today

The ARBURG magazine Issue 29 Summer 2005

MASTHEAD

today, the ARBURG magazine, edition 29, summer 2005

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ALLROUNDER in rank and file in the test bays. The machines are only delivered to the customers after extensive tests and trial runs.

ARBURG

Dear Readers,

After the K is before the K - this piece of wisdom, adapted from a famous quote by Germany's legendary football coach Sepp Herberger, is becoming more and more important in our industry. The year after the K year is no longer a quiet period - work continues at full speed. Therefore, in the middle of this year, we can already look back on a large number of successful milestones. Numerous events in addition to the general trade fair calendar, such as the extremely successful Technology Days with its 3,300 visitors demonstrates that we are continually working on further improving the range of information we provide to our customers, with particular emphasis on content quality.

The fact that our efforts over decades have borne fruit to the benefit of our customers is evidenced by the interesting customer reports in this edition.

And as another famous German saying goes - making a big noise is part of the business! Therefore we are only too happy to be able to present our company's extensive clean room technology range. Owing to the fact that ARBURG has supplied a large number of machines in clean room environments over many years, it is well worth dedicating a detailed technical article to this subject.

And the colourful world of in-mould labelling is also a suitable topic for a comprehensive report.

Once again, we report on the whole range of possibilities in terms of plastic injection moulding, and hope you enjoy reading our new edition of Today.

Juliane Hehl

Experti

Approximately 3,300 trade visitors, including 1,300 international guests from 36 countries, responded to ARBURG's invitation to the Technology Days, once again ensuring the success of the plastics event.

For the first time since the Technology Days were first held in 1999, they were given their own motto, "Intelligent Production", to indicate that maximum cost-effectiveness for the customer is the main objective. This catchphrase describes the targeted optimisation of customer production by means of comprehensive consultancy services and planning on the part of ARBURG. System supply from a single source, as well as production quality assurance and monitoring, complete the features of "Intelligent Production".

Another new feature this year, in addition to the event motto, was the opening of the ARBURG ARBURG Expertise Centre of Competence. The aim behind this was the customer-oriented presentation of our specialist know-how in all application technology sectors, in five consulting circles. As a pioneer in the field of multi-component technology more than 40 years ago, ARBURG has been able to gather a wealth of experience. Customers can benefit extensively from this expertise. Mould technology is an important element of machine technology – ARBURG specialists use their know-how to support customers in selecting and designing the best possible mould. Complete production cells from a single source provide a variety of advantages - first and foremost financial benefits. The ARBURG project department supports the customer from the planning

se en masse!

phase to the complete workable system. International customers receive the highest level of technical expertise from our International Technical Support (ITS) team, whose presentation during the Technology Days demonstrated the entire range of services from telephone consultancy to customer visits and training courses, on a global basis. As a market leader in the construction of injection moulding machines, ARBURG has a wealth of knowledge with regard to processing special plastics and the company provided targeted expert technical advice at the fifth consulting circle "Elastomers, silicone and thermosets".

There was also another premiere to be celebrated - ARBURG has complemented the U series with the new ALLROUNDER 370 U. After the 170 U, a top-class micro-injection moulding machine, and the next larger 270 U, the 370 U represents the largest machine in the series. As with all of ARBURG's products, the fully hydraulic ALLROUNDER U machines feature a modular design and can be combined in various ways for optimum clamping force, injection unit size and screw diameter. Throughout the Technology Days, an ALLROUNDER 370 U 700-170 was on view in the production facility, equipped with the "advance" feature, the ideal starter model as an introduction to electric drive technology. Situated directly next to the 370 U "advance" was an ALLROUNDER 320 A ("A" for the electric ALLDRIVE series), allowing customers to compare the two technologies in terms of energy consumption and cycle times. The excellent graphic display of the new alternative control system "SELOGICA direct" was enlarged specifically for the Technology Days for the groups of visitors, using external flat screens. Direct operator access provides the "SELOGICA direct" with even simpler data input and control of the machines and peripherals. The most obvious change to the control alternative is the generously dimensioned 15" control display with touchscreen, which replaces the keyboard.

Some 40 machine exhibits were on display throughout the company as a representative cross-section of the machine range, from the smallest machine, the ALLROUNDER 170 U, to the largest, the 820 S with a clamping force of 4,000 kN.

Even the "loading area", the loading station for haulage vehicles in a normal working week, was used as a presentation area for seven machines. In addition to the entire ALLROUNDER U series, the complete A machine series was also on show, which consisted of the 320 A, 420 A and 520 A models.

The topics of product training and spare parts management were the focus of the large service sector presentation. Throughout the entire year, ARBURG gives its customers and partners the opportunity to attend expert seminars at Lossburg on products and applications as well as on the fundamentals of plastic injection moulding.

The comprehensive range of information and specialist expertise at the Technology Days was rounded off perfectly by specialist presentations held in two languages by both internal speakers and external speakers from Bayer, Alpha Ionstatex and TRW. The presentations were well-received by a total of 1,300 interested parties.

More than 3,300 trade visitors at the three-day event were deeply impressed by the approx. 40 exhibits and by ARBURG's application expertise.

