

A close-up, low-angle photograph of several parallel, polished metal rollers or shafts. The rollers are arranged in a perspective that recedes into the background. The lighting is dramatic, highlighting the metallic sheen and the rounded edges of the rollers. The background is blurred, emphasizing the foreground rollers.

*Wittmann*  
**innovations**

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The cover photo shows a detailed shot of a number of plasticizing screws.

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**Wittmann**

# Editorial

Dear Reader,

A few days ago, a headline in the daily newspapers made me smile: "The EU Commission promises to cut bureaucracy." According to this, 25 percent of the reporting requirements for companies are to be



eliminated in order to make the EU more competitive. Please forgive me for remaining skeptical. The idea that the EU Commission could withdraw regulations that were previously laboriously negotiated by politicians who rarely come into contact with business seems too far-fetched to believe.

However, if the promise is meant seriously, then it would be advisable to repeal or postpone current regulations. That would be a very quick and promising approach.

A suitable example is provided by the Supply Chain Act, which will be binding for companies with more than 1,000 employees from next year. The current regulation ap-

plies to companies with more than 3,000 employees. The approach of EU politicians that such companies (which are small on the international market) have an influence on their possible non-European suppliers or can carry out on-site inspections to ensure compliance with all due diligence requirements is an unrealistic assumption. The purchasing volume for these company sizes is too small to have any leverage for change.

Obtaining the necessary commitments from suppliers will represent a major organizational and personnel challenge. But I like to be surprised. Perhaps the EU Commission is jumping over its own shadow.

Let's come to a more pleasant topic – the upcoming Fakuma 2023. This trade fair will once again provide an ideal platform for countless new presentations and innovations from our company. In addition to our

nine new products, trade fair visitors will find an energy efficiency path at our booth 1204 in Hall B1. This also consists of nine stations and includes devices on which energy analyzes usually focus, preferably injection molding machines, temperature control devices and intelligent cooling water distribution.

Devices that appear prominently in a company's energy demands and costs (but have not yet really come into focus) also play a role on this path. These include material dryers, vacuum conveyors and granulators. The energy efficiency path shows a wide variety of approaches to achieving lower energy consumption. Some of these can be practically managed for free and sometimes through optional equipment and functions.

Please make sure to visit our exhibition stand and follow the energy path! It would be our pleasure to see you there.

And now I hope you enjoy reading this issue of *innovations* magazine.

Very cordially yours, Michael Wittmann

# Content



Page 4: We present the numerous innovations from the WITTMANN Group shown at Fakuma 2023.



Page 9: The FIT FOR ENERGY program from WITTMANN BATTENFELD in Germany.



Page 10: MESTO, Germany, saves space and energy.



Page 12: PowerSeries for processing LSR.



Page 14: New central system at Praher, Austria.



Page 16: Energy efficient tempering process.



Page 19: Expansion of WITTMANN USA.

# WITTMANN is setting off a fireworks display of innovations at Fakuma 2023

The WITTMANN Group is using this year's Fakuma in Friedrichshafen, Germany, to present a record-breaking number of new developments in a wide variety of areas. From October 17<sup>th</sup> to 21<sup>st</sup>, the company will be presenting its current innovations in the areas of automation and peripherals as well as brand new injection molding technology with minimal energy consumption at stand 1204 in Hall B1.

## Even greater energy efficiency with the new EcoPower B8X

At the Fakuma 2023, WITTMANN BATTENFELD will present for the first time its new EcoPower B8X, which offers several advantages in addition to a further reduction of its energy consumption compared to its predecessor version. Particularly noteworthy here are above all the innovations in the areas of the injection unit, the toggle lever and the machine's dynamism. For instance, the new injection unit is pivotable and oil-lubricated instead of grease-lubricated, whereby the mechanical resistance is reduced, thus leading to an improvement in the machine's dynamism. In combination with a range of additional injection unit sizes, this has a positive effect on the energy balance. The design of the toggle lever itself has been optimized in terms of dynamism and service life. The faster injection units in combination with the highly dynamic toggle lever enable extremely short cycle times.

The B8X control system comes with several system components developed in-house. These enable a higher internal clock frequency, consequently shorter response times to sensor signals and thus a higher reproducibility of parts, with comfortable operation and familiar visualization remaining unchanged.

The new EcoPower B8X will be available to the European market in clamping force sizes from 550 to 1800 kN from the Fakuma 2023 onwards.

The functionality of the new EcoPower B8X will be demonstrated on an EcoPower 110/350 B8X in combination with the new WITTMANN sprue picker model WX90, designed as an Insider cell with an integrated



The EcoPower 110/350 B8X. With the development of the PowerSeries, WITTMANN BATTENFELD has created a machine series characterized primarily by high performance and repeatability combined with low energy consumption. Thanks to continuous optimization of these machines performance capacity and cost efficiency, WITTMANN BATTENFELD now offers a range of machine models which play a pioneering role on the market in terms of energy efficiency.

parts chute and an S-Max screenless granulator, plus a WFC120 flow controller. With this production cell, a bracket for a climbing net will be produced using an 8-cavity mold supplied by Lechner, Austria. The sprue will be removed and transported directly into the granulator integrated in the machine, by the WX90, which is also integrated in the B8X control system. There it is ground and subsequently returned to the process.

## EcoPower DC – direct current as energy source in injection molding technology

Solar cells on corporate roofs offer companies the possibility to generate their own electricity and thus not only to save costs but simultaneously protect the environment.

WITTMANN BATTENFELD has investigated the question of how the direct current generated by solar cells can be used effectively for running injection molding equipment directly without first passing through inverters. The conceptual study about this subject was presented for the first time at the K 2022. Meanwhile, WITTMANN BATTENFELD has taken further development steps to advance this type of technology, since the use of direct current to operate an injection molding machine has a number of advantages. Firstly, the energy costs can be kept low by the direct use of solar power, and secondly, direct current can easily be stored in conventional batteries as an ideal solution to cover expensive current peaks and to increase supply security. Moreover, the

use of direct current technology leads to increased energy efficiency, which contributes to reducing CO<sub>2</sub> emissions and to preserving resources.

At the Fakuma, this technology will be demonstrated on an EcoPower 180/750+ B8X. With a single-cavity mold from the Austrian company Kunststofftechnik Grabher GmbH, a drainage body will be manufactured from polypropylene. The part will be removed by a modified WX142 robot in DC version from WITTMANN, which draws its power supply directly from the interim DC voltage circuit of the EcoPower and also returns any surplus energy to the interim circuit whenever the axes are delayed. To enable a live presentation of the DC technology to the visitors, the machine remains disconnected from the mains network of the exhibition hall during the fair and is powered independently via a solar power storage battery consisting of ultra-modern, ecological salt battery technology supplied by Innovergy. The battery has a total capacity of over 45 kWh, which is more than sufficient for continuous machine operation throughout an entire 8-hour trade fair day.

### WX90 extends the WX series

The WITTMANN Group owes much of its high level of brand recognition to the success of its extremely flexible robots. The Sonic robot series excels in high-speed applications. The WX series with payloads of up to 150 kg offers a solution for almost every task that arises in automation of injection mold-

ing systems. Robots from the Primus series excel in pick&place applications. In injection molding automation, however, applications in the area of efficient part handling and sprue removal respectively should also not be forgotten. WITTMANN is therefore taking the Fakuma 2023 exhibition as an opportunity to put a special focus on sprue removal.

For a long time, the requirements of the users had not changed fundamentally, apart from special requests for the stroke axes. During the last two years – and especially with regard to the most energy-efficient solutions possible – the desire for a full-servo solution and more flexibility was repeatedly expressed, with the sprue nipper still being driven pneumatically.

At the Fakuma 2023, WITTMANN will present for the first time the WX90, a servo-driven removal device.

