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In-situ polymerisation opens up great opportunities

22

Molding technologies for urban mobility



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The AON-M2 2020 has been designed to print the expanding array of melt-processable thermoplastics, including PEEK, ULTEM™, PEKK, polycarbonate, and hundreds of other materials. Customers can realize the most demanding applications, since the extensive material compatibility offers the opportunity to 3D print parts that can resist harsh chemicals, stand up to extreme temperatures, and withstand intense mechanical stress.



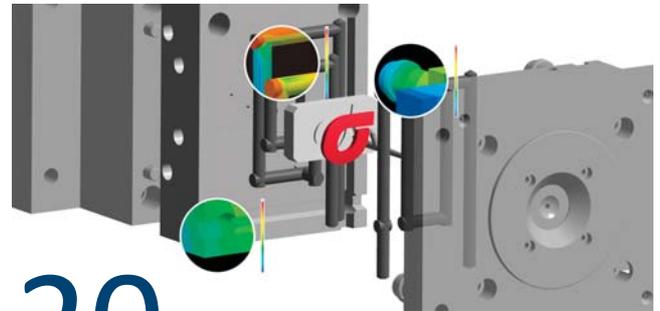
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NewPro3D recently joined Henkel's Open Materials Platform with the goal of providing additive manufacturing solutions at production scale. Working collaboratively, the companies are combining their areas of focus to create next-level solutions for the medical industry. With Henkel's expertise in materials and NewPro3D's innovation in 3D printing equipment and software, the companies are enabling new applications in anatomical modeling, prosthetics and more.



18

In-situ polymerisation opens up great opportunities in the production of fibre-reinforced plastic components with a thermoplastic polyamide matrix. The decisive factor for processing efficiency and product quality is the reactive unit developed by ENGEL specifically for the preparation and injection of ϵ Caprolactam. ENGEL has systematically further optimised its solution with a new, smaller size.



20

SIGMASOFT® provides a variety of methods to forecast the shrinkage and warpage of plastic parts. Along with this, one can also simulate the deformation of inserts or core pins during filling. SIGMA simulates and compares the deformation of core pins made of two different mold materials under equal process conditions. The calculations are based on the imbalanced melt flow inside the cavity and the mechanical properties of the two materials.



22

The pressure to reduce emissions and the wish of people concerning mobility leads to new concepts in automotive. Talking about electric cars, e-scooter or other ways for urban transports, light weight design is one of the most important headlines. The look and feel of thereby used polymers have to have a perfect surface and high-quality design. From these statements the importance of the future topics are related for the plastics machinery industry: lightweight design, combination technology, plastics Industry 4.0, 3D printing.



25

A substantial optimization of the dry-cycle time of NETSTAL ELION series models was achieved by making an adjustment to the clamping unit controller. The output can be increased even more in series production use.

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Both, BOY XS and BOY XXS offer 50% more plasticizing volume

Up to now the maximum plasticizing volume for the machine types mentioned has been 10.2 cm³, but from the middle of this year the two injection moulding machines will have a maximum stroke volume of 15.3 cm³ as standard.

An extended screw stroke at a screw diameter of 18 mm and an injection force increased by 25 % makes this possible. Thus, the compact BOY XS (100 kN clamping force / 0.77 m² footprint) and the BOY XXS (63 kN / 0.89 m² footprint) have a significantly wider range of injection volumes in comparison to other

machines in this clamping force class. These two BOY injection moulding machines do not use the piston plasticizing that is customary for this machine size, but instead rely on a screw plasticizing from 8 to 18 mm according to the "first in first out" principle. Maximum, specific injection pressures of up to 3128 bar are available.

The proven design is ideally tailored to the industrial requirements of micro injection moulding. In order to achieve a maximum conservation of resources, BOY is pushing for an almost sprueless part production



with cost-effective single-cavity moulds.

The diversity of the plasticizing units allows the processing of bio-based compounds in addition to the common plastics such

as thermoplastic (screw diameter 8mm to 18mm), elastomers (screw diameter 16mm) and silicone/LSR.

Dr. Boy
www.dr-boy.de

To focus entirely on hot runner business

INGlass announces the sale of 100% of INEVO to Luigi Cover, owner of CST Stampi and Roberto Fagarazzi, Sales Director of the INglass mould division, since 2015.

INEVO is the new name of the INglass mould division that started as INCOS in 1987. INCOS, focused since the beginning on injection moulds manufacturing for the car lighting market and the glazing technology.

Maurizio Bazzo, President and Founder of INglass, states: "The sale of INEVO will allow INglass to entirely focus on the HRSflow hot runner business, a market that requires continuous innovation and investments in order to satisfy the increasingly demanding needs of the injection moulding industry".

Luigi Cover, Ceo of INEVO states: "We are proud of this acquisition. INEVO has been chosen due to its deep knowledge of the lighting mould market and its high innovation skills in the production of new components for the smart mobility. At the same time the synergies with CST Stampi, both in design and manufacturing, will allow us to be a perfect partner for all the markets that require cutting edge technology".

The just signed company transfer represents the completion of the process of total separation between the hot runner systems HRSflow division and the lighting mold division.

INGlass
www.inglass.it

WITTMANN and FarragTech now under one roof

For more than 25 years, FarragTech GmbH has been active in plant engineering for plastics processing

in the auxiliary equipment sector, with one main focus within its product range on compressed air granulate



From left to right: Erhard Fux, WITTMANN Material Handling Department Manager, Aaron Farrag, Product Manager Compressed Air Drying and Mold Cooling, Michael Wittmann, WITTMANN Managing Director.

drying. As the inventor of the compressed air granulate dryer as well as internal compressed air mold cooling for blow molding processes, FarragTech has invariably been setting benchmarks when it comes to utilizing the benefits inherent in these technologies. Another main focus of the company's product development lies on protection against condensation water for cooled molds, in which area FarragTech has created an exceptionally

energy-efficient and low-cost solution.

Now the product range and the team of FarragTech are being integrated into the structures of the WITTMANN Group, thus providing them with direct access from their headquarters in Wolfurt to the entire development know-how and the international sales network of the WITTMANN Group. Further development of the FarragTech products from all three sectors will be driven forward,

and it is planned to have the appliances seamlessly integrated into the open concept of WITTMANN 4.0 technology.

The company's previous owner Aaron Farrag is taking over the compressed air drying and cooling segment as Product Manager, and will incorporate this product line into the WITTMANN Group. WITTMANN's Managing Director Michael Wittmann is looking forward to the future cooperation: "We extend a very

cordial welcome to the FarragTech team in our group of companies. With the small-quantity dryers from FarragTech, we are closing a gap in our product portfolio. Our international outreach – combined with the advantages of these technically outstanding products – promises an enormous growth potential for our new product segment."