INFOBOX

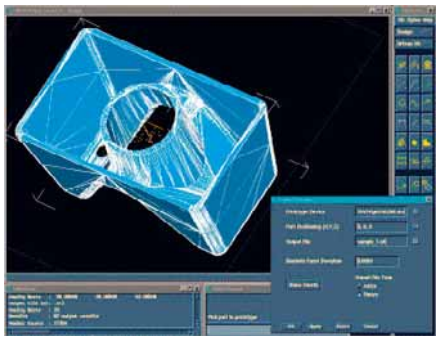
Visitors: some 3,300 visitors, including at least 1,300 international guests from 36 countries.
Factory tours: 1,200 visitors attended 210 German-speaking tours; virtually all the foreign guests visited the plant.
Machines: More than 40 exhibits
Applications: Multi-component injection moulding technology, water and gas injection moulding technology (WIT, GIT), processing of thermosets, LSR and elastomers, powder injection moulding (PIM), production of PET performs, clean-room production, precision and micro injection moulding as well as in-mould labelling.
Presentations: More than 1,300 visitors.

A big name in

SUYIN CONNECTOR

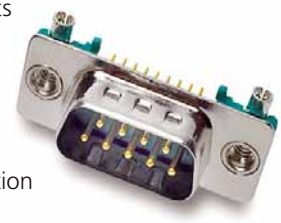
When end customers in the infocom sector hear the name "Suyin" they usually have little idea what it means. But that doesn't matter - they don't need to know. All they need to be aware of is that without the connectors from Taiwan most mobile phones wouldn't work, digital cameras wouldn't record and LCD TVs wouldn't produce a picture. However Suyin has been a well-known name for a long time among those who know the industry. And 169 ALLROUNDERs have played an important part in ensuring the high quality of the products.

Gary Lee, President of the Suyin Corporation, summed up the benefits of the cooperation between his company and ARBURG. "In the 1980s, Suyin chose ARBURG injection moulding machines when production was set up in Taiwan and then for the extension of production in China because they complied with the extremely stringent Suyin requirements on technology and safety." In other words, you can rely on ARBURG ALLROUNDERs. They are easy and safe to operate and the cooperation between the two companies is also very harmonious.



The Suyin Corporation is characterised by its highly-dynamic development, which is not untypical for Asia over the past 20 or 30 years. The company's two owners, H.J. Wang and the Lee family established the enterprise with five employees in the early eighties, at the time for the assembly of D-Sub connectors and the production of computer leads. After only two years, the company set up their own injection moulding facilities in order to produce a wide variety of computer connectors in-house.

In addition to their own production facilities, the company pressed ahead with research, development and mould construction in order to be able to integrate the entire value-added chain within the company. In the 1990s Suyin became a global player" with its own subsidiaries in Asia, Europe and the USA. It has been QA-certified by the German Technical Inspection Agency "TÜV".



After the turn of the century, the company concentrated on setting up new factories in the technology centres on mainland China, on expanding development and order processing capacities and precision mould construction, on production automation and on the certification of further corporate segments.

However Suyin has always remained true to its core area of expertise - the production of connectors and connecting cables for the computer world, mobile telephones, the automotive industry and consumer electronics.

Customer-specific solutions are Suyin's speciality and its forte. With the aid of the design engineers in Taiwan, China, the USA and Germany as well as the strong research/development and mould construc-

small components

From Taiwan into the rest of the world - at state-of-the-art production facilities at the headquarters and in China (photo, left) ALLROUNDERs are used for the series production of connectors and connecting cables for the mobile telephone, automotive, computer and consumer electronics sectors (photo, right).

Photo: Suyin

tion departments, Suyin is able to provide high quality solutions within an extremely short time.

Cooperation with ARBURG dates back to the year 1989. Most of the ALLROUNDERs are M and C machines with clamping forces between 350 and 1,000 kN. All of the machines operate on a multi-shift basis and are integrated into a production-wide quality control system which continually monitors the production quality.

A wide variety of plastic parts for connectors, including the latest-generation "DDR2 connector" and the "PCI Express connector" for notebooks are produced in Taiwan using ALLROUNDERs. According to Suyin, this saves production time and high numbers of top-quality parts can be produced – which is of vital importance in this particular sector.

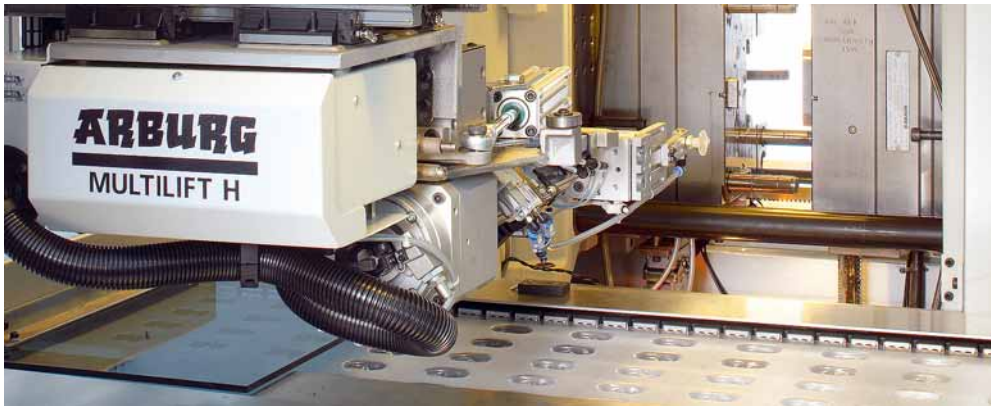
Those responsible at Suyin value ARBURG's service support very highly. The close relationship between the service specialists and the production sites in China can best be demonstrated using the factory in Dongguang as an example. At times, the service technicians stay for several days at the factory, and therefore in the town of Dongguang, to inspect the ALLROUNDERs based on the Suyin maintenance guidelines, in order to be able to solve any arising problems as quickly as possible. Being able to respond immediately when individual solutions are needed is not only valued by Suyin's customers, Suyin also values this characteristic in ARBURG.

