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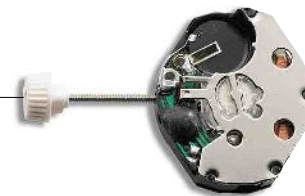
The ARBURG magazine

Issue 41

2009



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MASTHEAD

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Beauty and functionality combined: The new ARBURG Customer Center is really special - both by day and by night.





Dear Readers,

“To stand still is to lose ground.” This maxim has always held true for ARBURG, especially in economically challenging times. In the spring of 2009, we again proved its validity with our new Customer Center and our new products. Many customers have already made extensive use of the facilities offered by the Customer Center and the feedback has been positive throughout. The same applies to the extension of our product range with the new HIDRIVE machine series and the two new electric ALLROUNDER A machines.

All the innovations reflect the great significance that ARBURG places on the topic of “energy efficiency”. With regard to building technology, we have once again broken new ground with our construction activities. The goal of saving energy, however, has been deeply rooted in our family-owned company for generations. As a trend-setter, we have always sought for energy-efficient solutions, further developed existing concepts and consistently implemented them, both in our pro-

duction and in our products. Being confronted with the limits of technical possibilities, as ARBURG so often is, always proves both challenging and motivating. Continuously exploiting new potential and remaining competitive in the process, is an important goal for all employees. In injection moulding, the aim is always to optimise cycle times and energy consumption, while maintaining consistently high product quality. We provide you with extensive support by means of the appropriate products and our expertise. You will find valuable information in the following pages of the present magazine, as well as in our new brochures entitled “ARBURG - an energy-efficient company” and “Energy-efficient injection moulding”.

We hope you enjoy reading this new issue.

Herbert Kraibühler
Managing Director Technology & Engineering



Energy innov

At ARBURG, energy efficiency plays an extremely important role; accordingly, developments are ongoing. The latest results include two new electric ALLROUNDER A machine sizes and in the case of the hybrid ALLROUNDER HIDRIVEs, even a complete machine series. All these machines have one thing in common: the ARBURG "e²" energy-efficiency label.

To date, the principle driving force in terms of energy efficiency has been the electric ALLROUNDER A series. Thanks to its drive concept, it offers the best prerequisites for energy-efficient operation. Depending on the application, energy savings of up to 50 percent can be achieved. Now, the application range of the electric ALLDRIVE series has even been significantly expanded by means of two new machine sizes: The small ALLROUNDER 270 A with a clamping force of 350 kN rounds off the bottom of the range, while the large ALLROUNDER 720 A with 3,200 kN completes it at the top.

In addition to energy efficiency, cost effectiveness is another extremely important

topic for ARBURG. These two aspects have now been united in the new HIDRIVE machine series, which also achieves high production performances with reduced cycle times.

These are made possible through the hybrid machine concept of the ALLROUNDER H machines, which combines advanced hydraulic and electric components. The servo-electric clamping units originate from the ALLDRIVE series and have been combined with the hydraulic injection units from the ALLROUNDER S 'advance'.

A further requirement for the new machine series was a high injection performance. The HIDRIVE machines consequently feature large-sized injection units with respect to the clamping force. These are complemented by performance-optimised hydraulic accumulator technology so that a high-volume, dynamic injection flow is available.

However, high performance capabilities must also go hand-in-hand with reduced cycle times. This is ensured by the servo-electric toggle-type clamping units, which permit fast, dynamic mould movements. Thanks to independent movement

axes, extensive simultaneous machine movements are possible.

But how can such high performance be made available in an energy-optimised manner? By performing the energy-intensive dosage process using a servo-electric direct drive, as is the case with the toggle-type clamping unit. With this technology, the braking energy of the servo motors is recovered and fed back into the mains,



further optimising the machines' overall energy consumption. Moreover, the hydraulic accumulator drive operates with a minimum installed pump capacity and features an efficiency class EFF1 motor. In ad-



Energy-efficient machines



On the ALLROUNDER HIDRIVE (left) hydraulic valves and pressure accumulator are integrated in the machine base (centre left). The servo-electric toggle-type clamping unit (centre right) contributes to the energy efficiency of the ALLRDRIVE (below) and HIDRIVE machines.



dition, the dynamic charge control of the hydraulic accumulator automatically adapts the pressure level to the current requirement, ensuring energy-optimised operation. Energy savings totalling up to 40 % can thus be achieved.

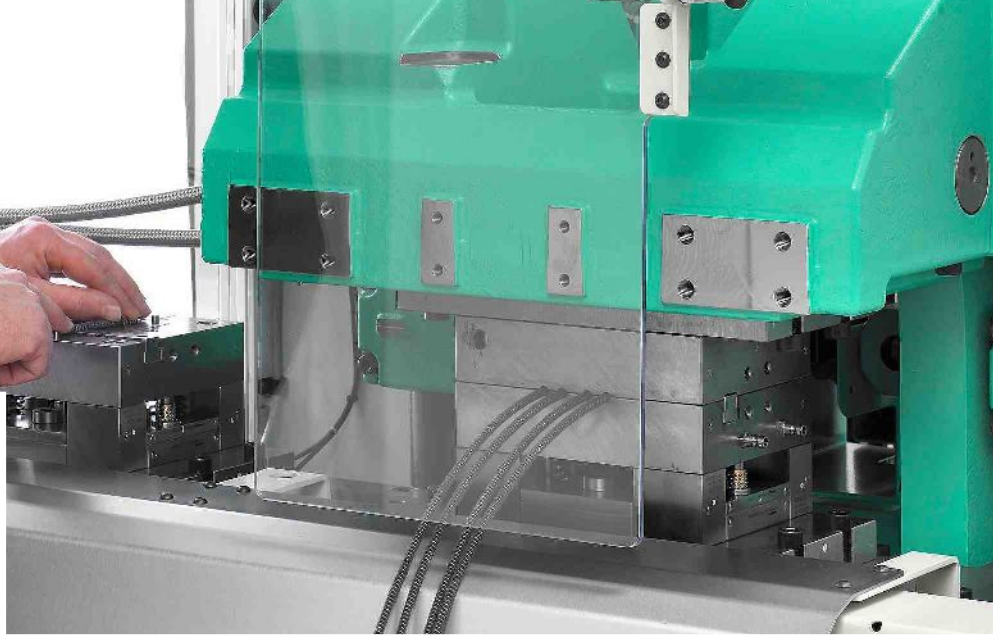
Nevertheless, the ALLROUNDER H machines are also efficient in terms of space requirements. Not only are the pump and oil tank housed in the machine base, but also the hydraulic valves, including the pressure accumulator. This makes the machines very quiet and provides them with a visually attractive design.