WITTMANN

Kunststoffgeräte

www.wittmann-group.com

New products for hot runner and control systems

Meusburger presents innovations in the field of hot runner and control systems. Under the PSG product brand, the number of versions of the smartFILL nozzle series has been expanded with a new focus. The range is perfectly complemented by the pneumatic and hydraulic operating unit for valve gate nozzles. In control systems, the combination of a VCON controller with the profITEMP+ in one cabinet has been made possible.

The newly developed series focuses on melt guidance and ease of maintenance. With the very large variety of nozzle lengths, melt channel diameters and gate geometries, the smartFILL nozzle series is now also available in the large 4557 and the small 4019 versions. The nozzles are available in the variations smartFILL (slide seal), smartFILL Shot (screwed in) or smartFILL Shot Single

(single application). They are not only suitable for processing technical and filled plastic types, but also for direct gating or gating to a cold runner. The new concept of heating right up to the injection point ensures a homogeneous temperature profile, which in turn guarantees highest component quality.

Compact redevelopment

Compatible with the smartFILL nozzle series, the pneumatic (DP 53x63) and hydraulic (MH 24x55) operating units for valve gate nozzles are new in the range. With the pneumatic operating unit, the pin is opened and closed via the clamping plate using compressed air. Even with individual actuation of each nozzle, tight inside dimensions are possible for both units. This makes these operating units particularly suitable for use in conjunction with the 19 and



Redevelopment of operating units for valve gate nozzles

27 nozzle sizes in the smartFILL series.

All options in one cabinet

Achieve optimum injection moulding results through sequential control of the melt flow. During the opening or closing of the valve pin, it is possible

to control the various pin positions hydraulically in staggered modes. For cascaded filling of injection moulded parts with several injection points, visible defects on moulded parts can be avoided this way.

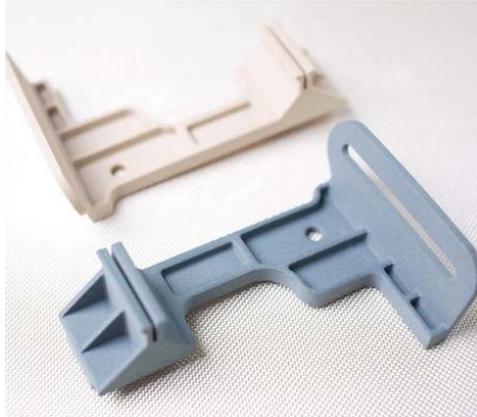
Meusburger Georg

www.meusburger.com

New materials being optimized for the latest sintering platform

The University of Exeter, in collaboration with Victrex, has completed commissioning of the new EOS P 810, laser sintering platform for high temperature polymers. The strategic arrangement aims to introduce next-generation VICTREX™ PAEK polymers and composites while improving the performance of the underlying AM processes. Investment in the new state-of-the-art equipment, and its commissioning, are expected to accelerate the commercialization of AM materials for high-performance parts.

The Centre for Additive Layer Manufacturing (CALM) at Exeter is one of the first to commission the recently launched equipment. “We



can now further our research by utilizing the next generation of high temperature systems, the EOS P 810,” explains Professor Oana Ghita, the lead of CALM at the University of Exeter. “The new equipment allows us to link the fundamental research with the commercial manufacturing process, to

optimize the materials and their application, while accounting for the new thermal, optical and mechanical upgrades and providing us with accurate insights into the detailed dynamics of laser sintering.”

The new EOS P 810 is capable of printing with materials that have melting temperatures around 300°C and particularly suitable for the new low-melting-point PAEK polymers (PAEK or Polyaryletherketone is the name of a family of high-performance thermoplastics including Polyetheretherketones such as VICTREX™ PEEK),

designed and optimized by Victrex specifically for AM. The work invested in this production-ready machine, which has a build volume of 700x380x380mm and two 70-watt lasers, is aimed at ensuring that future demand for large-scale parts will be readily met by the market as the platform is rolled out across the supply chain.

Victrex Director of Innovation, Ian Smith, added “This is an exciting milestone in our collaboration with the University of Exeter, which we announced in 2018, creating an effective eco-system to accelerate the commercialization of AM materials for performance parts to meet customer needs.”

Victrex

www.victrex.com

Adiprene prepolymers offer new possibilities in 3D printing

Specialty chemicals company LANXESS is offering the next generation of Low Free (LF) isocyanate urethane prepolymers that can be formulated into resins for 3D printing (additive manufacturing). In order to create such resins LANXESS works together with 3D printing companies. Based on Adiprene LF pPDI (paraphenylene diisocyanate) prepolymers, these high performance resins are easy to process and safe for industrial manufacturers as well as for the casual home, office or retail user.

The footwear industry is a key user of 3D printing technology for midsole, upper, and structural com-

ponents such as heels and toes. Footwear components are designed to require both very soft and more rigid elastomers. The wide flexibility to formulate LF prepolymers into printable resins enables 3D printers to drive toward mass customization, enabling printing across a wide range of hardness from very soft elastomers for cushioning to the more structural shoe elements.

High flexural strength and a wide range of use-temperatures are important to the



performance of these components. Adiprene LF pPDI prepolymers are designed to provide superior resistance to low and high temperatures, excellent toughness, and superior resistance to chemicals and abrasion. With excellent property retention up to 6 weeks at 150 °C, athletic shoes, for example, can

be stored in a hot car for long time periods without losses. In addition, footwear components benefit from higher flexural fatigue resistance and cold temperature flex performance down to - 20 °C.

LANXESS offers urethane prepolymers for 3D printing with other chemistries, including LF MDI and LF HDI. These elastomers provide unique performance, such as optical clarity, UV and hydrolytic stability for outdoor uses, and the elimination of surface imperfections.

LANXESS

lanxess.com

Eugen Hehl receives award for lifetime achievement

ARBURG Partner Eugen Hehl was awarded the Richard Vieweg Medal of Honour by the Association of German Engineers (VDI) in Baden-Baden on 11 February 2020 in recognition of his outstanding lifetime achievement. On behalf of her father, ARBURG Managing Partner Juliane Hehl accepted the highest award given by the VDI Department of Plastics Engineering.

Medal of Honour for lifetime achievement

Dipl.-Ing. Kurt Gebert, Chairman of the Department of Plastics Engineering, outlined the reasons for awarding the Richard Vieweg Medal of Honour: "Eugen Hehl has worked with great dedication to advance the development of injection moulding technology and at the same time has promoted new technologies outside his industry. He delegated many of his employees to join the committees of the VDI Department of Plastics Engineer-

ing and made it possible for their expert knowledge to contribute to the collaborative technical and scientific activities of the VDI".

