

# today

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## MASTHEAD

today, the ARBURG magazine, issue 48/2012

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Process integration ensures high production efficiency at Riwotec: during the production of an insect screen for smoke detectors, the filter mesh is fed, cut, inserted and overmoulded fully automatically.





## Dear Readers,

Following an extremely successful year in 2011, we have hit the ground running in the new year. Extensive activities in a number of areas are on the agenda. The common objective of these activities is to offer you even greater benefits in future. For example, the successful ALLROUNDER GOLDEN EDITION is now also available with the ARBURG AES energy-saving system in order to optimise the energy consumption of these hydraulic machines. We are currently working on a completely new website, which is set to go online soon. With a combination of texts, images and films, all the information you require will be quickly accessible: the right contact person, as well as useful facts on the company, products and services. Regardless of the country you come from and the end device you prefer to use: the new ARBURG

homepage is a real "Allrounder" and delivers an experience customised to your needs.

The same applies to our injection moulding solutions, which we configure precisely in line with your requirements. Our highest priority is always to ensure maximum efficiency for your moulded part production. Accordingly, as a pioneer in the overarching topic of production efficiency, we will focus even more strongly on this topic. Find out more on this subject from our Managing Directors, Herbert Kraibühler and Helmut Heinson's interview overleaf. Moreover, the current edition presents exciting practical examples of efficiency enhancements.

I hope you enjoy reading our new issue.

Renate Keinath  
Managing Partner & Managing Director

# Production efficiency as megatrend

## Interview with Herbert Kraibühler and Helmut Heinson

**I**n 2012, ARBURG is placing production efficiency at the centre of all its activities. Herbert Kraibühler (Technology & Engineering) and Helmut Heinson (Sales) explain ARBURG's objective and the significance of a holistic approach.

**today:** Why is ARBURG focusing on the topic of production efficiency in 2012?

**Heinson:** This emphasis is the result of a systematic development. Based on the topic of energy efficiency, which we promoted years ago as an industry trend-setter, production efficiency now represents the next step.

**today:** How are these two aspects linked?

**Kraibühler:** With energy-efficiency, the aim is to lower the energy requirements for production in order to reduce costs. Production efficiency goes one step further. Here, energy optimisation is supplemented with the improvement of production sequences and above all the reduction of cycle times. All three factors contribute towards minimising unit costs and thereby maximising the cost-efficiency of moulded part production.

**today:** What areas have to be taken into account in this regard?

**Heinson:** Our holistic approach encompasses the entire value-added chain: from product design, as well as



mould, machine and peripheral technology, including configuration, through to process integration, process control and production planning. Each of these areas offers, to varying degrees, potential for enhancing efficiency.

**today:** Isn't a holistic view extremely complex?

**Kraibühler:** It is. But that shouldn't prevent anyone from concerning themselves with the topic. Our intention is therefore initially to raise awareness of the subject in general. Moreover, thanks to our extensive know-how, we can provide our customers with support as a partner in all areas.

**today:** Is production efficiency actually relevant for all injection moulding plants?

**Heinson:** Definitely. In order to re-

main competitive in the future, everyone should take an interest in this topic. It isn't necessary to tackle all the various aspects at once. A first step is always to identify the potential for optimisation in the various areas and then to devise an individual plan for step-by-step implementation.

**today:** Do measures for enhancing efficiency always involve capital expenditure?

**Kraibühler:** Not all the improvements necessarily involve costs. It depends whether the measures relate to the planning or the production phase. The first phase involves product design, mould, machine and peripheral technology, configuration and process integration. Optimisation measures tend to be a long-term affair as the planning stage is aimed at determining the most cost-effective injection moulding solutions and then to make the relevant investments. During the production stage, in contrast, which comprises the areas of process control and production planning, savings can be achieved in the short term and in some cases without the need for new capital expenditures.

**today:** Can you provide some specific examples?

**Kraibühler:** One area that applies to all injection moulding plants is machine setup. Very significant time savings can be achieved merely by modifying the work sequences. In order to exploit this poten-



tial, it is important to examine established processes critically in order to optimise them. In our own production, we are continuously working on this and can strongly recommend video analysis as a successful tool. The example of machine setup also makes it clear that people also play an important role in enhancing production efficiency, above and beyond the machines themselves.

**Heinson:** On the subject of process control, I might also mention the cycle sequence, the details of which are often neglected somewhat. For example, thanks to their high positioning accuracy, servo-electric machine and robotic-system drives offer extensive potential for avoiding unnecessary idle periods in order to further reduce cycle times.

**today:** Are electric machines or drives consequently the tools of choice for efficient production?

**Kraibühler:** The answer is "yes, but". Of course, electric and hybrid machines offer advantages in terms of energy efficiency, such as speed and precision. Ultimately, however, what matters is to configure the right machine in accordance with the relevant product. Depending on the requirements, hydraulic machines may be superior with regard to production efficiency.

**Heinson:** Thanks to our cost effectiveness calculator, we are able to clearly determine the best concept and the right machine dimensions on a case by case basis. Incidentally, we will also be presenting this at the Technology Days.

**today:** Will production efficiency also be the guiding theme of the Technology Days?

**Heinson:** Yes. A separate exhibition area will be dedicated to production efficiency and the expert presentations will also all focus on this topic.

**today:** What further activities will there be relating to production efficiency?

**Heinson:** With numerous trade-fair

Herbert Kraibühler (left) and Helmut Heinson discussing a number of areas which influence production efficiency.

and open-house events, as well as the "Technology on Tour" series of events, we will take this topic of the future around the globe in 2012.

**Kraibühler:** And of course, it also plays a decisive role in the development and advancement of our products, quite in keeping with our corporate motto: "ARBURG for efficient injection moulding".



# Premieres included

**Technology Days 2012: exhibits and presentations shed light on**

**Q**uantity and quality: the **ARBURG Technology Days** combine both. It comes as no surprise, therefore, that thousands of experts from around the globe make their way to the **ARBURG** headquarters in Lossburg every year in order to find out about the latest products and future trends in the injection moulding sector. The main theme this year is production efficiency.

At the Technology Days 2012, which will take place from 14 to 17 March 2012, an exhibition area will be dedicated to a holistic approach to production efficiency. Based on practical examples, ARBURG will, jointly with partner companies, present the entire value-added chain, including the areas of product design, mould



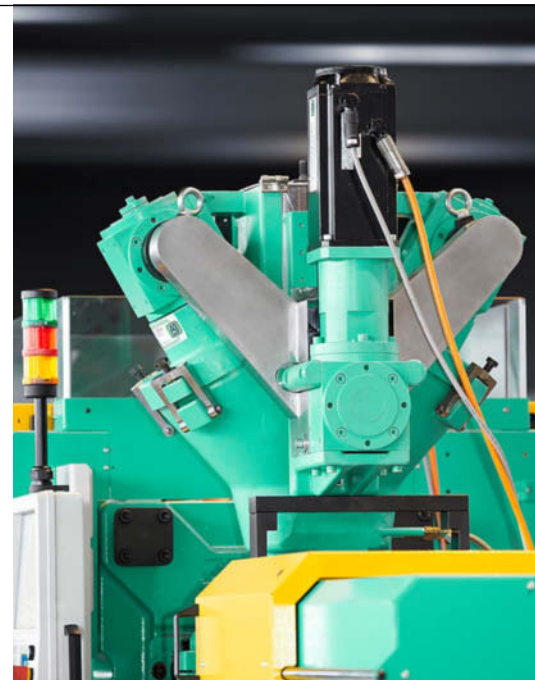
The inline printing of name plates (bottom left), the "Twin-screw INJESTER" (centre) and the IML system (right) are just a few of the many highlights at the Technology Days.

technology, machine technology, peripheral technology, configuration, process integration, process control and production planning.

## Integration enhances efficiency

One of the highlights with regard to process integration is the inline printing system, which is integrated together with an electric ALLROUNDER 370 E and a six-axis robotic system to create a fully automated production cell. What makes this so special is the so-called InkBOT process from FPT Robotik, which combines digital printing and robotics. The turn-key system produces personalised name plates in a cycle time of around 15 seconds.

