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innovations

Techniques - Markets - Trends

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*For
a smaller
carbon
footprint*

Battenfeld

Articles that appeared in *WITTMANN innovations* so far

Conveying/Drying/Entire Systems

- Central system at BOSCH 1/2007
- Quality control of dryers 1/2007
- Kromberg & Schubert's system 2/2007
- Cost efficient material drying 2/2007
- FEEDMAX for the clean room 3/2007
- The new DRYMAX ED80 3/2007
- Focus on material feeding 1/2008
- Network control at Arge2000 2/2008
- Changing parameters conveying 2/2008
- Optimizing a conveying system 3/2008
- Dryers with energy rating 3/2008
- The Metchem central system 4/2008
- Auxiliaries at Delphi in China 1/2009
- LISI COSMETICS' central system 2/2009
- Planning of central systems 3/2009
- Testing energy claims at FKT 4/2009
- The new FEEDMAX B 100 1/2010
- Greiner's dryers saving energy 2/2010
- The A.C.S., conveying system 3/2010
- FEEDMAX Primus conveyor 4/2010
- The new DRYMAX Aton 2/2011
- The BKF conveying system 2/2011
- WD Kunststofftechnik system 4/2011
- PET processor's conveying 1/2012
- The PLASTICOM system 2/2012
- The NICOMATIC system 3/2012
- Saving energy in material drying 4/2012
- The Bespak material handling 2/2013
- Vision Technical Molding 3/2013
- WPC injection molding 1/2014
- New Pollmann central system 2/2014
- The HELLA Mexico system 3/2014
- The Procopi system, France 4/2014
- The SLM material management 4/2014
- WITTMANN in Slovenia 1/2015
- Alliance Precision Plastics, USA 2/2015
- Our Spanish customer Fushima 2/2015
- Injection Molding at Tielke 2/2015
- The Wiba QuickLook App 2/2015
- FRANK plastic central system 3/2015
- Johnson central system (China) 1/2016
- Drying at Lek Sun (Malaysia) 1/2016
- GOTMAR system (Bulgaria) 2/2016
- The Havells (India) system 4/2016
- FC plus module for dryers 1/2017
- Axjo + BATTENFELD Sweden 1/2017
- The REINERT central system 2/2017
- The PT. WIK central system 3/2017
- The new ATON plus H dryer 4/2017
- 3A Plastics (F) central system 4/2017
- The fortell central system (CZ) 1/2018
- Stadlmann, Austria: energy saving 2/2018
- Natural fibers from the ATON 3/2018
- Vignesh, India, and WITTMANN 3/2018
- Simon (E) counts on WITTMANN 3/2018
- WAREMA (H) central system 4/2018
- The Cornaglia (I) drying system 1/2019
- MEGATECH central system (E) 1/2020

Blending

- The new GRAVIMAX series 2/2007
- Blender economics 3/2007
- GRAVIMAX 14V blender 3/2009
- The art of blending regrind 3/2011
- Dosing on the highest level 1/2013
- Precision for safe rail traffic 4/2013
- How to get to better blending 4/2015

News from the Subsidiaries

- Australia 2/08, 2/13
- Austria 2+3/08, 1/10, 3/11, 4/12, 3/13, 2+3/15, 2+3/16, 1/19
- Benelux 3/08, 2/09, 3/17
- Brazil 3/07, 1/09, 2/17
- Bulgaria 2/09
- Canada 1/07, 1+2/08, 3/09, 1/18
- China 2/10
- Colombia 2/12
- Czech Republic/Slovakia 4/09, 3/14, 1+3+4/17, 4/18
- Denmark 1/09, 1/13
- Finland 4/08+1/12
- France 2/07, 3/08, 4/15, 2/17, 4/18
- Germany 1/07, 3/12, 4/13, 3/14, 1/18, 2+4/19, 3/20
- Great Britain 2/09, 2/10, 3/17, 4/19
- Greece 2/14
- Guatemala 1/13
- Hungary 1/08, 4/15
- India 2/08, 3/10, 2/12, 3/18
- Israel 1/12
- Italy 4/08, 1/10, 4/11, 3/20
- Mexico 3/07, 3/09, 4+2/11, 3/18
- Morocco, 1/17, 1/20
- Poland 2+3/13, 4/15, 3/16, 3/17
- Russia 4/12
- Serbia/Kosovo/Albania 1/17, 4/19
- Slovenia/Croatia 1/10
- South Africa 1/16
- Southeast Asia 2/07
- South Korea 3/10, 2/17
- Spain 3/07, 1/17, 1/18
- Sweden 2/09, 4/18
- Switzerland 1/08, 2/12
- Taiwan 4/09, 4/15
- Turkey 3/08, 2+4/11
- Ukraine 1/19
- USA 2/08, 3/09, 1/11, 4/13, 4/14, 2+4/16, 4/17
- Vietnam 4/15

Injection Molding

- Injection molding one stop shop 4/2008
- MIM at Indo-USMIM 4/2008
- Cost optimization: EcoPower 1/2009
- IT assisted services 1/2009
- The water injection process 2/2009
- The Krona Industriä equipment 2/2009
- Micro-parts: Microsystem 50 3/2009
- wolcraft: multi-component 4/2009
- Process data acquisition 4/2009
- The new all-electric EcoPower 4/2009
- The Thomas Dudley company 1/2010
- IML with TM Xpress 1/2010
- AIRMOULD®/AQUAMOULD® 1/2010
- Design Molded Plastics 2/2010
- Stadlmann relies on Wille 2/2010
- The new MicroPower 3/2010
- AQUAMOULD® 3/2010
- New benchmark: MacroPower 4/2010
- The STELLA company 4/2010
- The ServoDrive technology 1/2011
- The 75th machine for Krona 1/2011
- Packaging specialist TM Xpress 2/2011
- WAVIN (Czech Rep.) 3/2011
- SANIT molding a success 3/2011
- WEPPLER's molding machines 4/2011
- MacroPower producing cable ties 1/2012
- The CELLMOULD® process 2/2012
- The 43 ESMIN machines 3/2012
- Remote connectivity 3/2012
- Foamed high-quality parts 4/2012
- LECHNER MacroPower 4/2012
- MacroPower at GT LINE 1/2013
- Praise for the standard machine! 1/2013
- Vertical machines at Electricfil 2/2013
- BECK's molding technology 2/2013
- ESCHA using HM machines 3/2013
- Hoffer Plastics' HM machines 3/2013
- Guppy using the EcoPower 3/2013
- The Backhaus success 4/2013
- Incapsulation: clean and safe 4/2013
- Multi-component parts 1/2014
- Success through versatility 1/2014
- The tried and tested at Philips 2/2014
- Light-weight foamed parts 2/2014
- The KRESZ & FIEDLER Systems 3/2014
- SME molder Autenrieth 3/2014
- Top micro parts from Küng AG 3/2014
- Opening up efficiency reserves 4/2014
- HiQ Shaping 4/2014
- ServoPower saves energy 1/2015
- Best quality at hünersdorf 1/2015
- The Grip H fixings success story 1/2015
- Gerresheimer system in China 2/2015
- MicroPower at Tessa (USA) 3/2015
- Molding at Interplex (China) 3/2015
- RT-CAD Tiefenböck (A) 4/2015
- Dieter Wiegelmann (D) 4/2015
- OneSeal ApS in Denmark 4/2015
- Denk Kunststofftechnik (D) 1/2016
- ELASMO Systems (A) 1/2016
- REUTTER Group (Germany) 2/2016
- P.P.H. LIMAK in Poland 2/2016
- MacroPower at Stüdi (CH) 3/2016
- Ever Rich Fountain, Taiwan 3/2016
- The Ackermann production (D) 4/2016
- Micro molding at Eltek, Italy 4/2016
- Moto Tassinari, USA 1/2017
- Linear Plastics, UK 1/2017
- LMBK (D) compact cells 2/2017
- Teflon micro precision parts 2/2017
- The HIDROTEN company (E) 2/2017
- PLASTIKA BEVC, Slovenia 3/2017
- Buzek processes PVAL 3/2017
- Fakuma Highlights 2017 4/2017
- Hybrid technology: high precision 4/2017
- EPC (USA) is still growing 4/2017
- MES cooperation 1/2018
- JSC Apex in Russia 1/2018
- Perfect surfaces at Boryszew (D) 2/2018
- Oldrati (I) and WITTMANN 2/2018
- MIM at Mimest in Italy 3/2018
- PowerSeries at Prewag (CH) 3/2018
- DAIGLER (D) recipe for success 4/2018
- HIRT (D): micro high-tech cell 4/2018
- Winkelmann (D): automotive parts 1/2019
- STIEBEL ELITRON, Eschwege (D) 1/2019
- Metak (D) and the PowerSeries 1/2019
- Fröbel in Blaufelden (D) 1/2019
- Cooper Standard, Poland 2/2019
- PWF, Germany: Automotive 2/2019
- WITTE (D): Vertical competence 2/2019
- YONWOO, Korea: MicroPower 3/2019
- aquatherm (D): MacroPower 3/2019
- LIM technology 3/2019
- Energy-efficient: Etzel (D) 4/2019
- The Vogt (CH) molding machines 4/2019
- Screw-Series, Part 1 + KURZ (D) + WITTE Ostroy (CZ) + Climax (E) 1/2020
- SmartPower at Langlotz, Germany 2/2020
- SmartPower at Maco, Austria 2/2020
- Screw-Series, Part 2 2/2020
- MacroPower at Prince, Netherlands + Screw-Series, Part 3 + FRÖBEL masks (D) 3/2020