Laudatory speech: long-term business associate Herbert Kraibühler

The laudatory speech was held by Dr.-Ing. E. h. Herbert Kraibühler, former Managing Director Technology & Engineering at ARBURG. "The award winner Eugen Hehl is a full-blooded entrepreneur who has made outstanding contributions to the global plastics industry over the past 60 years, in mechanical engineering, in the use and application of plastics, in training and in environmental protection", said Kraibühler. "This made him a true global ambassador for the German mechanical and systems engineering industry, he played a decisive role in shaping our industry. For this we all owe him our gratitude!"



From left to right: Dipl.-Ing. Martin Würtele, Dipl.-Ing. Kurt Gebert, Dr. Achim P. Eggert, Juliane Hehl, Dr.-Ing. E. H. Herbert Kraibühler, Dr.-Ing. Erwin Bürkle.

(Photo: © Christiane Haumann-Frietsch photo studio)

Juliane Hehl accepts Medal of Honour

Kurt Gebert presented the Richard Vieweg Medal of Honour to Juliane Hehl. She conveyed Eugen Hehl's greetings and expressed her gratitude on his behalf for the award and for the moving and sensitive laudatory speech. "He has never been on the 'hunt' for awards and prizes in his life – always following the

philosophy of 'substance over appearances'", said Juliane Hehl, adding that he would gladly accept the Richard Vieweg Medal of Honour, however. As an award for his life's work that he was able to realize only with the support of many people who travelled this successful path with him.

ARBURG
www.arburg.com

Mastip opens new subsidiary in Vietnam

Mastip is pleased to announce the opening of a new subsidiary in Vietnam with a Technical Sales and Support office based in Ho Chi Minh City.

The new subsidiary will operate as "Mastip Vietnam LTD" and will further strengthen Mastip's presence in South East Asia along with existing sales and technical support centres in Thailand, Indonesia,

Singapore and the Philippines.

Pham Minh Quãng, Technical Sales Manager of Mastip Vietnam, is looking forward to providing greater local service and support for our partners as Mastip continues to experience growth across the region.

Mastip
mastip.com



VMAP project: Software standard to boost efficiency in product development

The best products and parts are those created with holistically designed development and production processes. In the best of cases, all the data on the material properties and material behavior will be available for the entire workflow. So far, however, a large number of different interfaces has hampered the flow of data between all those involved. Different file formats frequently require extensive (and hence costly) manual adjustments for data transfer and are thus slowing down the current progress towards industry 4.0. Simcon – a leading supplier of simulation software for the

injection molding of plastic parts – has now teamed up with some 30 international partners in the VMAP project – Virtual Material Modelling in Manufacturing. The partners aim to draw up a uniform, manufacturer-independent standard for the optimal exchange of information in development and production employing Computer Aided Engineering, or CAE for short. Simcon's Cadmould simulation software constitutes a key development tool for manufacturing industry in the plastics sector.

Under the project management of the Fraunhofer Institute for Algorithms and

Scientific Computing SCAI, the participants are setting out to improve the entire value chain in industrial production with their new standard. Smooth, automated communication will significantly simplify the design process and shorten cycle times in design optimization. Apart from Simcon, further eminent industrial companies are participating in this ambitious project, including Audi, Bosch and Philips, software manufacturers from various industries and a number of universities.

The VMAP project partners will be jointly compiling

the standard in the period up to 2020. Afterwards, the open and manufacturer-independent community "Material Data Exchange Interface Standard" will monitor compliance with the standard and proceed with its further development. Funding for the project is coming from the German Federal Ministry of Education and Research (BMBF), together with other national institutions in Austria, the Netherlands and Canada.

SIMCON

www.simcon.com



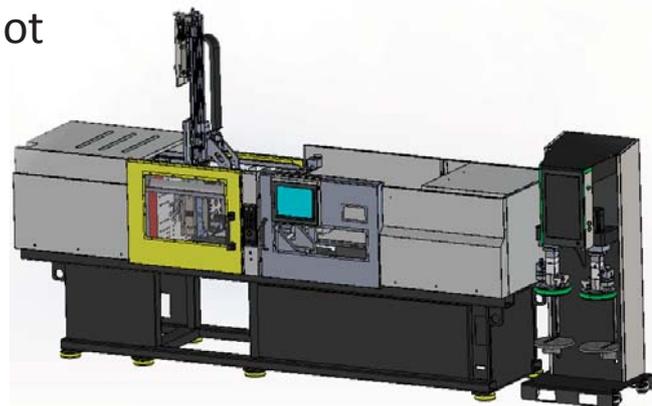
Milacron collaborates with Nexus to demonstrate precise LSR capabilities for Roboshot

Milacron Injection Molding & Extrusion, a leading industrial technology company serving the plastics processing industry, exhibited an all-electric ROBOSHOT machine at MD&M West.

Continuing the 1999 MD&M West introduction of ROBOSHOT LSR molding and growing LSR presence, Milacron exhibited the latest generation of ALL-ELECTRIC Alpha 110iA ROBOSHOT LSR molding cell. Milacron was pleased to be able to show this combination of a large platen using a small 14mm, 9cc LSR injection unit integrated with an X20 SERVOMIX dosing pump, a cold runner system utilizing Flow-

set cavity balancing with a 2-cavity mold, and a Nexmover robotic demolding system by NEXUS Elastomer Systems GmbH. The 3.0 cc shot size demonstrated the capability of tackling near micro-molding LSR applications.

Drawing on 60-years of continuous development, the centerpiece of the ROBOSHOT Alpha Series is its industry-leading reliable control. User-friendly, highly flexible sequencing and featuring all the standard interfaces, it delivers fast processing times and consistent parts quality. This ensures ultimate accuracy and exceptional reliability



across all processes as well as highly precise motion, position and pressure control.

Milacron is delighted to show the ROBOSHOT superior accuracy and technology in association with the NEXUS's dosing systems. Milacron will continue to leverage the shared presence in Cincinnati through

their newly established subsidiary, NEXUS Elastomer Systems Ltd. Following the MD&M show, Milacron will offer turnkey solutions including machines, molds, automation, dispensing units, as well as systems for thermoplastic technology.

Milacron

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AON3D launches the AON-M2 2020 industrial 3D printer

AON-M2 2020 has been designed to print the expanding array of melt-processable thermoplastics, including PEEK, ULTEM™, PEKK, polycarbonate, and hundreds of other materials. Customers can realize the most demanding applications, since the extensive material compatibility offers the opportunity to 3D print parts that can resist harsh chemicals, stand up to extreme temperatures, and withstand intense mechanical stress.

