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Dear reader,

In view of the nuclear crisis in Fukushima, which is still continuing at the time this issue of innovations goes to print, and the heated debate about the proper use of our resources which it has set off, further discussion of the energy-efficiency theme is also a must for our energy-intensive industry. Perhaps the events in Japan will sharpen the awareness of those responsible for investments in production equipment. It would be desirable to have economical use of our resources taken just as much into account as the actual costs when making such investments.

Our contribution towards improving the situation is by offering extremely efficient machinery and peripheral equipment. From a technical point of view, it presents no problem any more today to operate injection molding machines much more efficiently than would have been possible only a few years ago. From our portfolio, a choice of all-electric machines from the EcoPower series is available, as well as hydraulic machines with servo drive, namely the HM models with a ServoPower option with only slightly higher consumption rates. During the last few years, these machines were actually made available at relatively favorable conditions on numerous occasions, but ultimate energy efficiency still has some effect on the purchase price. However, with the increasing acceptance of all-electric machines and servo drives, the price gap will continue to close.

The economic trend in the plastics industry currently seems to point in only one direction, that is upwards. At present, the investment backlog caused by the financial crisis is dissolving very quickly. So we are exploiting all possible avenues to boost our production capacity, yet find ourselves currently unable to satisfy the demand in full. However, we expect that our present somewhat longer delivery times will only be a temporary phenomenon, and that the situation will improve in the course of the next few months.

Apart from this, the year 2011 is characterized by numerous Open House events where our latest innovations are on display. For instance, such an Open House has just been staged at our Mexican subsidiary, followed by another one at BATTENFELD Sweden from 13 to 15 April – and followed by one at WITTMANN BATTENFELD in the Czech Republic on June 8 and 9. And we are holding our Automation and Process Days in five German cities as well, where a program of interesting presentations on latest process technologies will be offered.

Sincerely,
Michael Wittmann
Joh. Fuchs & Sohn GesmbH (in short: FUSO) has been active in the plastics technology market for more than 60 years, offering high-quality solutions. The Austrian company based in Ybbsitz relies on WITTMANN peripheral technology as well as on BATTENFELD injection molding machines. At FUSO, an application developed by WITTMANN produces parts for WITTMANN flow regulators. 

**Walter Lichtenberger**

**Machine and tooling**

The injection molding machine is equipped with two core pulls for boring the thread cores of the housing components and/or handling the insertion cores during insertion of the brass parts.

The thread cores in the mold are powered with hydraulic drives and thus enable fully automatic production of the housing components.

Special attention also had to be paid to the lay-out of the cooling bores in the area of flow-pipe sealing, since quick heat dissipation is ensured by intelligent dimensioning and correct positioning. If it is effected within a short time, this not only favors high dimensional accuracy (and ultimately highly accurate concentricity), but of course also shortens the cycle time. Material consumption and consequently part costs have been reduced by the use of a hot runner nozzle.
**Automation**

The mold and the automation system were designed to enable fully automatic insertion of both the brass hose fittings and 3/8” sockets. Ultimate precision is required for passing the inserts to the insertion cores.

This requirement is met by using a WITTMANN W731 robot with a repeatability tolerance margin of no more than 0.1 mm. The material feeding station, including separation and monitoring of accurate transfer to the robot, was designed by the experts of WITTMANN's special engineering department. The robot finally removes the finished injection-molded housing component and deposits it on a conveyor belt.

**Temperature control**

The flow regulator housing is injection-molded from polyamide 6.6, with the material blend containing fiberglass reinforcement as well as a certain percentage of fillers. This compound requires precise temperature control in the mold, for which purpose a WITTMANN temperature controller from the newly developed TEMPRO plus D series is used. This appliance, laid out for a temperature range of up to 160°C, is equipped with a touch display which allows temperature regulation with a precision of ± 0.1°C.

The dual-zone temperature controller is ideally suited for this application, as it takes up very little space and offers two circuits for completely separate tempering of the injection side on the one hand and the mold’s ejector side on the other hand.