To complement the exhibits, expert presentations will provide a comprehen-



sive overview and detailed information on efficient production.

## Presentation of new products

As is customary every year, innovations in the product sector will be on view at the Technology Days 2012. In order to



## production efficiency potential

enhance the energy and therefore the production efficiency of the ALLROUNDER GOLDEN EDITION series, which has become well established around the world, these machines are now also optionally available with the ARBURG AES energy-saving system. You can read more about the advantages of AES on page 21. A completely new product is the "Twin-screw INJESTER" for processing moist polyester (BMC), solid silicone (HTV) and wax. The advantages of the ARBURG solution include the fact that it can be used for a broad range of paste-like compounds, the low filling level and the space-saving, two-part design for fast cleaning. This results in significantly reduced set-up and downtimes and high level of cost-efficiency in production.



### Cross section of the complete range

Altogether, ARBURG will present more than 40 exhibits with applications covering all injection moulding processes and sectors. Add to this the presentation of the entire service spectrum as well as plant tours. These offer exciting insights into ARBURG's production, which is characterised by a high degree of production efficiency.



# Fifteen p

## Continental: award-win

**E**ach year, the ARBURG Energy Efficiency Award is presented to a company which, like ARBURG, takes an holistic and global approach to the subject of energy efficiency. In 2012, the Award goes to Continental, a company which systematically implements its ambitious environmental objectives.

Continental is one of the world's leading automotive suppliers. As a supplier of brake systems, drive and chassis systems and components, as well as instrumentation and infotainment solutions, vehicle electronics, tyres and technical elastomer products, Continental contributes to both greater driving safety and global climate protection.

Energy saving and energy efficiency have been part of Continental's environmental goals for many years.



Quality, product benefits and production are continuously optimised with an aim to improving environmental compatibility and reducing the impact of the production sites on the environment, step-by-step.





# ercent reduction by 2015

## ner reduces CO<sub>2</sub> emissions and energy consumption

### Systematic reductions

The targets in this regard are ambitious: in terms of the manufacturing processes, CO<sub>2</sub> emissions are to be reduced by around 15 percent by 2015. By reducing power and water consumption, as well as waste, annual savings of three percent are possible in each of these areas. The waste recycling quota has also been increased by two percent per year in order to further reduce the consumption of raw materials and the energy requirements for recycling the waste.

Owing to the continually rising energy costs world-wide, energy management is an important cost and therefore competitiveness factor for Continental. The objective is to reduce energy consumption by around 15 percent by 2015. An important step in this direction was, for example, the comprehensive introduction of a systematic energy management system in accordance with ISO 50001 for all the automotive production locations world-wide.

### Practical example at Continental Automotive

This also includes Continental Automotive GmbH in Babenhausen. Dr. Carsten Schaumburg, Director of Occupational Safety, Health and Environmental Protection lists the measures implemented here in recent years: "In order to save energy long-term, we use, for example, a block-type thermal power plant for heat and power generation. We've also installed a large air conditioning system with heat exchangers and we use heat pumps in office buildings, recover energy during hall ventilation, as well as using a thermal solar installation for

producing hot water in showers." The fact that these activities reap dividends is demonstrated by the following figures: since it went into operation in 2009, the block-type thermal power plant has generated more than 8 million kWh of power, which corresponds to the annual consumption of 1,500 four-person households. Energy consumption in the infrastructure-related areas has been reduced by up to 5 percent annually.

### ALLDRIVE reduces energy consumption

Frank Blanke, Director of Plastics at Babenhausen describes the measures taken in injection moulding production as follows: "Energy consumption is one of the key topics. In order to exploit potential in this regard, we've been working successfully with Six Sigma projects for a number of years. Here, we examine the entire value-added chain from the granulate through to surface finishing and final component assembly. The injection moulding process represents an important controlling variable for reducing energy consumption. In addition to improving existing processes and production facilities, we also pay particular attention to a balance between the technological requirements and operating costs in the case of capital expenditure on new production equipment. This is where the electric ALLROUNDER ALLDRIVE machines make a significant contribution. They meet our stringent requirements in terms of precision, while also lowering the energy requirements and enhancing the long-term cost-effectiveness of our injection moulding production."

Karlheinz Boguslawski, Production

Continental has been presented with the ARBURG Energy Efficiency Award 2012 for its world-wide activities.

Manager at Babenhausen is equally delighted: "One of the most beautiful aspects of energy efficiency, and one which is consistently confirmed is that we are rewarded for our activities year after year – with the falling cost of our products. This is very motivating – for all the development and production departments. Furthermore, receiving the ARBURG Energy Efficiency Award spurs us on for the future and shows us that we're on the right track with the right partners."

### INFOBOX

**Founded:** 1871 in Hanover, as the publicly-owned corporation, Continental-Caoutchouc und Gutta-Percha Compagnie  
**Turnover:** EUR 26 billion in 2010  
**Plants:** in 45 countries  
**Employees:** 164,000  
**Sectors:** automotive  
**Contact:** www.continental-corporation.com



**PHILIPS**  
MASTERCOUR  
CDM-T Elite  
100 W / 930

**PHILIPS**  
MASTERCOUR  
CDM-T Elite  
35 W / 930

# New era in lighting technology

## Philips Lighting: ceramic injection moulding Innovative HID lamps

**S**ince the foundation of its first light lamp factory in 1891, the Dutch company Philips has been at the cutting edge of lighting technology. Progress has now condemned the incandescent lamp to obsolescence and the future belongs to new technologies, such as the high-intensity discharge (or HID) lamp. Using the innovative ceramic injection moulding process (CIM), the Group's Dutch subsidiary, Philips Lighting, has succeeded in significantly improving the quality of light produced by these lamps. Thanks to electric ALLROUNDERS, the company has demonstrated that it is possible to reduce energy consumption while also improving production efficiency.

Philips Lighting, one of three Royal Philips Electronics divisions in addition to Healthcare and Consumer Lifestyle, operates a centre of competence for the ceramic injection moulding of lighting products at its Uden site in the Netherlands. Some 30 staff are currently employed there on the development of burners for innovative HID lamps. The complete lamps are produced at the Turnhout site

in Belgium. The main focus is on achieving optimum lighting quality, as well as minimum energy consumption. HID lamps are suitable for commercial, public and private lighting applications – ranging from models with a rating of 20 Watts for the retail sector and 60 Watts for street lamps, up to 1,000 Watts for greenhouse illumination, for example.

### Translucent HID burner: shell halves from Al<sub>2</sub>O<sub>3</sub> ceramic

At the centre of the HID lamp is a ceramic burner. Philips Lighting uses the translucent material aluminium oxide (Al<sub>2</sub>O<sub>3</sub>) for this purpose. This semi-transparent ceramic material is a speciality of the CIM sector. "Off-the-peg" solutions are therefore few and far between.

As a result, in 2001, Philips Lighting became active and brought ARBURG on board as experts for powder injection moulding (PIM). Together, the experts have tested the production of high-purity Al<sub>2</sub>O<sub>3</sub> ceramics on hydraulic and electric ALLROUNDERS with clamping forces from 500 to 1,000 kN and brought them to production readiness. Today, Philips in Uden has acquired extensive experience

Translucent ceramic burners form the core of HID lamps. The elliptical shape, assembled from two shell halves, was only made possible through CIM.

in burner technology and a high level of competency with regard to the entire powder injection moulding process chain.

### Each process step has been optimised in detail

The company's know-how extends from the choice of feedstock to mould design and process simulation, through to debinding and sintering. The Philips employees from CIM Development optimise each process step down to the last detail before a new product goes into serial production. All the processes are documented. The ARBURG host computer system (ALS), to which all machines are connected, proves extremely useful in this regard.

Production efficiency in terms of energy consumption and cycle times has been significantly enhanced ever since Philips switched the production of HID lamp burners to injection moulding.

