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# innovations

Technics – Marktes – Trends

Volume 8 – 4/2014



**be smart**

**Battenfeld**



**WITTMANN innovations (Volume 8 – 4/2014)**

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# Editorial



**Michael Wittmann**

Dear Reader,

A German contest promoting non-smoking school classes is advertised with the slogan *Be Smart – Don't Start*. The initiators want to motivate school students not to start smoking in the first place. An endeavor which needs no explanations, since we have all been familiar for a long time with the consequences of tobacco consumption, which also place a financial burden on public healthcare. Extra costs are invariably incurred wherever people smoke. And smoking habits acquired early in life are hard to kick. So in this case, *Be Smart* stands for an appeal to refrain from doing something harmful.

By contrast, the slogan *be smart* on the cover of this issue of *innovations* encourages people to approach things from the right angle: *be smart* was our motto for the Fakuma 2014, announcing the arrival of our *SmartPower*, the latest addition to the injection molding machines of the *PowerSeries*. Following the successful launches of the *EcoPower*, the *MacroPower* and the *MicroPower* machine, the *SmartPower* comes to the market recommending itself primarily by the “smart” way it uses energy. With its servo-hydraulic system and clamping forces of up to 120 t, this series meets every expectation in terms of efficiency and compactness.

This also applies in a similar way to our other “smart” innovations. For example, the new robot series *W8 pro* with decentralized drive technology has been extended by adding the larger models *W842 pro* and *W843 pro*. In the *W8 pro* series, the servo modules have been placed even closer to the drive system, which constitutes a further step in optimizing the wiring layout and the dimensions of the drag chains. Energy-efficient appliances can also be found in the areas of temperature controlling, drying and material loading.

The new *FLOWCON plus* flow regulator deserves special mention. With the precursor of this model's predecessor, WITTMANN already made its debut in the plastics processing market in 1976. Continuously improved, this flow regulator series has now established itself as the benchmark in the European market. At the Fakuma 2014, we have presented the latest stage of its development. The *FLOWCON plus* offers all functions of the original design, but has been extended to include individual regulation of both temperature and flow volume as well. In this way, we pursue our goal to make our appliances constantly more “intelligent” with the *FLOWCON plus*, too, which means once again more user-friendliness.

Maximum efficiency, from the machine all the way to flow regulation, and all of this integrated in one central control system, this was and still is the objective of our work.

Sincerely, Michael Wittmann

# Content

## Injection Molding

### Opening up efficiency reserves



**Reinhard Bauer** describes the efficient Magna production in Klagenfurt. **Page 4**

### The HiQ Shaping technique



**Martin Philipp-Pichler** on the method of extended injection embossing. **Page 6**

## Entire Systems

### A showcase of expertise



**Fabien Chambon and Dominique Colbrant** on the Procopi production. **Page 8**

### Perfect material management



**Walter Klaus** visited SLM-Kunststofftechnik in Oebisfelde. **Page 10**

## Automation

### Reaching more productivity



**Muzaffer Engin** tells the success story of STAR PLASTIK in Istanbul. **Page 11**

## Tempering

### Cleaning of cooling channels



**Christoph Schweinberger** on the use of TEMPRO plus D units at DELPHI. **Page 12**

## News



Open House in the USA. **Page 14**



10,000<sup>th</sup> robot of the W8 series. **Page 14**



# Opening up efficiency reserves: He who seeks shall find

*That "standard" injection molding is not necessarily a boring, routine process without any potential for improvement is the conclusion one comes to after a visit to the Klagenfurt subsidiary of the Magna group of automotive suppliers. There, a team of engineers has scoured the production system for efficiency reserves. Their key focus was on the comparison of efficiency between two machine systems with differing proportions of servo-electric drive technology. The WITTMANN BATTENFELD EcoPower had the winning edge. Five to eight per cent gain in cycle time, lower energy consumption and a good price-performance ratio tipped the balance in its favor.*

**Reinhard Bauer**

*The injection molding shop is almost entirely equipped with hybrid machines from several different brands with varying technical concepts. Their most prominent distinctive features are the varying proportions of direct electric drives and indirect hydraulic drives.*



Photos:  
Reinhard Bauer

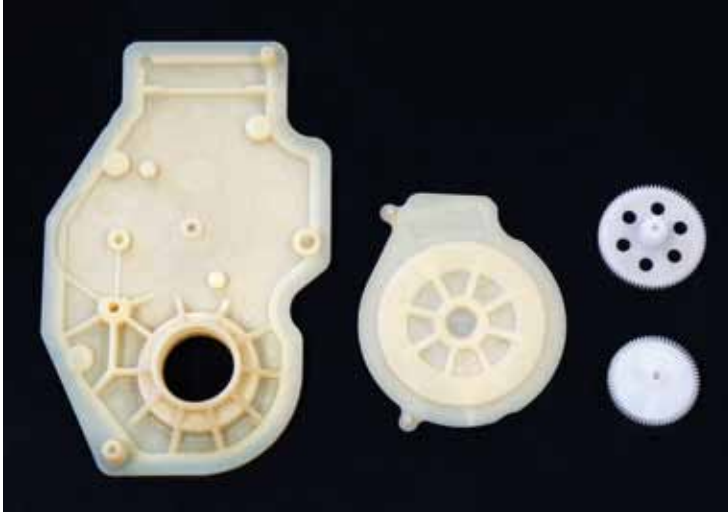
**H**ousing parts and gearwheels for stepping motors are manufactured in the injection molding shop of the Klagenfurt plant of Magna Auteca AG, which was constructed in 2008. The high technical standard of the parent company was scrupulously maintained in the original installations for Magna Klagenfurt's injection molding department. This means that production began with hybrid injection molding machines equipped with hydraulic, tiebarless clamping units and injection units with servo-electric drives.

All machines were designed for fully automatic, continuous unmanned operation. To this end, all machines are equipped with a parts stacking system, which has sufficient capacity to separate and stack the molded parts from multi-

cavity molds. The parts transfer between the mold and the stacking system using a linear robot, which passes the molded parts on to the separating device. That device's main component is a pipe system whose number of pipes is equal to the maximum number of cavities of the molds in use, e.g. 8-cavity molds. It transfers the parts to individual parts stacking units in the form of product bags. To maximize the amount of unmanned operation, the parts stacking unit is designed as a "twin configuration", which means that two identical separating stations are placed directly side-by-side within the robot's operating range. As soon as stacking unit number one holds a pre-set number of parts, the system automatically switches over to the ejector position for stacking unit number two.

