

innovations

Techniques - Markets - Trends

Volume 15 - 3/2021

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WITTMANN innovations (Volume 15 - 3/2021)

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Editorial

Content



Michael Wittmann

Dear Reader,

Every time we look at the vast range of different plastic materials available, we are overwhelmed. Especially with a view to more sustainability, both existing manufacturers and innumerable startups are pushing into the market with innovative bioplastics of all conceivable types and in all stages of development.

Many of these materials present both processors and equipment manufacturers with new challenges due to their limited or special processing attributes. As machine manufacturers, we are faced with many different types of materials daily, but every now and again we still encounter some materials which stand out by their exceptional attributes and characteristics in processing and thus stay in our minds. These include the biopolymers PLLA and PLDL, which can be resorbed by human bones. Definitely no commonplace materials, since even their transport and storage are genuine challenges. In this issue of *innovations*, we are presenting a successful application at LSM-MED in San Marino, a company which has already been relying on our injection molding machines and auxiliaries for a number of years and is actually processing these biopolymers.

Another report relating to material diversity deals with Schwarz Plastic Solutions, Germany. This is about ultra-modern processing of reactive plastics, which will continue to become more and more significant for applications in electrical engineering and electromobility. We are completing our tour through the world of the WITTMANN Group in this issue with exciting applications at forteq (Switzerland), Knudsen (Denmark) and R&D Plastics (USA).

The economic trend in industry, and in particular in machine manufacturing, has shown a very positive development since the middle of last year. Today, everyone is facing the new challenge of supply chains being unable to produce and deliver the necessary parts and components in sufficient quantities.

We are also feeling the effect of this development and have had to adjust our delivery times accordingly in some cases. According to current estimates, this present situation concerning the availability of components is not expected to ease before the end of this year. We do all we can to find an acceptable solution for your future projects together with you. Once again, what counts in this situation are your personal and direct relations with your contact partners in our company. Let's stay in touch – for optimal solutions!

And now, I wish you enjoyable reading.

Sincerely, Michael Wittmann

Automation

WITTMANN robots at R&D



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WITTMANN BATTENFELD helps R&D Plastics be their best selves

Godfathers of USA's northwest plastics industry, R&D Plastics uses WITTMANN BATTENFELD's flexible, open architecture robots and industry-best customer service and training to optimize their niche and thrive both in business and in their community. – A story about service orientation, teamwork, and social responsibility.

Mitch Hannoosh

R&D Plastics, a custom plastic injection molding company located in Hillsboro, Oregon, about 10 miles west of Portland, has a regional influence that one would expect from a company many times larger than the actual size of the business. Known locally as one of the “godfathers” of the plastics industry in the Northwest United States, the late Rod Roth of R&D Plastics walked the talk when it came to giving back to the plastics industry and the local community.

Roth, alongside his partner Sal Gonzalez, built a thriving business that doubles as a pillar of the Pacific Northwest manufacturing community. This company mission and outlook, combined with their production needs for automation, flexibility, customization, and durability, has made R&D's partnership with WITTMANN BATTENFELD a perfect match.

Lean, flexible, and innovative business

Starting with only 5 machines in 1996, R&D Plastics currently has 17 molding machines in their 48,000 sq ft plant, with sizes ranging from 40 tons to 720 tons. They are a custom injection molder, with a wide range of capabilities including elastomeric molding, over-molding, insert molding, structural foam molding, and more. Committed to a lean flow process, R&D employs 60 people and operates at 98% yield, and about 80% utilization. The lean work process also encourages automation, which is a strategy R&D commits to fully.

The majority of their IMMs utilize at least one robot, and most also harness additional automation including conveyors, EOATs, and other tools to support increased efficiency and decreased costs, including one cell that boasts multiple robots. With proven ability to execute a number of challenging-to-automate applications, including degating applications, flexing living hinges, and insert applications, customers are seeing the benefits of this commitment to and expertise in automation through how R&D can perform on these functions other molders their size often struggle with.

Enter WITTMANN BATTENFELD

This commitment to automation is how R&D initially began working with WITTMANN BATTENFELD. R&D was growing and needed to find a supplier to provide more and higher quality automation for their ever expanding and

ever diversifying needs. After a research project comparing five different robot suppliers to find the best fit, WITTMANN BATTENFELD robots were able to outmatch all of their competition across R&D's criteria: programmability/flexibility, competitive pricing, and potential for upgrading. In addition to these base criteria, WITTMANN BATTENFELD's robots came with unmatched customer service and training opportunities to ensure that R&D's staff could get the most out of their new automation.

“The level of support we get from WITTMANN BATTENFELD is really impressive,” says Matthew Barnett, President of R&D Plastics. “They are one of the best service-oriented companies we've worked with. Their Regional Managers come on-site and provide regular training, their machines are easy to install and setup with staff support on the phone every step of the way, and repair or troubleshooting when stuff does happen is responsive.”

WITTMANN BATTENFELD's robots have the capabilities and technology to match up favorably against any other robots in the industry on their own. Going the extra mile to support their robots and offer the highest degree of customer service possible, however, is something the company prides itself on, and their customers acknowledge it as a true difference maker in their decision-making. Once they purchased their first robot, R&D quickly recognized the benefits, and they now have four, including two W818 models, one W818S (dual-arm) model, and, most recently, a W843 pro model.

Training and continuous improvement

R&D also leveraged WITTMANN BATTENFELD's West Coast Tech Center for its training opportunities. They were able to send Don Altorfer, R&D Maintenance Manager and Automation Engineer, down to the California Tech Center for a three-day, comprehensive robot training. With help from the Regional Manager, local representative firm and WITTMANN BATTENFELD's YouTube channel, Altorfer was then able to come back to R&D and train his own staff on what he learned there.

“When we first got the robots, the WITTMANN BATTENFELD guys were a huge help getting it set up, and were always available by phone to help us get it all right,” says Don Altorfer. “Then the training really helped to learn all the details and features to push our programming to the next level. The robots are so flexible, which we need for the fast



customization we do, but to really get the most out of it, the programming was something we needed to learn for ourselves because everything we do changes on a weekly basis. Now I can go over the information I learned at the WITTMANN BATTENFELD training in California with our new people and use YouTube to reinforce it, which gets people excited to use everything.”

