

today

The ARBURG magazine

Edition 26

Summer 2004



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MASTHEAD

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Responsible: Dr. Christoph Schumacher
Editorial Advisory Board: Juliane Hehl, Martin Hoyer, Roland Paukstat, Bernd Schmid, Jürgen Schray, Renate Würth
Editorial team: Uwe Becker (text), Markus Mertmann (photos), Vesna Sertić (photos), Marcus Vogt (text), Susanne Wurst (text), Peter Zipfel (layout)
Editorial address: ARBURG GmbH + Co KG, PO box 1109, 72286 Lossburg,
Tel.: +49 (0) 7446 33-3149, **Fax:** +49 (0) 7446 33-3413,
e-mail: today_kundenmagazin@arburg.com, www.arburg.com



The new ALLROUNDER tie-bars distinguish themselves not only by their black colour, but even more by virtue of their improved resistance and protection against corrosion and sliding characteristics. The reason for this is the ARNOX nitriding process employed in the plasma-nitriding system integrated in the new tie-bar production plant.



Dear Readers,

Our Technology Days have again set decisive new trends in advance of this year's K, the leading world trade fair held in Düsseldorf. Some 3,500 visitors in attendance from around the world bear witness to the fact that our customers are willing to make even intercontinental journeys merely a few months before a leading exhibition in this branch of our industry. If you were unable to visit the Technology Days this time, this edition of "today" presents an overview of the range of products shown at our high-tech exhibition.

Of course, we will also – as always – provide a glimpse into the future. We already look forward to welcoming you to our stand at the K 2004 exhibition. The almost magical stand number "13 A 13" will make it easy for you to find us at the K show. You can rest assured that interesting innovations will once again be presented there. But we do not wish to reveal everything yet. The tension is rising, just wait and see and visit us in Düsseldorf!

Before K, we will nevertheless raise the curtain on two

interesting innovations in this issue of "today". As pioneers in multi-component injection moulding, we will introduce you to a new five-component machine for multicolour injection moulding.

The slogan "Black is beautiful!" also applies to our new tie-bar production plant, where we will in future produce high-quality black tie-bars for our ALLROUNDERS using the ARNOX process.

The two captivating customer reports and many further innovations round off this edition perfectly. As you already know, we will be one step ahead at the K show. The innovative spirit lives on at ARBURG.

A reminder: Please don't forget – our stand number at K is "13 A 13".

We look forward to your visit and hope you will enjoy reading the latest edition of "today".

Yours,

Michael Grandt



Three days of p

www.arburg.com



With a new record of some 3,500 visitors from around the globe, this year's Technology Days were again a complete success. The objective, however, is not to attract as many guests as possible to Lossburg, but much more to offer trade visitors a comprehensive insight into the current range and new products, to demonstrate the versatility and excellent performance of the ALLROUNDERS, and to provide information on current topics by means of expert presentations.

As a large exhibition space is required for such a mammoth programme, the entire company premises were put to use. Around 20 exhibits were on show in the technical centres, which during the rest of the year house machines from the current range for the purpose of performing tests on customer moulds or producing parts for in-house use. An additional exhibition forum was provided outside in the loading area for heavy goods vehicles, where among others, the new ALLROUNDERS 520 A and 170 U as well as two representatives of the large machine class were sited.

The main focus this year was on modular drives. With the new ALLROUNDER 520 A ALLDRIVE machine with a clamping force of 1,600 kN, the clamping force range for electric machines now extends from 800 kN to 1,600 kN.

ure high-tech



one of the machines, the optionally available pivoting mould clamp was demonstrated on the other. The two representatives of the large machines, the ALLROUNDER 630 S and 820 S, completed the range shown in the goods loading area. With two production cells, the project division, which is increasingly gaining in importance, was presented in an adjacent space.



The product range also includes C and S series ALLROUNDERS in the special "advance" model version with electro-mechanical dosage drive, energy-saving, frequency-regulated hydraulic drive (ARBURG energy-saving system AES) and position-regulated screw.

The ALLROUNDER A, on which the electric main axes can be freely combined with either hydraulic or electric auxiliary axes, were represented in various executions with medical and packaging technology applications. While the two new 520 A size machines exhibited featured electric ejectors and hydraulic core pull and nozzle drives, the 420 A, a fully electric ALLDRIVE machine, was available for even closer inspection. Moreover, an expert presentation highlighted the technology and potential of the ALLDRIVE machines in detail.

The new 170 U micro injection moulding machine was represented with two exhibits in the goods loading area. Whilst a precision injection moulding application was running on

A separate area was set up in order to enable adequate presentation of the comprehensive services available. An overview of an extended comprehensive ARBURG Service Allround, available in Germany, was provided in a further presentation. The presentations by two invited speakers on the subjects of "Encapsulation of inserts" and "The effects of mould temperature control on the quality and cycle times of moulded parts" concluded the presentations on offer.

LSR and thermoset processing were presented at the exhibition area in the fully-glazed assembly hall of ARBURG II. The tours of the production areas, a permanent feature of the Technology Days, were again met with great popularity. A highlight of this year's tour was the new tie-bar production plant, which was still under construction last spring.



Everything was under the microscope. The ALLROUNDERS in the goods loading area (small photo, centre) including the new 520 A (large photo), as well as the machines in the PIM laboratory (left) and LSR processing (2nd from left). The presentations from experts were well attended (3rd from left) as was the separate Service area (right).

INFOBOX

Visitors: Some 3,500 visitors, 1,300 of whom came from 32 countries (from around Europe as well as from Egypt, Australia, Hong Kong, Israel, Columbia, Malaysia, Singapore, South Africa, Thailand, Tunisia and the USA)

Factory tours: 1,200 visitors attended the German-speaking tours; virtually all the foreign guests visited the plant.