In-Mold Labeling

- IML stack mold systems 3/2007
- WITTMANN 2 + 2 stack mold 1/2008
- ATM d.o.o. in Serbia 3/2009
- PLASTIPAK in Canada 4/2010
- Tea Plast in Albania 3/2012
- EcoPower: fourfold IML 1/2013
- IML as a multifaceted process 4/2013
- IML at AMRAZ in Israel 4/2015
- 3D-IML at WITTE in Poland 1/2016
- The W837 IML lid-system 2/2017
- Stioplastics (F): further growth 4/2018

Automation/Control Technology

- Medical production and control 1/2007
- Large structural foam parts 2/2007
- The new R8 robot control 3/2007
- High-end: smart adjustment rods 1/2008
- Drive engineering for robots 1/2008
- Transponder pin production 2/2008
- Automated remote control keys 3/2008
- Automation at Carclo, UK 4/2008
- The flexible automation cell 1/2009
- Growth with robots 2/2009
- Bruder toy wheel production 4/2009
- Pallet production at Utz, Poland 1/2010
- EcoMode for efficient robots 2/2010
- Automated oil level sensors 2/2010
- Automating rotation welding 3/2010
- The new R8.2 robot control 4/2010
- Inear robots in the clean room 1/2011
- Super-fast part removal 2/2011
- Automation of cups and lids 3/2011
- Superior multi-component parts 4/2011
- Automating insert molding 1/2012
- The expert automation of lids 2/2012
- LSR parts at Silcotech (CH) 3/2012
- Zero-reject production 4/2012
- Smallest parts at JENOPTIK 2/2013
- The Schramberg automation 3/2013
- The Busch-Jaeger automation 1/2014
- Automating In-Mold Decoration 2/2014
- Automation at Pook Erie Plastics 3/2014
- Automating STAR PLASTIK 4/2014
- Jones Plastic and WITTMANN 1/2015
- Robots at Greeland/Singapore 2/2015
- SEB tandem robots (F) 3/2015
- The Sacel automation (I) 3/2015
- Automation in Korea 4/2015
- Suzuki India and WITTMANN 4/2015
- IML special solution (Bulgaria) 1/2016
- Innaware in Indonesia 2/2016
- 2 robots at Sanwa, Singapore 2/2016
- 7,000⁺ W818 at Krona (D) 3/2016
- COMBI-PACK automates IML 4/2016
- Jaeger Poway in China 1/2017
- RenyMed's automation solution 3/2017
- Digital robot twin 4/2017
- Cyber security 4/2017
- PIASSON's robots in Israel 1/2018
- WITTMANN 4.0 Plug & Produce 2/2018
- Green, China, has 180 robots 2/2018
- Intertech's WITTMANN robots 2/2018
- White Horse Plastics (UK) 2/2018
- Midwest, USA: Robots 2/2018
- EIFHEIT and WITTMANN 4/2018
- Plastisud (F): high-speed robots 1/2019
- The evolution of robot controls 1/2019
- The DMT 4.0 working cell 2/2019
- The EPG robots in Russia 2/2019
- The Alfmeier robots in China 2/2019
- TEMI+ at MAFLEX in Italy 3/2019
- The Gücsan (Turkey) robots 4/2019
- Plastika Skaza (Slovenia) 4/2019
- BELL (F), the biggest robot 1/2020
- Shiny producing stamps in Taiwan 2/2020
- CMHS Interview with G. Pigozzo 3/2020
- Machine Linking at Happ, Germany 3/2020

Granulation/Recycling

- Inline recycling of sprues 1/2007
- Giant granulator MCP 100 2/2007
- The new MAS granulator 3/2007
- Challenging recycling process 1/2008
- The MC 70-80 at Centrex 2/2008
- Gibo Plast enforces recycling 2/2009
- MC granulators with AF auger 4/2009
- Grinding of ferrite 1/2010
- Grinding critical material 3/2010
- The TMP CONVERT solution 1/2011
- Inline recycling with Minor 2/2011
- Granulators under the press 2/2012
- Large solutions for large parts 2/2012
- Minor 2 at IECOBEL, Belgium 2/2016
- MIHB and JUNIOR 3 Compact 4/2016
- ARaymond and the G-Max 33 3/2017
- Liebherr Bulgaria central system 1/2018
- The new S-Max granulator series 3/2018
- Feeding shaft for granulators 1/2019

Flow Control/Temperature Control

- Advantages of pulsed cooling 1/2007
- Comparing water to oil 2/2007
- The new TEMPRO plus C series 3/2007
- COOLMAX cooling units 2/2008
- TEMPRO "guarding" IMMs 3/2008
- TEMPRO with DUO cooling 4/2008
- Variothermal tempering 1/2009
- TEMPRO plus C180 2/2009
- TEMPRO direct C120 [C250] 3/2009
- WFC: Water Flow Control 4/2009
- TEMPRO plus C180 1/2010
- TEMPRO: Universal benchmark 2/2010
- BFMOLD® mold cooling 3/2010
- TEMPRO plus D 4/2010
- Online-thermography 1/2011
- Tempering at Fuchs & Sohn 2/2011
- TEMPRO plus D in automotive 1/2012
- Oscilloscope function 2/2012
- Compact temperature controller 4/2012
- Optimal tempering = quality 1/2013
- The Starlinger special solution 2/2013
- New WITTMANN equipment 4/2013
- TEMPRO uses heat waste 1/2014
- Clean solution at DELPHI 4/2014
- Blum using a special solution 1/2015
- The new FLOWCON plus 4/2015
- TEMPRO plus D at Fischer (D) 1/2016#
- WFC retrofit kit is available 2/2016
- FLOWCON plus at COLTOP (A) 3/2016
- TEMPRO plus D180 at Wehlie 4/2016
- The new TEMPRO basic C120 1/2017
- Rejlek Group uses TEMPRO 3/2017
- TEMPRO plus D with SpeedDrive 4/2017
- Water: high-temperature medium 4/2017
- Flow control at SANIT, Germany 3/2019
- New series 110 and 310 2/2020

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Editorial

Content



Michael Wittmann

Dear Reader,

An eventful year 2020 has come to a close, and I consider myself perfectly justified in saying that I feel no regrets about it, but only hope and anticipation for 2021. The reasons are obvious to everyone. The global lockdown in spring to counteract the rapid spread of the COVID-19 pandemic turned upside down our habits of work and life, well-established over many years, virtually overnight. At the beginning, it was even uncertain whether our group of companies could continue the not fully automatized parts of our production. Fortunately, this uncertainty was dispelled relatively quickly. With the introduction of fundamental hygiene measures, strict rules of social distancing on our corporate premises and working from home offices where possible, we were able to resume operations on an almost normal level. Since the summer months, all of our production facilities have been up and running again to 100%, with a trend towards further growth. For next year, we are therefore planning some further extensions to our Austrian production plants.

The plastics industry has proved very resilient during the Corona crisis. The strong demand for plastic products continued unabated in the sectors of medicine, hygiene, packaging and electronics. With a brief interruption, this was followed by the demand for leisure and sports equipment, toys and household appliances. Only the European automobile industry is still in the middle of transition to electromobility, with a continuing effect of heavily reduced volumes in order intake and uncertainty among automotive suppliers.

