

today

The ARBURG magazine

Issue 51

2013





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MASTHEAD

today, the ARBURG magazine, issue 51/2013

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RUCH NOVOPLAST model plane and Particle-foam Composite Injection Moulding get off to a flying start. This new process and its potential in lightweight construction are illustrated by the production of model wheels (see page 12).





Dear Readers,

I am delighted to introduce not only the new edition of the ARBURG customer magazine, but also myself to you here. My name is Jürgen Boll and I assumed responsibility as Managing Director Finance & Controlling on 1 January 2013. In recent months, at the side of my predecessor Michael Grandt, I have been able to gain knowledge of the company and its products, as well as ARBURG's philosophy and its innovative strength.

A first highlight for me was the exhibition stand at the Fakuma with its numerous world premieres. These included, for example, Particle-foam Composite Injection Moulding, which we present in detail in this edition. It is a wonderful example of how, above and beyond its machine technology, ARBURG also develops and advances new processes jointly with its partners. And this has been the case for decades, as evidenced by the

50th anniversary of powder injection moulding, the history of which we will outline here.

Partnerships and innovations also characterise our co-operation with the winner of this year's ARBURG Energy Efficiency Award, the company AMK. During the joint development of injection moulding solutions and products in the drive technology field, energy and production efficiency have been a central focus throughout.

These aspects are also reflected throughout the current issue of 'today'. The topics covered range from the ARBURG energy management system through to servo-electric drives. You are also certain to find some valuable ideas for your company.

I hope you enjoy reading the new issue.

A handwritten signature in blue ink, appearing to read 'J. Boll', with a stylized flourish at the end.

Jürgen Boll

Managing Director Finance & Controlling



ARBURG calls and the

Technology Days: Efficiency Arena highlight contributes to greater

Thanks to its unique offerings, the Technology Days has been a magnet for the international plastics industry for many years. At this year's event, to be held from 13 to 16 March 2013, the overarching topic of "production efficiency" will be the main focus. The organisers at ARBURG have come up with something very special for this occasion: the Efficiency Arena.

Jointly with selected partners, ARBURG will present the entire value-added chain of the moulded part in this special exhibition area.

Valuable ideas in the Efficiency Arena

At the various stations of the Efficiency Arena, trade visitors will discover how the cost-effectiveness of moulded part production can be enhanced. Furthermore, experts will answer individual questions to ensure that everyone can take home valuable and practical ideas for their own production facilities. In addition, four spe-

cialist presentations will provide information on the potential of the SELOGICA control system for increasing efficiency, on the opportunities that the new long-fibre direct injection moulding process offers for lightweight construction, on what must be taken into account during the galvanic coating of plastics and on new developments in the field of product and mould design.

Over 40 ALLROUNDERS from all series with applications

More than 40 exhibits covering a broad range of applications and industries will provide a comprehensive overview of all electric, hybrid and hydraulic machine series, horizontal and vertical machines, the entire ALLROUNDER clamping force range from 125 to 5,000 kN, automation solution offerings, as well as customised turnkey solutions. Innovations from the areas of machine, process and application technology will also be on show: the electric ALLROUNDER 630 A machine size, the servo-hydraulic drive concept for the large

ALLROUNDER 5, the "Packaging" version for electric and hybrid ALLROUNDERS (see page 19), the productivity package for the GOLDEN EDITION machine series, in-line printing, long-fibre direct injection moulding and Particle-foam Composite Injection Moulding (see page 12).

The programme will be completed by a presentation of the complete pre and after-sales services, including the training offerings, as well as tours of the production facility.

The more than 5,000 visitors from 50 countries attending the event annually in recent years bear witness to the attractiveness of the Technology Days. Three visitors from the US, Saudi Arabia and Guatemala have even undertaken extremely long journeys in order to attend.



trade experts arrive

production efficiency

Ryan Heidenfeld,
Process Engineering
Manager, Medbio, Inc.,
USA



Foto: Privat

Ahmed Noah,
General Manager,
FinePlast S.A.,
Saudi Arabia



Foto: Privat

Raul Bouscayrol A.,
General Manager,
Grupo Polindustrias,
Guatemala



Foto: Privat

"We've visited the Technology Days three times and it's been an invaluable experience each time. The live machine presentations have provided us with insights into new process technologies and we've learned how these can be used in the production of our precise, complex components and assemblies for applications in the medical technology and biotechnology sectors. The discussions with ARBURG experts and the opportunity to actively engage with potential partners and customers are also extremely valuable. For our company, it's therefore certainly worth travelling to the Technology Days in Lossburg."

"I've attended the Technology Days every year since 2010 and have gained new insights into improving the cost-effectiveness of our production. With its many exhibits, applications and presentations, the programme offers us an ideal opportunity to gather ideas for new projects and discuss these directly with the relevant experts. This allowed us, for example, to quickly forge ahead with a project for the efficient production of a complex closure. Moreover, thanks to the Technology Days, we no longer need to visit any other trade fairs, which saves us valuable time."

"I visited the Technology Days for the first time in 2012 and was impressed by the breadth of the programme. Because all the ALLROUNDER series were presented with different applications, I was able to experience the potential of ARBURG technology at first hand. Intensive discussions with the ARBURG experts were also extremely helpful. I was particularly fascinated by the in-mould labelling exhibits last year. As a result, we've invested in an IML system that will be delivered in March 2013. Then, we'll be the first manufacturer of IML products in Guatemala."

Award double

AMK: Award-winner manufactures efficient





y earned

products for and on energy-efficient ALLROUNDERS

The winner of the ARBURG Energy Efficiency Award 2013 deserves the prize in several respects. Not only does AMK, from Kirchheim/Teck, Germany, use energy-optimised ALLROUNDERS in its own injection moulding plant, it also uses them to produce components for servo motors. These, in turn, contribute significantly to the energy efficiency of ARBURG's electric and hybrid machines. Moreover, AMK and ARBURG benefit from a strong development partnership in the field of specific electric drives.

Each year since 2008, the ARBURG Energy Efficiency Award has been presented to a company which, like the injection moulding machine manufacturer, is comprehensively and globally involved with the topic of energy efficiency. This includes, in particular, the use of energy-efficient ALLROUNDER machines.

Award as confirmation and incentive

The 2013 prize winner is a specialist for innovative drive and control technology, which has developed from a motor manufacturer into a systems supplier over the past five decades. For the company, receiving the ARBURG Energy Efficiency Award 2013 represents both confirmation of what has already been achieved and an incentive for the future. "It's a great honour for AMK to have been bestowed this award. It confirms our long-standing and unequivocal approach and our objective to conserve resources in an environmen-



tally compatible manner. Our extremely successful co-operation with ARBURG, our joint developments and the associated challenges have further reinforced our goals," emphasise Managing Directors Eberhard Müller and Dr. Günther Vogt in unison.

ALLROUNDER enhances efficiency

In the injection moulding sector, the collaboration began in 2007, when AMK acquired a machine fleet consisting of ALLROUNDERS and set up an injection moulding plant. This was progressively modernised, initially with an electric ALLROUNDER 570 A featuring a MULTILIFT robotic system. A hybrid ALLROUNDER 570 H followed in 2012. "The reason for our most recent investment was our desire to improve our motor production," says Eberhard Müller describing the situation at the outset. "The injection moulding process seemed ideal for the production of stators and rotors. Together with ARBURG, a production concept involving an automation solution was developed, with which the efficiency of the downstream production was improved significantly," says a delighted Eberhard Müller.