Machines: More than 40 exhibits

Applications: Multi-component injection moulding, encapsulation of inserts, LSR processing, thermoset or metal and ceramic powder (PIM), micro injection moulding, water injection technology (WIT), Simplex TandemMould, MuCell process, as well as the manufacture of PET preforms and optical discs.

Presentations: Approx. 1,300 participants

Driving force: Custo

Helvoet B.V. has been involved in the processing of rubber and plastics for over 60 years. The excellent reputation which the company enjoys as a manufacturer of high-precision technology components in the micro and small parts sector is attributable to factors which are also to be found in child's play: unlimited and never-ending experimentation with new possibilities and their limitations.

The Dutch company, based in Hellevoetsluis and Eindhoven operates a further production location in Singapore and a joint venture in South Korea. Worldwide, Helvoet has 380 employees.

Control systems for the automotive industry, dosing devices for beverages (coffee machines and beer) and cosmetics (hair spray and creams), Seals for household appliances as well as gas and water installations, and finally, connectors for electronic products are Helvoet's main product areas. In order to meet the highest production quality standards, the company is certified according to QS 9000 and ISO 9001. Certification according to TS 16949 is fully under way and will be realised at the latest by the end of 2006.

Helvoet utilises a broad range of technologies to manufacture its parts and components. These include the semi and fully automatic assembly of parts made from several materials, the production of rubber and LSR parts, two-component injection moulding for the production of hard/soft combinations, the injection of a LSR component onto a plastic part using two-component technology, the encapsulation of inserts, as well as rubber extrusion.

This great variety of technologies has enabled Helvoet to successfully establish itself

Photo: Helvoet

Customer orientation



as a systems supplier for its customers. These customers involve the company at a very early product development stage. Owing to the extensive expertise which Helvoet has achieved, particularly in the production and combination of rubber and plastic parts, the specialists are consulted from the outset in the planning stage of new components. Their further involvement ranges from the design and construction of moulds through parts production to on-schedule delivery. In addition to Europe, Helvoet's major selling markets are Asia and North America.

Co-operation with ARBURG extends back to 1997. Today, it is not only standard machines, but also complete production cells with the corresponding peripherals such as MULTILIFT robotic systems which are delivered to the Netherlands and Singapore.

One of the most recent examples is an integrated production system for manufacturing a cap adapter for the beverage industry. The cap parts are not only produced on an ALLROUNDER 630 S 2500-675/150, but are also removed by means of a MULTILIFT H module with a servo-electric main axis and palletised in special plastic trays for further processing. The highly autonomous system ensures precise part set-down. ALLROUNDERS with a mould indexing unit and removal robot without a B axis and adapted picker system were fully integrated by ARBURG and are operated centrally via the SELOGICA machine control

system. The palletising station operates with a dedicated overhead three-axis NC handling system and separate PLC control for the palletising functions. It is connected to the injection moulding machine via an interface. High packing density and precise positioning of the parts is necessary for subsequent processing. Throughout the entire parts handling process, the soft components must not be touched. A read/write unit in the palletising system allows precise recording of the production times for each pallet by means of a microchip in order to ensure reliable troubleshooting. The entire system's autonomy is approx. eight hours or 10,000 parts.

It is not least the excellent performance of this system in practice which has ensured the continued co-operation between ARBURG and Helvoet. Further ALLROUNDERS as well as automation solutions and LSR machines are planned or currently being delivered to both the company's European and Asian locations. As with many other customers, when asked about the most important aspect of co-operation with ARBURG, the answer is: ARBURG offers optimum quality and service at a reasonable price.



The two-component moulded parts are removed from the mould and palletised in plastic trays by the robotic system.