R&D has the staff expertise and ability to really leverage these features as well. Regional Manager said: “R&D have a great crew who really loves what they do and have great vision. They are extremely creative with the ways they use their machines, and, thanks to the robots’ open architecture, can come up with solutions to challenges like complex insert jobs that would be impossible to hand them with some canned, out of the box solution.”

In addition to this expertise, and the ease of programming and constant training to support it, R&D engineer Gus O’Bosky noted that: “The interface is really intuitive, making it easy to do things ourselves with features like *QuickEdit* to adjust things fast, and the graphics on the pendant help to make the learning curve a lot shorter and easier.” The robot

itself is flexible as well. The traverse beam comes pre-drilled and tapped every five inches along the underside. This makes it extremely modular, and allows the user to “offset” mount the robot to work within the space constraints of any shop floor, as well as allowing for the fast adjustments and constant position shifting required from a custom injection molder.

The durability of the robot is key too. In a real world environment with constantly changing processes, a machine needs to be robust and hardy, and R&D noted the value they place on the robots not being overly finicky and having the ability to bounce back after taking a beating, as well as having easy to do repairs when something does go wrong.

Embracing value and adding to it

There are 1,800 different molds in-house, and while the greater portion of their business is “mold and ship” work, there is also a growing volume of value-added work being done both at the molding machines and in a dedicated value-added area. With in-house engineering, assembly >>

W818 robot as part of a production cell in Hillsboro, Oregon.



W8185 robot.

capabilities, and professional sourcing of items such as plating, painting and hydrographic coatings, R&D Plastics is able to provide a role as a full-service supplier. To meet their customers' requirements, they strive to be resourceful and flexible. With a focus on local clients, R&D Plastics works with clients and customers in a broad range of markets, and has applications running from relatively low volume to production runs in the millions of parts.

R&D prides itself in also being able to contribute a sizable amount of "value add" functions for customers. These value-adds include sonic welding, heat stamping, digital printing, assembly, bonding, inserts, and even a small amount of 3D printing.

By leveraging equipment purchased for value-adds on specific projects, R&D Plastics has been able to constantly expand their capabilities and use them as a selling point for future customers. While they only make up less than 10% of the company's total business, the ability to create this value for their customers wins them jobs on a regular basis from other companies that simply could not be a "full-service" supplier.

Embracing technology to develop applications and solutions

"R&D fills an important position in the industry and embraces technology in developing applications and solutions", says Ron Knowlton, CEO at R&D Plastics. "We are a medium-size molding company with the staff and tools of a much larger company. Another example of this is our state-of-the-art ERP system which (among other things) provides real-time information on exactly what is happening on the molding floor and in value-add as well as storing information about mold and machine adjustments and preventive maintenance. With our dedicated staff and having the engineering tools and expertise, we can tackle applications with the tools needed to succeed. WITTMANN BATTENFELD provides us with the automation tools and support to enable us to do even more."

Barnett adds: "Our value added business is really a value add to our own business as well. Being able to go the extra step and perform a smaller, but important function for our customer helps us get some jobs we otherwise might not.

We actively seek out opportunities to do this. An example being when we bought a new 15 kHz welder for a local client who needed it for a special project and then were able to promote it as a capability to get additional jobs that needed the same type of equipment.”

The value-add side of their business also comes from the company’s roots in Grant and Roth Plastics, the company previously started and owned by Rod Roth’s father, Merrill.

“Rod Roth’s dad, Merrill Roth, was a real tinkerer who loved to solve problems”, says Barnett. “His company, Grant and Roth Plastics, developed a lot of equipment and pro-



cesses we still use today, especially in the value-added side of the business. The prime example of this is our CNC Sonic Welder that includes an innovation that Merrill created decades ago to weld across various planes as opposed to the standard single plane welder.”

This commitment to doing more than would normally be expected of them is a part of the culture of R&D that goes beyond just their business. Their value added philosophy, important to their competitiveness in the industry, is also something they do for their community, helping support local businesses, youth, and job seekers through education, training, and financial support.

A focus on people and community

Giving back to their community is a core value of R&D, and it starts at the top. The company’s owners have made it a major part of how they run their business, practicing what they preach and personally giving back. For nearly a decade, Sal Gonzalez taught classes at two local colleges, Portland Community College and Clark College. In his limited spare

time he worked with students in their plastics labs, training them in valuable skills to successfully land jobs in the plastics industry. Sometimes, Gonzalez was directly training employees of R&D’s competition, but he emphasized that as a positive: “It’s a really small industry, especially out here in this region. We see competitors’ employees come in all the time, but in our eyes, by being friendly and ourselves, and expanding their knowledge, we’re helping to support the entire industry. Plus, who knows, they might change jobs down the road and remember the good people and great training they got from us!”

Rod Roth was a supporter of local higher education. He sponsored scholarships at Western Washington University’s Plastics and Composites Engineering program, brought in interns from the school every summer, and guest lectured in classes. This relationship with the school has led to the school being somewhat of a feeder program into R&D, with talented graduates moving from interns into full time employees.

The future of plastics

R&D also is constantly bringing people into their plant from around the region to learn about what they do and to train them on various things. Every year, R&D hosts an open house where they bring in anyone from the community who wants to come, feed them, and give them tours of their plant, usually drawing a crowd of around 100 people. In addition to the open house, R&D hosts a “lunch and learn” every month for anyone who wants to attend. They vary these lunch and learn topics to include a wide variety of skills, with recent examples being mold texturing and sonic welding. Quarterly, R&D will go over some bigger topics including part design, material selection, and mold design, also for anyone who wants to attend. As with their support for local schools, these events regularly host competitors, but R&D sees the plastics industry as a community and lives by their mantra that “building good will is good business”.

Every year, R&D hosts a plastics industry tour in the Portland area for engineering students of Western Washington University. They host about 45 students, loading them onto a tour bus early in the morning and coordinating thorough tours of plastics-related companies such as moldmakers and prototype shops, including Nike’s in-house molding/extrusion, GM Nameplate injection molding, PMT (plastics metalizing), and a few OEM manufacturers such as Daimler, always finishing up with a tour of R&D Plastics. Some of the students take full advantage of this and experience the “Portland tour” more than once during their student track. There’s also a “Manufacturing Day” event that R&D participates in and invites about 75–80 local high-school students to educate them about the plastics industry and career opportunities. They also see the value in supporting the interest level of future job seekers, as well as the importance of supporting local job opportunities. (The Manufacturing Day event is something WITTMANN BATTENFELD has also committed to celebrating every year.)