At the WITTMANN Group's booth, an Insider work cell with an integrated billet chute will manufacture a holder for a climbing net. The work cell consists of an EcoPower 110 injection molding machine, the new WX90 and an S-Max screenless granulator. The sprue ejected from the machine will be taken by the WX90 robot and – using a rotary servo axis – will be swiveled from the mold area to the opposite side of the operator and thrown onto the chute.

This work cell design allows the manufacturing footprint to be significantly reduced, thus enabling higher production capacity. Thanks to faster and more controlled axes, the removal time in the mold area is reduced. Last, but not least, the compressed air consumption is minimized. All of this innovation shortens the time taken for return on investment, often to just 18

months (considering current energy costs). The WX90 robot presented at the Fakuma is ideally used on machines with clamping forces of 35–150 t. The application shown presents the WX90 as fully integrated into the injection molding machine, which in turn means that the R9 robot control is also fully integrated into the injection molding machine. This means that there is no need for a control cabinet for the robot, the costs for the device are reduced, and also the space required for the protective housing is reduced. The integration of the device results in a further advantage: the control program of the WX90 is directly linked with that of the injection molding machine. This ensures optimal coordination between the different devices in the cell. The large machine display also reproduces the robot control. A small display – as is often the case with similar devices – is a thing of the past thanks to this solution.

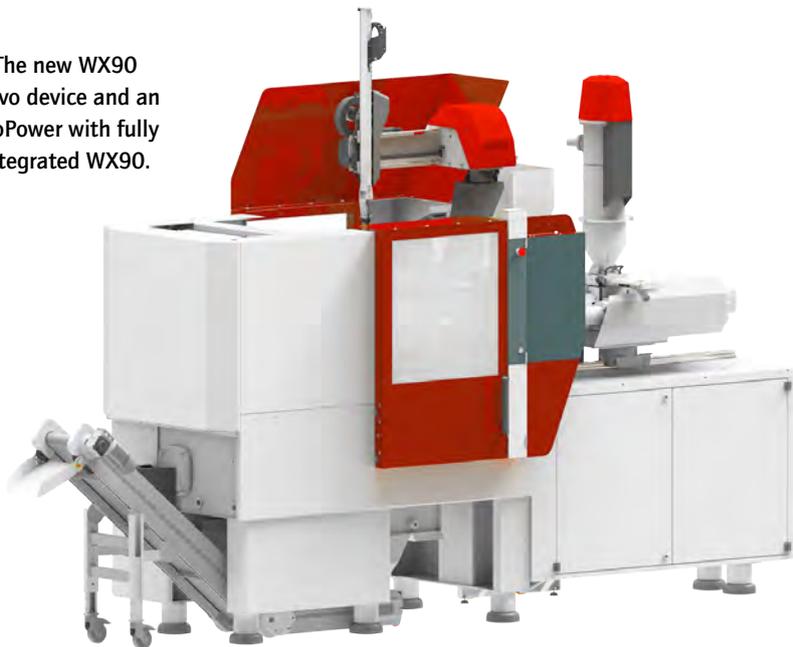
In addition to the Fakuma version with the pneumatic nipper, the WX90 can be equipped with a vacuum circuit. This also enables the device to remove finished parts. This increases the field of application of the removal system even further. Further versions of the device are already being planned. The sales appeal for this integrated work cell consisting of injection molding machine and WX90 can be expected in time for this year's Fakuma show.

### Primus 28

A few years ago, WITTMANN was able to successfully place the Primus robot series on the market. The latest Primus model in the series will be presented for the first time at Fakuma 2023: the Primus 28.



The new WX90 servo device and an EcoPower with fully integrated WX90.



The standards for pick&place applications are becoming more and more demanding. For example, larger removal grippers are used more frequently. These require an extremely stable axis structure in order to be able to absorb the torques that occur during the movement phases. The new Primus 28 meets precisely this special requirement thanks to its vertical Y-axis that is based on a steel profile.

Compared to most other common materials, steel offers decisive advantages, especially with regard to its bending and torsional rigidity. The Y-axis is driven by a rack and pinion, with the rack attached to the steel profile further increasing the overall rigidity. So that the user does not incur any additional maintenance work, the Primus 28 is equipped with a lubrication system for the vertical axis as standard. This ensures the constant supply of lubricant and thus the smooth and low-wear operation of the drive system.

The variant presented at the Fakuma show is designed for a payload of 15 kg. Other versions with vertical strokes of up to 1,600 mm are available.

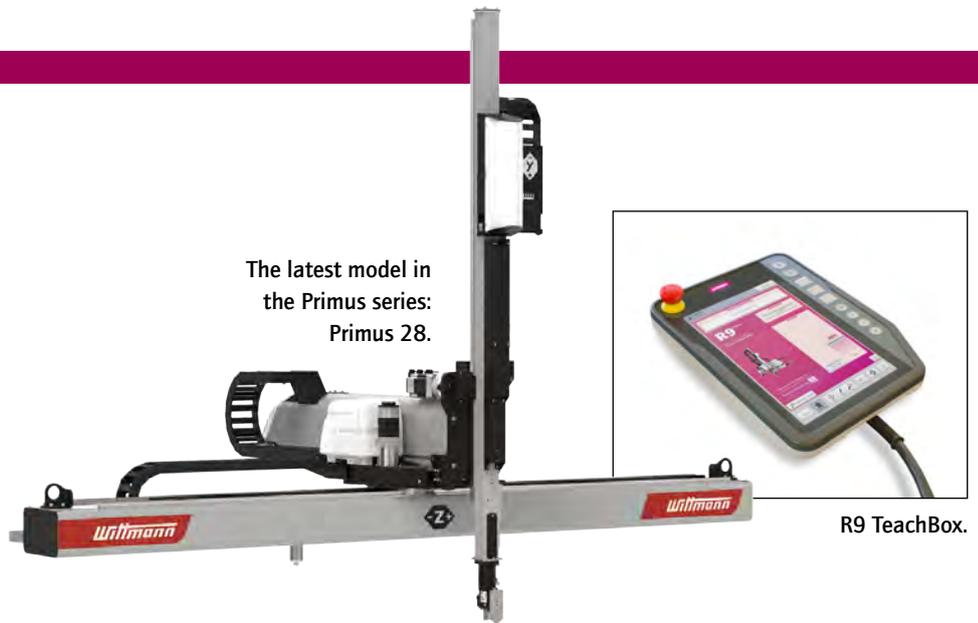
### R9 control for Primus robots

In addition to the new Primus 28 with a new drive and increased load capacity, another innovation will be presented at Fakuma that affects the entire Primus series.

The R8 control has been in use with WITTMANN servo robots worldwide since 2008. The new R9 control generation was introduced for the WX and W9 robots four years ago. Software features such as 3D simulation, torque monitoring (ACD) and the simple connection to production control systems using the OPC UA interface led to high acceptance and customer satisfaction. Further developments and cost optimizations now make it possible to offer the R9 control for the Primus robots. The features previously offered will of course continue to be available.

The R9 control has a particularly powerful processor, a larger 10.1" display, and it is now possible – as before for WX and W9 robots – to carry out the complete programming for Primus robots on the PC. The programs are saved on the PC stored in a separate folder and later transferred to the robot, which saves operators time in production.

In order to make it easier to distinguish the Primus robots with the new control from the previous devices, Primus robots with the R9 control also receive the number 1 in the device name. For example, the Primus 16



The latest model in the Primus series: Primus 28.

R9 TeachBox.

(R8 control) becomes the Primus 116 (R9 control). It goes without saying that the supply of spare parts for devices with R8 controls is guaranteed for more than twelve years.

Both Primus robots on display at this year's Fakuma (Primus 116 and Primus 128) are equipped with the new control.

### Tempo plus D200 EcoDrive

With its Tempo plus D200 EcoDrive high-temperature water device, WITTMANN is using Fakuma 2023 to expand the tried-and-tested range of temperature controllers in the Tempo plus D series – and thereby responding to the increasing number of inquiries for energy-efficient high-temperature solutions.