INFOBOX

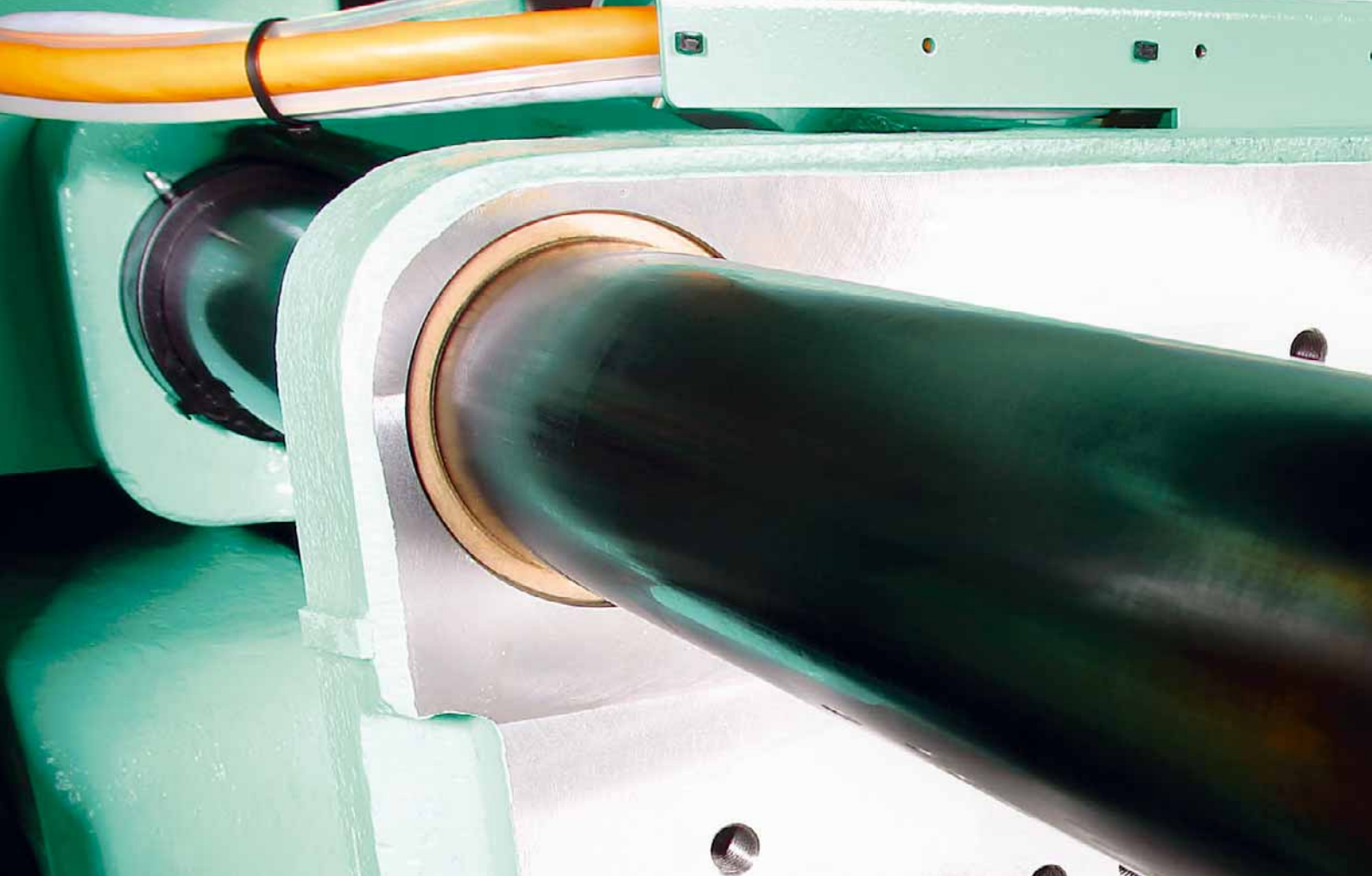
Founded: 1939

Employees: 300 at the Hellevoetsluis headquarters, 380 worldwide

Machine fleet: 90 injection moulding machines, 57 of which are ALLROUNDERS

Specialised areas: Systems supplier for high-precision technical micro and small parts for use in the automotive industry, consumer electronics, veterinary technology, in heating systems as well as dosing devices for the beverage and cosmetics sectors.

Contact: Helvoet B.V. Sportlaan 13, P.O. Box 2, NL3220 AA Hellevoetsluis, Netherlands, www.helvoet.com



ARNOX protects against corr

Why are the tie-bars on the ALLROUNDERS black, all of a sudden?, "Is that a protection which has to be removed before start-up?", "Is this the new ARBURG design?" These and similar questions were frequently asked when the delivery of ALLROUNDERS with black tie-bars first began.

But as always in these cases, the answer to the riddle is simple. During the in-house integration of a new production line for the complete machining of ALLROUNDER tie-bars, ARBURG also commissioned a new plasma-nitriding plant using the so-called ARNOX or "ARBURG No Oxidation" process.

The new nitriding process is based on a

multistage process. The tie-bars are plasma nitride-hardened in vacuum ovens as previously and then gas nitrated. Hardening of the materials occurs within a range of a few tenths of a millimetre. A wear-resistant layer is also created on the surface of the tie-bars within a range of a few hundredths of a millimetre. Additional ARNOX corrosion protection is achieved in the final process stage by means of spraying the parts with steam. This layer is no thicker than a few thousandths of a millimetre, however, it provides the black colouring of the tie-bars. The ARNOX nitriding process first deposits an oxide layer on the tie-bars with a second nitride layer consisting of a compound layer and a diffusion layer underneath. This innovative tie-bar treatment provides improved corrosion protection as well as greater fatigue

strength of the tie-bars during operation.

An extensive series of tests carried out in the course of the introduction of the process showed that the corrosion protection could be further optimised in comparison with the nitriding process used up to now, preventing leaks in the hydraulic systems even more effectively. This applies above all to the long-term wear of the tie-bars. With ARNOX, the absence of leaks and precision of machine movements is ensured for longer periods than in the past.

A "salt spray test" proved that the ARNOX process achieves better results than chromium plated or chemically nickel-plated surfaces. Even the so-called tribological properties of the ARNOX layer were impressive. By reducing the friction coefficient, better sliding properties and lower adhesion tendencies have been

osion

achieved. The previously-mentioned higher fatigue strength of the treated material is achieved by the reduction of the notch impact effect of the porous compound layer due to oxidation.

But what does this technical advance mean in practice? Not only do the further enhanced corrosion protection and improved sliding properties extend the service life and precision of the machines, they also mean lower maintenance and energy requirements. Consequently, the "black tie-bars" increase the service life and operational safety of all ALLROUNDERS.

During the course of 2004, all tie-bars mounted on the ALLROUNDER injection and clamping units will progressively be manufactured and supplied in accordance with this new process.



Thanks to the innovative ARNOX process, which has been registered as a protected trademark by ARBURG, the new ALLROUNDER tie-bars will be black and have even better corrosion protection and sliding properties.



Luminous power on ALLROUNDERS



The illuminated moulded part (above) was created by in-mould lamination of special films, which are manually loaded into recesses (below).

The ALLROUNDER 570 C in the Bayer MaterialScience AG Technical Centre does credit to its name. The flexible machine is not only the centrepiece of a production cell for in-mould lamination of film, but thanks to a second injection unit, it can also be employed for multi-component injection moulding using the interval and sandwich processes, water and gas injection, as well as Mucell technology.