The concept of the new HIDRIVE machi-

ne series was derived from the successful GOLDEN EDITION series. The HIDRIVE machines are available in the main sizes from 600 to 3,200 kN, with matched, fixed clamping force/injection unit combinations and high-quality basic equipment at an attractive price/performance ratio.

Thanks to this consistent standardisation, the new machine series is ideally suited for the processing of thermoplastics, not only on account of the energy optimisation, production capacity and cycle time reduction, but also due to its high quality. For detailed information on all these innovations, please refer to the

product information and technical data available in the "Downloads" area of all ARBURG websites.



Ideal for all mould constructions such as e.g. rotary tables: the vertical free-space system of the ALLROUNDER V (above). Sliding tables have proven ideal for the encapsulation of cables (right).

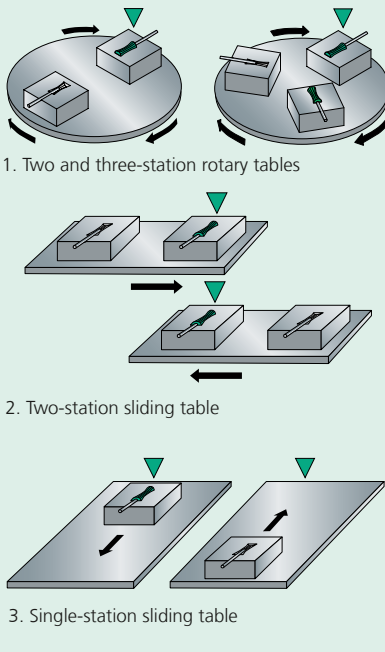
Vertical versatility

The abbreviation “V” stands for the “vertical” design of the ALLROUNDER V. However, it could just as easily stand for “versatility”. The entire machine series can be adapted extremely flexibly to meet a wide variety of requirements with regard to the encapsulation of inserts in volume production - for example through the injection unit arrangement options.

Customer-specific solutions such as rotary or sliding tables can be realised without problems. And as the following examples show, these are often already available as standard. Ultimately, everything is possible in terms of ergonomics and productivity, including integration in automated production lines. The special advantage of the ALLROUNDER V machines is the configuration of the vertical clamping units as so-called free-space systems with a fixed mounting platen positioned at the bottom. This allows the mould installation area to be freely accessed from



Rotary and sliding table versions:



three sides and permits easy installation of mould constructions such as rotary and sliding tables. Solutions of this kind are always particularly interesting where complex insertion procedures have to be designed ergonomically or cycle times reduced in order to increase productivity.

Productivity increases are made possible through the use of injection moulds with one upper mould part and changing, identical lower mould parts. Consequently, one lower mould part can always be emp-

ried and reloaded while the injection process is running in another part. The machine downtime otherwise necessary during these processes can be minimised in this way. But how do the individual rotary and sliding table solutions differ?

Rotary tables are characterised by a compact design and a fixed operating position. Rotary tables feature two mounting positions (stations) as standard. In the context of customer-specific automation solutions, up to three stations are possible. This allows sophisticated production sequences to be implemented with upstream or downstream operations.

In contrast, sliding tables are characterised by their linear movement. Sliding tables are consequently always recommended when inserts are particularly bulky and extend far beyond the mould. They are ideally suited, for example, for the encapsulation of cables. Up to two stations are optionally available. In the case of two-station sliding tables, insertion is performed alternately from the right and left of the clamping unit. Where ergonomics are a priority during the insertion procedure, for example in the case of intricate or complex parts, a single station sliding table is a cost-effective alternative.



Grand inauguration celebrations

An exceptional building was inaugurated with exceptional events: the new ARBURG building with its centrepiece, the Customer Center. The guests in attendance ranged from companies involved in the construction project through to visitors from overseas.

With three events and a total of 600 regional guests, as well as customers from throughout Germany and abroad, ARBURG celebrated the opening of its new Customer Center. Thorsten Kühmann, Managing Director of the German Machinery and Plant Manufacturers Association (VDMA) for plastics and rubber processing machinery, and William R. Cardeaux, President of the Society of the Plastics Industry (SPI) were among the guests of honour at the opening event and addressed their greetings to the proprietor families Hehl and Keinath. Both speakers congratulated ARBURG on the new Customer Center and underlined the importance of this investment for the future.

Long-standing customers such as Dr. h. c. Kurt Stoll, Vice Chairman of the Supervisory Board of Festo AG & Co. KG, as well as Flemming Simonsen (Global Procurement Category Manager) and

Anders Ravnskjær (Senior Director Moulding DK) of Lego Systems A/S, spontaneously took advantage of the festive occasion to officially thank ARBURG for the many years of co-operation and congratulate the company on its new Customer Center, before presenting their gifts on the stage. A particularly memorable point of the official ceremony was when Managing Directors Herbert Kraibühler and Helmut Heinson presented the new HIDRIVE machine series in a lively and entertaining dialogue. The first two machines were available for viewing in the Customer Center, as was the innovative and energy-efficient building technology.

In addition to the technical highlights, a number of culinary, musical and acrobatic delights were provided among more than 30 ALLROUNDERS over an area of some 2,100 square metres.



A high point of the celebrations were the acrobatics on aerial silk (top). The official inauguration ribbon was jointly cut by the partners Karl Hehl, Renate Keinath, Eugen Hehl, Juliane Hehl and Michael Hehl (from left to right, below).

An absolute must:



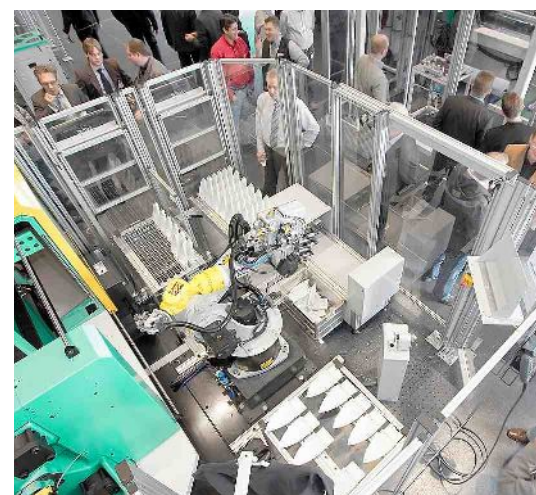
It was not only the new Customer Center which received its baptism of fire between 19 and 21 March. The Technology Days, which received more than 4,000 guests from 43 countries once again exerted its power of attraction and impressively proved its significance within the international plastics industry.

The fact that the sometimes arduous journeys to the event are always well worthwhile is evidenced by the positive visitor feedback. Here, visitors are granted a unique opportunity to discover the future trends within the injection moulding industry and the complete product and service offerings, as well as witnessing the launches of new products. The highlight of the event was the new Customer Center with more than 30 ALLROUNDERS.

