

Wittmann

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innovations

Techniques – Markets – Trends

Volume 14 – 2/2020

SmartPower

... as the name
suggests ...



Battenfeld

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Bernhard Grabner – tel.: +43-1 250 39-204, fax: +43-1 250 39-439 – e-mail: bernhard.grabner@wittmann-group.com

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Michael Wittmann

Dear Reader,

Only a few days ago, we were able to announce the good news that FarragTech has joined the WITTMANN Group. FarragTech is based in Wolfurt/Vorarlberg, Austria and has been working in plant engineering for the plastics industry for more than 25 years. The product portfolio consists of compressed air granulate drying and mold cooling, as well as protection from condensation water for cooled molds. This acquisition not only expands our range, but also rounds off our series of drying systems in the lower segment. This now enables us to cover the area of granulate drying optimally and in small steps down to 15 kg/h throughput.

In combination with the existing dryer program of our bulk material technology department as well as our international outreach, we expect an even stronger presence on the market. In any case, we are very pleased about this new addition to our group of companies and extend a very cordial welcome to Aaron Farrag and our new colleagues from Wolfurt!

At a time when the global economy is by no means short of challenges, a new problem has suddenly come up, leading to developments that may gain real momentum just at the time of publishing this issue of *innovations*: the corona virus. Of course, our Chinese branch was also forced to take an unplanned one-week break after the New Year. We are very grateful that we have no case of illness within our own workforce in China at this stage, and we hope that this will continue to be the case.

We welcome the decision of the organizers of Chinaplas to postpone the fair indefinitely for the time being. In view of the current travel restrictions and the general uncertainty about how the spread of the corona virus will continue to develop worldwide, holding the Chinaplas would not have made much sense – neither for exhibitors nor for visitors. We would even be happy if this and possibly other fairs were completely cancelled this year.

There are far too many trade fair events around the world for our industry, dating back to a time when the procurement of information was much more complex than is the case today in the era of the Internet and easier travel options.

Speaking of information: of course, in this issue of our *innovations* magazine we have also collected interesting contributions from different countries and are now presenting the new flow controller series 110 and 310. – I wish you a lot of fun reading!

Yours cordially, Michael Wittmann

Injection Molding

The SmartPower at Langlotz



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The SmartPower at MACO



... and the Austrian user at its plant in Trieben.
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Stamp production in Taiwan



George Shih on the successful partnership with WITTMANN BATTENFELD Taiwan.
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Flow Control

New series 110 and 310



Zdravko Gavran introduces the enhanced new devices.
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Smart solutions with smart injection molding technology

*Langlotz based in Halver, South Westphalia, Germany has made a name for itself with plastic parts and assemblies for water dispensers and bar systems. The company has brought state-of-the-art injection molding technology to its production floor with a servo-hydraulic **SmartPower** 300/1330 with Insider solution.*

Gabriele Hopf



Production of a housing component for a beverage dispenser with SmartPower 300/1330 with Insider cell.

Frank Höher, WITTMANN BATTENFELD, Frederike Seibert, Langlotz, Ulrich Seibert, Managing Director of Langlotz, Thomas Bertram, WITTMANN BATTENFELD, Christoph Seibert, Langlotz (left to right).

Picture right: Christoph Seibert shows Frank Höher a chrome-plated pillar for a beverage dispenser.



Langlotz, a family-owned company in the second and third generation, was established in Ruhla, Thuringia in 1910. Its first products were electrical consumer goods and radio accessories. Radio technology parts were already injection-molded from polystyrene in the 1930s.

In 1950, the company was newly established at its present location and has been concentrating on the production of injection molded parts made of virtually all thermoplastic materials ever since, including finishing processes and assembly.

On a 3,000 m² production floor, parts ranging from 0.1 g to 2 kg in weight are made. The company's portfolio of services includes product development and prototyping as well as series production.



For many years, Langlotz had been a successful supplier of power plant cooling tower components for the European market. The massive changes in European energy policy, and above all in Germany, which started at the beginning of this decade, necessitated a complete realignment of the company. 85% of its sales are now realized with new customers. The family-owned company with a workforce of 40 employees has shifted its focus to enclosure technology for water dispensers and bar systems, as well as pumps for drinking water systems.

About 8% of its sales are realized with products for the automotive industry. The company's main market is Germany. It delivers not only individual parts but complete assemblies. In this area, the company addresses its customers proactively, offering them its expert knowledge to improve their products or manufacture them at lower cost.

So, a metal adapter plate, for example, was replaced by a plate made of plastic, or threads dispensed with by using plastic-cutting screws.

Successful SmartPower Insider application

To produce the parts, Langlotz uses injection molding machines ranging from 250 kN to 5,000 kN in clamping force, among them three machines from the servo-hydraulic *SmartPower* series from WITTMANN BATTENFELD with clamping forces of 350 and 3,000 kN.