The ALLROUNDER 570 C is equipped with a MULTILIFT HV robotic system and is used predominantly by Bayer MaterialScience AG's "Polycarbonates" business unit. This unit focuses on generating process technologies for standard applications, developing new applications using new process technologies, optimising processes and part quality, joint customer development as well as identifying complete production chains such as the in-

mould lamination of special films, for which the production cell was designed.

The field of activities of the ALLROUNDER 570 C, which can be used for a wide variety of injection moulding applications is equally as versatile as that of the working group. The machine has a clamping force of 2000 kN, a distance of 570 millimetres between tie-bars, a size 675 horizontal injection unit. A variety of multi-component applications can also be realised using the second vertical injection unit. The advantages of the MULTILIFT HV robotic system are also brought to bear. The system can reach horizontally into the mould from the rear and set down the parts vertically without impairment. Thanks to full integration of the robotic system in the SELOGICA control system, a high degree of operating convenience is ensured.

The comprehensive production cell peripherals around the ALLROUNDER 570 C as well as the gripper of the MULTILIFT HV were sup-



plied by ASS Maschinenbau GmbH. For feeding the films, the system features two recesses in each of which nine sheets of film are inserted manually. Pick-up and insertion of the sheets of film in the mould, as well as moulded part removal and set-down on the conveyor belt are performed by the MULTILIFT HV. Its special gripper has two hinged axes – one for the sheets of film and the other for the finished moulded part – as well as a gripper jaw for sprue removal.

After the sheet of film has been picked up by the gripper and held in place via vacuum, the hinged axis pivots at 90 degrees in order to insert the film on the nozzle side of the mould. The high-precision required for this operation is ensured by the centring system using dowels, while the gripper on the other mould side is supported via cylinders.

The finished part is removed using the second hinged axis and is set down following a 90 degree pivoting movement.

The films, which are laminated by the injection in-mould system, were jointly developed by Bayer MaterialScience AG and the Swiss company Lumitec AG in Gais.

The speciality is that when current is applied, the plastic parts illuminate without requiring a separate light source. This multi-layer system based on Makrofol®/Bayfol® films illuminate in green, blue, orange or white when an alternating current of 110 volts is applied to them. A "cold light source" with a long service life and even illumination ensues. The conversion of e.g. nine or twelve volts of battery voltage is performed using an inverter.

The process expertise in electrolumines-

cence technology and the associated electronics were supplied by Lumitec AG, while Bayer MaterialScience AG provided the expertise in Film Insert Moulding (FIM) and suitable film products as well as the manufacturing electrically conductive polymers (Baytron P®).

The development goal was to test the plasticity and und in-mould lamination of the multi-layer film in order to achieve a directly illuminating moulded part. With its suitability and feasibility successfully proven, this technology opens up a wider field of new application possibilities such as the production of complex, low-thickness moulded parts in night designs for the automotive or electrical and electronics sectors.

Left: The complete production cell with the ALLROUNDER 570 C and peripherals. Centre: Each moulded part is checked for correct operation. Right: The complex gripper features two hinged axes in order to insert the film sheets (right) and remove the finished moulded part (left).

INFOBOX

The Group: Bayer MaterialScience AG is a subgroup of Bayer AG

Turnover: Bayer MaterialScience AG: approx. 9.9 billion euros in 2003

Employees: Bayer MaterialScience AG: approx. 23,700 employees at 120 locations worldwide, 30 employees in the Business Development department

ALLROUNDER machine fleet:

one ALLROUNDER in the Leverkusen technical centre, 24 in the test engineering department at Krefeld-Uerdingen and approx. 75 in the production locations worldwide.

Material: The "Polycarbonates" Business Unit focuses on all PC materials such as polycarbonate (Makrolon, Apec) and PC/ABS (Bayblend)

Customers: Automotive, electric and electronic, construction industry, domestic appliances, information technology, medical and laboratory technology, optical data storage media, etc.

Contact: Bayer MaterialScience AG, EMEA-BD-EP-APD, B207, D-51368 Leverkusen, www.bayermaterialscience.com



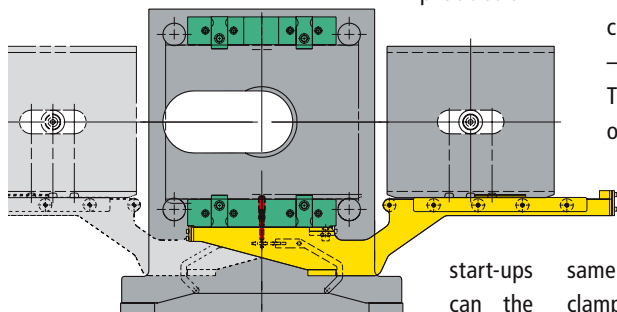
Photo: dpa

Optimally equipped

Optimum set-up times have always been an issue for injection moulding plants. Nevertheless, this point has often been neglected. Frequently, productivity increases achieved through complex process optimisation measures and cycle time reductions are nullified by poorly organised set-up processes.

As a rule, proactive planning is the key to short set-up times. Only by means of a well-organised and comprehensive work preparation stage with timely and machine-related

production

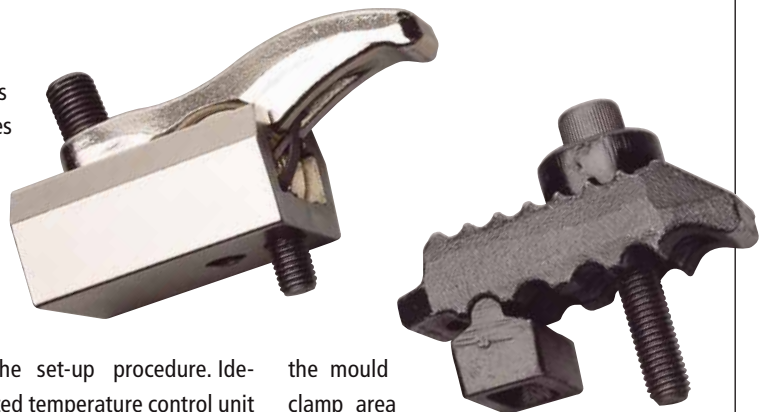


installation technicians start their work under ideal circumstances.

