. We would therefore like to extend particular thanks for this double victory. We shall continue to make every effort in the future to justify the confidence placed in us. This is your most obvious right as a customer!

Highly delighted – three ARBURG associates with Plastverarbeiter publisher Alexander Büchler (from left to right, Michael Hehl, Eugen Hehl, Alexander Büchler, Juliane Hehl).

The Bosch Group's recognition of the special quality of service supplied by ARBURG is set in stone.

13 – A lucky number for the exhibition centre Friedrichshafen

1981 saw its successful introduction: we are talking about the International specialist exhibition for plastics processing, the Fakuma in Friedrichshafen.

The continuing success of the Fakuma shows just how right P.E. Schall, the exhibition organisers, were to take the plunge. It is not only the technological highlights of the exhibition itself which attract the public, but also the region itself with that special Lake Constance flair, and the town of Friedrichshafen, which has a long history of technology behind it – thinking of the Zeppelins, for example.

With innovative industrial concerns such as ZF, MTU and DASA, Friedrichshafen shows how orientated it is to the future and to growth. The current municipality numbering some 55,000 inhabitants also benefits from tourism to the Lake Constance area.

Optimum extension

So how does the exhibition fit into this scene? Clearly very well indeed, as events are so popular that there are concrete plans for extending its capacity. Paul Eberhard Schall, the main director of the exhibition organiser, P.E. Schall GmbH Frickenhausen, is steering towards a new exhibitor record with the 13th Fakuma exhibition.

ARBURG has been in on it as an exhibitor right from the first Fakuma in 1981. In the view of Eugen Hehl, Chairman of the ARBURG board, the exhibition is an essential feature of today's specialist exhibition calendar. ARBURG has always strongly supported this exhibition not just for regional solidarity but also because it feels that the exhibition concept is exceptionally convincing. A highly professional exhibition organisation provides a great attraction with a high level of information but at the same time a familiar set-up in beautiful surrounding countryside.

ARBURG: focal points of the exhibition, both large and small

So what does ARBURG have to offer at the Fakuma this year?

Both large and small innovations, you could say. The 220 S 150-35 that ARBURG is showing is the smallest ALLROUNDER for making micro-parts with a 15 mm screw, which made its debut at the Technology Days '99. Another new introduction is the ALLROUNDER 630 S 2500-1300 representing the large-scale ARBURG machines. With a clamping force of 2500 kN and an injection unit size 1300, this machine paves the way to new production potential for customers with machines in the medium clamping force range.

A further focal point of the exhibition is thermoset processing. In this sector ARBURG is showing a specially equipped 420 C 1300-350 machine for processing thermoset wet polyester with an INJESTER tamping device. The coupling housing made on this ALLROUNDER is handled by a new design ARBURG horizontal handling system, which grips the mould from the rear side of the machine.

ARBURG is showing a representative cross-section of the ALLROUNDER machine range from the smallest to the largest, with several innovations as highlights.

SELOGICA

The overriding topic of the year, the SELOGICA control system and its exceptional advantages, is also widely represented here. The control system available universally for all new ALLROUNDER machines with graphic sequence editor, extensive individual access and monitoring options, ergonomic operation and divided-screen technology offers installers and operators optimum overview and transparency. The interested visitors can try out dummy terminals and operate the machines directly at the exhibition to discover for themselves the advantages of this.

So the company is showing three new developments at Friedrichshafen in 1999 alone. Proof that ARBURG really appreciates the worth of Friedrichshafen as an exhibition centre. Anyone who knows ARBURG will know that it still might have an ace up its sleeve. And where better to play it than the trusted exhibition in Lake Constance, which is so close to ARBURG's home.

Friedrichshafen at Lake Constance
Photo: the town of Friedrichshafen

Modern environment: the Friedrichshafen exhibition offers the optimum setting for specialist events.
Photo: the town of Friedrichshafen

Three questions on Fakuma to Paul E. Schall

Did ARBURG's presence at the first Fakuma exhibition in 1981 have a signal effect on the further development of the exhibition?

ARBURG's forward-looking decision to exhibit at Fakuma in 1981 in Friedrichshafen was certainly an important step in the success of our exhibition. The decision was a clear indication to the sector. So Eugen Hehl is without doubt one of Fakuma's main sponsors.

How do you see the exhibition centre, Friedrichshafen, and Fakuma developing in the future?

In 2002, Friedrichshafen will have finished a new exhibition area covering 55,000 square metres gross with 7000 m² more space than the present site. This will open up further opportunities for development to Fakuma. So I see very positive growth potential both the for the site and for the exhibition itself.

How do you see the growth potential for the plastics sector in general and where do the main trends lie in your view?

Development of the Fakuma is a clear indication: the plastics sector has a very sound future in my view. Important specialist areas with attractive possibilities for development are, for example, powder processing, optical disc production and multi-component and sandwich injection moulding.

City map: Friedrichshafen

Take the Shuttle to MIMtec

Anyone visiting the Fakuma exhibitions as an interested spectator and processor of injection moulded parts using metal powder should make sure they talk to our nice ladies at the information desk.

In conjunction with ARBURG, the Swiss firm MIMtec will be operating a shuttle service during the exhibitions to Rorschach, bringing guests to the company so that they can see MIM's exemplary production for themselves.

MIMtec AG is an ARBURG customer and a 100 % subsidiary of Perfecta Schmid AG, an internationally renowned manufacturer of weaving machines. Complex metal parts needed for production are produced on two 270 S 500-60 ALLROUNDER machines collected by the handling system, palletized, with automatic fluid and thermal debinding.

Various group trips are offered, organised and operated jointly by MIMtec and ARBURG. Individual visits are also possible.

Further details can be obtained from the information desk at the ARBURG stand at the exhibition in Hall 3, N° 326.

Ultra-modern: MIM production line at Rorschach
Photo: MIMtec

Camo: Success started at the cinema

If the owner of the "First TV cinema" in Schwanenstadt in Austria had known that his premises would one day house a high-tech company involved in the design and construction of injection moulding products, he would certainly have changed direction.