Open Materials - More Applications

Since its founding, AON3D has committed to the open materials standard in contrast with many 3D printing companies that restrict customers to a limited selection of costly, proprietary materials.

In addition, AON3D has focused its materials engineering expertise on developing optimized process parameters for vendors that provide the highest quality materials on the market. These include notable brands such as Solvay,

SABIC, Kimya, DSM, Infinite Material Solutions, and many others.

Designed for Part Accuracy and Repeatability

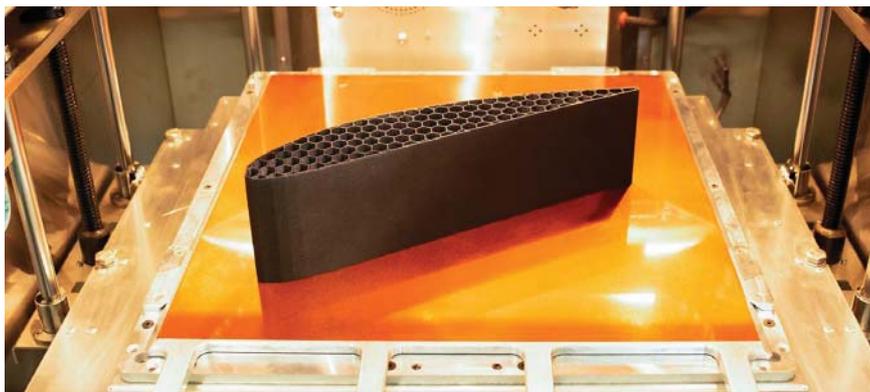
The AON-M2 2020 industrial 3D printer improves upon the original design with its focus on part accuracy and repeatability, as well as reliability. “From the all stainless-steel frame to minimize thermal expansion, to the chamber heater redesign that offers precise control of the thermal environ-

ment and heats up in less than 15 minutes, the AON-M2 2020 is an exciting step-up for AON3D,” said CEO, Kevin Han. “We are thrilled to continue offering customers the widest range of material options for their applications and materials expertise that goes well beyond the machine design.”

Making Materials Matter

With its higher chamber temperature of 135°C (275°F), and bed and hot end temperatures of 200°C (392°F) and 470°C (878°F) respectively, the AON-M2 2020 unlocks an even wider range of high-performance materials that are in demand by industries such as aerospace, defense, R&D, and manufacturing. Operators can achieve better mechanical properties for printed parts with its precision thermal control, enabled by the

A part made from Solvay KetaSpire® AM FILAMENT CF10 LS1 – a carbon fiber-loaded PEEK material



About AON3D

In 2015, a team of materials engineers from McGill University in Montreal, Canada founded AON3D with the mission of unlocking high-performance thermoplastics for 3D printing. Previously dominated by machines that use costly, closed systems, AON3D developed a line of open filament industrial 3D printers that offer best-in-class performance at a fraction of the cost. The AON3D team is equipped with expertise across materials science, engineering, additive design and applications support.



process expertise offering; application engineers, trainers, and PhDs combine forces to support users in achieving exceptional part outcomes.

The AON-M2 2020 is ideal for fabricating parts for a wide range of applications, including tooling, jigs and fixtures, end-use parts, or rapid prototyping

innovative chamber heater design and engineered convective flow path. Also, its huge 454 x 454 x 640 mm (18 x 18 x 25 in) build chamber accommodates larger parts, and its dual independent tool-heads can print support material for complex designs with ease.

“We are seeing a growing demand for an additive manufacturing platform that can print the strongest thermoplastics, as well as an increasing recognition that reaching the maximum mechanical property potential for any part-material combination is a challenge best met with expert support,” said Director of R&D, Andrew Walker. “The AON-M2

2020 is the bedrock of a complete solution we offer customers for getting from CAD file to end-use parts, without sacrificing affordability.” *smi*

AON3D pairs its industrial 3D printing platform with a comprehensive

AON3D
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BOY
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CONNECTIVITY BY BOY

63 kN – 1250 kN
Clamping force

www.dr-boy.de

NewPro3D and Henkel: unique 3D printing solution in the medical sector

NewPro3D recently joined Henkel's Open Materials Platform with the goal of providing additive manufacturing solutions at production scale. Working collaboratively, the companies are combining their areas of focus to create next-level solutions for the medical industry. With Henkel's expertise in materials and NewPro3D's innovation in 3D printing equipment and software, the companies are enabling new applications in anatomical modeling, prosthetics and more.

NewPro3D's unique technology for digital light processing (DLP) produces 3D models at record speeds. Specifically, the company's Intelligent Liquid Interface (ILITM) consists of a transparent wettable membrane that is chemically designed to facilitate faster movement between cured layers, eliminating the slow mechanical processes used on conventional 3D printing techniques. When used in combination with Henkel's wide range of photo-curing resins, the result is ultra-fast manufacturing of medical devices and tools including hard and soft anatomical models for use in surgical planning and educational programs.

"We're excited to work with NewPro3D to develop applications which can have a life-altering impact for so many people," says Henkel's Head of 3D Printing Materials, Sean Dsilva. "Our goal with additive manufacturing is to drive production at scale. While that's a potential game-changer in all the markets we serve, perhaps nowhere is it more important than in the medical industry, where lives are literally at stake. It's very gratifying for our team to play a small role in improving the outcome for those in need."

NewPro3D and Henkel demonstrated some of these applications at the 2020 MD&M West Conference.



Soft tissue anatomical model of a heart

3D printed anatomical model of an infant's skull

As the main event at the MD&M West Conference, the companies presented an anatomical model of the baby's skull. In this particular case, the child was afflicted with a syndrome that caused misalignment of the anterior mandible. To correct the issue, doctors must lengthen the mandible to approximate the maxilla. The model serves an invaluable role, helping the surgical team more accurately measure the defective position and identify areas where a device can be anchored to lengthen the mandible, in addition to helping them more easily visualize the overall position of other cranial bones.

"3D models help surgeons and proceduralists get better context and



Anatomical model of the baby's skull

therefore improve their planning and performance," says NewPro3D's Chief Operating Officer, Gabriel Castanon. "3D printing should be looked at as a way to reduce risk and improve outcomes."