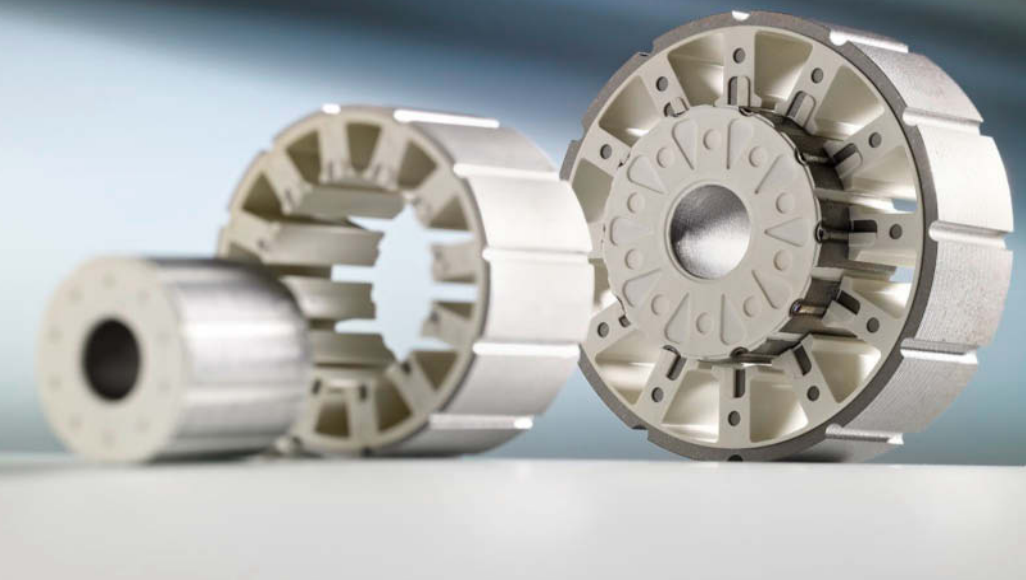
AMK Managing Directors Dr. Günther Vogt and Eberhard Müller (photos above, from left to right) are delighted with the award and the many years of co-operation.

A variety of motors and converters are used in ARBURG machines (photo on left).

Advantages compared to the previous manual bonding process include the high-strength joining of the components as well as the reliable, precise production of the components with a high repeat accuracy, including the automated and therefore cost-effective downstream processing. This example demonstrates the development of AMK towards greater efficiency in the manufacturing sector through process and quality optimisation, shortened throughput times and process conversions.

Joint development of drives

The company's development partnership with ARBURG in the motor segment dates as far back as 1994. The philosophy of advancing new technologies in terms of energy and production efficiency, as



Thanks to the injection moulding process, AMK is able to produce stators and rotors efficiently (top photo). For this purpose, AMK uses ALLROUNDERS (bottom photo) the efficiency of which is in turn enhanced by AMK products.



With the converters, liquid cooling and energy recovery are highly advantageous.

Energy efficiency always in focus

For AMK, the topic of energy efficiency has played a vital role from the beginning and this is reflected in all the company's activities today. It also includes their e-mobility and regenerative energy generation and storage segments. The product portfolio consequently also includes solar inverters. These are also used in the company's own photovoltaic plant, which supplies some 80,000 kWh annually. Future objectives of AMK in terms of energy and production efficiency include a further improvement in the efficiency of its products and during production using new technologies and even better utilisation of waste heat for service water and process heat.

well as quality enhancement, unites the two companies and has been the starting point for their joint innovations such as water-cooled converters.

AMK was involved in the development of the electric ALLROUNDERS from the outset: at the leading global K'96 trade fair, the electric machine, which was presented as a study, already featured an AMK three-phase, variable-speed drive. A further important milestone was the introduction of the first serially produced electric ALLDRIVE machine in 2001.

Here, special-purpose torque motors for injection moulding machines developed in close co-operation were used for the first time. These motors were characterised by an extremely high power density, compact dimensions and low weight.

INFOBOX

Founded: 1963 by Dr. h.c. Arnold Müller in Kirchheim/Teck, Germany

Plants: Six sites in Germany and further locations in 17 countries world-wide

Business segments: Electric drive and control technology, gear motors, handling and automation, automotive

Employees: 800 (2012)

Turnover: 115 million euros (2011)

Industries: Automotive and automation

Products: Servo motors, digital servo converters with integrated control modules and machine controllers as well as motors and compressors for vehicles

Plastics technology: Injection moulding plant with nine ALLROUNDERS with clamping forces from 200 to 2,000 kN, as well as an in-house mould shop

Contact: www.amk-antriebe.de



A great success!

Michael Hehl: ARBURG and ISO 50001 certification

In July 2012, ARBURG was officially certified to confirm that the company's operations meet the globally leading standards with regard to energy, quality and environmental management. The existing certifications relating to quality (ISO 90001) and the environment (ISO 14001) have now been complemented with certification regarding energy management (ISO 50001). Triple certification, which only a few companies in Germany were able to comply with at the time. The 'today' editorial team spoke to Michael Hehl, Managing Partner and Spokesperson for the ARBURG Management Team on his expectations, experiences and insights with regard to this management certification.

today: Mr Hehl, ARBURG was one of the first companies in Germany to receive triple certification. These certifications in-

volve complex processes. Put simply, why did you pursue this course?

Hehl: With certification according to ISO 50001, we commit to the efficient use of energy in all company areas. Environmental protection and the conservation of resources and energy have always been an integral part of our corporate culture. Many companies make this claim in their mission statements. With certification, we have taken things a step further. We document our activities and subject ourselves to a regular official audit procedure.

today: Does this mean that the certification process represents the documentation of the pre-existing, applied management practice?

Hehl: We did still have to put a great deal of work into systemisation and seamless documentation. The fact that certification was then obtained so suc-

cessfully was extremely gratifying to me.

today: What exactly is involved in this type of certification?

Hehl: Essentially, the task with this certification was the systematic, regular, structurally organised and verified processes. And the audit process has helped us to develop even further in this regard.

today: And were you satisfied with the results?

Hehl: Yes. The audit process was more important to us than certification itself. Although certificates are nice, for us, the inner attitude is much more important. You see, from the beginning, our company has been located in one of the most beautiful regions of Germany and the majority of our employees come from the immediate surrounding areas. Throughout the three previous generations of the owning families, an attachment to our natural environment has



therefore been and remains a central aspect of our work.

today: In other words, this certification wasn't actually necessary?

Hehl: No, that's not what I meant. The structured auditing process and the significant effort it entails have benefited us greatly. In most of the fundamental aspects, we were confirmed one-hundred percent, but of course, some room for improvement was pointed out to us here and there.

today: As a matter of fact, the process went further than just the triple certification. You also placed a fourth hurdle in your own path, so to speak.

Hehl: If you mean the choice of a new certification partner, then you're quite right. ARBURG has always placed high demands on itself (laughs). Allowing ourselves to be audited by a new certifier after so many years is a challenge in itself – even without an additional, new certification. We wanted a change in order to obtain fresh impetus and suggestions regarding the quality assurance (ISO 9001) and environment (ISO 14001) areas.

today: What is actually the main objective of ISO 50001?

Hehl: The international ISO 50001 standard, Energy Management Systems

was brand new in 2012. The official description is as follows: "The core of ISO 50001 is the continuous enhancement of an organisation's energy-related performance. The standard outlines the requirements that an organisation needs to fulfil for the purposes of introducing, implementing, maintaining and improving an energy management system. This systematic approach is intended to enable an organisation to improve its energy-related performance, increase its energy efficiency and optimise its energy utilisation."

today: That sounds highly complex.

Hehl: It is, too! But protecting natural resources and the environment is generally no easy task.

today: What does it mean in practice?

Hehl: With ISO 50001, we've committed ourselves to implementing and complying with individually quantifiable energy-efficiency measures. In future, a key component of the energy management system will be systematically planned, detailed and continuous energy measurements for the purpose of establishing precisely how much energy is utilised and where it is consumed in the energy-intensive production process. The evaluation and analysis of the annual consumption also helps in identifying hidden

savings potential. We attach great significance to ideas and suggestions from our employees, whose awareness of the topic of energy efficiency is being enhanced through various activities.

As you know, our theme has for some time been "production efficiency". This applies to our own production, but also to our customers' production – i.e. our products. Our focus on the manufacture of energy-efficient injection moulding machines in an energy-efficient production system was already enshrined in environmental management according to ISO 14001. We are continuously expanding our range of energy-optimised machine technology so that today, more and more ALLROUNDER injection moulding machines bear the ARBURG e² energy efficiency label. We have also, for example, been presenting our Energy Efficiency Award for a number of years: including 2013, our customers' efforts with regard to energy efficiency have been honoured a total of six times, resulting in a list of outstanding prize winners.

today: You always emphasise that your energy efficiency efforts are not a new invention. Does this mean that ARBURG has a great deal of experience in this topic?