All the machine series were presented, including horizontal and vertical machine concepts, the entire clamping force range from 125 kN to 5,000 kN, various automation solutions, a performance comparison between a hydraulic and an electric machine and much more. The various production cells not only demonstrated the high performance of the ALLROUNDER injection moulding machines, the MULTILIFT robotic systems and the SELOGICA control system, but also ARBURG's competence in the project business.

The collective expertise of the ARBURG Applications Technology department is reflected in the broad range of applications presented at the Technology Days. These included thermoset and LSR processing, Exjection[®], medical technology, multi-component injection

moulding, micro injection moulding, natural fibre processing, precision injection moulding, powder injection moulding (PIM), the production of optical parts a clean room environment, sandwich



Technology Days



With more than 30 exhibits, the Customer Center was at the centre of the Technology Days (left). Complex production cells (below) and expert presentations (centre) impressed visitors, as did the energy-efficient building technology in the new building (right).



The specialist presentations held by internal and external speakers are always extremely well attended. This year, the main focus was on the subject of energy efficiency. The presentations, for example, included an overview of how costs can be reduced through demand-based injection moulding technology, improved production processes, intelligent energy management and optimised building technology. With around 1,750 participants, the expert presentations, held in both German and English, were again extremely well attended and demonstrated that the valuable mix of theory and practice represents one of the success factors of the Technology Days.

injection moulding, high-speed thin-wall items, tandem technology, technical injection moulding and the encapsulation of inserts.

Thanks to the rooms dedicated to PIM, clean room applications and production technology at the Customer Center, visitors were introduced to areas where ARBURG has long been active and offers the relevant products in its range. The new, fully functional clean room, for example, enables prototyping to be car-

ried out under logged clean room conditions. The Production Technology area contains everything relating to production planning, control, monitoring and documentation. This includes, for example, the ARBURG host computer system (ALS) and ARBURG Quality Control (AQC). The main emphasis during presentation of the extensive range of available services was on the numerous training offerings, preventive maintenance and above all, the international service.



Passed with flying colours

At the inauguration events and the Technology Days, visitors were impressed by the facilities offered by the new Customer Center. But whether it lives up to its promise will only be revealed in practice. One of the first customers to benefit from the new offerings was **MENNEKES Elektrotechnik GmbH & Co KG** - and they were thoroughly impressed!

MENNEKES is one of the leading global manufacturers of standardised industrial plugs, with sales operations in 90 countries. The company's co-operation with ARBURG dates back to 1974. In the past, the company has already taken advantage of the offer to perform testing on various ALLROUNDERS. Depending on the machine in question, this took place at the nearby Technology Centre in Radevormwald or at the headquarters in Lossburg. To date, MENNEKES has been using

hydraulic ARBURG machines with clamping forces from 300 to 2,500 kN. Owing to the consistently positive experiences, the large ALLROUNDER 920 S with a distance between tie bars of 920 millimetres, a clamping force of

5,000 kN and a size 4,600 injection unit, as well as an electric ALLROUNDER 470 A are now being tested for the first time. At the new Customer Center, this testing can now be performed simultaneously because here, all the machine series and sizes, as well as equipment for every application are available in one place.

MENNEKES sent a complex mould with numerous threaded and folding cores to Lossburg for testing on the largest ARBURG machine. With the production of a 650 millimetre long AMAXX[®] housing component, dimensional stability is an important parameter. Not only must it fit precisely onto its counterpart, a perfect seal is also decisive for the finished part. "Although the mating stage is difficult to

At the new Customer Center, everything runs like clockwork and in a pleasant atmosphere: from delivery and installation of the mould (top left), test moulding and process optimisation (bottom left), through to evaluation of moulded part quality (top and bottom centre) and technical discussions (right).



perform with this mould, everything worked perfectly," said a delighted Dirk Gehle, Department Manager of the MENNEKES plastics injection moulding shop. During the testing, the clamping force and stiffness of the machine were investigated. For this purpose, the ALLROUNDER 920 S was initially operated with the existing mould parameters, for example a clamping force of 5,000 kN. During the tests, this was lowered to 4,200 kN without impairing moulded part quality. Not only were the duration of pressure build-up and consequently the cycle time reduced, but also the energy

"This moulded part is a housing, which is even more difficult in terms of dimensional stability." The electric machine was also run in with parameters provided by the customer. The subsequent testing related primarily to the speed of the clamping unit. As well as optimisation of the simultaneous machine movements, the cycle time for this application was reduced from 36 to 23 seconds. "This reduction by more than a third is enormously significant in this case, with a production volume of between 100,000 and 200,000 units," says Sven Goldmann, Deputy Foreman of the injection moulding shop at Technoplast.

Thanks to a further process optimisation measure, ejection of the moulded parts during the mould opening movement, more even ejection of the products was also achieved.

Both Dirk Gehle and Sven Goldmann were delighted with the results of the testing. "Thanks to the extensive documentation regarding the test series, including parameter settings and measurement results, we can optimise our current production, independently of the ALLROUNDERS, thanks to the process engineering advice and knowledge we have obtained."

The two visitors were also full of praise for the new Customer Centre: "Not only are all the technical facilities available for trouble-free testing, but also the collective expertise from all the ARBURG depart-



ments. In addition, we've learned about advanced technology and applications, allowing us to take home new ideas for our own production."



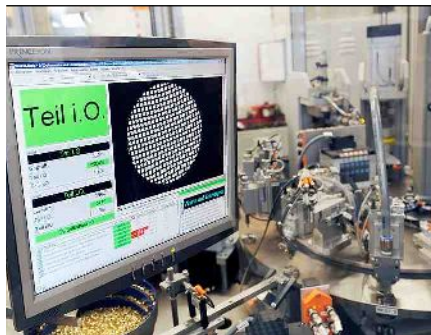
consumption of the machine. In order to fully benefit from the time at Lossburg, an electric ALLROUNDER 470 A was tested at the same time. The mould used was taken from production at Technoplast, a member company of the MENNEKES Group.



Perfect filteri

Utilizing quality and efficiency to be world-class" is the maxim of Karl Kufner KG, an absolute specialist in filter screens and weaving reeds of all types. Their high quality standards are ensured by manufacturing "Made in Germany", with a high proportion of in-house production and qualified personnel, as well as modern production and testing processes. In order to secure its leadership position on the global market in the long term, the family-owned company combines modern and proven methods to perfection: more than half a century of experience and the Japanese Kaizen principle.