Previously, cylindrical burners were extruded in five separate parts and then assembled in a comparatively complicated process.

**Efficient burner geometry thanks to design freedom**

Initially, when switching production processes, the identical parts were produced. The experts, however, soon recognised the significant benefits of injection moulding: design freedom. Technically speaking, the elliptical component shape that resulted from assembling two shell halves offered better burner performance. Thanks to the optimised burner geometry, lamps can be produced with increased lumen output, better colour performance and increased lifetime.

The energy-saving ceramic burners are produced on energy-efficient machines, such as an electric ALLROUNDER 370 A with a clamping force of 600 kN, equipped with a wear-resistant PIM screw and cylinder. "We were impressed with the high-precision servo-electric toggle clamping unit and the electric dosing option offered by the ALLDRIVE series. This enables us to



achieve excellent part quality, while significantly reducing energy consumption," explains Henk Derkx, who is responsible for CIM process development at Philips Lighting. Depending on the size of the component, the average cycle times are between 10 and 30 seconds.

**Significantly reduced assembly requirements**

The green compacts are removed by robotic systems and set down on trays. As only two shell halves have to be assembled, the required assembly costs has been significantly reduced. This also has a positive impact in terms of unit volumes.

"The production cells are in action around the clock here. Co-operation with ARBURG's PIM experts both at the company's headquarters and at the subsidiary in the Netherlands runs extremely smoothly," says Henk Derkx, adding that, "The injection moulded HID burners last longer and offer better lighting quality. Furthermore, the product itself and the machine used to produce it consume less energy."



Photo: Philips Lighting

Henk Derkx (top), CIM process developer at Philips, is impressed with the performance of the electric ALLROUNDERS. Innovative lighting concepts can be implemented with the produced HID-lamp burners (top right).

**INFOBOX**

**Founded:** 1891 by Frederik and Gerard Philips in Eindhoven, Netherlands  
**Plants:** production facilities in 100 countries, sales offices in 100 countries  
**Employees:** 121,888, of which around 53,000 are employed at Philips Lighting  
**Sales:** EUR 22.6 billion, EUR 7.6 billion for Philips Lighting (2011)  
**Divisions:** Lighting, Healthcare, Consumer Lifestyle  
**Lighting highlights:** interior and exterior lighting (private, public and commercial), automotive lighting, lighting installations, LED technology  
**Contact:** www.philips.com



# Better and better

**ALS: host computer system constantly enhanced since 1986**

**W**ith the invention of the ARBURG host computer system designed specifically for injection moulding plants in 1986, the company made a pioneering achievement. Ever since, the system has enabled the networking of machines, the monitoring of processes and the documentation of settings data. Today, ALS is a valuable tool with which injection moulders can achieve consistently high product quality and optimum production capacity utilisation, as well as minimise downtimes, significantly enhancing production efficiency.

ARBURG has accumulated enormous know-how over the past 25 years. ALS customers benefit from the fact that ARBURG develops, matches and produces its machines, control systems and the host computer system entirely in-house and that sales and support are from a single source. The practice-oriented software solution is precisely adapted to injection moulders' requirements with regard to a flawless process and part quality, as well as being SAP certified. Today, more than 5,000 ALLROUNDERS and third-party machines are connected to an ARBURG host computer system.

Milestones on the road to ALS include, for example, the introduction of a fully-

electric control system for ALLROUNDERS in 1972. Only three years later, ARBURG was the first ever manufacturer of injection moulding machines with micro-processor control world-wide.

## Interface between machine, automation solution, peripherals and human

The origin of the ALS product arose from the idea of a "flexible automation solution for injection moulding" (German: flexible Automatisierung des Spritzgießens = FADS). This was also the motivating factor for ARBURG initiating a joint project bearing the same name with the German Federal Ministry of Research and Technology (BMFT) in 1985. This resulted in fully-automated production cells with ALLROUNDERS of the CMD (Computer-Monitor-Dialog) series. In 1986, only five years after the PC began to make its way into offices and homes, the Lossburg-based company launched ALS onto the market. Up until then, no interfaces were available in the injection moulding sector, let alone software solutions for communication between machine, automation solution and peripherals.

The basic expansion stages for machine and production data acquisition (MDA and PDA) form the basis of all freely-configurable and expandable ARBURG host computer systems.

ALS (top left) ensures greater transparency in injection moulding production. ARBURG developed the host computer system in 1986 in order to control the first fully-automated production cells (right).

## Seamless quality documentation

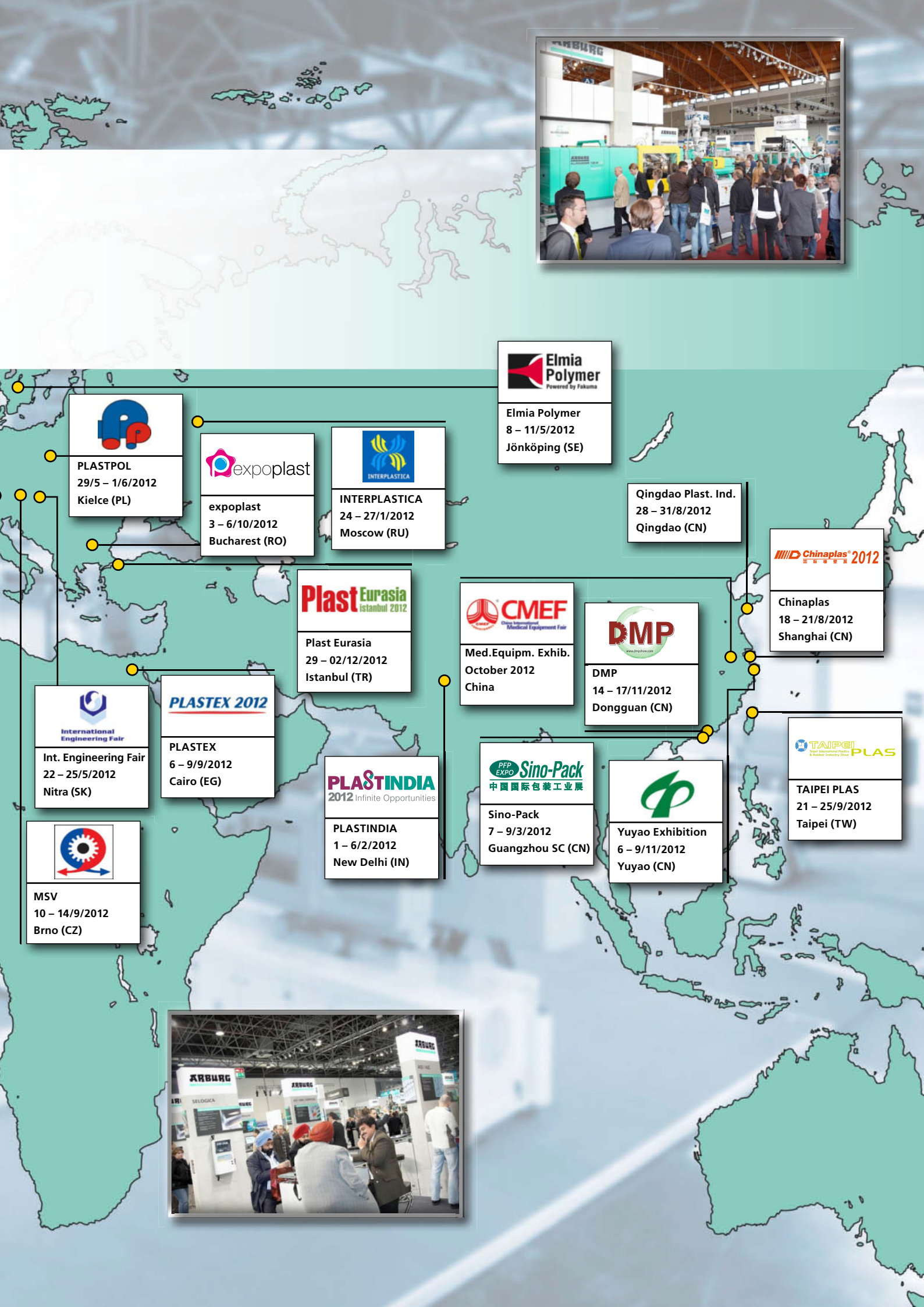
ALS ensures production transparency and enables the central planning, fast acquisition and straightforward management of machine and order data. Machines and systems can be efficiently controlled and all processes seamlessly documented. Various orders can be allocated directly to individual machines. The order status, production schedule and unit volumes are all visible at a glance. The ARBURG solution thus satisfies the trend towards the automation of injection moulding processes and the increasing demands with regard to seamless quality assurance.