In spite of all satisfaction about the current strength of the plastics industry, the medium- and long-term challenges we are facing have not changed. Our industry, too, is in the midst of the increasing change towards circular economy, saving of resources with more economical equipment, and the transition towards bioplastics based on renewable resources.

With our *PowerSeries*, the most modern injection molding machines on the world market, as well as our automation systems and auxiliary appliances developed for maximum efficiency in operation, we are in a position to meet the challenges facing us with high expectations. In any case, I am looking forward to 2021 and the prospect of further normalization of our lives. Next year, traditional trade fair events with personal meetings should be possible once more. That's great!

I take this opportunity to thank all our associates for their commitment and loyalty, and our business partners for continued successful cooperation in 2020 in spite of all the challenges we have had to face.

Sincerely, Michael Wittmann

Injection Molding

MtM reduces energy costs



Peter Lucas peered the production of the Australian WITTMANN customer. **Page 4**

The shortest lead times



Mitch Hannoosh covers the very lean and flexible production at Lawrence, USA. **Page 6**

Automation

„PRIMUS“ means „the first“



Michael Tolz on automation solutions at Fietz Thermoplast in Germany. **Page 8**

Recycling

Blade granulator service tips



Denis Metral responds to frequently asked questions and offers troubleshooting. **Page 9**

Hoffer's WITTMANN granulators



Greg Hannoosh on efficiently working granulators at Hoffer, USA. **Page 10**

Control Technology

No rejects with HiQ Flow®



Patrick Chromy and **Benjamin Pearson** on the highly developed molding technology. **Page 12**

News

New premises for WITTMANN BATTENFELD do Brasil
Obituary for Hans Günter Hunsicker

Page 15

MtM: low energy cost and highest quality with WITTMANN Group equipment

MtM Pty Ltd. in Melbourne, is a leading supplier of automotive assemblies worldwide. The company recently undertook some important investments with regard to saving its energy costs. As part of this strategy, MtM decided to focus on injection molding machines and automation solutions from the WITTMANN Group.

Peter Lucas



View of an injection molding working cell from the WITTMANN Group, consisting of a WITTMANN BATTENFELD injection molding machine and a WITTMANN robot, installed at MtM Pty Ltd. in Melbourne, Australia.

MtM Pty Ltd. was founded by Max Albert and has been manufacturing in Australia for more than 50 years. Mark Albert is now the Managing Director, with his son Edward Albert, who also works in the business, making MtM Pty Ltd. a truly family-owned and operated business.

MtM employs in excess of 190 employees across three manufacturing sites in Australia, Shanghai/China, and Columbia, Missouri/USA. The company is primarily engaged in the design, development and manufacturing of high value-added complex assemblies, supplied primarily to the global automotive industries.

MtM's main products include door check and automatic gear shift assemblies. However, to remain globally competitive and to protect its intellectual property, MtM also injection molds door check levers, sliders, and housings made from unique POM & Nylon blends. These are then exported to MtM overseas operations or affiliated joint ventures.

MtM's design center and head office is located in the southern city of Melbourne, Australia. Here, the design of all products and the manufacturing processes – along with

a combination of the materials and the reliable machinery – is the key to MtM's modus operandi and its intellectual property. The Melbourne premises comprise an approximate floor space of 8,700 square meters along with 18 injection molding machines ranging in size from 75 t to 450 t of clamping force.

"MtM's success is a direct result of innovation from continuous investment in research and development", says Mark Albert.

Steve Reynolds, Business Development Manager at MtM, adds: "Well before the anticipated closure of the Australian car manufacturers, MtM utilized its worldwide supply networks to gain important contracts to export automotive components to countries such as USA, Canada, Mexico, Thailand, South Africa, China, India, and Argentina."

MtM has also invested heavily into power saving equipment, such as installing a 542 kW solar energy plant on its Melbourne factory roof. This system generates enough energy to run the factory during the day. Along with the solar plant, MtM installed LED lighting and increased natural lighting where possible. The other investment to

reduce energy consumption has been to install a number of WITTMANN BATTENFELD *SmartPower* injection molding machines.

MtM and the WITTMANN Group

Back in 2001, during the development of the first global door check contract, MtM determined that automation was the key to consistent high-quality production output. Maintaining global competitiveness for the company's levers is an important part of the door check assembly, along with improved occupational health and safety for the employees. "Traditionally, steel levers were hand inserted into injection molding tools which was not only time consuming but also

were eliminated. Today, as a result of the further global expansion of MtM into the Chinese and USA markets, MtM not only still operates those very first machines, but has since commissioned more WITTMANN robots along with WITTMANN BATTENFELD injection molding machines with increased levels of technology.

As previously mentioned, MtM needed to reduce the energy cost to compete against lower cost manufacturers. "The solar plant helped to reduce the cost of energy, but MtM also needed energy-efficient injection molding machines to maximize the use of the solar plant", said Suresh Jayan.

After a comprehensive market review, MtM decided on the WITTMANN BATTENFELD *SmartPower* injection molding machine. The choice was made primarily because of the *SmartPower's* energy-saving functions; including KERS (Kinetic Energy Recovery System), ServoDrive, and Drive-on-Demand, the latter combining a fast-responding, speed-controlled, air-cooled servo motor with a fixed displacement pump.

Suresh Jayan also noted that another advantage was the full integration of the WITTMANN robot with the WITTMANN BATTENFELD *SmartPower*. This saved time during mold changes and eliminated errors when loading programs.

Another attractive feature of the WITTMANN robot was the ease of programming and the ability to quickly modify programs without an extensive knowledge of computer programming.

MtM also specified magnetic platens, allowing molds to be rolled on and off saving valuable downtime during mold changes.

This generation of innovation has resulted in cost-efficient injection molding machines and cycle time reductions

with the new WITTMANN robots. The next challenge for MtM is to incorporate Industry 4.0 integration into the molding operations.

The learning and trust gained in dealing with WITTMANN has enabled other projects to be undertaken, increasing productivity gains and thus countering global cost pressures. These newer projects have seen MtM being awarded significant new business with new customers in North America.

"If the past has any influence on the future, then MtM and WITTMANN BATTENFELD can look forward to a long and mutually beneficial future together", says Mark Albert. ♦

From left to right: Mark Albert, MtM Managing Director; Edward Albert, MtM Assistant Business Development Manager; Steve Reynolds, MtM Business Development Manager; Suresh Jayan, MtM Production Manager MtM; and Peter Lucas, Managing Director of WITTMANN BATTENFELD Australia.



Typical MtM automotive products: gear shifter (left) and door checks.

injury-risky to the operators involved", says Suresh Jayan, Plant Operations Manager at MtM. WITTMANN worked closely with MtM. Improvements to the process were then identified and implemented which resulted in cycle time savings and also reduced the risk of injury.

The first WITTMANN BATTENFELD robot and injection molding machine cell was installed in June 2002. This was so successful that MtM ordered the second robot and molding machine cell within only a week of the first unit being fully commissioned.

WITTMANN robots and automation delivered staggering results: productivity and capacity increased by 30%, direct labor reduced by 75%, and potential work injuries

Peter Lucas is Managing Director of WITTMANN BATTENFELD Australia Pty Ltd.

Leading lead times with help of WITTMANN BATTENFELD injection molding machines

By emphasizing lean business practices, American manufacturing, and a commitment to quality, Lawrence Industries and their WITTMANN BATTENFELD injection molding machines have set the standard for lead times in the hardware manufacturing industry.

Mitch Hannoosh

Lawrence Industries is an industry-leading manufacturer of door and window hardware based in Thomasville, North Carolina. In an industry that fled America over a decade ago, the fact that they are still here and thriving is a story in and of itself. Add to that fact that Lawrence Industries has lead times of just one to two weeks and the story is truly remarkable. From their first customer conversation, they can design a part, 3D-print a prototype, air-freight it for customer review, build the mold, and then ship the molded product in the 2nd or 3rd week. With supply issues from overseas and tariffs making internationally made products more expensive, Lawrence Industries is and has been the right molder at the right moment to take advantage of market inefficiencies with a smart, responsive business model and a commitment to flexibility and growth.

A view of the Lawrence Industries production hall in Thomasville, North Carolina, USA, picturing WITTMANN BATTENFELD injection molding machines.