Transposed to our contemporary management system, Kaizen introduces a continuous improvement process into companies. In accordance with this principle, Karl Kufner KG has since 2007 been working on continuous improvement of its employee-oriented management, staff training, optimised process orientation and the consistent further development of its quality management. Quality assurance extends throughout the entire process, beginning at the design stage. Worker self-checking and modern technology are in use with respect to all production and testing processes. Thanks to image processing systems, reject rates in the sub-ppm range do not represent any



Comprehensive quality assurance, including integrated camera monitoring (centre left) and moulded part inspection under the microscope (centre right). The versatile injection machine range covers a variety of different concepts, such as ALLROUNDERS with swivelling clamping unit (right) for example.

problem. The application areas for Kufner products are extremely varied and highly complex. Filter screens are installed wherever liquids or gases have to be filtered in order to protect sensitive or safety-relevant components from damage or failure. For historical reasons, the automotive sector currently predominates, with a share of around 70 percent. An impressive fact in this context is that there is virtually no car in the world that is not equipped with a Kufner filter.

Because the actual purpose of a filter is not the decisive factor, but much rather the competence that goes into its development and production, the company is not tied to a single sector. In future, the company will place greater emphasis on the building services, aerospace and medical technology

sectors. Pioneering medical technology projects aimed at opening up completely new dimensions in diagnostics are already under discussion. Moreover, the product segment is also to be expanded, and the fields of fully-plastic moulded parts and non-metallic screens made from nylon mesh, for example, are to be ramped up or reintegrated in production.

Global just-in-time supply of the products is achieved through a sophisticated internal and external logistics network. All the processes are perfectly structured and organised, everything is tidily kept in its place and close at hand for when it is required. There are only small storage areas, whether for plastic granulate, finished products or consumables. "Kaizen", or continuous "change for the better" is ubiquitous. Accordingly, the guiding principle at Kufner is also the ongoing improve-





küfner
Siebe
Webeblätter

ng guaranteed



Photos: Küfner

ment of all processes in terms of economy, quality and logistics. This includes breaking down batch volumes and minimising throughput times, which have been reduced from an average of 38 to nine days.

At the Truchtelfingen location, research, development and production are complemented by design and the construction of in-house moulds and special machines. The latter is an important area of competence for the company, with an in-house production ratio of 95 percent. This clearly demonstrates that in addition to manufacturing in Germany, a high proportion of in-house production plays an important role.

The parallels between Küfner and ARBURG in this respect are striking. It therefore comes as no great surprise that the two companies have been working together successfully since 1964. The fact most valued by Hanno Camphausen, authorised representative and Production & Logistics Manager, is "that the approach at ARBURG is always solutions oriented." This is particularly important in view of the high requirements placed on the products and consequently on the moulds and injection moulding machines. For example, the encapsulation of the wire mesh requires the highest precision, which in the case of Küfner means compliance with tolerances in the hundredth of a millimetre range.

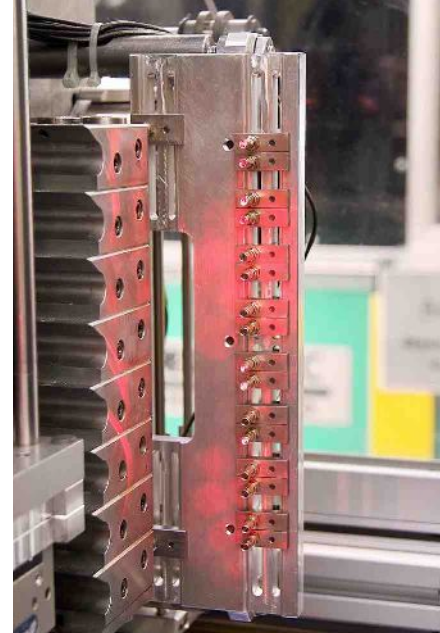
In order to achieve this, highly complex moulds and automation solutions, which are produced in-house by the company, are employed. It is also in order to ensure consistently high quality that piecework is dispensed with. The emphasis is not on quantity, but on one-hundred-percent quality of the products.

The injection moulding sector plays an increasingly important role. Not only are more than 80 percent of the products manufactured in this sector, 60 percent of the value added is also created here. But Küfner offers much more than merely production. Thanks to decades of experience, the company is also a competent partner to its customers around the world.

Its portfolio covers the entire production chain from filter development and the fabrication of prototypes and samples through to volume production. The moulds and special machines required for this purpose are produced in-house. Cassette moulds featuring quick-change inserts are used in order to reduce set-up times. Furthermore, the company is developing its own quick-change system. The rapid set-up capabilities of the special machines also contribute to production flexibility as they can be used for more than one product.



The comprehensive competence at Küfner's disposal, particularly in production, is impressively demonstrated during a plant tour in Truchtelfingen. Machines which have been expanded to meet in-house requirements can be seen in all production areas. In the automation area, ALLROUNDERS with a fixed vertical clamping unit are used, which are so perfectly



integrated in the production line that they are barely noticeable despite their central importance to the production process. The extensive peripherals are made by Kufner. A brief glance around the "normal" injection moulding shop does full credit to the "ALLROUNDER" name: Flexible machines with swivelling clamping units can be found here, as can standard horizontally-operating ALLROUNDERS. But here too, the term "standard" is something of a misnomer. On some of the machines, for example, the wire mesh is rolled, cut, shaped, inserted and finally encapsulated. As simple as this process may sound, its execution is highly complex. The wide range of peripherals required are provided exclusive by Kufner, as is the necessary expertise, which is understandably kept under wraps.

One of the company's specialties are cylindrical plastic filter screens with a wire mesh, which are produced fully automatically. These are used, for example, in ESP, ABS and fuel preparation systems for motor vehicles.

Kufner's innovative strength and know-how are reflected in the registered-design protected V filter, the uses of which range from high-pressure applications in fuel injection systems through to water treatment.

Production takes place in several shifts, which places correspondingly high stresses on the 95 ALLROUNDERS. The company regards these to be robust and extremely reliable. In order to ensure a high degree of availability, preventive

maintenance through the regular servicing of moulds and machines is awarded a high priority. "Although we perform the majority of this work ourselves, we appreciate the extremely rapid service offered by ARBURG", says Hanno Camphausen. In over 40 years, there have never been any delivery problems with regard to new machines or spare parts. "In addition to the flexibility of the machines, their universal SELOGICA control system also represents a significant advantage as it fully meets our requirements in terms of high production quality," adds Camphausen. Looking forward, the company is certain that it will also move in the direction of electric machines and clean room production.



Specialties in Truchteltingen (centre): special machine setups and moulds for the production of filter screens (top) and V filters with optimised flow characteristics (left), the special screen design of which was developed by Kufner.



