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Formnext 2026: The next generation of industrial manufacturing returns to Frankfurt

Current discussions about industrial development in Europe and around the globe are often shaped by economic challenges. At the same time, numerous examples demonstrate how Additive Manufacturing is enabling successful and scalable industrial business models, opening up new growth opportunities across a wide range of sectors. From 17 to 20 November 2026, Formnext will once again bring together the technologies and experts driving this transformation. The event will showcase concrete industrial applications throughout the entire Additive Manufacturing value chain, featuring numerous use cases and business cases from a diverse range of industries – all in one place. Visitor ticket sales are now open, with an early bird discount available until 22 October 2026.

You can find the whole text on page 46-47.



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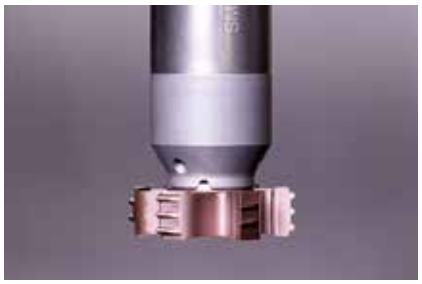

18 Reliable milling of tweezers

Maranello is famous for its red sports cars and Geneva is the Mecca for watch enthusiasts – but the products from Tuttlingen are usually only known to specialists. Over 400 companies produce world-renowned instruments and devices in the global centre of the medical industry. Tweezers, implants and endoscopes: the expertise in the medical industry has grown over time and is passed down from one generation to the next. The company HG-Micro-Instrumente GmbH & Co. KG from Wurmlingen, near Tuttlingen, is one of these specialists.



36 Plastics machining for chip manufacturing

The core business of M-O-T Mikro- und Oberflächentechnik GmbH in Saarbrücken is the provision of equipment for manufacturing microchips. In their endeavour to manufacture as many of the required plastic components as possible in house, the company has made great progress using the MAPAL NeoMill-Diamond-FlyCutter.



68 Chips as the limiting runtime factor

Ossenbrüggen Feinwerktechnik machines large components in just one clamping setup using a 5-axis mill-turn version of a HERMLE C 62 MT. This creates the ideal conditions for tight tolerances and ensures greater process reliability and flexibility for the contract manufacturer.

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70% Easier Hose Orders

HASCO hose configurator increases flexibility at Buzzi

For more than 100 years, the name HASCO has stood for simple processes and high-performance products. The latest example is the new hose configurator. This web-based tool provides an ordering system that makes configuring hoses and accompanying components particularly convenient, reliable and, above all, straightforward. At Kunststofftechnik Buzzi GmbH – a plastics processing company based in Germany's Black Forest – an online tool from HASCO has become an integral part of the hose ordering process. "With notable success," says Philipp Buzzi, Technical Manager. HASCO is one of the leading manufacturers of high-quality, standardised, modular mould systems and customised hot runner systems.

The configuration and ordering process is designed to guide customers step by step through the configuration. At each stage, the system displays only the components that are compatible with the previously selected option. This prevents incorrect combinations from the outset. "You are guided step by step through the online configurator and, in the end, you receive exactly what you need," explains Philipp Buzzi. The hoses are manufactured to the required length and delivered fully assembled and ready for use.

The process is supported by an integrated filter function, which enables suitable connection components to be identified quickly and easily. "For example, if I have configured a threaded connection with a ¼-inch male thread and then want to order a matching screw coupling, the system displays only the components that are suitable for that particular application," explains Andreas Matzander, Head of the Injection Moulding Division at Buzzi. In practice, where speed and process reliability are essential, this approach offers significant advantages. Ordering errors are greatly reduced, while selecting the correct components becomes much simpler.

Buzzi has a high demand for high-performance hose systems. The company operates a total of 22 injection moulding machines with clamping forces of up to 100 tonnes, producing mainly technical components for the sanitary sector. In addition, the Schiltach site manufactures CNC components and complete assemblies – from injection-moulded parts and ultrasonic welding through to the fully packaged end product.



Find the right hose easily and reliably with the HASCO hose configurator

Configuration code simplifies repeat ordering

For HASCO customers, the integrated configuration code function is regarded as a particularly valuable feature. As identical hose and connection configurations are often required in practice, this function offers considerable benefits. Once an order has been configured in the portal, the system generates a unique code. Using this code, the same hose system can be retrieved and reordered at any time.
Available around the clock, the system provides a high level of flexibility and speed in day-to-day ordering. "The amount of time required for each new order is considerably reduced by the code," says Philipp Buzzi. Once the codes for frequently used configurations have been saved, Buzzi estimates that a further time saving of up to 70% can be achieved compared with an already much faster ordering process.

PTFE hose Z8565/... for demanding applications

In Buzzi's day-to-day operations, HASCO's PTFE hose Z8565/... with polyester yarn braiding forms the basis of all hose orders. Above all, the decisive factor was the product's technical performance. “The hose offers excellent temperature resistance, high kink resistance, and outstanding flexibility and tear strength. In practice, this provides a high level of operational safety for our employees,” explains Andreas Matzander.
Previously, conventional process water hoses with metal braiding were used, bringing the well-known disadvantages of limited temperature resistance. The HASCO PTFE hose offers a guaranteed operating temperature range from -70 °C to +260 °C and an operating pressure of up to 138 bar. “Thanks to its performance characteristics, it can also be used without restriction in medical and food applications,” adds Ralph Moser, Technical Sales Engineer at HASCO. In addition, the PTFE hose range is available in three different colours, making it much easier to distinguish between different cooling circuits.

Everyday performance is what counts

For Buzzi, practical performance is the deciding factor. The company has found that there is currently no comparable hose material available on the market. “We have previously been offered hoses from other manufacturers that were claimed to be 100% identical to the HASCO hoses,” says the Technical Manager. “In practice, however, they proved to be of lower quality and lacked the same resistance to kinking.”
Buzzi's conclusion is therefore clear: for quality-critical applications, the company deliberately chooses HASCO products and has been consistently satisfied with this decision. “Our customers expect the highest quality from us,” says Philipp Buzzi. “And that is exactly what we expect from our suppliers.”



Working together to find the right hose solution: Ralph Moser (Technical Sales Engineer, HASCO), Andreas Matzander (Head of Injection Moulding) and Philipp Buzzi (Technical Director), both from Kunststofftechnik Buzzi (from left) (Pictures: HASCO)

What does the future of multi-cavity molds look like?

SPECTRIX and voestalpine explored this question together in the NextGen "Pipette Rack Mold project". The companies presented the result at Fakuma: a 6-cavity single-face mold from Männer for a pipette tip rack. The new mold concept combines the advantages of additive manufacturing and simulation-based design with the demanding requirements of precision multi-cavity mold making. Its clear objective is to sustainably reduce Total Cost of Ownership through a holistic approach across the entire mold lifecycle.



6-cavity single-face mold with 3 additive-manufactured and 3 conventionally manufactured mold inserts

The performance of an injection mold has a decisive impact on production quality and economics. Key factors include mold filling, mold temperature control and mechanical stability, all of which influence both part quality and process reliability. Particularly in industries such as medical technology, molds must consistently maintain the highest level of precision over millions of cycles. This requires an in-depth understanding of mold design, mold manufacturing and application engineering – expertise brought together by SPECTRIX and voestalpine High Performance Metals.

At the same time, the corrosion- and wear-resistant tool steel powders from voestalpine HPM open up new possibilities for the use of additively manufactured mold inserts in demanding injection molding applications. Combined with SPECTRIX machining expertise, this makes it possible to exploit the potential of conformal cooling concepts even in applications with demanding requirements for corrosion and wear resistance as well as polish ability to a high-gloss finish. A more homogeneous temperature distribution and improved heat dissipation close to the surface enable shorter cycle times and higher part quality, for example by reducing warpage or gloss variations. In practice, however, additively manufactured mold inserts are often implemented as geometric copies of conventional designs. As a result, considerable potential for reducing component volume – and therefore material use, build time and manufacturing costs – remains untapped.

Rethinking the mold

This is precisely where the joint development project between SPECTRIX and voestalpine HPM begins. Instead of transferring an existing Männer mold concept one-to-one to additive manufacturing, the mold insert design was fundamentally rethought to take advantage of the new design freedoms – not only with regard to cooling channel design. The project combines SPECTRIX expertise in high-precision mold making and hot runner technology with voestalpine HPM expertise in materials, additive manufacturing and simulation-based cooling design. This made it possible to systematically unlock new potential for performance, efficiency and economics in the injection molding process.

The development focuses on cooling design and topology optimization. In topology optimization, simulation is used to remove material from areas that are not required for function or for absorbing mechanical or thermal loads. All function-critical areas, such as cavity surfaces, sealing surfaces, fastening points, media connections and mechanical interfaces, remain fully intact.
The result is a mass-reduced mold insert that meets the thermal and structural-mechanical requirements of mold making and the injection molding process. In this application, the mass of one insert pair was reduced by 27.8% while maintaining part tolerances and the specified limits in the insert split areas.
The mold insert design takes a holistic view of all relevant loads arising during manufacturing and mold operation. These include machining and clamping forces during processing as well as cavity pressure, thermal stresses, clamping forces and demolding forces during injection molding. The objective was not maximum weight reduction, but the development of a robust design that optimally combines material efficiency, rigidity, fatigue strength and manufacturability. This was validated by simulation, taking the different load cases and corresponding safety factors into account.

The best of two manufacturing worlds

The cavities themselves continue to be manufactured using established processes and in accordance with all fundamental principles and requirements of precision mold making. Milling, EDM and polishing provide the required precision and surface quality. Instead of starting from a block machined on six sides, however, the starting point is an additively manufactured, hardened near-net-shape blank with machining allowance. With the topology-optimized design, non-functional component areas can remain unmachined rather than reproducing the geometry of conventional inserts. This significantly reduces the amount of mechanical machining required and limits it to the functional surfaces. The solution therefore combines additive manufacturing and conventional hard machining in a holistic approach that addresses precision, service life and economics.

Economic benefits increase with cavity count

The combination of conformal cooling and mass reduction becomes particularly attractive in multi-cavity molds. Topology optimization reduces the volume of material that has to be built. At the same time, build times can be shortened and utilization of the available build space in additive manufacturing can be improved, for example by reducing the footprint. The engineering effort for design, simulation and optimization is largely incurred only once. The resulting design can then be transferred to any number of identical cavities. As the cavity count increases, the engineering effort is distributed across a larger number of inserts, while the savings in material requirements and manufacturing capacity continue to apply to every individual insert.
The hot runner concept is also tailored to this field of application. The Männer Performance Line was developed specifically for molds with medium to high cavity counts and combines an economical system design with uniform melt distribution and stable thermal conditions. Mold and hot runner concepts therefore complement each other particularly well in high-cavitation applications, where both technical performance and the economics of the overall system are critical.



Pipetten Tips Rack

Conformal cooling as a key technology for higher productivity

The key advantage of additively manufactured mold inserts lies in the implementation of conformal cooling concepts. Unlike conventionally



Additive-manufactured and conventionally manufactured mold insert



Cooling channels in a conventionally manufactured mold insert compared to cooling channels in an additively manufactured mold insert (Pictures: SPECTRIX)

drilled cooling channels, the channels can follow the part geometry in order to minimize temperature deviations at the cavity surface. Injection molding simulation was used to design the cooling system specifically to optimize temperature distribution across the mold surfaces and address thermal hotspots at an early stage. The simulation also provides the thermal and mechanical boundary conditions for topology optimization. This improved part quality and process stability while reducing cycle time by 28% compared with conventional cooling, with residual cooling time reduced by 50%. At the same time, the more compact cooling structures create new potential for smaller, more resource-efficient mold concepts.

Mold performance instead of a technology debate

The project results show that the decisive question is not “additive or conventional?” Rather, the key is determining which mold concept delivers the best overall technical and economic performance under real production conditions. An analysis – for example using simulation methods – should therefore be carried out as early as the concept phase to provide a holistic view of TCO and support the most economically appropriate decision.

Conventionally manufactured mold inserts remain the more economical solution for many applications. However, where requirements for cycle time, part quality, process stability and unit costs are high, and where production volumes are substantial, additively manufactured inserts can offer clear advantages. The additional use of topology optimization can specifically reduce material consumption, build volume and manufacturing time, effectively lowering the production costs of additively manufactured inserts and making conformal cooling economically viable even at lower production volumes. Combined with conformal cooling, this creates high-performance mold concepts that increase productivity and cost efficiency while sustainably reducing Total Cost of Ownership.

At Fakuma, SPECTRIX and voestalpine showcased how this potential can be realized in practice and what impact it has on cycle time, mold performance and overall economics. The project partners will present further results, detailed comparative data and the resulting recommendations in a technical webinar after the trade show.

NextGen Pipette Rack Mold Showcase at a Glance

Application: Pipette tip rack
Mold: Männer 6-cavity Singleface Mold
Hot Runner: Männer Performance Line Valve Gate System
Temperature control: Gammaflux G25
Injection molding machine: ARBURG 570 H 2000-800 Ultimate
Part material: INEOS Styrolution PS 124N
Part weight: 11.2 g
Part dimensions: 78.1 x 43.3 x 31.4 mm³
Mold inserts: conventionally and additively manufactured
Material: Uddeholm Tyrax® & Uddeholm Tyrax® for additive manufacturing
Additive manufacturing process: Laser Powder Bed Fusion (LPBF)
Build time per mold insert: approx. 30 hours
Conventional cycle time: 9.85 s
Additive cycle time: 7.05 s
Cycle time reduction: 28%

Motor spindle platforms

STEP TEC, a UNITED MACHINING SOLUTIONS company, presented the HVC150 and HPC190 motor spindle platforms at AMB 2026 in Stuttgart, and provide a preview of their future integration with the new generation of digital spindle monitoring. In do-ing so, STEP TEC combines high-performance spindle technology with expanded capabili-ties for condition monitoring and diagnostics.

The HVC150 is designed for dynamic and high-performance milling applications where preci-sion, productivity, and thermal stability work in tandem. Its compact architecture offers ma-chine tool manufacturers a flexible foundation for various machine and application concepts.

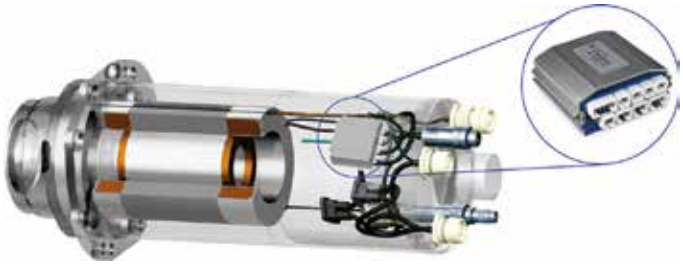
The HPC190 addresses demanding machining processes with higher requirements for torque and cutting performance. Its architecture is particularly well-suited for applications where rigidity, performance, and reliable continuous operation are paramount.

Together, the two platforms showcase the breadth of the STEP TEC portfolio—from dynamic milling processes to performance-oriented machining applications.

With the SDM30 (Spindle Diagnostic Module), STEP TEC is consistently advancing the con-dition monitoring of its motor spindles. In the future, spindles can be equipped with the SDM30, allowing them to benefit from expanded capabilities for monitoring and diagnosing spindle condition.

The additional transparency regarding spindle condition lays the foundation for detecting changes early on and helps machine manufacturers and users place even greater emphasis on process reliability and machine availability.

Technologies such as OptiCool and CoolCore, as well as the future integration of SDM30, underscore this approach. The goal: spindle solutions that are not only high-performance but also provide machine manufacturers with the prerequisites for stable and reliable machining processes.



Intelligent Spindle Monitoring with SDM – for Greater Transparency Regarding the Condition of the Motor Spindle (Picture: STEP TEC)





Felix Dorn of Weber Fibertech, right, and Joachim Scheffer of Oerlikon HRSflow, presenting a frame for the li:on youth bicycle that was injection-molded using water injection technology and FLEXflow HRS servo-driven hot runner technology (Picture: © Oerlikon HRSflow)

Using WIT and hot runner technology to produce lightweight youth bikes with high safety factor

Setting new industry standards, the li:on youth bikes from Kids Bike Revolution in Markdorf, Germany, combine high safety and stability with low weight as well as sustainable manufacturing and design. A key feature is their frames which come in two sizes. They are made of Fibrit, a polyamide reinforced with 40% recycled carbon fibers that is lightweight and recyclable. Weber Fibertech, which is also based in Markdorf, produces the frames using modified water injection technology (WIT) and its patented E-LFT process, as well as FLEXflow HRS servo-driven hot runner technology from Oerlikon HRSflow. PME fluidtec, a Weber Fibertech subsidiary and a leading global supplier of machines and injection systems for fluid-assisted injection molding based in Ettenheim, Germany, developed the WIT. KraussMaffei manufactures the MX 1600 injection molding machine, which is specifically designed for this application.

In the WIT process, the mold is first filled with molten material. Immediately afterward, a water jet strikes the still-liquid core of the part in the opposite direction of injection, forcing excess material back into the injection molding machine's melt supply. This saves material without reducing the rigidity of the tubular frame. However, it requires very complex control of the opening and closing of the injection nozzles in both phases of the WIT. FLEXflow HRS meets these requirements and was therefore key to the project's success.

FLEXflow HRS as a key

Compared to conventional hot-runner injection molding, the combination of WIT and hot-runner technology, together with the flexible control unit of the servo-driven FLEXflow HRS systems, offers significant advantages. It enables independent and precise adjustment and monitoring of the needle stroke positions as well as the movement speeds of all nozzles integrated into a mold. This allows for precise control of the opening and closing cycles as well as melt flow, compensates for different flow paths, and enables the targeted positioning of weld lines. This flexibility is available both during injection into the cavity and during the WIT-specific push-back of the molten material for direct use in the subsequent cycle. Separate overflow cavities are not required, eliminating the material loss otherwise associated with them.

