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Dear Reader,

“Can we trust in the upturn?” – After the sobering experience in the year 2009, the situation in the plastics processing industry at last has changed and much more so than forecasted. Especially, the last five months have shown unexpected investments of companies in the plastics business. This has not happened on all markets to the same extent, but for the manufacturers of machines and auxiliary equipment, the prospects are bright again. Such significant ups and downs are mainly a real challenge for production companies. Now it is again necessary to maximize our capacities to cope with the incoming orders. Anyway, the upturn has started some months ago, and whether it will continue with this strength or not, still remains to be seen.

Our decision not to cut down the expenses for research and development during the 2009 crisis was a fruitful one. On the occasion of our Competence Days, held April 28th and 29th in Kottingbrunn/Austria, we could present to our guests numerous new developments in the fields of molding machines, robots, and peripherals. In particular, we are happy about the fact that our efforts got an official notice. WITTMANN BATTENFELD won two medals at the PLASTPOL 2010 – an unparalleled occurrence in the show’s history. The EcoPower won the first prize for “Machines and systems for plastics processing”. One of our most advanced techniques, the combination of AQUAMOULD® and projectile technology, also received an award – again the first prize – in the “Process engineering” category.

Our bestselling W811 robot model is the universal workhorse par excellence. With its payload of 5 kg (11 lbs), its additional rotating axes and many more options, there hardly is an application of automation, in which this robot could not excel. The new R8 robot control is extending its effectiveness once more, and the SmartRemoval, EcoMode and SoftTorque functions now are available also for this model. The W811 is used for example at LYCRO in Sweden. Learn more about this interesting application from the article on page 8 of this innovations issue.

“Gloss – without flow lines and sink marks?” – A tough nut to crack, even for skilful engineers. But this can be done by means of BF MOLD®. The Kunststoffinstitut (= Plastics Institute) Lüdenscheid, Germany, has developed this innovative mold and tempering technique. As from now, we are taking over the exclusive rights of utilization and commercialization. Read also more on this topic in this “shiny” issue of innovations. I wish you a pleasant reading experience.

Sincerely, Michael Wittmann
Granulating under explosive conditions

The KLINGER Dichtungstechnik Company in Gumpoldskirchen (Lower Austria) took on a special challenge. They wanted to produce seal plates from a critical material, applying a modified production process. Therefore they had to think about a safe way of granulating the basic compound that still had to meet the special requirements of the material.

Markus Wolfram

KLINGER has been manufacturing seal plates since the year 1893. Their vast experience and active research and development have made KLINGER one of the most important manufacturers of high-performance sealing material.

A delicate job

In the course of a graduation project at the TGM Vienna, one of the leading training schools for technical professions, prospective TGM graduates and experts of the KLINGER research and development department have formed a workgroup. The job definition was to find a way to produce seal plates in the future by using a modified manufacturing process, instead of the classical calendering process. The new process promised a significant reduction of cost and production time, because of the possibility to shorten the repeated rolling process of the plates. One problem with the basic compound used for the sealing material is that it is only available in the form of very chunky lumps, which can not be used with the process. Thus WITTMANN was contacted as one of the acknowledged experts in the field of material grinding.

The basic compound consists of several components: elastomers, filler materials, fibers, and toluol. Mishandling can lead to “explosive reactions”.

The prime ML33

There were several crucial considerations for the size reduction process – the viscosity of the basic compound and the resulting heat build-up during the grinding process, the required particle size and throughput, and the system’s footprint. Most importantly, the granulator had to come with an EX-protected design. To avoid spark formation, a low-speed screenless granulator was considered, but this type of granulator is not suitable for grinding ductile or warm materials. The absence of additional water cooling for the grinding chamber could have possibly led to smudging of the material on the roller cutters. Even when using water cooling, the required material throughput would not have been achieved. Consequently it came down to using a WITTMANN ML33 conventional type granulator with 3-blade open rotor, slant adjustable knives for tight knife gap, and medium (340 rpm) rotor speed.