Of course, Camo's head offices are no longer housed here, but even more successful than the development of the cinema was indeed that of the firm itself: the cinema no longer exists, but Camo certainly does!

Camo's history – 10 years of rapid growth

Still back in the time of the cinema, in January 1989 Camo's owner, Josef Eidler, bought premises in Schwanenstadt which, having previously been used as a cinema and knitting concern, seemed to be ideal for producing

precision moulds for injection moulding and press blanks. Camo, standing for Computer Aided Moulding, was born. Even at that time it was not just a mould construction firm working hand-in-hand but a CAD flexible design and production facility.

100 employees now work at Camo, not only on injection moulds but also press blanks and devices, machine components and injection moulded parts, as well as assembling high tech equipment. CAD is used throughout the business from design to planning through to production.

From the outset, Josef Eidler concentrated on training his own apprentices. "That is part of our company policy", his reasoning goes. "We want to train up our own specialists".

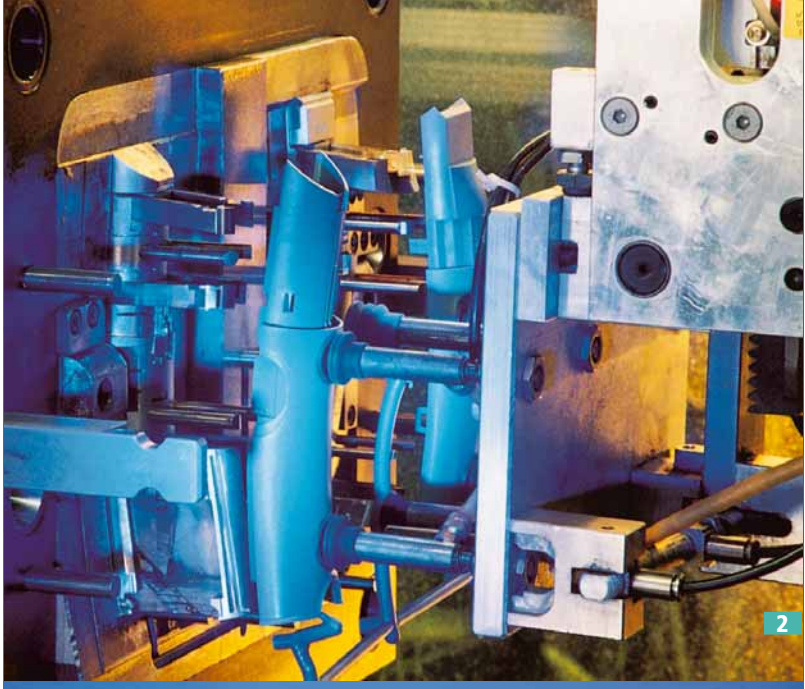
How ARBURG started at Camo

Obviously, when the company first started to develop, mould construction was the main business, so the first ALLROUNDER machines were designed exclusively for matching customer moulds. Customer requirements soon, however, became more extensive. They were clearly on the road to complete processing of entire projects. From the design and construction of moulds through to production and impression of injection moulded parts, and finally pre-assembly and packaging, all these tasks are now covered by Camo.

This meant that the injection moulding sector also became increasingly important. 24 injection moulding machines are now in operation at Camo, including 17 ALLROUNDERs, giving ARBURG the lion's share.