For final release of the production batches, which have been separated according to cavities, for downstream processing, Magna uses an SPC (Statistic Process Control) system with spot checks. Thorsten Lutschounig, responsible for application technology and product quality, describes the high quality standards in Magna injection molding production as follows: “Magna sets the bar very high in calculating its reject rate. Our total production quantity includes the

start-up parts, although they are sorted out. This increases our reject rate. Consequently, low reject rates are not only an indicator for the quality and state of repair of the molds and injection molding machines, but also for the ability of the machine technology to reach stable production cycles quickly. Although we had already consistently reached excellent reject rates, we did not want to be satisfied with that. After all, it should be possible to accelerate production still further without having to compromise on quality standards.”



**The all-electric machine – a source of efficiency**

These thoughts prompted Magna to search for alternatives in manufacturing technology. Mario Pföstl, graduate engineer and Head of Injection Molding at Magna Klagenfurt says: “It is clear to us that a continuous cost-cutting process contributes substantially to long-term preservation of a production plant. In short, the next logical step was to address machine technology. We regarded a higher proportion of servo-electric drive components as a promising feature, and with that in mind, we went out and checked the market. We finally settled for the EcoPower machine series from WITTMANN BATTENFELD, which offered a favorable price-performance ratio.” Magna Klagenfurt chose the machine model EcoPower 110/350 (110 tons clamping force, injection unit 350 with a 30 mm L/D 22 screw) combined with a WITTMANN W821 linear robot and the standard parts separating system used by the Magna group.

The EcoPower model just mentioned is an all-electric machine with servo drives for all main movements (clamping unit including the ejector, and metering/injection carried out by the injection unit), which is also equipped with an encapsulated hydraulic component as drive unit for a fast mold clamping system, core pulls and contact pressure for the injection unit.

**Passing the test**

The results of the twelve-month comparison phase speak for themselves, as Thorsten Lutschounig confirms: “Thanks to the machine’s fast servo drives for all main movements and its higher potential for parallel movements, the movement times have been shortened by five to eight per cent, with the mold cooling time remaining unchanged. And this was achieved although the EcoPower with a 110-ton clamping unit competed with a lower clamping force against the existing hybrid machines. A very welcome side effect is that, due to their higher degree of efficiency, the servo drives consume less energy as well. Our ongoing comparative measurements will show us how much that is in terms of actual figures.” ♦

*The Magna plant in Klagenfurt concentrates on the production of drive and housing components for the assembly of stepping motors to operate ventilation flaps in air conditioners, cooling systems and lighting systems.*

*The production cell at Magna Klagenfurt is based on an EcoPower 110 with servo motor drives for all main movements (clamping and injection units) and an encapsulated hydraulic aggregate for ancillary movements (primarily core pulls). Parts handling is taken care of by a WITTMANN W821 linear robot and a pipe distributor station stacking the parts according to cavities.*

*Magna production engineers Thorsten Lutschounig, Michael Hobel, Production Manager Mario Pföstl (center), and Bernd Aigner, WITTMANN BATTENFELD (right).*

*Reinhard Bauer is a freelance journalist and communications consultant specializing in plastics technology.*





# HiQ Shaping – next level injection embossing

*A new process is enabling the efficient production of parts with a constant weight, good shrinkage behavior, excellent surface quality and a low level of internal tension.*

**Martin Philipp-Pichler**

Components with attributes as isotropic as possible are increasingly required by molders. On one hand, this is in order to achieve the best possible surface quality and highest accuracy in shape and dimensions, and on the other hand it is to keep warpage, internal tension and orientation at a low level. Optical parts are particularly sensitive to anisotropy, since internal tension and orientation strongly diminish the optical brilliance due to the effect of birefringence.

This can only be remedied by applying a special form of injection molding: injection embossing. In this special process, the plastic melt is injected into a mold with a pre-defined embossing gap, then shaped by means of a pre-set compression stroke of the mold halves. Here, two different processes are commonly used:

- Complete filling of the cavity.
- Partial filling of the cavity.

Due to the high cooling speed inside the mold, injection embossing of thin-walled components and micro parts is largely restricted to the process with complete filling of the cavity. A compression stroke with partial cavity filling and an already frozen melt front would lead to surface defects and to changes in the internal tension and orientation which should be prevented. Injection embossing is characterized above all by low material shearing and orientation. As the holding pressure is not applied via the gating, but becomes effective across the entire projected surface of the component, this leads to a reduction in sink marks. An improved venting effect due to injection into the open cavity can also be observed. Of course, this also requires a higher amount of capital investment in custom-built molds and a specially adapted process control system.

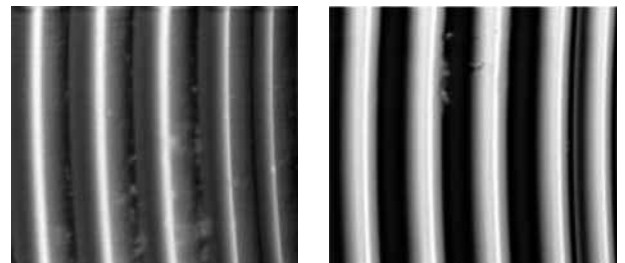
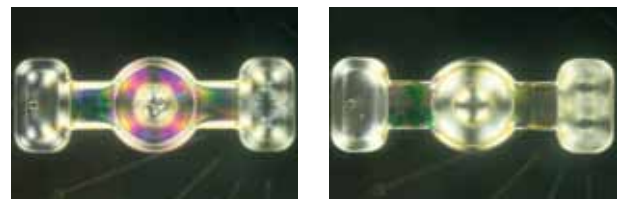
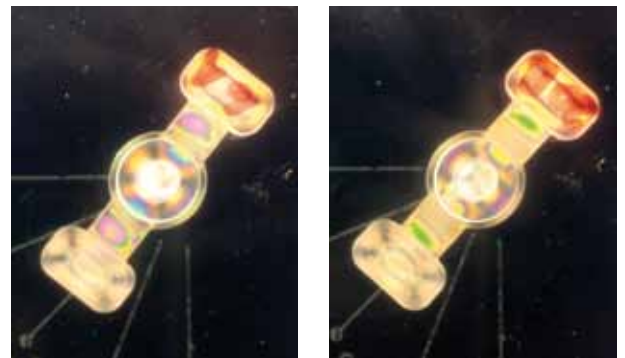
The decisive processing step in injection embossing is primarily the application of the compression stroke. In conventional embossing processes, this stroke is time- or path-controlled, which leads to relatively low precision of the entire process in the area of micro parts, since time and path settings only allow a rigid process without information feedback from the molded part. Information about the thermodynamic states of the material inside the cavity and information feedback from the mold would make it possible to use a process specially adapted to the material processed. In this way, adjustments can be made to the specific behavior of each material during the embossing phase in order to ensure a dynamic, flexible and material-preserving process.