For both frame sizes of the li:on bikes, four injection points on the rear fork have proven to be optimal. There, nozzles from the Wa series from Oerlikon HRSflow, which are designed for medium to high shot weights, allow for short injection times. They are made of a highly wear-resistant special steel and thus withstand the demands of processing the abrasive, carbon-fiber-reinforced polyamide.

Friedbert Schmitt, Managing Director of Weber Fibertech, comments: "Thanks to FLEXflow HRS hot



Buyers of the li:on youth bike – shown here in the Urban Green version – can choose from two frame sizes, three trim levels, and four colors (Picture: © Kids Bike Revolution)

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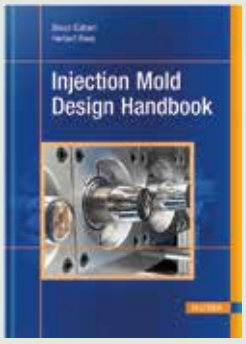

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Injection Mold Design Handbook

An injection mold is the heart of any plastics molding workcell. Understanding the principles of an injection mold design and its importance to a successful plastic part is fundamental to the success of the product. This book helps guide the designer, engineer, project manager, and production manager in making sure that the injection mold to be designed will work as intended.
This book will take the reader through the process of conceptualizing and designing an injection mold that will produce the desired plastic part. Since it all starts with the plastic part, the book will first focus on key features and details of the plastic part which are necessary for good mold design. The design of the main components of an injection mold will be discussed and good design practices will be shared. Finally the process of testing and gaining customer acceptance of the mold for production will be detailed. A comprehensive appendix and detailed drawings will provide the required detail for completing a mold design.

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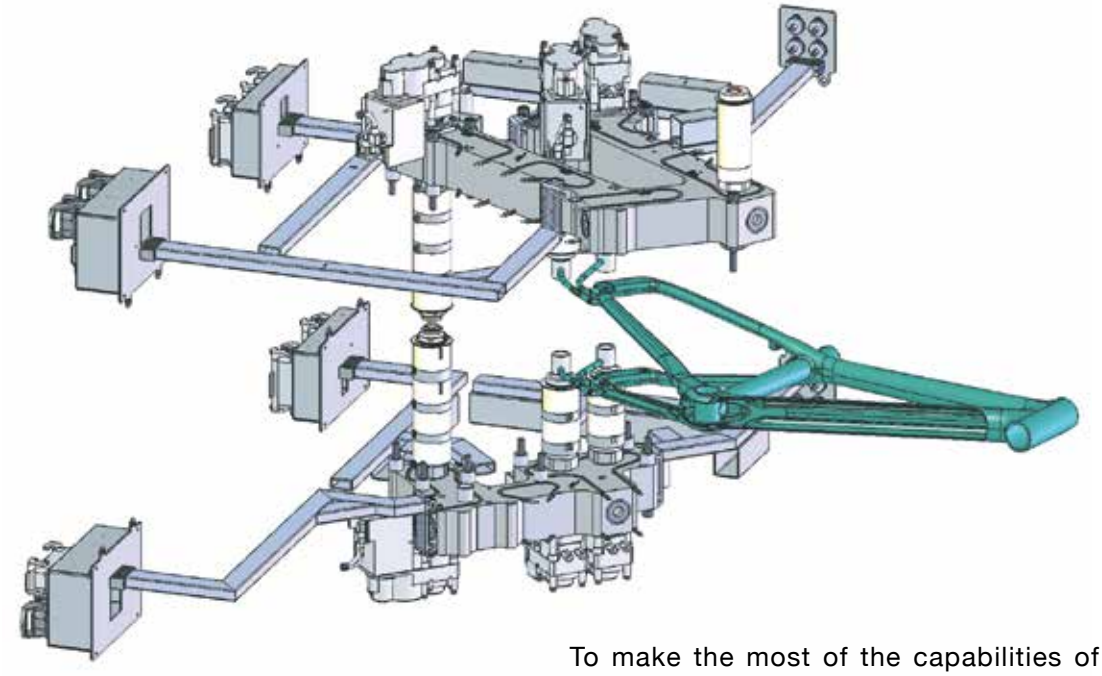

In line with the requirements of WIT technology, the hot runner system used to manufacture the frames for li:on Bikes features a highly complex design (Picture: © Oerlikon HRSflow)

runner technology, we can use the WIT for series production and deliver top-quality lightweight frames for the li:on youth bikes. Even at first glance, these closed, multidimensional hollow profiles impress with their perfect surfaces and lack of warping. Despite varying flow paths and cross-sections, their individual areas are completely and uniformly filled and securely sealed at the end of the process. Wall thickness requirements are precisely met throughout. The weld lines are optimally positioned, minimizing their impact. In this way, we make a significant contribution to the high safety level of the products."

To make the most of the capabilities of FLEXflow HRS in conjunction with the WIT system, Oerlikon HRSflow has customized the control software for this specific application. Joachim Scheffer, Key Account Manager at Oerlikon HRSflow, explains: "Working closely with PME Fluidtec, we first set up and refined the interface with the WIT system. We then programmed FLEXflow HRS so that the melt fronts, starting at the four injection points, converge in a defined manner at the seat post, in the bottom bracket area as well as at the head tube. Thanks to the ability to precisely control the movements and positions of the individual valve pins, we were also able to adjust the timing of the backpressure so that the separate melt flows in the individual



Phase 1, top: Starting from the four injection points, the melt spreads throughout the cavity until it is completely filled.

Phase 2, bottom: Starting from the opposite side, the water pushes the still-liquid cores of the individual sections back toward the needle-valve nozzles (Picture: © Oerlikon HRSflow)

About Oerlikon HRSflow

Oerlikon HRSflow, part of the listed Swiss Oerlikon Group, operates worldwide with over 1,000 employees and develops, produces and distributes innovative hot runner and control systems for plastic injection molding.
Thanks to its many years of experience, Oerlikon HRSflow implements sophisticated and advanced injection molding solutions. The company has been growing for years in a wide range of sectors, from automotive, logistics and environmental, domestic appliances, mobility, houseware and gardening, technical applications, medical, beverage and home, thin wall packaging, beauty and personal care markets.
A global network of three identically structured and networked plants (Italy-HQ/San Polo di Piave; China/Hangzhou and USA/Byron Center) and over 50 subsidiaries with expert teams that support our customers at the highest technical level enable us to respond quickly to high-demand markets. Thanks to the plants, targeted, customer-specific products can be manufactured with short lead times.
For further information: www.hrsflow.com

frame parts move back evenly. This project would not have been feasible with conventional hot runner technology."

Focus on safety and sustainability

Developed by former professional cyclists Tony Martin and Marcel Kittel, li:on bikes combine the lightweight design of aluminum frames with the high riding stability of carbon models. With three trim levels, three attractive colors, and frame sizes of 24" and 27.5", they set a new standard for children's and youth bicycles in terms of road safety and sustainability. Thomas Arimond, Managing Director of li:on-bikes, comments: "With the launch of these youth bikes, we are meeting two key requirements: outstanding visibility as a safety feature and environmental sustainability as part of our responsibility as a manufacturer for the ecological footprint of our products. The paint finish in bright, light-reflecting colors and additional lighting elements make them particularly conspicuous, even in poor visibility conditions. This helps protect the health and, in extreme cases, even the lives of young users. On the manufacturing side, we take various measures to ensure that the associated environmental impact remains as low as possible. We manufacture all components in Germany. This keeps transport distances short. In addition, we manufacture virtually 'on demand.' This minimizes the number of unsold returns that would otherwise have to be disposed of. The carbon fibers used for the Fibrit material come from the recycling loop. The material itself can also be recycled and returned to production. Compared to aluminum, it has a significantly reduced carbon footprint during manufacturing."

Help with development projects

To establish on the market such frames, which are made of cost-efficiently processable thermoplastic as an alternative to conventional aluminum and carbon frames, Weber Fibertech founded the Fi.Bi.Tec division (Fiber Bike Technology www.fibitec.com). This focuses on the local bicycle industry's growing interest in "Made in Germany" frames and other components. The company supports OEMs from the feasibility study through to large-scale production in Germany.

"Best Kids Bike" Award

Shortly after its market launch, the li:on bikes received a prestigious industry award. During Cyclingworld 2026 – Europe's show for the finest cycling culture – they were named "Best Kids Bike".
The jury recognized the brand's innovative concept of modern, safe, and sustainable children's bicycles. They highlighted the use of special light-reflective paint to make young cyclists more visible in traffic, the bike's exceptional safety features, and the manufacturing process, which emphasizes sustainable production.

About Weber Fibertech

Weber Fibertech (www.weber-fibertech.com and www.fibitec.com), headquartered in Markdorf/Germany on Lake Constance where it also operates its production facilities, is an expert in the manufacture and development of long-fiber-reinforced thermoplastic components. For more than 25 years, Weber Fibertech has been developing and manufacturing very lightweight components with high strength, maximum stiffness, and outstanding mechanical properties. With roots in the automotive industry, the company is now revolutionizing the bicycle industry with its new technologies. The focus is primarily on water-injectionmolding technology (WIT). This technology enables the automated production of hollow, thermoplastic structural components with virtually no waste generated during manufacturing. Other core competencies of Weber Fibertech include extrusion, with or without inserts, as well as thermoforming. Thanks to years of research, the company offers the highest level of technical expertise, from feasibility studies through to series production, all from a single source.

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Sensor Technology in the Valve Pin Holder Rather Than in the Cavity

Pressure measurement directly within the hot runner system

Monitoring the pressure profile in the cavity without installing a sensor there: The patent-pending intelliGate-p technology from Männer, a SPECTRIX brand, integrates the measurement point into the valve pin holder of the hot runner system. Comparative measurements with conventional cavity pressure sensors confirm comparable measurement accuracy. The system also detects tensile forces acting on the valve pin during opening and demolding. Following successful technical testing, SPECTRIX is now seeking partners for long-term use under industrial conditions.

Whether for real-time process monitoring, automatic identification of good parts or, potentially, predictive maintenance, the cavity pressure profile provides plastics processors with valuable information about the stability and quality of the injection molding process. However, mold makers are often reluctant to install sensors and the necessary wiring. Installing conventional cavity pressure sensors involves additional work. Required installation space, additional machining, wiring, and continued sensor accessibility and functionality must all be considered. Direct contact with the melt can also leave sensor witness marks on the molded part, while high thermal loads can affect sensor service life.

Measurement directly at the gate position

In intelliGate-p, a piezoelectric sensor is located in the valve pin holder of the hot runner system. It measures the force exerted on the valve pin by the melt pressure, providing a reliable representation of the cavity pressure profile. The cavity surface remains unchanged, and no additional sensor bore is required in the cavity. Existing molds can also be retrofitted with only minor modifications.

The system combines Männer's hot runner expertise with Priamus's expertise in sensor technology and process monitoring. The development team led by Christian Estorer and Johannes Bamberger brings these capabilities together within SPECTRIX. Mold makers receive hot runner and sensor technology from a single source.

intelliGate-p is designed primarily for small to medium-sized parts produced in high volumes with short cycle times. Typical applications include multicavity molds for packaging and disposable medical products – areas in which Männer has extensive experience.

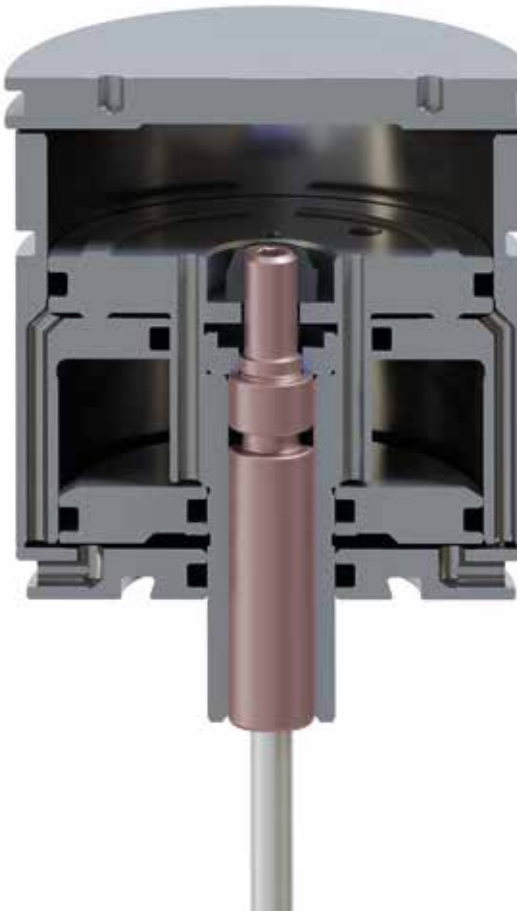
Tensile forces provide additional process information

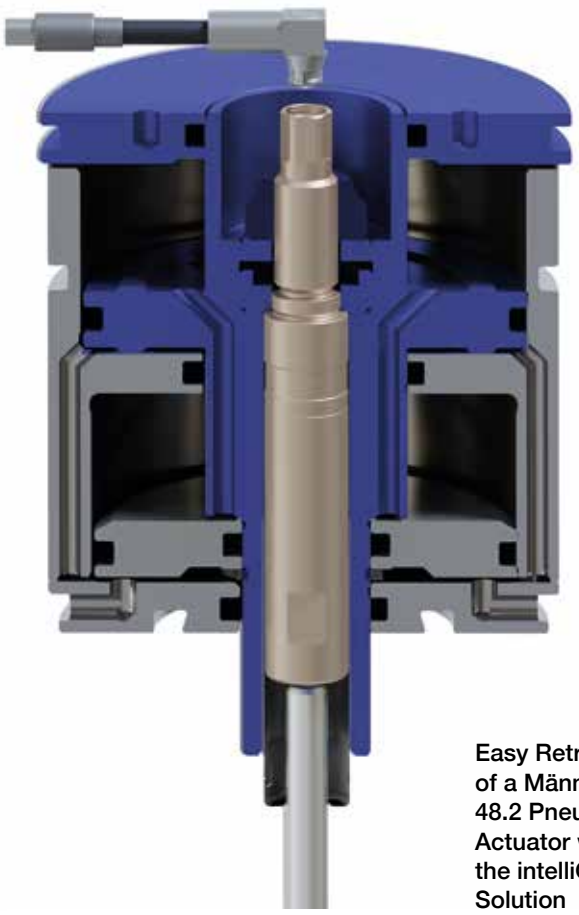
Christian Estorer, Manager Hot Runner Development R&D, sees a key advantage in the fixed measurement position: The sensor sits directly behind the valve pin at the gate position. Its installation location therefore does not need to be determined individually for each mold. Comparative measurements with conventional cavity pressure sensors confirm comparable measurement accuracy. In addition, intelliGate-p detects a negative peak when the valve pin opens, caused by tensile forces acting on the pin. These additional signals can help identify changes in the process and system condition at an early stage. Alongside the pressure profile, the system therefore provides information that conventional cavity pressure sensors do not capture in this form.

Easy retrofitting of existing systems

Retrofitting intelliGate-p is particularly straightforward in Männer Signature Line valve gate systems equipped with the PS 48.2 pneumatic actuator. The piston, piston cover, valve pin and insulation plate are replaced. The sensor, connection cable and signal pickup are then added.

Customers have several options for processing the recorded measurement data. Those using process monitoring products





Easy Retrofitting of a Männer PS 48.2 Pneumatic Actuator with the intelliGate-p Solution

such as Priamus Fillcontrol – also part of the SPECTRIX portfolio – can route the signals directly to the corresponding amplifier or first connect a Multi Channel Box, which combines signals from up to eight sensors.
intelliGate-p can also be connected to other suitable analysis and process monitoring systems, allowing flexible integration into existing production environments.

Reliably revealing relevant process changes

At high production volumes and short cycle times, even small process deviations can quickly result in large numbers of parts that do not meet specifications. intelliGate-p makes relevant changes visible and enables early intervention. The sensor is protected within the valve pin holder. The cavity surface remains unchanged, and no additional sensor wiring is required in the cavity-forming area. intelliGate-p thus combines precise process signals with a robust system architecture that is easy to integrate.
Johannes Bamberger, Team Lead Standardization, emphasizes: “The key advantage of intelliGate-p lies in the intelligent use of existing system components. Whereas conventional cavity pressure sensors must be installed directly in the cavity, modifying the cavity-forming area, intelliGate-p uses the existing valve pin as the interface for process monitoring. This allows us to rely on an established maintenance procedure, simplifying retrofitting and reducing service requirements. It makes the solution particularly robust, easy to service and durable.”

Partners sought for long-term use

intelliGate-p has successfully undergone extensive analyses and comparative measurements. Initial trials in customer-related applications have also shown positive results. SPECTRIX is now seeking application partners for long-term use under industrial conditions, in new projects or suitable existing molds. At Fakuma, interested visitors were explore the system on a demonstrator and discuss potential applications with the development team.

(Pictures: SPECTRIX)



Together they found the appropriate solution for the milling process: Stefan Minder in conversation with Christoph Götz

Specialities from the world centre

Reliable milling of tweezers

Maranello is famous for its red sports cars and Geneva is the Mecca for watch enthusiasts – but the products from Tuttlingen are usually only known to specialists. Over 400 companies produce world-renowned instruments and devices in the global centre of the medical industry. Tweezers, implants and endoscopes: the expertise in the medical industry has grown over time and is passed down from one generation to the next. The company HG-Micro-Instrumente GmbH & Co. KG from Wurmlingen, near Tuttlingen, is one of these specialists. The team, led by managing director and production manager Christoph Götz, produces forceps, ear tweezers and other medical instruments. In addition to skilled manual work, the company relies on modern CNC machining centres and tool systems. For milling tweezers, HG-Micro-Instrumente GmbH & Co. KG uses tool systems from Paul Horn GmbH and hydraulic chucks from Schunk.