The maximum operating temperature of the new water temperature controller is 200°C. It is also important to note that the high water temperatures and the pressures they require increase the demands on the durability of tools and mechanical components. The baseline requirement for this new device is that its components that come into contact with the medium are made of stainless steel in order to counteract possible corrosion. And thanks to the sophisticated design, the water quality is kept constant through the use of special fine filters in the mold circuit.

The operation of the Tempo plus D200 EcoDrive has also been kept as simple as possible: This includes fully automatic cooling and mold emptying, as well as the option of recording the process data and of downloading these data via a USB interface.

Last but not least, the Tempo plus D generation of temperature controllers offers the option of integrating the device control into the control of the injection molding machine via Wittmann 4.0. In addition, OPC UA or Euromap 82.1 interfaces are optionally available.



The new WITTMANN Tempo plus D200 EcoDrive high temperature device.

The process parameters of temperature and pressure are all permanently monitored. A standard temperature controlled cooling water bypass prevents any temperature related damage to the return lines of the cooling system. The extensive standard equipment of the Tempro plus D devices also includes automatic leakage and hose break monitoring and a pump pressure monitoring. In addition, all pumps of the Tempro plus D pressure devices are equipped with magnetically coupled pumps and are operated without mechanical seals.

The special option for the new Tempro plus D200 temperature controller is the EcoDrive pump. This frequency-controlled pump of energy efficiency class IE4 allows the process to be controlled using the freely selectable parameters pressure, temperature and rotational speed – maintaining the necessary process reliability.

### Screenless granulator S-Max Dual 6

The S-Max Dual 6 is the ideal granulator for central scrap reclamation, but can also be used for inline recycling of sprues from injection molding machines. It substitutes the forerunner model Junior Double 6. The main design difference between the two models: the new S-Max Dual 6 is driven (just like the forerunner model) by two gear motors with 2.2 kW; however, these are now installed vertically for the smallest possible footprint to accommodate tight spaces in shop floors.

The S-Max Dual 6 is designed for a throughput maximum of 40 kg/h. It is equipped with two counter-rotating cutting rotors as standard, with six blades and eight toothed rollers in total, and a cutting chamber with dimensions of 530 × 467 mm. The design of the granulator allows for easy and safe cleaning of the cutting chamber due to free access from the top. The speed of rotation is 27 rpm, ensuring maximum torque for the granulation of hard and brittle materials, as well as materials that are filled with glass fiber. Low granulator speed also means less wear on cutting tools for reduced maintenance, low sound levels, and low energy consumption. The low speed also decreases flyback during operation and provides a consistent regrind and better quality, minimizing dust and fines.

An optional feeding shaft keeps large runners/parts in motion, and pre-breaks them, thus helping to avoid bridging or nesting of parts within the material hopper. The shaft also helps to avoid downtime eventually caused by material backing-up or material overflow, and keeps the production process running smoothly. The optional



Cutting chamber with the additional feeding shaft in the swiveling part of the material hopper.

feeding shaft is completely independently driven and it has elongated hooks to pre-cut the plastic parts/runners and push them into the cutting chamber for a subsequent regular feeding. The feeding shaft therefore reduces the dimensions of the parts before they reach the cutting chamber, and this may allow the use of an altogether smaller type of granulator, possibly saving capital expenditure.

An optional Automatic Reversing System (ARS) boosts the cutting performance under high load conditions. The ARS helps minimize blockages in the cutting chamber and aids the granulation of thick-walled or harder plastics such as those heavily reinforced with glass fiber. The ARS enables the granulator to determine if the resistance to the cutting rotor is too high. When this should be the case, the rotor reverses, thus repositioning the part, allowing cutting from a different angle. The sound-insulated feeding hopper of the S-Max Dual 6 is made

of stainless steel. It features a viewing window that allows the filling level in the cutting chamber to be estimated and the material flow to be checked – without the need to switch off the granulator.

Toothed rollers are available with teeth in different sizes: 5, 7 and 10 mm, to obtain regrind with different particle size.

### Central conveying control E-Max 2

With the presentation of the new E-Max 2, the road to success – that was taken with the widely used WITTMANN forerunner model – will continue uninterrupted. The E-Max 2 is a compact conveying control system that can be used to implement material conveying with up to 24 conveying points and up to two vacuum circuits.

The central material loaders used can be connected to the central conveying control in a very simple manner, which enables a material conveying system to be set up quickly and easily. If the requirements increase, the system can be expanded just as easily to include additional material loaders. The E-Max 2 is operated and visualized via a high-resolution 5.7" touch display. Simple



E-Max 2 control and TeachBox plus.

settings can be made conveniently via the display. It is also possible to make more extensive entries of different conveying parameters – with the goal of optimizing the processes in the conveying system. The E-Max 2 has a user administration that can be used to define access rights, thus additionally securing the system.

The E-Max 2 material conveying control represents the optimal solution for small to medium-sized material conveying applications. It easily masters an expansion of the production, up to the expansion of the system to a comprehensive central material conveying system.

### Drymax plus 30 / Drymax plus 60 mobile dryers

The new Drymax plus series of mobile dryers is available with dry air volumes of 30 and 60 m<sup>3</sup>/h and is therefore an optimal solution for small to medium-sized material throughputs. A dew point of up to -60°C ensures the ideal degree of drying for further processing. Depending on the types of plastic to be dried, the Drymax plus mobile dryer series can be equipped with drying hoppers with a volume of 30 to 300 liters.

The new graphical user interface of the 5.7" touch screen is designed to be very user-friendly and enables the drying process and the integrable conveyors to be controlled in a simple manner. The respective drying parameters can be saved in an integrated material database or loaded when the material is changed, so that the right drying settings are immediately available at any time.

The additional Ambi-LED status display in the front door of the mobile dryer gives the operator feedback on the current operating status at a glance, without having to consult the screen display.

An OPC UA interface enables automated data exchange for the new Drymax plus series, a function that can be used for documentation, for example, in quality management.

### EcoDrive vacuum pump with automatic load control

The new EcoDrive vacuum pump from WITTMANN automatically optimizes the energy consumption of central material conveying systems – reliably carrying all materials to their usage point.

Despite this new and added function, the usual simple and convenient way of operating the entire system remains unchanged, since the optimization steps of the EcoDrive vacuum pump are carried out in the back-



Drymax plus.

ground without the system operator having to do anything here. By using appropriate monitoring mechanisms and the associated technology of automatic EcoDrive load control, energy savings of up to 75% can be achieved, depending on the system configuration.

The flexible design of the EcoDrive vacuum pump makes it possible to use this new technology in both new and existing systems. This represents another important step in efforts to optimize the energy consumption of plastics production and, last but not least, to reduce energy costs.

### Dosing of color and recycling materials with the help of sensors

WITTMANN Gravimax and Wittmann 4.0 technology is helping to meet new challenges in the processing of recyclates – challenges that were previously unknown when using only virgin material. The color and composition of recyclates – especially with regard to the characteristics of the finished

component – are crucial factors. It is now important to detect, for example, recyclates that were produced from non-food-grade products and to prevent their use in the food-grade area. The sensory monitoring of the material flows therefore – with regard to the purity and history of the recyclates and their inherent color – is essential for automated material management and for the best possible quality and high cost-effectiveness.

The sensors required for automated material testing can be mounted directly on the sight glasses of Gravimax dosing devices. Thanks to Wittmann 4.0 connectivity, the digital data from the processing machines can be linked to that of the Gravimax dosing devices or the entire dosing process respectively. The validation of different granules takes place in real time and controls the approval process of the processing machine. There are three different measuring methods available in parallel for material testing, these categorize the granules according to color and type of plastic, as well as marked plastic material.

The so-called 0°/45° method serves as the basis for the color measurement. Here the material is illuminated at 0° and detected at 45°. Measurements are made using the tristimulus method, also to determine the type of plastic. However, in contrast to color determination, measurements are taken in the near infrared range. The wavelength range is divided into three measurement windows from 1,000 nm to 1,700 nm, which are then standardized and compared with each other.