R&D Plastics continues their steady growth, and hopes to eventually expand their operation up to 20 molding machines, each supported by the advanced automation, value adds, and support that has led to their success. ♦

The R&D team. From left to right: Matthew Barnett, Ron Knowlton, Don Altorfer, Sal Gonzalez, and Gus O’ Bosky.

The late Rod Roth receiving an award from Western Washington University’s Plastics & Composites Engineering Program in recognition of a lifetime of contributions and support.

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

Equipment from the WITTMANN Group passes clean room test

LSM-MED relies on technologically advanced equipment for making medical implants from techno-polymers and resorbable PLLA and achieves double-digit growth rates in the international market. The company uses equipment from the WITTMANN Group for its clean room and grey room production.

Emiliano Raccagni



LSM-MED in San Marino makes resorbable screws, pins and other medical technology products from PLLA and PLDL (s. a. picture on the opposite page).

LSM-MED located in San Marino is a company specializing in the development, production and distribution of medical implants and medical instruments and has been a member of the Leghe Leggere Lavorate Group domiciled in Buccinasco (Milan) since 2018 – an important Italian player in producing components for orthopedic surgery and dental implantology. An industrial sector which has benefitted from substantial technological advancement in recent years and thus become able to supply medical staff and healthcare facilities with more and more efficient instruments. “Up to five years ago, 80% of our production was based on metal cutting technology”, reports Massimiliano Manobianco, Managing Director of the San Marino-based company. “This segment, including the production of titanium screws and pins, is now the core business of Leghe Leggere Lavorate, while LSM-MED has directed its attention increasingly towards technologies to produce polymer matrix components by injection and compression molding, drawing on its ten years of experience in this particular field, which also includes the production of tooling.” A strategy focusing on complementarity which

has produced excellent results, since “even in a difficult year such as 2020, which has had an overall negative effect on elective surgical interventions, we saw a steady increase in the quantities sold internationally”, he emphasizes.

Steel, metal alloys and plastics

In many cases, surgeons seem to prefer screws, pins and plates made of steel or titanium alloys or chromium-cobalt-molybdenum alloys, since these have mechanical properties which are difficult to achieve with plastic polymers.

“But there are cases where metal substitution is possible, for example in knee prostheses, in which the part connecting the femur with the tibial plateau consists of an inlay which serves as a buffer. In traumatology, however, it is possible to use plates made of PEEK with 30% carbon fiber content, which – even though they cannot equal the durability of metal – have the advantage of being easier to insert in areas exposed to lower physical strain, such as wrist joints or shoulders. Their higher elasticity supports micro movements and facilitates osteosynthesis”, Manobianco continues.

“This material does not act as a barrier to X-rays, so that better trauma history monitoring becomes possible. Another added value comes to light on removal of the plate, which is made easier, since with titanium there is a risk of fusion between the screw and the plate. Moreover, it can happen that in the course of a healing process taking several months titanium is corroded by coming into contact with body fluids, which complicates its removal.” In spite of some skepticism primarily concerning the lower level of resilience, these products made of techno-polymers are generally preferred: healing proceeds more quickly, the material shows better resistance to dynamic stress and provides a better grip. All these factors are promoting a gradual increase in the use of these medical products.

split into water and carbon dioxide and are subsequently gradually resorbed by the bone. In this way, a second intervention to remove the screw or the pin can be avoided, which undoubtedly has some advantages for the patient that are particularly obvious in pediatric foot surgery.”

Rigorous quality testing to ensure safety

“The price of these products must lie in the up-market segment due to the expensive raw materials as well as the need for meticulous handling”, Manobianco emphasizes. “The materials must be stored at low temperatures (between -5 and -10 °C). Prior to injection molding, they must also be dehumidified, since moisture would have a negative effect



Some time after their surgical implantation, resorbable products undergo a process where the biopolymers are split into water and carbon dioxide and separated, then gradually resorbed by the bone into which they have been inserted.

An era of bio materials

“Over recent years, we have also experienced a strong upsurge in the demand for resorbable products, which stands now at about 2,000 parts per year”, Manobianco emphasizes. “With these figures, we can point to an important case history resulting from development work over more than a decade – in cooperation with such excellent institutions as the Istituto Ortopedico Rizzoli in Bologna and the Meyer Clinic in Florence. These institutions supply us with important feedback, from which we derive information which helps us both to improve existing products and to develop new ones.”

The plastic materials most frequently used for this purpose because of their high bio-compatibility and bio-degradability are Poly-L-Lactide (PLLA) and Poly-D-Lactide (PLDL). Both are biopolymers, obtained from maize fermentation. “The first biopolymer is crystalline, more resilient and is resorbed more slowly, while the second has amorphous characteristics, causing it to be degraded more quickly”, says Manobianco. “In both cases, a process sets in some time after the implantation, whereby the biopolymers are

on density and viscosity and thus on the mechanical properties and resorption ability of the surgical medical device. This is why weight, density and cytotoxicity tests are carried out following every injection molding cycle as preparatory steps for the validation of the batch.

Additional tests are prescribed to check the mechanical properties, dimensional tolerance down to the tenth of a millimeter and the threading, all of which are basic parameters for correct insertion of the device during surgery and its presence inside the organism without causing problems.” The total cost is also influenced by the storage requirements for the end product. While other polymers require no special precautions, parts made of resorbable materials have a maximum life cycle of three years and must be kept in darkness at a constant temperature and humidity level of 50%. These special requirements play an even more important part in transport.

From May to October, these components are therefore transported in thermal tanks with dry ice, avoiding any intermediate stops which could have a negative effect on their special properties. >>

Servo-hydraulic HM operating in a clean room

“To ensure sterility, bioresorbable products are injection molded in an ISO class 7 clean room equipped with a production cell. Its core is an HM 45/60 injection molding machine from WITTMANN BATTENFELD, which was already installed in 2010 and still functions perfectly today”, explains Manobianco. “The finished parts are transported on a conveyor belt to a green box, where they are weighed, demolded and packaged. The conveyor belt and the green box fall into ISO class 5.” When thinking of a clean room, we imagine a place which is permanently watched and characterized by absolute cleanness, which is why injection molders use all-electric machines for this environment.

cooling systems for the fixed and removable plates, a step-by-step closing system, temperature and pressure sensors, an integrated fast-change system for the molds (since it is not possible to use hoisting devices in a clean-room environment), the extractor hood in the nozzle area, stainless steel panels with fast dismantling device and a disinfectant-resisting coat of paint, collectors for the air from the pneumatic valves, documentation for GMP validation and much more.