*Trial specimen: Makrolon LED 2045 flashlight lenses.*

*Internal tension and orientation made visible with polarization filters.*

*Birefringence effects and microscope photographs (pictures below) show the deviant qualities when comparing standard injection embossing and HiQ Shaping.*



The micro injection molding department of WITTMANN BATTENFELD has been engaged in developing such a dynamic injection embossing process for some time in order to provide the improvement in quality demanded by the market. Thanks to its flexibility, reproduction accuracy and dynamism, the *MicroPower* machine model serves as an ideal platform for studies and tests in this field.

### The development of HiQ Shaping at WITTMANN BATTENFELD

HiQ Shaping was developed at WITTMANN BATTENFELD under the FP7 EU research program COTECH in close cooperation with Microsystems UK, the Karlsruhe Institute of Technology KIT, the University of Bradford, the Technical University of Denmark DTU and the Department of Microsystems Engineering IMTEK at the University of Freiburg.

For this purpose, a new software was created and adapted to the *MicroPower* injection molding machine. HiQ Shaping is a process in which, similar to conventional injection embossing, the active movement of the clamping unit during injection plays a major part. In this innovative process, the reference input variable, or reference value, is extended by adding temperature and pressures values, which enables specific regulation of the embossing pressure (holding pressure) for every process via the closing stroke. The aim is to apply the embossing pressure to the entire surface of the molded part above the glass transition temperature with

a high degree of dynamism and precision. In this way, a drastic reduction in material tension becomes possible, since the deformation proceeds at significantly lower shear rates.

High dynamism combined with ultimate precision is necessary because micro parts solidify much faster than larger parts due to their small size/thickness, which reduces the time window for the compression stroke to a fraction of the time window of a larger part. Therefore, the viscosity of the melt is automatically taken into account at every stage. Thanks to its extremely rigid toggle design, which permits high precision, the *MicroPower* is able to perform extremely accurate movements of the clamping plates and consequently precise compression strokes.

Where micro structures are involved, the precision of the clamping stroke has an enormous influence on the pressure behavior inside the part. Due to the lower volume and small surfaces, the temperature conditions are much more critical than for larger parts.

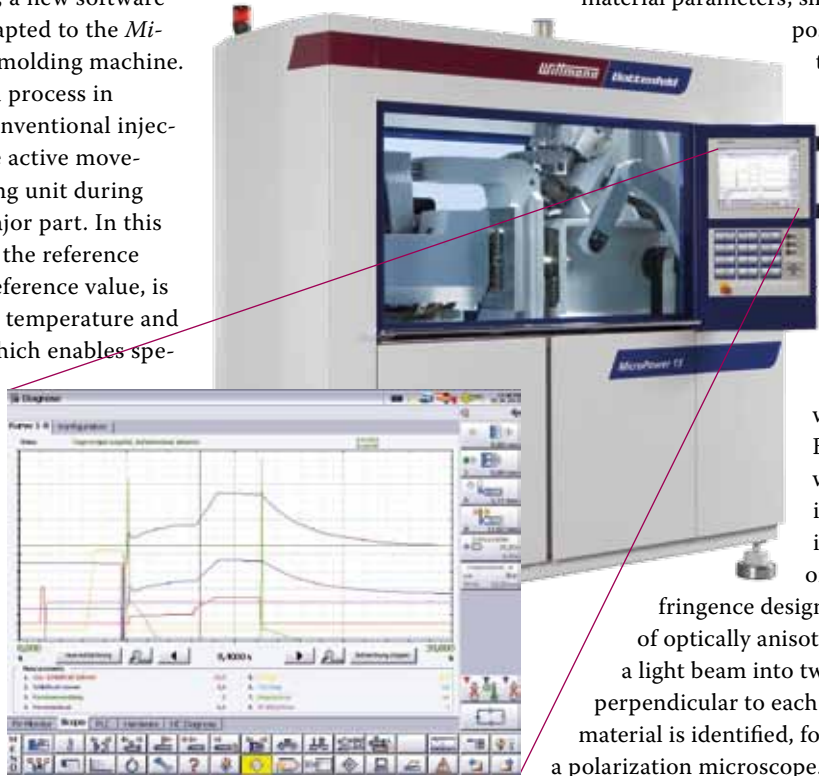
HiQ Shaping is a highly dynamic embossing process which can only be implemented with adequate software, control technology and machine performance. In tests, flashlight lenses were used as exemplary trial specimens, since these require high quality standards for the optical

attributes and surface properties of the molded parts. These lenses were manufactured from the polymer material Makrolon LED 2045, a polycarbonate with extremely high light transmission.

### Significant material parameters

Besides the PVT phase diagram, the effective temperature conductivity,  $\alpha_{eff}$ , and the glass transition temperature, TG, had to be considered as additional important material parameters, since they make it possible to calculate

the actual melt temperature at any point in time and thus make the process controllable in the first place. Specification of the final part dimensions and the desired density were also required. Birefringence effects were used to obtain information about internal tensions and orientations. Birefringence designates the proneness of optically anisotropic media to split a light beam into two beams polarized perpendicular to each other. A birefringent material is identified, for example, by using a polarization microscope. When the specimen is rotated between crossed polarization filters, the light intensity and/or color of a birefringent object will change, while optically isotropic materials show no change in their appearance. Conclusions about the surface quality of parts produced can be drawn by using comparative light microscopy.



the light intensity and/or color of a birefringent object will change, while optically isotropic materials show no change in their appearance. Conclusions about the surface quality of parts produced can be drawn by using comparative light microscopy.

### Summary of results

This new, innovative process makes it possible to produce parts with a constant weight, minimal shrinkage, excellent surface quality and a low level of orientation and internal tension. The following main factors influencing the quality of the molded parts have been established: mold temperature, compression force, and compression time. The tests have revealed that this process yields a higher degree of precision than standard embossing. Moreover, it was possible to reduce the internal tension and thus to achieve a significant improvement in translucency.

Moreover, the cycle times in HiQ Shaping are virtually on a par with those in conventional injection molding and ten times as fast as those in similar variothermic processes. This fact makes the process extremely economical and energy-efficient, as no high capital investment in a complex heating and cooling system for any comparable parts quality is necessary. ♦

*The WITTMANN BATTENFELD MicroPower injection molding machine – ideal for a dynamic injection embossing process. Here with Sscreen view of the UNILOG B6 control for extended injection embossing showing the relevant evaluation of different process parameters.*

**Martin Philipp-Pichler** is MicroPower Product Manager at WITTMANN BATTENFELD GmbH in Kottlingbrunn, Lower Austria.



# Procopi: A showcase of WITTMANN BATTENFELD expertise

*The French Procopi Group is a well-established multi-specialty manufacturer of swimming pool and spa products. The company distributes exclusively to the pool industry, inside and outside of France. Until recently, Procopi's production plant in Guingamp (Brittany, France) was equipped with eight injection molding machines from WITTMANN BATTENFELD, who also supplied all of the peripheral equipment.*

**Fabien Chambon – Dominique Colbrant**

Procopi first contacted WITTMANN BATTENFELD in August 2012, shortly after suffering a fire in its Guingamp production plant. WITTMANN BATTENFELD France SAS was chosen to install eight injection molding machines, all equipped with robots and additional peripheral equipment.