A decisive time factor during the set-up procedure is the actual fitting of the moulds. A well organised mould carriage with the relevant bolts and mould should always be available prior to actual set-up. Especially in the case of large machines and moulds, mould changes should ideally be performed by two technicians working from the front and rear

of the machine. This measure alone saves a significant amount of time if one considers how often a single technician has to walk around the machine during the set-up procedure. Ideally, a power-adapted temperature control unit should be permanently allocated to a machine so that set-up can be performed in a straightforward manner in conjunction with standard rapid-connect couplings.

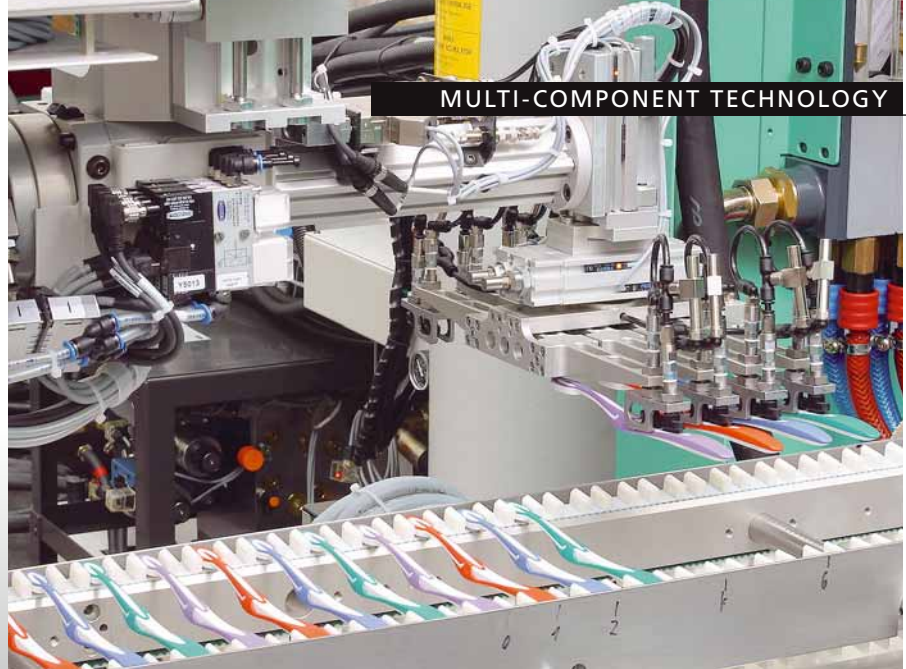
With regard to the clamping systems, a specific system should – whenever possible – be specified at the mould design stage. The simplest technique is direct bolting of the moulds to the machine, whereby uniform dimensions of the clamping platens on the moulds should be ensured in order to permit use of the same bolts throughout. Alternatively, universal clamping elements can be used which remain attached to the machine which can be used for other moulds. Here too, a sufficiently protruding clamping platen or an appropriately dimensioned recess on the mould should be ensured. If a large number of in-house moulds are used, for which the clamping platens can be standardised, the mechanical rapid clamping system supplied by ARBURG with integrated mould supports enable set-up times of only a few minutes. The mould is simply placed on the two mould supports and then pushed into



the mould clamp area and positioned on four permanently installed clamping bars, by means of which indexing the central position of the nozzle and mould clamping are performed.

Left: ARBURG's mechanical rapid-clamping system with integrated mould supports and guide rails.

Top: The universal clamping elements can be used for different moulds.



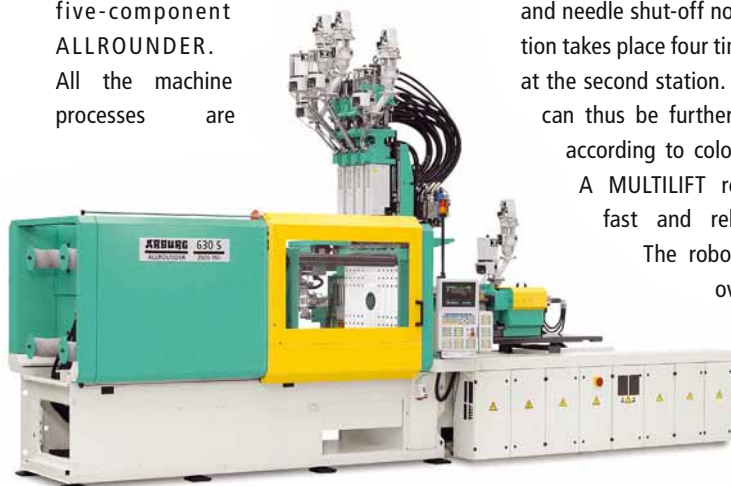
Four plus one

We are not discussing a primary school mathematics exercise here, but a special ALLROUNDER injection moulding machine with five injection units which can produce four different two-component moulded parts using a single mould. In other words - a real ALLROUNDER.

The machine designation is interesting in itself, owing to its length. It is an ALLROUNDER 630 S 2500-350/100/100/100. A size 350 horizontal injection unit injects through the fixed platen into the mould in the conventional manner. The other four units are positioned vertically on a common base plate, transversely to the machine axis and are manually adjustable. The base plate is mounted on the fixed mould platen.