An additional decisive aspect in the choice of this machine was the possibility of remote control via a PC. In this way, the machine operator does not have to enter the clean room to set the injection molding cycle and monitor the production process.

Picture left: To ensure sterility, injection molding of bio-resorbable products is carried out in an ISO class 7 clean room. In this picture: the production cell with the HM 45/60 from WITTMANN BATTENFELD.



Central picture: Bio-compatible thermoplastic materials are processed under grey room conditions. The core of the production cell is a WITTMANN BATTENFELD SmartPower with 90 t clamping force.



LSM-MED also thought along these lines, when the purchase of a new, smaller machine was under consideration in 2010. The main factors to be considered in the choice of a clean room machine are the pollutant particle load and the relevant sources of emissions, without disregarding the heat emission to the environment and contamination of the parts caused by the equipment used.

LSM-MED decided to acquire the hydraulic HM 45/60 injection molding machine from WITTMANN BATTENFELD, which was able to meet all relevant requirements. Since the volume of air to be filtered is one of the main parameters in the dimensioning of a clean room, the HM machine was able to score with an additional advantage: compared to an electric machine with the same clamping force, it takes up much less space.

The HM 45/60, which has been operating for more than a decade in the ISO 7 clean room at LSM-MED, is equipped with a fast-change barrel module, a 14-millimeter screw with an optimized profile for PLLA and another screw with a diameter of 22 millimeters for PEEK injection molding. The configuration includes other ad-hoc devices, such as

Servo-hydraulic SmartPower in the grey room

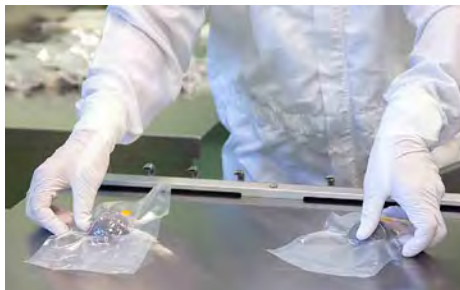
Bio-compatible thermoplastics are injection molded in another corporate department under grey room conditions according to ISO 10993. The range of materials processed includes the conventional plastics PC, ABS and PPSU, as well as the carbon fiber-reinforced techno-polymer PEEK (CFR-PEEK) and composite co-polymers with fiberglass content (PAM). “Three machines are operating in this part of the facility, and since 2019 one of these is a SmartPower 90/350 from WITTMANN BATTENFELD (with 90 t clamping force). The auxiliary equipment and the parts removal robot have also come from the WITTMANN Group: a W818 robot, a TEMPRO plus D180 temperature controller, an ATON plus H30 material dryer, as well as FEEDMAX material loaders, fans, a conveyor belt and safety devices.

The individual components of the system are interconnected according to the Industry 4.0 principle”, explains Manobianco. Following an agreement with a German planning company, primarily sets of disposable instrument components are manufactured for general or minimally

invasive orthopedic surgery, such as foot surgery: handles, screw drivers and countersinks made of fiberglass-reinforced plastic, and two-component instruments with plastic handles and metal ends. These products, too, are subjected to stringent quality monitoring and subsequently packaged by specialist staff in a protective environment (clean room ISO 7 and ISO 8).

Ultrasound cleaning and drying is followed by initial packaging (in blisters, Tyvek or vacuum bags) for reliable protection against contamination from outside. Finally, the labels are affixed, and the blisters are placed in appropriate boxes, which, in turn, are covered by a transparent shrink wrap to protect them from dust. Then the products are sent to external suppliers for sterilization in validated cycles.

tion process, simply by answering a few questions asked by the virtual assistant.” With the help of the intelligent TEMI Primus MES solution – the “light version” of the more widely known TEMI+ system from the WITTMANN Group partner ICE-FLEX – the operators at LSM-MED are able to monitor every single aspect of the process. “At present, this system only works with the new *SmartPower*, but in future it can also be extended to other machines”, Braga emphasizes. To meet the needs of the mostly middle-sized Italian, WITTMANN has developed with this MES system a solution which can be easily adapted to specific needs. And this system fulfills all requirements to be complied with in order to qualify for the relevant subsidies under the Italian Piano Industria 4.0 development assistance plan.



The products are packaged under a protective atmosphere. Ultrasound cleaning and drying is followed by initial packaging (in blisters, Tyvek or vacuum bags), which provides reliable protection against contamination from outside. After the blisters have been labeled and placed in boxes, the boxes are protected with a transparent shrink wrap and passed on to sterilization.

In 2019, almost ten years after the acquisition of their first WITTMANN BATTENFELD machine, LSM-MED returned to the same supplier to purchase a machine to be installed in the grey room. As before, a servo-hydraulic machine was chosen in 2019, too, the *SmartPower* now in place there, a further development of the HM series.“

Of course, it is now taken for granted that machines must meet the requirements for injection molding of medical parts, but the equipment also had to comply with the idea of Industry 4.0”, emphasizes Gianmarco Braga, Managing Director of WITTMANN BATTENFELD Italy.