Lean, flexible, and innovative

In business for over 30 years, Lawrence Industries made a name for themselves off the bat with their extremely short lead times. “When we first came up, lean manufacturing was really just getting started and a standard lead time folks were seeing was 16–24 weeks”, says Barry Lawrence, President of Lawrence Industries, Inc. “So when we came in with two week lead times, people honestly didn’t even trust it and we had to prove ourselves. Well, we did and we still prove it every day!”

By being based in the USA, the lead times are helped dramatically by simple geography. With most of the competition based in China, Lawrence is often able to have a part in production before their customers can even get a quote back from overseas. They’re also, however, extremely efficient. With only about 50 people total on staff, they still manage about 60 mold changes per day, each taking only about 10 minutes each. They incorporate automation in their mixing,

loading, and grinding to further speed up their process and currently they can produce about one million parts a day for the customers. They build their own tooling in-house, which drops cycle times building parts to bring to market, and they have the capability of building a mold in a day if necessary (although they would prefer at least a couple of days!). These internal capabilities did not happen overnight, but were the product of a continuous growth mindset and a commitment to the “one-stop shop” business model for their customers.

“We have had numerous jobs where we needed some type of part that was really unique and only came from one vendor”, says Lawrence. “We almost always jump on that opportunity to start making the part ourselves. It improves our own supply chain and makes us more versatile for future projects for our customers – a real win-win for us.” Overall, Lawrence Industries currently produces about one hundred projects per year, from design to tooling to manufacture, and they are still continuing to grow.

WITTMANN BATTENFELD's injection molding machines

This commitment to maximum speed and efficiency is how Lawrence Industries and WITTMANN BATTENFELD became a true partnership. As Lawrence was starting to experiment and do the R&D work for making hardware out of plastics, just before the recession in 2008, they purchased several used BATTENFELD injection molding machines. WITTMANN BATTENFELD agreed to support the older machines, and worked with Lawrence to provide the necessary training and equipment to help them grow. Lawrence Industries did grow, and as they did, they bought more equipment from WITTMANN BATTENFELD, who they trusted as a true partner due to their support of their initial



injection molding machines. “Our partnership with WITTMANN BATTENFELD has really helped us continue to be the most efficient manufacturer in our industry”, says Lawrence. “We like to buy all of our equipment from a single supplier when we can. There’s a learning curve when you go out and get a hodgepodge of different machines, and then you have to restaff more people, do more training, and generally spend more time and money. There is no such thing as saving money – you have to spend the right money to get the right result, and WITTMANN BATTENFELD’s machines have been worth every dollar to us.”

The added value that comes with quality and consistency is a benefit that WITTMANN BATTENFELD has been promoting for many years, and they have really seen it come to life through Lawrence Industries’ approach.

“We know how good our machines are, how easy to use they are and the quality of the product they give you”, says Jim Mitchell, National Sales Manager for the Molding

Machine Division at WITTMANN BATTENFELD. “We can yell about it from the rooftops all day but having a customer like Lawrence who sees the benefits every day and how it helps their business; there’s just no better promotion for us than that.”

After over a decade of working hand in hand with WITTMANN BATTENFELD, Lawrence Industries now has 40 WITTMANN BATTENFELD injection molding machines, and has no plans to slow down anytime soon.

Service and support

As stated earlier, Lawrence Industries has made a name for itself with its minuscule lead times and flexibility. With this need for speed and efficiency, one of the most important parts of their partnership with WITTMANN BATTENFELD is the service and support that WITTMANN BATTENFELD offers for their machines. The remote servicing feature in particular has been a real boon for Lawrence Industries.

Remote service allows users to contact WITTMANN BATTENFELD directly when there’s a question or an issue, and a WITTMANN BATTENFELD support person is able to diagnose the problem remotely right away. Not needing to send someone out to the plant to diagnose in person saves time and money on both sides, and keeps the customer plant up and running.

“We have 40 WITTMANN BATTENFELD machines in here and we can’t afford down time on any of them”, says Lawrence. “Being able to log on and get support has saved countless time. We contact them almost weekly, calling them up thinking there’s a problem and that we have to buy a repair part, and the WITTMANN folks will tell us we don’t need it and be able to diag-

nose and help us fix the problem faster, easier, and cheaper than thought it would be. It’s just a really user-friendly, manufacturing-friendly system.”

This remote service capability that Lawrence has embraced is a big part of the value that WITTMANN BATTENFELD’s machines bring to the table, and WITTMANN BATTENFELD has really appreciated the utilization that these features get from Lawrence.

“We have really enjoyed working with Lawrence Industries”, says Mitchell from WITTMANN BATTENFELD. “They know what they’re looking for out of our machines and utilize the features we always have to push and persuade customers to actually take advantage of. They’re money saving, time saving features but they’re new for some people and lots of people aren’t open to doing things a different way. That willingness to work with new things and push the cutting edge is part of what has made Lawrence Industries so successful and we’re a proud partner in their success.” ♦

Lawrence Industries is proud to be a family company and an industry leader in manufacturing door and window hardware.
- From left to right: Randy Lawrence, VP of Engineering; Barry Lawrence, President; Katie Lawrence, Corporate Secretary; Brandon Lawrence, VP of Sales.

Mitch Hannoosh is part of the team of Next Step Communications Inc. in Kittery Point, Maine, USA, and frequently working with WITTMANN BATTENFELD, Inc.

Fietz Thermoplast uses the PRIMUS among robots

News from Radevormwald, Germany: Fietz Thermoplast GmbH, the injection molding company of the Fietz Group, decided at the beginning of this year to invest there in new PRIMUS parts removal robots from WITTMANN.

Michael Tolz

Depositing of injection-molded automotive parts by a WITTMANN PRIMUS 26 pick & place robot. Directly above: the SICK camera inspection system mounted on the protective housing.

The German Fietz Group is a successful medium-sized group of companies processing high-grade engineering plastics to its customers' specifications, which ranks among the market leaders in the industry. It is a group consisting of four different companies with facilities located in Burscheid and Radevormwald. As an employer, the Fietz Group is responsible for 240 associates and currently eight trainees.

Fietz manufactures complex functional plastic parts from a great variety of basic materials. By using mechanical processing methods as well as injection molding, it is able to make virtually any conceivable type of product.

Particularly noteworthy in this context are the parts made of *FiPur*, a high-performance polyurethane specially developed by Fietz for sealing and drive technology applications. In addition, the companies of the Fietz Group produce color batches for fluoroplastics; another field of activity is high-temperature plastics recycling.

Decision in favor of PRIMUS robots from WITTMANN

Continuous improvement of process technology – numerous companies often pay only lip-service to this issue. However, the Fietz Group with its injection-molding plant Fietz Thermoplast GmbH sees a clear obligation to subject its existing injection molding auxiliaries at regular intervals to thorough update checks along the entire process chain. In this way, Fietz Thermoplast's customers can be absolutely sure that its products are invariably manufactured to highest possible quality standards, and by cost-optimized production as well.

Before starting any new large-scale production for a well-known customer in the automotive sector, the company sets itself the task to carry out a future-oriented optimizing review on its injection-molding auxiliaries. The aim is to upgrade the automation level of the injection molding machines and with the help of a camera-based inspection system to identify and remove any defective parts as well.

Following a thorough examination of all brands of removal robots, Fietz chose models from the WITTMANN Group's PRIMUS series: PRIMUS 16 and PRIMUS 26. PRIMUS robots have been developed for pick & place applications and are equipped with servo-motor drives in all three main axes. For Fietz, the high quality of these appliances, their low sound level in operation and, last but not least, their extremely short removal times tipped the

Jörg Schröer (left), Sales WITTMANN BATTENFELD, and Roman Fietz of the Fietz Group, inside the production plant of Fietz Thermoplast GmbH in Radevormwald, Germany.

Michael Tolz is Managing Director of WITTMANN BATTENFELD Deutschland GmbH in Nuremberg.



balance in their favor. Other features of special significance were easy operation and, of course, the possibility to integrate the camera inspection system without any problems.

Successful implementation

The PRIMUS robot removes the injection-molded parts, deposits them separated according to cavities, while the camera system from SICK checks whether the parts meet the specifications, and faulty parts are sorted out.

Following the implementation of these process optimization and quality assurance measures, Fietz Thermoplast GmbH was distinguished by its prominent automotive customer by being added to the that customer's top 3 suppliers.

Fietz has become a loyal customer of the WITTMANN Group – not only because of the outstanding quality of the products from WITTMANN and WITTMANN BATTENFELD, but also due to the machine manufacturer's strict adherence to delivery and commissioning schedules. ♦

Service tips on granulator blades and screens

Answers to some frequently asked questions and troubleshooting advice.