INFOBOX

Founded: 1981
Employees: More than 7,500 world-wide
Production area: 132,000 m²
Products: Connectors and cables for the infocom, consumer goods and automotive sectors
Major sales markets: Europe, USA and Asia
Subsidiaries: Headquarters in Taipei/Taiwan, production sites as well as sales and customer service centres in China, subsidiaries/sales offices in the USA, Germany (European headquarters), Israel, Korea, Japan, Hong Kong and Singapore
Contact: Suyin Corp. No. 233, Fu Teh First Road, Sheatza, TW.Taipei, Hsien, Taiwan R.o.C. www.suyin.com

What is meant by

Does this machine guarantee a clean room? This question is posed very often in today's age, as the requirements for clean room production are continually increasing in importance. "No," is definitely the answer to this incorrectly formulated question, as no machine can create a clean room. The important point is whether a machine is capable of producing goods in an existing clean room or independently as a clean room cell. ARBURG provides various solutions in this sector, based on customer requirements, which are being successfully used in practice.



For many years, several thousand ALLROUNDERs have been used throughout the world to produce goods in clean rooms or under conditions comparable to a clean room. These are not special machines but appropriately equipped ALLROUNDERs.

The results of many years of experience and expertise in the field of clean room technology are various solutions which ARBURG offers its customers on the basis of their requirement profile. The spectrum extends from machines which stand in the clean room in their entirety, through modular, decentralised clean rooms in which the conveyor belt is encapsulated and the moulded parts are transported within the clean room, to cells with clean room modules above the machine's clamping area and the robotic system area.

At this year's Technology Days, ARBURG presented this type of clean room in its clean room technology laboratory. The centrepiece of the cell is a hydraulic ALLROUNDER 270 U 350-70. With the "electromechanical dosage" and "position-regulated screw" options from the ARBURG range, this machine is characterised by a high level of dosing accuracy, low energy consumption, short cycle times as well as good dynamics and a high degree of reproducibility from the injection process.

The special clean room features include a water-cooled motor, with which particle distribution is prevented by means of a fan, as well as the two clean room modules with category 3 ionisation in accordance with DIN EN ISO 14644-1. Ionisation of the air volume flow is carried out by means of direct current. Due to the production of positive and negative ions at high density, the area beneath the

clean room compatible?

module is electrostatically neutralised, thus preventing dust particles from adhering to the product.

The powder coating on all the ALLROUNDERs is smooth, scratch resistant and resistant to cleaning agents – an advantage over wet painting which plays an important role, particularly under clean room conditions. With their light grey colour, the machines comply with the visual requirements for clean rooms. The issue of floor cleaning, which is also an important factor in these areas, has been taken into account by increasing the ground clearance of the machine base by 100 millimetres. During the Technology Days the clean room cell was used to produce a 1.3 gram medical product made of SAN. The part was moulded in a cycle time of 13 seconds, removed from the mould in the clean room area by a horizontally operating MULTILIFT H robotic system and placed in trays which are pre-manufactured by the packaging machine. With its stainless steel panelling, the packing machine from A&D Maschinen, Weissensberg is suitable for use in the food industry and for clean room production. The packaging sequence also began in the cell's clean room where the trays were deep-drawn. The moulded parts were then placed on the trays, which were sealed with a special film (Tyvek®). This ensures that the parts are cleanly packed and protected against contamination. Due to the properties of the Tyvek® film, the packaged products can subsequently be sterilised by means of ETO gas or radiation. Material drying and feeding is carried out by a small quantity drier with glass funnel, from Helios, Rosenheim.

With this exhibit, ARBURG highlighted one of the possible clean room cell solutions. A clean room cell such as this provides, for example, the ideal basis for meeting partial clean room requirements for clean injection moulding production, in a cost-effective way.

The complete clean room cell (below) encompasses an ALLROUNDER 270 U and a MULTILIFT H for removing and placing parts (centre) from the ARBURG range, as well as a packaging machine (top left), material dryer and conveyors (top right) from external suppliers.

Precise

In order to ensure that dials and other analogue indicators in cars and haulage vehicles provide the driver with precise information, so-called stepper motors are employed. These motors convert the information received into highly accurate pointer movements by means of cogwheels and worm gears. The stepper motor casings are manufactured on ALLROUNDER production cells at Siemens VDO Automotive in Babenhausen, Hessen.

So far, the Siemens VDO technicians have been so pleased with the performance of the two systems supplied that a third production unit has already been inspected and commissioned. Babenhausen is regarded as the centre of expertise for vehicle instrumentation within the global Siemens VDO Automotive AG network. At the plant in Babenhausen, some eight million plastic parts per week are produced for car instrumentation on over 30 injection moulding machines.