“In the digital environment of WITTMANN 4.0 – our Industry 4.0 solution – it is possible to control all relevant parameters, not only those of the molding machine, and thanks to the *Plug & Produce* function any additional equipment can be connected quickly and easily to the production cell, including the possibility to retrieve the parameter settings by remote control”, says Braga. “The operation is also facilitated by our *Wizard*, which makes it possible to start the machine with the correct parameters even for an operator not thoroughly familiarized with a specific produc-

Digital technological future

The approach to the best practice regarding Industry 4.0 is one of the areas where Leghe Leggere Lavorate invests most heavily. The group currently operates more than forty-six processing centers which are all networked via a manufacturing MES, which controls the production steps automatically. Although LSM-MED is engaged in more specialized and intermittent manufacturing processes, this company will introduce the same system and gradually address the integration of its machinery in the course of 2021, in order to automatize the management of its processes, too. Another major investment is planned to acquire a new, automatic washing and packaging system in the clean room area. “Our portfolio, which includes items such as femoral pins, tibia pins and prosthetic plates, is to be extended, this is one of our targets for the future. To develop new products, we are planning to establish a small additive metal manufacturing department within the next two to three years, to facilitate our entry into the world of customized medical technology products.” ♦

*This article by **Emiliano Raccagni** was first published in the Italian specialist medium “Plastix”, April 2021 issue.*

Production efficiency thanks to functional integration in turnkey systems

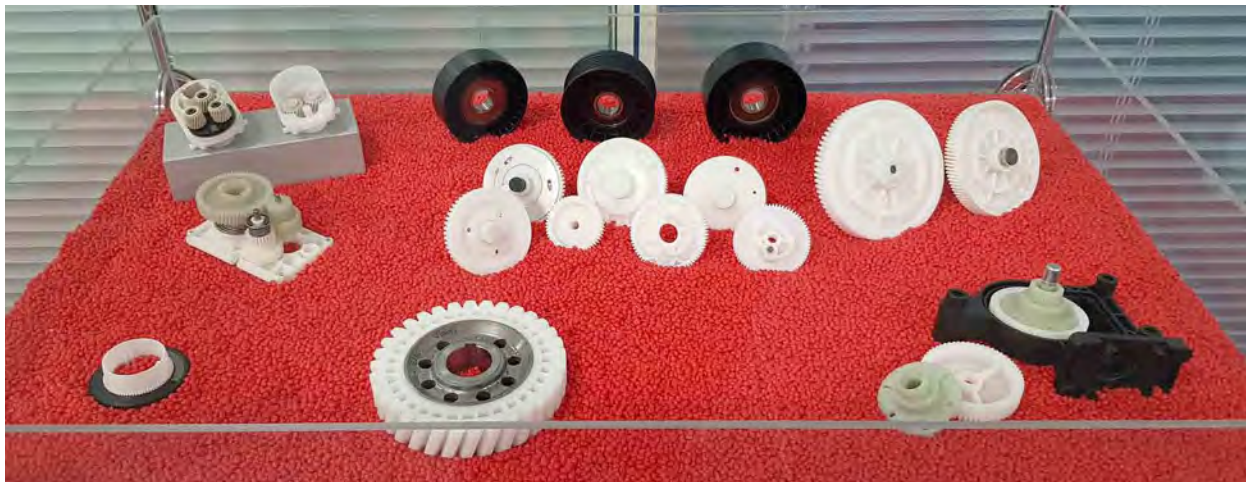
The globally active forteq Group based in Nidau/Switzerland is a well-known partner of the international automotive, consumer electronics and pharmaceutical industries. About 900 associates are employed at various engineering and production locations in Europe, the USA, and China. One of forteq's fields of specialization is the development and production of composite parts made of plastics and metal with complex geometries, which can be manufactured efficiently with the help of integrated systems.

Werner Bürli – Thomas Robers

From left to right: two-part metal insert (consisting of shaft and disk), injection-molded part, finished part.



Typical gearbox components from the portfolio of the forteq Group.



One of these highly efficient manufacturing systems run by the forteq Group in Nidau is a complete production cell from WITTMANN BATTENFELD for fully automatic manufacturing of "Gear Wheel Assy" pinion gear drives consisting of fiber-reinforced polyamide, which is over-molded onto shaft-disk modules inserted into the mold.

The system includes a VM R 150/525 R1520 vertical rotary-table injection molding machine from WITTMANN BATTENFELD, two WITTMANN W832 servo robots and a smaller W808 SCARA robot, all with grippers.

It is also equipped with a station to twist off the sprue, a turning station, two TEMPRO plus D dual circuit temperature controllers from the WITTMANN Group and several more integrated functional elements.

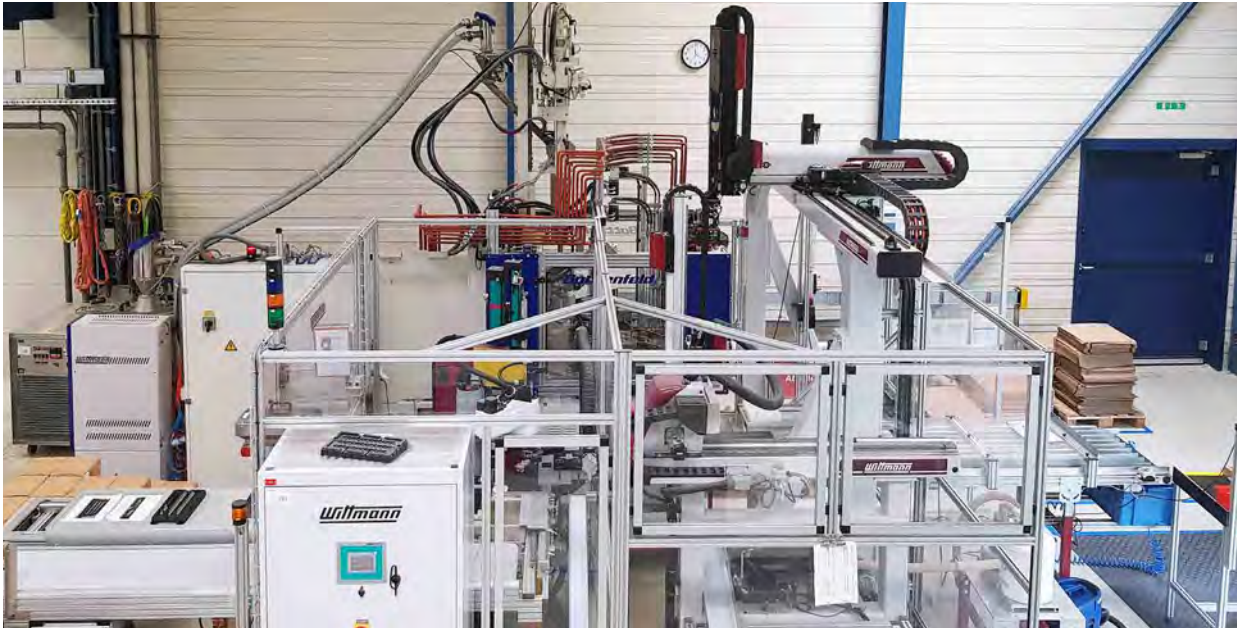
The process

On the vertical rotary table machine, a mold with four cavities is used to mold the gear wheels onto the inserted metal parts. Each of the metal parts consists of a steel shaft and a carrier disk.