In this particular example, doctors with the use of this helpful tool, were able to develop a treatment plan that involved the construction of an osteo-distraction device that was placed in the body of the mandible. As dictated by the treatment plan, the apparatus featured external screws, which were rotated daily to a prescribed number of revolutions. **smi**

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RUBBER IN MOTION



For even gentler plasticising

In-situ polymerisation opens up great opportunities in the production of fibre-reinforced plastic components with a thermoplastic polyamide matrix. Based on dry reinforcement textiles, polymerisation and moulding are combined, enabling particularly efficient and automated processes in series production, for example, in lightweight automotive engineering. The decisive factor for processing efficiency and product quality is the reactive unit developed by ENGEL specifically for the preparation and injection of ϵ Caprolactam. ENGEL has systematically further optimised its solution with a new, smaller size.

Now offering two sizes, ENGEL covers an even wider range of applications and supports its customers from product and process development, through scale-up to series production. The new smaller reactive unit can handle matrix volumes between 10 and 600 cm³, offering great flexibility, especially for testing facilities, in the production of test parts, specimens and parts up to a weight of 1.5 kilograms. The second, larger unit can process matrix volumes of up to 1500 cm³. Both units are very compact. They integrate the complete media supply and reduce

the footprint required for the entire system.

In in-situ polymerisation, the thermoplastic RTM process, pre-shaped dry fibre preforms are infiltrated directly in the mould cavity with the reactive matrix. Thanks to ϵ Caprolactam's low viscosity in molten state, the dry fibres can be wetted particularly well. Compared to duroplastic RTM, longer flow paths and a higher fibre content are possible. When the ϵ Caprolactam is polymerised to create polyamide 6, a composite with particularly high load-bearing capacity is formed that can be functionalised by injection moulding

immediately after manufacture in the same process.

Gentle preparation of material

Servo-electric injection pistons are a proven solution for injecting the reactive components. They support particularly precise adjustment of the injection volume and absolutely synchronous injection of the two components. The recirculation common in reactive systems is deliberately avoided. The volume of monomer melted is limited to what can be processed directly. The reactive components have a particularly short residence time in the

system and are not prone to residence time scatter. This in turn prevents thermal damage to the material.

A further benefit of ENGEL's system comes into play in testing and technology centre operations with frequent recipe and batch changes: the residual material can be quickly removed from the system without the system needing to be flushed.

The magnetically coupled screw conveyors for feeding the solid reactive components are a new feature. They ensure reliable and process-assured feeding of the solids. The magnetic couplings are contact-free and provide a wear-free sealing to ensure that the entire material feed is evacuated.

Within the user-defined limits, the solids are continuously dosed and plasticised using an approach that is largely independent of the injection process. Up to the moment when the material is fed in, storage and conveying of the solids remain strictly separated thermally and spatially from the melting zone underneath. The vacuum above the molten material is maintained even when topping up the storage hoppers material, and this further boosts both process stability and product quality.

Compatible with all ENGEL injection moulding machines

Both sizes of the ENGEL reactive unit can be combined with ENGEL injection moulding machines from all series. A

CC300 control unit.



ENGEL's solution for in-situ polymerisation for the production of fibre-reinforced thermoplastic components is characterised by particularly compact system technology (All pictures: ENGEL)

retrofitting option is available for injection moulding machines with the CC300 control unit. Complete control integration ensures that the entire process can be managed centrally on the machine display. Optionally, the reactive unit can be operated as a stand-alone system with its own CC300 control unit.

The range of applications for in-situ polymerisation extends from small parts with thin wall thicknesses through to large, highly stressed structural elements in lightweight automotive engineering, automotive electronics, technical moulding and sports equipment manufacturing.

When overmoulding metal inserts or cables in very small structures, in-situ polymerisation can offer advantages over other processes – even without fibre reinforcement.

Trend to thermoplastic composites

The new reactive unit is available for customer trials at ENGEL's Center for Lightweight Composite Technologies in Austria. At the Center, ENGEL is collaborating with the Johannes Kepler University in Linz, Austria, and mould maker Schöfer, on the further development of the in-situ polymerisation process.

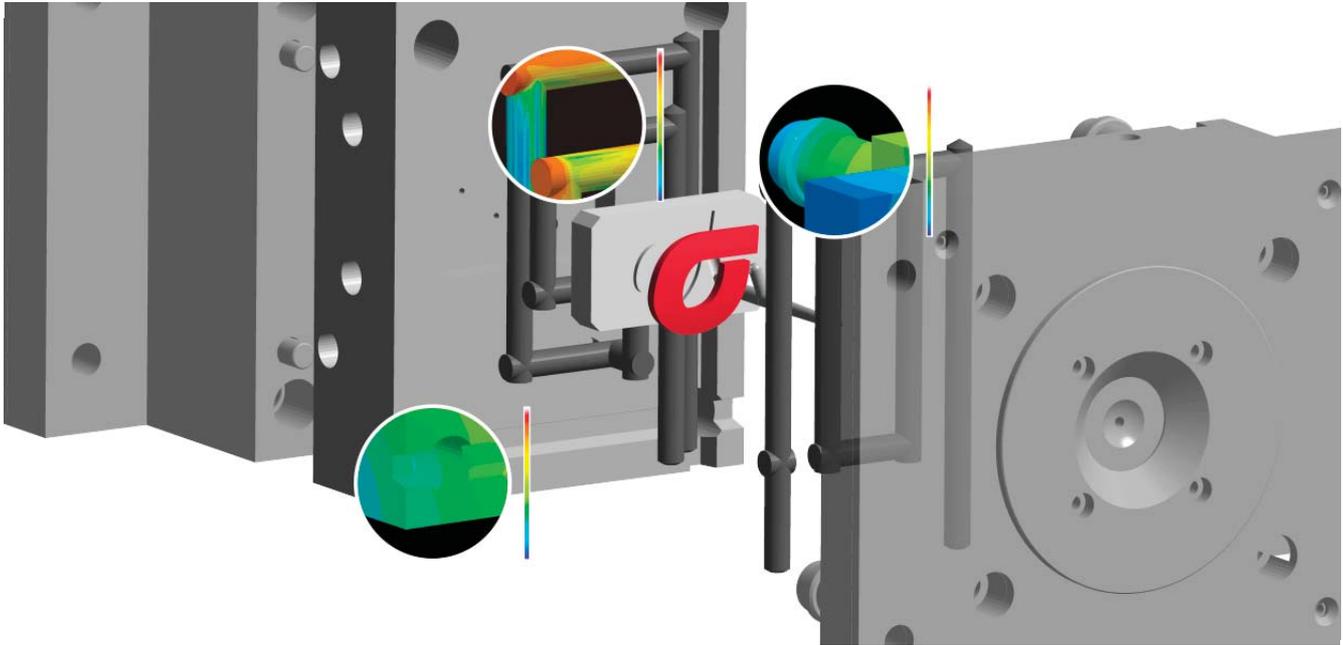
On account of the trend towards thermoplastic composites, this technology is increasingly shifting into the focus of lightweight engineering developers. The continuous thermoplastic material base enhances processing efficiency while at the same time paving the way for recycling composite parts. In the form of in-situ polymerisation and the ENGEL organomelt technology, system supplier ENGEL has two production-ready processes for the manufacture of thermoplastic composite parts in its product range. **smi**



ENGEL

www.engelglobal.com

Easier decisions in mold design using virtual molding



SIGMASOFT® provides a variety of methods to forecast the shrinkage and warpage of plastic parts. Along with this, one can also simulate the deformation of inserts or core pins during filling. SIGMA simulates and compares the deformation of core pins made of two different mold materials under equal process conditions. The calculations are based on the imbalanced melt flow inside the cavity and the mechanical properties of the two materials.