These machines stand out primarily by their compact design, high energy efficiency, precision and user-friendliness. One of the two *SmartPower* 300/1330 machines is equipped

with an Insider cell (see definition p. 8). On the *SmartPower* 300/1330 at Langlotz, a W821 robot from WITTMANN is used. This robot is designed with a horizontal stroke profile with optimized rigidity and weight, which is positioned directly inside the main carriage and carries out the parts removal stroke. The robot's main axes are powered by servo drives via belt or rack transmission. Minimized moving masses allow for extremely high acceleration and deceleration rates. The W821 model comes with the latest robot control system of the R8.3 generation, which provides a wide range of programming options

and the patented SmartRemoval function for maximal shortening of the unproductive mold opening times. Ulrich Seibert, Managing Director of Langlotz, expresses great satisfaction with the machines from the *SmartPower* series, in particular the *SmartPower* with an Insider cell, and primarily because of its small footprint and user-friendliness. "For us, this production cell is definitely an improvement in manufacturing technology. Its intuitive operation is also greatly appreciated by our staff members."

But as it is the case with many other WITTMANN BATTENFELD customers, Ulrich Seibert and his son Christoph, who is responsible for the company's commercial management, are not only impressed by the quality of WITTMANN BATTENFELD's machines, but also by the good service, which is an essential factor in this business relationship already existing for more than 20 years. ♦

Picture left:
Pumps for drinking water systems.
Picture right:
Finished beverage dispenser.

Stems for safety valves.

Flexible, fully integrated production cells for MACO in Trieben

Mayer & Co Beschläge GmbH, Austria, an internationally renowned manufacturer of high-precision components for windows and doors headquartered in Salzburg, uses fully integrated production cells from WITTMANN BATTENFELD to produce its plastic parts. The servo-hydraulic machines from the SmartPower series with Insider solution have been in operation at the production plant in Trieben since the end of 2018.

Gabriele Hopf



Machines from WITTMANN BATTENFELD at MACO in Trieben – in the foreground the most recently delivered machine, a SmartPower 35 with Insider cell and WITTMANN 4.0 integration.

The family-owned company Mayer & Co Beschläge GmbH was established in 1947 by Lorenz Mayer and has had its headquarters in Salzburg since 1952. In 1994, the Trieben production plant in Styria was opened, where now most of the MACO product range is manufactured. The MACO Group employs a total workforce of 2,600, 870 of whom work in Trieben.

The product portfolio consists of components for windows and doors including high-quality revolving and sliding doors. Typical products are slide and tilt fittings, sealing components, ground sills, window handles, edge closures, window rebate ventilators, door locks, access control systems and sensors. The majority of its products are exported. The company supplies customers in the building construction industry in more than 40 countries

and operates 15 subsidiaries for this purpose, six of which have their own warehouses. To manufacture its parts, MACO uses many different production processes such as punching, pressure die-casting, injection molding, extrusion, aluminum casting, turning, milling and others. One of MACO's strengths is its expertise in surface technologies, which offer maximum corrosion protection. The TRICOAT-PLUS process developed by MACO is unique on the market.

Great variety of parts

The company's injection molding technology is located at the main production plant in Trieben in Styria. From there, all assembly plants are supplied with components.

In Trieben, both semi-finished and finished parts are made. Most of the tooling required for this purpose is manufactured in-house. 60 toolmakers are employed in Trieben alone who, in addition to molds for injection molding, also produce pressure casting and punching dies. All common types of materials are used, with polyamide, polypropylene, POM and ABS taking the lion's share.

For load-bearing parts, materials with up to 50% fiberglass content are processed. The great diversity of the plant's product range is impressive. For example, more than 1,800 injection molded articles, each with a different geometry, are manufactured in Trieben. In order to satisfy the high quality standards, preliminary simulations in the form of mold filling studies are also carried out at the Trieben plant. With 52 injection molding machines

installed, ranging from 250 to 1,800 kN in clamping force, MACO is the largest injection molding plant in the region. The company's requirements for the injection molding machines are determined by the stringent requirements imposed on the parts produced by MACO. Very many articles are produced in large quantities, some of these with extremely small geometries, which are further processed with a high degree of automation. Typical examples are fusing parts, of which more than 40 million units are produced annually. Here, the reject rate must be kept as low as possible.

This requires machines which meet high standards of process stability and precision. Due to the company's wide range of different parts, the machines must also be adaptable to a great variety of mold sizes without compromising



From the left: Bernhard Schaufler, Regional Sales Manager Austria at WITTMANN BATTENFELD, Manuel Steiner, Head of Plastics Injection Molding at MACO, Christoph Guster, Plastics Technology Manager at MACO, Alfred Schrammel, WITTMANN BATTENFELD Customer Support.



on stability and precision. Therefore, the possibility to exchange the injection units of the machines with only minor effort is important to MACO.

MACO and WITTMANN BATTENFELD

WITTMANN BATTENFELD has been present with its machines at the MACO plant in Trieben from the beginning. Most of the machines purchased in the initial stages are still running today. Currently, 22 of the injection molding machines installed at MACO have come from BATTENFELD or WITTMANN BATTENFELD respectively. Last year, three new machines from the servo-hydraulic *SmartPower* series were delivered to MACO, one with 600 kN clamping force, the other two with 350 kN >>

Parts removal with W808 robot from WITTMANN.

clamping force. The two *SmartPower* 35 machines are also equipped with an Insider cell and WITTMANN 4.0 integration of the robots and temperature controllers. An *Insider cell* is a production cell with an integrated robot, conveyor belt and fixed protective housing combined with the machine. This solution not only saves valuable space on the production floor. It also offers a number of

additional benefits, such as systematization of the material flow with a uniform logistics interface for finished parts transfer at the end of the clamping unit, as well as cost advantages due to the fact that all hazardous areas are already secured and certified ex WITTMANN BATTENFELD works. Via WITTMANN 4.0, the WITTMANN W808 robots and the TEMPRO plus D temperature controllers are integrated in the Windows™ IoT-based UNILog B8 machine control system and can be operated from there.