# Around the globe

Trade Fairs in 2012: ARBURG present in all plastics markets

**M**aintaining existing contacts and establishing new ones has always been a top priority at ARBURG. An important instrument in this regard are the world-wide trade fairs at which the company is represented each year in order to present the ARBURG technology. As a glance at the current map shows, there's a lot going on in 2012. One plastics fair follows the next in rapid succession. But that isn't all. There are also a number of special congresses and several ARBURG events so that the ARBURG calendar is packed with almost 100 events.





**PLASTPOL**  
29/5 – 1/6/2012  
Kielce (PL)

**expoplast**  
expoplast  
3 – 6/10/2012  
Bucharest (RO)

**INTERPLASTICA**  
24 – 27/1/2012  
Moscow (RU)

**Elmia Polymer**  
Powered by Fakuma  
Elmia Polymer  
8 – 11/5/2012  
Jönköping (SE)

**Qingdao Plast. Ind.**  
28 – 31/8/2012  
Qingdao (CN)

**Chinaplas**  
18 – 21/8/2012  
Shanghai (CN)

**Plast Eurasia**  
Istanbul 2012  
Plast Eurasia  
29 – 02/12/2012  
Istanbul (TR)

**CMEF**  
China International  
Medical Equipment Fair  
Med. Equipm. Exhib.  
October 2012  
China

**DMP**  
14 – 17/11/2012  
Dongguan (CN)

**International Engineering Fair**  
22 – 25/5/2012  
Nitra (SK)

**PLASTEX 2012**  
PLASTEX  
6 – 9/9/2012  
Cairo (EG)

**PLASTINDIA**  
2012 Infinite Opportunities  
PLASTINDIA  
1 – 6/2/2012  
New Delhi (IN)

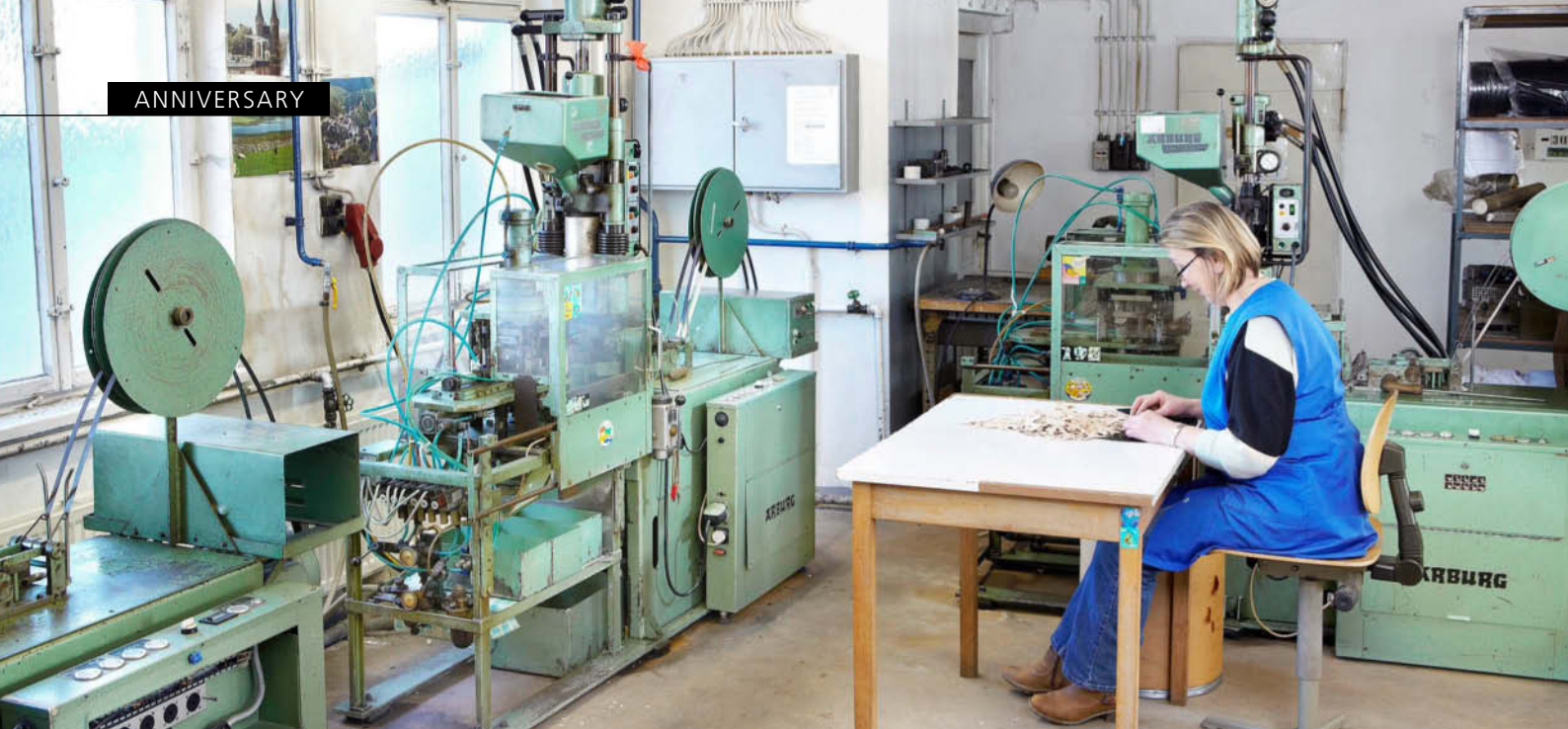
**Sino-Pack**  
中国国际包装工业展  
Sino-Pack  
7 – 9/3/2012  
Guangzhou SC (CN)

**Yuyao Exhibition**  
6 – 9/11/2012  
Yuyao (CN)

**TAIPEI PLAS**  
21 – 25/9/2012  
Taipei (TW)

**MSV**  
10 – 14/9/2012  
Brno (CZ)





# Indefatigable – for

## Wilh. Wissner: winner of the anniversary competition has been

**I**n 2011, ARBURG celebrated its anniversary “50 Years of ALLROUNDER”. One highlight was the “Economic Miracle” anniversary competition, where the oldest ALLROUNDER still used in production was sought. The prize, an electric ALLROUNDER 370 E, went to the Goeppingen-based company Wilh. Wissner, which has been operating the ALLROUNDER it purchased in 1966 to this very day. This “living” proof of the high performance and durability of ALLROUNDER technology produces several million suspender clips every year.

Those responsible at ARBURG were overwhelmed with the world-wide response to the anniversary competition. A total of 160 companies participated, from Germany, Europe and even South Africa. The prerequisites for participation were that the company had to be the original owner of the ALLROUNDER and that the machine still had to be operating in production today. The oldest ALLROUNDER found was the machine belonging to Wilh. Wissner. It dates back to

1966 and not only met all the criteria for the competition, but has been producing the same product using the original mould until today. Suspender clips.

### Product-specific solution

In order to automate production, Wissner devised a special solution. The suspender clips are injected in two rows onto a continuous cotton tape, which is fed from reels. An integrated four-fold feed and stamping unit then cuts the continuous tape with the moulded-on plastic parts to produce the suspender clips as a free-falling finished product.

In comparison with the previous production on an ARBURG C4b piston machine, unit volumes were doubled using the automated ALLROUNDER 150. Moreover, thanks to the plasticising screw it was possible for the first time to produce the suspender clips not only in black and

white, but also in a wide variety of colours. At several million units per year, the suspender clips are a permanent fixture in the product portfolio.