There are many questions that injection mold manufacturers confront daily regarding the variety of mold materials which are available in the market. What type of steel should be used for which part of the mold? Whether it is the thermal conductivity of the steel used for the cavity insert, the diameter of a suitable ejector pin or even the mechanical stability of the core pins, SIGMASOFT® Virtual Molding leads to the correct decision.

In SIGMASOFT® every mold material, e.g. steel, isolation, etc., is taken into account with its thermal and mechanical properties. As an example, one can

simulate the heating up phase or the development of hotspots during several injection cycles having the thermal conductivity and specific heat capacity of all the mold materials. Besides the prediction of shrinkage and warpage of plastic parts, SIGMASOFT® also simulates the deformation of inserts and core pins during filling. These calculations are based on possible imbalances in the filling of the cavity and of course the mechanical properties of the steel.

SIGMA Plastic Services, Inc. (IL), the American subsidiary of SIGMA Engineering GmbH, simulated an interesting project in cooperation with

two companies, CAVAFORM (FL) and Crafts Technology (IL). In the project the deformation of core pins made of different materials during filling of the cavity was evaluated.

The investigation was done for an injection mold with 16 cavities, which is used to produce centrifuge tubes. In 8 of these cavities, core pins made of tungsten carbide are integrated to form the inside of the tubes. 420 stainless steel is used for the other 8 core pins. Simulative analysis of the filling phase shows an imbalance, which comes to existence after about 85% of filling has passed and becomes more obvious near the end of filling (Figure

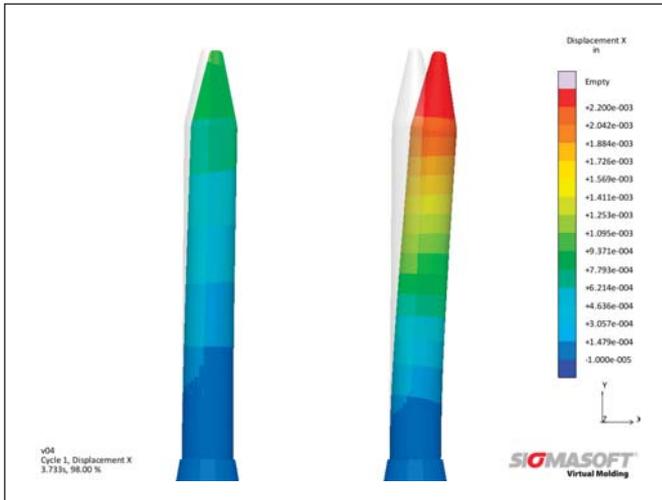


FIGURE 1 – Simulative comparison of the deformation of core pins made of tungsten carbide (left) and 420 stainless steel (right) at the end of the filling of the cavity – the material with the lower modulus of elasticity deforms three times more under constant process conditions

2). This imbalance is caused by the asymmetrical geometry of the screw in the cap area of the tube and leads to a force, which tends to deform the core pins during the filling of the cavity.

Due to the lower module of elasticity of 420 stainless steel, pins made of this steel are deformed about 3 times more compared to the pins made of tungsten carbide (Figure 1).

The described case is just an example of the many details of an injection mold, which can get misplanned during the mold design phase. SIGMASOFT® Virtual Molding provides even the most experienced mold manufacturers with a detailed insight of the injection molding process.

With a very low effort and based only on the thermophysical and mechanical phenomena, even before ordering the mold units, they can examine and evaluate the effect of changes in the mold. Thus, simulation provides a sound basis for decisions and supports the mold design from the beginning. **smi**

SIGMA Engineering
www.sigmasoft.de

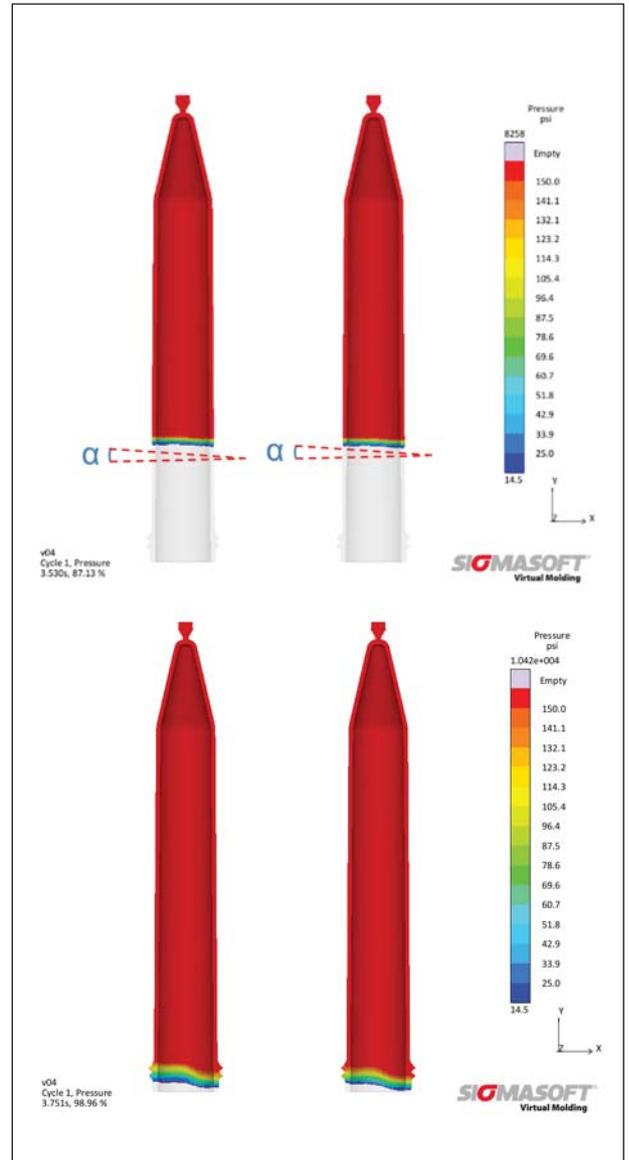


FIGURE 2 – Demonstration of the melt pressure in two cavities with core pins made of tungsten carbide (left) and 420 stainless steel (right) – The upper section shows the point in filling where the imbalance is visible for the first time. At the end of filling (lower section) this phenomena can be seen clearly