SmartPower machines, absolutely convincing

Christoph Guster, Head of the Plastics Technology Department at MACO, and Manuel Steiner, responsible for plastics injection molding, are very satisfied with the new machines. Christoph Guster comments: "These machines are compact production cells which meet our stringent requirements for process stability, precision and flexibility in every respect." Christoph Guster and Manuel Steiner also regard the possibility to purchase machines, robots and auxiliaries from a single source at the WITTMANN Group as a major advantage, mainly also due to the system integration via WITTMANN 4.0, from their point of view definitely a step in the right direction.

Manuel Steiner is particularly pleased about the high process stability of the WITTMANN BATTENFELD machines, which, as he puts it, thanks to their stable production process can also continue to operate in "ghost shifts", that is, without a machine operator being present. According to Steiner, this not only applies to the new, but also to the older BATTENFELD machines. Manuel Steiner specially appreciates the high standard of customer support offered by WITTMANN BATTENFELD: "For us, the excellent customer support provided by WITTMANN BATTENFELD was a decisive argument in favor of buying the injection molding machines from the *SmartPower* series. The response times are short, the support functions perfectly, both by phone and on site." ♦

Typical components for windows and doors made by MACO. Picture at the bottom: Window rebate ventilator, consisting of five individual components.



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

All about plastizing screws

Part 2 of the series

In the previous issue of "innovations", the basic design of a plasticizing unit and the correct choice of the injection unit were discussed in the first part of this series. The way to determine the required screw diameter on the basis of the shot volume was also explained. By applying the formula for the mean residence time, the utilization rate and the thermal material load can be estimated; the latter needs to be kept low to achieve high end product quality. The maximum injection pressure and the available screw torque are additional key variables for successful injection molding production. These considerations form the basis for the choice of the barrel-and-screw combination and also the starting point for further optimizations. In the second part of this series of articles, the basic methods for simulative assessment of the geometry of a given screw are presented – using the example of a 3-zone screw.

Filipp Pühringer

Developing a screw geometry

The first question to be answered is what objectives should be pursued in developing a screw geometry. Often the goal can be clearly defined, such as increasing the flow rate, reducing the melt temperature, improving the quality of the blend, etc. The requirements become more complex as soon as the desired results are only indirectly linked to the screw geometry, or when they can be attributed to several causes, for example, when it is desired to reduce the formation of plaques, or when the wear behavior and conveying stability need to be improved. Such multiple demands on screw aggregates often conflict with each other.

Careful balancing of the layout is necessary to resolve such conflicts between several different objectives. It has become common practice to optimize the geometry of a screw by way of simulation before the first tests are carried out with real experimental screws. With PSI/REX, WITTMANN BATTENFELD has a special software at its disposal for calculating the screw design. This software is ultra-modern and subject to continuous updates by targeted research carried out at Paderborn University.

While using the computer to calculate the screw geometry, the geometry can be varied extremely flexibly, and the resulting change can be immediately visualized on the screen. By running systematically through a pre-defined series of tests, it is possible to analyze the emerging trends.



Finally, the results of all calculations are combined and compared. From the sum of this information, the corresponding screw geometry is developed and further optimized down to the last detail – until the desired result comes into view.

Only then are experimental screws produced and used in practical tests. Depending on the complexity of the task, several different experimental screws may be used to approach the objective from various angles. If these tests prove successful, the optimization process is completed. Where there is still room for improvement, the development loop is re-run.

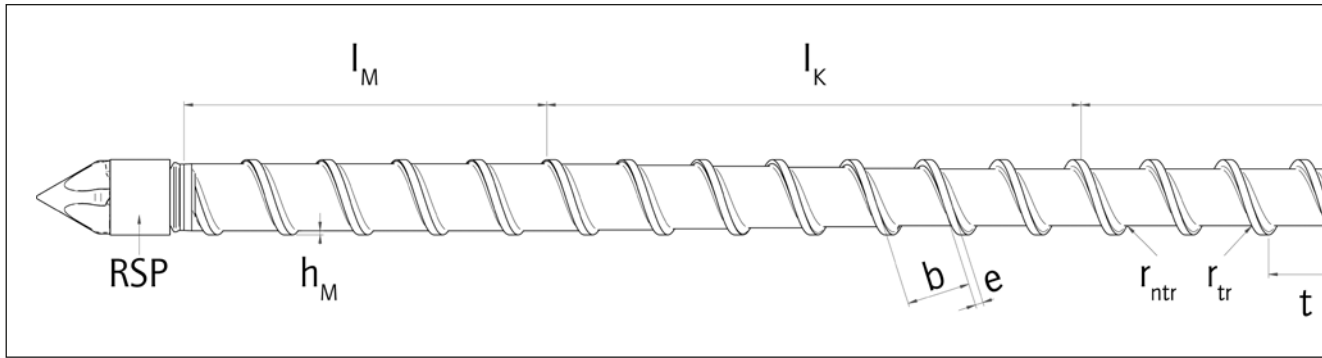
Screw geometry parameters

Next, the parameters of a standard 3-zone geometry shall be discussed, and their influence on the manufacturing process shall be illustrated by an example. In order to give a full description of such a geometry in terms of process technology, the following parameters must be known:

- D_{SC} = External screw diameter
- L/D and/or screw length
- l_E = Length of feed zone
- l_K = Length of compression zone
- l_M = Length of metering zone
- h_E = Flight depth of feed zone
- h_M = Flight depth of metering zone
- b = Flight width

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3-zone screw with number of screw flights $i = 1$.



- i = Number of screw flights
- t = Flight pitch
- e = Width of screw thread
- Flank angle, driving
- Flank angle, passive
- r_{tr} = Radius of driving flank base
- r_{ntr} = Radius of passive flank base

From the number of geometry parameters for only a relatively simple standard 3-zone screw, it is already apparent that there is basically a multitude of possible variants even for this type of screw. In the case of more complex geometries, such as those found in barrier screws, screws with shearing and mixing sections or shearing/mixing screws, the number of geometry parameters is many times higher.

Exemplary calculations

Starting basically from the recommendations available in the relevant professional literature, the optimization of the geometry for a 50 mm screw is calculated below as an example.

It is assumed that the length of the feed zone is 50% of the total length of the screw and the lengths of the compression zone and metering zone should each be 25% of its total length. We set the feed zone depth at 0.1 D, i.e. 5 mm. The flight depth ratio between the feed zone and the metering zone should be 2. The L/D ratio is assumed to be 22.

A variety of different calculations can be performed for a plastizing screw with these pre-defined parameters. The present discussion focuses on the melt throughput, the pressure curve or pressure build-up capacity and the melting process.

Further assumptions also include the metering stroke (85 mm) and the cycle time (35 s). The back pressure is set at 80 bar. To simulate moderate and realistic metering conditions, a circumferential screw speed of 300 mm/s is assumed.

The barrel temperature profile follows the pattern illustrated below for all calculations: The calculation of the profiles (pressure curve, melting process) is carried out for the 50 mm screw position.

Throughput behavior

For the previously selected cycle parameters, the average metering performance is calculated at about 12.49 g/s for the present pastizing screw geometry. The total out-

put is 44.92 kg/h. This means that the injection molding machine transports 12.49 g/s in the metering phase and thus takes about 12.7 s to plasticize 158 g of the respective material.

With a residual cooling time of more than 12.7 s, the molding machine can start a new metering stroke on time. But if plasticizing takes longer than the residual cooling time, the timing of metering impacts the total cycle time and thus reduces productivity.

The total output determines the amount of material consumption in the course of production. Since the screw does not dose during most of the cycle time, this output falls below the figure suggested by the average metering performance. The total output is the decisive parameter in dimensioning auxiliary equipment (dryers, material loaders, etc.).

Pressure build-up capacity

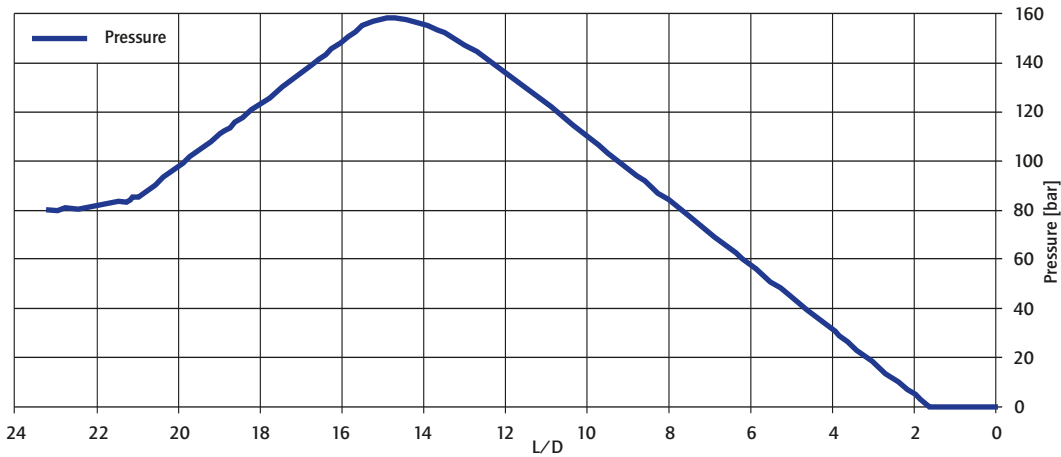
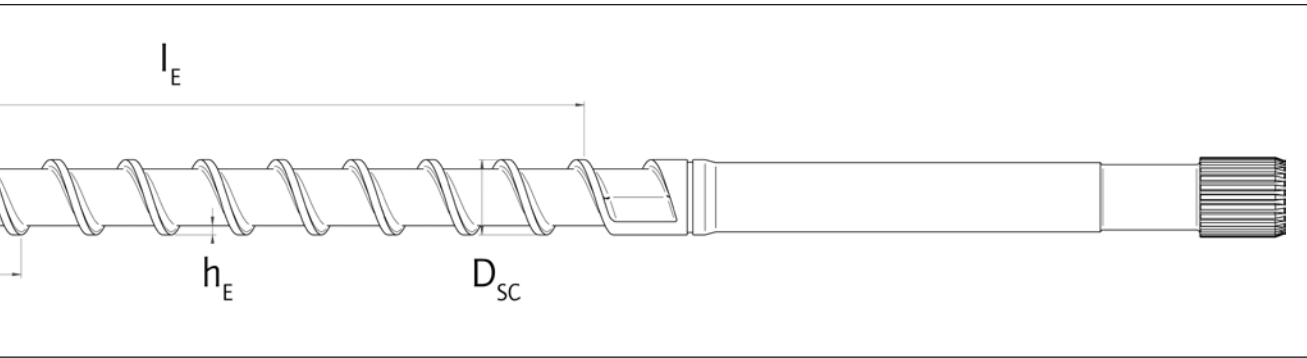
During the metering phase, the pressure inside the screw channel increases from the feed opening to the back pressure in the antechamber. Depending on the screw geometry, there may be one or more pressure peaks in between.