The double bearing design of the ML33 rotor maintains a balanced rotor and prevents knives from contacting each other, thus eliminating spark formation. The integrated sieve with optional hole diameter produces the required particle size. The basic compound is so ductile, compared to technical plastics like PS or PP, that the ideal cutting clearance between knife and sieve had to be determined. The knife clearance was easily optimized on the spot by means of an adjustment gauge that comes with every conventional style WITTMANN granulator with adjustable knives. With this material, residues tend to be very quick to harden and hard to remove, but the ML33 allows for fast and easy cleaning due to its hinged hopper and the entirely accessible cutting chamber.

Necessary modifications

After the system’s inspection, executed by the explosion and fire prevention experts of the Austrian TÜV, the modification of the ML33 could take place. All the necessary modifications were done by WITTMANN themselves, namely the adaptation of the driving motor, the safety equipment, and of the system control. Since ignition sources are to be avoided as far as possible within the EX-area, the granulator uses a special motor according to the EX standard for an application range of up to 135°C. The safety equipment at the reground collection bin and at the hopper has been adapted to not allowing spark formation. Lastly, the control was installed some meters away from the system – outside of the inner hazard area.

The outcome is meeting all expectations. After having been ground, the basic compound can now be continuously processed without any difficulties. Now it is possible for KLINGER to produce their seals in the most advantageous way – and they are considering their resources.

Markus Wolfram is responsible for the sales of material handling systems in Austria for WITTMANN Kunststoffgeräte GmbH in Vienna.
The new A.C.S. conveying system

The Alpes Connectique Services Company (A.C.S.) near Chambéry in Savoy (France) is specialized in the production of plug-in connectors that are primarily used in motor vehicles. WITTMANN received an order from A.C.S. for a central system that will serve four molding machines.

Fabien Chambon

Until 2009, A.C.S. outsourced their molded parts they needed. The decision was made that they should manufacture the plastic parts themselves. For this reason, four injection molding machines were purchased.

To keep the costs of manufacturing as low as possible, the production should be automated as far as possible.

Thus WITTMANN was contacted to deliver the entire peripheral equipment for the new Alpes Connectique Services injection molding department.

WITTMANN’s suggestions for the system’s facilities were entirely convincing, and that clinched A.C.S. for them.

Drying, conveying, granulation

The drying hoppers of the A.C.S. central material conveying system are installed on an elevated platform, together with a WITTMANN DRYMAX E 300 battery dryer with a dew point sensor.

The DRYMAX is supplying four SILMAX hoppers with dry air. The raw material is stored in roller-containers right under the platform, allowing for the most efficient use of the limited floor space. After the completion of the drying process the material is conveyed to the four processing machines by means of an intermediary coupling station. To avoid possible problems that could be caused by reintroduction of humidity, the material lines are emptied by a controlled vacuum take-off adapter.

As the materials that are processed by A.C.S. are in the first instance polyamides with glass fiber content, the straight pipework is made of stainless steel, and the curved elements are glass bows.

This specification can significantly reduce wear from the highly abrasive material. This is essentially stretching the life-span of the tubing. All processing machines are equipped with WITTMANN FEEDMAX B series conveying units with integrated proportional valves. These valves are managing the return transport of recycled material into the process via a closed circuit.

The granulators that are in use with this system are the screenless WITTMANN SUMO Minor series. They are most suitable for the granulation of materials that contain highly abrasive glass fibers.

Temperature control

To ensure perfect dimensions and geometry of the molded parts, two WITTMANN TEMPRO plus C series temperature controllers were purchased to control the mold temperature. The units are equipped with an interface for the communication with the injection molding machine.

With this interface the temperature controllers can be controlled directly from the machine panel. Every deviation from the predefined process temperature values is communicated immediately to the processing machine that is giving an alarm.

Variations in temperature which can cause minor quality imperfections can be avoided.

Automation

The fully automated removal of the finished parts from the injection molding machines has also been handed over to the WITTMANN specialists.

For this purpose two WITTMANN robots of the W7 series were purchased, one W711 robot, and one W721 robot. Provision was made for the removal of finished parts from the machines only, but nevertheless the robots were already prepared to execute automated insertion procedures sometime in the future.