Hehl: I believe, in all modesty, that we can answer affirmatively. The strategy



Michael Hehl explains the numerous resource conservation measures adopted. Examples include expansion of the photovoltaic plant and insulation of the Customer Center by double-glazing the facade to exploit all the sunlight as well as the solar heat generated (photo on p. 9).

underlying the new energy management system is planned and organised by the Energy-efficiency Group, which comprises experts from various departments and has actually been in existence since 1996. So, the topic is not new to us. It's much rather the case that company-wide savings potential plays a leading role with regard to energy consumption and has been a key consideration in all developments and investments for decades.

today: Investment is an important keyword. ARBURG is not an environmental protection agency, but an industrial enterprise that has to also take business aspects into account. What precisely are the environmental protection and efficiency measures?

Hehl: Well, the term "efficiency" in itself is indicative. By sustainably conserving resources and increasing efficiency, we're already killing two birds with one stone! The investments we've been making for decades therefore pay double dividends for us: in business terms and in the sustainable conservation of resources. This applies to us as well to as our customers and is incidentally also the idea behind the certification system according to ISO 50001, which aims to

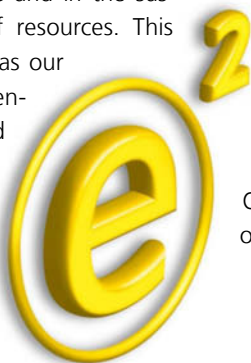
extend across all the individual links in the supply chain.

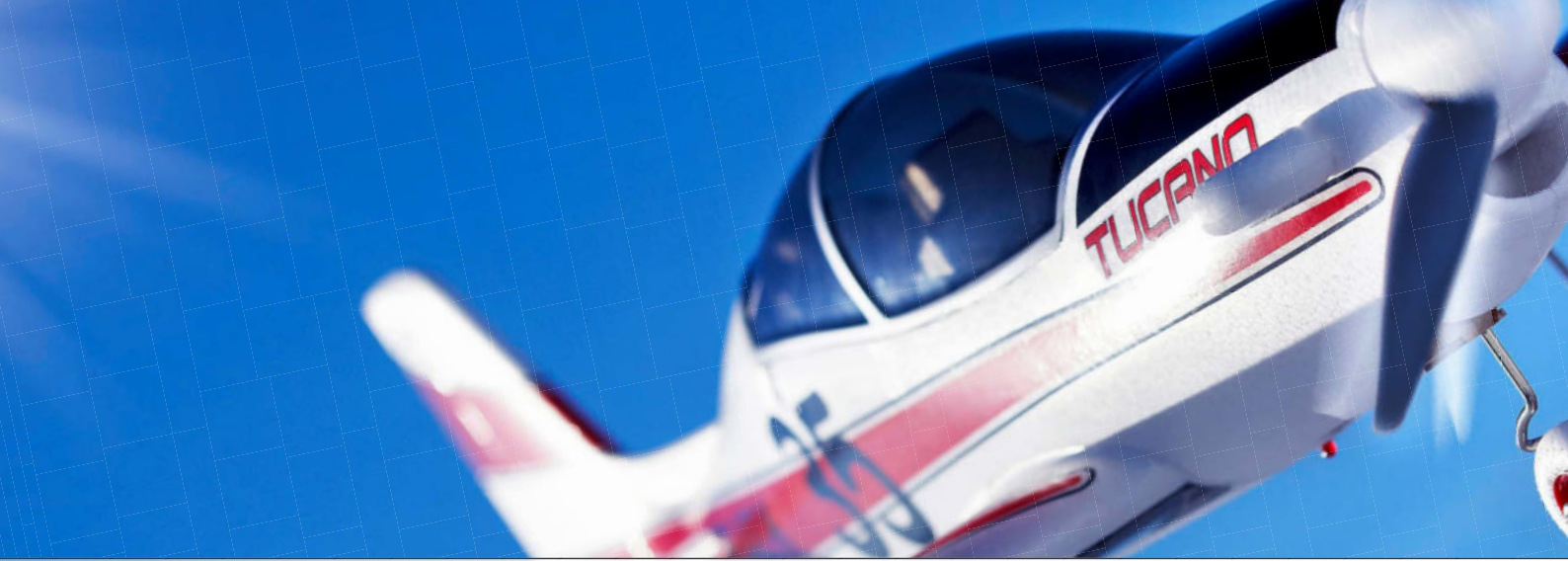
today: Can you put a figure on these investments?

Hehl: Here, we've treated these activities as an overall package for decades, which we approach and implement from a number of angles: resource conservation, environmental protection, business aspects, product quality enhancements and production efficiency. But I can give you a general indication. In 2012, we invested a high six-figure amount in expanding our photovoltaic plant alone. If you think about our facility management, which is based on geothermal energy, photovoltaics, block-type thermal power plants, utilisation of rain water, wind energy and waste heat from production, as well as the natural ventilation and extraction in our buildings, you can imagine that, over the long period in which we have pursued this approach in practice, the capital investments have been considerable. But as I said, it's to the benefit of the environment, our customers and ourselves!

today: Sounds like a big success...

Hehl: Yes, without a doubt. Obtaining certification, making our organisation even fitter, strengthen-





Jointly reaching new

Particle-foam Composite Injection Moulding: Innovative process

The very best combined: this is how both Particle-foam Composite Injection Moulding (PCIM) and the co-operation between partners RUCH NOVAPLAST, Krallmann and ARBURG can be described. The three companies have bundled their expertise and developed a new process for combining the advantages of particle foam and plastic moulded parts in a single product.

The initiators of the project were RUCH NOVAPLAST (www.ruch.de) and the Krallmann Group (www.krallmann.de), specialists for particle-foams and injection moulds and plastics processing respectively. The application technology know-how and process integration were provided by ARBURG.

What lies behind the new process?

With Particle-foam Composite Injection Moulding (PCIM), a polymer is injected onto a product made from particle foam. During injection of the polymer component, the foamed insert is subjected to defined melting. A strong, permanent bond is created between the particle-foam and polymer components. This allows the typical properties of particle foams such as EPP and injection moulding compounds such as ABS, PP or TPE to be combined in a composite part.



Foto: RUCH NOVAPLAST

What are the benefits of foam?

Particle foams include materials with a variety of different characteristics. EPS (expanded polystyrene) – also known under the trade name Styrofoam – is non-elastic and is used to absorb mechanical energy. Products include, for example, crash helmets or packaging for sensitive goods. In contrast, EPP (expanded polypropylene) has elastic properties and the resulting resetting forces can be utilised for holding functions. RUCH NOVAPLAST, for example, produces technical applications made from EPP, such as high-end chassis systems for medical and analysis devices. As in many other cases, the foam is not visible from the outside here. It does, however, fulfil a very important function inside the devices. It holds the parts

Delighted with the joint success:
 Dr. Thomas Walther, Application Technology Manager, ARBURG (photo on left),
 Ingo Brexeler, Managing Director, Krallmann Kunststoffverarbeitung (photo on right, centre),
 Managing Director of RUCH NOVAPLAST
 Roland Zeifang (photo on right, left)
 and Winfried Mantwill.

in position and protects them, for example when dropped. Thanks to their outstanding design possibilities, foam parts can be used to perform even very difficult tasks and assembly can be achieved through slotting rather than screwing. Moreover, particle foam with densities between 20 and 60 grams per litre is extremely lightweight.

heights

opens new dimensions in lightweight construction

New dimensions in lightweight construction

The range of applications for these damping and lightweight EPP materials is significantly extended with Particle-foam Composite Injection Moulding. Through the combination with polymer components, properties such as hardness, contour accuracy and functionality are added. The result are lightweight functional parts that meet all the technical requirements despite their light weight. Furthermore, the foam surfaces can be sealed or fully overmoulded with injected plastic. Holding and clipping functions can also easily be implemented.

Example: model wheel

The three partners have demonstrated the potential of the PCIM process and its further development with the production of a wheel for a model plane. At the world premiere of the process at the Fakuma 2012 plastics trade fair, a wheel rim made from polypropylene (PP) was injected onto an EPP tyre. For this purpose, an ALLROUNDER was equipped with a vertically operating MULTILIFT robotic system, which removed the foamed tyre from a storage device and inserted it into a single-cavity mould before removing the finished

wheel with the injected rim and setting it down. Finally, the parts were automatically packaged in individual bags, which were printed during the running process.