The stepper motors can be used in all analogue dials such as speedometers, rev counters, fuel gauges, temperature and oil pressure indicators. Mounted onto the motors are cogwheels and worm gears made of plastic which are moulded onto metal shafts. These shafts move within a casing which is also made of plastic. As the plastic material used is very abrasive, the wear resistance of the relevant parts was modified to suit mould and injection technology in order that the required service life could be achieved. The shut-off nozzles for sprue-free injection are each fixed to the mould.

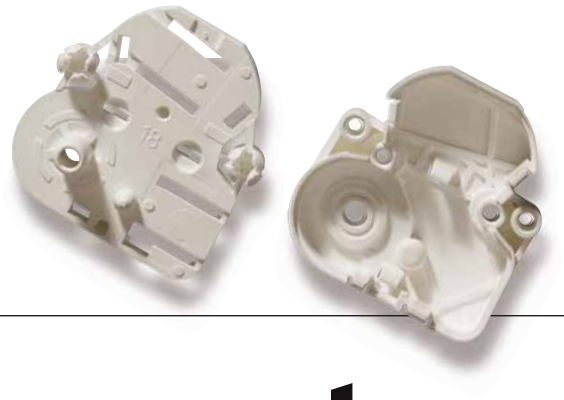
The casing itself consists of two parts - a lid and a base plate - which snap together automatically during assembly and which cannot then be separated. The parts weigh 2.6 grams and are produced in 8 or 16 cavity moulds using hot-runner technology, one for the lids and one for the base plates, whereby a total of four versions of these hot-runner moulds are used.

The production cell consists of an ALLROUNDER 420 S 800-350 "advance", a MULTILIFT H with an additional B axis for horizontal part removal at the rear of the machine and a moveable placing system for depositing the moulded parts produced on an individual cavity basis.

The placing system consists of two stations, each with two drawers and eight containers. These containers can hold ap-

INFOBOX

Sectors: Automotive supplier for electronics, electrics and mechatronics; automotive industry development partner
Sales: Nine billion Euros in 2004 (30.09.04)
Contact: Siemens VDO Automotive AG
64832 Babenhausen
www.siemensvdo.de



measurements

proximately 1,000 parts. Consequently, up to 32,000 parts can be stored within the placing system. A total of 32 separate ejector chutes are needed to separate production in this way.

The gripper physiognomies of the MULTILIFT robot also had to be adapted to the various mould designs - a total of four different gripper systems are used.

A particularly interesting feature is that the entire placing system, including the parts buffer, is accommodated in the area of the MULTILIFT removal robot. This ensures maximum use of space within the production cell. Reject parts are separated off and random samples are removed for quality control via separate chutes.

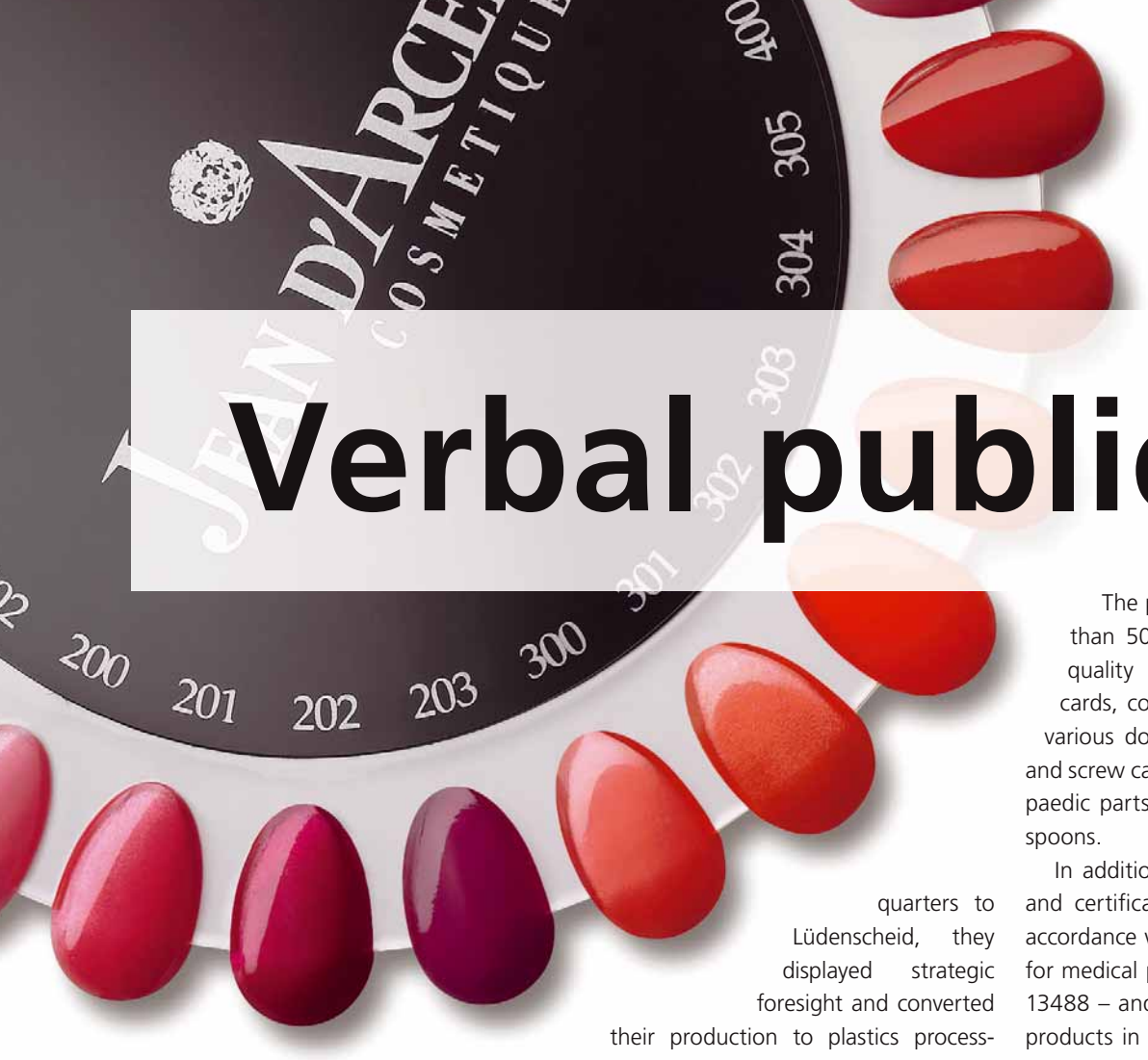
The high level of reproducibility in parts production was a particularly important quality criterion for Siemens VDO. The ALLROUNDER 420 S "advance" fully complied with their requirements. The test series at ARBURG showed a very high degree of consistency with regard to part weights. The minimum/maximum spread was always less than five milligrams. This in turn shows that the "advance" machines, with position-regulated screw and electromechanical dosage, are especially suited to traditional, technical injection moulding applications.