<table>
<thead>
<tr>
<th>The system components (2 weeks for system installation)</th>
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<td>Material conveying system</td>
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<td>1 DRYMAX E 300</td>
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<td>1 SILMAX E 200</td>
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<td>4 FEEDMAX B206-LL – c90</td>
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<td>4 FEEDMAX B206-DPV – c90</td>
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<tr>
<td>2 GM 07 pumps with XM filter</td>
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<td>1 M7.2 TeachBox control</td>
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<td>1 Line-server LS-B30T</td>
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<td>9 BLIS modules BM4/4</td>
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<td>50 m BUS cable</td>
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<td>Granulators</td>
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<td>2 MINOR 2</td>
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<tr>
<td>Robots</td>
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<tr>
<td>2 W711</td>
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<td>2 W721</td>
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Fabien Chambon is Sales Engineer for robots at WITTMANN BATTENFELD France SAS.

At ground level the roller-containers are positioned, above the battery dryer and the drying hoppers are arranged.

Part of the tubing made of stainless steel and glass.

Arrangement of the processing machines with conveying units and robots.
BFMOLD™: The new technique for quick heating-up and cooling of injection molds

As is known, when plastics material is injected into a hot mold, the part emerges precisely according to the cavity’s surface. This improves the quality of molded parts. However, thermoplastics have to be cooled down again to allow for proper hardening. The obvious disadvantage is a much longer cycle time.

**The solution found**

The method of heating up the mold; with every single cycle, and before injecting the material, up to the softening or glass temperature (or even higher), is not a new achievement. BATTENFELD had executed the first successful tests back in the seventies. Heating up the mold, and its subsequent cooling down, had been achieved by means of water as the tempering medium. Presently, this procedure is known as variothermal tempering. The concern with variothermal tempering is the need for the very high use of energy, and extended cycle times. Therefore, variothermal tempering could not be used economically or profitably.

KIMW, the established Kunststoffinstitut Lüdenscheid (= Plastics Institute Lüdenscheid) in Germany, has developed a new cooling system that is very close to the inner contours of the cavity – the so-called BFMOLD™ technology, enabling an especially high water flow rate.

**Mold and temperature control**

The fundamentals of the BFMOLD™ technology can be described as follows:

- The region of the mold that is lying behind the cavity is milled out – only a few millimeters away from the cavity’s surface.
- The excavation is filled with small steel balls.
- The forces that are acting on the cavity from the injection cavity pressure, are now transmitted to the mold’s base frame. This prevents deformation (e.g. deflection) of the cavity.
- In comparison to conventional cooling, the squeezed steel balls allow for a volumetric flow rate that is four times higher than previous technology.
- Only the mold sections next to the cavities are heated up. Heating up only the cavity’s surface, and cooling it down, can be achieved quickly and energy efficiently by using water.

Specifically, when using BFMOLD™ technology (respectively variothermal tempering) WITTMANN has developed a powerful heating/cooling unit: The TEMPRO plus C160.
The material had to be black ABS.
- The part showed many cut-outs.
- High gloss polished surfaces were needed.

For the purpose of comparison, the first trial parts were molded in the conventional way; at a mold temperature of 80°C and in a 30 second cycle time. In this first trial, the joint lines at the cut-outs of the finished parts were clearly visible. The second trial, using variothermal mold tempering, the mold was heated up during the period between its opening and closing to a temperature of 120°C at the start of injection. Following the injection of the material, the temperature controller switched to the cooling procedure, also using a 30 second cycle time. The results of the second trial yielded a finished part of impressive high gloss quality. The part reflected the perfect high gloss polished surface of the cavity, with no unaesthetic joint lines and no sink marks.

**An adaptable technology**

For an even quicker mold switchover from heating to cooling – and vice versa – it is possible to mount the valve switch unit closer to the mold on the clamping plate of the injection molding machine.