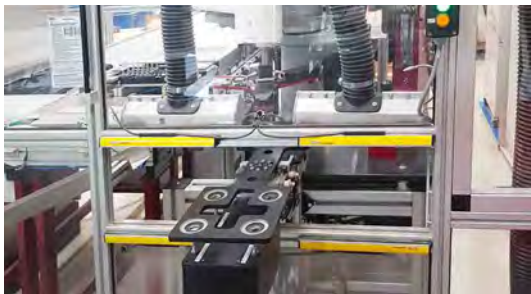
The metal steel shafts are fed standing up in blisters. The carrier disks are supplied as bulk parts and they are transported to the process via a vibration conveyor.

In a separate part of the production system, the shaft and the carrier disk are put together by the SCARA robot and then pressed and crimped in two steps.

Four finished inserts are subsequently passed on to the WITTMANN W832 insertion servo robot to be placed into the mold.



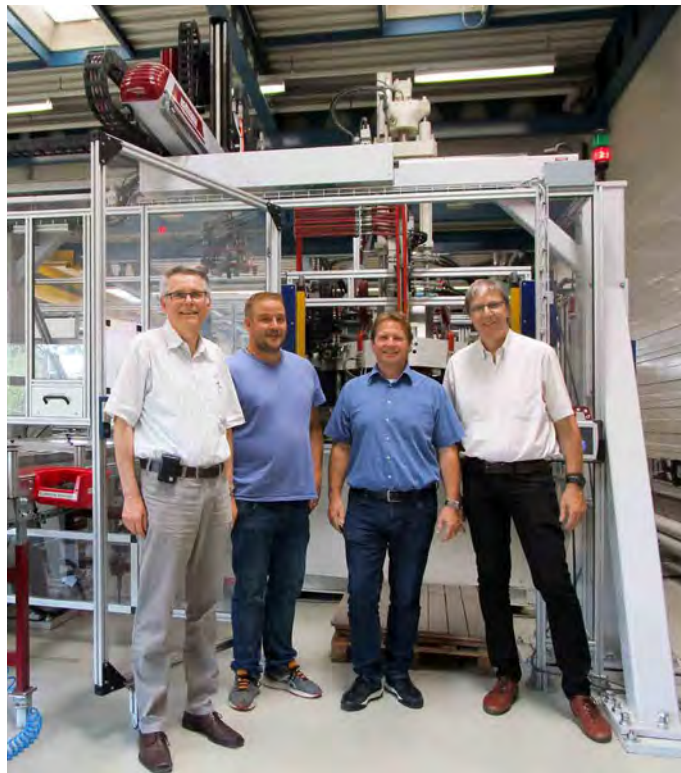
Complete, fully automatic manufacturing system for making gear wheels.



Picture left: Feeding station for pressed inserts.



Picture left below: WITTMANN W808 robot with twisting station.



All pleased with a highly efficient manufacturing system (from left to right): Werner Bürl, Managing Director of WITTMANN Kunststofftechnik AG, Switzerland; Marco Rubin, forteq Managing Director; Diego Haug, forteq Production Manager; Thomas Robers, Managing Director of BATTENFELD Schweiz AG.

Pressing station for inserts

The pressing station consists of a hydraulic cylinder and a sliding tool. The first tool presses disks and shafts together path-controlled. The second tool then carries out crimping by a subsequent stroke with path and force monitoring. In fact, every pressing process is controlled by path and force transducers, and the relevant data are recorded.

Over-molding

In the course of each cycle, the W832 robot first removes 4 finished parts simultaneously and subsequently places 4 metal inserts into the mold. Then the finished parts are passed on directly to the W808 robot.

Twisting station

The W808 robot inserts the finished part into the pick-up device of the twisting station, where the sprue is twisted off. The turnings are sucked off and dropped into a container via a chute. The robot subsequently removes the finished part again and deposits it on the conveyor belt for finished parts.

In use around the world

The forteq Group operates several similar WITTMANN BATTENFELD systems at its production plants in Italy, the Czech Republic, the USA, and China. In this way, the Group is optimally prepared to supply its automotive customers worldwide “just in time” with top-quality products. ♦

Werner Bürl is Managing Director of WITTMANN Kunststofftechnik AG in Kaltbrunn, Switzerland.
Thomas Robers is Managing Director of BATTENFELD Schweiz AG in Effretikon, Switzerland.

Clean room precision molding and service

For more than 40 years, Knudsen Plast in Frederiksværk, Denmark, has produced injection molded plastic components for the health-care sector. Knudsen prides itself in bringing both products and production to perfection; performing precision injection molding and conducting advanced quality management. Work with some of the most renowned medical-technical companies in Northern Europe has led Knudsen to be one of the most competent suppliers in the market – partnered in its technical matters by the WITTMANN Group.

Michael Juul-Andersen



Working in factories in Denmark and Slovakia, Knudsen constantly aims to fulfill its clients' high demand for quality, precision, and documentation. Knudsen designs the most efficient and economical solutions with regard to the commissioning of molding tools, process validation and quality management – especially high-tech production in clean rooms and controlled environments, as well as an overall efficient management of the supply chain.