The graph on the next page shows the pressure curve over the length of the plastizing screw. In this particular case, the pressure curve begins to rise at about L/D 2 and reaches the peak pressure of about 160 bar at about L/D 14.25. In the last zone of the screw, the metering zone, the pressure drops continuously up to the check valve.

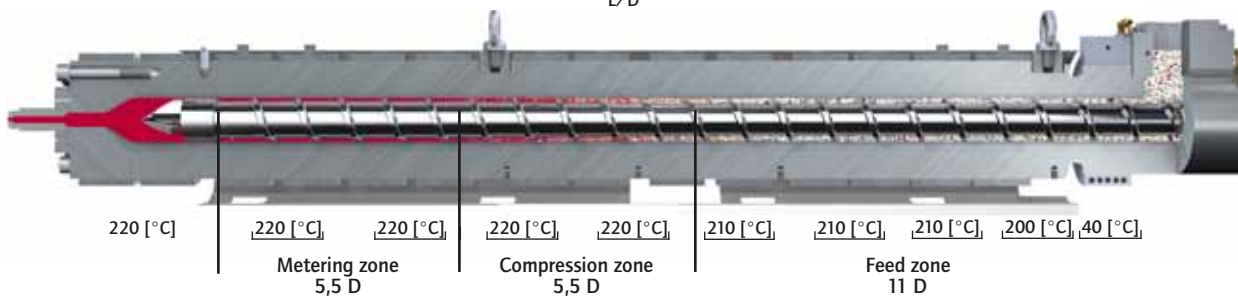
Melting process curves (MP)

The melting process (see the respective graph on the next page) is visualized via two curves: the solid bed width (red) is shown for the corresponding screw channel section, and the proportion of molten material (blue) during the metering process. In addition, the development of these two parameters towards the end of the cycle is illustrated (in green and orange). From the results, it can be concluded that this melting process promises good melting of the material, since the proportion of melt has already reached 100% at about L/D 8 (proportion of melt MP = 1). In other words, the solid bed width has been reduced to 0. ♦

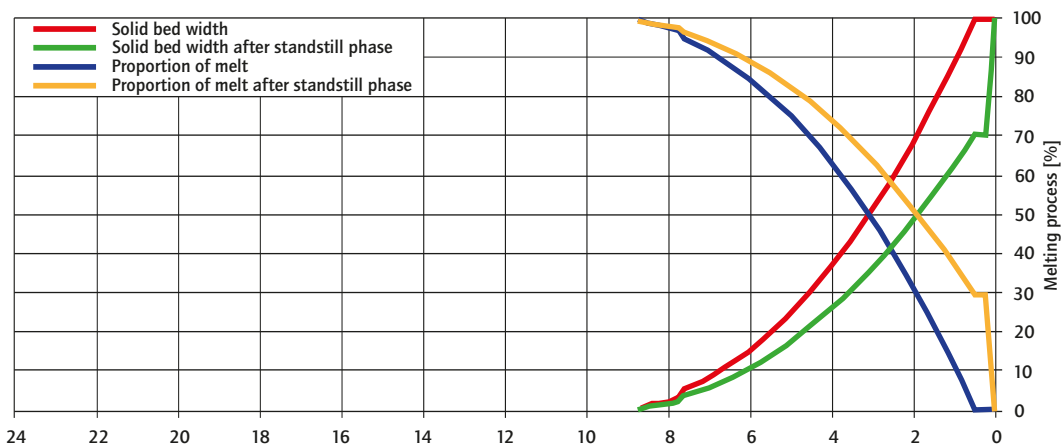
In the next issue of the "innovations" magazine, in the 3rd part of this series of articles, the calculation results will be analyzed, and first steps towards optimization of the geometry will be outlined.