The cylinder modules are from the standard ARBURG range, all axes can be moved and programmed independently. This makes the machine a true five-component ALLROUNDER.

All the machine processes are



synchronised via reference points and fully integrated in the SELOGICA control system. Consequently, there is only one common data record containing all the relevant information. Five interfaces for colouring units permit the automatic mixing of the necessary colours.

Toothbrushes with a coloured soft-touch finish are produced on this machine as hard/soft combinations in four colour versions of the soft component. In fact, in this application case, the ALLROUNDER is a "two-component, four-colour" machine for multicolour injection moulding.

The basic body made from PP can be combined with four different TPE colour surfaces in a single production step. An index platen, moved via an electric rotating unit made by Zahoransky, turns the eight-cavity mould insert to three stations. At the first station, injection is performed in all eight cavities via hot runners and needle shut-off nozzles, while injection takes place four times in two cavities at the second station. The moulded parts can thus be further pro-cessed pre-sorted according to colour and then packaged.

A MULTILIFT robotic system ensures fast and reliable parts handling.

The robotic system features an overhead support, a servo-electric Z axis with a length of

1,200 millimetres and pneumatic X and G axes. The eight-cavity, three-station, hot runner mould permits removal of the finished parts from the closed mould via a pivoting arm on the index platen.



With the implementation of this technology – the system was first shown at the Zahoransky exhibition stand at the "INTERbrossa-BRUSHexpo 2004 in Freiburg in April – expansion to six components was considered, whereby the sixth unit would operate in the 45 degree position through the fixed platen.

Photo, top left: After injection of the toothbrush body is completed, it is passed by the index platen transfer station to the MULTILIFT robotic system.
Photo, top right: The colour-sorted toothbrushes on the way to the packaging station.

Specialist for

Thanks to a high degree of automation with state-of-the-art machine and robotic system technology and a highly skilled team of employees, Kunststofftechnik Schmid has been a reliable partner for 15 years when it comes to the production of complex, high-quality technical moulded parts.

Because the company's owner, Eugen Schmid, has 25 years' experience in the sector and has learned about plastics processing from the very beginning, he knows exactly what counts. This is evidenced by the success story of the family business which he founded in 1989. Since then, the company has progressed in leaps and bounds. Today, the production and warehouse area of the DIN EN ISO 9001: 2000 certified company covers 3000 square meters, the machine fleet encompasses 31 injection moulding machines and the company counts 35 employees. The aim is to maintain this size in the forthcoming years.

"We are a small family business, which asserts itself on the market thanks to its strengths.", says Eugen Schmid, summarizing his philosophy in one sentence. "We operate according to a uniform line."

What is meant by this is revealed by looking at the produc-

tion facilities, in which everything is uniform and a high degree of automation is standard: the 31 injection moulding machines with clamping forces between 250 and 2500 kN are ALLROUNDERS, which are all equipped with comprehensive standardised peripherals.

"As a matter of principle, we avoid buying the currently cheapest equipment, preferring to build up production facilities with proven partners and products." Because forward-looking capital expenditure choices are made with regard to production reliability when purchasing new machines, the ALLROUNDERS feature high-tech equipment. The fleet of machines is complemented by two-component machines and ALLROUNDERS with pivoting mould clamp used for specialised multi-component injection moulding of hard/soft combinations and the encapsulation of metal inserts with plastic material.

Automation, however, begins long before the injection moulding process. Worthy of mention in this context is material drying, using dry air dryers, and a central conveying system both of which operate fully automatically, or a closed cooling water circuit, which ensures a constant feed tem-



perature. "The best machine technology is useless if there is a loss in temperature. As all the factors ultimately determine moulded part quality, the environment has to be right," is Eugen Schmid's guiding principle.

From the outset, the company has always maintained a wide product range, which includes technical moulded parts with weights from 0.1 to 400 grams for the automotive, electronics and medical technology sectors. The company has had close, long-standing relations with its suppliers as well as with its customers. Although all of these are based in Germany, the products made by Kunststofftechnik Schmid are used around the globe.

Its specialities are parts for vehicle interiors and a wide variety of connectors, which are produced using conventional injection moulding as well as insert encapsulation processes.

A high level of injection moulding expertise is required in this sector. As the edge connectors have many undercuts, the moulds are





difficult applications



Photos: Kunststofftechnik Schmid

Uniform production lines with a high degree of automation (left) at Kunststofftechnik Schmid in Salzstetten (centre).

Quality assurance (below) is the top priority for moulded parts such as connectors or edge connectors.

correspondingly intricate and equipped with numerous slides. For this reason, part removal is performed by robotic systems with these applications. The complex, customer-specific moulds are usually supplied by the customers, which bears witness the high degree of confidence placed in the company. Often, even customers who have their own injection moulding plants place orders with Kunststofftechnik Schmid for the production of highly complex moulded parts.

These high demands are met thanks to the modern production facilities as well as the young team of highly qualified employees, who work in three shifts and regularly participate in training courses.

This is why the worker self-diagnosis policy, which plays a decisive role in addition to quality management, works so successfully.

"Quality is produced directly rather than as a result of checking!", says Klaus Lückmann, head of the quality department. In order to prevent defects and damage from the outset, many of the moulded parts are removed directly by a robotic system and set-down onto a conveyor belt. Further QA measures include quality monitoring by means of parameter settings at the machine, 100 per cent checks integrated in production, random samples, product separation according to mould cavities, preventive mould maintenance every four hours, machine maintenance at monthly, quar-

terly, one and two-yearly intervals. Furthermore, the machines are subjected to statistical process control with regard to product quality.