Currently, the company operates around a dozen ALLROUNDERS. These produce components with supporting, shaping, holding, adjusting and fastening functions for lingerie and orthopaedic products. In addition to suspender clips, these include bikini clips, bra underwires



The ALLROUNDER 150 (above) has produced suspender clips (left) to this day.

and bandage accessories. As the company

also regularly invests in new machines, the prize ALLROUNDER came at just the right time. “With the new electric machine, we intend to develop and produce new orthopaedic and medical technology products among others,” explains Wissner Managing Director Dr. Andreas Lederer.



# Jubilee

# ARBURG

Wissner



# over 45 years!

produced suspender clips for decades



Eugen Hehl (right) congratulates Dr. Andreas Lederer on the new ALLROUNDER 370 E, which perfectly complements his machine fleet (above)

responsible for commissioning the nominated machine in the autumn of 1966.

During the prize-giving ceremony, Eugen Hehl spoke as follows: "I'm delighted that our technology of the day still works and is in reliable operation today." Dr. Andreas Lederer

is convinced that this durability and reliability also applies to today's ARBURG machines: "As with the prize-winning ALLROUNDER 150, the new electric machine is certain to be in operation at our plant for several decades as well, continuing the ALLROUNDER success story."

## Ceremonial presentation in Lossburg

During a festive celebration in Lossburg, the Allrounder 370 E was handed over by ARBURG Partner Eugen Hehl, who welcomed the Wissner delegation together with Managing Partners Juliane Hehl, Michael Hehl and Renate Keinath, as well as the Managing Directors. Dr. Andreas Lederer was accompanied by his Production Manager Siegfried Eberle and the retired Bernhard Nägele, who was

## INFOBOX

**Founded:** 1859 by Christian Wissner  
**Plants:** Germany und Hungary  
**Employees:** approx. 100  
**Machine fleet:** 13 injection moulding machines, of which 12 ALLROUNDERS  
**Customers:** lingerie and orthopaedic suppliers  
**Contact:** [www.wissner.de](http://www.wissner.de)



# A cage insects

Riwotec: automatically

**A**s a producer of technical parts, Riwotec GmbH offers its customers a wide-ranging portfolio: stamped and turned metal parts, plastic injection moulded parts, as well as hybrid parts made from both materials. One speciality of the Thuringian company is the overmoulding of various materials, as in our present example of an insect prevention cage.

“Really, we’re a typical contract injection moulding outfit,” is how Managing Partners Bernd Ose and Jürgen Wiesel describe their company. This statement slightly hides the fact that Riwotec GmbH, based in Bad Blankenburg in Thuringia, is actually a broad-based service provider. Its



core competences range from stamping, plastics and turning technology as well as a die and mould construction.

The basis for the company’s plastics processing operation was already

# against

## overmoulded filter screen protects smoke detectors

laid back in 1993. Before that date, Ose und Wiesel were already familiar with an ALLROUNDER 170 CMD, which was used for the production of small plastic parts.

"With support from ARBURG, things quickly progressed from there," reminisces Bernd Ose. "One of the company's big advantages in our view is the comprehensive support that it offers," adds Jürgen Wiesel. The main priority is not only selling the machines, the after-sales service is also crucial. The two Managing Directors single out the technical support and the numerous training offerings for particular praise. For example, ARBURG supports the entire injection moulding plant at Riwotec, including the automation solutions.

### High availability vital

"For us, it's important that the machines and automation solutions run smoothly," explains Bernd Ose. The low-maintenance operation, simple control and not least the universal application range of the ALLROUNDERS were the decisive factors for Riwotec. This is easy to understand in the light of annual batch volumes running between 500,000 and five million units. With some 1,000 active moulds, Riwotec processes around 3,500 tonnes of technical plastics annually, currently on 32 ALLROUNDERS. The company's balanced customer structure is not least down the clever business policy of its two founders. No individual customer accounts for more than a 15 percent share of the sales revenue.

Riwotec has experienced a veritable

boom in recent years. The bulk of their business activities has progressively moved to the automotive, medical and domestic appliance sectors, which has resulted in a growth rate of almost 40 percent in the plastics segment alone. During this phase, the construction of a new production hall in mid 2009 was both a blessing and a challenge. An interruption in production was unthinkable. However, with support from ARBURG, the company succeeded in completing the move without shutting down running operation. Within three months, the complete plastics production area had been rehoused in the new hall without noteworthy complications. Owing to the ideal location of the new production hall, Riwotec can operate its comprehensive shift system on 365 days a year.

### Round cage produced in a single step

As a main contractor, ARBURG was contracted by Riwotec to design, build and install a fully-automated injection moulding system for the production of an insect screen for smoke detectors. As a project partner, automation specialist kiki Ingenieurgesellschaft mbH, Malsch, were also involved.

The insect screen consists of a round cage made from a PA mesh ring overmoulded with ABS. In the smoke detector, the component protects the sensitive



The insect screens for smoke detectors (above) are produced fully automatically using a production cell (bottom left). The screen is supplied as a tubular mesh (left).

sensor in the smoke detection chamber from insects, which could cause false alarms. Smoke particles, however, can pass through the mesh unhindered. The cage comprises a base plate with different wall thicknesses and a ring. The mesh, which is additionally overmoulded with four narrow supports, is located between these two parts. The components are produced using a 4-cavity mould on a hybrid ALLROUNDER 370 H operating with a MULTILIFT V robotic system with a load bearing capacity of up to 15 kg.

"One challenge at the very start of the project was to find a mesh that was suitable for our production requirements," explains project manager Jörg Ziermann. The idea of positioning a length of mesh tape around a core



and then overmoulding it soon proved unsuitable.

### The problem: feeding the mesh

The best solution proved to be a tubular mesh supplied flat on a roll. This mesh has a seam along its length, which is no longer visible on the finished part because it is overmoulded with one of the supports.

In the feed direction, the tubular mesh is advanced by parallel grippers onto a trapezoidal core, which opens it up. In order to collect the tubular mesh sections, the 4-core gripper of the robotic system moves to the transfer station horizontally above the feed device. Once the robotic gripper has been centred via pins, the parallel grippers push the tubular mesh onto one of the four gripper cores. A circulating, heated blade then cuts off a defined section of the tubular mesh on the core.

"Hot cutting has the advantage that the thermoplastic mesh material is cut immediately upon contact with the heated blade. The cut edge is melted slightly in the process, fusing it cleanly so that no threads are drawn during cutting," explains Ziermann. The blades are standard components that can easily be replaced as required.

When the tubular mesh is in position on all four cores, the gripper moves vertically into the mould. After it has been centred, a pressure plate pushes the mesh rings onto the counter-cores in the mould. Then, overmoulding is carried out. The finished parts fall from the machine as bulk goods.

Control of the feed device is connected to the SELOGICA machine control system via programmable interfaces. This allows the production cell to be operated simply and effectively. Riwotec produces around a million of these parts annually in this manner.

"The development and implementation of the production cell is an example of a highly successful design and effective co-operation," says Jörg Ziermann, summarising the project. Decisive for success was ultimately the fact that the project partners held meetings at an early stage. This meant that there were only a few details that still needed to be resolved during acceptance of the production cell in Lossburg.

The 4-core gripper (left) moves to the transfer station (right), where four tubular mesh sections are individually pushed onto the gripper cores.

## INFOBOX

**Founded:** 1993

**Production area:** 17,000 m<sup>2</sup>

**Employees:** 225

**Sales:** EUR 23.4 million (2011)

**Machine fleet:** 33 injection moulding machines with clamping forces from 250 to 6,500 kN, including 32 ALLROUNDERS

**Products:** technical parts with shot weights from 0.7 to 2,500 g, plastic/metal hybrid parts, turned parts, stamped and moulded parts; in-house injection mould construction, stamped-bent parts as well as die-casting dies

**Industries:** automotive, electrical/electronic engineering, domestic appliances, safety technology, medical technology

**Contact:** [www.riwotec-gmbh.de](http://www.riwotec-gmbh.de)

# Energy saving made easy

**GOLDEN EDITION: model refinements for energy and production efficiency**

In order to ensure that the complete ALLROUNDER machine range is always up to latest technical standards, ARBURG continuously invests in model refinements of the individual machine series. The latest example is the ALLROUNDER GOLDEN EDITION, which is available with the ARBURG energy-saving system AES with immediate effect.