Due to its narrow cooling ducts, the temperature controller is equipped with a flow regulator based on ultrasound technology. This enables monitoring of the flow volume even at temperatures above 100°C and prevents uncontrolled blockage of the mold circuits. The technology used in the TEMPRO plus D almost entirely eliminates the penetration of oxygen into the system and thus contributes to slowing down contamination of the temperature control circuit. The pressure in the system is continuously monitored and kept stable at 1 bar above the vapor pressure curve to prevent cavities forming in the pump housing, thus lengthening the appliance’s service life and maintenance intervals.

The proverbial “dot on the i” is the interface with the injection molding machine, which makes for easy, optimal operation. The user interface of the temperature controller is transmitted in real time to the machine’s display panel via the Ethernet interface, offering users the same screen experience as is available on the temperature controller itself.

**Everything from a single source**

This production line illustrates once again the benefits gained by users through purchasing “everything from a single source”. WITTMANN and WITTMANN BATTENFELD are the ideal partners for planning and implementing complete solutions, since they combine counseling, execution and service all in one place.
At the beginning of the 1990s, the first rotary wheel dryers based on honeycomb wheel technology were used. These dryers were generally characterized by an extremely constant dew point, but also by an unreasonably high energy consumption. With the new DRYMAX Aton, WITTMANN has revolutionized the drying wheel concept.

Andreas Vierling

After several years of product development, WITTMANN has now succeeded in designing a completely new drying wheel, which for the first time combines the benefits of a constant dew point with high energy efficiency. The combination of these two attributes – seemingly incompatible up to now – has only become possible by deciding at the development stage to discard the honeycomb wheel and pursue a completely new approach.

WITTMANN drying wheel

The result presents itself as a drying wheel divided into numerous stainless steel segments or chambers. These chambers are loosely filled with ball desiccants.

The favorable energy rating is due to the way the chambers are filled, since more effective energy and heat transmission is achieved by strong air turbulence at the molecular sieve. By contrast, honeycomb wheels cause a substantial increase in energy consumption, since they consist of linear carrier plates arranged in a honeycomb design, a structure which produces extremely weak air turbulences.

Another fact in favor of the WITTMANN drying wheel is that, in the case of honeycomb wheel dryers, significant dew point impairments must be tolerated if return air temperatures are high.

Consequently, honeycomb wheel dryers must be equipped with return air cooling. By contrast, the DRYMAX Aton still achieves low dew points even at a return air temperature of 85°C, which generally means that a return air cooling device is unnecessary. A further advantage of the WITTMANN drying wheel is that the standard-type desiccant (zeolite) in the wheel can be replaced quite easily as required, while honeycomb wheels are expensive throw-away items, since replacements invariably have to be purchased from the manufacturer as complete, non-refillable units.

The structure of DRYMAX Aton is simple and solid. The drying wheel is positioned between the two blowers and the process air and regeneration filters.

It is powered by a stepping motor and represents a real power pack in terms of water extraction, operating in a minimum of space. The housing of DRYMAX Aton takes up only about half the space required by a cartridge dryer of similar performance.
Two operation modes

Operation of the drying wheel in two operation modes is truly a WITTMANN exclusive. DRYMAX Aton enables both continuous operation of the wheel and the EcoMode operation mode as an alternative. Continuous operation of the drying wheel ensures a completely stable dew point even with maximum moisture content.

When the water extraction rate declines during the drying process, the regeneration temperature is automatically lowered and adjusted to the actual requirements. Whenever water extraction is low – that is, when the material throughput is drastically reduced or the moisture content declines accordingly due to the type of material being dried – then DRYMAX Aton automatically changes over to the EcoMode. In the EcoMode, regeneration of the desiccant no longer takes place in continuous operation, but sequentially, according to the principle of a cartridge dryer, which is an additional energy-saving factor.

The EcoMode

In the EcoMode, the drying wheel is first stopped, then a certain number of segments or chambers are subjected to regeneration. The SmartReg function ensures optimal energy utilization in regeneration. The newly regenerated section of the drying wheel is then returned to the drying process in two steps. In this way, a stable dew point is also achieved in the EcoMode.