"We once had a complaint because the forceps were four grams too light," jokes Christoph Götz as he talks about his experience and continues: "Almost everything is certified when it comes to surgical instruments. Even the slightest deviation from the target parameters is not acceptable, even if tweezers are made of titanium to reduce weight." Tolerances of a few microns are the order of the day in the production of medical instruments. HG-Micro-Instrumente GmbH & Co. KG produces the products on a contract basis for the big players in the medical industry according to drawings and customer requirements. 90 per



Götz machines fillets using an end mill with a solid carbide insert



No chatter marks: Despite the long overhang, the system achieves a high level of vibration damping

cent of the instruments are titanium. “We process steels such as 1.4021 into ear tweezers,” explains Götz.

Quality was not good enough

The carbide blanks for the tweezers arrive as turned parts. Götz and his team use a Hermle C22U machining centre to produce both halves of the tweezers from carbide blanks. The two halves are laser welded together in a subsequent process. “We used to buy in the halves already machined. However, the quality was no longer good enough for us. We were also inconvenienced by the long delivery times,” says Götz. The company therefore switched the production processes to complete machining. To do this, Götz looked for an appropriate tool solution. It was not just the insert that was important, but the entire system from the insert to the spindle interface. Due to the sometimes long tool overhang and the high surface finish required, the tool system must be vibration-damped to avoid chatter marks. Together with HORN applications engineer Stefan Minder, Götz found the appropriate tool solution with HORN's circular interpolation milling system. The milling system performs three important processes: milling the hollow groove, milling the gear teeth of the tweezer tip and milling the handle pattern for flat-handled tweezers. A six-edged type 632 full-radius insert is used for milling the chamfer, which serves to reduce weight. The tool has a diameter of 30 mm (1.181") and mills the 3 mm (0.118") deep chamfer in two cuts. “The tool demonstrated high milling performance right from the start. We just had to tweak the machining parameters a little here and there to achieve the best possible surface quality,” says Minder.

Cut distribution

A type 628 insert with six cutting edges is used for milling the handle pattern and the serrations of the tweezer tip. The individual insert edges are ground offset to each other. The six-edged insert therefore acts like a three-edged insert during the milling process. The advantage of this cut distribution is that fine serrations, for example, can be milled without high cutting pressure. The fine serrations must be present on the tweezer tip. In one milling pass, the 7 mm wide insert mills 17 teeth to a depth of 0.35 mm. In addition, the milled serrations must be highly precise. In use, the serrations on the two halves of the tweezers must mesh precisely. This principle of cut distribution is also used when milling the handle pattern.
The optimised cutting edge geometry in conjunction with the IG35 coating ensures high productivity and process reliability when machining titanium. With a coating thickness of just 0.003 mm (0.0001") and a maximum operating temperature of around 1,100 degrees Celsius (2,012 degrees Fahrenheit), the tool achieves on average twice the service life of conventional coatings. HORN coats the tools in-house in its own HiPIMS coating systems. In addition to high cutting performance, this enables fast delivery of the tools.

Profile for milling the handle pattern



HORN circular interpolation milling system

HORN's circular interpolation milling system offers the user a number of advantages: It is fast, reliable and achieves good surface results. The tool, which is guided on a helical path, plunges into the material either at a steep or a very shallow angle. It allows high-quality threads, for example, to be produced reproducibly. Compared to machining larger diameters with indexable inserts or smaller diameters with solid carbide milling cutters, circular milling cutters are generally more economical. They have a wide range of applications, including machining steel, special steels, titanium, aluminium and special alloys. The precision tools are particularly suitable for slot milling, helical milling, thread milling, T-slot milling, profile milling and gear milling. However, they are also highly effective in special applications such as milling sealing grooves or connecting rod machining.

Stable overall system

Götz relies on the Schunk TENDO hydraulic clamping system for securing the milling tool. TENDO has been a byword for precise clamping of shank tools for decades. Thanks to continuous further development, this pioneering clamping technology meets the constantly increasing requirements of demanding, universal precision machining. TENDO is suitable for all common shank types. The wide range of products offers the appropriate solution for almost every application. The run-out and repeatability of the clamping system is around 0.003 mm (0.0001"). The excellent vibration damping is particularly advantageous with long tool overhangs.

The combination of the insert, solid carbide tool shank and hydraulic chuck performs well in HG-Micro-Instrumente applications. “We have mastered the milling process and are very satisfied with the result. Furthermore, HORN's service and technical advice are of a very high standard,” says Götz.





(l) The tool mills 17 teeth in one pass for cutting the serrations of the tweezer tip

(r) The production of surgical tweezers is precision work (Pictures: HORN/Sauermann)

HG-Micro-Instrumente GmbH

For over three decades, HG-Micro-Instrumente GmbH & Co. KG has been dedicated to the manufacture of high-quality surgical instruments, which are 100 per cent manufactured in Wurmlingen. A family-owned company, HG-Micro-Instrumente GmbH & Co. KG focuses on high quality, flexibility and reliability in every phase of production. Its expertise lies not only in the manufacture of surgical instruments, but also in CNC contract machining, where the team develops customised solutions for its customers. The company always strives to achieve a high level of customer satisfaction and makes no compromises when fulfilling exacting production requirements.

Official dates announced for PLAST 2029

Promaplast has announced the dates of the next edition of Plast, Europe's leading trade fair of the year for the plastics and rubber industries. The 21st edition will take place from 15 to 18 May 2029 at the Fiera Milano exhibition centre in Rho.
Its return to a spring slot in the international exhibition calendar will give exhibitors and visitors an ideal moment to plan investments and showcase the sector's latest technological innovations, from processing machinery to next-generation raw materials.

Building on the success of Plast 2026

Plast 2029 builds on the legacy of an edition that exceeded cautious pre-show forecasts, against a geopolitical and macroeconomic backdrop marked by considerable uncertainty. Plast 2026 recorded 35,000 attendances, with foreign visitors from 110 countries accounting for 25% of the total, and more than 1,000 exhibitors, 44% of them international, across 40,000 square metres of exhibition space. Over 350 selected foreign delegates took part in the incoming programme organised with Agenzia ICE – Italian Trade & Investment Agency, while the conference programme was fully booked on several occasions.
"By announcing the dates of Plast 2029 now, we want to give exhibitors and visitors a clear horizon on which to build their participation. The return to May is a sign of continuity that the market has been asking for, and we are already working to make the next edition even richer in content, more international and closer to the needs of businesses", says Mario Maggiani, Managing Director of Promaplast.
"For European plastics and rubber machinery manufacturers, Plast is a strategic showcase for the markets of the Mediterranean, the Middle East and Eastern Europe", says Tobias Baur, President of Euromap, the European association of plastics and rubber machinery manufacturers. "At a time of profound transformation for the sector, amid the circular transition and global competition, exhibitions such as Plast are essential for asserting the technological leadership of European industry".
The new features of Plast 2029 will be unveiled shortly, from the opening of exhibitor registrations to the satellite shows, and from innovation initiatives to internationalisation projects.
All updates will be published on plastonline.org and on the exhibition's official social media channels.

PLAST

Plast 2029 is Europe's leading trade fair of the year for the plastics and rubber industries, taking place from 15 to 18 May 2029 at Fiera Milano, Rho. Organised by Promaplast, the exhibition is the benchmark platform for presenting plastics and rubber processing machinery and next-generation raw materials for the production of semi-finished and finished products, as well as a unique opportunity to forge new business relationships.



(Picture: Promaplast s.r.l.)

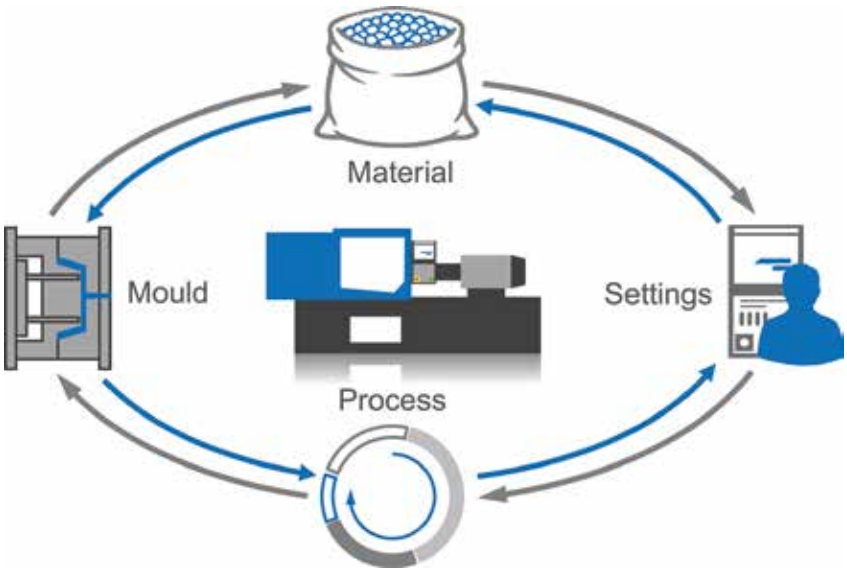
The dream of an autonomous injection moulding machine: An achievable utopia?

Author:
Lukas Niebler
Sumitomo (SHI) Demag

Injection moulding is one of the most significant manufacturing processes for producing plastic components, enabling efficient industrial-scale production of complex shapes. It also allows for consistent and precise production of parts at a low cost per unit. Therefore, injection moulding is widely used across various sectors, including the automotive, medical, packaging, and consumer goods industries. The combination of short cycle times and the cost-saving effect of high production volumes makes it the preferred method for mass-producing plastic components. [FK17, SJP22]

Focus on the economic relevance, research and industrial development have long sought to fully automate process setup and optimisation to decrease dependency on operator expertise while improving productivity and consistency. Early advances in computer simulation enabled the prediction of filling, packing, and cooling behaviour, thereby reducing the initial process setup time [Car22]. Furthermore, early mould pressure controls aimed to maintain the optimal process setups [BPM80]. In the following decades, research ranging from statistical process control to fuzzy logic and neural-network-based controllers gradually reduced the need for human intervention, hence trying to close the loop between machine parameters and the resulting part quality [HL00, CT05]. More recently, sensor integration and data persistence, along with the related increase in availability, have driven the adoption of real-time optimisation algorithms and intelligent control systems. As a result, the long-termvision of a fully automated injection moulding machine has moved closer to industrial application [ZZD+20].

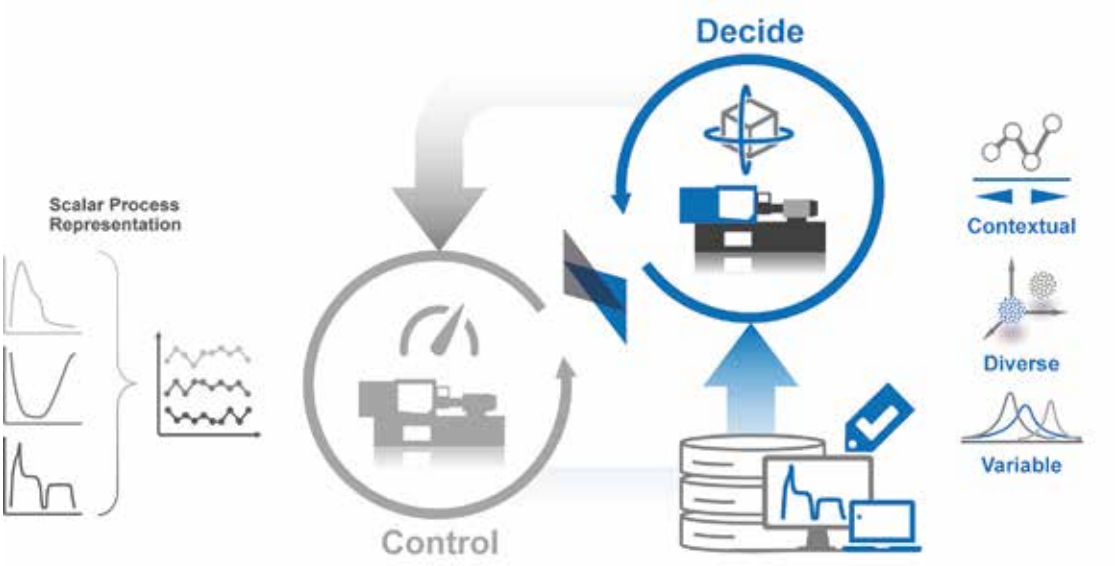
This longstanding development raises an essential question: Is the vision of a fully automated injection moulding machine a realistic possibility or still an unattainable utopia? The practicality of complete autonomy must be assessed by considering the inherent interdependencies of the injection moulding process, with tightly coupled cyclic phases of dosing, filling, packing, and demoulding, whose dynamics heavily depend on nonlinear, multi-physics interactions and are sensitive to variations in mould, machine, and material properties, as well as environmental conditions. Even minor deviations in viscosity, thermal conductivity, or mould geometry can propagate throughout the entire process, making a fully automated setup and self-optimisation a significant challenge. [CT05, ZZD+20].



1.1 Complexity and Interdependencies in Injection Moulding

Injection moulding, aside from its industrial importance, is also a convoluted manufacturing process, due to the interactions between material properties, mould geometries, and machine settings. Polymer materials show considerable variability in properties, as residual moisture, viscosity, and additive content directly influence melt flowand solidification behaviour [CT05]. Mould design sets boundary conditions to the process because the number of cavities, gating concept, cooling layout, and hot-runner system all influence dynamics, and even minor deviations can cause significant differences in part quality [PM08]. Machine parameters, such as injection speed, switchover point, and packing pressure, determine the material shear rate and, consequently, the viscosity and required filling pressure, aswell as the subsequent solidification based on the material-specific pVT behaviour. [RRR00].

Interactions between these three domains

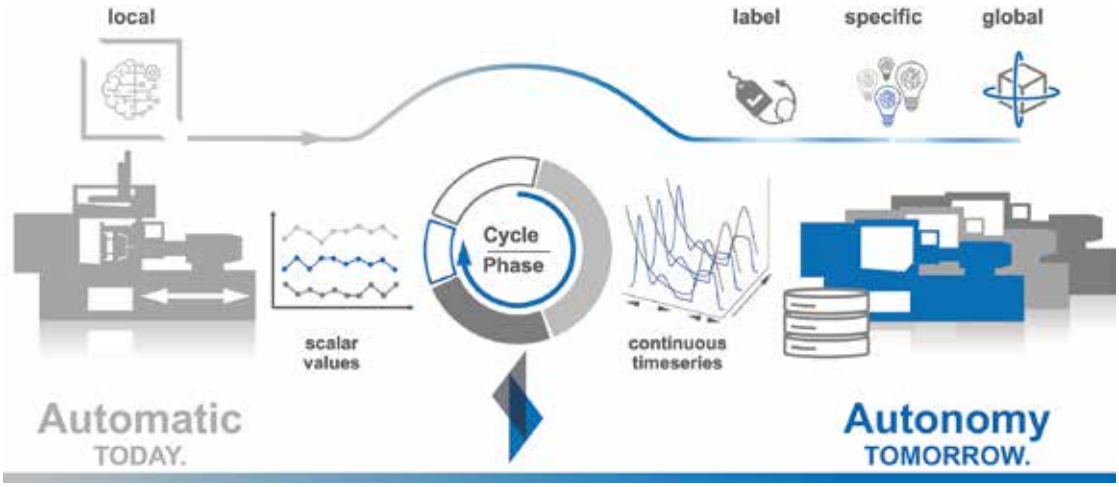


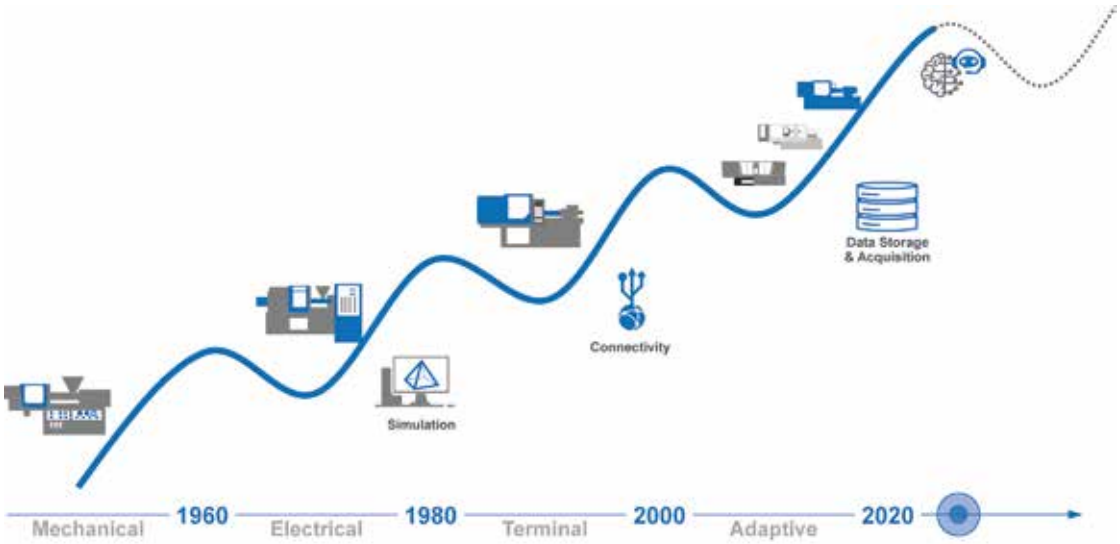
create a high-dimensional, nonlinear optimisation problem where small changes in one factor can spread and intensify throughout the system. A clear example of such interdependencies is found in viscosity, compressibility, and solidification. Melt viscosity is heavily influenced by temperature and shear rate, which affect filling patterns and pressure distribution within the cavity. The variability in viscosity, resulting from batch differences, moisture content, or additives, affects the pressure required to fill the cavity and causes deviations in the flow front velocity [CT05]. Compressibility adds further complexity as pressure deviations caused by viscosity result in different melt compressions, leading to volumetric changes during injection and affecting the density distribution during packing [RRR00]. The solidification process involves the interaction of thermal, rheological, and mechanical effects. Factors such as viscous dissipation during flow, pressure-induced densification, and mould temperature all influence the cooling rate, shrinkage, and warpage of the material. Because of this, small changes in mould temperature, design, injection pressure, or cycle timing can significantly affect the quality of the final parts. [PM08, ZZD+20].