Denis Metral

How quickly will the granulator blades become dull?

That will depend on how much material the granulator is processing, together with the geometry of the re-grind part, as well as the material type. Focus on the fact that blades are the highest wearing items of a granulator; and in many cases blades are the most expensive maintenance item.

What happens when blades are dull or improperly spaced?

- Non-uniform and dusty re-grind is produced
- Throughput rates may drop
- Increased noisy working
- Higher energy consumption
- Increased heat development when the material isn't cut properly
- Premature failure of connected devices (motor, belt tensioner, etc.)

Check fixed and rotating blades regularly with a quick visual inspection!

Do this practice as a regular preventive maintenance schedule. It will soon become clear how often the blades need to be sharpened. An hour meter helps to track preventive maintenance scheduling on blades. Regular inspection and maintenance by trained staff is recommended for early detection and elimination of problems, the minimization of downtime and more serious issues.

Gap, re-sharpening or replacing of blades

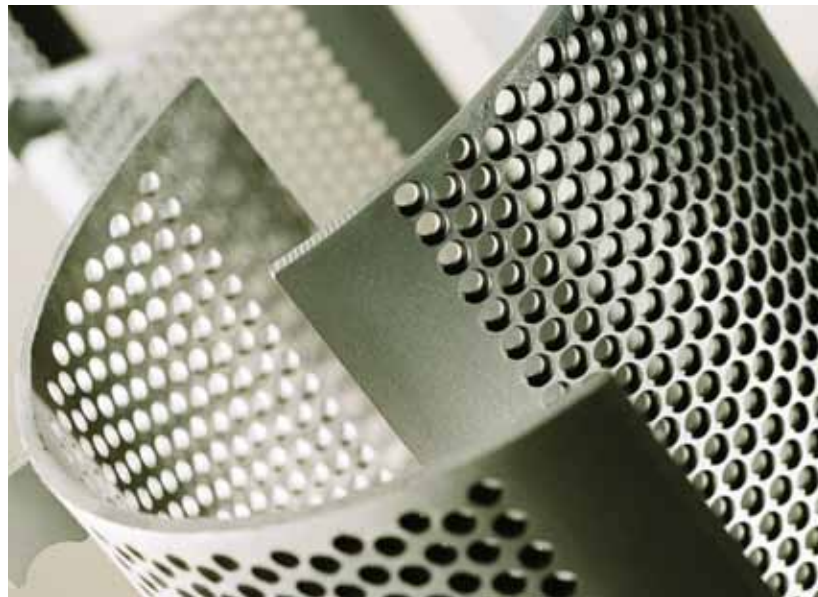
Dull blades are by far the most common problem in granulators. Have a spare set of moving blades available on the shelf for each granulator. This prevents extended downtime while waiting for blades to be reworked or replaced.

Improperly gapped blades

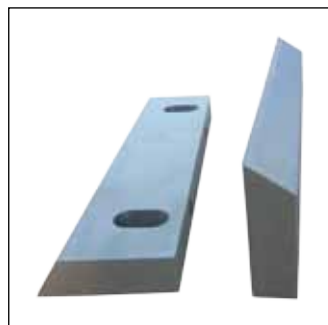
If blades are sharp but the quality of the regrind is not what it should be, check if the knife gap is out of tolerance. The gap refers to the space between the rotating knives and the fixed bed knives; recommendations relating to different granulator models range from 0.2 to 0.3 mm. Gap adjustment should be a priority on every preventive maintenance schedule.

Blade change

The blade gap pre-adjustment fixture allows for a pre-gapped set of blades that are not yet mounted within the cutting chamber. This ensures a quick and easy change, and also prevents potential injuries when



Artistically inspired view of granulator screens.



Pictures from left to right: Two blades to be used as parts for rotors with open design; blade gap pre-adjustment fixture from WITTMANN.

gapping blades directly inside a granulator. Adjustable rotating blades are of increased durability. Each blade can be sharpened individually as required – not just the most worn one. After replacing the blades, the rotor should be turned manually to ensure proper clearance between the stationary and rotating blades before starting the unit.

Blade resharpening

Carefully follow the sharpening instructions of the operating manual.

Screens

If a granulator is not properly maintained, the space in between the screen and the knife edges can increase, causing a reduction of throughput or clogging the screen. Clogs require a shutdown and granulator cleaning, thus reducing production rates. The screen itself can also wear down; small circular holes in the screen can eventually become larger, allowing bigger, non-uniform pieces of plastic to fall through. The quality of the regrind will be affected. Rotate the screen regularly to prevent wear and tear. Take a look at the screen holes. – If they are beginning to appear pear-shaped, it is probably time to replace the screen. ♦

Denis Metral is International Product Manager for granulators at WITTMANN BATTENFELD France SAS in La Buisse, France.

With WITTMANN granulators, Hoffer stays on the industry's 'cutting edge'

WITTMANN BATTENFELD, Inc., the U.S. subsidiary of the WITTMANN Group, has been supplying Hoffer Plastics with injection molding machinery and equipment for many years. On some recent Hoffer applications, the WITTMANN granulators that they have purchased have become a real standout when compared to their competition.

Greg Hannoosh

Hoffer Plastics is a family-owned and operated injection molder based in South Elgin, Illinois, USA. In business since 1953, they process over 20 million pounds of plastic and ship over 3 billion parts every year, primarily caps, closures, fitments, small engine, and appliance parts.

They have built a strong reputation in the industry for their commitment to their core values of customer service, trust, integrity, and fostering a family atmosphere both with their over 400 employees as well as their loyal customer base.

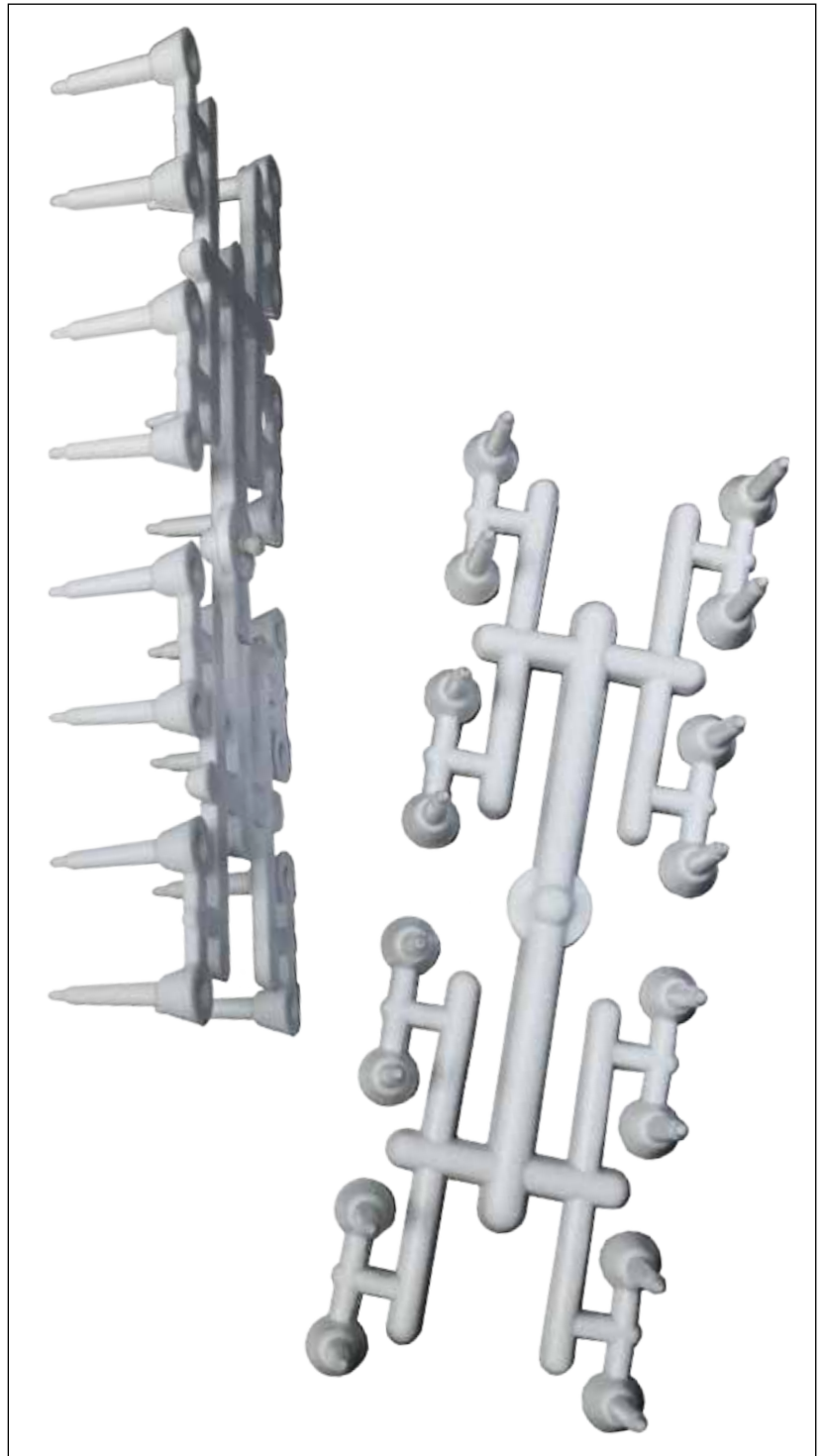
Beyond that strong culture, however, they also have a well-earned reputation for being an industry leader in quality and innovation, constantly developing new products and improving existing ones that can better suit their customer needs.