More news at 

www.smart-molding.com



Yizumi novelties based on trends in automotive and urban mobility

The pressure to reduce emissions and the wish of people concerning mobility leads to new concepts in automotive. Talking about electric cars, e-scooter or other ways for urban transports, light weight design is one of the most important headlines. The look and feel of thereby used polymers have to have a perfect surface and high-quality design. From these statements the importance of the future topics are related for the plastics machinery industry: lightweight design, combination technology, plastics Industry 4.0, 3D printing. These headlines have likewise strategic importance to the product development of Yizumi.

Lightweight technologies

The well-known foam injection moulding process is ideal for manufacturing lightweight products. Yizumi developed a new screw design to increase the process to higher recovery rates and better performance for glassfiber filled polymers. In addition, the price of the equipment decreases significant. In Germany Yizumi is part of a standardisation team which is defining a new standard for the production based on foam injection moulding. Meanwhile also the disadvantage of foam injection moulding – poor surface quality – is solved. Based on a thin ceramic layer in the cavity walls of the tool you get a perfect surface for a low amount of investment cost.

Physical foam injection moulding related technologies like Water Injec-

tion Technology (WIT) or Gas Injection Technology (GIT) are also developed and offered to customers. In this special case we work close together with our network partner PME fluidtec in Germany. Based on the WIT process for example, you produce in thick wall areas of plastic parts cavities or hollow spaces to lower the weight of the final part. In addition, you decrease the cooling time pretty much and prevent shrinkage.

Lightweight design often means to replace a part which is designed on a metal material base by a plastic part. Consequently, you have to choose for the final design of the part a polymer with high mechanical properties: You have to process fiber reinforced plastics. Together with our German network partner C4PP we developed

the Direct Injection Moulding (DIM) process.

The advantage of the DIM process is the significant reduction of material cost down to 50% of the original market cost. An injection moulding machine is equipped with a special mixing screw. In the area of the metering section of the plastification unit a fiber cutting and stuffing device is connected to the injection moulding machine. The fiber length can be varied by the cutting device and the amount of fibres can be changed by changing the speed of the unit and/or can be changed by the number of rovings which are fed into the device.

As a result you do not need to purchase high priced fiber filled plastics anymore. You purchase cheap standard resins and cheap fiber roving and

produce your own compound on your machine while processing. Glassfibers as well as natural fibers or carbon fibers are suitable.

Combination Technology

As already mentioned in the introduction of this article, the look and feel of plastic parts plays a tremendous role in our business. Especially in foam injection moulding long time only the rapid heating cooling method guarantees shiny surface quality – but with the disadvantage of higher investment cost and longer cycle time during production. The simple ceramic coating of the tool cavity walls brought the breakthrough.

The Combination Technology or Integrative Technology offers a wide variety of methods to improve the look and feel of final plastic parts. The idea of combination technology is developed by a cross-technology potential analysis of the known industry processes. The material and process combinations emerged as a result form an important cornerstone for Yizumi's research activities in the headquarters in China as well as in the R&D Pre-development Centre in Aachen, Germany.

One of the first activities was the development of the so called 'React-Pro' process: Based on an exclusive agreement with the company Frimo Lotte / Germany we developed the process of overflowing a thermoplastic carrier part by PU coating. To explain the React Pro machine system in



SpaceA, on the left Nicolai Lammert (Head of Additive Manufacturing), right Richard Yan (CEO Yizumi)

a simple manner we can say that our engineers married their DP 2-platen injection moulding standard machine with the PU equipment produced by Frimo. The Yizumi 'smart and better' approach is given by this technology by an innovative tool concept we developed together with our network partner GK Concept from Dresden / Germany. Based on the ReactPro process you can produce final plastic parts with high glossy surfaces and also with soft touch surface if requested.

A second example to get a better 'look and feel' was developed as 'DecoPro' process and presented already at Chinaplas 2018. In this case an aluminium foil was back injected by a thermoplastic carrier. The final part was an engine cover as dem-



Engine cover with thermoplastic carrier and second component flooded PU after first trial

onstrator. The tool design integrated the cutting of the Al foil whereby the foil was continuously delivered from a roll. DecoPro in this case delivered a final part with a look and feel like pure metal!

Plastics Industry 4.0

The trend word 'Industry 4.0' is in every mouth! On one hand it is a matter of accessing a high amount of different data, provided by material supplier as well as machines and sensors inside the whole supply chain. On the other hand, the focus is a standardised analysis and utilisation of this data for new business models. Yizumi is prepared to attend to this new world and offers all interfaces which are standardised by Euromap.

One typical example for the use in the Industry 4.0 world is our new development called DCIM (Direct Compounding Injection Moulding): DCIM is a complex



DCIM system inside Tech Center Yizumi

machine system, based on the main components Injection Moulding Machine (IMM) and Compound Delivery System (CDS). Viewed from the systematic of a machine design engineer the DCIM depends also to the group of 'combination technologies' (see above). The compound delivery system exists out of two subgroups. The compound single screw extruder and the dosing system of the different polymer components and additives. The CDS processes the molten and mixed compound into the feed section of the IMM. Finally you get the parts out of the mould as known from the IMM process.

The advantages for the end user are divers: On one hand you produce your own compound based on standard polymers and additives which can be purchased cheap in the market. This relates into lower material cost depending on recipe up to 50%. On the other hand you run your production based on own recipes which creates a lead in know-how. Well known is also the situation if an end user needs only a small lot of a special compound. Sometimes the compounding company let you wait a pretty long time up to delivery and that in addition with a high price!

Last but not least I come back to the aspect of Industry 4.0: The whole chain

starts with the recipe and ends with the final part. Our partner Exipnos is a material specialist and creates the right recipe for you. The recipe will be sent via the cloud into the control of the DCIM system and can be changed frequently. Also material compounds based on recycle material can be developed by Exipnos and processed with the DCIM machine.

3D Printing

The 3D Printing or Additive Manufacturing (AM) is a well-known manufacturing method to process plastics or metal without a mould into the final shape.