For instance, a rising melt temperature reduces viscosity, which in turn reduces the required filling pressure, increases filling volume due to compressibility, and influences the pressure distribution. This affects cooling behaviour and, consequently, part quality. These interconnected effects demonstrate why injection moulding is a complex, multifactor challenge. As a result, experienced human operators and intuition are still essential for effectively managing these interactions. [ZZD+20].

1.2 Data Challenges: Acquisition, Storage, and Accessibility

To create a genuinely autonomous system, access to both diverse and reliable data is essential. Particularly in injection moulding, learning cannot depend solely on repeated





(Pictures: Sumitomo (SHI) Demag)

measurements from a single injection moulding process unless the goal is to automate only that specific process. Instead, data should cover a broad spectrum of materials, moulds, machine settings, and process scenarios, enabling algorithms to generalise effectively as an automated solution.

The availability of such usable data requires robust interfaces between machines, sensors, and control units, enabling the seamless collection of high-frequency process signals, such as force, torque, temperature, speed, and positions. Additionally, storage management must maintain traceability, consistency, and accessibility across batches while handling the volume and speed of the generated data. Without a direct link between individual data sets and their contextual significance, along with temporal and physical dependencies, their value would be diminished for later use. Hence, without explicit contextual annotations, the potential of the data is limited, reducing its effectiveness for future analysis and insights.

Therefore, the main practical challenges are consistent and cost-effective process tagging. Inline measurements or manual sampling methods must provide accurate indicators of part or process quality without incurring additional costs or disrupting production. Without structured, accessible, and economically viable data, even the most advanced algorithms will struggle to reliably optimise process parameters or adapt to variations across multiple processes [ZZD+20, GZZL18].

1.3 Challenges in Knowledge Transfer

Access to high-quality, diverse data remains a challenge in transferring knowledge between different process scenarios. Automation on one machine, mould, or material does not automatically apply to other production setups. The complex and interconnected nature of injection moulding parameters means that even small changes, such as in material batches, mould geometry, or ambient conditions, can significantly impact the results.

The limited availability of comprehensive datasets across various production conditions intensifies this issue. Many automated methods rely on controlled experiments or narrow process windows, which provide valuable but non-generalizable insights. Consequently, human expertise remains essential for interpreting results and adjusting parameters in new situations. Overcoming these challenges requires knowledge transfer strategies, such as model adaptation, transfer learning, or meta-learning, which can leverage prior experience while adapting to variations in materials, moulds, and machine setups [ZZD+20, GZZL18]. Without these capabilities, fully autonomous process setup and optimisation remain ambitious.

1.4 Targeting the Utopia

The concept of a fully autonomous injection moulding machine remains neither uniformly defined nor conclusively established. As a result, systems that operate within a limited, predefined, and adapted process window are often presented under this terminology, even if their operational scope is limited. Recent technological developments have led to highly automated production cells that reduce the degree of human intervention, hence these applications only function within narrowly trained process conditions. Consequently, promotional claims of “full autonomy” must be interpreted with caution,

as the underlying systems may fall short on the implied terminology.

Achieving autonomy in injection moulding requires more than parameter optimisation within a fixed operational scope. Instead, it depends on the ability to integrate detailed, high-resolution process data with specific modelling approaches while continuously learning from previous production runs. A robust data infrastructure capable of capturing high-frequency signals and relevant contextual information is essential, as it forms the basis for reliable adaptation, decision-making, and optimisation. Tools like myASSIST facilitate cycle based data recording as a traceable set. Segmenting the cycle into distinct phases allows targeted models to evaluate and predict specific behaviour, generating aggregated indicators that can be interpreted by higher-level models. These aggregated insights offer a mechanism through which the entire injection moulding process may be regulated, providing a potential foundation for more sophisticated autonomous control strategies. Moreover, systematic process analysis facilitates the identification of anomalies, drifts, and step responses, enabling differentiation between random fluctuations and genuine process deviations. When combined with contextual metadata, such insights support causal interpretation, guide model retraining, and enable incremental refinement of control structures over time. In this way, the integration of contextual data, phase-specific models, and accumulated knowledge from previous runs offers a practical route towards increasingly self-optimising and autonomous injection moulding systems. Although the claim of a fully autonomous injection moulding machine may still be more aspirational than implemented, the progressive convergence of data availability, modelling techniques, and adaptive control architectures suggests that the long-standing vision is steadily approaching feasibility.

References

[BPM80] Bongardt, W.; Pleßmann, K.; Menges, G.: Systemtechnisches Gesamtkonzept der selbsteinstellenden Spritzgießm. PDV-Berichte KfK-PDV 187. Karlsruhe: KfK, 1980

[Car22] Cardozo, D.: A brief history of the filling simulation of injection moulding. Journal of Mechanical Engineering Science 223 (2022) 3, p. 711–721

[CT05] Chen, Z.; Turng, L.-S.: A review of current developments in process and quality control for injection molding. Advances in Polymer Technology 24 (2005) 3, p. 165-182

[FK17] Franchetti, M.; Kress, C.: An economic analysis comparing the cost feasibility of replacing injection molding processes with emerging additive manufacturing techniques. The International Journal of Advanced Manufacturing Technology 5 (2017), p. 2573–2579

[GZZL18] Gao, H.; Zhang,Y.; Zhou, X.; Li, D.: Intelligent methods for the process parameter determination of plastic injection molding. Frontiers of Mechanical Engineering 13 (2018), p. 85-95

[HL00] Huang, S.-J.; Lee, T.-H.: Fuzzy logic controller for a retrofitted closed-loop injection moulding machine. Journal of Systems and Control Engineering 214 (2000) 1, p. 9–22

[PM08] Prötsch, G.; Michaeli, W.: Injection Molding: An Introduction. Munich: Carl Hanser Verlag GmbH & Co. KG, 2008

[RRR00] Rosato, D.; Rosato, D. V.; Rosato, M. G.: The Complete Injection Molding Process. New York: Springer Verlag, 2000

[SJP22] Singh, D.; Joshi, K.; Patil, B.: Comparative Economic Analysis of Injection-Moulded Component with Conventional and Conformal Cooling Channels. Comparative Economic Analysis of Injection-Moulded Component with Conventional and Conformal Cooling Channels 103 (2022), p. 307–317

[ZZD+20] Zhao, P.; Zhang, J.; Dong, Z.; Huang, J.; Zhou, H.; Fu, J.; Turng, L.-S.: Intelligent Injection Molding on Sensing, Optimization, and Control. Advances in Polymer Technology 2020 (2020) 1, p. 7023616

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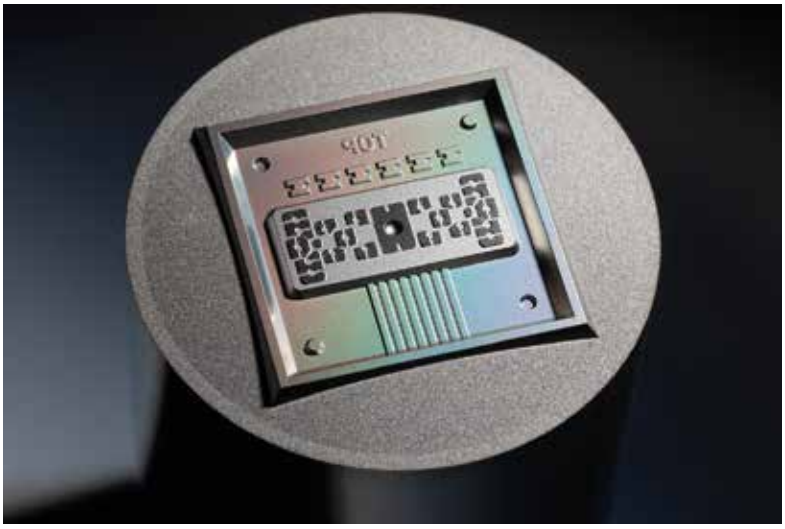
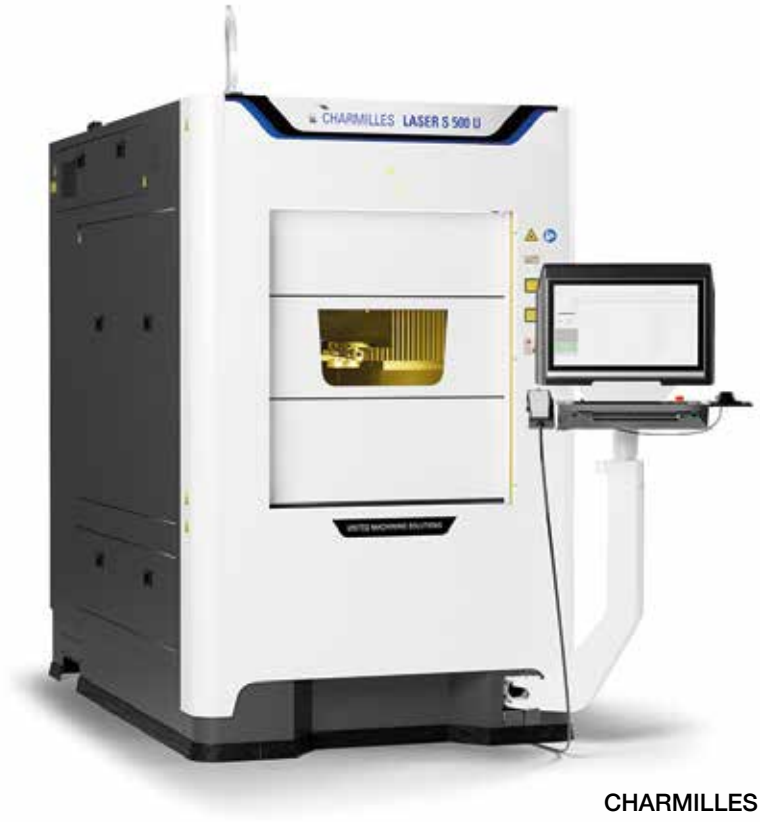
Creating complex 3D geometries and fine details using laser machining

At AMB 2026 in Stuttgart, CHARMILLES demonstrated the breadth of high-precision Laser manufacturing, from complex femtosecond micro-machining and award-winning 3DShaping to watch decoration and functional texturing for medical implants. At the center of the showcase is the CHARMILLES LASER S 500 U.





CHARMILLES LASER S 500 U

Simplifying complex manufacturing

High-precision manufacturers increasingly face complex 3D geometries, extremely small fea-tures and tight tolerances in materials that are difficult to machine. Conventional methods can require multiple process steps, dedicated cutting tools and extensive electrode prepara-tion, adding complexity and lead time.

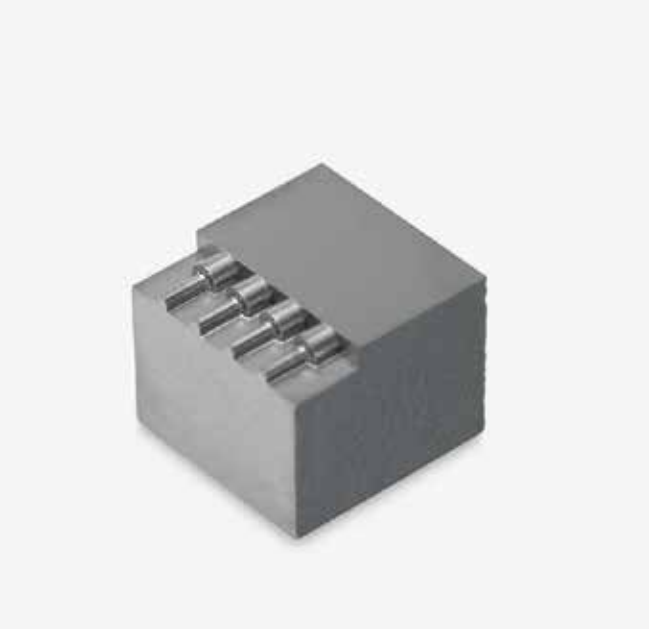
Direct Laser machining provides a simpler, tool- and electrode-free alternative. Femtosecond Laser technology can process a wide range of materials – including extremely hard materi-als – while enabling geometries and microscopic features that are difficult to achieve with conventional methods.

At AMB, CHARMILLES demonstrated these capabilities with a progressive stamping die for optical connectors machined in tungsten carbide, combining deep profiles, progressive draft angles, undercuts and difficult-to-access features. On this application, the five-axis LA-SER S 500 U achieves a surface finish of Ra 0.26 µm and 3D profile accuracy of ±10 µm.

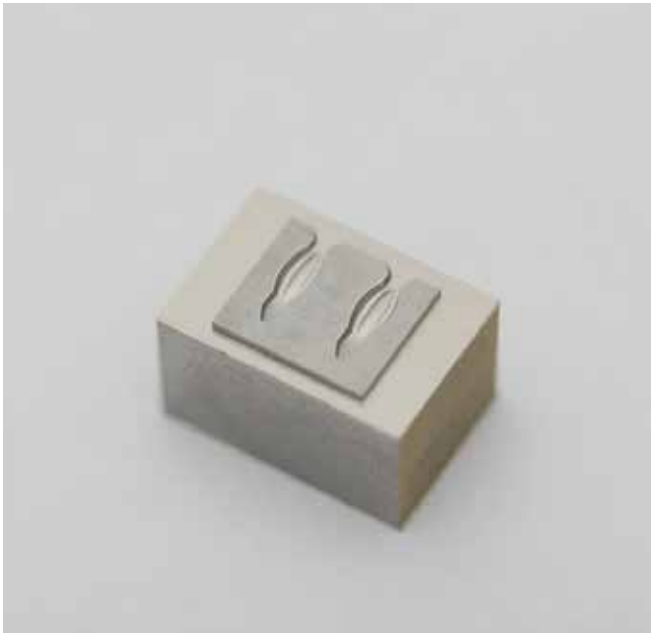
Further micromold and microtooling applications will illustrate how Direct Laser machining can produce fine details and complex 3D geometries while reducing production steps.

LASER S 500 U: one platform, multiple Laser applications

At the heart of the showcase was the CHARMILLES LASER S 500 U, a high-precision plat-form available in three- or five-axis configurations with Laser sources ranging from nanosecond to femtosecond. Its fully thermoregulated architecture maintains accuracy and repeatability throughout long machining cycles, while linear and torque motors and a high-speed 3D scanner provide



A progressive stamping die for optical connectors



Carbide die for press-fit connectors

the dynamics required for demanding Laser applications.
Combined with LaserSUITE360 and the proprietary 3DShaping strategy within LaserCAM™, the LASER S 500 U addresses a long-standing limitation of Laser ablation: machining complex 3D forms with vertical walls. Among the applications on display, the “part micron” demonstrates this capability through full taper control on a complex tungsten-carbide geometry.

Award-winning 3DShaping for precision microtooling

Visitors also saw 3DShaping demonstrated on a tungsten carbide press-fit connector die that contributed to CHARMILLES receiving the CECIMO Green Impact Award at EMO Han-nover 2025.
The application achieves ±5 µm profile accuracy and a surface finish below Ra 0.4 µm, with a machining time of approximately 1.5 hours. CECIMO recognized the LASER S 500 U and 3DShaping combination for delivering precision through an oil-free, electrode-free and en-ergy-efficient process, reducing consumables and production steps.

From watch decoration to functional medical surfaces

Beyond micromachining, CHARMILLES will demonstrate the versatility of the LASER S 500 U for decorative and functional surface processing.
For watchmaking, applications on brass and stainless-steel combine Laser engraving, brush-ing and finishing strategies to create complex decorative effects on 3D surfaces, with pattern continuity and multiple finishes achievable in a single setup.
For medical manufacturing, a stainless-steel hip implant demonstrates Laser blasting as an alternative to grit blasting. The digital process eliminates manual masking and blasting media while enabling multiple surface textures to be applied with precision in a single setup.
Together, these applications show how one Laser platform can address applications ranging from micron-scale geometries and precision tooling to decorative and functional surfaces.

(Pictures: CHARMILLES)



Machine tool manufacturer bavius technologie relies on tools from ISCAR

Milling a deep V-shaped pocket in an aluminum block



Machine manufacturer bavius technologie conducted a test cut under real conditions to convince a customer that even long overhanging tools run smoothly on the machine with the smaller HSK tool holder. An important part of the test was to get the right tools. With a tool set for roughing and finishing from ISCAR, the test exceeded all expectations.

The AeroCell 160 I 400 from bavius has a high-performance spindle that runs at up to 30,000 revolutions per minute and delivers 140 kilowatts of power in continuous operation

bavius technologie, based in Baienfurt, Germany has been operating since 2017 as an independent, family-owned company with around 120 employees in the development and production of high-speed CNC systems for high-volume aluminum machining. bavius focuses on two product lines: PBZ profile machining centers and HBZ horizontal machining centers with the AeroCell series.