INFOBOX

Founded: 1951 by Karl Kufner, today managed by Bernd and Markus Kufner

Locations: two in Albstadt-Truchteltingen (Swabian Alp) and one in Ludwigstadt (Upper Franconia)

Employees: 350

Products: Filter screens and weaving reeds

Customers: approx. 500 from the automotive, medical technology, engineering, aerospace, facility management and power equipment sectors

Markets: Mainly Germany and the EU, also major customers in North and South America as well as East Asia

Machine fleet: 95 ALLROUNDERS with clamping forces from 600 to 1,600 kN

Contact: Karl Kufner KG, Rossentalstraße 87-89, 72461 Albstadt, Germany www.kuefner.com

Safety and confidence as standard

“Our customer is the international automotive industry. Our commodities are safety and confidence.” This is the slogan used by the Estonian company AS Norma to market its production, which is based on extremely high standards, as well as its products. AS Norma produces high-quality parts and components, for example for safety belts in cars. In order to be competitive, especially in the field of encapsulation of metal inserts, parts must be produced in a highly automated series production process. The company therefore invested in an ARBURG production cell at the end of 2008.

Since 1999, the globally operating Autoliv Inc. Group, with its headquarters in Stockholm, Sweden has been the majority shareholder of AS Norma. With a total of 80 production sites in 31 countries around the globe, Autoliv Inc. is one of the world's largest automotive suppliers. In addition to stamped and bent parts, AS Norma also produces 100% plastic components. Both product types are combined when metal parts are encapsulated in plastic. As a system supplier, AS Norma is not only involved in producing these types of parts, the company also works closely together with the customer on the form and design of the parts as well as on producing moulds, complete parts production and

just-in-time delivery. All work is carried out with strict adherence to the “zero fault principle”, which also includes preventative quality assurance measures, both internally in accordance with the Autoliv Production System (APS) methods and in line with the ISO/TS 16949 quality guidelines, where specific requirements from the automotive industry are also defined.

AS Norma was founded in 1891, when it began to produce stamped metal parts. Contacts with the automotive industry have existed since 1973, when Norma started to produce seat belts. This segment has developed over the years and the company today produces complete system components for safety systems in vehicles.



AS Norma has also always been a leading force in the field of automated production. This gave rise to its cooperation with ARBURG, which began in 2007. ARBURG was well-known at AS Norma and within the Autoliv Group as a pioneer with respect to the encapsulation of inserts. In fact, the history of ARBURG shows us that it designed and built its first in-house injection moulding machine especially for the purpose of encapsulating inserts. The company consequently has a vast wealth of experience to fall back on in this production segment in particular.

The production cell for encapsulating belt tongues was put into operation with great success at the end of last year. The cell is built around an ALLROUNDER 470 S with a clamping force of 1,100 kN and a size 400 injection unit. It is of particular interest due to the integration of all the feed and

handling operations into the automated production process. A transverse design MULTILIFT V robotic system is used for all insertion, adjustment and removal sequences. The MULTILIFT is equipped with two gripper units which can be pivoted by 90 degrees and features a load weight of 15 kilogrammes.

The cycle time for encapsulating the belt tongues is approximately 30 seconds and the material used is PPR Hostaform 1042. The automated production cycle works as follows: First, the stamped belt tongues are placed into two manually-loaded shaft magazines, each with eight pins. The vertical pins are already positioned approximately in line with the cavity spacing. There is space for 105 metal parts per pin in the two magazines which are both located on the rotary table. This means that the system can run without intervention for approximately one hour.

To pick up the parts, the ejector-side removal module is pivoted downwards by 90 degrees and is positioned horizontally above the relevant magazine. The gripper module picks up the parts by means of suction and sets them down on a centring station, where perfect positioning is ensured by the centring pins and insertion guides. When the first stack of metal parts have all been taken,

the second stack is moved upwards and the next parts fed to the system. A photoelectric barrier hereby monitors the correct positioning of the top layer of parts. When all metal parts have been removed, the rotary table is turned by 180 degrees and the second magazine is started. During this time, the empty magazine is loaded again manually, ensuring continuous production.

To insert the parts, the insertion module pivots into horizontal position in order to pick up the centred parts. Centring pins prevent them from becoming dislodged in the vacuum gripper. The insertion module then pivots back into the vertical position and moves into the mould.

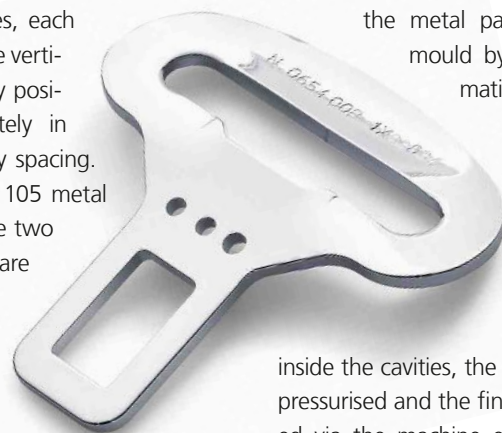
This position also corresponds to the alignment of the mould cavities in the eight-cavity mould. Centring devices on the nozzle side then ensure that the insertion module is positioned correctly. The removal stroke is extended, thereby fixing the gripper in the mould. The insertion stroke then extends.

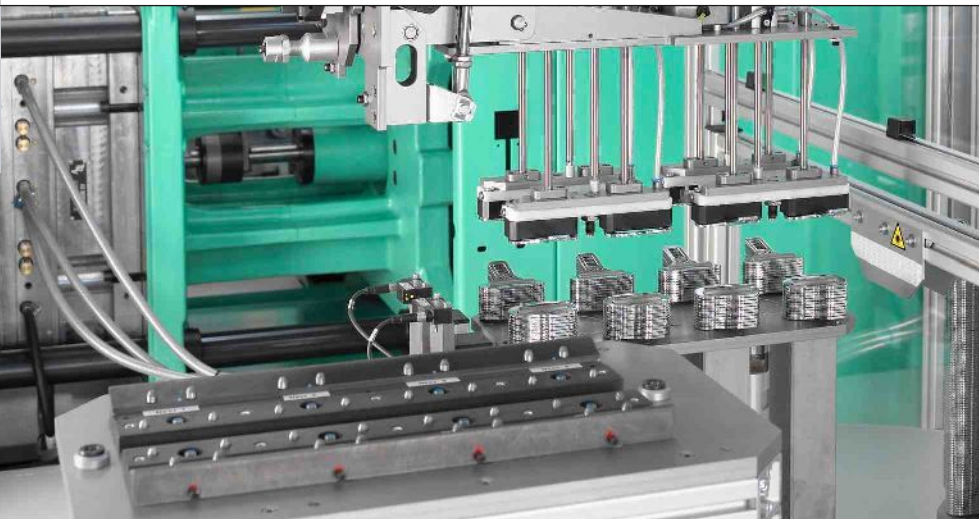
Once the final position has been reached, the metal parts are held in the mould by means of a pneumatic function.