Yizumi Germany is the home for the start-up business unit 'SpaceA', a series of Hybrid 3D Printers to produce polymer parts. The base of SpaceA is a module in accordance to the Melt Deposition Modelling (MDM) process. The process original developed at IKV (Institute for Polymer Processing) in Aachen. The former research engineer which developed the process at IKV is nowadays employed by Yizumi Germany and is the head of the SpaceA business unit.

With the MDM you reach outstanding part building speed based on the use of standard polymer material like

everyone knows from injection moulding. Also high filled and fiber reinforced polymers like for example PA with 30% CF can be processed. As a result and compared to other AM processes, the SpaceA gains tremendous advantages in productivity.

Due to this reason, the SpaceA is not only a machine to produce prototypes, it is the first 3D Printer for profitable production.

The hybrid SpaceA is equipped with an articulating robot and if requested can be added inside the cell by subtractive manufacturing processes like grinding or milling and others. Also the functional integration of complex inserts is no problem and allows a high degree of design freedom of the final part. As already mentioned the focus of SpaceA is not only the prototype production of polymer parts, the main focus is profitable production in competition to injection moulding of small and medium lots. **smi**

**Guangdong Yizumi
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www.yizumi.com

NETSTAL ELION: faster than ever

A substantial optimization of the dry-cycle time of NETSTAL ELION series models was achieved by making an adjustment to the clamping unit controller. The output can be increased even more in series production use.

The dry-cycle times of the high-performance NETSTAL ELION have been reduced by up to 0.2 seconds across the entire model range. The shorter dry cycles are available for all NETSTAL ELION models with aXos version 8.2.0. and up. "This update for the NETSTAL ELION series incorporates the latest controller technology insights, which we had already applied to the NETSTAL ELIOS series," said Renzo Davatz, CEO of KraussMaffei HighPerformance AG. The additional speed is made possible through the adaptive optimization of the acceleration and deceleration ramps for the clamping unit drive. The result: The maximum moving speed will be reached faster than before and can be maintained longer before the moving mold plate is harmoniously decelerated and the toggle lever mechanism seamlessly transitions to building up the clamping force – all without compromising mold protection.

Taking into account the potential mold weight allows shorter production cycles

However, a shorter dry-cycle time does not automatically mean a faster cycle under real production conditions. That is why the new control algorithm takes into account the potential tool weight based on the set installation height and incorporates it in the control of the acceleration and deceleration process. "This allows our customers to further speed up the production cycles on their NETSTAL ELION and, as a result, achieve further productivity increases," emphasized Davatz.



The dry-cycle times of the proven NETSTAL ELION have been reduced by up to 0.2 seconds across the entire model range

High-performance solution for closure applications

The following application example illustrates what this can mean in practice: A NETSTAL ELION 4200 with a 96-cavity mold produces Type 29/25 HDPE closures. One closure weighs 1.23 grams. Thanks to the optimized control, the cycle can be shortened from 2.77 seconds to 2.6 seconds. The hourly output goes up from 124,750 to 132,920 closures, which equals an increase in productivity of 6.5 percent. "Even before the update, the NETSTAL ELION already provided our customers across the globe with the highest-performance solution for closure applications. Thanks to the optimized clamping unit control, users now benefit from additional increases in the effectiveness of the machines," said Davatz in summarizing the customer benefit.

Fast, precise, reliable: the NETSTAL ELION

In the high-performance segment, KraussMaffei's NETSTAL brand stands

for the fastest, most precise and most reliable injection molding machines. NETSTAL machines are built to reliably deliver perfect results year-after-year and with extreme loads. The NETSTAL ELION series, which was launched in 2004, is proof of this: Through a horizontal servo motor, the centrally positioned 5-point dual toggle lever is put in motion especially dynamically yet harmoniously. No other manufacturer uses this demanding yet highly efficient lever mechanism. For the past 15 years, the NETSTAL ELION operating principle has convinced customers through top speeds, low wear and top energy efficiency. These are the elements needed for the successful production of thin-wall packaging, beverage closures and consumable articles for the medical industry. **smi**

KraussMaffei
www.kraussmaffei.com

exhibitions calendar



Eurostampi

26-28 March 2020
Parma, Italy
www.mecspe.com

Eurostampi is an international exhibition for molds, presses and injection molding machines. Numerous exhibitors worldwide are represented at this fair to show the latest equipment, processing techniques and applications. The Eurostampi is an important platform for exhibitors and users in the industry.



Plastpol

19-22 May 2020
Kielce, Poland
www.targkielce.pl/plastpol

Plastpol is one of the largest exhibitions in Poland and Eastern Europe dedicated to the plastics industry and attracts almost all the leading companies operating in plastics processing. It features all areas of plastics processing beginning with the first stages of plastic production and finishing with its disposal and recycling.



Equiplast

02-06 June 2020
Barcelona, Spain
www.equiplast.com

The **Equiplast** is a specialized trade fair in the field of plastic manufacturing. It is a meeting ground for manufacturers from Europe and South America. The Equiplast shows technical innovations and innovations of plastic and rubber production.



Rosmould

08- 10 June 2020
Moscow, Russia
www.rosmould.ru

Rosmould is an international exhibition on manufacturing solutions of the next generation organized by Messe Frankfurt RUS. Exhibition covers such groups as design and product development, additive technologies, moulds, die moulds, stamps, materials, machinery and tooling.



Chinaplas

03-06 August 2020
Shanghai, China
www.chinaplasonline.com

Accompanying the growth of China's plastics and rubber industries for over 30 years, **Chinaplas** has become a distinguished meeting and business platform for these industries and has also largely contributed to their prosperous development. At present, Chinaplas is the world's leading plastics and rubber trade fair, and also widely recognized by the industry as one of the most influential exhibitions in the world.



Taipei Plas

09-13 September 2020
Taipei, Taiwan
www.taipeiplas.com.tw

Taipei Plas is a biennial international exhibition for plastics and rubber technology. You can see every facet of production, meet company representatives and industry professionals from across Asia and check out the vast array of breakthrough processing machinery, parts, finished products and materials.



IPF

06-10 October 2020
Tokyo, Japan
www.ipfjapan.jp

The **IPF** – International Plastic Fair – is Asia's leading trade fair for plastic and synthetic material. International exhibitors, including the world leaders in the industry and demonstrate innovative products and machinery.



Fakuma

13-17 October 2020
Friedrichshafen, Germany
www.fakuma-messe.de

The **Fakuma** is one of the leading trade fairs in the field of plastics processing, which takes place every two years in Friedrichshafen, that provides an ideal event base with its location in the border triangle Switzerland, Austria, Germany. As a meeting place of the industry, the Fakuma has established itself internationally and provides an overview of the entire plastics technology, whether injection molding, extrusion or thermoforming.

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