To date, the AES option has been available for all the hydraulic ALLROUNDERS except the GOLDEN EDITION series. AES could be ordered both independently, or, in the context of the "advance" equipment package, together with the electro-mechanical dosage drive and the position-regulated screw. The fact that the ARBURG energy saving system is now also available for all the GOLDEN EDITION machines underscores the company's commitment to providing its customers with energy and consequently production-efficient alternatives in all its machine series.

## What can AES achieve?

On machines featuring AES, a frequency converter continuously adjusts the speed of the electric motor to the actual power requirement. The basic idea is, in the case of applications with lengthy cycle times, to adapt the drive power of the

pump motor to the low energy requirements of the machine during phases in which the hydraulic axes are inactive. Instead of working at a high nominal speed and a low level of efficiency, the speed and accordingly the power of the drive unit is adjusted to the actual power requirements during long cooling and hardening times, for example. The relevant momentary power requirement is determined by means of the program parameters.

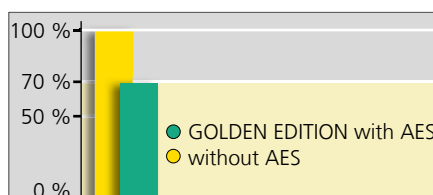
## What are the benefits of AES?

With AES, the drive train operates at optimum efficiency, even at low levels of utilisation. The energy consumption of the machine is thus sustainably reduced. In particular, AES can exploit energy saving potential in the case of applications in which "rest phases" such as cooling and delay times make up a significant share of the total cycle time. Optimised-efficiency drives also minimise wear and produce

less heat loss, resulting in energy savings when the cooling system is in operation.

## Even more energy saving features

With the higher-end GOLDEN EDITION model featuring dual-pump technology for simultaneous machine movements, AES has double the effect as it operates on both pumps. In conjunction with the efficiency-optimised IC2 motors installed as standard, the production of moulded parts is thus not only energy efficient, but also more production efficient thanks to the achievable cycle time reductions. Model refinement hardly gets better than this.



With AES, the GOLDEN EDITION consumes up to 30 percent less energy than without.

# Ever greater efficiency

## Phoenix Contact Electronics: ALLDRIVE reduces cycle times by 20

**A**t Phoenix Contact, improving efficiency is a topic that pervades the entire corporate group. In the plastics sector, this means consistent investment in new technologies, e.g. in electric injection moulding machines. The fact that this strategy pays dividends is evidenced by the production of PLC relays at the group subsidiary Phoenix Contact Electronics. By using an ALLROUNDER 520 A, a cycle time reduction of around 20 percent has been achieved. And less energy is required as a consequence.

At Phoenix Contact, energy has been a central focus from the outset. The electrification of a tramway system was the catalyst for the foundation in Essen of a commercial agency dedicated to the sale of overhead line fittings in 1923. At the end of the 1920s, the idea of modular, serially installable terminal connectors, so-called series terminals was born. This proved to be the cornerstone for the suc-

cess of the group, which is today the global market leader for components, systems and solutions in the electrical engineering, electronics and automation sector.

### Technology and philosophy combined

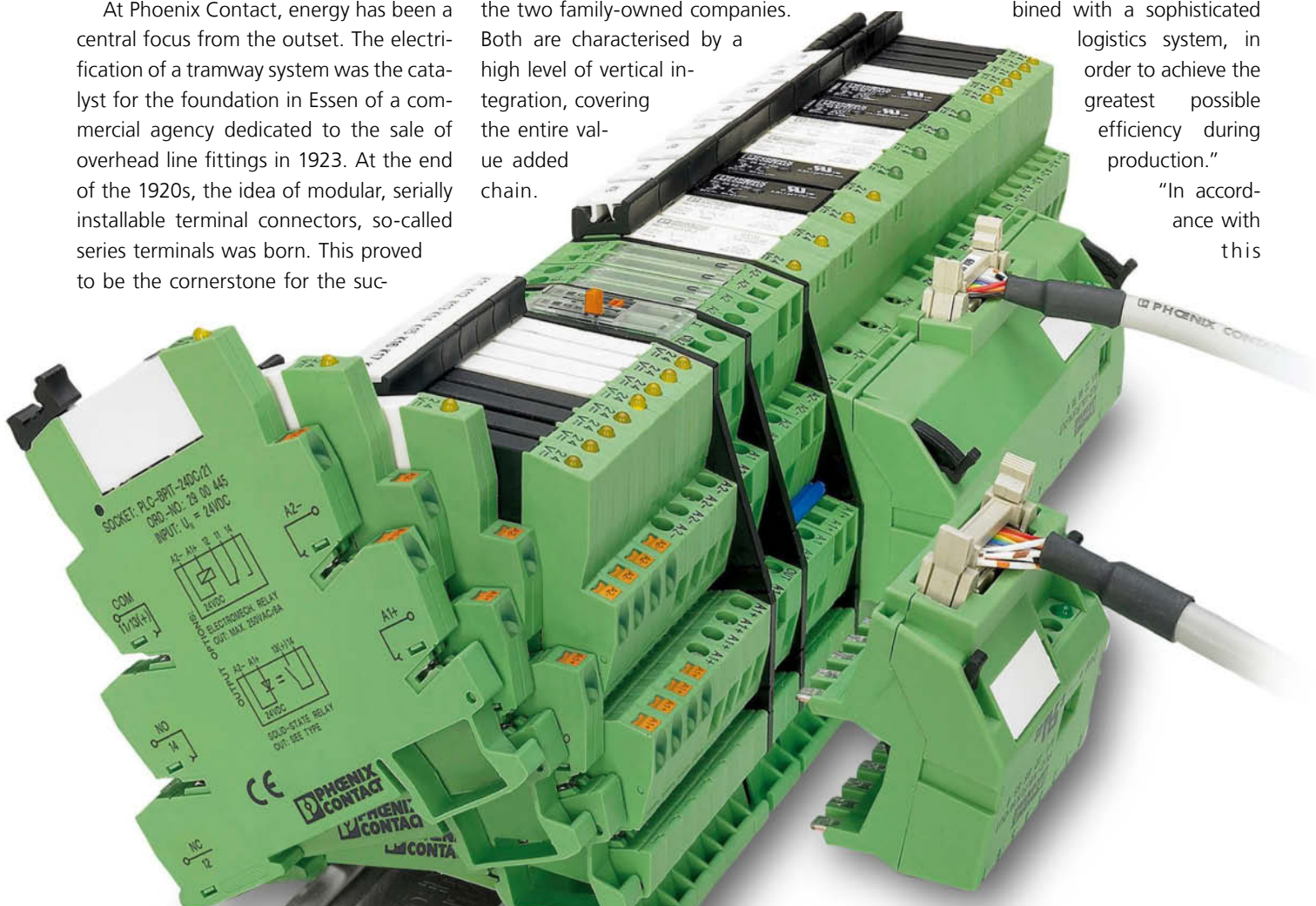
In the injection moulding sector, Phoenix Contact has been working together with ARBURG for decades. In Germany, this successful co-operation extends to the company's two locations in Blomberg and Bad Pyrmont. This is primarily based on technology, but also on the mutual philosophy and structure of the two family-owned companies. Both are characterised by a high level of vertical integration, covering the entire value added chain.

At Phoenix Contact, this means that it produces all of its own plastic and metal parts, injection moulds and module assembly machines.

### Latest technology for high efficiency

Georg Beretitsch, Director and Head of Production & Engineering of the Interface Business Unit describes the approach adopted during production as follows: "Depending on the product design and properties, we employ different manufacturing technologies for the entire production process. The degree of automation is also adapted to the unit volumes, combined with a sophisticated logistics system, in order to achieve the greatest possible efficiency during production."