By means of the BFMOLD™ technology the cooling process happens close to the cavity surface with higher water flow rate. This technology is capable of being integrated into molds for a wide range of application. More specifically, the technology can be applied to a desired area and not necessarily the entire mold. In many cases it would be sufficient to arrange for BFMOLD™ in specific areas only, where joint lines and other imperfections are not acceptable and where high gloss is desired. Thus by using a TEMPRO plus C160 VARIO and variothermal tempering, the surface quality of molded parts can be improved selectively and essentially. In addition, BFMOLD™ is suitable for the intense cooling of parts. The BFMOLD™ technology is distributed exclusively by WITTMANN BATTENFELD and WITTMANN. In combination with temperature controllers of the TEMPRO plus C160 VARIO series it helps to reduce energy consumption, time and money. The resulting molded parts are of an impressive quality.

If plastics processors are choosing a powerful injection molding machine from the wide WITTMANN BATTENFELD portfolio, then they are getting all the benefits of a supplier offering "one stop shopping".

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**BFMOLD™ in practice**

The application that has been presented at the Competence Days 2010 was realized on a BATTENFELD HM 110/525 injection molding machine with UNILOG B6® control. The mold from the Kunststoffinstitut Lüdenscheid was operated with variothermal tempering. The part that was to be molded had its perils:

- Max. temperature: 160°C.
- Max. heating capacity: 12 kW.
- Max. cooling capacity: 70 kW at dT = 150°C.
- Max. volumetric flow rate: 60 l/min.
- Standard configuration of the valve switch unit at the temperature controller.

![BFMOLD™ in practice](image)

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Helmut Eckardt is Head of New Technologies at WITTMANN BATTENFELD in Kottingbrunn, Lower Austria.

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WITTMANN innovations - 3/2010
LYCRO STREAM RWM: Rotation welding machine with integrated W811 robot

LYCRO AS, a Norwegian company based in Leksvik, develops and manufactures downstream machines for extrusion lines, molds for injection molding, and pipe fittings for the international plastics pipe industry. They voted for WITTMANN as a partner for robot handling on their new rotation welding machines.

Christian Hiljemark

LYCRO believes it is their mission to help customers achieve better profitability, and do this by continuously providing better solutions. Based on 40 years of experience they have a unique capability in construction, machine building, tool making and injection molding. These combined capabilities enable LYCRO to provide unique solutions.

Throughout their history, LYCRO has supplied more than 80 rotation welding machines (and 100 machines in total) to 13 countries worldwide, as well as supplying molds to major international plastics pipe manufacturers.

Their injection molding department consists of more than 20 modern injection molding machines ranging in size from 50 to 1,500 tons of clamping force. They are providing their customers with both, pipe fittings and all types of technical components. A well-skilled workforce, high quality machinery workshop, highly skilled project engineers and the cooperation with their customers and suppliers enable them to deliver high quality products at reasonable prices.

New rotation welding machinery

A couple of years ago LYCRO decided to redesign their rotation welding machine due to the globalization of their product. The target goal was to build a machine which was easy to transport, fitting the downstream production line of their customers and, last but not least, was easy to handle. The old system was pneumatic, something LYCRO wanted to move away from, since the finished machine should be all-electric. The decision was made to use standard products existing in the market place and to combine these with their machine building experience and rotating welding knowledge – to develop a new rotation welding (RW) machine series. BATTENFELD Sverige AB, the WITTMANN Group supplier in Sweden and Norway, was contacted to supply
The WITTMANN robot solution

The handling robot solution was a standard W811 robot from WITTMANN. A pneumatic system is used with the WITTMANN robots only for the gripper and its movements by a pneumatic C-axis wrist flip.

The electrically (servo) controlled axis are resulting in greater flexibility when it comes to adapting the LYCRO RW system to different types of sockets. The robot was integrated and installed at LYCRO’s plant from a WITTMANN service technician. The first real test was at the customer’s site, where the production program was changed from one pipe fitting size to another. This change was made in less than 15 minutes which easily would have taken up to 2–3 hours with the old system. Saving changeover time means more real production time!

Outcome and benefits

The result of all this is the new LYCRO STREAM RWM (rotation welding machine), and thanks to the integrated WITTMANN W811 robot, LYCRO AS has developed a new machine meeting the actual demands of their customers, or as LYCRO put it themselves, "Integrating the WITTMANN W811 robot for socket handling saves time and reduces costs – especially when changing the dimensions of the parts. The handling of sockets also is improved.