Simultaneously, the vacuum on the removal module is activated. As soon as the inserts are fixed

inside the cavities, the removal stroke is depressurised and the finished parts are ejected via the machine ejector. The insertion stroke is retracted at the same time and the MULTILIFT moves out of the mould area.

To set down the finished encapsulated parts, the removal module is pivoted downwards again by 90 degrees and thereby moved back to its horizontal position. The parts are always set down in pairs from the adjacent cavities into a total of four transport boxes positioned in a square. Four individually-controlled strokes are used for this pur-





After the manual filling of the magazines (top l.) the stamped belt tongues are picked up by the removal module with suction force (bottom l.) and placed onto the centring station (r.).

pose. Two cycles, each comprising eight parts, form one layer in the transport boxes. The intermediate layers needed are inserted into the boxes after two to three complete layers of parts. In order to do this, a pneumatically driven pick-and-place system is used; this is positioned above the roller conveyor on which the transport boxes are removed. The pick-and-place system picks up four intermediate layers in a matching arrangement, guides them over the boxes and sets them down. Collision with the MULTILIFT V is effectively prevented by a programme-specific locking system. Filling is completed with one intermediate layer in each box. The boxes are then moved onto the roller conveyor, passing under the pick-and-place system. The transport boxes are provided on a conveyor or belt and the intermediate layers are filled by means of a pull-out drawer.

As the main contractor, ARBURG and its Projects department not only ensured optimum operation of the entire system, but also cooperated in its design from the outset, adapted it in line with the requirements of AS Norma, selected and put together all the components and then implemented the entire cycle sequence perfectly. AS Norma were extremely pleased with the coopera-

tion and with the turnkey production cell supplied. Andrej Botvinov, Project Manager responsible for the implementation of this system at AS Norma explained: "We do work together with other machine manufacturers, however, what we really liked about ARBURG was that, with a project as complex as this one, there was very close, non-bureaucratic cooperation from the very beginning. There was a lively exchange of opinion and information at all times, which ensured that the project was implemented in a coordinated way. For example, the system was continuously modified to perfectly match the moulds provided by us, ensuring that production could start smoothly. With ARBURG you can also rely on expert service at all times, even following the purchase of a production unit of this kind. This enables problems with the system to be overcome quickly and interruptions to production are kept to a minimum."



INFOBOX

Founded: 1891

Location: Tallinn, Estonia

Employees: Approximately 700 at the central production site

Products: Safety systems for the automotive industry, in particular seat belts and their components, covering the entire value-added chain

Turnover: Revenue in 2007 – 80.8 million EUR, an increase of 21 percent compared to 2006

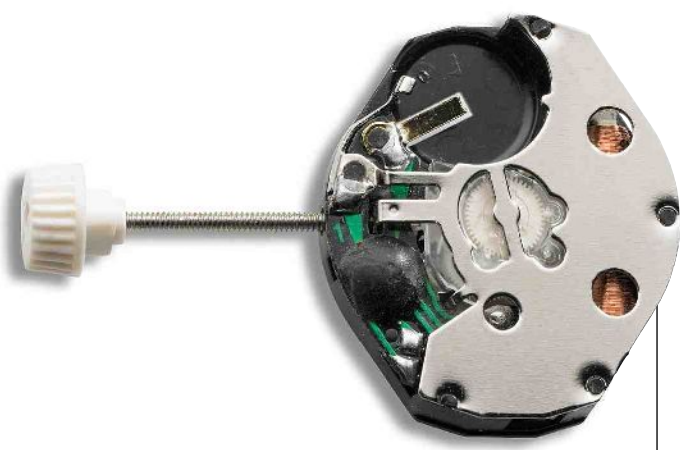
Contact: AS Norma, Laki 14, 10621 Tallinn, Estonia
www.norma.ee



Over 10,000 hours non-stop

Throughout the world, ALLROUNDERS are regarded as reliable injection moulding machines that meet the highest quality requirements. The Guangzhou Pearl Group has provided impressive proof of this: In 2006, a hydraulic ARBURG machine produced carrier plates for cog wheels around the clock without interruption for 14 months on a hydraulic Allrounder, while maintaining the highest precision.

The ALLROUNDER 270 S was only stopped when a regular product change was required. Production then resumed immediately. Managing Director Pearl Liu, one of the company's founding members, is particularly proud of this endurance record: "The machine's staying power was really astonishing! We didn't even have to interrupt the production process for maintenance work, and what's more, the ma-



The individual high-precision parts are responsible for the high quality of the clocks made by the Guangzhou Pearl Group.

chine is still in operation today." He was so thoroughly convinced by this performance of the ARBURG technology that further ALLROUNDERS have already been ordered.

The company, which currently exports world-wide, originally started up as a classical garage company. It began producing quartz clocks under its former name "Panyu Pearl Clock Factory" in 1992, in an apartment in Dashi Village with only 18 employees. The founding members of the first and only company of its kind in mainland China aspired to the quality ideal represented by "Swiss clocks". The aim was to distinguish the products from the cheap, mass-produced goods and manufacture high-quality, manually assembled

Pearl Group

quartz clocks. "Our strongest core brands such as Pearl, Ostar, Pavia Esens or Sunon emphasise our significance as the largest and leading producer of quartz clocks in China," says Pearl Liu, summarising the past 17 years of the company's development.

Annual production amounts to some 40 million clocks. 85 percent of the products are now exported to more than 100 different countries. The clock production and sales division is primarily based in the

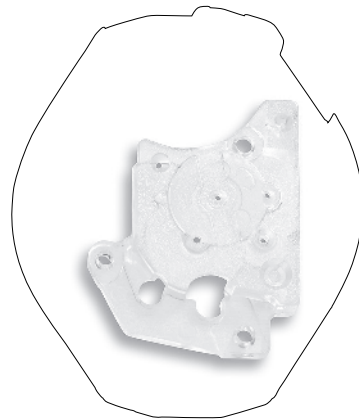


province of Guangdong and comprises six factories with an overall production area of 120,000 square metres, 5,000 employees and a total of 130 injection moulding machines.

Despite this rapid growth, the production of high-quality clocks remains the prime objective to this day. This involves more than just control of the complete value added chain, from the design stage and the production of virtually all the components, through to assembly of the clocks. The moulds are also built in-house in order to respond immediately to modifications and minimise costs through prompt repairs. The research and development department also has an important role to play. In China, the Guangzhou Pearl Group is regarded as the innovation leader in the sector, it "employs the best engineers in order to continuously improve product quality," says Pearl Liu. Quality improvement measures also include capi-

tal investments in high-quality production technology, which also increases productivity and effectively reduces costs in the long term.