In addition, and with the help of phosphorescent markers in the plastic granules, the future intended use (e.g. non-food area) of the granules can be determined. The markers embedded in the granules can be detected with the help of light excitation and corresponding evaluation sensors. Different markers are available for this purpose and these can complement each other.



Vacuum pump and XMB filter station.

# FIT FOR ENERGY: save energy efficiently, individually and flexibly

When it comes to saving energy, the question is not whether, but rather how you can get the most out of it. With FIT FOR ENERGY, WITTMANN – the system partner for the injection molding industry – supports plastics processors in finding and implementing the right measures.

**Andreas Schramm**

In order to identify savings potential, it is important to proceed in a structured manner. WITTMANN has put together three service packages for this purpose.

What's new and special in this approach? Our offer applies not only to WITTMANN's own machines and production systems, but also to systems from other brands. The WITTMANN system works holistically and focuses on its customers' entire machine park.

## Transparency is all about the energy consumers

First of all, energy issues are about transparency: With our entry-level package, the respective energy consumption of injection molding machines is determined and documented in accordance with Euromap 60.2.

The second package goes one step further and includes energy issues of the entire production cell, including peripherals in measurement activities. Based on the data collected, the potential for energy savings is shown, from the injection molding machine to the peripherals, to the cooling water and compressed air consumption.

The premium package then includes the implementation of energy efficiency measures. Energy consumption is recorded and analyzed across the entire production cell and then the change measures – together with the processor – are decided upon and initiated. The package includes a follow-up measurement in order to make the success visible. The three packages are also coordinated with each other. If the customer initially decides on the entry-



Ensures transparency across all energy consumers in the machine park: the energy analysis tool IMAGOxt.



A strong team working for FIT FOR ENERGY: Michael Halfbas, Daniel Eckstein, Stefan Schübler, Daniel Greitsch, Markus Walus, Martin Dröscher. (left to right)

level or extended package, he can upgrade to the scope of advice of a higher-quality package at any time.

## Everything, from energy measurement to funding applications

WITTMANN has consistently invested in the FIT FOR ENERGY program, including matters of measurement and analysis equipment. In addition, the energy analysis tool IMAGOxt was developed, which records and analyzes energy data from both individual machines and at the production level.

The employees were also consistently trained for the new consulting tasks. Experienced application and service technicians who understand the injection molding processes in depth are now available to the processors for measurement, analysis and advice. As a system provider with its own high level of development expertise in the areas of injection molding machines, automation, material handling, temperature control and digitalization. In this way WITTMANN cov-

ers all energy issues throughout the entire injection molding cell. No other provider on the market can therefore analyse and improve performance in this way.

Through close partnerships with energy consultants, especially in Germany, the WITTMANN experts have also acquired much additional know-how in promoting this kind of investment. The successful joint implementation of funding applications has long been an integral part of sales work.

The conservation of resources is the focus of all new and further developments in the WITTMANN family business – both in our own factories and in all customer projects. Our processing community reaps the benefit both from individual advice and flexible implementation. In short, we believe that energy efficiency in plastics processing cannot be achieved more effectively.

Andreas Schramm is Managing Director of WITTMANN BATTENFELD Deutschland GmbH with locations in Meinerzhagen and Nuremberg.

# MESTO saves space and energy with the WITTMANN Group

The sprayer manufacturer MESTO based in Freiberg/Neckar relies on injection molding machines from the WITTMANN Group to modernize its machinery. Apart from reliability and quality of service, the most attractive features of these machines are their low energy consumption and compactness.

**Gabriele Hopf**

**T**he MESTO Spritzenfabrik Ernst Stockburger GmbH, a German family-owned company in the third generation, was established in 1919 by Karl and Ernst Stockburger as a metal workshop. Its initial business consisted of repairs and locksmith work.

In 1925, it started its production of spraying equipment. Today, the company with a workforce of 120 employees ranks among the leading manufacturers worldwide in the spraying equipment sector, making one million sprayers annually on 9,000 m<sup>2</sup> of production floor.

## Represented on many markets

In the 1970s, MESTO started the production of plastic parts for its appliances, which was further extended with the construction of a new production hall in 2012. Its high vertical range of manufacture is one of the company's vital success factors.

Plastics injection molding, metalworking and assembly are all located in-house, to enable the production of steel and stainless steel containers as well as all necessary plastic parts, including appliances completely made of plastic.

## Focus on sustainability

The appliances from MESTO stand out in particular by features which give the customers added value. These are, for example, the ergonomic design of the sprayers for fatigue-free working, long service life of the appliances due to their robustness, as well as guaranteed availability of spare parts for 20 years. The products are marketed partly as catalog goods and partly developed and manufactured for OEMs.

Typical customer segments are industry and tradespeople, home and garden, the food industry, fruit growing and viticulture, agriculture and forestry, the automotive sector and cleaning services. A product line of special interest to MESTO is sprayers for



View of the MESTO production floor in Freiberg/Neckar, Germany. (Photo: MESTO)

disease control, and here in particular for fighting malaria. MESTO's range includes an appliance certified by the WHO which was specially developed for this purpose. With this appliance, MESTO is one of the mere handful of manufacturers worldwide which cater to this segment.

The aspect of sustainability is also given a high priority at MESTO. For instance, recycled material is used for producing non-pressurized parts. A photovoltaic system is currently being installed, and the waste heat from the injection molding machines is used for heating.

Élise Sellmayr, Manager of Production Technology and Process Optimization at MESTO, points out that a significant amount of energy savings has also been achieved by replacing old injection molding machines with new ones. Élise Sellmayr explains: "The decision to replace the first

old machine models was made in order to improve quality standards and reliability. After a substantial reduction of electricity consumption was measured with the new equipment, this aspect was another decisive motive for replacing more old machines. In this way, electricity consumption has been reduced by 30% since 2017 by exchanging eight of a total of 16 existing machines for new ones from WITTMANN BATTENFELD."

## Partner WITTMANN Group

Currently, a total of 15 injection molding machines are operating at MESTO, ranging from 250 to 5,000 kN in clamping force, 11 of which have come from WITTMANN BATTENFELD.

The machines delivered since 2017 are models from the servo-hydraulic SmartPower series with clamping forces from 600 to

3,500 kN, as well as one MacroPower with 5,000 kN clamping force. The machines from the SmartPower series stand out by their high level of stability, energy efficiency and compactness. Most of the machines come equipped with linear robots from WITTMANN.

One SmartPower 350 injection molding machine is designed as an Insider cell, which means that the W831 robot from WITTMANN, a conveyor belt and the protective housing are all integrated in the production cell – a solution greatly appre-

ciated at MESTO due to the amount of space saved by the system's compactness, and one which will also be considered for the acquisition of future production cells. On the most recently delivered SmartPower 350, an automation system designed by WITTMANN BATTENFELD Germany based in Nuremberg has been implemented, which includes a separation and feeding device for insert parts and a stacking unit.

At present, an additional SmartPower 180 equipped with a robot and automation will be delivered. The object of this project

is to feed various metal inserts to the machine for overmolding. In addition to the machines with automation, MESTO has also ordered a printing station for plastic parts from WITTMANN BATTENFELD Germany.

Apart from their high energy efficiency, the injection molding machines are appreciated at MESTO primarily for their compactness and reliability.

The possibility to obtain machines, automation and auxiliaries all from a single source from WITTMANN is also becoming



The WITTMANN W831 robot places components for 3-bar sprayers on the conveyor belt. (Photo: MESTO)



In front of the SmartPower 350/2250 injection molding machine, from the left: Michael Wittmann, WITTMANN BATTENFELD Sales, Johannes Stuber, Production Manager at MESTO, Élise Sellmayr, Manager of Production Technology and Process Optimization at MESTO, Simon Heber, Process Engineer for Plastics and Rubber Technology at MESTO, and Domenico Scavello, WITTMANN BATTENFELD Sales.