Under partial load, sequential regeneration in the EcoMode leads to energy savings of about 20% – compared to the wheel mode.

Dew point management

In cartridge dryers, dew point-controlled changeover from one desiccant cartridge to the next is a standard option. Whenever a “bad” dew point is measured, the dryer switches over to the newly regenerated desiccant cartridge, which then takes over the drying process.

By contrast, the new WITTMANN DRYMAX Aton is equipped with a genuine dew point control system.

A pre-defined dew point can be maintained by lowering or increasing the regeneration temperature, which in turn leads to granulates dried with high precision. Here, DRYMAX Aton shows much greater reliability than conventional cartridge dryers, even in the discontinuous EcoMode.

The WITTMANN rotary wheel dryer offers dew point control without using a dew point sensor. The water extraction rate measured enables calculation of the dew point, and the regeneration rate can be adjusted accordingly.

This not only lowers the energy consumption, but also helps to precisely maintain any desired residual moisture content in the granulate – even without a dew point sensor. Unnecessarily low dew points which only lead to an increase in energy consumption are a thing of the past.

Easy handling

In the typical WITTMANN manner, the DRYMAX Aton’s clearly structured control panel enables easy operation of the appliance. Lighting in different colors on the outer rim shows in a very simple way the current status of the dryer at any time.

The design of the operating panel is very similar to those of other WITTMANN auxiliaries, which means even easier operation of the device.

The ambiled concept – lighting in different colors on the outer rim of the operating panel – shows the current status of the dryer:

- EcoMode (green)
- Wheel mode (blue)
- Alarm (flashing red light)

Andreas Vierling is the Head of the Bulk Materials Development Department at WITTMANN Robot Systeme GmbH in Groß-Umstadt, Germany.
Conveying

BKF in Thailand working with WITTMANN BATTENFELD

BKF was founded in 1963 as the Bangkua Factory by Mr. Booyu and Mr. Viriya Trangadisaikul. Since then the company has grown steadily and today employs a staff of 850 people and has a registered share capital of 150 millions baht (US$ 3.8 million). Since 2004 BKF is working with WITTMANN BATTENFELD, especially in the field of material drying and material conveying.

Prathin Pratumlai

The continuing success of BKF is due to the company’s recognition of the need to adopt and develop the latest management philosophies and manufacturing techniques through which BKF is able to achieve high levels of customer satisfaction and continued business growth. Some of BKF’s key philosophies and techniques which lead to the company’s sustained business growth are:

• Putting customers first.
• Focus on quality, cost and delivery.
• The use of continuous improvement techniques such as Kaizen.
• Developing and investing in its people to meet customer’s expectations.

BKF’s commitment to quality has led to successfully implement the ISO 9001:2000 quality system, and in 2010 BKF achieved the AS 9000 standard – as the company’s continued growth makes it a part of the international aerospace business. BKF’s core business is situated in the fields of plastic injection molding, aluminum die-casting and the production of rubber tires for motorcycles and bicycles. With domestic automotive markets and international opportunities in aerospace, food/beverage and European railway companies, the business continues to grow.

BKF is continually seeking innovation in its manufacturing processes with the implementation of new technologies. This has led to the collaboration with WITTMANN which began in 2004 with the supply of 6-Series servo robots for use in automotive part production.

The BKF material conveying system

Since the initial orders in 2004 BKF has continued to turn to WITTMANN for the supply of machines and services to support their manufacturing business.
In 2006 WITTMANN BATTENFELD commissioned a material conveying system at the BKF factory with a material throughput of 1.4 tons per hour. The entire system was made up of ten FEEDMAX A315-60 vacuum loaders, two GM 13 vacuum pumps, and the M7.2 network control system.

In 2008 WITTMANN BATTENFELD installed a second system at the BKF factory, namely a complete material drying and conveying system for processing the following materials: PC, POM, PA and ABS. This system achieved altogether a material throughput of 2.0 tons per hour and served 24 injection molding machines. The fully integrated energy efficient drying system consisted of a DRYMAX 900 battery dryer and 10 SILMAX drying hoppers with capacities ranging from 100 to 400 liters. Significantly, the new system was fully integrated into the existing M7.2 network control system, using a BM4/4 type BUS module.