Wanted: dynamic machine

"An American company in the aerospace industry was looking for a system that offered high removal rates, dynamics, and availability while also delivering high machining quality for the production of large aluminum structural components," explains Dominik Merz, Director of Global Sales | Applications at bavius. "A perfect task for our HBZ AeroCell 160 I 400." The machine has a high-performance spindle that runs at up to 30,000 revolutions per minute and delivers 140 kilowatts of power in continuous operation (S1 mode). In S6 mode, power outputs of up to 175 kilowatts are available for short periods. "Since the 140 kilowatts are already available at 19,000 revolutions per minute, high power outputs can be achieved even in the medium speed range, which offers a number of advantages," explains Dominik Merz.

Only the HSK-A63/80 tool holder used as standard by bavius caused concern for the US customer. Based on experience and for



The horizontal machining center with the bavius bmh 3 fork milling head is designed for high-volume aluminum machining and reliably inserted the pocket in just three hours



In order to convince a customer, a V-shaped bag was created during a test, modeled on original parts from the aviation industry

HELIALU

HELIALU is ISCAR's high-performance milling cutter for aluminum machining. ISCAR designed its double-edged, rhombic indexable inserts for shoulder, full groove, and face milling at extremely high speeds. The milling cutter is equipped with pinpointed JHP cooling. This allows deep pockets and shoulders to be roughened and pre-finished. The precise, pinpointed cooling of each individual cutting edge increases the surface quality and produces compact chips with less chip entanglement. The user benefits from high process reliability thanks to optimal chip removal and a long tool life. Significantly fewer built-up edges form, and improved cutting parameters increase efficiency.

stability reasons, he preferred a larger one. However, this would have significantly limited the available machining capacity of the system. "In order to be able to run at 30,000 rpm, the AeroCell 160 is equipped with an HSK 63/80 tool holder, which, thanks to its larger contact surfaces, provides the necessary stability to the tool even with long overhangs," explains Stefan Diem, application engineer at bavius. "With a HSK100 holder, on the other hand, only 20,000 rpm would have been achievable. That was not an option for bavius at first and would have limited the advantages of the machine." Dominik Merz adds: "Above all, 70 to 80 percent of the machining of such parts, which often takes several hours, is carried out with short tools. In production, it quickly becomes apparent whether the user can utilize the full speed and full power."

The bavius team agreed with the customer to conduct a live test run under real conditions at bavius in Baienfurt, Germany to demonstrate that the smaller holder also offers the necessary stability for long tools. The plan was the following: a 170 × 626 millimeter and 260 millimeter deep V-shaped pocket, as typically found in structural components for aviation, was to be cut into a 600 × 780 × 500 millimeter block of EN-AW 7012 (AlZn6Mg2Cu) aluminum- wrought alloy.

Customized solution

"We contacted our longtime partner ISCAR to put together the optimal tool package for roughing and finishing," explains Stefan Diem. Michele Piccolantonio, Equipment Projects Consulting and Sales, Calogero La Quatra, Product Specialist Multi Master, Solid Carbide and PCD Tools, and Anton Kress, Product Specialist Milling, were briefed on the task



With ISCAR's HELIALU monoblock tool, up to 148 kilowatts could be drawn from the spindle in S6 operation

and, together with the bavius team, put together a set precisely tailored to the task and the material.

"Aluminum can generally be machined quickly and easily, but it still has its peculiarities," says Anton Kress. Highly positive systems with very sharp polished cutting edges are required here to prevent chips from sticking to the cutting edge and surface, ensuring reliable operation. This also results in lower cutting forces during machining. This offers enormous advantages when using long tools and significantly reduces deflection and vibrations.

"Important selection criteria therefore included the use of soft-cutting standard tools that support the machine's high dynamics,



Even with tool lengths of up to 357 millimeters, the processes ran reliably and vibration-free



Using MegaAlu solid carbide milling cutters in lengths from 5xD to 8xD, bavius reduced the corner radii and rough-milled the pocket to its final depth of 260 millimeters

MegaAlu

The solid carbide milling cutters in the MegaAlu family enable very high metal removal rates and top surface qualities while reducing throughput times. The three-flute milling cutters have an unequal pitch. This makes them chatter-free and reduces noise. Highly polished flutes reduce built-up edge formation and increase tool life. Asymmetrical chip breakers in combination with a defined helix ensure perfect control during chip evacuation. A central coolant hole ensures optimum chip removal and excellent temperature control, even in deep cavities.





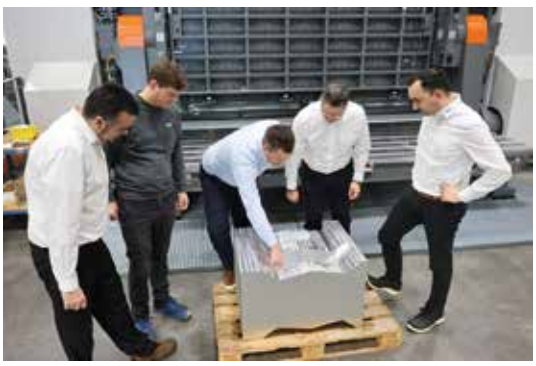
During finishing, interchangeable solid carbide ball nose and barrel heads from ISCAR's MULTI-MASTER family with tool lengths between 155 and 293 millimeters ensured high surface qualities

allow high speeds, and run reliably in order to maintain high plant availability," says Michele Piccolantonio. "In addition, very high removal rates should be possible during roughing – keyword: high-volume machining – and top surface qualities during finishing," adds Anton Kress.

The result was a tool set with milling cutters from the HELIALU, MegaAlu, and MULTI-MASTER families.

Roughing a large amount of material quickly

HELIALU milling cutters with targeted JHP cooling and a diameter of 50 millimeters were used to remove large quantities of material in a short time. For roughing the surface contour and the first part of the pocket, the milling cutter was designed as a 110-millimeter-long monoblock tool equipped with four indexable inserts with two helical cutting edges. The circumferentially ground, 22-millimeter-long, sharp cutting edges with a highly positive rake angle and polished rake faces cut smoothly and ensure excellent chip flow. "This allowed us to rough at a spindle speed of 25,400 rpm and draw up to 148 kilowatts at the spindle," says Stefan Diem happily. "At a feed rate of 25,400 millimeters per minute and a cutting depth of 16.5 millimeters, we were able to remove up to 14.5 liters of material per minute." Bavius used HELIALU face mills in lengths of 157, 207, and 257 millimeters equipped with 14mm long inserts – with speeds of up to 28,000 rpm, a power output of up to 65 kilowatts, and feed rates of up to 16,500 millimeters per minute.



Reviewing the test results (from left): Anton Kress, Milling Product Specialist at ISCAR, Stefan Diem, Application Engineer, Dominik Merz, Director Global Sales | Applications, both bavius, Michele Piccolantonio, Equipment Projects Consulting and Sales, and Calogero La Quatra, Product Specialist Multi Master, Solid Carbide and PCD Tools, both ISCAR

"It was really impressive to see how the machine whizzed through the material," says Dominik Merz.

Using four three-edged MegaAlu solid carbide endmills with a diameter of 25 millimeters and lengths ranging from 5xD to 8xD, bavius reduced the corner radii from R50 and R25 to R12.5 and premachined the pocket to its final depth of 260 millimeters. "We also use the only exceptions to the standard for this. The two endmills in 7xD and 8xD are special tools," says Calogero La Quatra. "A particular advantage of these three-edged aluminum specialists is that they have an unequal pitch and, thanks to their special cutting geometry, the process is virtually chatter-free even with such high overhangs."

Top surface quality thanks to MULTI-MASTER milling cutters

However, manufacturing aerospace components is not just about removing large amounts of material quickly. High-quality surfaces are equally important. This makes finishing a crucial process. The test used screw-on solid carbide ball nose and barrel heads from ISCAR's MULTI-MASTER family with tool lengths between 155 and 293 millimeters. With spindle speeds between 21,000 and 27,000 revolutions per minute, fine, burr-free surfaces with rough depths of 6.5 micrometers were created on the bottom and walls of the pocket within a few minutes.

A three-edged EBA ball-nose cutter with a diameter of 16 millimeters and an 8-millimeter radius was used to finish the bottom of the pocket. Mounted on a 200-millimeter shank, the tool measures 280 millimeters. To finish the larger sides of the pocket, bavius used the barrel-shaped EOBA cutter with a diameter of 16 millimeters, four cutting edges, and a 75 millimeter profile radius on the 200-millimeter shank. "This barrel cutter finishes up to nine times faster than a comparable ball-nose cutter. This is because the radius serves as a mathematical factor and, accordingly, the steps can be increased axially by a multiple,"



Discussing the final details of the test (from left): Anton Kress, milling product specialist at ISCAR, Stefan Diem, application engineer, Dominik Merz, Director Global Sales | Applications, both bavius

explains Calogero La Quatra. “And this is achieved at low speeds and independently of cutting parameters.”

Test results exceed expectations

In just three hours, around 70 kilograms of material had been removed and the pocket had been milled into the block reliably and to the required quality. “The combination of a dynamic, powerful system and the right tool ensure shorter processing times and significantly increases productivity,” says Stefan Diem, summarizing the result. “And as predicted, even the long overhanging tools ran absolutely stably and vibration-free with the HSK63/80 holder.” The mechanical engineers took this stability test to the extreme with a 357-millimeter-long HELIALU face mill with a diameter of 50 millimeters: In addition to the V-pocket, they milled another cavity into the aluminum block with a feed rate of 8,100 millimeters per minute and a spindle speed of 18,000 rpm in a process-reliable manner. “The test run exceeded all expectations. The customer was completely convinced and so enthusiastic that he would have liked to take the machine with him right away,” says Dominik Merz. “Thanks to the combination of our dynamic AeroCell and ISCAR's innovative tools, we were able to offer him an efficient solution.”



Michele Piccolantonio, Equipment Projects Consulting and Sales, and Calogero La Quatra, Product Specialist Multi Master, Solid Carbide, and PCD Tools, both ISCAR, are impressed by the fine, burr-free surface



Designed the tool catalog for the test together (from left): Anton Kress, Milling Product Specialist, Calogero La Quatra, Multi Master, Solid Carbide, and PCD Tools Product Specialist, Michele Piccolantonio, Equipment Projects Consulting and Sales, all from ISCAR, Application Engineer Stefan Diem, and Dominik Merz, Director of Global Sales | Applications, both from bavius

MULTI-MASTER

The interchangeable, barrel-shaped MM EOBA solid carbide heads for 3D profile milling of aluminum achieve excellent surface qualities during (pre-)finishing and enable processes to be up to nine times faster. The uncoated heads have four sharp cutting edges and are available in nominal diameters from 8 to 16 millimeters. The EBA solid carbide ball nose cutters have three sharp cutting edges and are designed for roughing and finishing ISO N materials. Manufactured in uncoated, wear-resistant IC08 substrate, they achieve long tool life, and their adapted cutting edge geometry allows high surface qualities.



“The combination of a dynamic, powerful machine and the right tool ensures shorter machining times and significantly increases productivity. And as predicted, even the long overhanging tools ran absolutely stable and vibration-free with the 63 mount,” says Stefan Diem, application engineer at bavius



“The test run exceeded all expectations. The customer was completely convinced and so enthusiastic that he would have loved to take the machine home with him right away,” says Dominik Merz, Director of Global Sales | Applications at bavius

(Pictures: ISCAR)



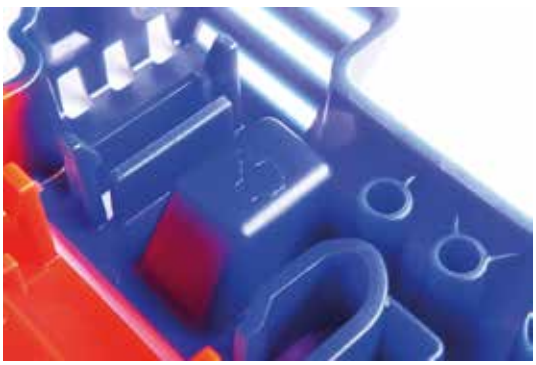
Alongside the classic two-color Polyman, which illustrates the fundamentals of injection-molded part design in combination with its accompanying Z-card, the green foamed Polyman demonstrates the benefits of foaming technology

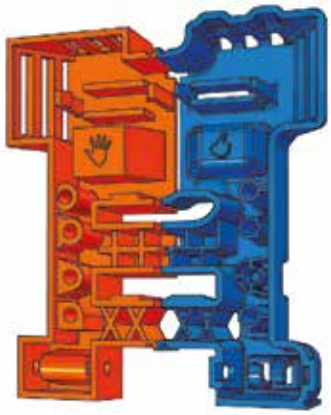
Ten years of Polyman: The success story of a teaching tool

A small plastic part with a big impact is turning ten: the Polyman. Through hands-on experience, this component conveys essential knowledge of mold making and injection molding. Today, it has become indispensable to many educational institutions and companies.

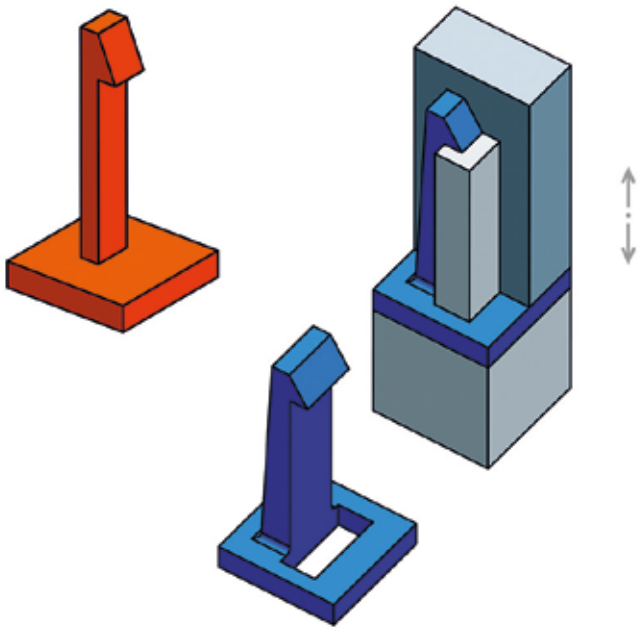








A timeless teaching tool and communication aid: On the bad side, draft angles are missing, wall thicknesses are uneven, the part is warped, and sink marks are present. The good side, by contrast, shows how good design can reduce the number of slides needed. Its design requires 23 percent less material. If the Polyman were manufactured without the bad side, tooling costs would be 30 percent lower



The details of the Polyman illustrate the principles of design for injection molding through a comparison of the good and bad sides. For example, the good side (blue) of this snap-fit hook has no undercuts, while the bad side (orange) requires a slide in the mold for demolding

The Polyman fits in the palm of your hand and provides a clear, at-a-glance illustration of key aspects of injection molding and mold design. The teaching tool was developed ten years ago and has since become well established among instructors and experts.

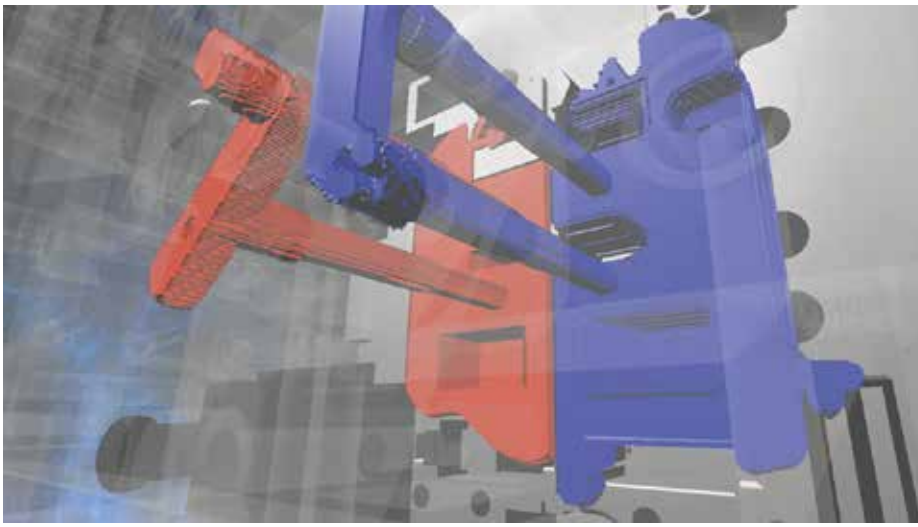
The idea originated with Prof. Steffen Ritter of Reutlingen University, who also spearheaded and coordinated the project. The VDWF brought it to fruition in collaboration with several partners from the industry and the wider association network. The two-component polyethylene part reveals what matters through direct comparison: On the bad side (orange), draft angles are missing, wall thicknesses are uneven, the part is warped, and sink marks are present. The good side shows what good design looks like: how a high-quality component should be engineered, how a mold can be built using a small number of simple components, and how functional features can be incorporated into a plastic product in a technically sound way. Defects can thus be seen and felt on one half of the Polyman, while the other incorporates possible solutions to the design challenges.