From left to right: Three 3-bar pressurized sprayers and three 6-bar high-pressure sprayers from MESTO. (Photo: MESTO)

more and more important for MESTO. Johannes Stuber, Production Manager at MESTO, particularly appreciates the good cooperation with the WITTMANN Group right from the concept planning stage. Johannes Stuber comments: "What gives WITTMANN BATTENFELD a competitive edge is above all its excellent service. In combination with its energy-efficient, compact, complete solutions, this is a decisive factor for us in the joint implementation of any projects."

Gabriele Hopf is the Marketing Manager of WITTMANN BATTENFELD GmbH in Kottlingbrunn, Lower Austria.

# Processing LSR through the PowerSeries machines

Liquid silicone injection molding has been part of the WITTMANN BATTENFELD technology and machine offering for many years. Machines for the reliable and economical production of molded parts made of liquid silicone (LSR) are successfully used by numerous well-known users. Injection molding machines from the MicroPower, SmartPower and the EcoPower series are used, as well as vertical machines.

**Wolfgang Roth**

**T**he liquid silicone rubbers belong to the group of hot-vulcanizing rubbers and are becoming increasingly important in the production of elastic molded parts.

Characteristic of liquid silicone rubbers – in contrast to solid silicone rubbers and other elastomers – is their low viscosity. LSR are 2-component mixtures that are available ready for processing and have an addition cross-linking reaction using a platinum catalyst.

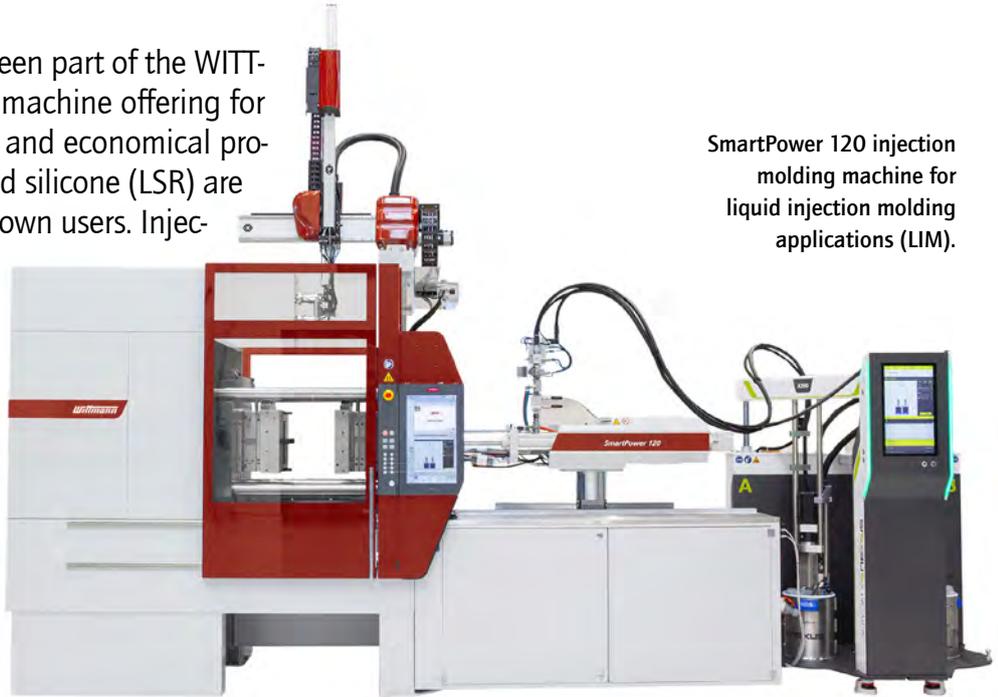
To produce LSR molded parts, a process that is specifically tailored to the material properties and process management is required. The abbreviation LIM was chosen for this main topic at WITTMANN BATTENFELD in Kottlingbrunn; it stands for Liquid Injection Molding.

## Material properties and fields of application

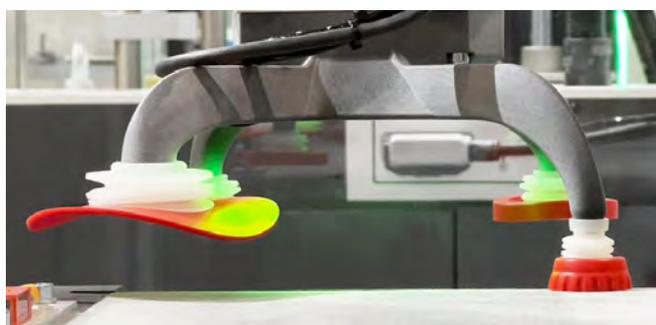
Due to a variety of excellent properties and the fact that LSR can be dyed in almost any color, these products are used in all sectors of industry. Typical properties of LSR are:

- High heat resistance, even at continuous temperatures of up to 180°C
- Cold resistance while maintaining elastic properties down to -40°C
- Good weather and aging resistance
- Outstanding electrical properties
- Temperature stability of mechanical and electrical properties
- Advantageous fire behavior – no toxic fission products
- Excellent physiological properties
- Sterilizable

SmartPower 120 injection molding machine for liquid injection molding applications (LIM).



Device for measuring differential pressure when feeding material.



Special solution of a 3D-printed gripper with a colored status display for removing molded LSR parts.

The cross-linking principle and the low viscosity of LSR allow high vulcanization speeds and therefore shorter cycle times than can be achieved with conventional rubbers that cross-link with sulfur or peroxide.

Molded parts made of LSR can be produced without burrs using the latest tool technology, which eliminates the need for costly post-processing.

Environmental compatibility, the possibility of a high degree of automation, easy processing and rapid vulcanization are advantages of liquid silicone rubbers that enable economical production of elastic molded parts.

example of this is that it is now possible to connect any commercially available liquid silicone dosing and conveying system to the machine control using an OPC UA interface.

The plasticizing unit, the core of the LIM process technology within the injection molding machine, has been expanded for the current stage of evolution to include differential pressure measurement when feeding in the material. This feature is an absolute novelty for today's marketplace. Two pressure sensors, paired with a filter element, provide information about the flow behavior in the material inlet. This filter element allows impurities as well as pre-cross-

handling technology for plastic molded parts. An important area is the know-how-intensive handling of flexible parts that cannot be ejected, but are either pushed out of the cavity using compressed air or must be removed from the robot using a gripper. Matching the correct demolding method to the respective molded part is an optional but recommended part of the LIM offer package.

### Dimensions: from micro to medium size

When processing liquid silicone rubber, special attention must be paid to the injection unit of the machine due to the material properties. In common with all aspects of the standard machine program from WITTMANN BATTENFELD, this unit is designed to be modular in order to be able to cover a wide range of shot volumes.

The equipment and systems for liquid silicone injection molding are available for a wide range of micro parts with shot volumes from 1.2 to 4 cm<sup>3</sup> up to medium-sized molded parts in the kg range. The LIM injection unit includes the following components:

- Liquid-cooled screw barrel to eliminate cross-linking reactions
- Plasticizing screw for dosing and mixing the supplied components as well as for reproducible injection of the LSR into the heated mold
- Non-return valve for reproducible shot volumes, specially tailored to the properties of LSR
- Screw seal to prevent material leakage
- Liquid-cooled nozzle to eliminate cross-linking reactions
- Needle valve nozzle, pneumatically operated
- Connection for a 2-component mixing and dosing system

### From baby care to optical applications

The transparency of LSR is particularly suitable for applications in the baby care sector, such as the well-known pacifiers. For special applications such as optical components in the automotive sector, highly transparent optical silicones are used, which also place special demands on system and tool technology. Extended mixing sections and tools with ventilation and overflow mechanisms guarantee smooth production and maximum performance.