ARBURG technology is employed for the production of the clock movements. Today, 22 ALLROUNDER with clamping forces from 150 to 400 kN are in use, which ensure a high degree of process reliability, precision and reproducibility. The machines are also durable, reliable and consequently extremely productive. With



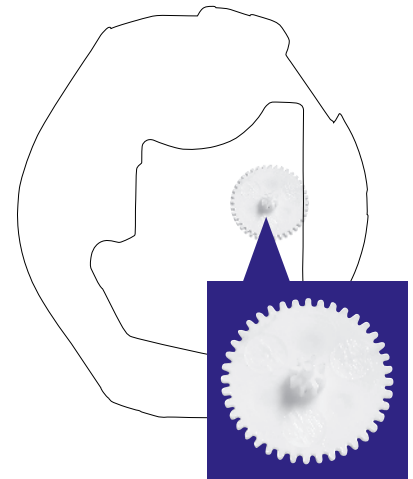
an ALLROUNDER GOLDEN EDITION, for example, the injection moulding process was optimised and the cycle time for the production of cog wheels was reduced from 8.2 to 7.36 seconds. With the 16-cavity mould employed and 24-hour production, this represents a significant increase in productivity.

In addition to the machine technology and the excellent co-operation, which began in 2003, the Managing Director mentions a further, very personal advantage of ARBURG: "The colour scheme of the machines has lent a particularly pleasing appearance to our injection moulding shop."

The Guangzhou Pearl Group produces cogwheels and carrier plates for high-quality clocks on ALLROUNDER machines.



Photo: Pearl Group



INFOBOX

Founded: 1992 as Panyu Pearl Clock Factory

Group: twelve individual companies

Employees: 8,000 in total, approx. 5,000 involved in clock production

Products: High-quality wristwatches, wall, radio, wooden and glass, as well as ultra-flat clocks, thermometers, barometers and hygrometers, pocket calculators

Machine fleet: 130 injection moulding machines, including 22 ALLROUNDERS with clamping forces up to 400 kN

Contact: Pan Yu Pearl Clock Factory, Hujiang Village, Dashi Town, Panyu, Guangzhou, China
www.pearltime.com.



Stringent hygiene regulations apply to the production and packaging of moulded parts.

Systematic

in operation: an ALLROUNDER 630 S with a clamping force of 2,500 kN and an ALLROUNDER 820 S with a clamping force of 4,000 kN. Both machines have proven their endurance qualities in the production of boxes and lids for confectionary packaging. But MPKT does not regard itself merely as a parts manufacturer and supplier, it also offers complete solutions in keeping with its corporate principle, "Systematic quality". These solutions range from customer consulting, prototyping and mould design through to volume production of the parts.

Of the 37 injection moulding machines in total, 15 are hydraulic ALLROUNDERS. More than 300 different packaging items with a maximum part weight of 900 grams are produced for the company's well-known customers from the medical, hygiene, cosmetics, food and engineering sectors. In addition to confectionary packaging, products include spoons, tubs, caps and office supply items. The range is completed by unusual products such as mouthpieces for cigarillos, which are automatically attached.

An interesting fact is that at MPKT, older ALLROUNDER machines are just as effectively integrated in production as the modern ARBURG machines. "ARBURG is well known for the reliability of its machine technology. Our ALLROUNDERS are in operation non-stop without any notable downtime. However, they do undergo regular

maintenance," says Erich Maier, founder and Managing Director of MPKT, expressing his satisfaction at the reliable operation of all the ARBURG machines. Virtually all the ALLROUNDERS are equipped with a robotic system. In addition to high-volume production, the day-to-day business is also characterised by frequently changing products. This requires a high degree of flexibility with regard to the configuration of automation solutions, which is a major advantage for MPKT. Peak order periods and short-term seasonal orders can be processed without problems. Because production steps for parts packaging have been progressively automated, the machine operators are able to operate several machines at the same time. The positive result of this is that the output rate has been increased significantly, which has contributed to a steadily growing sales trend in recent years.

The company's consistently high production level is evidenced, for example by the innovative in-mould lamination of films on first aid boxes. But two-colour injection moulding, the pad printing process and the assembly of caps on spray cans are also included in the production tasks performed by MPKT. The company sets great store upon quality assurance (QA).

Maier und Partner Kunststofftechnik GmbH (MPKT) is a medium-sized family-run company involved in the production, assembly and finishing of plastic parts. The ALLROUNDER injection moulding machines it uses ensure smooth, high-quality production. Since its foundation in 1972, a clear strategy has been developed at MPKT: Only products that cannot be manufactured in any material other than plastic are produced.

The success of the company has confirmed the wisdom of this decision. Today, MPKT has around 120 employees, all working at two locations in Germany: Firstly, the company headquarters in Bempflingen, where goods are produced for the pharmaceutical and packaging sectors, and secondly at Crimmitschau, which produces only high-volume packaging articles. At the Crimmitschau plant in Saxony, two large ARBURG machines are



quality

Since 2004, four shift operation was introduced seven days a week. During each shift, samples are taken at regular intervals and checked with regard to weight, dimensions, bending characteristics and peel strength. Visual checks are also performed. Consequently, the reject part rate is virtually zero. During high volume production, mould changes are less frequent owing

to the large batch sizes, the rejects typically occurring during start-up of the machine, at the beginning of the week or during batch changes do not arise.

At each plant, two QA officers with CAD support examine moulded parts for faults, document these and initiate corrective action with regard to the injection moulding process as necessary. The QA system is certified according to ISO 9001, with further certification measures to follow: Employees receive training in general hygiene for the production of moulded parts for the food sector through to microbiological tests in the production environment. The latter in particular are decisive in order to ensure ideal conditions for producing medical parts, a field in which PKT plans to expand in the coming years.

"We opted for ALLROUNDERS because in addition to their reliable machine technology, the service the company provides



The company founder and Managing Director Erich Maier, who originates from Lossburg, has been a convinced ARBURG customer since 1975.

is excellent. As our machines run at full load, even during the weekend, we depend on the permanent and rapid availability of service technicians in the case of emergencies. With ARBURG, this poses no problem. However, real emergencies are an absolute exception", says Erich Maier, who is delighted with both the ARBURG injection moulding technology and the all-round service package provided.

The fact that machine operators and plastics processing engineers are regular attendees at training courses in Lossburg, where they learn about the latest product know-how, is self-evident for MPKT.

MPKT produces exclusively in Germany: The company headquarters is located at Bempflingen (large photo) and the branch factory at Crimmitschau (small photo).