Despite these demanding specifications, the cycle times were successfully kept within the ideal range. The entire sequence, including the required indication of container changes and QA part requirements in the low manpower production mode is managed centrally via the SELOGICA machine control system. The complex production cycle is displayed as a visual flowchart on the control monitor.

This example shows that demanding and highly-complex production sequences are in the best possible hands with the ARBURG project group.

Photo:Siemens VDO

Siemens VDO has made a significant contribution to the 100-year history of the speedometer. Today the required "background technology" is produced in the form of so-called stepper motors (top right) on ALLROUNDER production cells (bottom right) using a special placing system (centre left).



Verbal publicity

It is one of the truest marketing slogans ever: "No one talks about us but we are nevertheless on everyone's tongue." Measuring spoons, measuring cups and tongue spatulas represent the core business of Hugo Meding GmbH, founded in Iserlohn in 1949.

The most up-to-date spoon development, patented by Meding, is a colour-graduated, two-component measuring spoon for senior citizens. Gerontology, "technology for the aged" will increase in importance in our ever ageing society. This market forecast encourages plastics processors to invest more and more in the medical field and to allow product creativity to flourish - fixed spoon holders, dosing pipettes and straw holders provide but a small insight into the possible range of user-friendly products for senior citizens.

It all began with metal processing after the war – for example, poster stands made of aluminium extrusions for Kaiser's coffee. When Klaus and Ursula Pietzner took over the company in 1974 and moved its headquarters to Lüdenscheid, they displayed strategic foresight and converted their production to plastics processing. Applicators and measuring devices made from physiologically harmless plastics for the pharmaceutical and cosmetics industries became their "bread and butter products", alongside traditional advertising items. Renowned customers, including Merckle, Novartis, Procter & Gamble, Avon, Aventis and Glaxo Smith Kline, have put their trust in Meding's product quality and service-orientation for more than two decades. The stringently applied company motto "Meding – Precision in Plastic" is put into practise collectively and is reinforced by means of customer audits and constant production monitoring.

The product range, covering more than 500 parts, extends from high-quality nail varnish colour sample cards, cosmetic and medical spatulas, various dosage systems, protective lids and screw caps, technical parts and orthopaedic parts to measuring cups, lids and spoons.

In addition to patents, design patents and certificates – Meding is certified in accordance with EN ISO 9001: 2000 and, for medical products in particular, EN ISO 13488 – and the CE mark for all Meding products in accordance with the Medical Devices Directive 93/42 EEC, winning the innovation award in the field of orthopaedics in 2004 was a special accolade for the company based in Halver. The joint development of the prize-winning "T-Flex" spinal brace system with partners from the "Brancheninitiative Gesundheitswirtschaft" (health management industry initiative) is also a lucrative extension to the medical technology business field.

Concentration on the clearly defined core segments of cosmetics, pharmaceutics, medical components and technical parts has been rewarded by market success. A constant annual growth in turno-

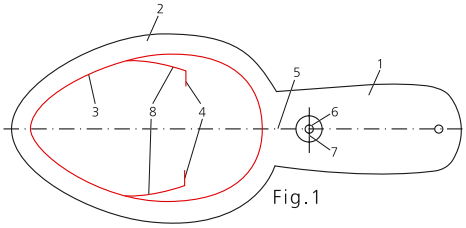


Fig.1

Sterile production with constant process and product quality monitoring (left and right). Award-winning and patented - the spine brace system and the two-component measuring spoon are among the product highlights (right).