Wolfgang Roth is Head of Application Engineering at WITTMANN BATTENFELD in Kottlingbrunn, Lower Austria.



A cover and various closures for cans and bottles, made in a 1+1+1 family tool.



A SMART lens weighing just 10.38 g, an optical lens for Adaptive Driving Beam headlights (ADB).

### Efficiency progress through numerous detailed improvements

Market requirements are the main driving force behind the constant development of LIM process technology. The latest version presented by WITTMANN BATTENFELD at K 2022 includes both updates to the mechanics and the integration of various communication interfaces between the machine and the peripheral components according to the Industry 4.0 standard. A concrete

linked material to be collected in the filter sieve, thereby avoiding damage or costly maintenance work in the cold runner system. Another advantage of this method is that it can also provide information about the closing characteristics of the non-return valve via a pressure increase during injection.

### Handling highly flexible molded parts

The Robots and Automation Division of the WITTMANN Group covers the entire

# A new drying and conveying system optimizes production

As part of its extensive modernization measures, Praher relies entirely on WITTMANN equipment in order to create a new drying and conveying system. It turns out that seamless project planning leads to success.

**Christoph Schweinberger**



**P**raher Plastics Austria GmbH is a renowned plastics processor based in Schwertberg, Upper Austria. The company is primarily known for its high-quality mountings (the Praher Plastics® brand) and fittings (the IBG® brand), which are successfully used in industrial pipeline construction and pool construction.

The history of Praher goes back to 1971, when Ludwig Praher began manufacturing plastic products. Over the last few years, significant modernization steps have been planned and successfully implemented, which will now help to further optimize the production processes and be able to respond even better to future challenges.

## Optimization of production

The entire project encompassed two areas of production, each with very different requirements. Praher was fully aware of the importance of optimal preparation and the scope of the upcoming planning, and so the first concept discussions began around two years before work began.

After all, the aim of the modernization of the system was to noticeably reduce energy consumption and thus also reduce the CO<sub>2</sub> footprint. In addition to optimizing energy consumption, the highest possible level of flexibility was to be permanently achieved. This posed a challenge when designing the system, due to the number of conveying lines and the overall complexity of the entire installation. The official starting signal for the complete modernization of the drying and conveying system for both production halls was given in January 2022, i.e. during the difficult time of the second wave of the Covid pandemic – posing an additional challenge for everyone involved.



Praher Plastics® mounting (left) and IBG® fitting, two examples from the extensive portfolio of Praher Plastics Austria GmbH. (Fotos: [www.praher-plastics.com](http://www.praher-plastics.com))

## The new drying and conveying system

Divided between the two production areas, two drying batteries were installed on specially planned drying platforms in order to save space. The two drying systems have a dry air volume of 2,100 m<sup>3</sup>/h, and the 21 drying silos have a capacity of 7,100 liters. The space gained in production by this system enabled an expansion of the machine park, and freed further expansion of production capacity.

The low energy consumption – compared to that of the previously existing individual solutions – led to energy savings of 30–80%! These reductions were achieved through consumption-driven control of the drying performance – automatically determined and saving operating personnel from additional work steps.

Due to the numerous different materials processed in Praher's first production area, correct material distribution was ensured by using an RFID-coded coupling station. In the second production area – a lower variety of materials and less frequent material changes – the couplings were color-coded.

Before the new facility was completed, beside-the-press dryers were deployed. This, in order to keep the material dry after conveying it to the processing area. In order to avoid this in the future, a conveying solution was implemented as part of the new installation that is continuously operated with dry air from the material silo to the processing area. In this way, contamination of the material with moist ambient air was avoided.

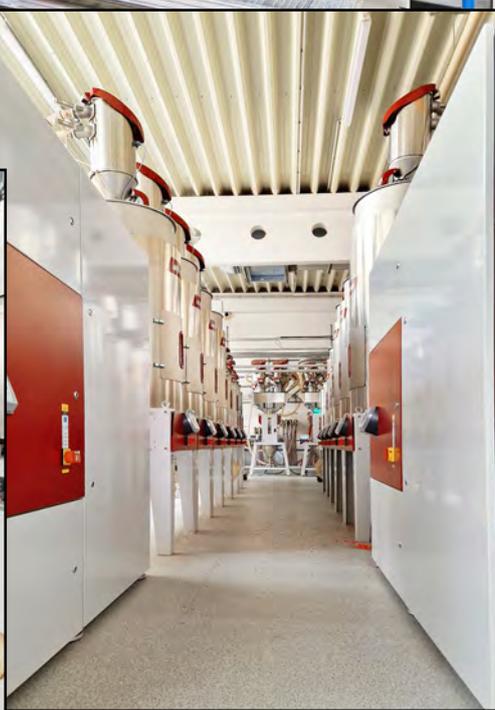
This option, which was taken into account during the planning phase, meant that the additional dryers previously required could be almost completely eliminated from production, and this led to a further significant cost reduction.

## Energy saving and process reliability

Thanks to the detailed and advanced discussions, and thanks also to well-thought-out and detailed project planning, process reliability was also significantly improved – this in addition to the realization of considerable energy savings. For example, a user administration system was established, assigning precisely defined authorizations to



The two coupling stations of the system: RFID-coded (above) and color-coded material couplings.



Views of the Praher drying system in the production plant in Schwertberg, Upper Austria. In total were installed: 2 Drymax 900 battery dryers with FC plus (consumption-driven dryer control), 1 Drymax 300 FC dryer, 21 Silmax drying silos with volumes from 150 to 800 liters, and 89 Feedmax material loaders.

individual operators and activated for employees with responsibility for particular machines and/or materials. This kind of authorization can be also defined for specially trained employees, through which they can act across the board and, in the event of service, also be able to make more detailed settings on the system.

Christoph Schweinberger is International Sales Manager Material Handling at WITTMANN Technology in Vienna, Austria.



The new drying and conveying solutions supplied by WITTMANN at Praher are the result of the consistently good cooperation between the two companies. – In the foreground: Michael Wittmann, President of WITTMANN Technology (left) and Rainer Pühringer, Managing Director of Praher Plastics. In the background (left to right): Gerald Gruber, Production Manager at Praher; Christoph Schweinberger, International Sales Manager Material Handling at WITTMANN; Rene Oswald, WITTMANN Service; Oliver Döchler, WITTMANN Service; Wilhelm Raber, Head of Injection Molding Technology and Production at Praher.

# Energy savings in mold temperature control

Three industrial companies based in Western Austria tested the parallel mold connection of a powerful WITTMANN temperature controller in practice. The results were impressive ...