Photos: MPKT

Maier Partner Kunststoff-technik GmbH
QUALITÄT MIT SYSTEM

INFOBOX

Founded: 1972 by Erich Maier

Locations: Bempflingen (Baden-Württemberg), Crimmitschau (Saxony)

Employees: 120

Products: For the food and pharmaceutical industries, including spoons, first-aid boxes, tubs, seasonal goods for the food sector, cosmetic items, office supply items

Machine fleet: 37 injection moulding machines, including 15 ALLROUNDERS with clamping forces up to 4,000 kN

Contact: MPKT Maier + Partner Kunststofftechnik GmbH, Weidachstr. 2-6, 72658 Bempflingen, Germany www.mpkt.de



TECH TALK

Dipl. Ing. (BA) Oliver Schäfer, Technical Information

“Direct” process

Even the best injection moulding machine only works as well as its settings permit. This applies to the quality of the moulded parts, the cycle time and energy consumption. Keeping everything running smoothly requires a control system that is intelligent and intuitive to use. With its graphic sequence programming, SELOGICA forms the ideal basis for this purpose.

order can be documented. What can be taken into account when making settings for an injection moulding machine in order to save energy?

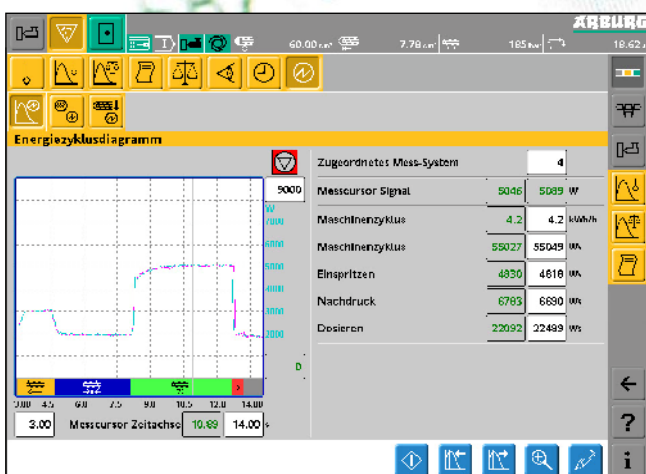
The basic rule is that the higher the setting value, the more energy is required. Therefore, it should always be determined whether the maximum values are actually necessary for a stable, reliable process. However, maximum values do make sense whenever they enable significantly shorter cycle times. The specific energy consumption of an injection moulding machine depends to a large extent on material throughput - in other words, the volume of plastic being processed per unit of time. In concrete terms, this means that higher machine utilisation and therefore a higher material throughput greatly improve energy efficiency. This is because the latent dissipation loss, which is independent of the throughput, is distributed among a larger volume of processed plastic. It is therefore ineffective to use excessively small moulds on excessively large machines or to run a machine more slowly.

Moreover, the extensive options for process optimisation, monitoring and documentation, such as energy consumption measurement, are available.

This feature is integrated in the SELOGICA ‘direct’ control system and permits a detailed analysis of the energy consumption

during the individual cycle steps. The effects of modifications to the machine settings are made immediately visible in this manner. Moreover, the energy consumption of a machine or even an individual

One approach to optimising the machine settings in terms of energy consumption is via the melt preparation. Here, the aim is to reduce the screw speed to the greatest possible extent. The more time is available for the dosage process, the better. In the case of hydraulic machines in



Process optimisation with a view to energy efficiency - no problem with the “energy consumption measurement” feature.



optimisation

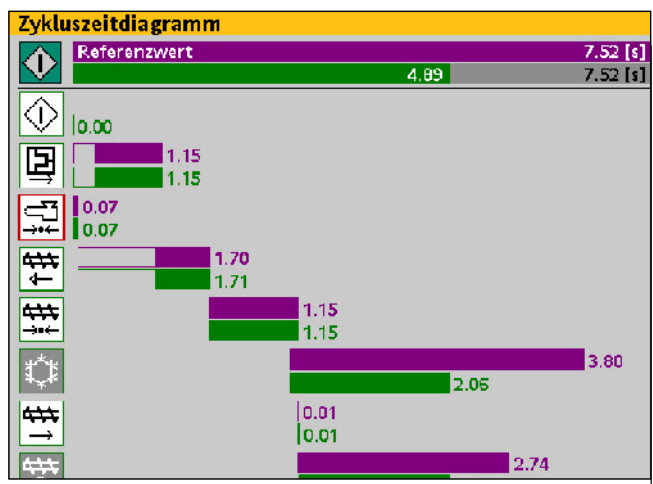
particular, the dosage time, however, is often limited by the cooling time. Here, short cooling times also always entail high speeds and therefore higher torques. The consequences are rising energy consumption and a higher material load. In these cases, electro-mechanical direct drives, which allow dosage to take place during and beyond the cooling time, have proven to be especially advantageous. The independence of this type of dosage drive enables the cycle time to be further optimised and makes a major contribution to increased energy efficiency.

Energy can also be saved by avoiding operating at the maximum melt temperature. On the one hand, energy consumption is minimised by shortening the heating process; on the other hand, the moulded part reaches its demoulding temperature faster. This in turn enables the cycle time to be optimised. Moreover, less heat energy has to be removed from the process, which has a positive effect on the overall energy balance of production.

Mould movements also offer further energy saving potential. This particularly applies to large machines. Here, several tons must be moved quickly to open and close the mould. In this process, energy is used not just to accelerate, but also to brake these moving masses. With servo-electric clamping units, such as those of

the ALLROUNDER A and H, the braking energy of the motor can be fed back into the mains. This method not only allows the recovery of energy that can be reused elsewhere - it also considerably reduces cooling time and the heat radiation from the motor. The mould should only be opened as far as necessary, in order to reduce both the cycle time and energy consumption. Fast mould movements are only of benefit where they effectively reduce the cycle time.

Finally, the clamping force and nozzle contact force can also contribute to energy savings. These are often simply set to the maximum value, regardless of whether this is required by the relevant application. Some ALLROUNDER machines also additionally offer an option to progressively reduce the forces during the residual cooling period, which in turn has a positive influence on energy consumption.



The cycle time diagram: a universal aid to process optimisation.



High-quality: automatic clamping force control



Productive: innovative drive concept



Fast: servo-electric clamping unit

HIDRIVE



High performance. The new ALLROUNDER H machines. Perfect for energy-efficient, cycle-time optimised thermoplastics processing. Clamping units with servo-electric precision. Injection units with dynamic accumulator technology for increased hydraulic performance. HIDRIVE: Powerful hybrid machines at an extremely attractive price. Made by ARBURG - Made in Germany.



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