Following production, quality monitoring continues at the warehouse. The first-in-first-out principle is implemented consistently throughout, so that stocks can be called up at any time and parts can be traced without interruption.



INFOBOX

Founded: 1989

Employees: 35

Surface area: 3000 square metres of production and warehouse areas

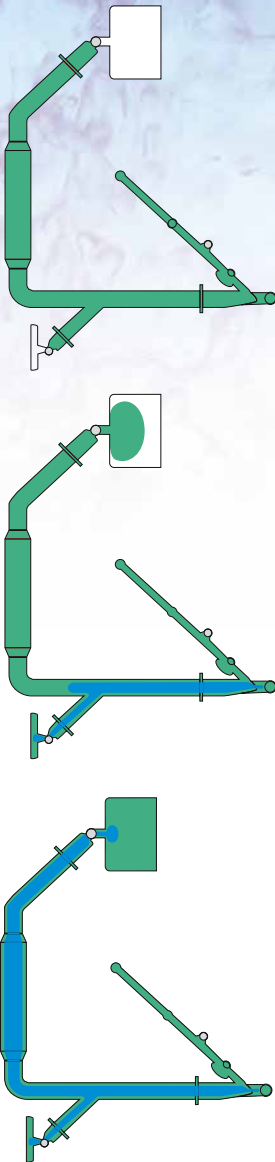
Products: Technical moulded parts for the automotive, electronics and medical technology sectors

Material: Thermoplastic plastics, predominantly technical materials such as PC, PA, PSU, TPU, blends, elastomers, UV-stabilised plastics for vehicle interiors

Machine fleet: 31 ALLROUNDERS from 250 to 2500 kN

Contact: Kunststofftechnik Schmid, Schlattweg 16, D-72178 Waldachtal 2 - Salzstetten, www.kunststofftechnik-schmid.de

Water on the advance



Diagram, left: The individual water injection technique process steps (top to bottom).

Photo, right: Injection moulding of the tube demonstrates the advantages of WIT.

As an alternative to gas injection technology, water injection technology (WIT) combines a low-cost process medium with a significant reduction in cycle times and also opens up new application fields for injection moulding.

In conjunction with the IKV Aachen and Bayer MaterialSciences AG, Leverkusen respectively, ARBURG demonstrated a prototype mould producing a tube using water injection technology at the Technology Days in 2003 and 2004. The advantage of injection moulding compared with other processes is the high degree of design freedom, as tubular hollow bodies can be combined with functional elements such as brackets or branches. The application potentials are to be found in the automotive industry for components such as water or oil-carrying tubes, but also in the furniture, electrical goods, sports and leisure industries. Typical applications include armrests and handles.

For the creation of a hollow body using WIT, water is injected into the cavity, which is already filled with the melt, via an injector integrated in the mould. The water forces the still flowable plastic core of the moulded part out of the mould, creating a hollow cavity. The excess material can either be "blown out" into overflow cavities, or back into the injection moulding cylinder. Subsequently, the water is drained from the part prior to ejection.

The use of water as a process medium results in decisive benefits compared to the established gas injection technology (GIT). Owing to its high thermal capacity and significantly higher heat conduction properties, water acts as a much more effective coolant than gas. The moulded part is not only cooled from outside through the mould wall, but also effectively from the inside by means of the water. This is the principal reason for the drastic cycle



time reductions achieved using WIT. Because the inside walls of the moulded part cool very rapidly, no foaming of the inside surface occurs – as is the case with GIT –. Moreover, water is incompressible, which simplifies process control. Not to be neglected is also the low price in comparison with technical gasses such as nitrogen, which represents an important cost factor in gas injection technology.

New domicile in Brazil

On 27 January 2004, the new building for the Brazilian subsidiary in São Paulo was officially inaugurated. Subsidiary manager Roberto Schaefer and his team celebrated the event with ARBURG manager for sales and controlling, Michael Grandt, and some 30 invited guests.

Today, ARBURG has been active on the Brazilian market with its own subsidiary for around four years. It also boasts a dense sales and service network comprising 14 representations in Brazil.

With the move to its own building, conditions at the location were improved significantly. At the official inauguration ceremony, customers were highly impressed with the new premises and the possibilities it offers. Covering an area of 700 square meters, the bright, light and modern ARBURG Ltda. premises provide sufficient space for sales, service, spare parts warehouse and customer training. Up to four ALLROUNDERS can be on demonstration in the showroom and the training room provides space for up to 15 participants.



"In this building, we can work in accordance with our philosophy," says Roberto Schaefer, "and present ourselves as a first-class, respectable partner."

"Our own subsidiary building also gives our customers the confidence and assurance that ARBURG Brazil is important", adds service technician, Wolfgang Voigt.

In the first four months of this year, more customers have visited the subsidiary than in the whole of 2003.

The new training room was inaugurated with two training courses for the representatives, who were highly impressed and proud to be able to receive their customers in a building of this kind.

For Elizabeth Gasperek, administration and accounts assistant, a further benefit is the security aspect, "With the new building, security has been enhanced, so that we can work more assuredly and with even greater concentration."



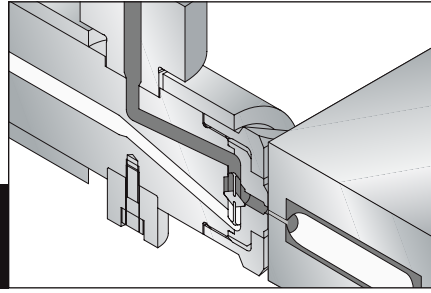
"With the move, during which everyone lent a hand, the team spirit of the employees was also strengthened," said sales assistant, Sibile M. Rehder. The pride the employees in Brazil feel for their new domicile is best illustrated by the fact that in-house it is referred to affectionately as "ARBURGLAND".