The re-designed rotation welding machine is a module based machine, an all-electrical machine that saves energy – compared to the old pneumatic system. And its footprint is also reduced.”

Christian Hiljemark is the Director of BATTENFELD Sverige AB in Halmstad, Sweden.
Micro injection molding:
The *MicroPower* is the logical future trend

**WITTMANN BATTENFELD**’s Microsystem 50 has positioned the company as one of the undisputed worldwide technology leaders in micro injection molding. The Microsystem 50 has now been refined. The successor model, the MicroPower, is eclipsing everything that has appeared in this field so far. The MicroPower is providing much more flexibility and a wide range of application possibilities, leading to more customer value and cost effectiveness.  

*Martin Ganz*

In the center of WITTMANN BATTENFELD’s activities one can see the clear goal of providing injection molders with a complete lineup of machinery that is ranging from the injection molding machine to any peripheral equipment: robots and automation, temperature controllers, central material handling systems, dryers, blenders, and granulators.

WITTMANN BATTENFELD is offering complete manufacturing systems, entirely developed and produced in-house, reflecting the company’s motto of “one stop shopping”.

This all-embracing corporate concept is accounting for safe technology and guaranteeing the required flexibility in regard to the adaptation and further development of their systems. Processors are getting products that are safe to operate at attractive prices. This concentrated but comprehensive competence has been applied to the development of the next generation of WITTMANN BATTENFELD injection molding machines for the molding of micro and miniature-precision parts in the micro sector – once more with the intent to maximize the customer benefits in this field. The result is the new *MicroPower* machine series with a wide range of applications.

**The MicroPower series**

The all-electric *MicroPower* series is offered as a basic machine with clamping forces of either 5 t, or the new 15 t. Each of these platforms can be equipped with an injection unit of either 1 cm³, or the new 3 cm³. This is widening the range of applications enormously.

Injection molding machines with 15 t of clamping force are sold seven or eight times more often worldwide than machines in the 5 t range. The higher number of pieces is permitting the optimization of the manufacturing costs and thus is the precondition for an attractive machine price. This simplifies entering into this technology for processors, primarily due to the wider range of applications that is allowing for a high capacity factor, right from the start.

Practical experience made over the years with the Microsystem 50 has shown that increased productivity and improved quality yield higher revenues, in comparison to standard machines.

The development of the MicroPower and the enlargement of the WITTMANN auxiliaries program have happened simultaneously. In the field of auxiliaries the development has led to special equipment for small machines: a low-volume material dryer and a respective conveyor with low throughput. A simple example is proving these needs.

A 4-cavity-mold with a shot volume of 0.2 g and a cycle of 3 sec is producing 4,800 micro-parts per hour, at a material usage of only 240 g per hour.

The optimal units for the drying and conveying of these small amounts are now at hand. Beyond that, tempering systems with suitable performance characteristics are available, because small molds require a lower heating capacity. For example, installing a heating capacity of 3,000 W would cause unnecessary expenses, as the piping and safeguarding would have to be oversized. When developing these auxiliaries it was kept in mind that the standard units would be used not only with the MicroPower, but with any customary injection molding machine. For the automatic handling of the parts, which is one of WITTMANN’s core competences, a special vertical SCARA robot was developed that can very
effectively manage the handling of micro parts. It is driven by three servo motors, removing the parts successfully and precisely (at a maximum payload for part and gripper of 2 kg). Even more complex functions can be managed by this robot, e.g., handling parts that require insert loading or overmolding. The MicroPower is built with all WITTMANN components, fully interfaced and integrated.

**Integrative control**

More essential customer benefit comes from the UNILOG B6 control that is used with every WITTMANN BATTENFELD injection molding machine. The UNILOG B6 is offering a continuous control and handling concept for the easy operation of the machine, including all auxiliaries. An entirely comprehensive concept that is working for all all-electric models with clamping forces ranging from 5 t to 300 t and for hydraulic models of up to 1,000 t. Even untrained operators are learning intuitively to deal with the system within a short period of time.