"We're really proud of the number of things we're able to hang our hat on here at Hoffer," says John Lederer, Hoffer Plastics' Maintenance Manager. "We are an American-made, multi-generational, family-owned manufacturing business with a 99% on-time delivery record and a variety of patented and successful innovations to our credit. Any of those things are worth being proud of, and we've got all of them and more going for us here."

Quality suppliers for quality products

Hoffer Plastics' commitment to innovation and customer service naturally has led to a need for machinery that can keep up with their changing, often cutting edge demands for it, pushing beyond standard usage and having the flexibility and durability

Sprues accrued at Hoffer Plastics that are grinded using the WITTMANN JUNIOR DOUBLE granulator.



to do a variety of outside-the-box jobs well. WITTMANN BATTENFELD, Inc. has been able to meet those needs and be a reliable partner to Hoffer with a variety of their equipment, including their injection molding machines, robots, central material handling systems and granulators.

“We’ve been purchasing WITTMANN granulators for about 6 years now,” says Lederer. “They have been consistent and reliable, working on a variety of challenging materials and projects, and been easy to use and to clean – really everything you could ask for and more out of a grinder.”

Tough materials need tough grinders

Those challenging materials include a 33% glass-filled nylon, which runs on a 500-ton injection molding machine running a 9-second cycle, producing sheetrock anchors. The granulator in use is a WITTMANN JUNIOR DOUBLE low-speed screenless granulator, and its ability to provide high-quality, efficient regrind on this tricky material is one of the factors that helps it stand apart from other granulators in the industry.

“With a standard granulator, there are a variety of challenges with the 33% glass-filled nylon material that we run,” says John Lederer. “Primarily though, the blades on them will dull far too fast for our needs, and a dull blade results in dusty, poor-quality regrind. Having a grinder stay sharp longer and be able to be cleaned and maintained easily seems like a simple thing, but it really does save us a lot of time and money on every job we do.”

The WITTMANN granulator leverages a low speed and durable design to allow for a longer blade life and thus better quality regrind of even the toughest materials.

Hoffer’s workers have also praised the granulators’ ease of use and ease of cleaning, two features that also are integral to a longer blade lifespan and continued high quality output regardless of the material being used.

Hoffer Plastics now has four of WITTMANN’s single low-speed screenless granulators and two of the JUNIOR DOUBLE low-speed screenless granulator models that have worked on these glass-filled runners for years.

Flexibility and a sustained partnership

In addition to their high quality and high durability, these granulators are also flexible, with options and additions that make them effective for any variety of job, even one not envisioned at initial purchase.

One such option that Hoffer Plastics has found particularly useful is the integration of magnets. “One great feature of the grinder that we’ve been able to take advantage of is the optional magnets,” says Lederer. “The magnets work to prevent scrap metal from getting through into the regrind, and the flexibility and connectivity has been great.

We purchased an upright conveyor and we were able to key this grinder to that conveyor so that all runners drop past a magnet, pulling out scrap metal and keeping the regrind from getting contaminated.”

This flexibility is something the WITTMANN Group prides in their whole product line, but is a benefit that sometimes is undervalued or overlooked by customers in their auxiliary equipment.

“This ability for our granulators to fit into new processes that involve a wide variety of materials is an incredibly valuable feature,” says Jake Powell, Midwest Regional Sales Manager at WITTMANN BATTENFELD, Inc. in Torrington, CT. “Hoffer Plastics is a company that has taken our machine and used it to the absolute best of its ability. They take advantage of the quality and the flexibility, and really see the value here that we always preach but often gets overlooked.”

Hoffer plans to continue purchasing WITTMANN granulators to replace aging equipment and expand their capabilities moving forward. ♦



High-quality sheetrock anchors, injection molded at Hoffer Plastics, South Elgin, Illinois, USA.

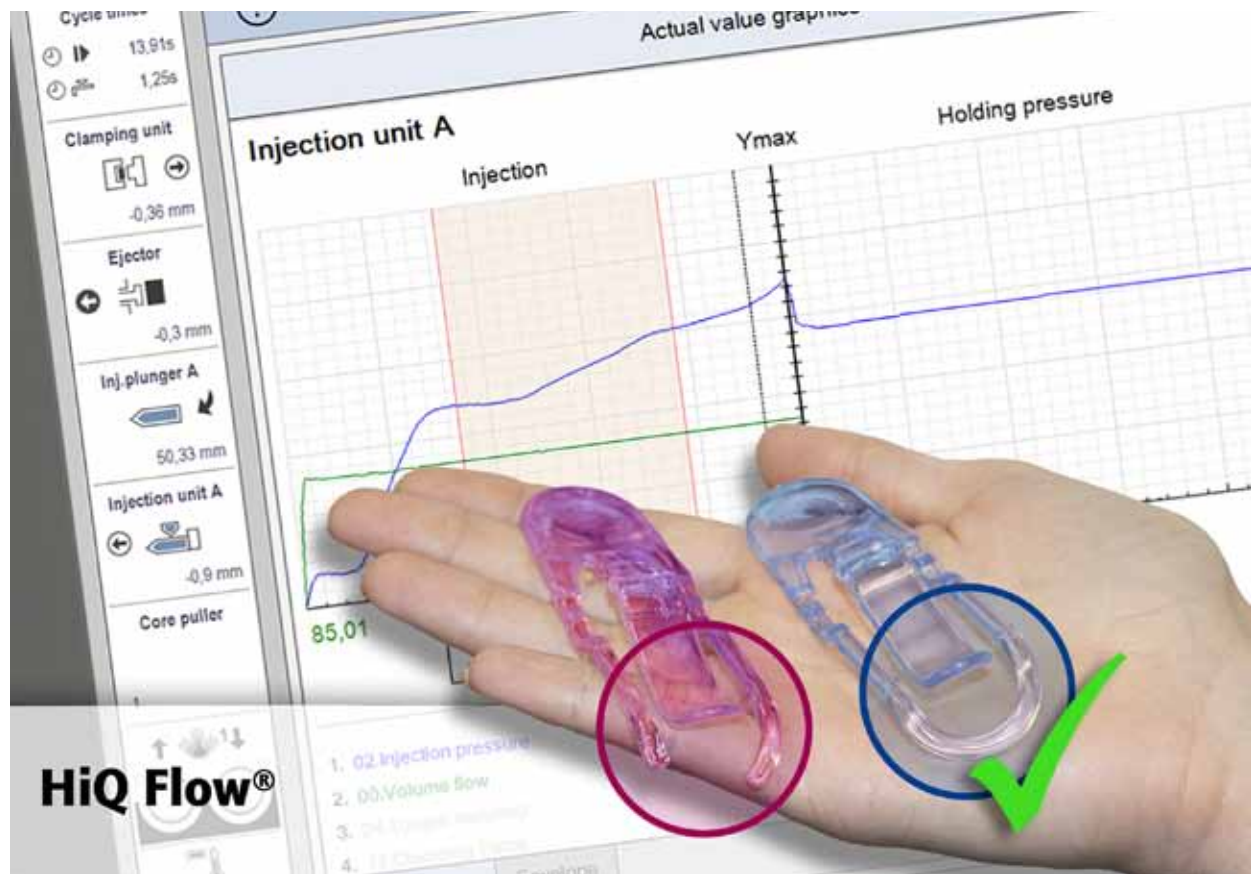
John Lederer, Maintenance Manager at Hoffer Plastics, with a JUNIOR DOUBLE screenless granulator from WITTMANN.