Photo: meding

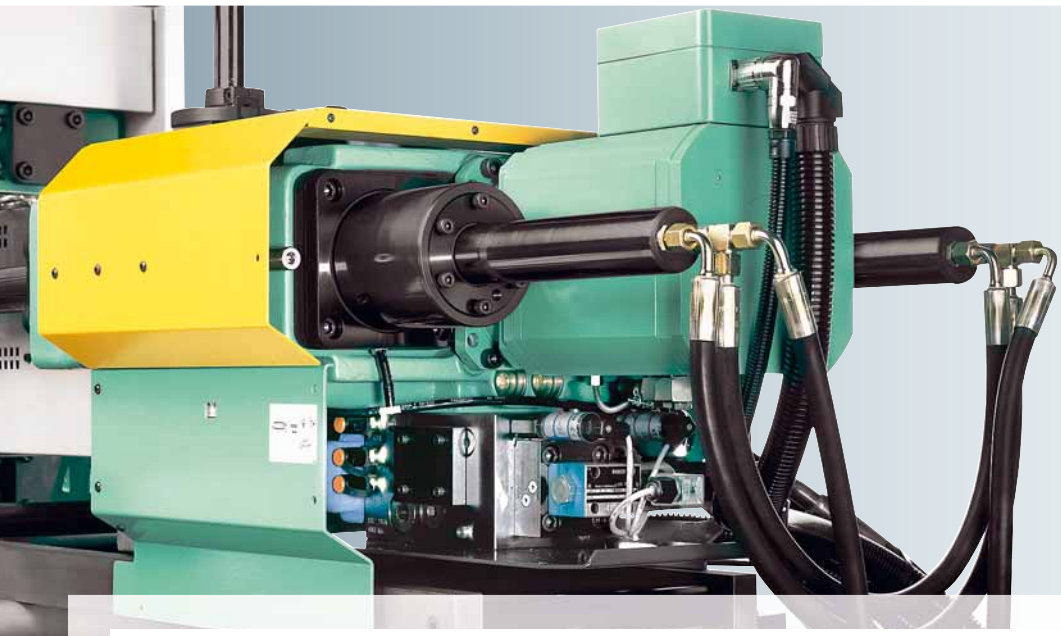
ver of approximately five percent – in 2004 a growth of 9.7 percent was recorded, despite the German health reform –, an annual investment rate of ten to fifteen percent and a staffing level of 20 specialist employees which has remained stable for many years, are impressive indications of Meding's business success.

The pharmaceutical, cosmetics and orthopaedics sectors account for 65 percent of the total turnover, the other 35 percent results from technical parts and advertising items. The share of total production which is exported remains stable at 50 percent, whereby Switzerland, the Benelux countries, Poland, and Austria are the most important sales markets.

The long-term partnership with ARBURG has also contributed to Meding's success. Managing Director Stefan Pietzner is always happy to emphasise his faith in the machine quality over many years and the fact that "ARBURG, despite its size, is always an equal partner and the companies can be aptly described as being on familiar terms." Now, twelve ALLROUNDERs with clamping forces of between 220 and 1,300 kN can be found on Meding's production lines. Special features include mould venting, injection into the parting line, the injection coining control option and internal mould cavity pressure measurement. The company's own demands in the service sector stoke expectations regarding the expertise of its partners Pietzner does not hesitate in confirming that ARBURG can live up to these expectations. "Since the beginning of our working together we have valued the high level of expertise of the field service engineers who have made a major contribution to the optimisation and extension of our machine fleet and of the technological equipment needed now and in the future."

INFOBOX

Founded: 1949
Total area: 2,200 m²
Employees: 20
Product areas: Medical technology, pharmaceutics, technical parts, orthopaedics, advertising items
Machine fleet: 14 injection moulding machines, including twelve ALLROUNDERs with clamping forces of between 220 and 1,300 kN, two thermoset presses
Contact: Hugo Meding GmbH
Kruppstrasse 8, D-58553 Halver
www.meding.com



The position-regulated screw is extremely accurate due to the constrained cylinder system with pressure applied on both sides.

Hydraulic injection

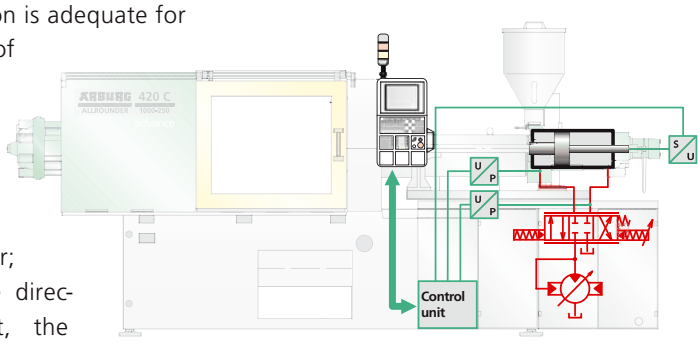
Hydraulic injection has a significant advantage over electric versions - it is significantly easier to design and construct and is therefore more economical to use. However, hydraulic injection systems are often accused of being less accurate. ARBURG supplies both hydraulically and electrically driven versions, and includes a precise hydraulic alternative in its range with the position-regulated screw (PRS).

The company has therefore been able to successfully counter existing prejudices with regard to hydraulics-based injection systems. All the movement axes are driven via the regulating pump as standard. This version is adequate for the vast majority of injection moulding tasks. During injection, pressure is applied to one side of the hydraulic cylinder; when reversing the direction of movement, the pump is switched to the other piston side via a shift valve.