This made it possible to use the key features of the M7.2 network control for the monitoring of the drying process as well as the material flow – by simply consulting the 7” touch screen of the M7.2 control.

This control unit is enabling monitoring all material handling functions, and it is constructed for the further integration of even more equipment when the system is upgraded somewhere along the way.

Energy efficiency and process safety

The WITTMANN BATTENFELD central drying system offers more power while consuming less energy. This system is providing a constant air flow of 900 m³ of dry air per hour. Through the use of dew point sensor technology the drying system is able to switch automatically between two desiccant beds, constantly regenerating one of them.

As a part of the conveying system, BKF has installed a WITTMANN CODEMAX Radio Frequency Identification (RFID) coupling station. Through a network of transponders and a 64 bit identifier, 80 material outlets are controlled and displayed on the M7.2 network control system touch screen. This coupling station solution ensures that there are no connective mistakes in relation to the several material hoppers that would lead to the wrong material being fed to the processing machine.

An all-embracing partnership

BKF continually strives to improve manufacturing processes and controls – and in part does this through seeking the most advanced technology available. BKF CEO, Mr. Chawat Trangadisaikul, clearly recognizes the assistance provided by the WITTMANN products in achieving the BKF business objectives. Thus it is no surprise that BKF is operating 14 WITTMANN servo robots with their injection molding machines, with clamping forces ranging from 220 to 1,600 tons.

In addition to the WITTMANN drying and conveying system, BKF also is using WITTMANN TEMPRO direct C120 temperature controllers and volumetric blending units.

Not least, four WITTMANN BATTENFELD injection molding machines are installed at the BKF plant, namely two HM series machines with clamping forces of 25 and 110 tons, and also two EcoPower series injection molding machines with clamping forces of 110 and 180 tons.

The EcoPower machines provide BKF with the latest in electric molding machine technology. The key features of the machines are their compact injection units, clean clamping units, and a highly efficient direct drive, thus offering BKF the advantages of the highest levels of energy efficiency, precision and cleanliness.

The BKF prospects

The BKF business growth will continue in a number of market sectors, both domestic and international. And BKF will continue to seek the support of WITTMANN BATTENFELD to achieve the company’s business objectives.

Total view of the BKF material drying and conveying system.
The right software to enable super-fast removal of injection-molded parts

“Time is money” – a saying often applied to industrial life, where the number of parts that can be produced per time unit is inversely proportional to the cycle time. A 20% reduction in cycle time to 4/5 would increase the number of parts by the reciprocal value (5/4), that is, by 25%. Some software functions of the new R8.2 robot control system help processors to achieve such ambitious goals.

Johannes Rella

For parts removal robots, the cycle time is the sum of what is called mold-open time plus depositing time. The mold-open time is the time interval for which the robot “stops” the injection molding machine before the mold can be closed again to produce the next part. The mold remains open during the time required for the robot to remove the part including extension and retraction movements.

The depositing time is the time needed for stacking the part. To prevent the robot “stopping” the injection molding machine for any undue length of time for its depositing movements, these movements must take up less time than the total time required by the injection molding machine for closing the mold, injection, cooling and subsequent mold opening.

In most existing injection molding applications, the dynamic functions of the respective robots enable the depositing time to be kept below this limit. But that’s not all.

The operation mode known as EcoMode even offers the option of slowing down the WITTMANN robot fully automatically during the depositing movements, which leads to energy savings and gentle treatment of the mechanical parts, as well as the robot returning to its position above the mold only just before it opens again. Therefore the real challenge in process control is minimizing the mold-open time.

WITTMANN robot control with “smart” functions

With the option of slurred movements, WITTMANN parts removal robots have always been capable of extremely close adjustment to the various time limits.

With the anew enhanced control software for the series 8 parts removal robots, WITTMANN has now taken a remarkable further step forward and claims to reduce the total removal time to the absolute minimum that is allowed by the given mechanical conditions in each case (e.g. acceleration capacity).