The next development step will be on view at the Technology Days 2013. On the wheel with the moulded-on rim, the EPP tyre is additionally overmoulded with a thermoplastic elastomer to provide it with a soft coating. As further development stages, production of the complete component using a multi-component process and ultimately integration of the foaming operation into the complete production sequence are planned.

Product developers required

The strong interest among the trade public and specific enquiries from a number of industrial sectors demonstrate the potential of Particle-foam Composite Injection Moulding. What is needed now

are product developers, for whom the new process offers completely new possibilities. The PCIM process can make an important contribution to production efficiency: both through new products and through cost-effective production thanks to process integration.



The model plane wheel demonstrates the potential of the PCIM process. During moulding on of the rim, a strong bond is created with the foam tyre (left). In the next step, the tyre is overmoulded with a TPE component (right).



Film

Think global

TRW Automotive: ARBURG first choice for injection moulding

As one of the world's major automotive suppliers, the US-based TRW Automotive group manufactures parts for around 250 different vehicle models. The company's good co-operation with ARBURG is evidenced by the more than 300 ALLROUNDERS currently used by TRW Automotive to produce a wide variety of products, including intelligent vehicle electronics. The company recently named ARBURG as a First Source Supplier and extended its international framework contract, which will standardise and simplify the procurement of new machines in future.

Leading-edge innovations from TRW Automotive include active and passive systems to increase vehicle safety and driving comfort. The products include ABS, airbags, driver assistance systems and electronic technologies. One example for a product that makes vehicles "more intelligent" is a rain/light/humidity sensor which automatically controls the wiper function and vehicle lights. TRW Automotive produces the relevant complex optical system, the so-called lens plate, at its Radolfzell site.

"With production of the lens plates, we've taken a first step towards

electric injection moulding machines," says Heiko Beck, Process Development BCS.

Entry into the world of electric injection moulding

"Owing to the high requirements with regard to precision and reproducibility, we have opted for the high-performance ALLDRIVE machine series." The ALLROUNDER 370 A features a size 70 injection unit, a clamping force of 600 kN and operates with a four-cavity mould. The optical component made from an easy-flowing PC is produced as a low-stress component with surface microstructures using the compression injection moulding process. The complex process sequence requires in-depth process expertise. In mid 2013, an electric two-component ALLROUNDER 470 A is set to be commissioned, which will

produce a two-component lens plate for a renowned motor-vehicle manufacturer.

Owing to its broad product range and the wide-ranging associated requirements to be met, TRW now relies on representatives of virtually all the ARBURG hydraulic, hybrid and electric machine series covering the entire clamping force range between 125 and 5,000 kN, including vertical machines. The first ALLROUNDER was commissioned in Radolfzell as far back as in 1965. Today, more than 300 machines are in operation at the company's sites around the globe – from Germany, France and the Czech Republic to China and the US.

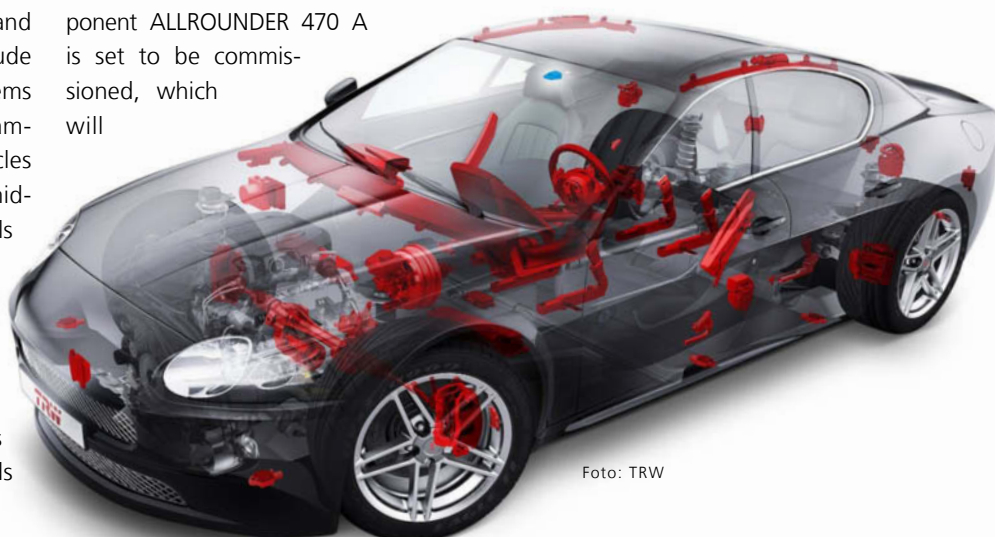


Foto: TRW



machines

First Source Supplier ARBURG

In order to simplify the procurement of new injection moulding machines, TRW will only work together with two manufacturers in future. For this purpose, benchmarking was carried out to compare a number of companies in terms of product range, technology, service and internationality.

"With the aid of defined standard specifications, we have continuously optimised the process for the procurement of ALLROUNDER injection moulding machines and increased cost-effectiveness, so both partners benefit in equal measure," explains Ralf Müller, Senior Key Account Manager at ARBURG. This applies, for example, to vertical ALLROUNDER 375 V models, 1200 T rotary table machines, hydraulic, hybrid and electric, size 470 ALLROUNDERS, as well as multi-component machines.

"ARBURG offers the right machines for our products, world-wide. During identification and evaluation of the wide-ranging requirements, Ralf Müller provided outstanding support," says Dorothee Becker, Capex Purchasing Manager Europe at TRW. "The ARBURG employees generally impress us due to their innovative expertise and particularly their high flexibility. They help us to implement complex technical requirements, enabling the new

development of products. Of course, we will not neglect developments on the world market as highly specialised applications will continue to be required at TRW." However, it is not the machine range and calculable price alone that have made ARBURG to a First Source Supplier.

First-class service the key factor

TRW Automotive places particular attention on machine servicing. Accordingly, mutual agreements are in place between TRW Automotive and ARBURG with regard to spare parts and maintenance. "A first-class global service and support are key factors in order to operate successfully on the world markets," is the consensus reached by Thomas Türp, Manufacturing Engineering OSS, and Michael Arzt, Commodity Manager Indirect Materials and Logistics. From consulting through to maintenance, TRW feels well looked after by ARBURG – ideal prerequisites for a continuing, long-term successful co-operation.

TRW Automotive produces a wide range of components for around 250 different vehicle models (bottom photo), e.g. rain/light/humidity sensors (top photo).

INFOBOX

Founded: 1901

Plants : 185 world-wide, eleven production sites and seven technology centres in Germany

Employees: More than 60,000 of which 10,700 in Germany

Turnover: 16.2 billion US dollars (12.4 billion euros) in 2011

Machine fleet: Around 800 injection moulding machines, more than 300 of which are ALLROUNDERS