**Zoran Bijelac – Christian Kainrath**

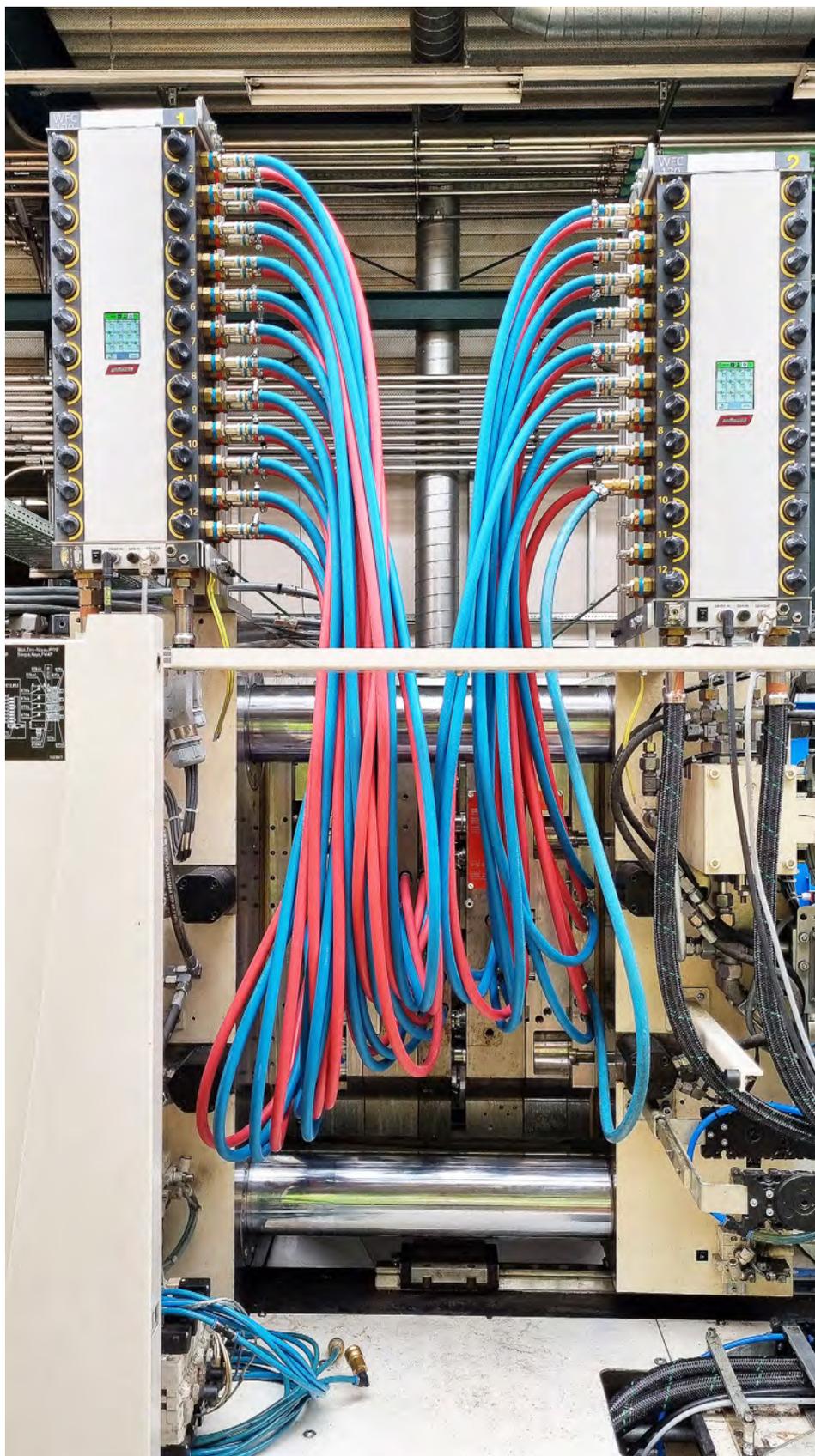
The last few years in the plastics industry have been characterized by increasing cost pressures in production. On the one hand, this is caused by the prevailing shortage of skilled workers, but on the other hand, it is largely due to the massive increase in energy prices. This development particularly heightened the industry's awareness of the need to use all available resources in a considered manner, i.e. to optimize production in the sense of maximum output with minimal energy use.

## The "right way" of temperature control

In this context, cost-minimized and – at the same time – energy-efficient mold temperature control is the order of the day. Together with the Vorarlberg regional representative of WITTMANN, Harald Müller from SOLA-Messwerkzeug GmbH in Götzis initiated a project for which a series of tests was to be carried out. The question of the "right way" of temperature control was on the agenda. The experimental setup envisaged the use of a powerful temperature control device – to distribute the temperature control medium over the cooling channels in a parallel mold connection. The results from these tests would then be compared with those for a serial connection. In this way the general and practical suitability of the parallel connection concept would be checked.

## Test series in several companies

For many years, SOLA has been developing and producing measuring and marking tools that are characterized by simplicity, efficiency and maximum precision. This is where the temperature control tests that were ultimately carried out as part of this project began.



The picture shows the cooling circuits connected in parallel to the fixed mold plate on the one hand and movable mold plate on the other. The same installation was used by all three companies participating in the project described here.

Perzi Kunststofftechnik GmbH mit Sitz in Lustenau also expressed its interest – a company that has proven itself to be a reliable industrial partner over time and has strong innovation potential, as demonstrated by innovative plastics technology and new material combinations.

Finally, Kunststofftechnik Grabher GmbH in Höchst was also acquired, which has also been keen for many years to use the

expertise available in all aspects of injection molding to implement customer-specific solutions.

### **The goal in mind**

The initial aim of this project was to provide practical proof that with parallel tool connection of the temperature controller, the output in production and the quality of the parts can be maintained, if not even exceeded.

Instead of using a large number of temperature controllers that pass on the temperature control medium in a serial connection via the cooling channels, this approach can also lead to a reduction in the number of temperature controllers actually required. This alone can reduce energy costs, as well as the investment costs for the devices and, as the case may be, the costs for spare parts.

After carrying out theoretical calculations as well as after practical field tests and continuous production, the conclusion drawn from this cannot be rejected: the optimal temperature control solution in injection molding is the parallel distribution of the tempering medium using a powerful frequency-controlled temperature controller.

### **Success through cooperation**

The people involved at WITTMANN would like to thank their partners – SOLA, Perzi

and Grabher – for the excellent cooperation within the framework of this joint project. They wish them continued success with this new concept for mold temperature control and look forward to continued very good cooperation.

Zoran Bijelac works in the Department of Technical Sales Support for Temperature and Flow Controllers at WITTMANN Technology GmbH in Vienna.

Christian Kainrath is Regional Sales Manager of WITTMANN Technology GmbH for Western Austria and South Tyrol.

The following page shows calculations and the results from production practice that were obtained from this project that spanned several companies.

#### **SOLA-Messwerkzeuge GmbH**

is an Austrian company based in Götzis, Vorarlberg, which specializes in "measuring and marking in construction". The product range includes over 1,500 items, 75% of which are manufactured in Götzis and 95% in the EU and Great Britain. Founded by Ing. Guido Scheyer, the history of SOLA began with the production of a spirit level in the attic of his family home. The company now has three production sites in Götzis and has over 300 employees, including 30 apprentices in eight teaching professions. With over 80 countries supplied worldwide and an export share of over 80%, SOLA achieved annual sales of around 64 million euros in 2022. SOLA has been producing plastic parts using injection molding since the mid-1950s, both for in-house production and as a contract manufacturing company. In 2003, a separate location for the production of plastic parts was acquired. This currently includes 46 injection mold-

ing machines in the range of 80–300 t clamping force. At SOLA, a variety of injection molding processes are used, such as stack injection molding, multi-component injection molding, internal gas pressure processes or chemical foaming, and various thermoplastics with up to 70% glass fiber content are processed. The product range includes parts with a weight of 0.06–600 g.

#### **Perzi Kunststofftechnik GmbH**

is a medium-sized family business based in Lustenau, Vorarlberg, and can now look back on 60 years of company history. The company, founded in 1962, currently employs 31 people. Perzi is active in the areas of injection molding and tool making and currently has 25 injection molding machines (60–400 t). The company's offerings range from the idea to the finished product, including packaging and labeling. Perzi supplies a wide variety of industries such as fastening technol-

ogy, dental technology, electrical industry, mechanical engineering, furniture industry, textile industry and cleaning technology.

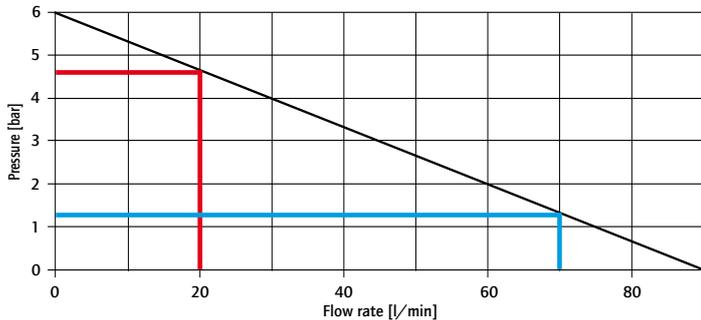
#### **Kunststofftechnik Grabher GmbH**

is a medium-sized company based in Höchst, Vorarlberg. The company has 26 injection molding machines (22–1,300 t) at this location, seven of which are in the multi-component range (50–1,300 t). Additional seven machines (200–1,000 t) in Switzerland and Italy provide additional delivery capacity. There are 42 employees in Vorarlberg. The competencies range from product design (including moldflow analysis), global tool procurement (40–50/year) and injection molding of parts to the assembly of complex assembly groups and ultrasonic welding. Grabher supplies the fittings and filter industry and also works in the household and catering sectors (coffee machines). Parts for air heat exchangers, shading devices and shutters are also produced.