ARBURG's position-regulated screw, available as an optional extra, is designed for those who need a higher degree of injection precision. This equipment version is a so-called "constrained system", with which the injection piston can be actively slowed down as well as accelerated. The inertia of the injection axis and the resistances in the plasticising cylinder can therefore be minimised effectively. The system's dynamics and reproducibility are significantly improved.

The reason behind the high degree of positioning accuracy of the position-regulated screw is the differential cylinder with a high-response servo valve. With this system, pressure is actively applied to both sides of the injection piston. The screw can therefore be accelerated and decelerated quickly.

To sum it up - for those whose injection moulding company handles standard tasks, the accurate, pump-regulated hydraulic injection version is more than sufficient. To master more demanding tasks, which require an even higher level of dynamics, precision and reproducibility, the position-regulated screw with differential cylinder is to be recommended. With this system, almost all the possible part requirements in everyday practice can also be mastered with the proven hydraulic systems.



Active spare parts management

Personalised customer support has been high priority at ARBURG for a great many years. This has been further enhanced by the introduction of active spare parts management (ASM). This includes extensive consultancy services, a high level of spare part quality and availability with a fair price/performance ratio, as well as customised maintenance and expendable parts packages.

The aim of ASM is to reduce downtimes and therefore costs by means of proactive planning.

An important factor is extensive, personalised consulting. Depending on the machines used and the materials to be processed, ARBURG supports its customers with advice and assistance and helps them select the suitable components. In this way it is often possible to rule out production problems from the outset. In order to minimise production downtimes, various maintenance and expendable parts packages are put together for the customers, which are tailor-made to the relevant machine fleet. An important aspect of this is the guarantee of being able to subsequently purchase spare parts for older machines.

The high degree of spare part quality and availability is ensured by the in-house production at the headquarters in Lossburg – from development to series production. Thanks to constant investment in modern production facilities and processes, ARBURG is able to offer quality products with the best possible price/performance ratio. The costs, for instance, of complete cylinder modules and of individual screws and cylinders have been considerably reduced through optimised screw production processes. Those wishing to achieve additional cost savings can procure spare parts packages at favourable conditions. Furthermore, the high degree of spare parts availability in conjunction with a sophisticated in-house logistics system guarantees fast shipment of spare parts.

Well attended - the "Service" presentation forum set up especially for the Technology Days.

Innovative

High-quality design, flexible product changes, efficient production – thanks to these advantages, the importance of in-mould labelling (IML) has increased dramatically in the packaging sector over the past few years. "The potential of IML is far from exhausted today," says Hans Auer, Managing Director of P'AUER AG. Innovations in this sector range from special finishes through to new fields of application for IML.

P'AUER AG, with its headquarters in Fällanden, Switzerland, has been involved in the production of in-mould labels with offset UV printing since 1990 and is one of the pioneers in this sector. Hans Auer

heads the company together with his daughter Nadine, responsible for controlling, and his son Roland, head of production. The company employs 35 people. Since the year 2000, the company has specialised entirely in printing foils which are bought primarily from Europe as well as from overseas, for example from Japan.

Its extensive foil printing expertise is reflected in the products as well as in the two modified production lines, with a maximum print format of 74 cm/102 cm. While the smaller size is designed for six dyes plus one finishing unit, more than eight dyes and two finishes can be printed on the larger foils. This system in particular was constructed exclusively in accordance with P'AUER's requirements. It boasts special features such as material pre-treatment to improve dye adhesion, an ionisation unit to combat electrostatic charging and in-line finishing for punching out the labels. Furthermore, an integrated dye management system monitors the dye quality during the entire production process.

The air in the production halls is conditioned with regard to humidity, as this plays a significant role in relation to the running properties of the material as well as foil processing – the key issue being electrostatics. The finished labels are shrink-wrapped to maintain these conditions.

As a leading manufacturer, P'AUER not only produces high quality labels, but also develops new, customer-specific solutions and prompts innovations from the foil manufacturers. The IML specialist Hans Auer forecasts new trends in the packaging sector with regard to the functionality and the design of the label. This includes, for example, three-ply foils with an aluminium layer in the middle

P'AUER®
SWISS MADE

which have excellent protective properties, finishes with a UV filter in order to make it possible to offer UV-sensitive foods in transparent packages, or finishes with special soft touch properties which ensure pleasant touch characteristics. In the field of RFID (Radio Frequency Identification - technology for identifying goods without touching them, for example), in future it will be possible to attach a chip to the label for subsequent in-mould lamination. Currently, P'AUER AG is already actively working on this type of development. However according to Hans Auer, fragrant packaging, which today is used for coffee for example and which is produced by means of aroma capsules integrated into the printing dye, is likely to remain a niche product.

With regard to design, labels with holograms or diffraction foils are possible options. HDPE foil, which looks like Japanese paper, has already been requested. Whereas these innovations mainly affect the packaging sector, other injection moulding sectors in particular offer new application options for IML. For products such as dials, toys, vehicle-interior components

potential


Photo: P'AUER

IML pioneer and owner of P'AUER AG, Hans Auer together with his wife Martha (left), daughter Nadine (front) and son Roland (back) at the large production machine

and household appliances, IML offers more than just new design possibilities. IML can also eliminate the need for complex, subsequent printing.