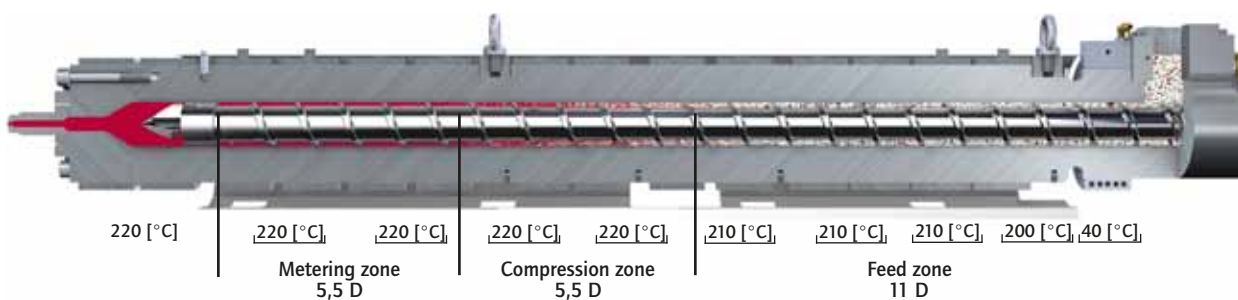
Pressure curve along the screw at 50 mm stroke position.



The calculations are based on the barrel zone temperatures.



Melting process curves for the screw at stroke position 50 mm towards the end of the cycle.



Filipp Pühringer is Head of the Process Engineering Department at WITTMANN BATTENFELD in Kottlingbrunn, Lower Austria.

Shiny Stamp Co., Taiwan: making our clients mar- ket leaders

In 1957, Shiny Stamp took its first step into the industry of rubber stamp manufacturing. Over the years, with the strong support of its clientele and staff, it has established a name for itself in the worldwide stamp making industry. It has also enjoyed a year-on-year growth. Shiny uses equipment from the WITTMANN Group.
George Shih

Today, Shiny Stamp is the proud owner of an eight-story high office building in Tainan City, complete with a four-story fully automated warehouse. It uses the latest manufacturing technology to ensure high product quality that its clients have come to recognize and expect. Shiny Stamp has exclusive representation in over 70 countries around the world and Shiny's products are sold in 109 countries.

Insisting on quality

Shiny consistently seeks to improve quality and efficiency, and provides its clients with a competitive pricing policy. The company continually strives to improve working conditions that encourage the development, training and utilization of skills – ensuring that all staff use every opportunity to improve product quality throughout the company. A great deal of capital has been invested into this area in recent years. As a reward for Shiny's efforts, in July 1998, the company was awarded the ISO 9002 certification.

By complying with environmental standards as well as executing an efficient use of energy and raw materials – from planning and development throughout the production process – Shiny also received the ISO 14001 certification in 2009.

Continuing innovation to meet the customers needs

Shiny has a variety of different product lines that are made of high quality material as well as recycled plastic. The company has a priority in fostering environmentally friendly concerns. Shiny has established strict regulations in every area – from part sourcing and design to development – in an effort to minimize impact on the environment. It is worth mentioning that Shiny is one of the few companies that utilizes recycled plastic and uses such material in its production. With environmental threats such as deforestation in mind, Shiny has introduced a series of



Views of the Shiny Stamp production facility in Tainan City, Taiwan, with WITTMANN BATTENFELD injection molding machines and WITTMANN robots.



products using 75% post-consumer recycled material. The types of recycled plastic material include recycled PET and recycled ABS that come from special waste sorting facilities that exercise a strict filtering and sorting process before the waste materials are again transformed into second life plastics. The most popular sizes of Shiny stamps are available as products within the standard “Printer” line as well as the so-called “ECO Line” made from recycled material. So any prospective customers can easily find suitable products.

Shiny uses WITTMANN Group equipment

In 2004 Shiny began to expand its Tainan City plant and to invest in new production facilities. The aim was to produce diversified products more efficiently and to provide employees with a more comfortable working environment. In 2005, the construction area measured about 6,300 m². The new plant was officially opened in early 2006. The company’s production equipment consisted initially of Taiwanese and Japanese machinery. In 2013, in order

to obtain stable production quality and effective production performance, Shiny decided to purchase the first WITTMANN BATTENFELD HM180/1330H UNILOG B6 injection molding machine – ideal for the optimization of the production process and the improvement of process efficiency.

In 2019, Shiny owned 15 WITTMANN BATTENFELD injection molding machines, 15 WITTMANN automation solutions, and 34 mold temperature controllers.

The Vice President of Shiny, George Shih says: “WITTMANN BATTENFELD equipment is stable and consistent in reproducibility. This is one-stop equipment integrated with WITTMANN peripheral equipment. Our machines store production processes and production data in a database, and build more efficient and stable production conditions. WITTMANN ensures the convenience and effectiveness of the manufacturing process, enabling operators to work more effectively and optimizing production data. For after-sales service, WITTMANN BATTENFELD Taiwan also provides comprehensive support and plant planning which also greatly enhances our operational efficiency.”

Future prospects

Today, Shiny continues to use the latest manufacturing technology and production equipment in order to make the high quality products expected by customers. Shiny firmly believes that with its professional design and firm structure its products have superior image quality and easy operation – a combination which assures the best customer satisfaction.