Photos: Jorge Hargesheimer

Photo, left: Américo Mota (Confidor), Roberto Schaefer, Carmen Schaefer and Michael Grandt (from left) at the inauguration of the new building in São Paulo (photo above).
Photo, right: The Brazilian ARBURG team with Michael Grandt (11th from right) in the new showroom.

MILESTONES



As with many innovative processes, interval injection moulding, which was developed by ARBURG technicians from 1976 onwards, originated as a response to customer demands. Dual-coloured combs were a typical product for which there was a manufacturing requirement. Constantly changing designs were not the objective, but the reproducibility of interflowing patterns.

Using a special interval control system, the injection delay between the two injection units could be continuously adjusted, permitting a wide range of potential colour effects. The colouring also had an influence on moulded part design, sprue position and the flow properties of the materials, as well as changes in injection speeds.

The interval process patented by ARBURG was introduced to series production in an extremely short time, within about six months. A further development thereof, sandwich injection moulding is still in use in injection moulding plants today. This process utilises the same platen design as the one used for interval injection moulding. An additional platen with an alternating valve is mounted between the fixed platen and the mould on a standard two-component machine, which fulfils the same function as the original valve on the nozzle side. The sandwich process is used, for instance, to inject an outer skin of high-quality plastic onto a "core" of recycled material in order to produce in an environmentally conscious and cost-effective process.

Technologically speaking, the interval process is a form of two-colour injection moulding.

However, interval injection does not result in a structured two-coloured surface, but in a moulded part characterised by two colours flowing into one another. The colour boundaries are not clearly defined, but are deliberately merged.

The interval effect is achieved in the following manner: a horizontal and a vertical injection unit feed the respective materials independently into a common mixing nozzle with a pressure-dependent alternating valve fitted on the horizontal unit. The two materials are injected either simultaneously or alternately into the cavities via this nozzle, achieving the specific patterning of the moulded part, which most importantly, can be reproduced as required. This effect could not be achieved by the preceding marbling technique as here, no immediate influence could be exerted on the pattern. The moulds used are no different than the conventional moulds and the two injection units can also be used to produce two-coloured parts.

Related to interval injection moulding: sandwich technology is used e.g. to provide recycled material with a high-quality plastic covering.





TECH TALK

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

Precision ejection

Frequently, little importance is awarded to the ejector movement in the injection moulding process despite the fact that the characteristics of this movement often influence cycle times. Particularly in the case of sophisticated or fast-running applications, a servo-electric ejector with the associated load-independent and high-precision movement sequence brings numerous benefits.

The option of an electric ejector is now also available for 270/320 S and 420/470 C ALLROUNDERS. A servo motor drives a planetary roller screw drive via a toothed belt, which moves a threaded spindle in the axial direction. This combination of a servo drive

with an absolute stroke measurement system and high-precision mechanical transmission elements results in a position-regulated, highly precise, dynamic and above all load-independent movement, which can be performed simultaneously with the mould clamping movement, independently of the hydraulic system.

The precise synchronised, simultaneous movements of the ejector and clamp unit offer the advantage that the parts are not ejected in an uncontrolled manner in a horizontal direction, but drop almost vertically from the mould area. This is especially advantageous in the case of fast-running multi-cavity moulds as all parts can be demoulded evenly and in an absolutely reproducible manner. Consequently, the mould can be closed again rapidly, reducing cycle times even further. If robotic systems

are employed for part removal, the ejector can also be used as a positioning axis owing to its precise position regulation, in order to ensure the accurate transfer of parts to the gripper. Further application options are the high-precision functions with the mould closed. Here too, position regulation will ensure that positions are reached with precision.

Spring, summer... "K"

After three years, expect the unexpected, because in the autumn, the plastics sector meets for the industry event par excellence, the "K" in Düsseldorf. This year it will be held from 20 to 27 October.

220,000 visitors are expected in 2004 and more than 2,500 exhibitors will present their innovations in the wake of the exhibition centre expansion to a total exhibition area of 160,000 square metres. Consequently, sore feet are pre-programmed. It is not only the Düsseldorf exhibition centre which has a great deal to offer.

The city itself offers a wide range of culinary delights, ranging from the sophisticated to the simple, from African to Vietnamese food, from gourmet restaurants to bistros. The city on the Rhine offers even more: theatres, musicals,

renowned museums, concerts, discos. Entertainments are therefore in ample supply beyond the exhibition visits.

According to the organisers, the optimum structure of the K is to be maintained. The exhibition areas will again be divided in the

previously successful manner into, raw materials, process materials, semi-finished products, technical components and reinforced plastic products as well as machines and equipment.

"First Choice for Winners" is the slogan for the special exhibit on polymers in sports and sports-facility construction in Hall 6. The provisional exhibition directory for the K 2004, which is updated daily, and further details can be found on the Internet by visiting www.k-online.de. Standard ARBURG number: As in 2001, 13 A 13!





Optimised!

Those who want to be flexible in the choice and deployment of servo-electrically driven machine axes, as is required for in-house production, can rely on ARBURG's modular range of technologies. With the ALLROUNDER "advance", based on the ALLROUNDER C and S,

we combine hydraulic and electric drives to create a new machine concept – practically and economically. Electro-mechanic dosing, the AES energy saving system and the position-regulated screw as standard. For a high degree of reproducibility and highly accurate operation.



ARBURG GmbH + Co KG
Postfach 11 09 · 72286 Lossburg
Tel.: +49 (0) 74 46 33-0
Fax: +49 (0) 74 46 33-33 65
e-mail: contact@arburg.com

ARBURG