"In accordance with this



objective, we always invest in the latest technology to suit our products during the procurement of injection moulding machines," adds Klaus Felsner, Manager Plastics Production Interface.

He goes on to mention that one important advantage with ARBURG, which becomes particularly apparent during modernisation of the machine fleet, is the SELOGICA control system. "The standardised ARBURG machine control system always significantly facilitates things for my employees when we upgrade to enhanced or even new machine technology." At his production facility in Bad Pyrmont, this journey has led from the hydraulic ALLROUNDER S machines through to electric ALLDRIVE models.

Although all the machine series are still represented today, the trend at Phoenix Contact is clearly moving towards electric machines, which are one step ahead in terms of precision, energy consumption and particularly cycle times. "This allows them to make a significant contribution to improving production efficiency," explains Klaus Felsner, citing the new ALLROUNDER 520 A, on which PLC relays are produced using a 4-cavity mould, as an example.

### Highly-automated relay production

The manufacture of these thin-walled parts, which are among the company's top sellers, is highly automated. Handling of the moulded parts and sprues is performed by the vertically operating MULTILIFT V robotic system. This sets down the finished parts in automatically provided crates, which are then transported away by means of a packaging and storage unit docked directly to the ma-



Photos: Phoenix Contact

chine. The sprues are disposed of directly into a grinder by the robotic system. From here, the recycled material is returned to the central material supply system where a proportion of it is automatically mixed with the new material, depending on the product.

### 20 percent saving with ALLDRIVE

"Compared with the hydraulic machine on which we previously produced the PLC relays, the ALLROUNDER A immediately impresses with the greater precision of the electric drives and the resulting perfect product quality. The decisive benefit in terms of production efficiency, however, arises from the simultaneous movements of the electric drive axes and the resulting cycle time reductions, which amount to just under 20 percent in this case," says a delighted Klaus Felsner.

In order to ensure higher machine availability and efficiency in moulded part production, the machines are inspected every 24 months in accordance with an inspection contract. "Here, ARBURG offers us a complete package comprising modern technology and a comprehensive service," summarises Georg Beretitsch. For his next investment, he mentions that the new electric EDRIVE series could be interesting,

Klaus Felsner (left) and Georg Beretitsch are highly impressed with the quality and efficiency with which the electric ALLROUNDER 520 A produces the PLC relays, which are used in modular relay systems (below left).

which his colleagues from Blomberg are already using in production.

### INFOBOX

**Founded:** 1923

**Sales:** EUR 1.3 billion (2010)

**Plants:** seven production locations in Germany and a further seven worldwide, almost 50 fully-owned sales companies

**Employees:** 11,000 world-wide (2010)

**Products:** components, systems and solutions for the electrical engineering, electronics and automation sector

**Industries:** automotive industry, chemical industry, power supply, appliance manufacture, machine and plant construction, oil and gas industry, telecommunications, traffic technology, water supply and distribution

**Contact:** [www.phoenixcontact.de](http://www.phoenixcontact.de)

# Big Coopera the Smalles

## Dynomax: micro-injection module

**T**hrough its ALLROUNDERS, ARBURG has made a significant contribution to the sustained success of the company. As contract manufacturer of high-precision components, Dynomax Inc. depends on machine technology to meet their customers' strict tolerance requirements.

Dynomax from Wheeling, Illinois (near Chicago) is an expert of small and micro-miniature injection moulding. The company, which has celebrated its 25th anniversary in 2011, offers much more than injection moulding and tooling. It has extensive capabilities in high-precision and thin wall machining, component assembly, spindles, specialty machine design and build and automation systems.

### Continued growth and expansion

Dynomax's increased penetration into the aerospace and defense industries has propelled its record growth. Since early 2009, Dynomax has tripled its staff and invested in over 70 new milling, turning and broaching machines, EDM machines, and ARBURG injection moulding machines.

The first one was an ALLROUNDER 170 CMD, which was bought as early as 1986. Today, many of the ALLROUNDER machines are equipped with Dynomax's proprietary automation systems developed in cooperation with ARBURG.

In keeping with its mission to provide vertically integrated solutions for its customers, Dynomax is expanding its operations to include finishing processes for aerospace components in mid 2012.

### Design engineering and vertical integration

Dynomax's core competencies are to provide unique engineering design solutions, coupled with vertical integration. That means: The company not only constructs moulds in order to process diverse plastics such as PC, silicone, thermoset and LCP, but it has also integrated pre- and post-production steps in its manufacturing process.

Dynomax is constantly advancing its use of automation. Several six-axis robotic systems are used on ALLROUNDER machines for moulded part production for careful demoulding of silicone parts and further processing of thermoset parts.

### ALLROUNDER with micro-injection module for smallest parts

The ALLROUNDER machines, including machines from the electric ALLDRIVE series, are utilized for their high precision and accuracy. The injection units are partly equipped with electro-mechanical dosage drives and can be used very effectively for the production of the smallest moulded parts. The full production of these products adheres to the stringent tolerances and strict regulations of ISO 9001 and AS9100 standards, and takes place during three shifts, five days a week. Dynomax is recently using the new micro-injection module from ARBURG on an electric ALLROUNDER 270 A.

Tom Filippo, General Manager of Moulding and Tooling Operations, summaris-



es the experiences with the machine: „We needed an ideal technical solution for our requirements and ARBURG has the right one in its program: an electric screw pre-plasticising unit mounted on an injection screw with a diameter of only eight millimetres and fitted with a non-return valve. The advantages are: continuous material feed from the inlet to the tip of the screw, constant injection conditions via dosage control and the processing of standard granulates, as melting is performed prior to injection. In this way, we obtain exactly what we require for the production of our micro-components. We are also able to homogenously prepare the smallest material quantities, plasticise





# tion on t Parts

as perfect complement

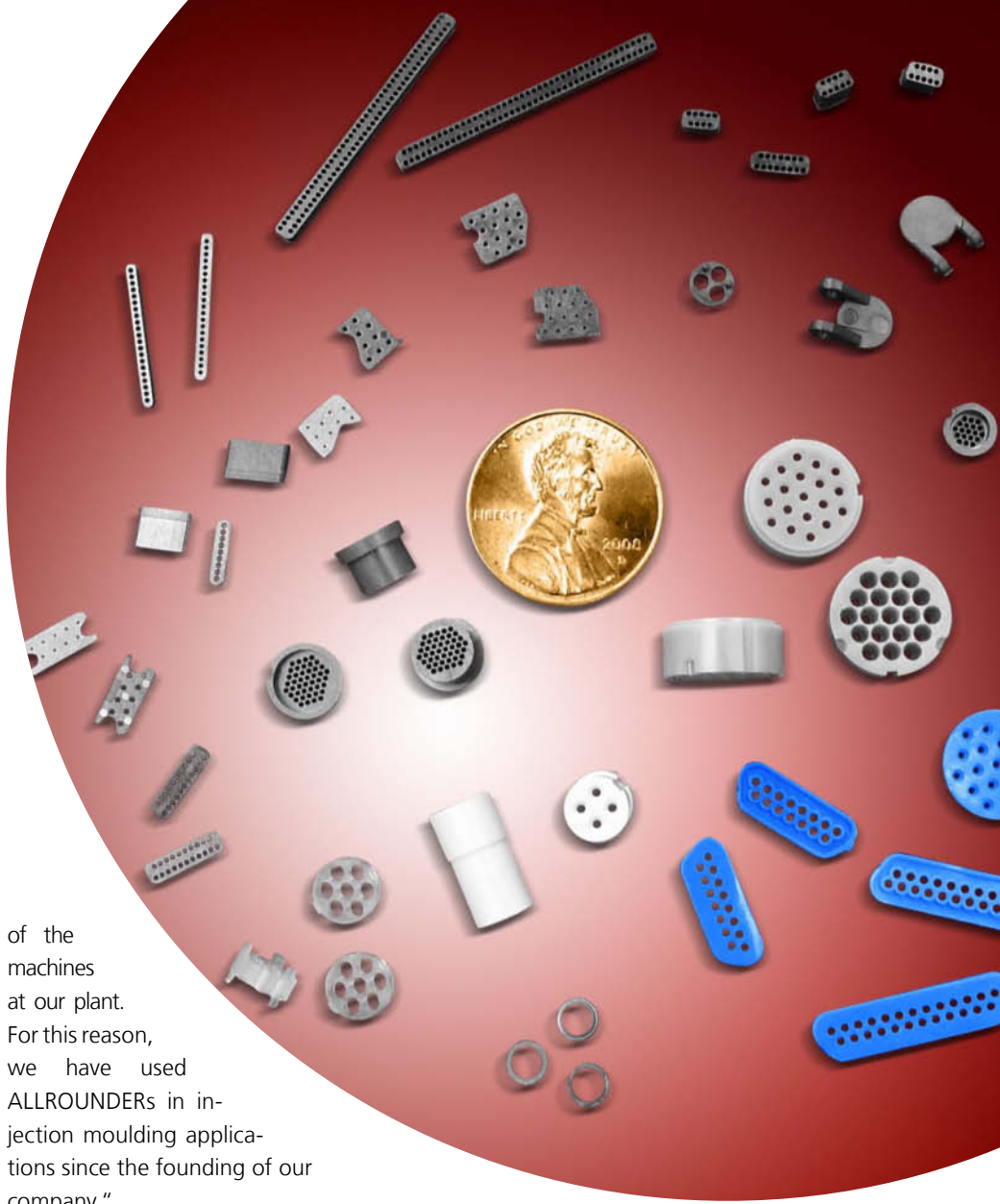
For the production of micro parts (right), Dynamax uses an ALLROUNDER 270 A (left), which can be equipped with the ARBURG micro injection module (below).