The company’s business philosophy is always: quality, innovation, service, and the business continues to work diligently for it. This is why Shiny succeeds. ♦

From right to left: Jimmy Chen, Deputy Executive Manager of Shiny Stamp; George Shih, Vice President of Shiny Stamp; David Chen, General Manager of WITTMANN BATTENFELD (Taiwan) Co. Ltd.; Josh Tsai, Sales Department of WITTMANN BATTENFELD (Taiwan) Co. Ltd.



S-85 series self-inking stamps (top), S-84 series Self-inking stamps (middle), S-72 series handy stamps (bottom).



George Shih is the Vice President of Shiny Stamp Co. in Tainan City in the South of Taiwan.

Flow controller series 110 and 310: new generation, familiar look

Redeveloping a globally known product with a unique selling point is not easy and requires a good team and a lot of patience. To bring a product already proven for decades one more nuance closer to meeting the demands of modern injection molding presents developers with completely new challenges and requires the courage to create new solutions without losing sight of what is already available. When the next optimization step is then accomplished, it is the best argument for the work that has been put in.

Zdravko Gavran

For more than 40 years, WITTMANN flow controllers have been part of the standard equipment for every injection molding machine. They were often copied – but never equaled. With more than 500,000 devices sold, flow controllers from WITTMANN have long been the undisputed number 1 and have significantly contributed to the company's success from the very first day.

Every product must be revised from time to time, since progress never stands still. The experience gained in practice provides the basis for further improvements to a product to increase its customer benefit. The development of the new WITTMANN flow controller series 110 and 310 was no exception. Their predecessor models had satisfied users worldwide for decades. They were used for distributing cooling water and cooling molds as well as specific areas inside injection molding machines, such as the feed zone, or the oil cooling system in hydraulic machines.

The new 110 and 310 flow controller series are setting new benchmarks to ensure the ongoing technical progress for these products, which seem simple at first glance but prove complex when taking a closer look.

Proven and new features

The tried-and-tested method of pipe cleaning, which can be carried out without removing the pipe through the top part of the housing, has been left unchanged in the 110 and 310 series. It is easy to replace the O-ring by lifting the pipe out of the bracket and then pulling it through the housing.

An absolute novelty is the new control valve! This valve, specially developed for fine tuning of the flow rate, was taken over from the WITTMANN FLOWCON plus flow controller series. It allows precise control of the flow rate in steps of 1/10 liters. The double sealing of the valve disk towards the spindle

and the axial movement performed by the valve disk instead of a radial movement are also novelties in the sector of cooling water flow controllers. With these features, WITTMANN is setting a new, unprecedented standard!

These vital innovations contribute to reduced wear of the O-rings and extend their service life. The O-rings themselves are made of EPDM and offer a high level of chemical and thermal resistance.

As before, the sensor tube of the thermometer is placed directly in the return water and thus responds very quickly to temperature fluctuations. To keep the pressure drop inside the flow controller to a minimum, the cross-sections have been designed as large as possible, since a minimal pressure drop constitutes a decisive advantage at low system pressure.

Interesting options

Additional valves are also offered for the new 110 and 310 series, such as the central shut-off or Z-valve for central blocking of the water supply to several circuits in the event of interruptions in the injection molding cycle. Single shut-off valves or E-valves are available as well, which are used to interrupt the cooling process in individual mold circuits by cutting off the cooling water flow. E-valves are normally used in combination with temperature sensors evaluated by the injection molding machine's control system. In this way, temperature control of individual mold cooling circuits can be performed by cooling pulses.

The blow-out valve, which is also available as an option, has an additional compressed air connection and enables – usually in combination with the Z-valve – emptying of the mold circuits by blowing out the cooling water. ♦



The longitudinal section through the new flow controller series shows the functionality of the valves, which have been specially developed for fine-tuning the flow rate.



Solenoid shut-off valves (left) and optional blow-out valve.