*View of the new WITTMANN and WITTMANN BATTENFELD equipment at Procopi's Guingamp production plant.*

*Samuel Lebigot, WITTMANN BATTENFELD Sales Engineer; Laurent Demougin, Procopi Production Manager; Eric Guimbert, Procopi Technical Director; Fabien Chambon, WITTMANN BATTENFELD Sales and Marketing Director; Jean-Christophe Durant, Procopi Marketing Director (left to right).*

Since that time, WITTMANN BATTENFELD and Procopi have been working together to establish

an entirely new plant for the manufacturing of professional swimming pool and spa equipment. Production began in July 2013, and is now being implemented in a newly constructed building.

## *The Procopi Group*

Procopi has 220 employees and earns a revenue of over 60 million Euros, some 23% of which is export sales. The Procopi Group produces more than 100 brands and 17,000 products for the professional pool and spa industry.

Procopi has three production units located in Brittany in the north-west of France. It is here that the products are designed and manufactured, and from here they are brought to market. "One of our major strengths is having the ability to develop our own production tools," says Christophe Durand, Procopi Group Director of Marketing and Communications. Every piece of plastic used for Procopi's products is designed and made in one of the Group's facilities. The Guingamp plant specializes in mold construction, the manufacture of injection molded parts, and in the extrusion of



thermoplastic materials. This production unit of 11,500 m<sup>2</sup> is equipped with the most advanced injection molding and extrusion techniques available.

Procopi is the only company in this market that makes its own molds. The company is also the only company in the pool and spa market with machinery that enables the



production of any part made from PVC and ABS. These two types of plastics are the most important for many parts needed in pools. Applications include water circulation technology; skimmers, filters, and panels – just to name a few. Procopi is also the only company in the market equipped to manufacture specialty extruded products. The company's design department and quality control is located in Rennes, France.

### *Procopi and WITTMANN BATTENFELD*

The fire that devastated the Guingamp plant in August 2012 destroyed all the injection molding machines, as well as all the robots and injection molds. The building was very



damaged: "Of course, we had the intention to repair our factory and restart the entire injection workshop as soon as possible," says Eric Guimbert, Director of the Procopi Design Department. Procopi took the opportunity to consult with the five largest suppliers of injection molding machinery. WITTMANN BATTENFELD's proposal was

accepted and highly appreciated – particularly with regard to their responsiveness, their pricing, and their quality of service. "From an economic point of view, we thought it very sensible to deal with a single provider for injection molding machines and also robots – firstly, because of the agreed price," says Eric Guimbert. "In addition, the responsiveness of WITTMANN BATTENFELD with regard to the equipment delivery was clearly at the highest level. Finally, we had an added efficiency in that our teams received expert training in equipment relating to just one brand. WITTMANN BATTENFELD accompanying this project was an undeniable asset."

Once the proposal of WITTMANN BATTENFELD was approved in terms of cost, time and preparatory work by Procopi, the project started in mid-October 2012. The WITTMANN BATTENFELD production of the ordered equipment took from December 2012 to March 2013. The on-site delivery of the machines was done in April.

### *The new Guingamp equipment*

This was the first time WITTMANN BATTENFELD France sold a complete plastic injection turnkey system where everything was manufactured by WITTMANN and WITTMANN BATTENFELD.

It also represented the first delivery of a *MacroPower* injection molding machine with a clamping force of 650 tons. In total, eight injection molding machines (five *EcoPower* and three *MacroPower* machines) with clamping forces of 55 to 650 tons were installed.

These machines are now used by Procopi to manufacture plastics parts that range from the size of a coin to that of a vacuum cleaner. Each machine is equipped with a WITTMANN robot (three W818 robots, three W821, one W832, and one W843), a conveyor belt, a temperature controller (WITTMANN TEMPRO basic C90), a material dosing unit (DOSIMAX MC 12), and a FEEDMAX material loader.

The central material drying and conveying system consists of a DRYMAX E 600 battery dryer, and of SILMAX drying hoppers of different sizes (E 600, E 400, E 100, and SILMAX E Compact).

The entire central system is controlled via the WITTMANN M7.3 IPC control. Altogether, the collaboration between Procopi and WITTMANN BATTENFELD turned out to be an object lesson in plastics technology fundamentals and one-stop-shop supply capability.

### *The Procopi benefits*

"We are fully satisfied with the way how the project was implemented. WITTMANN BATTENFELD accompanied us every step of the way throughout the installation. Previously we owned injection molding machines from different brands; now we have a single solution with a single provider," says Eric Guimbert.

"As a consequence our entire production has been streamlined thanks to very significant savings in floor space, and thanks to much more operator convenience. Moreover, productivity gains – that are not yet quantified – are expected. Finally, choosing machinery from just one supplier will greatly facilitate plant maintenance and upkeep." ♦

*Skimmer parts, injection molded on a MacroPower machine from WITTMANN BATTENFELD.*

**Fabien Chambon** is Sales and Marketing Director of WITTMANN BATTENFELD France in Moirans. **Dominique Colbrant** is Marketing and Sales Assistant of WITTMANN BATTENFELD France in Moirans.

# Best scrap prevention and material management

*When SLM-Kunststofftechnik GmbH in Oebisfelde, Saxony-Anhalt in Germany was established in 1998, it started with seven injection molding machines and three employees. Today, 16 years later, the SLM company operates 50 processing machines in five production halls, realizes some 30 million Euros in annual sales and has become a greatly respected supplier by the automobile industry.*

**Walter Klaus**

*Managing Director Thomas Brüsch and Production Manager Gunnar Kasprzyk (from left to right) in the recycling area of SLM-Kunststofftechnik GmbH in Oebisfelde. The left-hand side of the picture shows one of the two MC 46-60 central granulators from WITTMANN. Gunnar Kasprzyk: "We are 100% satisfied with the high performance and reliability of WITTMANN central granulators. We have created a recycling area here, to which our staff deliver all scrap produced as a part of their daily routine – some rejects are placed in lattice boxes, depending on their size."*

**Walter Klaus** works as a consultant and technical writer. Until 2008, he was the Chief Technical Officer of WITTMANN Robot Systeme GmbH in Schwaig, Germany.