and inject minimal shot weights, making the material dwell time in the cylinder correspondingly short. Thanks to the servo-electric drives, high-precision control of injection movements is possible and enables us to achieve continually reproducible and high-quality results, even with the smallest parts."

## Diverse program meets all requirements

According to Walter Zic, Vice President of Operations, ARBURG is also a valuable partner for the future success of the company: „Our many years of collaboration is a direct result of ARBURG’s diverse product range, which covers all of our requirements such as the processing of a wide range of materials. We use hydraulic and electric machines, as well as vertical machines. This is supplemented by a wide range of automation options and the interface of complex sequences via the SELOGICA machine control system.“ Dr. Richard Zic, founder and CEO of Dynamax, adds: „ARBURG has always provided tremendous technical support and responsiveness. This has included training on new products and quick on-site servicing and repairs

of the machines at our plant. For this reason, we have used ALLROUNDERS in injection moulding applications since the founding of our company.“



## INFOBOX

**Founded:** 1986 by Dr. Richard Zic

**Production:** high-precision micro molded parts held to the most stringent tolerances

**Employees:** more than 200 at the Wheeling headquarters and three other locations in the Chicago suburbs

**Machine fleet:** over 20, including 16 hydraulic and electric ALLROUNDERS, as well as a rotary table machine

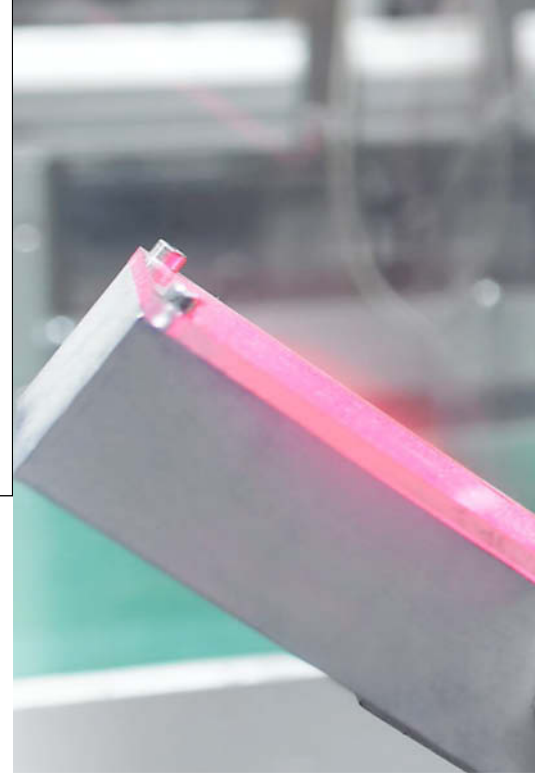
**Industries:** aerospace, defense, medical, transportation and energy

**Contact:** [www.dynamaxinc.com](http://www.dynamaxinc.com)



## TECH TALK

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



# Faults excluded

## Integrated quality monitoring for zero-faults production

**T**he objective of cost-effective production is always the reduction of unit costs. For this reason, injection moulding companies increasingly rely on the combination and systematic automation of processing operations. A stable production process which guarantees a high-quality product at all times minimises rejects and ensures a continuously high level of productivity. The possibilities offered by integrated process control are extremely varied today and extend to inline colour measurement.

In order to ensure that no faulty components whatsoever are produced during injection moulding, it is often decisive to ensure the quality of the initial materials. Here, optical inspections are used in order to ensure that, for example, the rotational and axial positions, dimensions, panel thicknesses or bend angle of inserts are correct. Weight inspections are also a further option. The results can then be taken into account during calculation of the dosage volume for the next injection mould-

ing cycle in order to prevent overfeeding, for example. Downstream inspection steps enable 100 percent quality control. This can be carried out in a number of ways, depending on the requirements.

### Electrical, mechanical and optical inspections

For example, the operability of contacts can be tested electrically, or the resistance between contact tracks monitored using high voltage. The generation of vacuum or pressure can be used to test moulded-on seals. Parts can be precisely measured mechanically using measuring probes or, in particularly critical areas, it is possible to determine in detail whether, for example, seals have been fully moulded on at a specific location.

The greatest options with regard to downstream quality are offered by optical measurement systems. These are able to inspect moulded parts in great detail, optionally even in the mould itself. In addition to dimensional stability, over and underfeeding, sink marks and soiling can also be detected in transparent plastics.

### New: inline colour measurement

Today, colour is often an important quality criteria for moulded parts. Particularly when dyeing takes place directly in the machine. Here, colour changes to the plastics during cooling (thermochromism) must be taken in to account. In order to detect colour faults on moulded parts, a special optical measuring system featuring a temperature sensor has recently become

Inline colour measurement uses thermochromics to verify the colour accuracy of moulded parts.





temperature. This enables quality defects to be effectively prevented during high-volume production.

### Effective quality management

Reject parts detected are generally separated out via the robotic system responsible for all the parts handling tasks. In order to separate the reject parts from the production process immediately and reliably, the robotic system should be integrated in the machine's quality control system. This enables efficient working sequences while also resulting in a high degree of process reliability. This ensures correctness of the batch counter on the machine, even in the case of faulty production. The same applies to the separation of random samples, which can optionally be implemented as a

available. The colour of the moulded parts is measured immediately after demoulding and the obtained colour values are back-calculated to room

function of number of units, time or upon request. For preventive quality assurance, fault cycles can be evaluated in a targeted manner, e.g. according to the total number of faults, consecutive faults, or the same fault within several cycles. Follow-up functions can be individually selected: from warnings or stopping at the end of the cycle, through to immediate machine shutdown. Through the early detection of quality problems, timely intervention is possible. An additional benefit: authorisation for performing individual quality functions is managed centrally and allows exclusive access for quality assurance personnel.

The integrated optical inspection ensures that the complete seal is moulded onto every part.



**Production efficiency counts!** A broad perspective is essential: every day, some 3.5 billion high-quality plastic parts are produced on ALLROUNDER machines – so the utmost production efficiency is required. If you are seeking to produce that efficiently, we are the right choice. We ensure your economic success. ARBURG for efficient injection moulding!



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