**Quality depends on the injection process**

From a technical point of view, the MicroPower injection module is of particular interest. The revised injection aggregate has a maximum shot volume of 3 cm³. It is permitting the molding of small and precision parts of only some grams to the point of micro parts that are weighing only some milligrams and even less.

The aggregate is processing all injectable materials. The universally designed screw geometry allows for the feeding of any standard pellet size. A 14mm screw plasticizes the material absolutely stress-free and with the lowest possible degradation. The pre-dosing of the exact shot mass is realized via the axial stroke of the screw. The back pressure that is necessary for the dosing is controlled exactly by means of a servo motor. The exact amount of thermally homogenous-melted material is passed over to the injection piston. The piston is accelerating the material within the aggregate to the injection speed before it reaches the cold cavity. Because of the small piston diameter – compared to a screw injection unit –, it is possible to precisely adjust and control the injection speed. The adequate injection pressure is built up directly in the sprue, but not until the material is reaching the cold cavity.

This concept is enabling an extremely small melt cushion and very short flow paths. Furthermore a cold material slug can simply not occur, because there is no plastics material between the cold cavity and the injection aggregate. If applicable, all this is reducing the sprue weight to the twentieth part of the amount that the standard technology is working with. This process is guaranteeing the injection of thermally homogenous melt, going along with an extended processing window, better dimensional stability, less shape distortion of the parts and less degradation of the material, therefore less scrap.

The result is steadily produced high-quality parts. The Microsystem and the new MicroPower are the only systems worldwide that are injecting thermally homogenous melt, ensuring unrivaled quality of micro parts.

**Flexibility and easy handling**

Due to its intelligent machine concept, the consistently developed MicroPower is offering optimal solutions – for the simple production of small parts, but also for manufacturing micro and precision molded parts. The concept is based on a basic machine that can be upgraded with the elements of a modular system.

A very simple “opening-closing-machine” therefore is possible as well as a multi-functional production cell for the molding of highly complicated micro parts. In particular insertion technique, multi-component injection molding and assembling injection molding can be executed safely, simply and efficiently by default.

**Efficiency and availability**

The main advantage of the MicroPower for the processor – next to the unrivaled part quality – is in its efficiency. Due to shorter cycle times and less usage of material and energy, cost savings of about 30% to 50% can be achieved. Thus the return on investment can be realized very shortly.

At the WITTMANN Group’s Competence Days, held in April 2010 in Kottingbrunn (Lower Austria), the MicroPower was presented to the general public for the first time. The machine series impressed the experts and earned an enormous response. The first orders were made immediately. This fact is referring to the high potential of the MicroPower.
AQUAMOULD® and projectile injection technology for media carrying lines

At this year’s PLASTPOL Show, held May 25th–28th in Kielce/Poland, WITTMANN BATTENFELD was decorated with two awards. The EcoPower 110 injection molding machine got the prize for the best machine, and the combination of the AQUAMOULD® process with the projectile injection process earned the prize for the most innovative technique. This article describes the award winning process combination on the basis of a concrete application.

Wolfgang Roth

The AQUAMOULD® modular system was developed by WITTMANN BATTENFELD for the production of molded parts by means of water assisted injection molding.

The AQUAMOULD® technique is quite similar to the internal gas pressure process AIRMOULD®.

The basic difference is the injection of water instead of nitrogen when applying AQUAMOULD®. Using the water injection process leads to low-strain molded parts that are free of sink marks.

This technology is particularly suitable for moldings in which the aesthetics dominate (handles, thick walled parts), functional parts for which medium conducted channels are necessary (pipes, lines carrying media), and for highly charged functional parts. In addition to the process of partial filling with plastic and subsequent complete filling of the cavity by the injection of water, there are other water injection processes.

The type of internal water pressure technology applied to the molded part concerned depends on the part geometry, the raw material and the requirements on the product. Applicable process options are:

- Partial filling process.
- Overflow cavity process.
- Melt back pressure process.
- Multifoam process.

The AQUAMOULD® components are embraced in a modular system. The WE pressure generation units are compressing the water to 300 bar.

In combination with pressure control modules, very high injection rates can be achieved. Water injection and pressure curves can be adjusted via the UNILOG B6 control on the mobile control unit.