**E**conomical consumption of raw materials, which can be achieved both by avoiding mistakes and by systematic recycling, is one of the major factors

that has contributed to the growth of SLM-Kunststofftechnik. As one of its guiding principles for long-term corporate success, this company has focused on efficient material management from the very beginning. A major aspect of achieving such efficient management is reclaiming valuable materials. Logistics also plays a vital part, since intelligent logistic solutions save time and prevent damage in transport.

More production capacity has been added step by step over the years, which has made it possible for SLM to connect the individual production halls directly with the relevant goods depots. In this way, transport paths have been kept short, and open-air transport, with all its possible risks, can also be generally avoided.

Materials are fed to the machinery from eight material silos. A material dryer is stationed in every production hall; after the plastic granulate has undergone the drying process, it is conveyed directly to the individual injection molding machines.

## Targeted use of appliances helps save resources

Highly accurate mold tempering also contributes to avoiding mistakes and consequently to minimizing the production of scrap. Primarily, WITTMANN temperature controllers in the temperature range from 90 to 160 °C are used for this purpose. Here also, maximum saving of resources is regarded as the highest of priorities. This guiding principle is also generally applied to automation, where mostly linear robots from WITTMANN Robot Systeme in Nuremberg are used. Virtually

all of the 50 machines with clamping forces ranging from 35 to 1,700 t are equipped with WITTMANN robots, which come with load capacities from 5 to 35 kg. SLM-

Kunststofftechnik has added extremely gentle handling of injection-molded parts by robots to meet its required standards. In this way, the automation equipment also contributes to virtually 100% of the materials used being processed into high-quality parts which are fit for use.

Various WITTMANN plastics granulator models regrind sprue directly beside the injection

molding machines, or serve, like the two MC 46-60 central granulators installed on the company's production floor, to recycle bulky start-up scrap and rejects. These central granulators have a capacity of 30 kW and come with sound-insulated hoppers and wear-resistant cutting chambers. They can handle a material throughput of 500 kg/h. A dust removal system and downstream metal separator ensure optimal quality of the regrind.

From the total 3,500 t of annual material consumption with a scrap rate of 1.0%, 35 t of plastic material is processed into regrind every year. This material is either returned to parts production or sold to compounders.

## High quality ensures long-term success

SLM-Kunststofftechnik owes its special status as a supplier to Volkswagen, Audi, Porsche, Daimler and BMW to its extremely high quality standards. It is also a system supplier to Rehau, SMP, Faurecia, Magna and several other automotive suppliers.

SLM has won so much renown in the automotive and electrical industries over the years that its production reached a 100% plant utilization level even during the economic crisis in 2008/2009. ♦





# WITTMANN automates STAR PLASTIK

*STAR PLASTIK was established in Istanbul as a family-owned company in 1990 to manufacture coupling elements for roof structures and other auxiliary products for the construction industry. The company holds its ground successfully in a highly competitive market – with help from automation from WITTMANN.*

**Muzaffer Engin**

Through the joint effort of its young, dynamic, customer-oriented team, which continuously and thoroughly researches the market to pinpoint the sector's needs, STAR PLASTIK has emerged as one of the preferred suppliers in this region. Its product portfolio was quickly diversified early on, and the company grew in line with the development of the building construction industry.

To increase its market share further and avoid jeopardizing the important market position it had already gained, continuous investment in innovation was indispensable. Competition had become stronger in the local market, which was also increasingly overrun by lower-priced products of inferior quality.

## *An investment in the future*

STAR PLASTIK decided to make additional investments to increase its efficiency and further improve the quality of its products. At the same time, the running costs had to be reduced, especially those that had been incurred due to poorly skilled labor up to that point. As a result, automation was given priority in planning the next investments. The company proceeded to make inquiries about automation solutions and relevant suppliers from which the greatest benefit could be expected.

"We asked around, and the name WITTMANN was mentioned from numerous directions, so our further inquiries became more focused on just this company," says Haluk Hoşgörmez, STAR PLASTIK's General Manager and CEO. In summer 2011, the time had finally come: the WITTMANN Group was awarded the contract to supply a comprehensive turn-key automation solution for the production of STAR PLASTIK.

A total of 20 robot systems were to be supplied and commissioned by the end of the year. First, in September 2011, an isolated solution was delivered and fitted to only one of the injection molding machines in order to test its functionality over a short period of time. This was successful, and as a result was followed by the production and installation of the other appliances. Towards the end of the year, all robots had been delivered, and installation work had been completed to the extent of 75 to 80%.

## *Expectations exceeded*

"After all installation work had been completed and mass production of parts had been started, we evaluated the move and found that the benefit we derived from the equipment was far greater than expected," explains Haluk



*STAR PLASTIK's production hall in Istanbul. All processing machines are equipped with WITTMANN automation systems.*

Hoşgörmez. "So we decided to also install automation on the two injection molding machines that we had originally planned to continue using without this type of solution. Now all of our 22 processing machines are fitted with WITTMANN robots. Really, we never had any doubts about the quality of these systems, even before the installation. We had already been in this business for many years, and WITTMANN's excellent reputation had always been a given wherever the topic was mentioned among Turkish and foreign companies. What we were probably most concerned about was the question of whether technical support after installation of the equipment might present a few problems, but nothing of the kind has happened in this area either, so our experience with this investment was again entirely positive."

STAR PLASTIK went on to purchase three more robot systems and twelve *EcoPower* 240/1330 injection molding machines as a next step. The acquisition of the processing machines had become advisable, since the company was able to handle more injection molding capacity after the new automation systems had been installed. Once again, STAR PLASTIK expressed complete satisfaction with the new equipment, especially with the productivity and energy efficiency of the *EcoPower*. ♦

**Muzaffer Engin** is the Managing Director of WITTMANN BATTENFELD Plastik Makineleri Ltd. Sti. in Istanbul, Turkey.

# WITTMANN temperature controller cleans cooling channels

*For DELPHI – one of the world's leading automotive suppliers – quality and reliability are the top priorities. DELPHI Automotive Systems Austria GmbH in Mattighofen, Upper Austria, has found a very effective solution for servicing cooling channels in cooperation with WITTMANN, leading to a significant improvement in production reliability: TEMPRO plus D, a temperature controller model from WITTMANN, ensures dry mold inserts.*

**Christoph Schweinberger**

**D**ELPHI Automotive Systems Austria specializes in manufacturing automotive connector systems. The company ranks among the globally leading manufacturers in this segment.

To be able to meet the particularly stringent requirements of the automobile manufacturers, only the most proven technologies, combined with processes designed for efficiency, are applied in the production of connector systems.

As part of the company's relentless search for innovative solutions to improve its processes, plans for optimization in the area of mold set-up and mold maintenance had also been envisaged at DELPHI.