Series 110

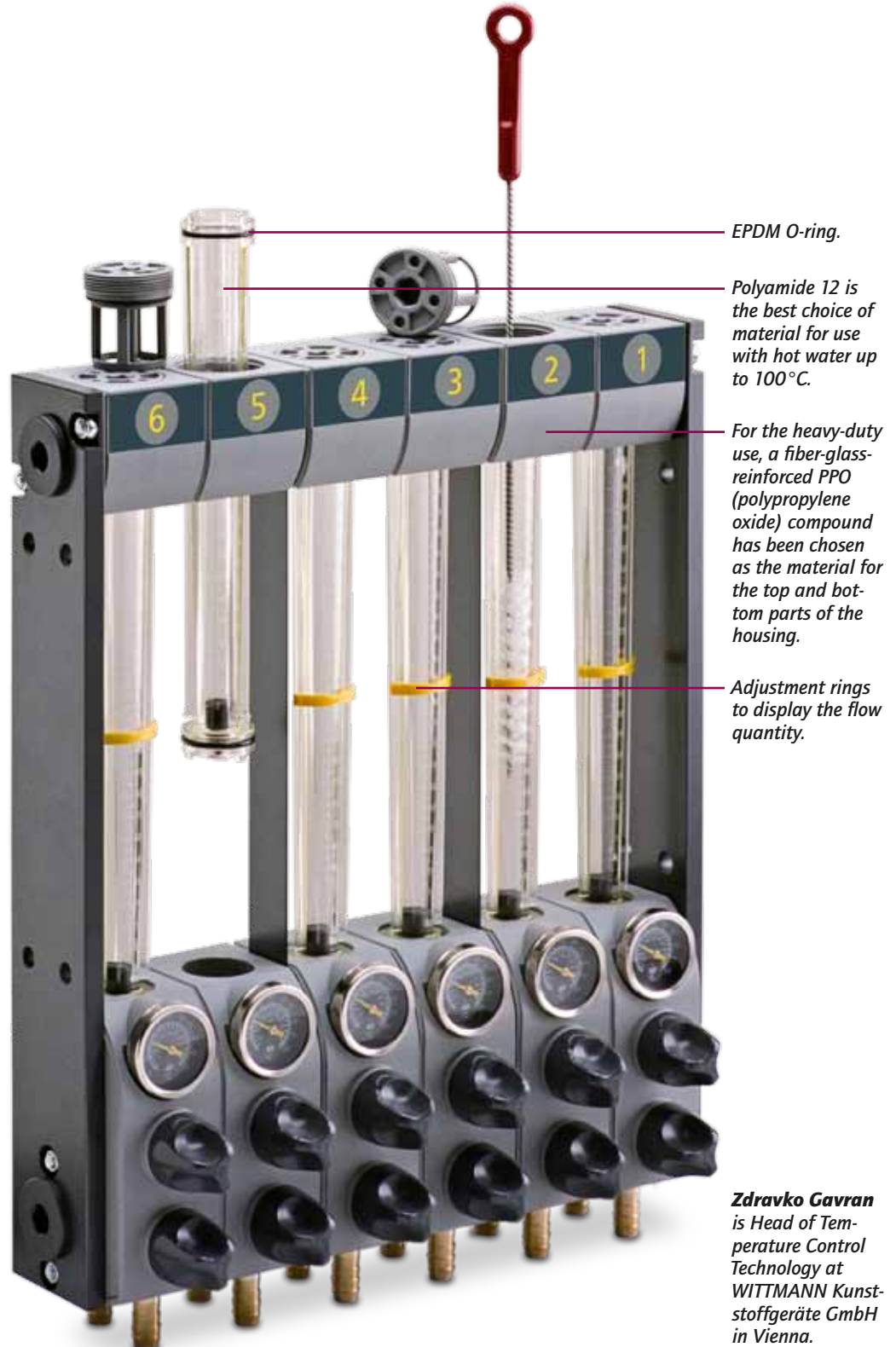
The essential device for your plastics processing machines for open and closed cooling circuits. Flow volume is indicated in accordance with the float measuring principle: a cone is lifted by the water flowing in the return of the mold circuit.

- Flow range per circuit: standard 0 – 10 l/min.
On request: AI, PVC-cones.
- Standard: mold connections with 12 mm brass socket for 3/8" hoses. On request: threaded connection with G 3/8" brass threaded sleeve.
- Option: screwed 14 mm brass socket for 1/2" hose, or screwed 20 mm brass socket for 3/4" hose.

Series 310

The optimum flow regulator for large injection molding and blow molding machines. Its low pressure drop makes it suitable for highest flow volumes. However, by means of a special design of the regulating valves, excellent regulation and accurate reproduction of cooling water volume and temperature in the different mold circuits can also be achieved for low flow volumes.

- Flow range per circuit: standard 0 – 30 l/min.
On request: AI, PVC-cones.
- Standard: mold connections with G 3/8" brass threaded sleeve.
- Option: with screwed 14 mm brass socket for 1/2" hose, or screwed 20 mm brass socket for 3/4" hose.



EPDM O-ring.

Polyamide 12 is the best choice of material for use with hot water up to 100°C.

For the heavy-duty use, a fiber-glass-reinforced PPO (polypropylene oxide) compound has been chosen as the material for the top and bottom parts of the housing.

Adjustment rings to display the flow quantity.

Zdravko Gavran is Head of Temperature Control Technology at WITTMANN Kunststoffgeräte GmbH in Vienna.

WITTMANN
KUNSTSTOFFGERÄTE GMBH
Lichtblaustrasse 10
1220 Vienna, AUSTRIA
tel.: +43 1 250 39-0
info.at@wittmann-group.com
www.wittmann-group.com

WITTMANN
BATTENFELD INC.
1 Technology Park Drive
Torrington, CT 06790, USA
tel.: +1 860 496 9603
info.us@wittmann-group.com
www.wittmann-group.com

WITTMANN ROBOT
(KUNSHAN) CO. LTD.
No. 1 Wittmann Rd.
DianShanHu Town
Kunshan City, Jiangsu Province
215245 CHINA
tel.: +86 512 5748 3388
info@wittmann-group.cn
www.wittmann-group.com

WITTMANN
BATTENFELD GMBH
Wiener Neustädter Strasse 81
2542 Kottlingbrunn, AUSTRIA
tel.: +43 2252 404-0
info@wittmann-group.com
www.wittmann-group.com

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