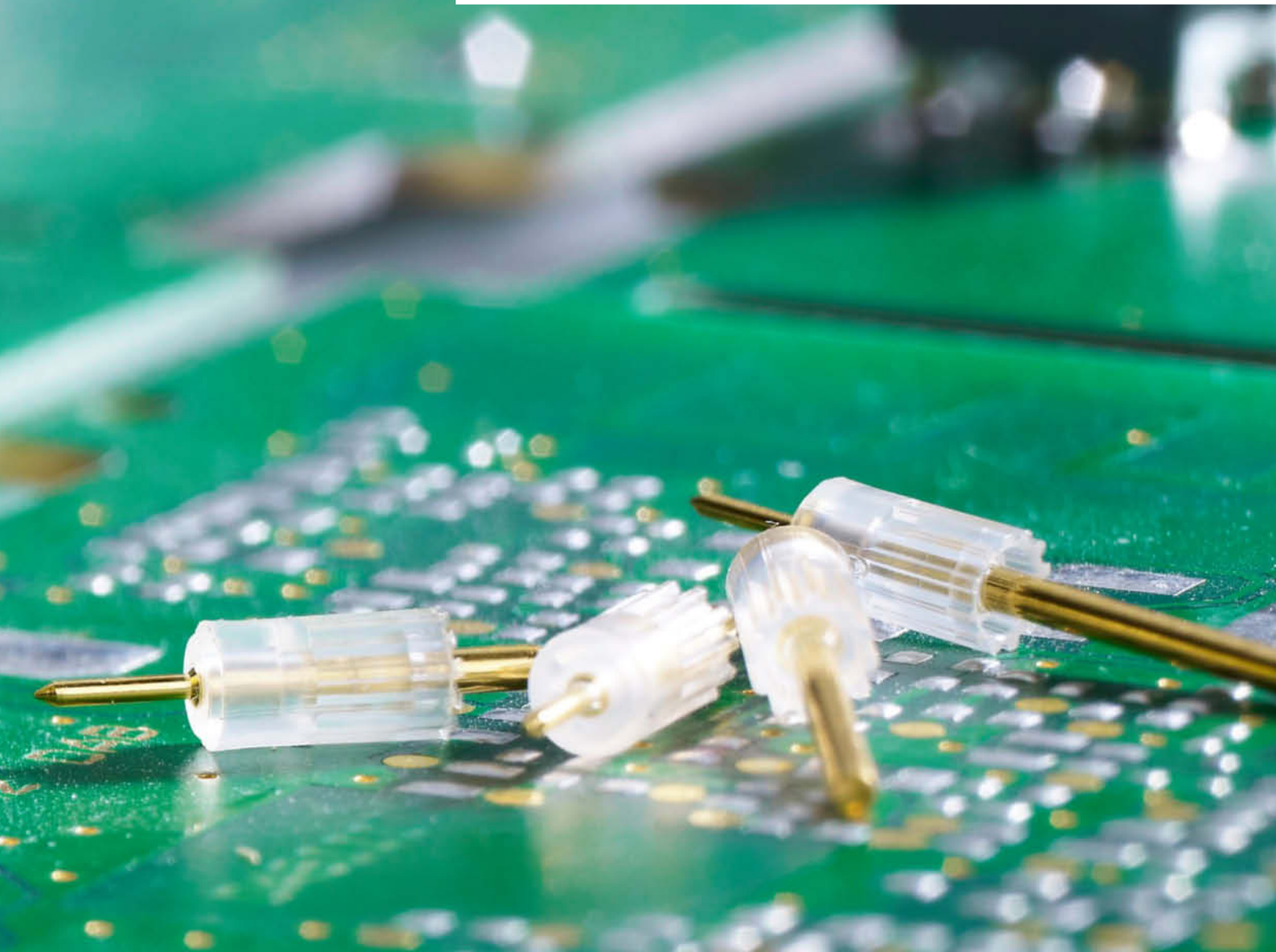
Products: Active and passive vehicle safety systems, steering and brake systems, electronics, occupant protection systems, engine components and fastening systems

Contact: www.trw.com



16 pins insert

Lautertal Plastic: Automated overmoulding





The overmoulded pins, so-called internal conductors, are used on printed circuit boards (photo on left). During production, the robotic system transports the pins from the feeding device to the mould, removes the finished parts and transfers them to the tubular distribution system (top photo).

ed per cycle

of up to 72,000 internal conductors per day

Lautertal Plastic GmbH mainly produces plastic parts for the automotive industry. In order to win a major contract for internal conductors, a new fully automated solution had to be found. Managing Director Wolfgang Goller and Operations Manager Ingo Schöllhammer ultimately opted for the ARBURG concept. Since recently, they have been operating a production cell built around a hybrid ALLROUNDER 370 H, which is capable of encapsulating up to 72,000 parts per day thanks to high-speed peripherals.

The decision to set up an in-house injection moulding shop, today Lautertal Plastic in Münsingen, came about rather fortuitously for parent company Heideker 48 years ago – through a company out- ing for plastic processors, an empty bus garage and animated discussions during the trip. This is because Heideker was originally a bus company that was open to new business segments. “Today, we produce with 24 employees in several shifts, for bus manufacturer EVOBus among others. For reasons of quality and capacity utilisation, we increasingly

rely on fully automated systems,” says Wolfgang Goller, Managing Director of Lautertal Plastic.

High-performance concept for overmoulding pins

The company’s product portfolio includes internal conductors for Fakra connectors used in the wiring of e.g. GPS, GSM and radio for cars. During the conception phase for the efficient production of these components, the company approached various suppliers with a defined cost framework and the idea of fully automated, high-volume production. “We wanted to produce the inserts, pins made from gold-plated brass in two length versions, in high unit volumes on a 16-cavity mould from Erz in a cycle time of around 20 seconds,” says Wolfgang Goller describing the basic prerequisites. Implementation was largely in the hands of the injection moulding machine manufacturers invited to tender. In the end, the ARBURG concept impressed the most.

“During the planning phase, all those involved sat down around a table. Everyone had a chance to speak and the pros and cons were deliberated,” is how

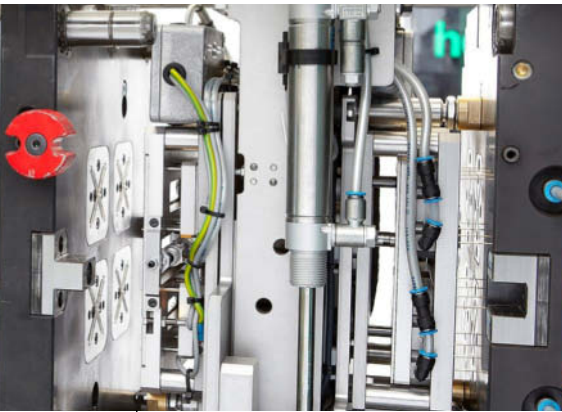
Wolfgang Goller and Operations Manager Ingo Schöllhammer describe the process. “At the end of the day, this resulted in a high-quality and high-performance production cell.” As a systems supplier, ARBURG assumed responsibility for the entire system, including the peripherals. A central contact person is available for all questions and problems.

HIDRIVE for speed and precision

The production cell is built around a hybrid injection ALLROUNDER 370 H, the electric clamping unit of which permits short cycle times. Precise injection is assured by a position-regulated screw and electro-mechanical dosage drive. A shortened 15 millimetre screw minimises material dwell times. The pins, in versions with a length of 10 or 16 millimetres, are overmoulded with 0.07 grams of a special polypropylene. The PP is cross-linkable in order to increase its temperature resistance. This is because the internal conductors are subsequently irradiated and soldered onto circuit boards at a temperature of around 260 degrees centigrade. In addition to the vertical MULTILIFT V robotic system, the peripherals are also in-



Managing Director Wolfgang Goller (left) and Managing Director Ingo Schöllhammer operate the fully automated system around the clock.



The gripper system precisely inserts the delicate pins into the mould and removes the finished, overmoulded pins (photos above).

egrated in the central SELOGICA machine control system. "The complex system is simple to operate," says a satisfied Ingo Schöllhammer. "ARBURG programmed the sequences for us and then trained the machine operators on our application."

Gripper performs simultaneous removal and insertion

The key challenge here is the reliable and positionally accurate insertion of 16 pins per cycle into the mould. The feeding device was designed by Hörmlle: two vibrating spiral conveyors separate the bulk goods and feed the pins to a Scara robotic system, which transfers them one-by-one to a provisioning device. The part length is optically checked in a fraction of a second during the process. As soon as all the pins are in a horizontal position, the vertical MULTILIFT V robotic system docks onto the insertion module of the gripper (made by Kiki). The pins are pressed into the bores provided and held in place by

vacuum. The robotic system then moves vertically into the open 16-cavity mould, where it is centred. Forked photoelectric sensors ensure that no pins are left on the nozzle side.

On the ejector side, the finished parts are first pushed into the 16 cavities of the robotic removal module and held in place via a locking plate. Simultaneously, the insertion module on the opposite, nozzle side, inserts the pins into the bores. A vacuum applied to the mould ensures that the pins remain in position.

During vertical extension of the robotic system, photoelectric sensors check that all 16 pins are inserted and, if the number is correct, transmits an OK signal to the SELOGICA control system. The injection moulding process can then begin. In the meantime, the finished parts are ejected according to the cavity pattern via a tubular distribution system and the next 16 pins are provided. This process allows Lautertal Plastic to produce up to 72,000 parts a day.

Version changeover in 15 minutes

The same system and mould are used for both part versions. "When switching to a different length, all that has to be changed are two flat bars. After around 15 minutes, the system is running smoothly again," explains Ingo Schöllhammer. As it is very difficult to distinguish between

the two pin versions with the naked eye, the correct lengths are verified via a camera system during the ongoing injection moulding process.