IML is of interest for technical applications, as today it is possible – thanks to many years of experience in the packaging sector – to produce high quality labels cost-effectively, even in smaller quantities. According to Hans Auer, injection moulding companies that want to enter the IML sector require patience above all. "You can't count seconds to start with!" He explained that a certain amount of time is needed before the process runs smoothly. "1,000 items today, 2,000 tomorrow and then in four weeks a cycle time of between 5 and 15 seconds," said Auer, describing the necessary learning period.

"After all, with in-mould labelling, four high-tech components – the injection moulding machine, the mould, the robotic system and the label – have to be matched to one another." From a customer point of view he therefore advocates complete solutions from a single source in conjunction with expert advice, such as that provided by the ARBURG project department, which has already completed a variety of IML systems.

INFOBOX

Founded: 1957, IML since 1990
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MILESTONES

"Milestones" has often dealt with the technology behind multi-component processing, a development to which ARBURG has made a significant contribution since 1961. The following article demonstrates the wide variety of applications which are possible using multi-component technology.

From the beginning, the requirements in the field of multi-component processing were also directed at increasing the injection capacities. With an increasing number of options with regard to mould design, coupled with higher performance control concepts, it was possible to use more than two injection units at the same time to produce parts. On this basis, machines were developed which today can produce parts made from several colours or plastics with up to five injection units.

In addition to the traditional two-colour arrangements - horizontal and vertical - successful trials are regularly being carried out where both injection units have been positioned horizontally next to each other. In one case, the injection units were angled towards each other at 90°. The floor space needed remains small and the use of robotic systems remains possible, without restrictions.

In the three-component sector there is also a "traditional" arrangement with two horizontal and one vertical injection unit, whereby the third unit injects into the parting line from the rear of the machine in the ‚`L´ position. As an alternative to this ARBURG has constructed an ALLROUNDER with the third unit positioned diagonally to the horizontal unit. The injection unit is positioned at a 45° angle above the horizontal unit. Again, the most important factors are smaller footprints and easy access for robotic systems.

Four components can be injected at the same time if two diagonal injection units, vertically offset, inject through the fixed platen, another injects vertically into the parting line and the fourth then injects from the rear of the machine in ‚`L´ position. In principle, two ALLROUNDERs are operating in one clamping unit, whereby both machines are operated via one terminal and are linked to one another via synchronisation points.

The final result of the development until now is an ALLROUNDER 630 S 2500-350/100/100/100/100, the horizontal unit of which injects centrally in the conventional way. The four vertical units are positioned on a base plate transverse to the machine axis, they can be slid manually and be moved/programmed independently. Due to the integration of all the sequences into the SELOGICA machine control system, the ALLROUNDER becomes a genuine five-component machine which is used for colour-sorted injection moulding as a "two-material, four-colour" machine in the production of toothbrushes. However there are no limits to the imagination in the multi-component sector. A sixth injection unit at a 45° angle above the horizontal unit is being considered for the current configuration.

One of numerous versions - a three-colour ALLROUNDER version with the conventional injection unit arrangement, plus a third unit at an angle of 45° above the horizontal injection unit, operating in the fixed platen.

TECH TALK

Jürgen Schray, Dep. Manager, Applications Technology

Hard/soft combinations - advance planning is decisive

Thermoplastic elastomers (TPE) – also known as engineering TPEs – have experienced two-figure rates of growth over the past few years. One important reason for this is the ease of processing in comparison with conventional elastomers.

Today, traditional hard/soft combinations are still combinations of ABS and TPU, followed by PP and its compounds in combination with TPEs on the basis of EPDM. As the soft materials can be chemically bonded, permanent bonds can be achieved with almost all conventional thermoplastics. Well known abbreviations for soft components are, for example, TPE, TPE-U, TPE-E, SB, SEBS, SEPS and TPE-S. A decisive factor for processing on the machine and the subsequent functionality of the component is perfect preparatory work with regard to material selection, as this defines the basic structure of the bond. If this step is ignored, it is often not possible to fulfil the subsequent requirements on the component as it is then only possible to change the processing window during production by means of parameterisation. It is therefore important to look into the adhesive properties of each polymer at the outset, and to involve the raw materials and machine manufacturers when choosing the design or during the construction phase at the latest. Whereas the raw materials manufacturer is responsible for the bond requirements, the machine manufacturer can define the necessary equipment at an early stage, based on the process sequence. The advantages of this are high melt transportation speeds due to optimised nozzle geometries, flow-benefiting sprue systems, small gates and hot runners with a needle shut-off system. Problems can arise due to large cross sections – starting with the machine's nozzle tip –, thick sprues and gates on the component, three-platen moulds and long melt dwell time in the cylinder.

Technology back on tour

After the great success of the first ARBURG road show "Technology on Tour", ARBURG will once again be bringing its technological expertise to its customers this year. The "Technology on Tour" road show will be paying informative visits throughout Germany in the second half of the year.

The success of the first "Technology on tour" premiere is expected to be repeated in 2005.

Nuremberg, Bielefeld, Hamburg and Darmstadt are the chosen stops, where internal and external experts will give specialist presentations on current injection moulding technology issues. The tour programme is "Hard/soft combinations made of thermoplastic elastomers and engineering plastics", "Production cells for market-oriented production", "Needle shut-off hot runner systems & staged mould technology" as well as "The plasticising system – - an overview of selection criteria". The events, scheduled on a single day, will impart concise injection moulding technology know-how within a technical framework.

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