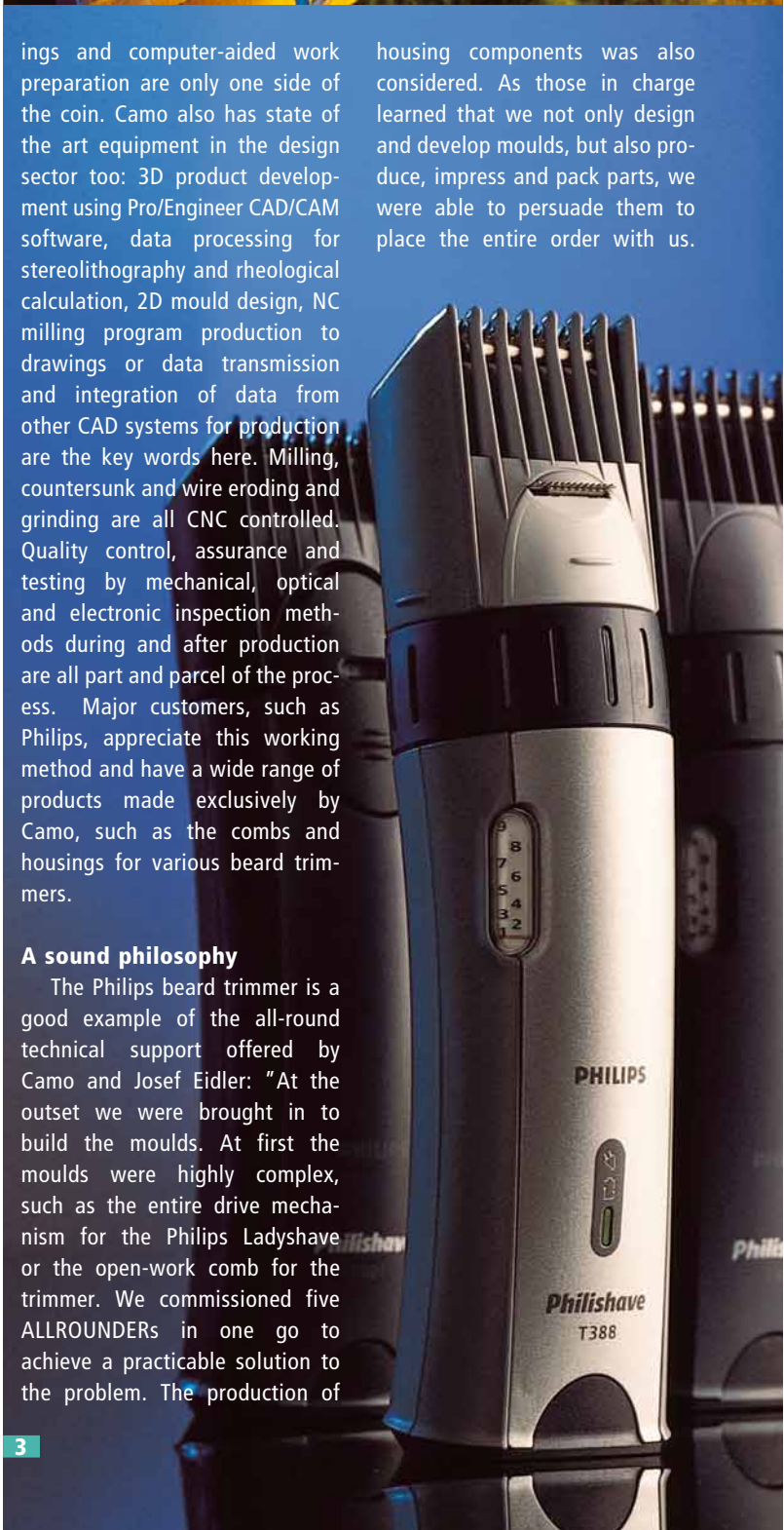
High tech for complex moulds

The main end users of Camo are from the electronics, precision mechanics, household appliance and automotive industries. The demand is usually for complex mould geometries. This is why the design and development departments are so closely involved in planning. Detailed working drawings and computer-aided work preparation are only one side of the coin. Camo also has state of the art equipment in the design sector too: 3D product development using Pro/Engineer CAD/CAM software, data processing for stereolithography and rheological calculation, 2D mould design, NC milling program production to drawings or data transmission and integration of data from other CAD systems for production are the key words here. Milling, countersunk and wire eroding and grinding are all CNC controlled. Quality control, assurance and testing by mechanical, optical and electronic inspection methods during and after production are all part and parcel of the process. Major customers, such as Philips, appreciate this working method and have a wide range of products made exclusively by Camo, such as the combs and housings for various beard trimmers.



A sound philosophy

The Philips beard trimmer is a good example of the all-round technical support offered by Camo and Josef Eidler: "At the outset we were brought in to build the moulds. At first the moulds were highly complex, such as the entire drive mechanism for the Philips Ladyshave or the open-work comb for the trimmer. We commissioned five ALLROUNDERs in one go to achieve a practicable solution to the problem. The production of housing components was also considered. As those in charge learned that we not only design and develop moulds, but also produce, impress and pack parts, we were able to persuade them to place the entire order with us.



Providing a full service also means making the most of the synergic effects in the company. So our methods pay off, despite a possibly higher production cost, on unit numbers."

Clearly the entire company philosophy bears fruit, as Camo has already three times been awarded the distinction of "Internorm partner diploma", as well as receiving the "Gold Supplier Award" from the Phillips DAP household appliances factory in Klagenfurt. Camo itself has had ISO 9001 certification since 1997.

Salient details: housing components for the Philips beard trimmer

One complex practical example from the Camo production unit is the complete production of housing components for the Philips beard trimmer. Three ALLROUNDERs operate in a Geiger handling assembly line, to produce a window and the front and back of the trimmer housing, which is then impressed in the same production block and palletized in ready-made blister packs. Sprue separation is handled automatically, so that production is fully automated.

One feature of particular interest is the production of the window, which is later used to display the cutting length setting. It is made of clear PC and is produced on an ALLROUNDER 270 C with a single mould. A handling robot removes the window from the cavity and places it on the pick-up device of a linear slide. The slide runs to the buffer press where the window is impressed and made ready for pick-up by a further handling system. The second handling system takes the window and places it in the mould of one of the two ALLROUNDER 370 C 600-250, which are positioned on the left and right at right angles to the central linear slide. Injection moulding of the window with the ABS cover and the housing, i.e. the back of the future trimmer, made of the same material, takes place in a twin cavity.

This is where it starts to get complicated. After opening the mould, the CNC handling system removes both parts, but then places just the cover in the pick-up of the linear unit. Before that, the cover produced by the second ALLROUNDER C and impressed in the interim, has been removed from the linear slide to leave space for the next one to be impressed. As this new impression process is taking place, the impressed cover and the housing are placed together in the blister pack. The complexity of the procedures is increased still further by the fact that the production unit works discontinuously to enable automatic exchange of the packaging inserts in the two ALLROUNDER C machines without interrupting production.

The comb for the beard trimmer is produced on a machine with twin moulds. The design of the mould is particularly expensive in this case. The combination of open-work bars which do not pass all the way through but stop at the corner angle, require extremely high precision in mould construction.

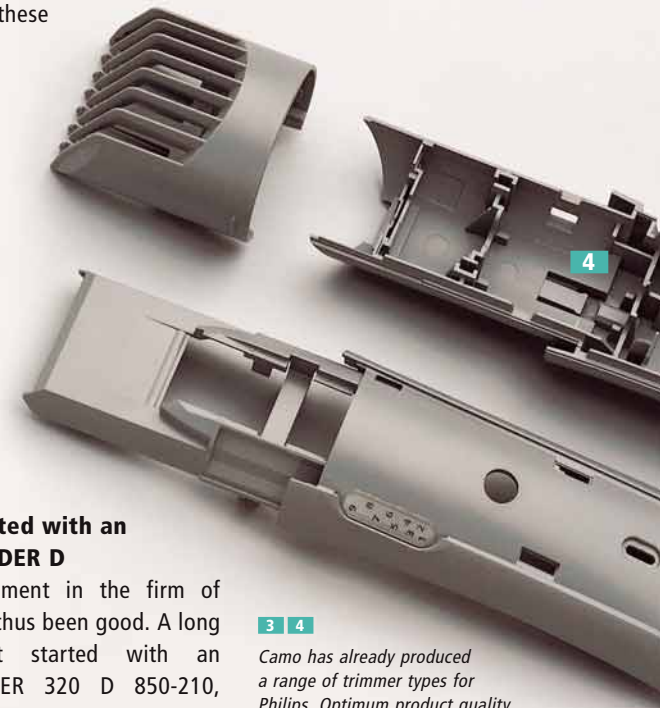
The combs are produced on an ALLROUNDER 270 C 400-100, with a CNC device ensuring careful handling, positioning in the correct setting position and packaging in the boxes. As Josef Eidler says: "It is not without good reason that we are considered a centre of excellence by Philips, when it comes to making these parts".