This is made possible by some “smart” software functions which enable the operator after only a short training session to teach the device time-optimized and simultaneously safe parts removal.

Extension into the mold area

The time-optimized extension movement into the mold area sets in even before the mold is completely opened. When using the SmartRemoval extension function, the robot does not wait directly above the closed mold in the usual way.

Instead, the vertical removal axis accelerates in the 0-position, so that it has already reached the optimal speed and distance to the mold as soon as the mold is open. This approach enables the robot to move into position more quickly for parts removal.

The situation can be illustrated by a comparison with road traffic. When a vehicle moves towards a red traffic light and the driver recognizes in time before the vehicle...
stops that the signal is changing to green, and provided the
distance to the traffic lights at that time does not exceed
a certain limit, then this vehicle has a ‘head start’ and will
quickly overtake any other vehicle waiting in front at the
lights which has to accelerate from a standing position.

Applied to the parts removal robot, this type of proce-
dure leads to a time cut of about 12% compared to conven-
tional, slurred extension movements.

Moreover, the SmartRemoval function’s extension com-
mand allows essentially earlier execution of subsequent
teach commands, such as the release of the extension
stroke for the ejector and activation of the vacuum valves
on the gripper.

In this way, the ejection movement can already be trig-
gered up to 250 ms prior to reaching the removal position.
Gripping of the part requires negative pressure build-up in
the vacuum valves.

Here, another opportunity for process optimization
presents itself, where the system continuously monitors the
vacuum and releases the extension movement at precisely
the point of time when the preset minimal negative pressure
has been reached.

A further significant reduction in the linear robot’s
extension time is possible if the injection molding
machine issues an appropriate signal as soon as a preset
interim position in the mold opening movement has been
reached.

Then the SmartRemoval extension movement can be
calculated with reference to this interim posi-
tion, which can lead to additional time savings of
some 100 ms. In this case, the horizontal stroke is
delayed until the mold is completely open to prevent
a collision.

**Smart Removal and the extraction from the mold area**

When SmartRemoval is applied to the extraction
movement, here also the time-optimized path for the
combined horizontal and vertical axial move-
ments is calculated first.

It is impossible to lift the axis out of the
mold area faster than the robot’s kinetic capa-
city will allow. But if the robot and/or the control
system are equipped with the additional option of
“emulate mold safety switch in software”, the
release signal for closing the mold and the “mold
area free” signal are already transmitted to the
injection molding machine up to 250 ms prior to
leaving the mold area – at the earliest, though,
when the continually and dynamically calculated
braking point of the robot has moved out of the
mold area.

Thus reaction times resulting from relay switch-
ing times and mold initiation times can be compen-
sated for, where the latter can be quite considerable
in the case of hydraulic machines. With this option,
an additional cut in mold-open time of 100 ms on
average can be realized.

**More process security through parts deposit monitoring**

Furthermore, a teachable SmartMonitoring func-
tion checks whether the part is in fact still correctly
attached to the gripper immediately before the
movement of closing the mold is released.

In this way, closing of the mold on a possibly lost
part is prevented. Thanks to this delayed, precisely
timed activation of monitoring, no incorrect trig-
ger will occur during the strongly accelerated
extraction movement. This parts monitoring func-
tion remains active throughout the entire depositing
process.

Johannes Rella
is Head of the Software Develop-
ment Department at WITTMANN
Kunststoffgeräte GmbH, Vienna.
A Polish farmer came up with an interesting challenge for WITTMANN BATTENFELD: he wanted a system for the optimal production of a disposable package. He needed stackable crates that were easy to handle, and that could be filled with bulk white mushrooms. The crates needed dimensions of 400 × 300 × 110 mm, a maximum weight of 200 g, and they should consist of 100% reclaimed PP MFI 16. Each crate would have to hold 3,000 g of white mushrooms.

Of course the sufficient stability of the stacked crates had to be ensured to prevent damage to the mushrooms during shipment to the customer. From this the requirement arose to produce lightweight parts that should also have extreme strength – molded at a maximum speed.