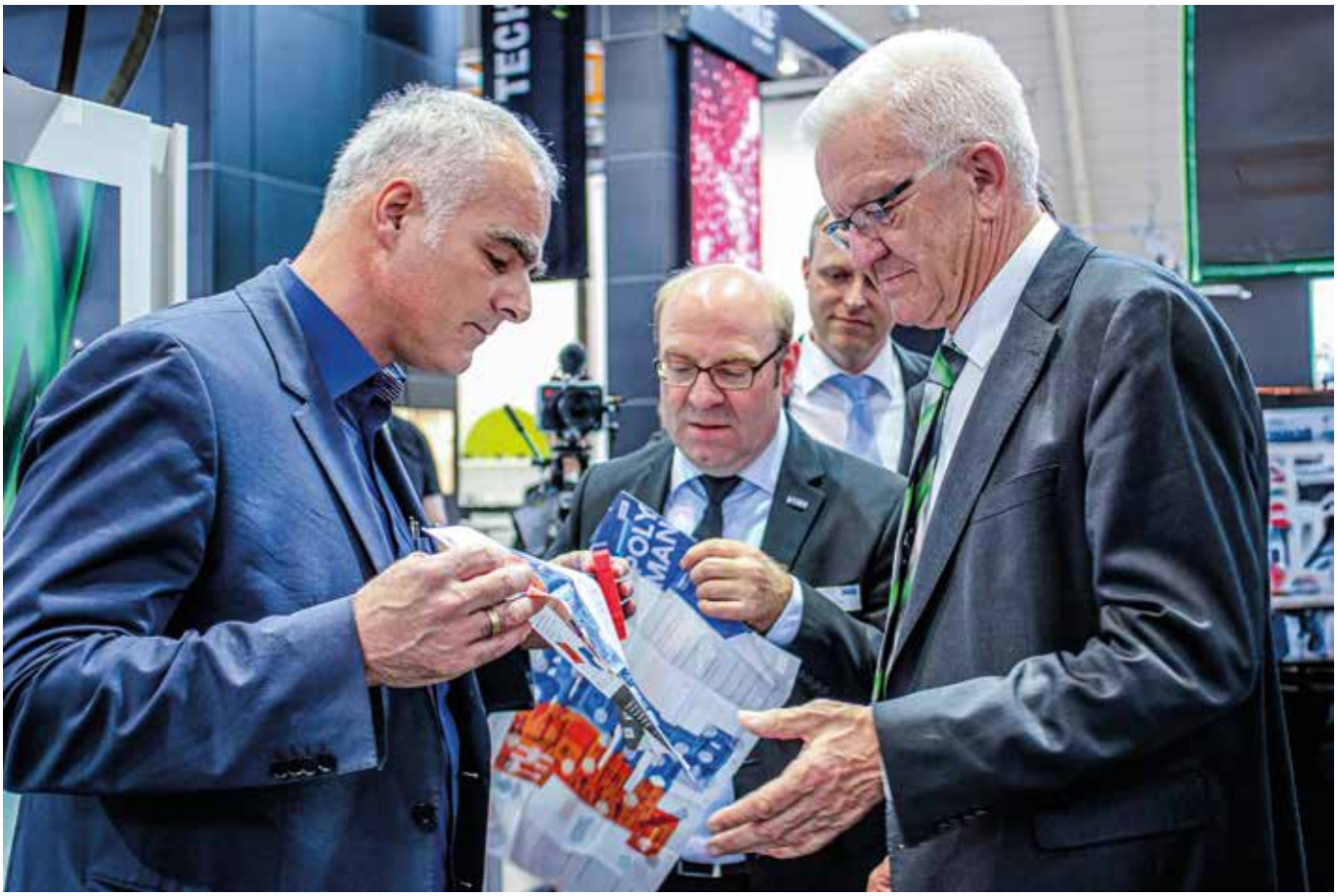
A decade-long favorite

Even after ten years, Ritter is convinced that this compact teaching part remains as relevant as ever: “The Polyman is timeless. Time and again, it helps apprentices, students, and other industry newcomers to get started with mold making and plastic injection molding. It provides a practical example for explaining the fundamental principles of design for injection molding.”

The Polyman made its debut at Moulding Expo 2017, where it was produced live at the VDWF joint booth. After the trade show, Schmalkalden University of Applied Sciences



The virtual reality application allows users wearing a VR headset to step inside the transparent Polyman mold, where they can control the mold-filling process themselves and observe it from every angle. This immersive experience brings the dos and don'ts of mold design for the specific part and plastic material to life



The Polyman was unveiled to the public at Moulding Expo 2017. Here, Prof. Steffen Ritter (left) and VDWF President Prof. Thomas Seul (center) explain its benefits to Winfried Kretschmann, then Minister-President of Baden-Württemberg (Pictures: VDWF)

manufactured all subsequent units. Ritter is pleased that around 40,000 units have now been distributed across the industry. "The great advantage of the Polyman is that people can actually hold it in their hands. This makes it much easier to convey knowledge than a presentation alone, however well it is done," says the plastics expert. "Here, people can literally grasp the concept with their hands, which makes it easier to understand and remember."

This tangible, visual approach has made the Polyman a versatile teaching aid. Time and again, it proves to be the perfect hands-on tutorial, including for the many companies that have since discovered how effectively the two-color part conveys technical knowledge across the industry. Even experienced designers value the Polyman as a communication tool, for example to explain specific design principles to their teams or refresh their memory. A unit is often kept in the conference room, ready to serve as a visual aid in client meetings whenever needed. "The Polyman serves as a communication tool that makes many things easier: Instead of discussing draft angles or wall thicknesses abstractly, you can simply show them," says Ritter. The accompanying foldout brochure also helps by highlighting individual details of the Polyman and using them to explain essential principles of design for injection molding.

The Polyman family

Since its debut ten years ago, the original model has been complemented by a green, foamed version and a virtual reality application. With the latter, users put on a VR headset and step inside the transparent Polyman mold, where they can control the melt filling process themselves and view it from any angle they choose. This gives them a firsthand look at the dos and don'ts of mold design tailored to the part and the plastic material.

The Polyman has now become an integral part of training in the tool and mold making industry. "I'm proud to have helped develop a resource that is both timeless and aesthetically pleasing, one that helps people learn faster through clear, vivid visualization," says Ritter. "The Polyman is a true asset to our field."

Mould monitoring with coordinated sensor technology

Smart injection moulds require reliable sensor technology to monitor processes reliably and optimise production processes. Meusburger offers a wide range of electrical components for mould making, from proximity and limit switches, magnetic proximity sensors and thermocouples, through to cavity pressure sensors. Matching cable systems, push-in connections and logic distributors enable the components to be integrated and aligned.

Large selection, fast availability

A wide range of sensors, cables, push-in connections and logic distributors for a wide variety of temperature range are all available at Meusburger from stock. This ensures maximum planning reliability, supports the rapid realisation of new projects and reduces downtime when spare parts are required. Plug & Play compatible system solutions minimise wiring effort and decrease the risk of connection errors. Clear connection options also simplify the design, commissioning and maintenance of moulds. This allows the sensor technology to be integrated efficiently into existing and new mould designs.

Sensors for end positions and other positions

Limit switches and inductive sensors enable the reliable monitoring of moving mould components. Mechanical limit switches are activated by direct contact, whilst inductive sensors detect metallic items without making contact. This means they operate without wear and ensure reliable position sensing. Positioning errors can be detected at an early stage, and automated mould operation can be reliably monitored.

Monitor temperature accurately

A constant mould temperature is essential for stable processes and consistent component quality. The thermocouples from Meusburger operate on the thermal sensor principle and comply with accuracy class 1. They provide reliable measured values even under demanding conditions and enable precise temperature monitoring. Depending on the design, the sensors have temperature resistance up to 400 °C. This enables controlled mould temperature regulation, contributing to consistent processes and a consistently high level of component quality.

Cavity pressure as a key process parameter

Cavity pressure also provides relevant information for process monitoring in injection moulding. Pressure sensors make it possible to record pressure trends and thus monitor process stability and the quality of the manufactured items. Meusburger offers versions for direct and indirect measurement, as well as suitable connection technology. CAD data including installation spaces is available digitally for the design process.

Matching connection components

Various types of logic distributors bundle signals, simplify machine connection, reduce the installation effort and ensure reliable signal transmission. This results in a fully aligned solution – from the sensor technology in the mould right through to the connection on the injection moulding machine.
With its range of products designed specifically for mould making, Meusburger supports the reliable monitoring of position, temperature and cavity pressure. More information on the range is available in the Meusburger portal:
www.meusburger.com/mould-monitoring



Limit switches and inductive sensors enable the reliable monitoring of end positions and the positions of moving mould components (Picture: Meusburger)

NeoMill-Diamond-FlyCutter for clean surfaces

Plastics machining for chip manufacturing

The core business of M-O-T Mikro- und Oberflächentechnik GmbH in Saarbrücken is the provision of equipment for manufacturing microchips. In their endeavour to manufacture as many of the required plastic components as possible in house, the company has made great progress using the MAPAL NeoMill-Diamond-FlyCutter.

Established in 2001, M-O-T Mikro- und Oberflächentechnik GmbH has been a part of the Woll Group since 2011. M-O-T complements the versatile range of the custom machine manufacturer by producing wet chemical process systems for the microsystem and semiconductor sectors. With a workforce of around 30 employees, this specialist company is fully integrated into the group, which is also evident with regard to its premises: M-O-T works out of three rooms in the middle of one of Woll's manufacturing halls.

In this area, a number of things are different from the general production process, which is predominantly focused on metalworking. It is not permitted to wear outdoor shoes, and there is a slight yet constant atmosphere of overpressure. Although manufacturing does not take place in a cleanroom, it is carried out in a controlled environment with elevated cleanliness standards, as explained by production manager Mike Jakob. Contaminants that enter the space could change readings in the high-precision equipment and therefore jeopardise the process. When working at the customers' premises, operations will subsequently take place in cleanrooms.

With the exception of the built-in electronics, the systems are almost completely made from plastic and designed in a modular fashion so that the necessary individual process steps can be accommodated in sequence during semiconductor manufacturing. Process cells are arranged in rows on the front side; silicon wafers are inserted into these for machining. Storage tanks are located behind the machine. They hold the liquids that are needed – mostly acids, bases and solvents. It is also possible to perform electroplating if necessary. Depending on the specific application, surface treatment is performed using M-O-T's custom-designed systems, either before or after the wafers have been exposed. By using off-the-shelf components, it is also possible to directly integrate photolithography into the system.



Production Manager Mike Jakob demonstrates how work is performed in the system's process cells



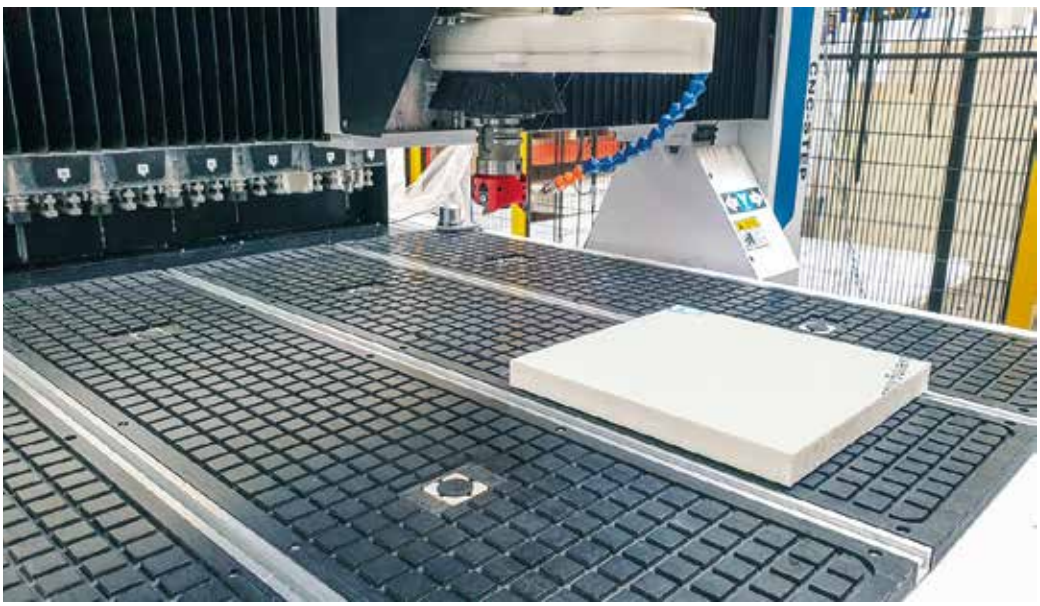
MAPAL's lightweight HSC NeoMill-Diamond-FlyCutter milling cutter is perfectly suited for machining the surfaces of plastic parts clamped by M-O-T on a vacuum table using a BT30 connection

Plastics for various applications

In order to manufacture the containers for the processing and storage of chemicals, M-O-T primarily uses sheets that are welded together using a thermal joining process. A number of different plastics are used for this purpose, the choice of which depends on the specific chemicals and the process temperature. The usual choice is PP or PVC, but in some cases it is also necessary to use PEEK, which is resistant to high temperatures, or fully acid-resistant PVDF. If a combination of different extreme requirements is needed, the best choice is often PTFE (also known as Teflon).

The number of systems constructed has increased greatly in recent years. In 2021, the figure was five or six per year, but M-O-T now supplies 20 to 30 of them. Fluctuations depending on market conditions do exist, and these in turn are the result of developments in the global semiconductor market. Furthermore, the equipment is becoming more complex. Manufacturing initially relied on suppliers most of the time. The fact that M-O-T has been relying on in-house production since 2022 is also linked to quality issues experienced with parts supplied by external suppliers: there were repeated instances of leakages in finished systems.

The way in which M-O-T processes its plastic sheets may at first seem to be rather unusual: the machine originates from the model-making sector, the tool was developed for milling aluminium, and a disinfectant is used as the cooling lubricant. For the purposes of this system engineering firm in Saarbrücken, however, this non-traditional combination proved to be very effective.



M-O-T can use a vacuum to clamp components with dimensions of up to 1,000 x 1,000 mm onto the machine's worktable. MAPAL's NeoMill-Diamond-FlyCutter provides low cutting pressure and is perfectly suited for milling sheets



Group photo at the machine: (front row, from left to right) Robin Kollmann, M-O-T milling, Mike Jakob, M-O-T Production Lead, (back row, from left to right) Jan Schattschneider, Milling & Production Center M-O-T, Klaus-Dieter Leick, MAPAL Application Engineering and Leander Bolz, Component Management MAPAL

NeoMill-Diamond-FlyCutter provides a solution after a year of research

The chosen machine was the T-Rex open-frame milling machine built by the manufacturer CNC-Step. The small SK30 connection is used as tool interface, while workpieces up to 1,000 x 1,000 mm in size can be clamped onto the vacuum table. It proved challenging to find a suitable tool for the intended machining operations where good surface quality was the primary concern. Jakob explained the situation: “We weren’t happy with the quality we were getting at the start. I spent a year looking for a suitable cutter head, but nobody was able to offer us a product that was completely suitable for the surface finish. It was while attending AMB 2024 in Stuttgart that I found what I was looking for with MAPAL, who had a milling cutter for our connection.”

Together with Klaus-Dieter Leick, an application engineer at MAPAL, they determined the most feasible solution for the existing machine. They decided to go for a NeoMill-Diamond-FlyCutter with a milling head diameter of 63 mm. “We originally developed this tool for machining aluminium components in the electronics industry, where our aim was to produce a surface during face machining that was as close to perfection as possible”, explained Leander Bolz from MAPAL’s Component Management team. The Aalen-based tool manufacturer immediately felt confident that this would also work for plastics, especially since the tool had originally been designed for critical machine concepts such as small spindles and vacuum clamping.

The lightweight triple-edged milling cutter provided with a special cutting geometry lowers cutting pressure and removes chips from the machining zone relatively quickly. The low cutting pressure was already a core feature with regard to milling aluminium surfaces. By choosing the appropriate cutting material, MAPAL was able to adapt the tool to different materials.

M-O-T is very pleased with the NeoMill-Diamond-FlyCutter that has now been widely rolled out and has proven to be a genuine game-changer in surface machining. When the milling machine was purchased, the manufacturers only imagined it would be used to machine the doors of the enclosure. Over time, the company gradually expanded its in-house production capabilities and began manufacturing an increasing number of components itself. M-O-T now entirely manufactures the storage tanks for the necessary

chemicals in-house and is also intending to manufacture the process cells in the future. Specialist components, such as Teflon process tanks, will continue to be manufactured externally. M-O-T uses the NeoMill-Diamond-FlyCutter for face milling the sheets. With regard to lateral machining and to finish contours, another tool from MAPAL, a PCD end milling cutter, is used.

Ongoing optimisation

Jakob's department doesn't yet believe that its goal has been fully met. Trials will be carried out with cooling lubricant to optimise surface quality and to better protect the tool. In particular, machining the rigid and brittle PVDF has at times caused wear to the PCD cutting edges on the NeoMill-Diamond-FlyCutter. However, M-O-T is severely limited in its choice of cooling lubricant. It is not possible to consider using oil since it may lead to the introduction of contaminants into the system that could, for example, affect the pH value or other process parameters. That is also why no metal chips are permitted in the M-O-T production area. Since it evaporates very quickly, isopropanol was chosen as the cooling lubricant, but the significant odour nuisance it causes means that it can only be used in a limited way on the machine.

It is also challenging to use plastics when it comes to cooling, as Robin Kollmann, who is responsible for milling operations at M-O-T, explains: "Plastics absorb less heat than aluminium. This means that the heat cannot be dissipated from the component rapidly enough. As a result, chips may fuse or clump together, which builds up more pressure and might potentially damage the cutting edge. The quality of the surface finish is also not as good as we would like it to be." During the machining process, 0.3 mm is milled away per cut. Depending on the material and quality grading, the stock allowance is up to 1 mm.

To avoid generating too much heat during machining, M-O-T is currently operating at a cutting speed of 6,000 rpm and a feed rate of 1,200 mm/min. This means the manufacturer is working well below the values initially suggested by MAPAL, which were already set lower than those for aluminium machining. To date, there is insufficient evidence to be able to assess the impact of isopropanol cooling on the service life of the cutting edges. Alongside this, M-O-T has started testing a new water-based coolant. As part of the testing process, the manufacturer has also decided to test working with higher cutting speeds.