It all started with an ALLROUNDER D

Development in the firm of Camo has thus been good. A long road that started with an ALLROUNDER 320 D 850-210, which ARBURG and Camo have trodden together over the years. The owner of the company is well pleased with our Black Forest machine technology as ever before. As Eidler comments, "ARBURG products have our full support. What we have learnt about injection moulding we have for the most part discovered on the ALLROUNDERs. And that is likely to continue! "

Investment in the future

Josef Eidler sees the way forward as follows: "Development must proceed in other company sectors just as dynamically as it has with CAD/CAM. I am thinking in particular of further expansion of automated production as well as extension of assembly lines. At a technological level, multi-component injection moulding is the way forward. We have started producing hard/soft combinations and feel that this sector too is a further point of contact with ARBURG".



3 4 *Camo has already produced a range of trimmer types for Philips. Optimum product quality even in detail is a common feature to all.*

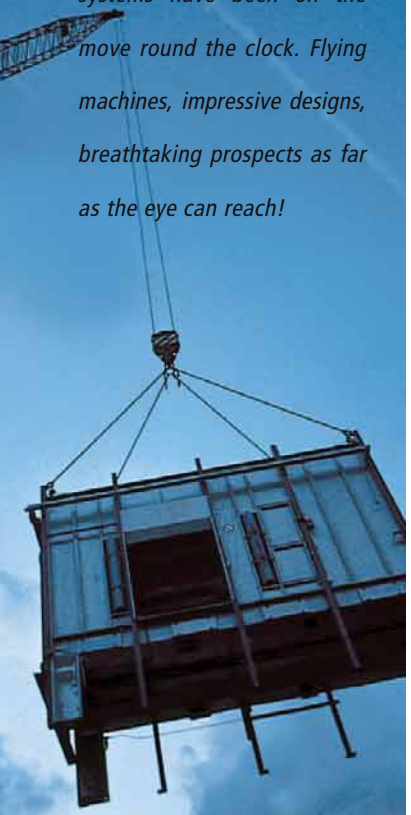
1 *The transparent window is impressed in a buffer press.*

2 *The complex twin cavity mould is used for the production of the housing and cover of the ABS cover. Photo: Camo.*

Light and bright

New views, prospects and insights, but also more company transparency: a glass structure offers many interpretations

ARBURG II is making major strides into the future: whilst some sectors are still continuing with the basic tasks, since July parts of the production systems have been on the move round the clock. Flying machines, impressive designs, breathtaking prospects as far as the eye can reach!



Whilst we are used to this type of architecture from exhibition halls or formal buildings, ARBURG will be using this design specifically for the construction of ARBURG II for the production sector. The advantages of this type of construction which should be ready for all sectors to move into in the year 2000, are anything but mere philosophy. According to the latest scientific evidence, ultra-transparent buildings permeated with light with a view of the outside generate motivation and this has a positive impact on the well-being of employees. That includes an ergonomic workplace design.

Factors considered for the previous company buildings have been even more closely incorporated in the new building: energy saving, environmental protection and use of natural resources are priority targets for ARBURG II and thus anchored in the company's philosophy.

The ARBURG types bay will measure 80 x 96 m, with glass facades on three sides, to a total of 3,000 m^2. The high quality heat insulation glass will be combined – as in the administration building – with wall heating housed in the pillar frame system. This obviates the necessity for conventional heating units. Additional heating is provided solely by dark glas radiators in the ceilings and floor heating in the basement, the floor heating being supplied by waste heat from the production process. Shade against peak solar radiation in summer will be provided by a specially designed frieze on the east and south sides of the building.

Foundation work

"Light" is the keyword in construction of ARBURG II. The prime factor is optimum lighting at workstations inside the bays. Daylight is provided not only through the transparent outer skin of the bays, but also via the shed roof. The glass front of this structure at an angle of 60° is on the north side, and the non-transparent surface on the south side. This is set at an angle of 45°. The 60° angle ensures a relatively low heat input. On the non-transparent south side, solar technology can be applied at an optimum angle to the sun. Here solar collectors will be used firstly to utilise solar heat and secondly for photovoltaic current.

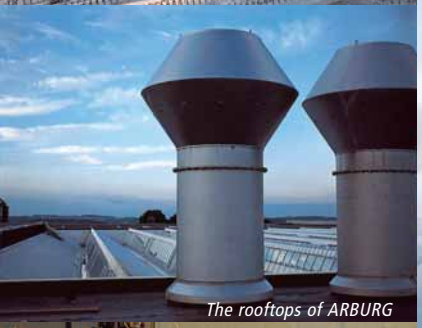
"Intelligent" bays

An EIB (electronic information bus) system will be used to control the entire lighting system inside the bays. Energy saving lamps can be switched on in stages to achieve the optimum lighting levels in all working areas in conjunction with penetrating daylight. All the building services – heating, ventilation, etc. – will be controlled by the central building automation system of the works, which also handles extraction of harmful CO from the road at the goods delivery point. Bay ventilation is largely handled by natural means and is also possible in poor weather conditions by means of a specially integrated module on the south side of the shed roof.

Natural resources are also utilised in the form of rainwater collection. The current planned collection capacity is 600 m^3. 350 m^3 in the area of the sprinkler tank will enable waste heat from the production process to be "stored"

Art in construction: the wide range of pipework will be pre-graded

Load-bearing elements



The rooftops of ARBURG

Work round the clock

up to a temperature of 40 °C max., so that in cold weather the heat stored there can be recycled. This will be supplied to the buildings as heating energy. The remaining collection capacity will be used on the one hand for external irrigation and on the other hand as industrial water for the sanitary blocks.