*Laborious manual blowing dry of the molds has now become history at DELPHI in Mattighofen, Austria.*

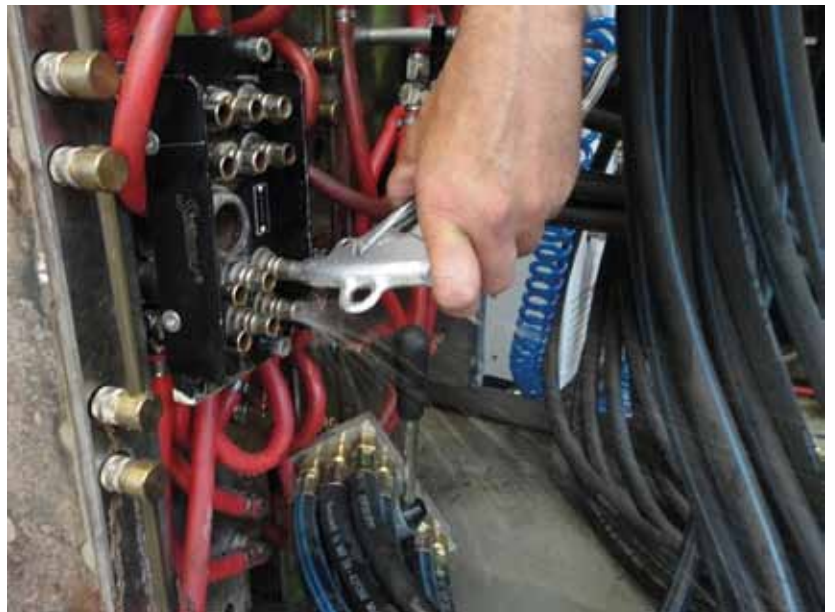
## *Residual water presenting a problem*

In what is known as code conversion, mold inserts are modified without the mold having to be unclamped from the processing machine.

However, high standards of cleanliness in the production process require that the temperature control medium must be emptied out from the mold cavities as completely as possible in the course of this work.

Any residual water remaining in the cooling channels would make it necessary to clean the mold inserts afterwards, and parts of the processing machine as well. Moreover, experience with molds kept in storage has shown that any residual water remaining inside them has led to increased soiling of the sensitive cooling circuits. For systematic prevention of such effects, the molds had to be subjected to an adequate maintenance routine before they could be stored: compressed air had to be blown manually through every individual cooling

*Completely dry cavities.*

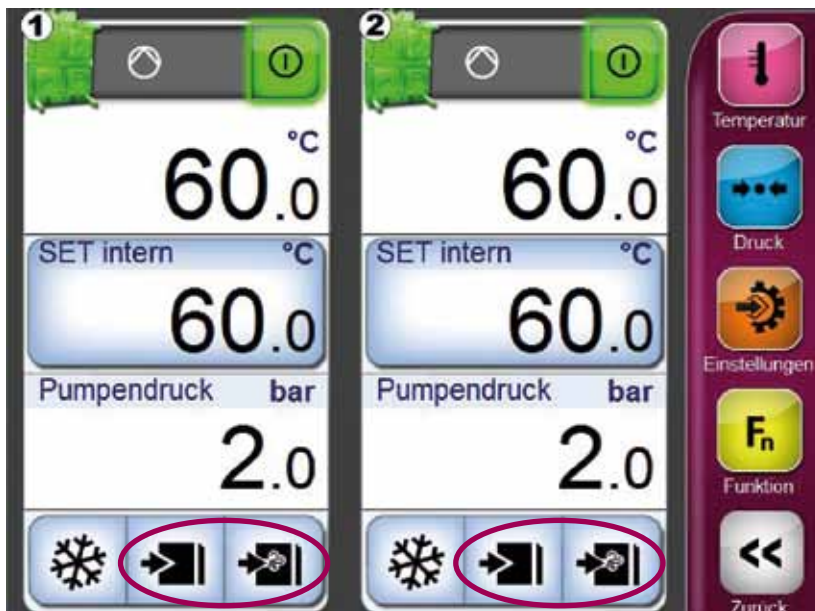
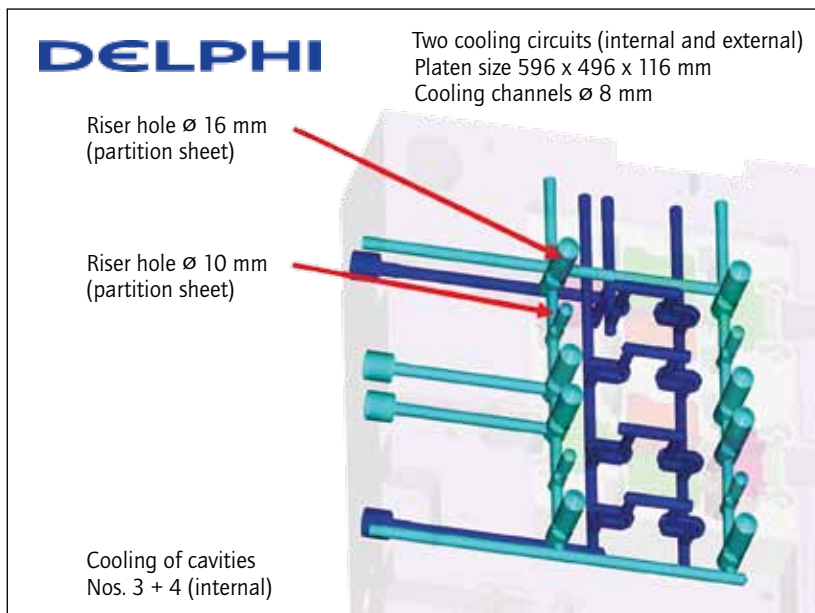


circuit. Of course, the goal was to dispense with this additional procedure if at all possible, so ways to support injection molding machine operators in this matter and to optimize the relevant process were discussed with the WITTMANN experts.



**Problem-solving strategies**

During first discussions of this project it already emerged that this problem was extremely diverse in extent and complexity, so it had to be expected that any kind of standardized methods would bring about only limited success. Preliminary tests revealed that, especially in the case of highly complex parallel cooling channels, in spite of sucking these channels dry, quite a sizeable quantity of residual water could still remain in some of them. Blowing compressed air through each individual cooling channel via various riggings (with gate valves) seemed to be one possible approach, but here, the problem of adequate process monitoring emerged; the risk of operation errors seemed excessive, so this approach was also abandoned.



In the end, there was no alternative besides integrating an additional function into the temperature controllers to implement a viable solution for the DELPHI equipment, which consists of more than 100 injection molding machines. The addition of such a function promised a high

level of cleanness, and this approach also seemed to meet all requirements in terms of process reliability and user-friendliness. The additional process steps needed for this were to be implemented directly via the temperature controllers – without having to make any adjustments to the mold itself or its hosing, which would altogether amount to an enormous reduction in the operator’s workload.