**Pressure/Flow rate**

**Serial connection:** 4.6 bar pressure loss, 20 l/min flow rate

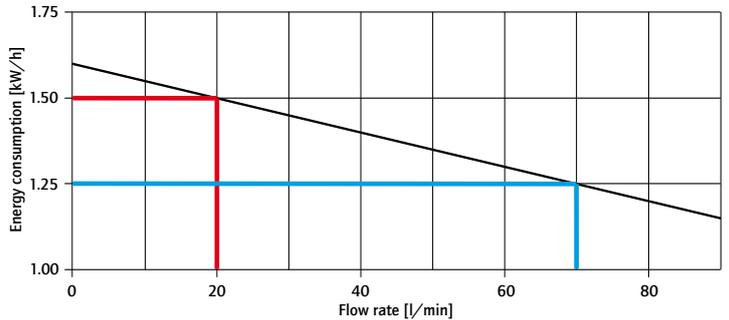
**Parallel connection:** 1.3 bar pressure loss, 70 l/min flow rate



**Energy consumption/Flow rate**

**Serial connection:** 1.5 kW/h, 4.6 bar pressure loss, 20 l/min flow rate

**Parallel connection:** 1.25 kW/h, 1.3 bar pressure loss, 70 l/min flow rate



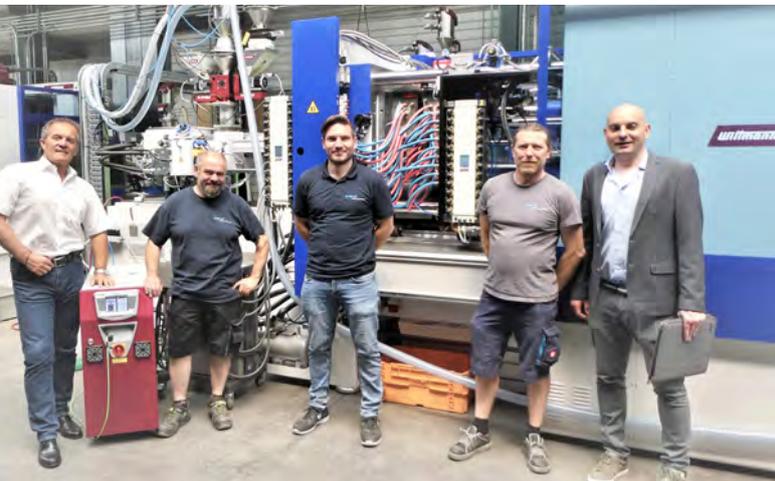
The two charts show the calculations for an EcoDrive pump installed in a WITTMANN temperature controller with 2.2 kW output, a maximum flow of 90 l/min, and a pressure of a maximum of 6 bar. The calculations result in the following conclusion: With a parallel connection, the pressure loss is reduced by around 70%, the flow increases by around three and a half times, and power consumption falls by around 20%!

**Results – SOLA-Messwerkzeuge GmbH (Harald Müller, Engineering)**

- 1 Tempro plus D L120 with EcoDrive pump and 2 WFC 100 8-fold
- replace 6 temperature controllers from other manufacturers with 67% energy savings
- replace 5 temperature controllers from other manufacturers with 53% energy savings
- increase flow rate by 15% at 85% rpm



Left to right: Christian Kainrath, WITTMANN; Harald Müller, Patrick Klien and Patrick Maier, SOLA; Zoran Bijelac, WITTMANN; Stefan Mayer, SOLA.



Left to right: Gerald Schodl, WITTMANN; Helmut Stampfer, Claudius Reinhard and Mr. Hagspiel, Perzi; Zoran Bijelac, WITTMANN.

**Results – Perzi Kunststofftechnik GmbH (Claudius Reinhard, Managing Director)**

- Energy consumption test for 48 hours
- 1 Tempro plus D L120 with EcoDrive pump: energy consumption 1.67 kW/h at 70% rpm
- replaces 5 temperature controller circuits (90°C) with an energy consumption of 10.13 kW/h
- leads to an energy saving of 83.5% for the same flow rate
- leads to a cost reduction from EUR 7,200 to EUR 1,200 annually = EUR 6,000 annual savings



Left to right: Daniel and Helmut Schneider, Grabher; Christian Kainrath, WITTMANN.

**Results – Kunststofftechnik Grabher GmbH (Helmut Schneider, Owner)**

There are currently no exact current figures regarding optimization of production or energy savings through the new temperature control solution. However, the concept has already been unanimously convincing in production practice and investments have already been made in the solution.

# WITTMANN USA Plant Expansion Update

**A**fter a year-long process, the WITTMANN USA plant expansion is complete! The final two milestones, the installation of a new 15 ton crane and the expanded parking lot, were finished as of June 1<sup>st</sup>, 2023. "This is really the first phase of the transformation that is in process at our Torrington, Connecticut headquarters", says Duane Royce, Vice President Robots & Automation at WITTMANN USA. "The next phase - moving into and using the new 9,360 sq. ft. of space - has already begun."

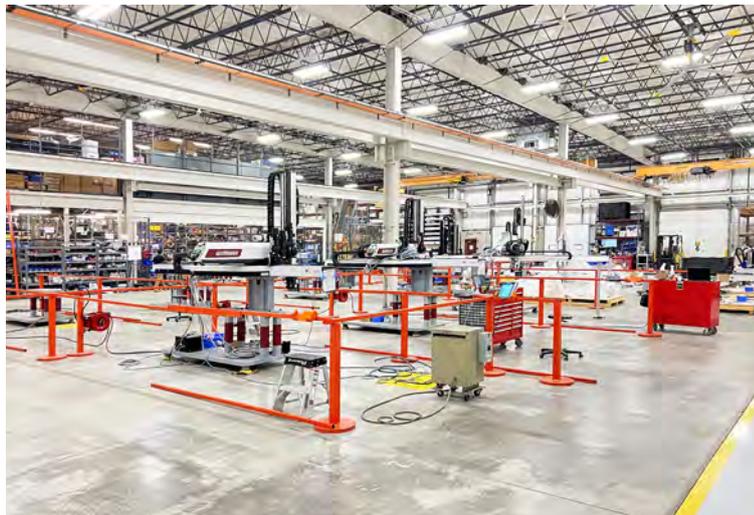
The area that was formerly the Automation Assembly Department is now part of the Robot Assembly and Startup Departments. "We now have more room to build large robots, more room to work on modifications to completed stock robots, and more room for our robot production lines. It also offers us more room for turnkey complete molding systems", says Royce.

This project also included adding two new shipping and receiving docks, and the company has added additional EV chargers in the parking areas (four chargers at Plant 1, and two chargers at Plant 2). In addition, complete solar panel arrays are up and running, helping the company convert to solar power.

While most of the expansion has taken place in Plant 1 (molding machines and robots), Plant 2 has also seen improvements including installation of all-new custom racking systems for efficient storage of stock robots, and material handling equipment. The two dock doors are also being expanded, which was completed early July. "We're happy that our latest expansion project is now completed, as it gives us much-needed new space for our continued growth", says David Preusse, President of WITTMANN USA.



A view of WITTMANN USA's completed new 9,360 sq. ft. addition.



The newly created area for the robot test stations.



Plant 1 shipping docks, ...



... and two of the new electric charging stations.