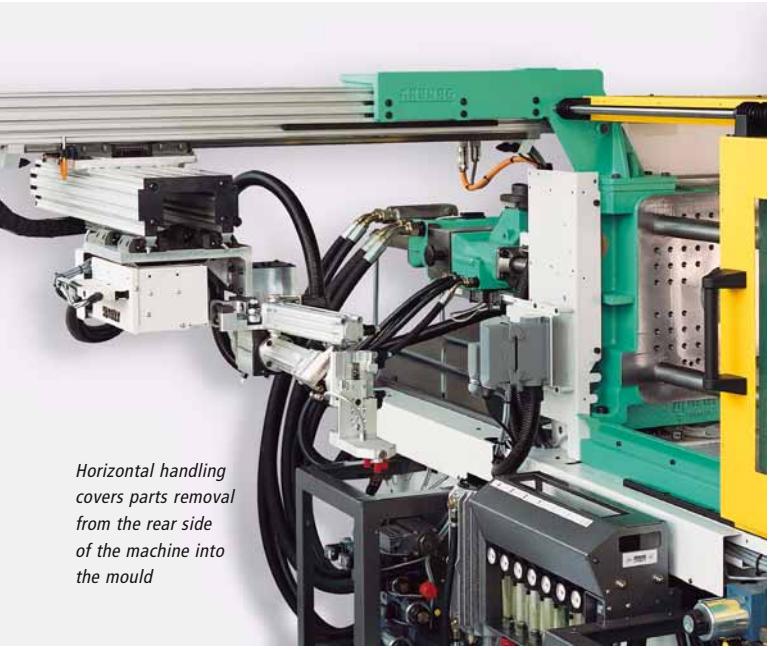
With regard to the future financial impact of sealed areas, this procedure will provide items for tax offsets.

Safety measures

The safety necessary in a building complex of this magnitude will be ensured by clearly visible evacuation, alarm and rescue systems. Complete room monitoring controls access to the buildings as well as lorry preparation at the goods delivery point.

Ground, floor and drainage protection is also especially considered in the waste disposal building. All devices and containers are designed accordingly. The concept of multiple use of energy thus makes for an "intelligent" extension to the works combined with automation of the building.

...by...step....



Horizontal handling covers parts removal from the rear side of the machine into the mould

Fast intervention

At the Fakuma exhibition, ARBURG will be presenting its latest developments in the handling sector on three of its machines – the ALLROUNDER 570 and 420 C and the ALLROUNDER 470 S: horizontal handling, a cost-effective, ergonomic solution for removal of parts from the simple through to the more complex.

This new removal handling system will in future be offered on all machine sizes.

Compared to vertical removal, horizontal intervention offers some important advantages. Firstly horizontal removal has much less impact on the height of the entire machine configuration. It is fully variable even when used in the parting line, as it moves in from the rear side of the machine. The conventional machine arrangement thus becomes more universal, as additional vertical peripherals such as brush or stripping devices can be used. Moulds can be inserted from the top into the clamping unit without obstruction and the shorter intervention paths provide additional stability and speed due to the horizontal axis arrangement, not to mention cost benefits.

Swivel movement

The gripper arm of the horizontal handling system travels along a defined path into the mould closure and can, if necessary, perform a swivel movement 90° around a vertical axis outside the mould. This provides a large setdown area, but the dimensions of the machine and handling system at the same time remain compact. Grippers, pincers, suction boxes or suction plates can be fixed swiftly and easily. Admissible gripper weights and available intakes and outlets enable more complex gripper configurations to be used, however. The simplest design of the new handling system operates pneumatically, with the option of adding on further pneumatic shafts. A further option is servo-electric horizontal intervention shafts.

In line with ARBURG philosophy, the new handling system can also be integrated with all its processes in the SELOGICA machine control system.

Cable boxes and handling manipulators

There is not a buyer, machine installer or operator who wants to know what really goes on in an ALLROUNDER. All that matters is that the machine functions.

To make sure that our customers need to worry as little as possible about the "inner life" of the ALLROUNDER, some of our firm's departments do nothing but that: the control cabinet construction unit at ARBURG assembles, groups together and puts the control cabinets of all ALLROUNDERs to the acid test before they are passed on for final assembly.

Control cabinet housings are passed on complete to the department from steel plate manufacture, control hardware from the electronics department and cable harnesses from the cable manufacturing unit.

The control cabinet construction department is responsible of making a functional ALLROUNDER central switching system from all the various components.

The first stage in this is plate assembly. It is here that the individual components for the heavy power units – such as transformers, fuses, contactors and main switches for the machines – are placed on the assembly plates as assemblies for use in the control cabinet. This is done using "handling manipulators", manually operated manipulators which can lift loads "weightlessly".

The control cabinet housings are routed to a buffer area on flexible conveyor cars and are already specifically assignable in terms of control configuration by machine number. Once the plate assembly line has completed the preliminary assembly work, the control cabinet then passes on to one of a total of five assembly lines. The processing sequence is determined by assigning a number according to the machine priority concerned. The conveyor car also contains the relevant control hardware as well as the "cable box" with all the pre-assembled wiring for the specific control cabinet.

Wiring according to wiring diagram

Those working on the assembly lines fit the control cabinets out completely. The connections provided in the cable boxes are already equipped with all the requisite end contacts and only require wiring according to the wiring diagram.

Full use is made of any potential for rationalisation, as Uwe Bergmann, Group Head of the control cabinet assembly unit explains to us: "by using freely configurable modules for customised control applications we can shift hardware tasks to the software sector, which means we can not only work more flexibly but also more cost-effectively long term.