The projectile injection technique

At the WITTMANN Group’s Competence Days, held April 2010 in Kottingbrunn (Lower Austria), the AQUAMOULD® process was presented in combination with the projectile injection technique for the first time. When the mold is open, a projectile is placed on the water injector.
After having closed the mold and having applied the clamping force, at first the cavity is filled with melt – as it happens with the AQUAMOULD® process. When the water injection starts, the water pressure shoots the projectile through the melt and it displaces the surplus plastic into an overflow cavity or back into the space in front of the screw. The projectile technique is particularly suitable for tubular parts, e.g. cooling water pipes.

Here the projectile is pushed through the hot inner core of the plastic material that is already solidifying at the cavity walls. In comparison to the conventional water injection process, the molded part is getting a more consistent wall thickness that is defined by the diameter of the projectile (e.g. pipe wall thickness).

Because of the possibility of thinner walls this technique allows for the production of considerably lighter pipes with consistent pipe profiles – within shorter cycle times.

The process cycle

The process cycle of the combined AQUAMOULD® and projectile injection process is running as follows:

- The mold opens.
- The robot runs in, takes the part and places the projectile.
- The mold closes.
- The parts are dropped on a conveyor belt.
- The projectile is picked by the robot from a magazine and moved to its position above the mold.
- The cavity is entirely filled with melt. The overflow channel is closed.
- After the predefined time, the connection to the overflow cavity opens. The sprue runner is closed, and the water injection starts.
- The water pressure moves the projectile through the inner core of the melt, thus forming the hollow space. The projectile remains in the run-out of the part.
- After the period of time defined using the control unit, the water passes off through the water injector and the pressure control module.
- After the expiration of the cooling time the clamping unit opens.
- A new cycle begins.

The external diameter of the molded parts is about 30 mm. The pipes are showing a pretty consistent wall thickness of about 3 mm that has been formed by the diameter of the projectile. Here highly developed mechanical engineering (together with innovative AQUAMOULD® and projectile techniques) has been combined with intelligent automation. The outcome is a fully automatic system for the production of cooling water pipes.

This application is once more demonstrating the plastic processor’s advantages when presenting challenges for high quality equipment to a supplier that is able to offer “one stop shopping” and turnkey integrated work cell solutions.

The layout of the system

During the Competence Days, a media line was produced in a single mold running on a WITTMANN BATTENFELD HM 180/1330 UNILOG B6 injection molding machine. The mold, built at the IKV, the German Institut für Kunststoffverarbeitung in Aachen (= Institute of Plastics Processing), has a flexible design to cope with the conditions of different fluid assisted injection molding techniques. It is equipped with an overflow cavity and with an axial injector for water that is injecting the water straight in the direction of the hollow space that is to be shaped. The necessary projectiles are consisting of PA 6 with a 30% glass filled fiber, and they have been manufactured using another IKV mold.

The AQUAMOULD® system is making use of a WE 100 pressure generation unit. The mobile control unit with UNILOG B6 control is linked to the machine via the standardized EM 62 fluid injection interface. The pressure control module is mounted directly under the mold.

The temperature control of the mold is done by a TEMPRO plus C series dual zone unit. A W821 robot removes the finished parts from the mold and is inserting the projectiles into the mold.

Wolfgang Roth is Head of the Applications Engineering Department at WITTMANN BATTENFELD GmbH in Kottingbrunn, Lower Austria.
India: WITTMANN BATTENFELD (India) Pvt Ltd

WITTMANN India came to life December 19th, 2006. After the takeover of BATTENFELD the subsidiary was named WITTMANN BATTENFELD (India) Pvt Ltd (= WBIP). Nanda Kumar is the Director of the Chennai based company that is commanding eight regional sales and service offices (Bangalore, Vapi/Daman, Mumbai, Pune, Chandigarh, Haridwar, Delhi, and Kolkata). Beyond its service features the Indian branch is producing special automation tools and material dryers.

WITTMANN BATTENFELD India has a young and dedicated team of 27 employees, looking after all the business sectors: sales, technical service, software development, purchasing and finance. Throughout the entire country of India, customers can expect rapid responses from the highly qualified WITTMANN BATTENFELD experts.