In several test series carried out jointly by DELPHI and WITTMANN for sucking the channels dry, the procedure was tested on molds and cooling channels of varying size. The results showed beyond doubt that a general solution to cover all molds does not exist – in spite of all conceivable optimizations in detail. The diversity in the original conditions was simply too great, from the differences in the numbers of cooling circuits, to the diameters of cooling

channels and even the available volume of compressed air. To achieve the best possible results, it became indispensable to create a flexible means of using both functions of sucking and blowing for drying the channels.

**Getting the channels dry**

On the basis of all findings derived from the test series, WITTMANN extended the functions of its TEMPRO plus D units accordingly. The WITTMANN team made a special point of offering operators a simple, yet clear, method of handling the device. An additional function key was created which can be uploaded directly into the main screen of the temperature controller.

The additional function now makes it possible to either suck the mold dry, or blow it dry with compressed air, at the push of a button. For highly complex cooling channels, both functions can even be combined, thus offering maximum efficiency. By activating just the sucking function, the compressed air function is automatically deactivated. In this way it has become possible to completely eliminate the risk of operator errors or waste of compressed air simply by forgetting to switch it off.

Only a few weeks after the new function had been integrated into the production process at DELPHI, a substantial improvement in overcoming the problems described above was already noticed. More or less as a side effect of this move, operator safety

was also improved, since there was no longer any water leaking from the molds during their transport. The cooperation between DELPHI Automotive and WITTMANN has finally led to a solution that has brought substantial improvements to the manufacturing process. ♦

*Schematic diagram: cooling channels inside the mold.*

*The function keys for sucking dry and blowing dry of the mold on the TEMPRO plus D touch display (marked).*

**Christoph Schweinberger** is the Austria Sales Manager for peripheral equipment at WITTMANN Kunststoffgeräte GmbH in Vienna.

# Open House hosted in Torrington, USA

On June 5 and 6, WITTMANN BATTENFELD USA hosted an Open House event at its recently expanded headquarters in Connecticut. At the event, the company's 25<sup>th</sup> anniversary was also celebrated. The Open House proved to be a complete success. As an immediate result, orders with a value of more than 1 million US\$ were received, and more are expected to follow.

*In June this year, WITTMANN BATTENFELD USA welcomed more than 250 visitors into Torrington to attend the Open House & Innovation Workshop. The seminars and workshops offered were met with lively interest.*

In the recently built 2,300 m<sup>2</sup> hall, the multitude of visitors were able to witness an installation of 14 injection molding machines in operation.

WITTMANN BATTENFELD demonstrated its vast competence with various technologies and processes such as micro injection molding, liquid silicone processing (LIM), internal gas pressure and insert technology. In addition, seminars and workshops were held jointly with partner companies such as RJG, Gammaflux, the MGS Manufacturing Group, Fluid Automation, MR Mold and Haidlmair, which all were met with lively interest. The guests included representatives of

leading companies from a great variety of industries, such as ADAC Automotive, the Aptar Group, Hella, Intralox LLC, Nike Inc., Nova Biomedical,

“From our point of view, this event was a really great success,” says David Preusse, CEO of WITTMANN BATTENFELD USA. “We had many



Nypro, Parker Hannifin, SABIC, SMC LTD, Smith and Nephew, Sonoco Plastics, Valeo, Vision Technical Molding LLC, Whelen Engineering Co. – to name just a few from the long list of attendees.

visitors and were able to demonstrate our enlarged capacity, as well as the benefits we can offer by our ability to supply everything from one source. And we are pleased about the numerous orders we received as a result.” ♦

## The ten thousandth WITTMANN W8 robot

The celebratory event took place during the first half of 2014: a W832 middle-class linear robot from WITTMANN saw the light of day and became the 10,000<sup>th</sup> unit from the W8 series. Numerous previous generations of appliances, continuously improved over time, laid the foundation for the production of this landmark unit.

The persons present here have come to represent the many contributors who made this success story become a reality: Friedrich Kaiser, Production Manager Robots and Automation (fourth from the left), Andreas Klackl, Divisional Manager Robots and Automation (third from the right), and Roman Weber, Order Management Robots and Automation (fourth from the right), with other colleagues from WITTMANN Kunststoffgeräte GmbH in Vienna, Austria. ♦





# Articles that appeared in *WITTMANN innovations* so far

## Conveying/Drying

- Central system at BOSCH 1/2007
- Quality control of dryers 1/2007
- Kromberg & Schubert's system 2/2007
- Cost efficient material drying 2/2007
- FEEDMAX for the clean room 3/2007
- The new DRYMAX ED80 3/2007
- Focus on material feeding 1/2008
- The WITTMANN network control at Arge2000 2/2008
- Changing parameters when conveying different materials 2/2008
- Optimizing a conveying system 3/2008
- Dryers with energy rating 3/2008
- The Metchem central system 4/2008
- Auxiliaries at Delphi in China 1/2009
- LISI COSMETICS' central system 2/2009
- Perfect planning of central systems avoids downtime 3/2009
- Testing WITTMANN energy claims at FKT 4/2009
- The new FEEDMAX B 100 1/2010
- Greiner is saving energy by using WITTMANN dryers 2/2010
- The A.C.S. conveying system 3/2010
- FEEDMAX Primus conveyor 4/2010
- The new DRYMAX Aton 2/2011
- The BKF conveying system 2/2011
- WD Kunststofftechnik and its central system 4/2011
- PET processor uses a WITTMANN conveying system 1/2012
- The PLASTICOM system 2/2012
- The NICOMATIC system 3/2012
- Saving energy in material drying 4/2012
- The Bespak material handling 2/2013
- Vision Technical Molding: Prescription for efficiency 3/2013
- WPC injection molding 1/2014
- New Pollmann central system 2/2014
- The HELLA Mexico system 3/2014

## Automation

- Production and quality control in medical engineering 1/2007
- The handling of large structural foam parts 2/2007
- The new R8 robot control 3/2007
- High-end: The production of seat adjustment rods 1/2008
- Drive engineering for robots 1/2008
- Automating the production of transponder pins 2/2008
- Automated production of remote control keys 3/2008
- Automation at Carclo, UK 4/2008
- The flexible automation cell as ABA-PGT 1/2009
- The cultivation of growth with WITTMANN robots 2/2009
- Bruder toy wheel production 4/2009
- Production of pallets at Georg Utz in Poland 1/2010
- EcoMode helps getting energy efficient robots 2/2010
- Automated production of oil level sensors 2/2010
- Automating rotation welding 3/2010
- The new R8.2 robot control 4/2010
- Linear robots in the clean room 1/2011
- Super-fast part removal 2/2011
- Automation of cups and lids 3/2011
- Superior multi-component molding 4/2011
- Automating insert molding 1/2012
- The expert automation of lids 2/2012
- LSR parts at Silcotech, Switzerland: Quality through automation 3/2012
- Zero-reject production 4/2012
- JENOPTIK: Handling of smallest parts 2/2013
- The Schramberg automation 3/2013
- The Busch-Jaeger automation 1/2014
- Automating In-Mold Decoration 2/2014
- Automation at Port Erie Plastics 3/2014