But there are also less spectacular changes that contribute to greater efficiency. "We no longer produce cable connections with the conventional crimped connectors. We use an ultrasound soldering system to form the connec-

Assembly of heavy power components

Perfect order

tions directly from the ends of the copper cable," is how Bergmann explains the latest advances in technology. Once the control unit, power inserts, cable harnesses and pre-assembled assembly plates are installed in the control cabinet and wiring is completed, the next step is quality control.

There are a total of six test benches for 100 % inspection of all available connections between the individual component modules.

In-house test benches

The test bench concept was developed in-house at ARBURG. In the dialogue between the PC test bench and SELOGICA control system, a special test program checks all the functions by applying pre-set currents fully automatically to the functions. The PC program transmits a message to alert personnel if a fault is detected.

An important feature here is the open structure and dynamics of the program. If the software detects a fault that has not yet appeared, the test engineer can advise the system of his procedure in keywords once he has located and remedied the fault.

This means that a comprehensive archive of knowhow and experience can be established, which is always available automatically to the system if the same fault occurs again.

What actually happens is that test personnel receive a message display not only of the fault but also (various) remedy options at the same time. This minimises the proverbial "looking for a needle in a haystack".

In order for this to work, the PC program has an extensive database at its disposal. This contains "test modules", small test programs which are produced and stored by the test engineer as a one-off according to the wiring diagram. There is one of these modules for every technical sales unit, which means that an individual test routine can be interrogated automatically for each customised control cabinet. In future we plan to enable test engineers to produce the required test module in situ.

Room for further detailed improvements

That there is always still room for improvement despite constant efforts in this direction is evident from a final look at an explanation of the system. According to Uwe Bergmann, "There will always be improvements in details. For example, a relatively short time ago, plate screws with a Torx head were introduced as a standard connection between components and assembly plates. These replaced a number of threaded screws, plate plastic rivets, resulting in an increase in the number of plate screws ordered with a consequent reduction in cost."

So in control cabinet construction as in all other sectors, the trend is the same, to be able to handle increasingly more complex tasks more effectively.

Control cabinet assembly

Pre-assembled cable harnesses

Control cabinet test bench

Handling manipulator

Why use a vertical set-up?

One of the main advantages of vertical clamping units is that it is "particularly suitable for inserts". But what is really behind this general assertion?

One of the general advantages of vertical working positions is the ease of access to the clamping unit or the mould. This is particularly important in relation to manual fitting by operators, as this requires safe access to the clamping area of the ALLROUNDER.

There are no limitations on installation of the injection units. Both horizontal injection in the parting line and central injection through the fixed platen with a vertical injection unit are all easily possible with the ALLROUNDER design principle.

This means that several components can be produced with a vertical clamping unit.

A special design with vertical clamping and injection units and moving platens that close from the top are likewise available in the ARBURG machine range. The entire hydraulics of the clamping units with this solution are located underneath (traction system) to enable installation of the injection unit on the moving platen.

Insert/Outsert technique

The advantages of a vertical clamping system can be seen in particular in automation or in the case of particular requirements in processing special parts. It is, for example, important to ensure that there is no jarring when processing small parts requiring optimum centring. With a platen moving vertically from top to bottom, it is possible to achieve this. The half-mould used for inserting stays static, which then reliably rules out such sources of risk.

Coil to coil

This technique feeds inserts to the injection moulding machine on the train from a coil. These are then injection moulded and stored on a coil again. This method is widely used in the automotive parts supply industry for example. Autonomous production stations make complete electrical contacts with installations connected in series upstream and downstream for punching, bending, detaching or packaging of parts. Precision is again of prime concern here.

There are, however, also applications for parts which require coating for insulation purposes or injection moulding for application to other modules. The existing free space around the mould can be used to optimum effect for bringing the conveyor and centring devices for conveyor movement and the end of travel switch for monitoring, register and cutters close to the mould without any problem.

More flexible peripheral solutions

Finally the space available around the clamping unit affords a more flexible, individual use of peripherals around the machine, such as robots or handling systems, for part assembly or discharge.

Special applications

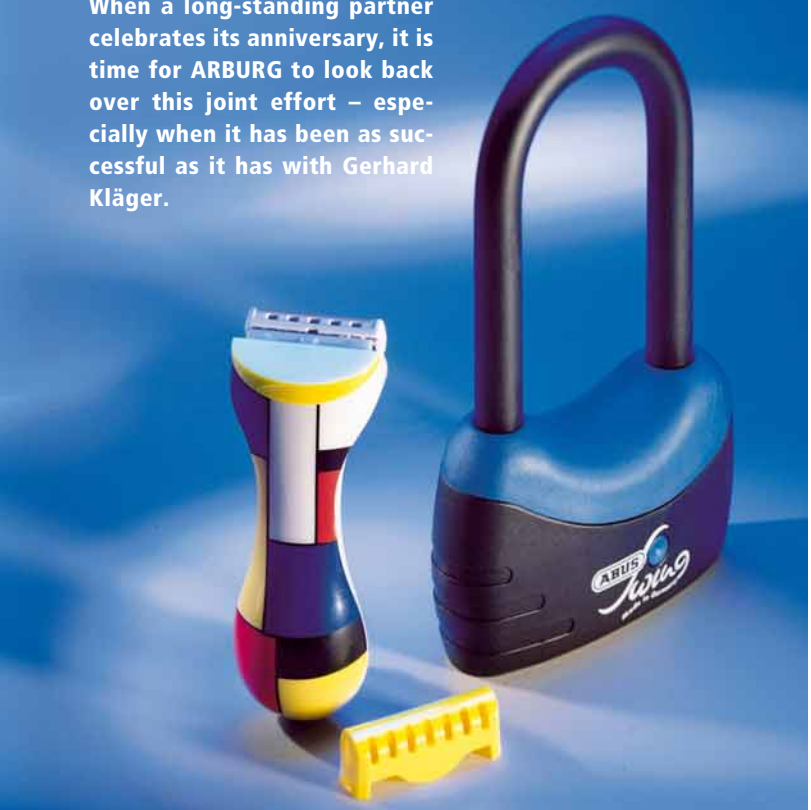
There are a number of special applications in the thermoplastic sector where use of a vertical clamping unit can prove advantageous. A typical example is the manufacture of PET preforms for bottle production. Due to deformation problems, stripping of parts from the mould can only be done at the neck of the bottle. A vertical clamping unit can offer advantages in this case from the point of view of both the injection moulded part geometry (mould fill) as well as stripping. Use of this type of system can ensure sound production and stripping from the mould for even the most difficult part geometries.