Greg Hannoosh is Founder/President of Next Step Communications Inc. in Kittery Point, Maine, USA, and frequently working with WITTMANN BATTENFELD, Inc.

HiQ Flow® – dynamic adjustment of switch-over pressure and holding pressure for constant part weights

HiQ Flow® is WITTMANN BATTENFELD's answer to the challenge of fluctuating shot weights in injection-molded parts. HiQ Flow® modifies the process parameters in the course of the same shot to counteract viscosity fluctuations caused by batch fluctuations in the material or by the use of regrind.

Patrick Chromy – Benjamin Pearson



Production without scrap parts using HiQ Flow® from WITTMANN BATTENFELD.

The viscosity of a plastic melt has a significant effect on the part quality of an injection-molded component. Viscosity fluctuations caused, for example, by different batches of material or the use of regrind may lead to effects such as weight fluctuations or in more drastic cases even to incomplete cavity filling.

In times of 6 σ and at optimized production processes, such fluctuations are not acceptable, so it is necessary to intervene as early as possible using the most verifiable and reproducible methods available.

One option is to check the values measured by the injection molding machine in order to detect possible viscosity fluctuations and where necessary already counteract their effect automatically in the course of processing. This is precisely the approach followed by the process technology developed by WITTMANN BATTENFELD. HiQ Flow® takes

care of monitoring, recording and controlling viscosity deviations during the injection and holding pressure sequence in order to achieve a consistently high parts quality regardless of the material's viscosity.

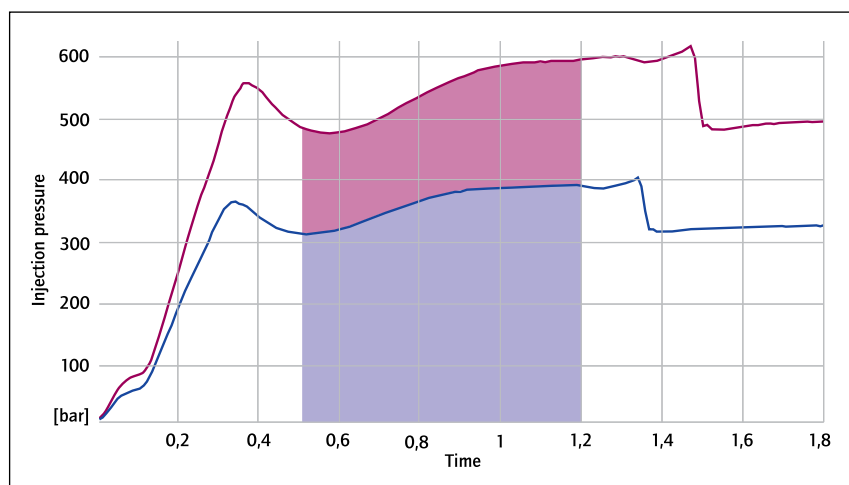
How does HiQ Flow® function?

Low-viscosity materials require less pressure to fill the cavity than melts with a higher viscosity. If the viscosity drops, the changeover point and the holding pressure are not corrected, an increase in weight must be expected. This weight increase results from the lower compression up to the changeover point as well as the better pressure conductivity in low-viscosity melt. The pressure conductivity up to the end of the flow path is relevant for the holding pressure phase and the pressure level set for it.

With HiQ Flow®, any viscosity fluctuations detected during the injection phase are actively corrected within the same shot (Fig. 1). For this purpose, the integral of the injection work is calculated for a predefined segment of the injection curve. The injection work is the result of multiplying the injection pressure with the cylinder surface and the travel of the injection plunger (the stroke). On the basis of a reference shot, both the changeover point and the holding pressure level are corrected to fit the injection work of the current shot.

HiQ Flow® visualization

operator HiQ Flow® has been developed with the aim of providing maximum possible user-friendliness. The reference values of the injection work are retrieved by a single



click on a button. For experienced operators, there is also the option of entering the reference value for the injection work manually. All the operator needs to do subsequently is to activate HiQ Flow® in the desired mode. The visualization also enables the operator to set the software for situations requiring fine adjustment.

Advantages of HiQ Flow®

- Achievement of a constant part weight even without cavity pressure sensors
- Prevention of scrap
- Less manual readjustment of the production process
- Faster restart after production interruption

HiQ Flow® - a benchmark test

The test was carried out on safety-relevant parts for an application from the automotive industry. The partner company had substantial viscosity fluctuations due to deviations in fiberglass content from one batch to the next batch. The basic material processed was a special polyamide with a desired weight proportion of 40% fiberglass content. The problem was solved successfully by using HiQ Flow®.

Test method

Three different batches of the same material were tested. These were designated as material 1, 2 and 3 in the description of the results. 500 g of each batch were weighed out and filled into the hopper as soon as the previous batch had been emptied into the feed opening of the barrel. The material change was registered as soon as the new batch reached the hopper outlet. The same material changes were subsequently repeated with HiQ Flow® switched on.

Cavity pressure sensor

In this application, the weight could not be used as a reference value for quality assessment. This is due to the fact that the varying fiberglass content not only leads to fluctuations in the material viscosity but

also varies its density.

Therefore the part weight is not only determined by the filling level of the mold, but by the material density in each case as well.

Consequently, the part weight is not directly related to the correct dimensions of the part. This is why the peak cavity pressure was taken as the relevant reference value for quality assessment.

A cavity pressure sensor is a pressure transducer installed in the mold, which is able to measure the melt pressure inside a certain cavity. The peak value of the cavity

pressure is directly related to the part filling level, and this in turn to the final dimensions of the molded part. During filling, the material is pressed into the cavity through small orifices in the nozzle and in the mold.

These geometric obstacles cause a certain amount of pressure loss in the plastic melt. The maintenance of a constant cavity pressure inside the cavities between the individual injection shots ensures that the melt has the same injection profile in each case. Deviations in material viscosity have a significant effect on the final cavity pressure. Viscosity fluctuations invariably occur whenever a filler material such as fiberglass or recycled regrind is used. A batch change in the same material may also lead to viscosity fluctuations.

The peak cavity pressure is normally reached during the holding pressure phase of the filling, when the dynamic pressure subsides and the pressure of the screw on the cavity becomes steadier.

Advantages of using cavity pressure sensors are the better control of the injection process and getting more detailed process information about each cavity. Disadvantages are the much higher cost and the fact that a sensor is needed for every individual cavity.

It must be noted that a cavity pressure sensor delivers accurate data only as long as the plastic surrounding it remains liquid. Correct placement of the sensors is a decisive factor, since the complex flow paths of the melt inside the cavity must be taken into account. >>

Fig. 1: Injection profile over time for two materials of different viscosities (blue for low and red for high viscosity), with active support from HiQ Flow®. The highlighted area represents the period of time for which the injection work is calculated. HiQ Flow® shifts the changeover point and the holding pressure level within the same shot on the basis of reference values.

Fig. 2: Peak cavity pressure per shot for three different materials. In the first section, HiQ Flow® is deactivated, in the second section, HiQ Flow® is switched on. This shows that with HiQ Flow® being activated, a stationary cavity pressure and consequently repeatable cavity filling has been achieved.

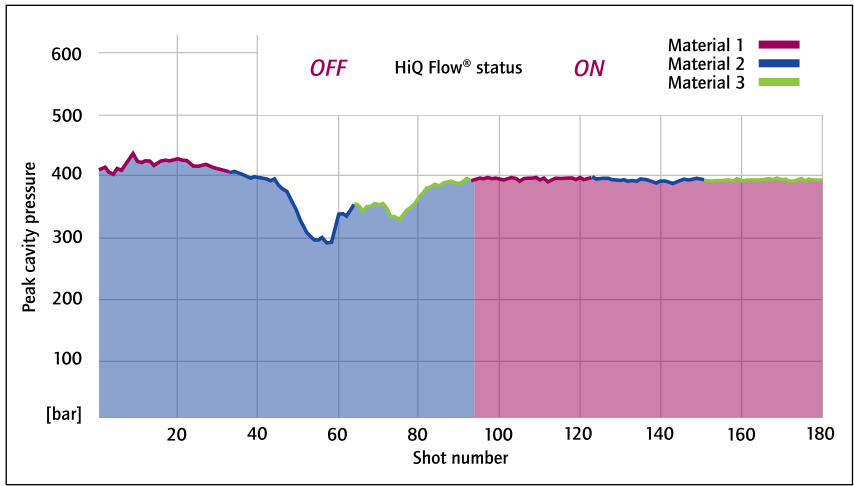


Fig. 3: Combined box plot to compare the peak cavity pressures per material and test series.