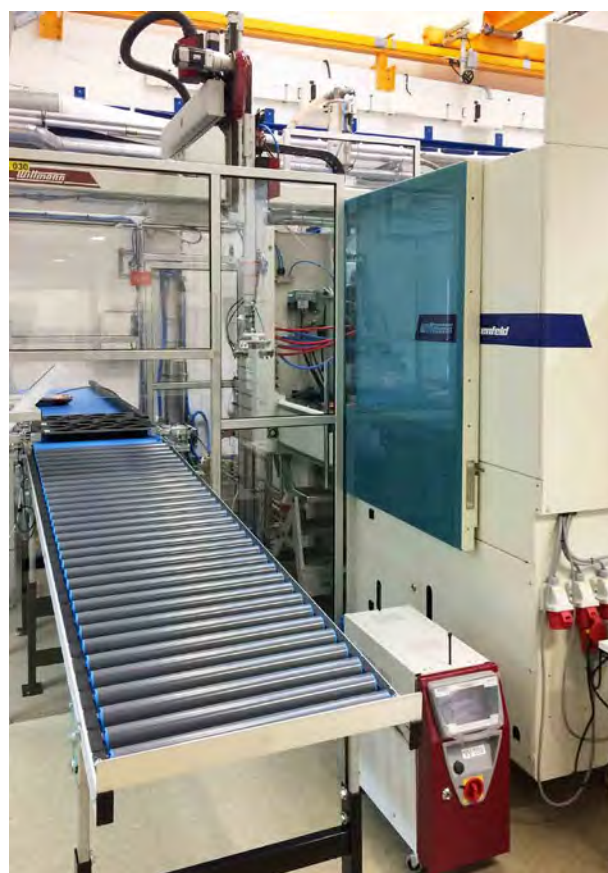
WITTMANN BATTENFELD was chosen as a new supplier of production equipment in 2016: Knudsen Plast found the *EcoPower* machine to be very suitable for clean room production, as well as ask for the unlimited possibilities of fully integrating peripheral equipment. Knudsen also favoured the compact and highly productive *SmartPower* injection molding machine which was very well suited for the production of “Knudsen Kilen”, the Knudsen product line of wedges, shims, and boxes.

“At Knudsen Plast we constantly concentrate on high-end injection molding every single day. Over the years we have built up an extensive bank of know-how and an all-around experience that covers a great variety of products”, says Knudsen Plast CEO Jens Kristian Pedersen. Knudsen is particularly specialist in perfecting the utilization of production equipment so as to achieve optimal flexibility and to also arrive at the most economical solutions. The company's Slovakian plant is currently focussing on volume production; and at both plants – Denmark and Slovakia – the production takes place in controlled environments and in class 8 clean rooms. The facilities contain advanced robot technology as well as the more than 100 injection molding machines with clamping forces ranging from 25 to 500 tons. This makes the Knudsen clean room facility one of the largest in Denmark.

Wiba Tech ApS as the local partner

Due to Knudsen's constant need for reliability and competent service, the company always focuses on the performance of injection molding machines in use, and also on the availability of local service.

In Denmark, the WITTMANN Group is represented by Wiba Tech ApS in Fredensborg, and the Danish agent is



proud to be qualified by Knudsen Plast as its partner. The relationship includes not only injection molding machines, but also robots and other peripheral equipment. Today, Knudsen Plast runs eight WITTMANN BATTENFELD machines – and more are to come. The orders included different types of WITTMANN robots: W8XH, W818, and WP80 sprue pickers. In addition Knudsen has ordered TEMPRO plus D Micro 100 temperature controllers and FLOWCON plus water flow controllers; and for the purposes of careful and high-precision blending of materials, WITTMANN GRAVIMAX G14 blenders were also purchased. ♦

Pictures from above:

A view of the Knudsen Plast production in Frederiksværk: CEO Jens Kristian Pedersen in front of a WITTMANN BATTENFELD EcoPower injection molding machine.

One of Knudsen Plast's production units: EcoPower 160/130 with W818 robot and TEMPRO plus D Micro 100 temperature controller.

Michael Juul-Andersen is Sales Manager of Wiba Tech ApS in Fredensborg, the agent of the WITTMANN Group in Denmark.

Cooperation in the area of reactive plastics

Ingo Schwarz (Schwarz Plastic Solutions GmbH), Thomas März (Precupa GmbH), Andreas Schramm (WITTMANN BATTENFELD Deutschland GmbH) and Rainer Weingraber (WITTMANN BATTENFELD GmbH in Kottlingbrunn/Austria) signed in 2020 a contract for cooperation in the area of reactive plastics. The objective of this agreement is to advance the technologies in the fields of thermoset injection molding and processing of other reactive plastic materials, as well as to strengthen the participating companies in this business.

Gabriele Hopf

The conviction that thermosets and other reactive plastic materials are gaining more and more significance above all in the electrical engineering sector has prompted the mentioned companies to pool their expertise in machine and automation technology, process technology and mold technology.

The co-operations partners

Schwarz Plastic Solutions is a technology service provider domiciled in Gilching, near Munich. This company supports plastics processors in all matters relating to thermosets, such as the selection of suitable thermosets, optimization of components, filling simulations, thermal layout of molds or strength calculations (FEA). Its range of services also includes user training courses and material characterizations.

Schwarz has close relations to well-known OEMs and component suppliers and has good contacts to raw material suppliers as well. The company also cooperates with several universities, including some outside Germany.

Precupa is based in Gaissach, near Bad Tölz, and engages in high-precision mold making. This company with its 40 associates produces injection molding tools with weights of up to 3.5 tons and dimensions of up to 600 × 600 mm. In addition to its know-how in the area of thermoset molds, Precupa also has extensive experience with molds for processing of thermosets and LSR.

A recently completed, in-house technical lab is available for sampling. Schwarz and Precupa will use this lab to produce samples with customers' molds as well as for thermoset training courses. Prof. Dr. Ing. Sascha English from Steinbeis University Berlin provides the partnership with scientific support.

WITTMANN BATTENFELD Equipment

Precupa und Schwarz have jointly invested in an ultra-modern injection molding machine from WITTMANN BATTENFELD specially equipped for thermoset processing.

This acquisition was generously supported by WITTMANN BATTENFELD as part of the cooperation agreement with these two companies.

This molding machine is a servo-hydraulic model from the *SmartPower* series with 2,400 kN clamping force. The *SmartPower* XL 240/3400 UNILOG B8 machine is equipped with a number of several different plasticizing systems and consequently very versatile. It is capable of producing parts with small shot weights and dimensions of up to 200 cm³, but also large shot weights with volumes of up to 1,500 cm³, such as an encapsulation for electric motors, or overmolding of inserts.

Materials which can be processed include both granulated thermosets and pasty materials, such as wet polyester (BMC). With applications for parts exposed

to high mechanical strain in view, the machine also comes with an additional hydraulic unit, which offers high additional compression forces for processes such as injection compression or injection stamping.

An innovative, modular thermoset mold facilitates extensive processing test series, including material tests and analyses. A large package of exchangeable inserts enables the production of testing samples, tests with winding goods (e-mobility) and rheological examinations. On the basis of the cooperation partners' own technical equipment, both process technological and scientific-analytical evaluations and assessments of the tests are feasible. Thanks to a further cooperation agreement between Schwarz and the Netzsch Group, extensive sensor systems and evaluation facilities are also available inside the mold.