For the customer, this meant the entry into the manufacturing of plastic parts – and this had to lead inevitably to a comprehensive advisory service during the project planning. The customer needed the entire equipment, and thus, WITTMANN BATTENFELD was responsible for coordinating the whole project: the machine, the mold, and the auxiliaries.

**Machine and mold**

The application is running on a TM Xpress 450/2250 hybrid machine with a clamping force of 450 t. The machine is equipped with a high-performance injection unit and plasticizing system making it the ideal solution for the packaging industry – an industry that has to
Injection Molding

The finished product, ready for its delicate load.

The material feeding takes place via a WITTMANN FEEDMAX conveyor – directly from a container standing beside the machine.

The entire energy consumption (including machine, mold, and auxiliaries) for the crate production is 0.68 kWh/kg. The actual cycle time is 9 seconds.

A special advantage occurs from the fact that because of the hot runner, the parts can be molded without any sprues.

Low weight of the finished parts at an adequate loading capacity and economic production of large quantities: once again, due to their possibilities, WITTMANN BATTENFELD has succeeded in meeting all these requirements.

Gabriele Hopf is Head of the Marketing Department at WITTMANN BATTENFELD in Kottingbrunn, Lower Austria.

Since only reclaim material is processed, a ROKO filter nozzle is applied to separate even very small foreign particles from the melt.
The Turkish branch of WITTMANN BATTENFELD in Istanbul

WITTMANN Turkey was established in 2006 in Istanbul. Muzaffer Engin joined WITTMANN Turkey as a Sales Manager in 2008. On April 1st, 2009 he took over his current position as the Managing Director. WITTMANN BATTENFELD Turkey has successfully coped with the global recession, and is expanding again.

Like the other comparable markets all over the world, the Turkish plastics industry was hit hard during the economic crisis in 2008 and 2009. One of the hardest hit sectors was automotive, which is looked upon in Turkey as the “locomotive” of the plastics injection molding market. The first signs of improvement appeared in the second half of 2009. WITTMANN BATTENFELD chose the right moment to launch their promotion activities, and they nearly immediately were awarded several important robot projects.

**Market position**

Today, WITTMANN has become one of the well-known robot suppliers in Turkey, and the number of robot customers has increased by about 70 percent within the last 2 years. In Turkey, EOATs (end-of-arm tooling) have been designed and assembled in-house for a long time – even for complicated applications.

For customers requesting turnkey solutions, the Turkish WITTMANN BATTENFELD team also supplies conveyor belts and other auxiliary equipment, including “water products” such as temperature controllers and water flow regulators, and is supplying high-capacity central drying systems.

**Customer proximity**

WITTMANN BATTENFELD Turkey works to create long-term business partnerships with local plastics injection molders. Therefore, they see their job as much more than supplying the respective equipment to the sector. As being partners of their customers, they work to realize only the best cus-

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WITTMANN BATTENFELD Plastik Makineleri Ltd. Sti. in Istanbul. It is planned to move to bigger premises this year.

General Manager Muzaffer Engin (third from the left) and the Turkish WITTMANN BATTENFELD core team.

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Because of anticipated growth, the Turkish office is planning to move to bigger and even better equipped premises this year.

The new facility will feature at least one injection molding machine for demonstrating in-house all the possibilities that WITTMANN BATTENFELD injection molding and auxiliaries technology can offer.

**The Turkish market**

Automotive, white goods and packaging are the main sectors of the plastics injection molding industry in Turkey – especially automotive, where the country has become one of that sector’s biggest players. There are plans in the industry to increase the production of cars from 1 million vehicles per year to 1.8 million – within the next 5 years.

Most forecasters think that it will not be possible to employ enough workers to keep up with this growth. Therefore, it is becoming more and more important to employ robots to meet the expectations concerning increased productivity and better quality. WITTMANN BATTENFELD and other international companies that are setting up offices in Turkey are realizing increased business as the country’s need for plastics machinery and equipment continues to grow.

WITTMANN BATTENFELD Turkey is poised to enjoy a leading market position due to superior products, technology, and customer service.