Meanwhile, there has been a successful trial of the next optimisation step: M-O-T tested a larger version of the NeoMill-Diamond-FlyCutter with a milling head diameter of 100 mm, consequently deciding to place an order for the tool. Making a change to the milling head in a modular system such as this is not difficult since all MAPAL milling head diameters from from 63 to 160 mm are mounted on the same milling arbour. This is a good example of how MAPAL not only supports the application through provision of an appropriate tool but is also working on additional ways in which to increase productivity through an ongoing dialogue with the customer.



The NeoMill-Diamond-FlyCutter with three PCD-tipped milling cartridges was specifically developed for unstable machining conditions and small connections (Pictures: © MAPAL)

Fakuma 2026: Promoting Technology – Shaping the Future – Connecting People

The international plastics industry has just concluded five eventful trade fair days packed with technological innovations, in-depth technical discussions, award ceremonies and special encounters. The 30th Fakuma international trade fair for plastics processing was a vibrant, highly innovative industry gathering and a resounding success, held in Friedrichshafen from the 12th through the 16th of October, 2026.



Juliane Hehl (middle), managing partner of Arburg was awarded the the first Paul Eberhard Schall Medal (Picture: © P.E. Schall)

The anniversary edition of Fakuma has come to a very successful close with great enthusiasm. For five days, 1547 exhibitors presented the latest innovations and developments in plastics processing to the 36,278 expert visitors who travelled to the fully booked Friedrichshafen Exhibition Centre. The trade fair week also featured an impressive supplementary programme. The final day of the trade fair, namely "Career Friday" with its campaign for the promotion of young talent, provided a fitting finale and a strong signal for the future of the plastics industry. With guided tours and exclusive insights into technologies and manufacturing processes, participating companies provided young people with in-depth knowledge of the plastics industry and the opportunities it offers for the future. "The feedback from everyone involved has been overwhelming," emphasises Annemarie Schur, Fakuma project manager at trade fair promoters P. E. Schall. "Career Friday was a brilliant finale. Many young visitors eagerly participated in the various activities. Our thanks go out to all of the companies whose support has helped pave the way for the future."

High levels of internationality, central exchange platform, tangible results

With the highest level of international exhibitors to date (51.2%) the 30th Fakuma has expanded its global significance and further consolidated its status as Europe's leading trade fair. This is also confirmed by the steadily rising proportion of foreign visitors, which this year reached an all-time high of 42%. The unanimous conclusion is that Fakuma is one of the industry's most important events. Exhibitor statements confirm the exceptionally high calibre of the visitors and the success of the trade fair. Numerous concrete contracts were concluded, and projects that had previously been placed on hold were launched. "Personal interaction is particularly valuable," said Dr Friedrich Kastner, CEO and managing partner of the NGA Group. "Direct dialogue with customers and partners often gives rise to specific ideas that form the basis for new solutions and long-term partnerships." Stefan Glöckner, managing director of injection moulding machine manufacturer Dr. Boy, also points out the advantage of discussing topics openly with expert visitors and addressing new market challenges. "This allows us to work together on the development of concrete solutions." Michael Wittmann, managing director of Wittmann Technology, emphasised that this year's focus was, above all, on investment and long-term security. "Quick return on investment and competitive unit costs are what really make the difference."

Award for long-standing commitment – first Paul Eberhard Schall Medal

Bettina Schall, managing director of Schall trade fair promoters, presented a personalised award to 12 companies that exhibited at the very first Fakuma in 1981 and are still among the exhibitors today. This honour was be-

stowed upon Arburg, Engel Austria, Getecha, Technotrans Solutions, Hasco Hasenclever, Ihne & Tesch, Kistler Instrumente, Werner Koch Maschinentechnik, Mold Masters Europa, Schuma Maschinenbau, Single Group and Wittmann Battenfeld. Juliane Hehl, managing partner of Arburg, was delighted to receive a special distinction – the first Paul Eberhard Schall Medal. Paul-Eberhard Schall and her father, Eugen Hehl – then managing director of the world's leading manufacturer of plastic injection moulding machines – launched Fakuma together in 1981. Thanks to their collaboration, at both the business and personal levels, these two exceptional individuals championed technologies, shaped the future and brought people together. They set new standards and shaped an industry, and created a unique success story. The first Paul Eberhard Schall Medal was awarded in a festive atmosphere as part of the trade fair's opening ceremony. Prof. Dr. Martin Bastian, CEO of the SKZ German Plastics Center in Würzburg, emphasised the following in his laudatory speech: "Fakuma's success story was not conceived in a strategy paper. It arose from entrepreneurial spirit, from trust, from a handshake being enough and from people who were prepared to take on responsibility. And thus it's only fitting that the first Paul Eberhard Schall Medal should go to the company that has been one of this trade fair's closest partners right from the start."



Sparkling display of innovations at the first Fakuma Innovation Award

The first Fakuma Innovation Award, which was launched to mark the anniversary edition of Fakuma, attracted a great deal of interest. The goal was to recognise technological excellence, innovative strength and teamwork within the plastics processing industry, and to showcase them on a platform that celebrates these qualities. An expert jury reviewed an overwhelming number of entries and were finally able to select the winners. The award ceremony for the innovation competition, held on the afternoon of the first day of the trade fair, featured an impressive array of innovations: a total of 18 companies were recognised with 3rd, 2nd and 1st place honours in the six respective thematic categories including injection moulding, extrusion, recycling, tool and mould making / thermoforming, compounding and materials, as well as peripheral equipment.

Strong startup community, especially in the field of bioplastics

On all five trade fair days, 18 young companies – more than ever before! – presented new solutions and ideas for the plastics industry in the startup area. Biomaterials were well represented, e.g. for use in packaging, household goods and medical devices. Bioplastics made from natural, renewable resources such as algae, maize or potato starch, are biodegradable and recyclable, and help to minimise plastic waste in the environment. As material performance and quality continue to improve – and thus versatility as well – the solutions offered by these startups promise to become increasingly significant in the future.

This year's "Fakuma Round Table" has also provided a strong impetus for future business viability. On the second day of the trade fair, "Building on Strengths" was the theme of the expert discussion at which Eva Söhnlein, managing director of the Geiger Group; Dr Johannes Kilian, vice president of Process and Application Technology at Engel Austria; Günther Klammer, CTO at Next Generation Holding; and Michael Weigelt, managing director of TecPart – the Association for Technical Plastics Products, deliberated further areas for action. Last but not least, all trade fair visitors were able to benefit from the transfer of knowledge, an exchange of expertise and networking opportunities during the daily expert presentations held at the forum.

"We're grateful and pleased that we've been able to celebrate this anniversary trade fair with everyone involved," says Bettina Schall, summing up Fakuma 2026. "It was a fantastic industry event filled with valuable professional exchanges and numerous meaningful encounters. The new schedule, with the event running from Monday to Friday, was well received. And the familiar and highly valued spirit of Fakuma was also evident across the board again this year: thematic relevance, pragmatic focus, solutions-oriented approach and discussion conducted on an equal footing. We'll continue down this path by promoting technology, shaping the future and bringing people together. We look forward to seeing everyone again at the 31st Fakuma from the 11th through the 15th of October, 2027."

Comprehensive cleanroom solutions

In Reinraumanwendungen sind höchste Anforderungen an Sauberkeit, Prozesssicherheit und Produktqualität zu erfüllen. Dafür sind aufeinander abgestimmte Komponenten entscheidend. Mit einem umfassenden Sortiment an Platten, Einbauteilen und Heißkanalkomponenten bietet Meusburger ein Komplettpaket für den Reinraum aus einer Hand und unterstützt Anwender bei der Umsetzung sauberer, stabiler und effizienter Fertigungsprozesse.



With a wide range of plates, components and hot runner components, Meusburger offers comprehensive cleanroom solutions from a single source (Picture: Meusburger)

Fewer interfaces, greater process reliability

Smooth interaction of all the components used is crucial for the cost-effective operation of cleanroom applications. Combining plates, components and hot runner components from an aligned range reduces the coordination effort required throughout the value chain. At the same time, users benefit from clearly defined interfaces and a consistent standard of quality. Meusburger's comprehensive solution enables efficient procurement and supports the rapid realisation of projects.

Low-wear components for clean processes

A key factor in cleanrooms is the prevention of particle abrasion. Meusburger's range of products therefore includes various components that are designed to meet the requirements of clean production environments. DLC coated components reduce wear – and consequently particle formation – due to their low coefficient of friction. In addition, stainless steel components are available which offer excellent corrosion resistance. Stainless steel, low-leakage temperature regulation components also minimise the risk of leaks and ensure reliable and clean operation.

Corrosion resistant materials as a stable foundation

The selection of the right material plays an important role in cleanrooms. Corrosion resistant materials help to maintain surface quality in the long term and ensure process stability. Meusburger offers a range of plates and bars made from corrosion resistant tool steels, available directly from stock. The materials 1.2083 (ESU/H), 1.2085 and 1.2316 are characterised by their high chromium content and the resulting corrosion resistance. Depending on the application, a range of properties is available in terms of hardness, machinability and surface quality, making the materials suitable for various cleanroom requirements.

Precision hot runner components for challenging applications

Injection moulding technology also has a decisive influence on process reliability in the cleanroom. Meusburger's valve gate systems enable the gating points to be opened and closed with precision and are suitable for demanding applications with high quality requirements. The defined gate enables high-quality plastic parts to be manufactured consistently. The systems also support a high number of cavities and short injection cycles. Pneumatically or servo-electrically actuated valve gate systems also enable oil-free operation, thereby reducing the risk of contamination – an important prerequisite for controlled and stable cleanroom processes.
Through the coordinated interaction of mould components, plates and hot runner components, Meusburger provides a reliable basis for cleanroom applications.

For more information on complete cleanroom solutions can be found at www.meusburger.com/cleanroom

A burr-free component straight from the machine

New end mills for deburring and chamfering have been added to the FRANKEN Chamfer product range

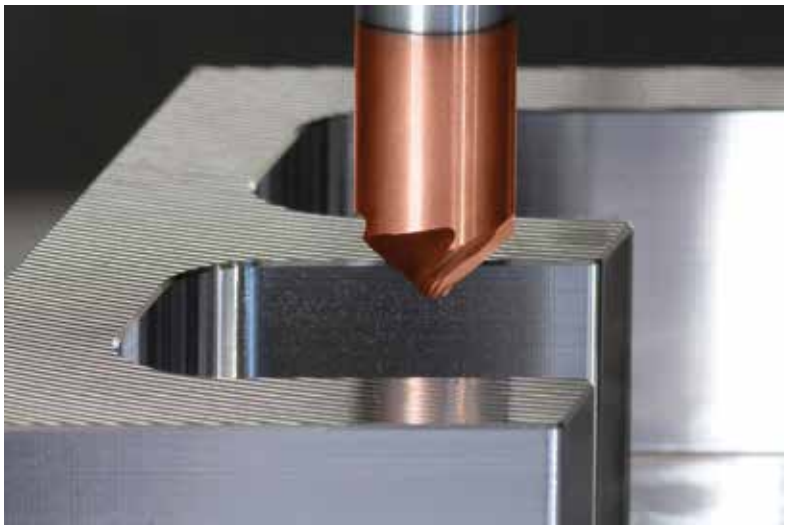
Modern manufacturing does not end with milling, drilling or turning, but with the component ready for installation. This is exactly where FRANKEN's chamfer end mills come into their own: Integrated directly into the machining process, they enable reliable on-machine chamfering and reduce time-consuming manual reworking. This makes chamfering an integral part of the complete machining process – ensuring consistent quality, shorter lead times and cost-effective manufacturing processes.

The FRANKEN Chamfer product range is now being expanded to include newly developed, spiral-fluted 60° and 90° chamfering end mills, as well as lollipop cutters. The specially designed geometries ensure a smooth cut and reduce the formation of secondary burrs across a wide range of materials – right up to the machining of hard materials with a hardness of up to 66 HRC.

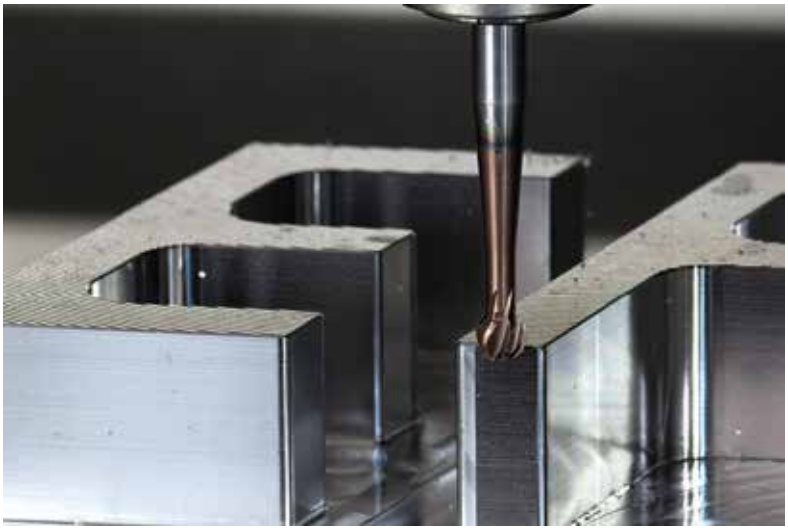
The special tip geometry of the chamfering end mills enables them to target interference contours precisely, thereby providing additional flexibility when producing the smallest of chamfers. Spiral flutes ensure a high-quality finish, whilst the high-performance HPC geometry is designed to deliver high cutting performance and a long tool life.

For 3D simultaneous chamfering, centre-cutting lollipop end mills with a wrap angle of up to 280° offer a high degree of flexibility for machining undercuts and rear surfaces. Their slim design and the two available lengths ensure optimum accessibility, even to hard-to-reach edges of workpieces and complex contours. The HPC geometry, with up to six cutting edges, combines high performance with a long tool life.

With its new deburring and chamfering end mills, FRANKEN consistently integrates chamfering processes into complete machining. The result: burr-free components straight off the machine – reliable, reproducible and cost-effective.



The chamfer end mill with HPC geometry and helical flutes is available in 60° and 90° versions



The wrap-around angle of up to 280° of the ball cutter offers maximum flexibility during use (Pictures: EMUGE)

About EMUGE-FRANKEN:

EMUGE-FRANKEN is a group of companies with approx. 2,000 employees that has been one of the world's leading manufacturers of thread cutting, drilling, testing, clamping and milling technology products for over 100 years. The innovative product range with 40,000 stock items and a variety of customer-specific products focuses on applications in the automotive, power plant and aerospace industries as well as medical technology, mechanical engineering and plant construction. As a system provider of precision tools, EMUGE-FRANKEN is represented in 60 countries by subsidiaries or via sales partners.

InsertKey from HASCO provides support in construction and maintenance projects

Positioning mould inserts without any risk of confusion reduces design and production work



Thomas Haas (Wilhelm Weber, right) and Walter Kiekert (HASCO) discuss the advantages of the InsertKey

In multi-cavity moulds, the clear allocation of mould inserts represents a frequent challenge in mouldmaking. Different corner radii or varying screw-hole positions mean that inserts often have to differ in their design. Particularly in the case of moulds with a large number of cavities, this results in a considerable amount of work during design, programming and production.

One example is an 8-cavity injection moulding tool. In many cases, separate datasets have to be created for each cavity and different mould inserts designed. In addition to the extra time required for design, production also becomes more complex because the individual inserts have to be clearly identified throughout the entire manufacturing process and kept separate from one another. Errors in allocation can have a negative impact on both assembly and subsequent maintenance work. To solve this problem, Wilhelm Weber GmbH & Co. KG in Esslingen uses the InsertKey Z088/... from HASCO, one of the leading manufacturers of standardised modular mould units and customised hot runner systems. Developed by the standard mould unit manufacturer, the system enables mould inserts to be positioned without any risk of being mixed up, supporting both mould production and subsequent maintenance work.

The coding is achieved through the combination of the sleeve Z0881/... and the bush Z0882/.... This unique coding not only guarantees assembly without any risk of mixing up components, but also ensures the correct allocation of the inserts, thereby significantly improving process reliability.

"On its first use in an 8-cavity mould, the allocation of the inserts worked perfectly," reports Thomas Haas, Technical Manager for mouldmaking at Wilhelm Weber. "We designed just one insert and then produced it eight times. In combination with the InsertKey, we were able to significantly reduce the time required for both design and production."

Up to 64 distinguishable combinations



HASCO InsertKey Z088/...

A single InsertKey unit can code up to eight different positions. By combining two units, the number of possible combinations increases considerably. "By using two InsertKey units simultaneously, each with eight different positions, up to 64 distinguishable combinations can be achieved," explains Walter Kiekert, a member of the HASCO sales team.

Only a small installation space is required for integration into existing mould concepts. As no protrusion on the mould insert is necessary, the system can also be

used where installation space is limited. “The InsertKey can be positioned very compactly around a screw that is already present. Installation is therefore straightforward,” says Haas.

Support through the poka-yoke principle

A further advantage becomes apparent when implementing poka-yoke concepts in mouldmaking. The aim of this method is to prevent errors during the manufacturing process and eliminate assembly mistakes through the design itself.
At Wilhelm Weber, this principle is consistently applied. The unique mechanical coding prevents inserts from being installed in the wrong position. This advantage is particularly valuable during maintenance and repair work. “In practice, it regularly happens that a mould returns to the workshop for maintenance and was not originally built by the mouldmaker carrying out the work,” explains Haas. “The InsertKey ensures that the inserts are always reinstalled in their correct positions.”