The Indian branch is playing an important role in the development of software for the control of WITTMANN peripheral equipment.

A team of six Indian software experts is working in conjunction with the technical software department at the Austrian WITTMANN headquarters in Vienna. Together the software control innovations are developed that offer the mostly unrivaled functionalities of WITTMANN auxiliary equipment.

The Indian market

From a global point of view, India is becoming a leader in attracting research and development investments for multiple manufacturing fields, and in particular the automotive sector.

Numerous multi-national companies have opened or extended their bases in India, requiring the same demand for innovative technologies they employ at their other global locations, including WITTMANN peripheral equipment and automation solutions. Until recently the automotive industry has been the undisputed basis of the Indian economic growth, but currently India is gaining experience on many different sectors including medical, white goods, consumer electronics and packaging. WITTMANN BATTENFELD India has been able to further increasing their market share in all of these segments, with a diversity of customers in all plastics market segments.

WITTMANN BATTENFELD’s medical customers include Rexam Pharma, ADS Hitech, Beckton Dickinson, and Sologuard, where requirements can include 10,000 clean room standards when purchasing injection molding machines, robots, material dryers and conveying equipment. In the automotive industry, traditionally Ford and some Japanese manufacturers (Suzuki, Hyundai, Toyota) were
the main players. Now also German companies like Volkswagen and Daimler are putting more effort and investments into the Indian market, where their presence is already being felt.

The automotive market is one of the main pillars of WITTMANN BATTENFELD India, maintaining some of the markets high profile injection molders including Motherson Automotive, Visteon, Varroc, United Industries, Poly Plastics, Minda and Taco.

**Future prospects**

The long-term perspective for WITTMANN BATTENFELD India is to establish a new plant for the production of material dryers. This development will lead to a reduction in delivery times for standard and specialized drying equipment needed for the local market. The trend for the Indian injection molding machine market is shifting from hydraulic to electric machines. Electric machines are scoring with their reduced energy consumption, precision, reliability, productivity, as well as reduced pricing. It is very likely that the Indian processors will draw their attention also to the new WITTMANN BATTENFELD EcoPower injection molding machine, based on their previous experience with the technical process solutions and quality of BATTENFELD.

The activities that WITTMANN BATTENFELD will execute in the Indian market will certainly lead to a higher degree of brand awareness and further consolidation of their already excellent reputation.

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**South Korea: DIGI Trading Co. Ltd.**

Since 2008 DIGI Trading Co. Ltd. has been acting as an agent for WITTMANN and WITTMANN BATTENFELD in South Korea. DIGI Trading’s customers are amongst the most important players in this market, including Samsung Electronics, Hyundai, Hyundai Motors, and Mobis.

Employing a team of 13, DIGI Trading is in the position to offer outstanding technical sales and service support to their customers.

Most of the large Korean companies are producing goods for the global community, thus establishing branches abroad. A typical characteristic of the Korean market is the huge enthusiasm for new technologies. To remain competitive in the global market, it is a necessity to improve even applications seemingly working at their best. This highly positive and innovative attitude along with a customer oriented business approach is the cornerstone to the success of DIGI Trading.

These market leading companies are constantly demanding the latest in primary and peripheral injection molding equipment and technology, to maintain their competitiveness. Automation solutions and equipment for multi-component injection molding are attracting special attention. These market demands are constantly requiring DIGI Trading and WITTMANN BATTENFELD to develop new and creative approaches in the injection molding field, with a constant focus on innovation and technology development. An ideal challenge for a team that has adopted the motto: “Challenge is the gateway to success.”

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Part of the DIGI Trading staff (from left to right): Jong Geun Kim (Sales Director), Dong Loul Park (Head of Service), Kyung Soo Yoo (President), Sang Ho Lee (Service Engineer), Hyunjung Mun (Assistant Manager Import/Export), Kyung Sik Hwang (Service Engineer), Won Kyung Cho (CAD Design), Sang Hoon Lee (Head of Production), Bo Hyun Kim (Accounting Manager).