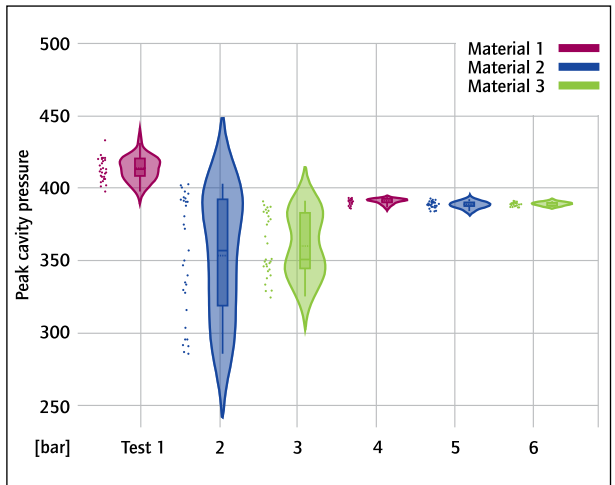
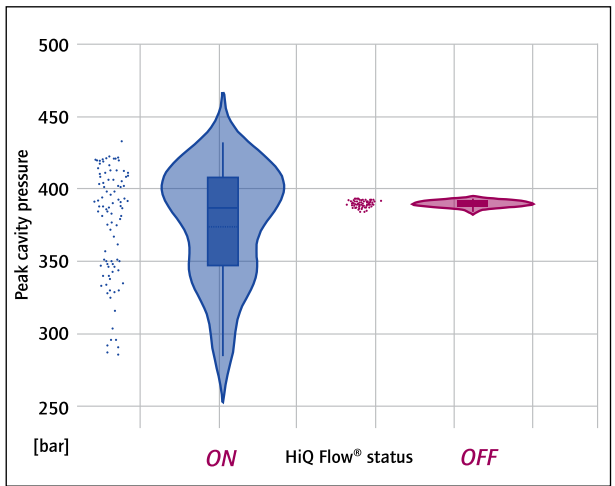


Fig. 4: Combined box plot for comparison of the maximum peak cavity pressures with HiQ Flow® ON/OFF.



Test results

Fig. 2 shows the results of the test run. The peak cavity pressure over the number of shots is depicted. Without adjustment of the changeover point (HiQ Flow® OFF), materials 1 and 3 show similar pressure levels, meaning similar proportions of fiberglass content. Material 2 shows lower pressure levels. The process was not stable. With material 2, less plastic melt reaches the cavity than with 1 or 3. Only when HiQ Flow® is activated, a constant cavity pressure is reached with all materials.

Fig. 3 shows a combined box plot, in which the probability distribution of the individual values is also estimated. In a simplified form it can be said that the steeper the peak or

peaks of the distribution, the more measuring points are located in the corresponding area. Each material is marked by a different color code. The dots beside the box plot stand for the cavity pressures of the individual injection processes.

A total of 6 tests have been carried out, 3 each with HiQ Flow® activated and HiQ Flow® deactivated. From test 4 onwards, HiQ Flow® is activated, and the distribution of the values is drastically reduced.

The data reveal that prior to switching on HiQ Flow®, the cavity pressure values were distributed across a relatively wide range. Moreover, the individual readings were distributed relatively extensively across the entire distribution range, which means that every additional injection process has a high probability of landing just anywhere within the entire range.

But as soon as HiQ Flow® is activated, not only the distribution range is diminished, but the injection processes within that range are more strongly concentrated close to the mean value as well. So the value for the next injection process will also be more likely to lie close to the mean value rather than in the marginal areas of the distribution range.

Fig. 4 summarizes the results and depicts the test series 1, 2 and 3 grouped into the “OFF” section, whereas the remaining tests (4, 5 and 6) were combined under “ON”. This demonstrates on a practical example the ability of HiQ Flow® to keep the part quality constant throughout changing viscosity levels. With the activation of HiQ Flow®, the standard deviation of the peak cavity pressure was reduced by more than 85%, the distribution range of the values by almost 75%.

Summary

HiQ Flow® keeps the part quality within tolerance even with a material change. It calculates the switchover and holding pressure levels of the current injection process. As a result, the efficiency of the production cell is increased by reducing the required working hours as well as the scrap rate. This may in turn boost the cost-efficiency of the production.

In the benchmark test, the parts produced under normal processing conditions were outside the tolerance band; by using HiQ Flow®, the process was stabilized and the scrap rate reduced to zero.

The ability of HiQ Flow® to generate a reproducible peak cavity pressure makes this system a possible alternative to expensive cavity pressure sensors.

In contrast to a cavity pressure sensor, which must be installed in each individual mold, HiQ Flow® is available to every mold once it has been installed and activated in a WITTMANN BATTENFELD injection molding production cell. In this way, HiQ Flow® offers an extremely high return on investment. ♦

Patrick Chromy and Benjamin Pearson work in the Process Engineering Department of WITTMANN BATTENFELD in Kottlingbrunn, Lower Austria.

Brazil: New WITTMANN BATTENFELD premises

The team of WITTMANN BATTENFELD do Brasil moved to a new site at the beginning of August this year. The new building in Vinhedo (State of São Paulo) has a floor space of 850 m² and thus offers enough room for optimal support to local customers.

Brazil has been the most important market for the WITTMANN Group in South America for many years. This is why the WITTMANN Group has made a special point of providing its Brazilian subsidiary with adequate facilities for customer support. Since its customers are becoming more and more interested in complete systems and consequently in commissioning entire work cells, the space in the previous building became too confined. Therefore WITTMANN BATTENFELD do Brasil looked for new premises. Due to the challenging situation caused by COVID-19, the relocation of the WITTMANN BATTENFELD team, originally planned for March this year, was delayed. But at the beginning of August it finally happened.

Unlimited possibilities

In addition to areas for offices and meetings, the new 850-square-meter building also includes space for storage,



Cássio Saltori, Managing Director of WITTMANN BATTENFELD do Brasil (on the left), and his team.

(Photos: WITTMANN BATTENFELD do Brasil)

servicing, training programs and customer inspections. Thanks to their spacious layout, the new premises are now considerably more suitable than the previous site for presenting complete injection molding systems, i. e. injection molding machines fully equipped with automation and auxiliaries. Michael Wittmann, Managing Director of WITTMANN Kunststoffgeräte GmbH and co-owner of the WITTMANN Group, and Cássio Luís Saltori, Managing Director of WITTMANN BATTENFELD do Brasil, are



New building of WITTMANN BATTENFELD do Brasil.

both pleased about the new facilities and the opportunities thus provided for even better service to customers in this region, which is so important for the Group. ♦

Obituary Hans Günter Hunsicker

The sad news that a colleague who had served our company as a top executive for many years passed away only a few weeks ago has been received with deep distress within the WITTMANN Group. On 26 October, Hans Günter Hunsicker died shortly after his 78th birthday. Already physically weakened to some extent, he succumbed prematurely to an infection with the Corona virus.

In the course of his active life, Hans Günter Hunsicker dedicated himself to the companies of the WITTMANN Group for 18 years: from 1991 to 2009. During this time, the production of WITTMANN dryers and other bulk materials handling

components began with the acquisition of Cramer Trocknerbau in 1998. Hans Günter Hunsicker successfully managed this process with his expertise. As a result of his relentless dedication as Sales Director of WITTMANN Robot Systeme GmbH, WITTMANN subsequently established itself firmly in Germany as market leader in robots for injection molding machines. Following the takeover of BATTENFELD in 2008, he successfully promoted the integration of the BATTENFELD



sales organization into the sales structure of WITTMANN before going into retirement. Hans Günter Hunsicker was greatly respected by both his colleagues and business partners for his professional expertise and also highly regarded for his personal character.

All those who knew him still remember with pleasure and gratitude their cooperation with him during his active time.

The Management and staff of the WITTMANN Group will always keep Hans Günter Hunsicker in honorable memory. ♦

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