So if we look at the applications of vertical clamping units more closely, it is evident that there is a much wider range of uses for this machine arrangement than "just" injection moulding of inserts.

Insert made using a vertical clamping unit

Cooperation with a view to innovation

When a long-standing partner celebrates its anniversary, it is time for ARBURG to look back over this joint effort – especially when it has been as successful as it has with Gerhard Kläger.



What started more than 20 years ago with the purchase of an ALLROUNDER 305, has now seen innovation in development. Kläger is one of the leaders in injection moulding of ceramic products – a position that is not least attributable to its partnership with ARBURG.

This year the company headed by Dr. Roland Kläger will be 40 years "young". The focal point of business for this firm, which has its head offices in Dornstetten in the north Black Forest area and has 90 employees, is precision injection moulding of plastic and ceramic parts, mould construction and engineering services, product planning and development.

Over 1600 products are currently produced for sectors such as medical technology, the electrical industry, telecommunications technology, consumer products and the automotive industry, machine construction, air and space technology, and micro-systems technology. Kläger's reference list includes such names as Hewlett-Packard, Bosch, Siemens, Mannesmann and Deutsche Aerospace – all firms who have confidence in the extensive know-how of a high tech company, which sets store by quality awareness, flexibility and customer orientation as the keystone of relations with its customers. An exemplary innovative management structure implemented in all company sectors provides for open dialogue between all employees right across the hierarchies.

Dr. Roland Kläger, owner and creative force behind the company Photo: Kläger

The owner of the company, Dr. Roland Kläger, is convinced that this is the only way to instil a company spirit to promote new ideas for new products.

Cooperation in the PIM sector

For several years now Kläger has been testing new materials and techniques with ARBURG in this sector. The processing of different ceramic powders and the production of hollow-blown or two-component ceramics are key features of the business.

In 1998 the company was honoured with the first "EuroMold Award" for a "ceramic scoop with hollow-blown handle" in the category "Materials and Methods". As well as material processing, the design, material savings, weight reduction of parts for the same stability and time savings in the process throughput time by a reduction in cycle times were also praised.

Advantages for both partners

Kläger and ARBURG have collaborated in Powder Injection Moulding (PIM) sector since the end of 1996. Collaboration covers all the main sectors in this processing method.

View of a production bay at Dornstetten: Pure ARBURG! Photo: Kläger

In technical terms, Kläger is state of the art. Parts production is handled fully automatically on ALLROUNDERs with discharge handling, with the green compacts then passed on to the stripper furnace and then to sintering. Capacity is currently fully utilised, and a production facility has therefore been purchased directly next to the works in Dornstetten to enable further expansion of the PIM parts production. To this end, the Dornstetten firm is considering purchasing further ALLROUNDERs to boost the production capacity.

Trends in this sector clearly point towards expansion, and Roland Kläger is clear in his mind what the targets are: "By the year 2000 we will be injection moulding non-oxidic materials at mass production level." A task that will require an in-depth knowledge of PIM processing. This knowledge will be to hand, thanks also to collaboration with ARBURG.

Always there when you need them

We all know what it is like when technology does not seem to be able to do what you want it to, especially when you could least do with a problem. And even then it is not always easy having to resort to the telephone or computer to order spare parts.

Never mind the fact that these then have to be delivered to the right site. ARBURG can save you time, stress, money and trouble, however: AEM, our active spare parts management system enables every customer to order spare parts packages specially designed for each ALLROUNDER before there is an urgent need. So there is no longer any need to fear machine downtime – the necessary parts are already in place when you need them and can be used straight away, reducing downtime, which no company can afford, to the absolute minimum.

Based on their experience, spare parts specialists have put together spare parts packages which provide the customer with exactly the right exchange parts for their ALLROUNDER, according to the age and condition of the machine, as required for maintenance or the replacement of wear parts.

Looking at the individual packages in more detail, it will be noticed that they cover three main problem areas: firstly, maintenance, secondly, wear and thirdly operating safety. All the packages are available for every current type of machine, and on request, some are available for certain older models from the ARBURG range.

The maintenance package is designed to enable routine maintenance work to be carried out easily on the machines. The package contains all the parts used for the ALLROUNDER concerned for routine maintenance intervals.

The basic wear part package includes all components with a relatively high level of wear, although this is of course dependent on the production conditions in which the machine is operated. The rule of thumb in this case is that all parts that may fail within a year from commissioning of the ALLROUNDER are provided in this package. Typical examples of this are the check-valve, nozzle heater bands and temperature control elements.

Operating safety is covered by the mechanical and electrical equipment package. These spare parts packages contain components which are of particular use in businesses where several of the same type of ALLROUNDER are in operation. They are thus much more comprehensive than the maintenance and wear based packages. These packages are used, for example, by subsidiaries and trading partners wishing to keep a store of parts for a new ALLROUNDER machine series.

The hydraulic hose spare parts package is based on the fact that professional associations specify that high pressure hoses on machines must be changed at least every six years on grounds of safety. The "hose package" is designed to meet these requirements and is likewise available for all current ARBURG machines.

So what are the spare parts packages for?

Customers deciding on this "package solution" benefit in each case from ARBURG original spare parts. This thus rules out problems arising during and after exchange of these products. Also, according to our experience, it guarantees that the components fit the machines a hundred percent and the packages always contain all the requisite parts for the intended purpose. In addition, as an incentive, there is always a financial benefit as the total price of the packages is lower than that of the total for all the individual parts together. A simultaneous reduction in delivery and ordering costs also has a positive impact on budget when ordering these spare parts packages. "The outstanding plus factor of this solution is the actual reduction in machine downtime, as the customer already has the essential spare parts to hand and they do not need to be ordered and supplied", stressed Norbert Seeger, who is responsible for the spare parts service, in explaining the advantages of this new system.