Lautertal Plastic generally places great emphasis on preventive maintenance and service. The responsible service technician makes regular visits and also keeps up-to-date by regularly attending training courses at ARBURG.

"The fully automated system of internal conductor production is in permanent use here and operates in a very stable manner," says Wolfgang Goller. For 2013, Lautertal Plastic is planning a total production volume of 12 million units.



INFOBOX

Founded: 1964 by Reinhold Heideker

Plant: Münsingen, Germany

Production area: Approx. 2,600 m²

Employees: 24

Machines: 20, of which 9 are ALLROUNDERS with clamping forces from 300 to 2,000 kN

Products: Primarily technical inserts and multi-component parts for the automotive (70 percent), electronics and aquaristic industries.

Contact: www.lpm.de



Special package

Packaging industry: "Packaging" versions and expert support

ARBURG offers a complete package for the packaging industry: adapted machine technology for electric and hybrid ALLROUNDERS in the "Packaging" version and experts who use their extensive experience in customer consulting for optimum solutions. In the interview below, Andreas Reich and Reiner Schmid explain the offerings.

today: What requirements does injection moulding technology have to meet for the packaging sector?

Andreas Reich: For this sector, fast, high-quality, volume production that is also reliable and energy-efficient is important. Here, with our electric ALLDRIVE and hybrid HIDRIVE machines in the new "Packaging" version, special technology is available that combines high productivity and low energy requirements. These ALLROUNDERS are identified by the letter "P" after the machine designation.

today: What are the special features of these machines?

Reiner Schmid: First of all, adaptation of the combination between "distance between tie-bars/clamping force/opening stroke" to suit packaging applications. For the "Packaging" versions, this results in clamping forces of 1,800, 2,300, 2,900, 3,700 and 4,600 kN with the appropriate, larger injection units. Servo-

electric dosage drives in conjunction with position-regulated barrier screws enable high plasticising capacities as well as short injection times. Torsionally rigid machine bases, FEM optimised mounting platens and servo-electric toggle-type clamping units with energy recovery ensure fast movements and low masses to achieve energy-efficient operation.

today: Are special equipment features available for the production of thin-walled items or closures?

Reiner Schmid: Beyond the basic equipment of the "Packaging" machines, there is, for example, the preparation for connecting an external IML or other removal system for the production of thin-walled items. Extension of the robotic interface for entry during mould opening is included. Freely programmable ramps for the hydraulic ejector and valve clusters with large cross-sections for rapid actuation of pneumatic functions complete the equipment features.

For the production of closures, for example, a servo-electric ejector with a booster function for synchronous, powerful ejection and increased screw circumferential speeds are also available. Important additional control functions are always included with our machines. These enable, for example, the fast, controlled production start-up of multi-cavity moulds with few reject parts.

"The 'P' designates ALLROUNDERS in the 'Packaging' version," explain packaging experts Reiner Schmid and Andreas Reich (from left to right).

today: And what decision-making aids can ARBURG offer its packaging customers?

Andreas Reich: "As is customary, we combine our comprehensive technology with expert consulting services. In addition to application technology support, we also provide our customers with assistance in the planning of complete systems, commissioning, CE certification and competent support world-wide. These services are ensured reliably and rapidly by our Packaging team, which comprises both sales and engineering personnel. Just as the industry has come to expect from us.



Powder mould

PIM competence: 50 years of injection mo

Whether for automotive engine valve actuation systems, components for smartphones or grinding rings for coffee machines – compared to conventional machining processes, the injection moulding of metal (MIM) or ceramic (CIM) materials offers far greater possibilities in terms of part design. This is because, with powder injection moulding (PIM), complex parts with internal threads, gearings or undercuts can be produced efficiently and cost-effectively in high volumes. This year, ARBURG is celebrating 50 years of PIM competence.

Back in 1963, an ALLROUNDER C4/S belonging to German company Feldmühle produced the first PIM part – a geometrically complex pigtail thread guide for the textile industry. Instead of plastic granulate, an injectable moulding material made from ceramic powder and a thermoplastic binder were used. This feedstock was developed in-house by Feldmühle. In the subsequent years, demand for machines



suitable for powder injection moulding grew continuously.

ARBURG develops PIM expertise in a targeted manner

The processing of powder materials gained further impetus when BASF introduced feedstocks at the end of the 1980s and Hoechst launched a binder system onto the market. During this period, ARBURG also developed its process expertise in a targeted manner. This began with an external consultant who created feedstock recipes for ARBURG customers. In order to actively enhance the process and the entire process chain, the management team decided to create an in-house PIM laboratory. Together with the binder sup-

Over the past five decades, a wide variety of PIM products have been produced on ALLROUNDER machines: e.g. milling cutters, thread guides or parts for the Millennium locomotive from Märklin (photos above).

plier, customer-specific feedstocks were developed and the injection units were adapted to the increased PIM requirements. For this purpose, suitable materials and geometries were tested and identified. Today, an ALLROUNDER 270 S with PIM equipment, for example, is available for customer testing purposes. Upstream and downstream production steps such as material preparation, debinding, sintering and part analyses





ded into shape

Building of metal and ceramic components on ALLROUNDERS

take place in the modern PIM laboratory. This is equipped with a shear roller extruder, debinding systems, sintering ovens and a device for simultaneous thermal analysis etc. Consequently, all the process steps can be tested under practical conditions.

The product range, which is produced on ALLROUNDERS, extends from micro gear wheels with an external diameter of 1.4 millimetres to ceramic cores weighing up to two kilograms for stationary gas turbines. In 1992, the first two-component PIM part was a hard-metal milling cutter with an internal thread made from materials with a cobalt content of six and twelve percent.

From spectacle hinges through to coffee machines, PIM is present

Today, PIM parts can be found in many everyday items, including watches, spectacles, smartphones, HID bulbs and orthodontic braces. One significant advantage of the PIM process is its suitability for high-volume production.

For example, intermediate levers for an automotive valve actuation system for BMW engines in unit volumes of five million per year are produced on ALLROUNDERS. However, exclusive solutions have also been implemented, like the Millennium edition "Krokodil" model engine with a platinum chassis from Märklin. For this product, micro parts such as ceramic insulators, stainless-steel wheels and titanium con-rods were produced using PIM.

"Today, we work with virtually all the powder processors and established research institutes world-wide," says Marko Maetzig, responsible for further development of the PIM process at ARBURG. "With our extensive know-how, we can advise customers across the entire value-added chain," adds his colleague and PIM Applications Technology Consultant Hartmut Walcher. The PIM team around Hartmut Walcher,

Marko Maetzig and Uwe Haupt give presentations on current developments and trends at conferences and is present with inno-

The ARBURG PIM team (photo above) comprising Marko Maetzig, Hartmut Walcher and Uwe Haupt (right to left), provide consulting to customers, including on material selection (photo below).

vative solutions at trade fairs. Moreover, the ARBURG PIM Newsletter, which is available for subscription on the Internet, provides information on current topics.



Perfect closure

FM-Plast: "Efficient Closure System" for high

The fact that what counts at FM-Plast GmbH are high unit volumes is evident as soon as one arrives on the factory yard. A 40-tonne truck is just filling the huge production silos with plastic granulate. The equally important emphasis on expertise and quality are soon also revealed in conversation with Managing Partner Karsten Bergmann and Managing Director Thomas Lübbering. ARBURG provides assistance here in its role as long-standing machine supplier.

Just how much the company relies on ARBURG injection moulding technology is revealed by the absence of any other machine manufacturers at their production facility since 1 January 2012. Since the inception of their corporate activities, ARBURG has always worked extremely closely with FM-Plast. Today, the company is one of the European market leaders in the closure and closure system segments for the private label industry. However, FM-Plast also enjoys a strong position in the branded goods industry. For example, German company Dr. Beckmann uses child-safe closures on its popular "Fleckenteufel" stain remover.

"Efficient Closure System" philosophy

The term "Efficient Closure System" refers not only to the products manufactured at FM-Plast, but especially to how they are produced. Here, there are strong parallels with ARBURG, upon which recent machine purchases by FM-Plast are largely based. Karsten Bergmann explains: "We introduced the Efficient Closure System in order to achieve maximum efficiency and an optimal balance between performance and price in all business segments. This requires high standards across the entire value-added chain. Consequently, we not only examine efficiency in terms of costs and projects, but also in terms of production, logistics and in the energy sector."