## In-Mold Labeling

- WITTMANN IML stack mold systems 3/2007
- The WITTMANN 2 + 2 stack mold 1/2008
- ATM d.o.o. in Serbia grows with WITTMANN systems 3/2009
- Quadrangular IML design at PLASTIPAK in Canada 4/2010
- Tea Plast in Albania wants to become the Number One in IML 3/2012
- EcoPower: fourfold IML 1/2013
- IML as a multifaceted process 4/2013

## Temperature Control

- The advantages of pulsed cooling 1/2007
- Comparing water to oil 2/2007
- The new temperature controllers of the TEMPRO plus C series 3/2007
- COOLMAX cooling units 2/2008
- Temperature controller "guarding" injection molding machines 3/2008
- Temperature controllers with DUO cooling 4/2008
- Variothermal tempering 1/2009
- The new TEMPRO plus C180 2/2009
- The new TEMPRO direct C120 [C250] 3/2009
- WFC: Water Flow Control 4/2009
- TEMPRO plus C180 1/2010
- TEMPRO: Universal benchmark 2/2010
- BFMOLD™ mold cooling system 3/2010
- The new TEMPRO plus D temperature controllers 4/2010
- Online-thermography 1/2011
- Tempering and injection molding at Fuchs & Sohn 2/2011
- TEMPRO plus D in the automotive sector 1/2012
- Oscilloscope function 2/2012
- Compact temperature controller 4/2012
- Quality assurance through the optimal tempering process 1/2013
- The Starlinger special solution 2/2013
- New WITTMANN tempering and flow control equipment 4/2013
- TEMPRO uses heat waste 1/2014

## News From The Subsidiaries

- Australia 2/2008, 2/2013
- Austria 2+3/2008, 1/2010, 3/2011, 4/2012, 3/2013
- Benelux 3/2008, 2/2009
- Brazil 3/2007, 1/2009
- Bulgaria 2/2009
- Canada 1/2007, 1+2/2008, 3/2009
- China 2/2010
- Colombia 2/2012
- Czech Republic/Slovakia 4/2009, 3/2014
- Denmark 1/2009, 1/2013
- Finland 4/2008+1/2012
- France 2/2007, 3/2008
- Germany 1/2007, 3/2012, 4/2013, 3/2014
- Great Britain 2/2009, 2/2010
- Greece 2/2014
- Guatemala 1/2013
- Hungary 1/2008
- India 2/2008, 3/2010, 2/2012
- Israel 1/2012
- Italy 4/2008, 1/2010, 4/2011
- Mexico 3/2007, 3/2009, 1+2/2011
- Poland 2/2013, 3/2013
- Russia 4/2012
- Slovenia/Croatia 1/2010
- Southeast Asia 2/2007
- South Korea 3/2010
- Spain 3/2007
- Sweden 2/2009
- Switzerland 1/2008, 2/2012
- Taiwan 4/2009
- Turkey 3/2008, 2+4/2011
- USA 2/2008, 3/2009, 1/2011, 4/2013

## Injection Molding

- WITTMANN BATTENFELD: One stop shopping for injection molding 4/2008
- Metal injection molding at Indo-US MIM 4/2008
- Cost optimization: EcoPower 1/2009
- IT assisted services 1/2009
- Water injection for all-plastic parts 2/2009
- Krona Indústria and WITTMANN BATTENFELD 2/2009
- Molding micro-parts with the Micro-system 50 3/2009
- Multi-component process at wolcraft 4/2009
- Process data acquisition: partnership with Wille System 4/2009
- The new all-electric EcoPower injection molding machine 4/2009
- Thomas Dudley and WITTMANN BATTENFELD 1/2010
- IML with TM Xpress 1/2010
- AIRMOULD® and AQUAMOULD® Mobile 1/2010
- Design Molded Plastics and their molding machines 2/2010
- Stadelmann relies on Wille and WITTMANN BATTENFELD 2/2010
- The new MicroPower 3/2010
- AQUAMOULD® and projectile injection technology 3/2010
- New benchmark: MacroPower 4/2010
- STELLA relies on WITTMANN BATTENFELD machines 3/2010
- The ServoDrive technology 1/2011
- The 75<sup>th</sup> machine for Krona 1/2011
- Packaging specialist TM Xpress 2/2011
- WAVIN (Czech Rep.) and WITTMANN BATTENFELD 3/2011
- SANIT molding a success 3/2011
- WEPPLER Filter using BATTENFELD machines 4/2011
- MacroPower for the production of cable ties 1/2012
- The CELLMOULD® process 2/2012
- ESMIN uses 43 WITTMANN BATTENFELD machines 3/2012
- Remote connectivity 3/2012
- Foamed high-quality parts 4/2012
- LECHNER' MacroPower 4/2012
- MacroPower at GT LINE 1/2013
- Praise for the standard machine! 1/2013
- Vertical machines at Electricfil 2/2013
- BECK's molding technology 2/2013
- ESCHA using HM machines 3/2013
- Hoffer Plastics' HM machines 3/2013
- Guppy using the EcoPower 3/2013
- The Backhaus success 4/2013
- Incapsulation: clean and safe 4/2013
- Multi-component parts 1/2014
- Success through versatility 1/2014
- Philips perfecting the tried and tested 2/2014
- Light-weight foamed parts 2/2014
- The KRESZ & FIEDLER Systems 3/2014
- SME molder Autenrieth 3/2014
- Top micro parts from Küng AG 3/2014

## Blending

- The new GRAVIMAX series 2/2007
- Blender economics 3/2007
- GRAVIMAX 14V blender 3/2009
- The art of blending regrind 3/2011
- Dosing on the highest level 1/2013
- Precision for safe rail traffic 4/2013

## Granulation

- Inline recycling of sprues 1/2007
- Giant granulator MCP 100 2/2007
- The new MAS granulator 3/2007
- Challenging recycling process 1/2008
- The MC 70-80 at Centrex 2/2008
- Gibo Plast enforces recycling 2/2009
- MC granulators with AF auger 4/2009
- Grinding of ferrite 1/2010
- Grinding critical material 3/2010
- The TMP CONVERT solution 1/2011
- Inline recycling with Minor 2 3/2011
- Granulators under the press 2/2012
- Large solutions for large parts 1/2013

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