How does AEM operate in practical terms?

After giving general information on this new service, customers wishing to order spare parts individually that are prime parts in the packages are advised of the benefits of the package solution. ARBURG's spare parts service then quotes a price for this. There is no fixed package structure, parts are put together individually to suit requirements based on the customer's details and the machine numbers. The general system for the package solution is modular. This means that a customer choosing an extended package does not buy the basic package as well. This has advantages in both financial and management terms. Packages can be

AEM – active spare parts management provides spare parts packages containing spare parts tailored to suit the age of the ALLROUNDER machine, as required for servicing.

Packages are available not only for current machine ranges but also for older machine models. By ordering the spare parts packages in advance, there is nothing to fear from maintenance work or machine problems: spare parts are ready and available when they are needed.

ordered for delivery with a new machine or afterwards, perhaps before routine machine maintenance.

With the introduction of spare parts packages, ARBURG is taking a further step towards individual customer service. Not only are customers actively offered cost-effective solutions, but the packages can be tailored to suit specific machines. This quality of service opens up new dimensions in advice as well, and this will in future be tailored even more specifically to individual customer requirements.

Optimum adjustment in machine control

The requirements present-day machine control systems have to meet are extremely high. It is important here to ensure optimum adjustment of the control system to the needs concerned.

Even with the basic SELOGICA control set-up, optimum adjustment to the injection moulding machine can be achieved.

Depending on your requirements for the injection moulding process, the machine functionality can, however, be vastly increased. Various extension capabilities, combined in a function package, can be put together and combined with each other as necessary.

Complex injection cycles can be performed with the "extended monitoring" package. At each point in the cycle, the mould can be monitored in its position simply by marking the sequence editor.

Expensive mould technology requires the most exact travel movement of the injection moulding machine. The "extended travel capability" package affords a much wider range of travel stages and hence profiled machine cycles. Programming of the ejector and core pulls with intermediate stop positions presents no problem and, as well as reduced mould wear, adjustment of the clamping force saves energy.

Optimum adjustment of production on your machine to your business can be achieved by the extended function "production control". The injection moulding machine can be switched on and off by automatic control. With extended production downtimes, the operating temperatures of the machine and peripherals are reduced. Programmed starting cycles ensure that each time the machine is restarted, no defective parts are allowed into current production.

Machine operation is facilitated still further with the "optimisation/operating aids" package. Freely programmable parameters mean that you can set up a high-speed operating facility without any problem. This enables you to compress the relevant parameters for your machine operator into two pages. For high-speed cycles, all times are displayed in 1/100 seconds.

The "quality assurance" package enables you to ensure the quality of injection moulded parts directly on the production line. Defective parts are automatically extracted. The adjustable monitoring graphics controls processes such as the compression integral on each injection shot, so that the slightest deviation in the injection cycle can ensure extraction. The automatic random sampling function ensures ease of quality monitoring, as do the extended monitoring functions.

Last but not least, process documentation is becoming increasingly more important. This extended function enables you to record extensive documentation on important quality-related actual values on hard copy or floppy disc. SELOGICA – the easy way to do it!

ARBURG PTE Ltd.: Gateway to Asia

ARBURG's long-term involvement in the Far East is not just limited to Japan, China and Korea. As international trade centres, the city states of this region have always been of major importance.

This is why ARBURG has its own subsidiary in this strategically important base: ARBURG PTE Ltd. in Singapore, serving the entire Asiatic Pacific area, or ASEAN region.

As early as the Sixties, ARBURG started to develop contact with Singapore. As economic development was making major strides in this area, the requirement for plastic products and thus injection moulding machines started to increase. With ARBURG's claims of offering optimum service with reliable ALLROUNDER technology, the company soon became very popular.

1988 Technical Training Centre, 1991 subsidiary set-up

ARBURG took the final decision to choose Singapore as a base at the end of the Eighties. In 1988, the Lossburg company opened a "Technical Training Centre" which was equipped to offer extensive technical services. As a synergic effect, local employees were instructed in all technical matters by the Lossburg technical personnel, so that the Singapore service team was soon in a position to be able to offer extensive help themselves.

Just three years later the service centre was extended to provide a fully-fledged subsidiary. The initial manning levels of three were increased to 14, and ARBURG Singapore became ARBURG PTE Ltd with several agencies – Thailand and Indonesia – in the South East Pacific region.

A familiar image

The image ARBURG gained in this region by this early commitment is evident. The company was in fact the first German injection moulding machine manufacturer with its own offices in South East Asia. This high profile image was reinforced with cooperation with major scientific institutions. Here ARBURG provided support by passing on machines on loan for training purposes.

This "basic work" did not go unnoticed by customers either and is often reflected in long-term associations with ARBURG. This is promoted by various special functions – "Family Days", meetings and technical seminars as well – at ARBURG in Singapore, which came into being to strengthen the bond between customer and company. "We are basically not doing anything out of the ordinary" comments Michael Ho, branch chief in Singapore on their efforts in customer care, "we are just trying to show our customers that we understand their problems.

Major growth potential

It is especially in the South Pacific area that the future promises to be as interesting as it has in the past. The opening up of countries such as Vietnam, Laos and Myanmar and continuing efforts at industrialisation in the region as a whole mean that a local presence is essential for an internationally active company such as ARBURG. Those working in Singapore see the main potential in optical disc production and new media/telecommunications. This is why ARBURG is progressing and intensifying its service in the region via the branch in Singapore, as ARBURG PTE Ltd. is the gateway to Asia!

Michael Ho, subsidiary chief in Singapore, ensures optimum contact with Asiatic customers

Fig. Below: The ARBURG service team: fully trained training and highly competent