Foto: FM-Plast

High-quality closures (photo on right) demand high standards: thanks to their product-specific configuration, the ALLROUNDERS at FM-Plast operate highly efficiently (photo above).



es

standards throughout the value-added chain

Thomas Lübbering adds: "In production, for example, we offer our customers very fast cycles and job throughput times, together with mould setup within 24 hours of order receipt, colour changes within 30 minutes, last minute sampling from more than 500 standard colours as well as automated removal and conveyance systems."

High efficiency thanks to ARBURG technology

In order to achieve low-manpower manufacturing of this kind in three shifts, seven days a week, modern injection moulding machines must be used. For this purpose, FM-Plast relies on a total of twelve electric and hybrid ALLROUNDER ALLDRIVE and HIDRIVE machines, as well as two hydraulic GOLDEN EDITION machines with the ARBURG energy-saving system. During selection of the right machine, ARBURG provided in-depth support using its cost-effective calculator. Karsten Bergmann has the current figures: "70 percent of our machine fleet is younger than five years old and our hybrid and electric ALLROUNDERS, which achieve a reduction of up to 30 percent in energy consumption measured under the production conditions, ensure that we count among the leading processors in terms of energy efficiency."

This is entirely in keeping with the objectives pursued by ARBURG with its topic of production efficiency. Here too, the aim is to fully exploit the savings potential across the entire value-added chain in order to achieve maximum possible cost-effectiveness in production while also ensuring low unit prices. The fact that such comprehensive approaches reap benefits is not least demonstrated by the innovations that FM-Plast implements for its customers. In this context, an automated production cell built around an electric ALLROUNDER 570 A with a clamping force of 2,000 kN and a size 1300 injection unit was constructed with the aid of ARBURG. This operates with a 24-cavity mould and enables the injection moulding, unscrewing and removal of closures with a four-turn thread in a cycle time of only six seconds.

In future, FM-Plast will continue to work strictly according to its "Efficient Closure System" guidelines. This includes investment in three further hybrid and electric ARBURG machines and, in 2013, the purchase of an ARBURG host computer system in order to centrally monitor the operating data for production management purposes. The ARBURG field service, as well as the development and applications technology departments were singled out for particular praise by FM-Plast: "The field service is fast, efficient and technically well versed. The development work carried out jointly

in Lossburg has repeatedly culminated in perfect results that fit seamlessly into our philosophy. Together with their service staff, which we use jointly with our own maintenance department to perform preventive maintenance, we have a situation," state Bergmann and Lübbering unanimously, "that couldn't possibly be better for an SME (small and medium-sized enterprise)."

INFOBOX

Founded: 1977 in Lennestadt

Employees: 70

Products: High-quality plastic closures, including tamper-proof caps with tamper-evident bands manufactured using single and two-component, multi-cavity injection moulds as well as automated assembly.

Machine fleet: 44 ALLROUNDERS as well as central material feed and packaging provision

Quality assurance: In-house Quality Matrix System according to ISO 9001:2008

Contact: www.fm-plast.de





Excellence in

Plastics Industry Awards 2012: Joint John Guest and ARBURG

In the United Kingdom, a joint project between John Guest Ltd. and ARBURG Ltd. has succeeded in winning one of the coveted and prestigious "Plastics Industry Awards" for 2012. Trade magazine *Plastics & Rubber Weekly* awards these prizes in 15 different categories for excellence in the field of plastics design and implementations. The entry by John Guest and ARBURG was recognised for multiple savings with regard to energy efficiency, cycle times, use of materials and waste in the manufacture of a complex technical part.

The two companies look back on many years of successful co-operation. This must have always worked very effectively over the years when a customer assures its machine manufacturer that, "... we've never regretted the decision made in 1982 to purchase ARBURG machines exclusively. In fact, it was one of our best business decisions..." Thirty years have passed since the purchase of the first ALLROUNDER, a 220 H with a clamping force of 350 kN and the legendary HYDRONICA micro-processor control. Since then, more than 143 further ALLROUNDERS with clamping forces of between 250 kN and 1,300 kN have been added to the company's fleet. The two companies are today linked by a

comprehensive partnership which also extends to the areas of consulting, solutions for complex production tasks and spare parts management. The companies have a great deal in common: both are family-run companies which stand for top quality in manufacturing and which invest a great deal in the areas of research, development and training in an effort to always be one step ahead of the competition.

Prize-winning performance

The objective of the project that obtained the Plastics Industry Award was the production of a complex Speedfit connector under extremely tight tolerance specifications.

Conventional series production resulted in an unacceptably high number of reject parts. Previously, production had taken the form of a multi-stage process to which further automated and manual processing and assembly steps were added. The part geometry meant that a separate screw-out operation was required after injection moulding in order to ensure that the parts functioned correctly. However, this step proved to be both complicated and costly, as a great deal of material was wasted and the manufacturing process was prolonged. Moreover, the original sequence – which involved making a groove in the

moulded parts, an ultrasonic welding process and subsequent two-stage assembly etc. – lasted a total of 64.75 seconds.

Greater production efficiency through step-by-step analysis

Step-by-step analysis of the entire production process in co-operation with ARBURG yielded numerous benefits: modification of the mould design and the use of a high-precision electric unscrewing unit enabled fully automated production to be achieved without compromising on quality, as well as dispensing with the downstream unscrewing operation. The rotational precision of the electric unscrewing unit is 0.001 millimetres. This also enabled savings in injection and cycle time and consequently in energy consumption.

Furthermore, the ideal solution was found by means of a comparison between electric, hybrid and hydraulic machine technology and selection of an injection unit suitable for the production task and featuring a position-regulated screw. Here, a hybrid ALLROUNDER 370 H with a clamping force of 600 kN and a size 170 injection unit offered the best price/performance ratio in terms of reliability, repeat accuracy, quality and energy efficiency.



Foto: John Guest

efficiency

project saves time, energy and material

The close co-operation between the companies included a personal meeting (photo on right) between John Guest (right) and ARBURG Partner Eugen Hehl.



During the prize-giving ceremony (top left photo) Julia Moore, Chief Executive GTMA, presented the award to Colin Tirel (left), Managing Director of ARBURG Ltd. John Guest produces exclusively using ALLROUNDERS (top right photo).

Savings in the order of a two-digit percentage value

Optimisation of the entire production process – including very rapid, simultaneous part cycles – resulted in a three-step production process with a duration of only 40.2 seconds. The savings are evident: the cycle time was reduced by 15 percent, material consumption by 11 percent, the production time by 38 percent and the energy requirements by 49 percent, thanks to the hybrid technology. The assembly was successfully semi-automated.

Delivery of the four HIDRIVE machines was followed by an intensive training phase for operators to ensure that the best levels of machine utilisation and performance were achieved. In the case of the John Guest project, process analysis according to the ARBURG production efficiency model – from design and technology through to production planning – obtained precisely the desired result: optimum cost-efficiency through maxi-

mum productivity at minimum operating costs. John Guest was thus able to maintain production in the United Kingdom as well as delivering on its quality pledge to its customers.

The decision-makers at John Guest were also so impressed with the performance of the ALLROUNDER HIDRIVE that they ordered six more of these machines to replace older models in production.