Future perspectives

According to Andreas Schramm of the WITTMANN Group, the cooperation with Schwarz and Precupa is very promising: "With this partnership, we will be able to meet the challenges of the thermoset market with competence and to drive the advancement of thermoset processing technology." ♦

From the left: Andreas Schramm, Managing Director WITTMANN BATTENFELD Deutschland GmbH; Thomas März, Managing Director Precupa GmbH; Ingo Schwarz, Managing Director Schwarz Plastic Solutions GmbH; Gottfried Hausladen, WITTMANN BATTENFELD Sales (Germany).



WITTMANN BATTENFELD Romania moves forward on the growth path

In order to meet continuing business growth, the Romanian team of WITTMANN BATTENFELD S.R.L. is leaving its current office - moving on July 1st to a nearby bigger facility. The new headquarter building of WITTMANN BATTENFELD Romania in Bucharest covers an area of 320 m² and will allow for further growth.



The team of WITTMANN BATTENFELD S.R.L., the Romanian subsidiary of the WITTMANN Group, in front of the new Bucharest premises. Fifth from the left: General Manager Bogdan Nestor, showing the victory sign.

Also, in order to support customers even better, there will be a secondary office of 50 m² in the town of Oradea which is an important area for the plastics industry.

The two new facilities in Bucharest and Oradea will service the strengthening commitment of the Romanian plastics industry with regard to delivering plastic parts of higher quality.

The new Bucharest facility of WITTMANN BATTENFELD S.R.L. will house:

- Sales and Service.
- A warehouse of spare parts, but also of some new equipment constantly asked for, like single material loaders, temperature controllers, and mobile dryers.
- A repair shop for loaders, temperature controllers, and dryers.

- A facility for customer training – lectures and practice in process understanding and mold optimization, starting from January 1st 2022.

The Oradea facility team will undertake the same responsibilities – except customer training.

Ambitious service ...

WITTMANN BATTENFELD Romania has built up an excellent service team in order to satisfy service requests of customers quickly and effectively. There are seven service engineers overall working in the Bucharest and Oradea regions, all of them skilled in mechanics, hydraulics, and electronics. This team also carries out start-ups, and undertakes maintenance and repair work for any equipment: processing machines, robots, dryers, loaders.

Members of the service staff are trained themselves periodically at the Austrian group headquarters. General Manager Bogdan Nestor notes that the high quality expertise of the Romanian team is of particular value to the industry there. These technical services are supported by two people in the office. In addition, there are two additional employees taking care of the more simple applications.

... and customer focus in sales

The sales team comprises two sales engineers and also two office staff members. Bogdan Nestor states: “The first injection molding machine is sold to the customer through the work of the sales team, the second machine is always sold through the expertise of the service team, starting-up and solving problems. Without perfect service, we wouldn't be able to sell a

second machine to any customer. And again – with regard to every first machine we sell – we are not principally focused on sales, but on serving the real needs of our customers and their growing competitiveness.”

Today – with the only exception of granulators –, WITTMANN BATTENFELD is the market leader for all types of injection molding equipment in Romania. The following statistics apply:

- A market share of around 40% in the segment of injection molding machines with clamping forces of under 2,000 tons.
- With regard to robots, an average market share of 80% during the last five years.
- Also, within 5 years, 30 centrally-controlled material drying and conveying systems have been sold – representing an average market share of around 80%.

- During the last five years, 120 temperature controllers have been sold annually, comprising a market share of 45% – and again, coming in first.
- Not to mention the fact that WITTMANN water flow regulators have been the industry standard for decades now.

Bogdan Nestor is keen to thank all the company’s Romanian customers, many of whom, he says, are really driving the Romanian plastics processing industry forward. By far, the most important industry sector for WITTMANN BATTENFELD Romania is the automotive industry. Here are the company’s most important markets.

- Local car manufacturers Dacia and Ford, boosting the plastics industry the most.
- Other brands oriented themselves to Romania after having realized the massive gain

in high-quality production, even coping with the most delicate automotive parts. Thus, other active players are Mercedes, BMW, Toyota, Audi, Volkswagen, Peugeot, Fiat, Volvo, Opel, Mini, Hyundai, KIA, Citroën.

- White Goods – Electrolux, Arctic (Arcelik), Haier.
- Electronics, household, hand tools – Philips, De’Longhi, Makita.
- Vacuum and pressure cleaner manufacturer Kärcher – important in the market.
- Teraplast and Valrom, both manufacturers of fittings and pipes that cover the country’s demand in this field.

Bogdan Nestor is very grateful to the extraordinary team of WITTMANN BATTENFELD S.R.L. for doing such great work in the highly dynamic and unfolding Romanian market where the best is still yet to come. ♦

WITTMANN is making massive investments

For WITTMANN’s two production facilities in Vienna, a major remodeling of its headquarters in Lichtblaustrasse is planned for the year 2021, together with an extension of the building in Percostrasse. The latter involves an extension of the R&D departments in the areas of mechatronics and software development. An additional 1,050 m² of office and test lab space will be created.

Another absolutely noteworthy investment is imminent at WITTMANN BATTENFELD in Kottlingbrunn. Here, a fully automatic pallet racking system with about 1,500 pallet bays will be built. For this purpose, the construction of an extension to the existing building to provide about 3,000 m² of additional space started in May.

Completion and commissioning is scheduled for 2023. In addition to the fully automatic pallet racking system, this extension will house a separate storage and order picking area, as well as assembly



Red edging: extension to the existing assembly hall in Kottlingbrunn – space: 3,000 m².

space for vertical and large molding machine models and a new electrical workshop. Rainer Weingrabner, WITTMANN BATTENFELD GmbH Managing Director, comments: “This investment will help us to make the production process even more efficient and to continue on our course of growth.

It will be a further milestone for the production plant in Kottlingbrunn.” The investment projects of

the WITTMANN Group planned for the current fiscal year for its subsidiaries concern primarily China, Hungary and Bulgaria. The facilities at these locations will be further extended.

Michael Wittmann: “With these planned investments we will be optimally prepared for the challenges of the next few years in the areas of development as well as logistics and sales.” ♦

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- 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
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- 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, 1+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
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- 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

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