INFOBOX



Founded: 1961

Employees: Over 1,000

Products: Fittings, valves and plug connections

Industries: Heating and plumbing, drinks technology, compressed air and pneumatics, automotive and machine construction, as well as special applications

Plants: Production locations in West Drayton/United Kingdom

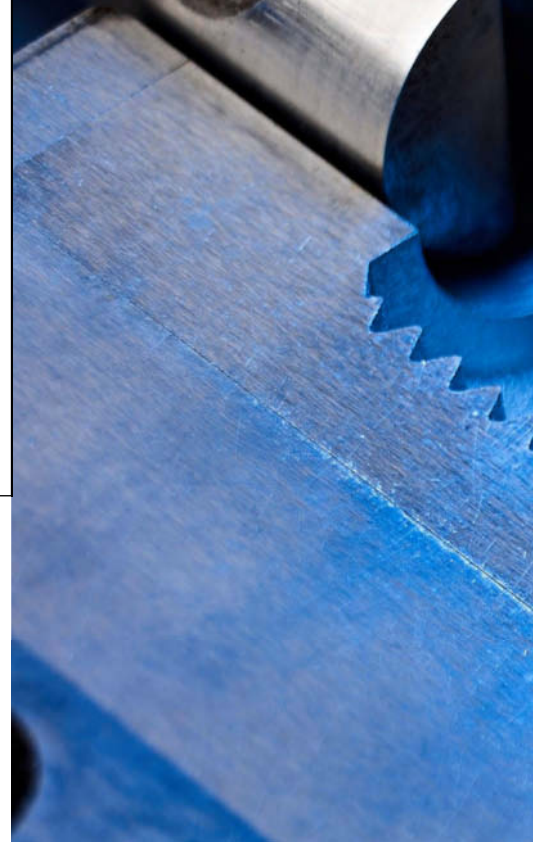
Certification: ISO 9001 and ISO 14001 as well as national and industry-specific marks of approval

Contact: www.johnguest.com



TECH TALK

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



Turning it on

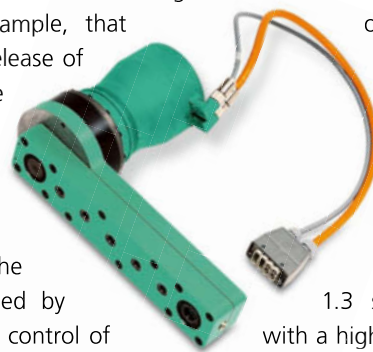
Greater efficiency for mould functions through servo-electric

Finding the most efficient and therefore the most cost-effective drive technology is no longer restricted to the machine itself. A detailed comparison of the available alternatives is also worthwhile in terms of the mould functions. Here, servo-electric drives offer impressive advantages, particularly when it comes to rotary motions: autonomous design, simple set-up, high-precision, position-regulated sequences and short cycle times.

A good example is the demoulding of threaded components. There are massive differences between the various drive concepts, even with regard to the basic design of the mould. Whereas hydraulic unscrewing devices are directly integrated into or mounted onto the mould, servo-electric solutions can also be implemented as external drive elements. This can simplify mould installation and use on smaller machines.

More flexible adjustment of movements

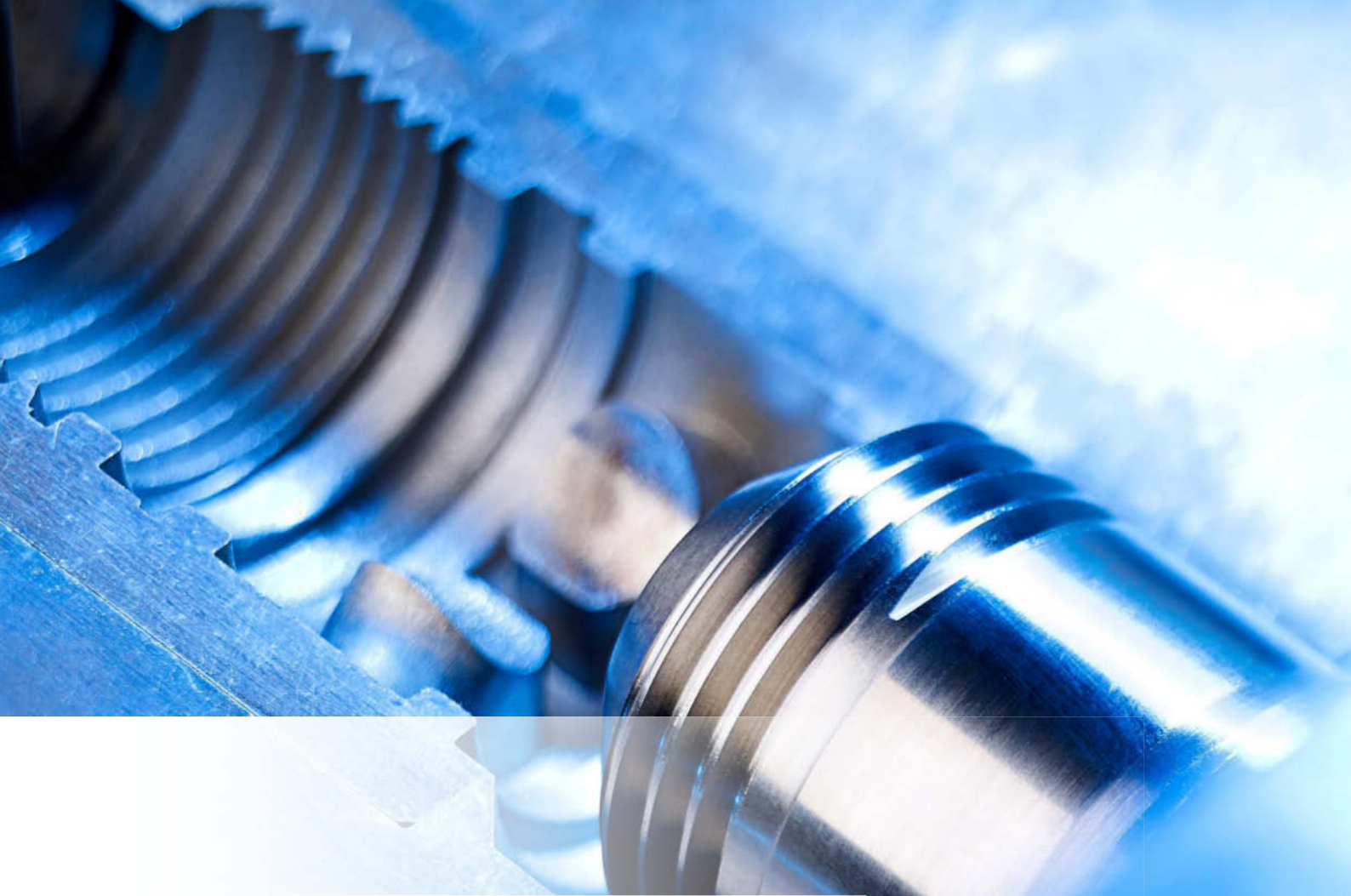
Furthermore, servo-electric drives offer significantly greater scope for process optimisation. The precise position of the threaded cores is known at all times. Acceleration and braking ramps ensure smooth movements which protect both the mould and the part. Torques, rotational speeds, revolutions and positions can be freely programmed in various stages. This means, for example, that intermittent stops, release of the thread with the mould closed or continuous rotation can be implemented with ease and precision. The basis here is provided by the electric core pull control of the SELOGICA control system. The relevant demoulding sequence required can be set individually via dedicated



screen pages and integrated into the production sequence. All entries are saved to a common data record, meaning that mechanical adjustments on the mould can be dispensed with.

Fast and precise rotation

A number of factors, such as higher rotational speeds and superior repeat accuracy also speak for the use of servo-electric drives in favour of hydraulic ones. These advantages can be decisive, for example in the case of rotary units for multi-component moulds. Premoulded parts, for example, can be rotated from one station to the next around 1.3 seconds faster on average, with a high degree of process reliability. Controlled acceleration and braking ensure very even, smooth and consequently low-wear rotation of the mould, despite



drives

the higher dynamics and speed. Moreover, the servo-electric rotary units operate independently of the machine movements. Together with the flexible options for process settings and optimisation, shorter cycle times are virtually pre-programmed. Savings totalling up to 20 percent in comparison with hydraulic rotary units are not uncommon.



consequently restrict the available mould installation space and can be used for a variety of moulds.

Moreover, servo-electric indexing and rotary units are low-maintenance, ideal for use in clean rooms and can be seamlessly integrated into electric machine concepts.

The ARBURG servo-electric unscrewing and rotary units (photos on left and right) permit controlled, high-precision rotary motions. Threaded cores in the mould (top photo) can thus be demoulded in a part-protecting manner.

Technological edge included

With servo-electric drives, a technological edge can also be gained, as the example of so-called indexing units demonstrates. These systems, which are specially designed for rotating mould platens or inserts, can also be integrated into the moving mounting platen. They do not



High performance counts! 7.3 million cycles per year on an ALLROUNDER HIDRIVE: performance becomes high performance. This is what really counts in the packaging sector. Whether it's yoghurt tubs or closure caps. At the end of the day, production efficiency alone counts. This is precisely what we offer you. ARBURG for efficient injection moulding!



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