Simplified spare parts inventory – reduced from eight inserts to one

In addition to simplifying production, the unique coding also has a positive impact on the spare parts strategy. Because all mould inserts can be manufactured with identical geometry, the number of different spare parts required can be reduced significantly—from eight to just one.
“Only one mould insert needs to be kept in stock as a spare part,” explains Haas. The position-specific allocation is achieved through the corresponding coding in the moulding tool.
“With a conventional 8-cavity mould, it was generally necessary to keep eight different mould inserts in stock as spare parts because it was impossible to know in advance which cavity might fail,” adds Kiekert. “This new solution offers significant savings in both storage costs and spare parts management.”

Advantages throughout the entire process chain

The production process also benefits. Identical mould inserts can be manufactured without changing CNC programs or making geometric adjustments. As a result, the number of different CNC programs required is significantly reduced.
“When different corner radii are used, the correct CNC program has to be selected for each application. This increases the risk of errors,” explains Haas. “With identical inserts, this step is no longer necessary.”
During assembly, the InsertKey is positioned in the mould base. The mould insert is then fitted and secured with screws. Thanks to the design, the insert is automatically aligned in the correct orientation.
For users, this results in reduced design time, simplified production, greater process reliability and lower storage costs. Particularly in multi-cavity moulds with a large number of cavities, the systematic coding of mould inserts can therefore make a measurable contribution to improving efficiency in mouldmaking.



The HASCO InsertKey enables the identical production of mould inserts (Pictures: HASCO)

Wilhelm Weber: High level of in-house production in the company's own mouldmaking department

At its site in Esslingen in southern Germany, Wilhelm Weber GmbH & Co. KG employs around 80 people and operates in several business sectors. In addition to plastics processing, its portfolio includes the production of rotary tables and an in-house mouldmaking department with a high level of production. Operating 21 injection moulding machines with clamping forces ranging from 200 to 275 tonnes, the company focuses particularly on manufacturing complex multi-component silicone parts for the medical, lighting, automotive and electrical industries. The company has been using HASCO products in its mouldmaking department for many decades. According to Weber, the main reasons are their high functionality and cost-effectiveness.



Formnext brings together the global AM community and showcases the latest innovations in industrial 3D Printing and advanced production technologies (Pictures: Copyright Formnext / Mesago Messe Frankfurt GmbH / Marc Jacquemin)

formnext

Formnext 2026: The next generation of industrial manufacturing returns to Frankfurt

Current discussions about industrial development in Europe and around the globe are often shaped by economic challenges. At the same time, numerous examples demonstrate how Additive Manufacturing is enabling successful and scalable industrial business models, opening up new growth opportunities across a wide range of sectors. From 17 to 20 November 2026, Formnext will once again bring together the technologies and experts driving this transformation. The event will showcase concrete industrial applications throughout the entire Additive Manufacturing value chain, featuring numerous use cases and business cases from a diverse range of industries – all in one place. Visitor ticket sales are now open, with an early bird discount available until 22 October 2026.

The current market environment highlights the importance of resilient supply chains, flexible production processes, and technological innovation. Additive Manufacturing provides practical solutions to these challenges, enabling companies to respond more quickly to market changes, develop new applications, and strengthen their long-term competitiveness.

Particularly strong growth momentum is currently being observed in industries such as aerospace, defense, energy, medical technology, and semiconductors. Against this backdrop, Formnext 2026 will once again present the latest developments across the entire Additive Manufacturing process chain, as well as a broad range of application examples and business cases from numerous industries.

As the AM industry continues its dynamic industrialization phase, Formnext further reinforces its position in 2026 as the leading platform for next-generation manufacturing technologies. With around 800 expected exhibitors, the major players from across the global Additive Manufacturing ecosystem will be represented, covering the entire AM value chain. Throughout all four days

of the exhibition, face-to-face networking, expert exchange, and practical application insights will remain at the center of the event experience.

"Especially in the current market environment, the importance of exchange, market orientation, and access to innovation has become increasingly evident," says Sascha F. Wenzler, Vice President Formnext at Mesago Messe Frankfurt GmbH. "Formnext brings together the industry's key stakeholders and provides the framework where new momentum for the industrial adoption of Additive Manufacturing can emerge."

Discussions with Formnext's exhibitor advisory board indicate that sentiment across many sectors is considerably more positive than in previous years. An increasing number of companies report successful industrial applications, new projects, and continued market scaling. Showcasing these developments and fostering dialogue around them remains one of Formnext's core objectives.

In response to current industry developments, the organizer has further optimized the exhibition layout for the 2026 edition. To reduce walking distances, improve navigation, and ensure a consistently high-quality visitor experience, the exhibition will be consolidated into Halls 11.0, 12.0, and 12.1, rather than being spread across four hall levels, while maintaining nearly the same total exhibition space.

Extensive supporting program with new highlights

Formnext 2026 will once again offer a comprehensive supporting program featuring a wide range of topics and numerous opportunities for professional development and networking.

"While Additive Manufacturing has already become an established production technology in many industries, the technologies remain complex and require expertise, as well as the identification of viable business models and growth opportunities," explains Christoph Stüker, Vice President Formnext. "Through a variety of program formats, we aim to facilitate exactly this exchange, including across different industries."

The freely accessible conference program for trade show participants will address both cross-industry topics and concrete application examples on the Industry & Application Stage, delivering valuable insights for users, technology providers, and decision-makers from various sectors. The program will be complemented by the Technology Stage, where exhibitors will present their latest technological innovations and solutions.

Among the new content highlights is the Formnext Defence Summit, which will explore current developments and requirements in security- and defense-related manufacturing environments. In addition, a special exhibition dedicated to post-processing will showcase key steps within the industrial value chain.

Established Formnext highlights will also return. The Formnext Awards will once again recognize outstanding innovations and developments, while the Discover3DPrinting seminars will provide newcomers with practical insights into the world of Additive Manufacturing. Additional formats such as the Start-up Area and Pitchnext will continue to foster connections between innovators, investors, and strategic partners.

Further program highlights include:

- Showcase by the VDMA Additive Manufacturing Working Group focusing on Additive Manufacturing in mechanical engineering
- BE-AM showcase and BE-AM Symposium dedicated to Additive Manufacturing in the construction industry
- Showcase and guided tours on the topic of post-processing
- Career@Formnext, featuring a job wall, personalized career consulting, professional photo sessions, and networking opportunities
- Partner Country United Kingdom, showcasing its strong manufacturing sector and leading role in Additive Manufacturing through a powerful ecosystem of technologies and industrial applications
- AM Innovation and Standards Summit, organized by ASTM International and taking place on the day prior to the exhibition opening





The Formnext Awards 2026 finalists have been announced

Formnext Awards 2026: Finalists showcase the diversity and innovative strength of additive manufacturing

New specialized AM production technologies, groundbreaking applications in textiles, aerospace, and medicine, as well as innovative concepts for recycling and AM education: the Formnext Awards 2026 once again recognize outstanding achievements in six categories, honoring, among others, young innovative companies, sustainable business ideas, and pioneering technologies. The finalists have now been selected by the respective juries and will present their exhibits both online ahead of the exhibition and in a special showcase at Formnext. The winners will be announced during a festive awards ceremony on 19 November 2026. Once again, the public is invited to participate in the voting process, starting immediately.

formnext

(Picture: © Formnext / Mesago Messe Frankfurt GmbH / Marc Jacquemin)

The finalists in the six award categories demonstrate how Additive Manufacturing is shaping the future. They impressed their respective juries with a wide range of innovative applications in fields such as textiles, aerospace, medical technology, and dentistry. At the same time, the selected projects highlight the innovative strength of emerging AM companies that have developed new, highly specialized Additive Manufacturing technologies. Both young and established AM companies are also presenting compelling concepts that can make modern industrial production even more sustainable. Visitors to Formnext can experience all finalists at the Formnext Awards Showcase (Hall 11.0, booth F60). The winners will be announced and the awards presented on Thursday, 19 November 2026, starting at 4:10 p.m. at the Industry & Application Stage (Hall 11.0, booth D72). In addition, all finalists are already featured on the Formnext Awards website. Voting is open for all categories until Thursday, 19 November 2026, at 12:00 p.m.,

with the public online vote counting as an additional jury vote.

AMbassador Award: From university education to Brazil's AM map

The AMbassador Award recognizes outstanding individuals or organizations that make a unique impact on the industry and its users through innovative training and educational approaches or through personal advocacy for Additive Manufacturing.
One of this year's finalists is Dr. Michael Kraemer from the AM Center at TU Darmstadt, who is dedicated to educating future AM specialists. Each year, between 50 and 60 students complete the center's educational programs, which also include more than 20 student projects and 10 doctoral theses over a three-year period. Additional AM training opportunities are offered to apprentices in cooperation with the IHK Rhein-Main and to professionals from industry.
Professor Leroy Gardner and the Steel Structures Research Group at Imperial College London are advancing the use of metal AM in construction. Their work combines experimental research, structural optimization, design development, robotic metal 3D Printing, and full-scale testing. Among their achievements are the world's first 3D-printed steel bridge, developed together with MX3D, and a hybrid steel truss structure featuring additively manufactured nodes.
Mechanical engineer Luan Saldanha of Aditiva Brasil has created the Additive Manufacturing Map of Brazil, making the country's AM ecosystem more visible and interconnected. He also publishes the AM newsletter Panorama MA, operates the industry news platform Manufatura Digital, and produces educational AM content on YouTube and Instagram.

Design Award: 3D-Printed bras, implants, and rocket engines

The range of exceptional AM designs that have reached the finals could hardly be more diverse, spanning from a 3D-printed bra to a rocket engine.
As part of her Master's degree in Industrial Design at the Technion – Israel Institute of Technology, Maya Kaplan developed the Computational Bra, a 3D-printed garment that demonstrates how computationally designed textile structures can strategically combine elasticity, support, and compression within a single product. These functionalities are directly integrated into the textile and produced from TPU material using a desktop FDM 3D printer.
At the Levin Center of the Tel Aviv Sourasky University Medical Center, a monolithic, anatomy-conformal titanium implant was developed and successfully used in surgery. Combined with point-of-care 3D surgical planning, the implant, produced from medical-grade Ti-6Al-4V titanium, sets new standards in areas including the treatment of bone cancer in children and adolescents.
Indian space-tech start-up Agnikul Cosmos has developed a single-piece semi-cryogenic rocket engine manufactured in Inconel using 3D Printing. Designed specifically for Additive Manufacturing from the outset, the engine has already been successfully deployed as part of the Agnibaan SOrTeD Mission 2024.

(R)Evolution Award: Innovations from dentistry to micrometer-scale 3D printing

The (R)Evolution Award honors groundbreaking products, technologies, and services that deliver exceptional value to users. This year's finalists are advancing applications ranging from dental technology to micrometer-scale 3D Printing.
With its new GHOST machine, Fyous aims to introduce a completely new way of manufacturing aligners and retainers. Its PolyMorphic Moulding technology creates molds temporarily using thousands of precisely actuaded pins.
Malta-based Thought3D promises improved tensile strength and significantly enhanced performance for materials such as nylon with its inline filament dryer Drywise. Instead of drying an entire filament spool, the system dries only the filament segment immediately before extrusion.
For micron-level 3D Printing, Boston Micro Fabrication (BMF) has developed the microArch S150 desktop printer. Based on Projection Micro Stereolithography (PμSL) technology, it achieves an optical resolution of 25 μm. Applications include microfluidic channels, fiber-optic components, and electronic components.

Rookie Award: From battery recycling to copper recycling

The Rookie Award recognizes individuals with promising business ideas who have either not yet founded their company or have

done so within the last year.
This year's finalists are developing solutions for battery recycling and copper 3D Printing while further advancing an AM process originally developed for aerospace applications.
The engineering initiative cAIclone (founding in preparation) develops AI-optimized, 3D-printed hydrocyclones for fine-particle separation in the 1-50 µm range. The Munich-based founding team initially targets the battery recycling market.
FlexCycle Solutions produces copper powder for Additive Manufacturing and powder metallurgy from electronic industry waste. The powder is manufactured entirely through a mechanical process, resulting in a spherical-rough particle morphology that improves laser absorption in LPBF applications.
Spaceform develops Vacuum Atomised Suspension Printing (VASP), a new architecture for metal Additive Manufacturing. During the process, a metal-powder suspension is vacuum-dried before laser processing, creating a stable and cohesive powder layer. Initial applications include RF components, advanced thermal management, and precision fluidics.

Start-up Award: New Additive Manufacturing concepts in focus

The Start-up Award recognizes young AM companies with sustainable business models and market-ready products. This year's finalists focus on new Additive Manufacturing concepts.
With its AX-150 system, Aumatis uses AM to automate a traditional process employed in industry and jewelry production. A 3D-printed plastic model is embedded in a proprietary investment compound, burned out, and then cast under vacuum.
The Swiss start-up sallea develops 3D-printed soluble cores and tooling that simplify the production of lightweight components with complex geometries. Initial applications include thermoset CFRP components for motorsports and the sporting goods industry.
Hydra Manufacturing develops hybrid manufacturing technologies for challenging-to-process materials, including advanced ceramics and cemented carbides. By combining paste extrusion, green-state machining, and in-process inspection in a single machine, the company significantly expands the range of processable materials, including silicon carbide and hard metals.
Berlin-based start-up additiveStream4D follows a similarly hybrid approach with retrofit technologies that enable standard metal LPBF systems to manufacture precisely on existing geometries. Potential applications include advanced cutting tools and the repair of high-value parts such as turbomachinery components.
With its simulation software, QH Build aims to make Additive Manufacturing more efficient. In one WLAM application, implementation was completed 72% faster and with 64% lower cost per part. QH Build combines industrial robotics, multiphysics simulation, and a controller-aware digital twin to reduce costly trial-and-error in metal DED.

Sustainability Award Supported by Renishaw: Recycling, spare parts, and CO_2 data

The finalists for the Sustainability Award, which recognizes AM products and applications based on their entire product life cycle, are FlexCycle Solutions, BMF GmbH, and Baker Hughes.
FlexCycle Solutions impressed the jury with its mechanical production of copper powder for Additive Manufacturing and powder metallurgy from manufacturing waste streams (see Rookie Award for additional details).
BMF GmbH (Bernstein Mechanische Fertigung) provides customers with a 3D printer alongside its blasting systems, enabling them to produce plastic spare parts on demand. The required design files are made available through the cloud-based spare parts catalog Digitalsource.
With its Manufacturing Carbon Platform, Baker Hughes enables manufacturers to make better-informed decisions based on carbon data. The platform provides transparency regarding the environmental impact of additive production processes, from quotation through delivery.

Awards ceremony and online voting

As part of the awards ceremony, the winners in each category will receive attractive cash and non-cash prizes as well as unique award trophies, designed by SutoSuto and manufactured by FKM Additive Manufacturing.

Further information, online voting, and detailed finalist profiles are available at formnext.com/awards

Demoulding of internal threads: rotation and linear motion perfectly synchronised

Servomold, a pioneer in the electrification of injection moulding tools, was showcased its newly developed servo-electric linear unscrewing unit (SLU) for the first time at Fakuma 2026. When demoulding helical internal contours, this unit moves the core both rotationally and linearly in the axial direction with micrometre-level synchronised precision. It thus demoulds threads quickly and with repeatable accuracy, such as those found in plastic components of auto-injectors, pens and similar drug-delivery systems. Two sizes, with minimum core spacings of 40 mm and 60 mm respectively, enable compact mould designs. A single SLU unit can drive up to eight threaded cores. With four units, moulds with a maximum of 32 cavities can therefore be created.

Standardised core holders with customised mould contour attachments enable rapid changes between different contours and pitches. The integrated linear guide simultaneously guides the slide body and enables the demoulding of additional, non-rotating contours. In the closed mould, a mechanical locking mechanism ensures micrometre-precise axial positioning of the threaded core, even at high injection pressures. Cooling of the slider and core is integrated directly into the system, enabling short cycle times.

Software-controlled synchronisation

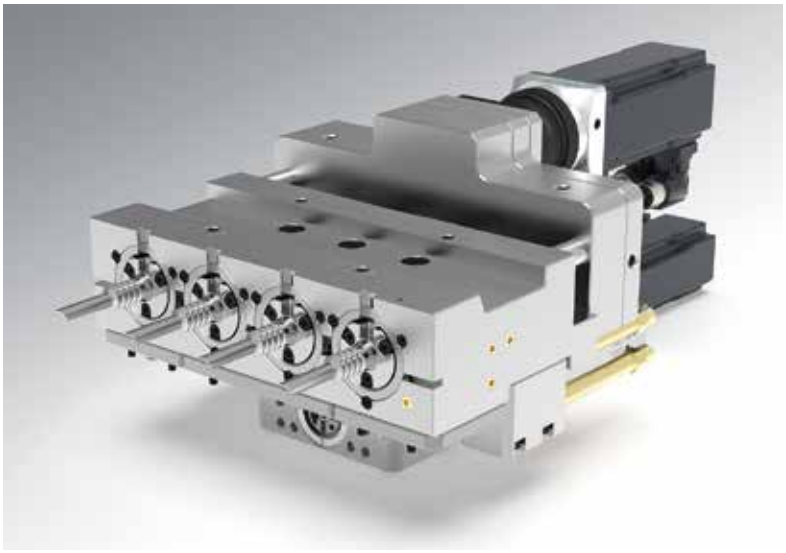
In conventional unscrewing systems, a lead screw nut generates the axial stroke simultaneously from the rotational movement of the threaded core. Thread pitch, rotation and linear movement are thus mechanically coupled. The SLU separates these functions: one servo drive generates the rotational movement, whilst a second generates the linear stroke. The MoldControl system synchronises both axes electronically. The movement ratio is specified in the control system to match the thread pitch. Furthermore, rotational and linear movements can also be used independently – for example, when, after unscrewing a thread, a long sleeve section is demoulded using purely linear movement. There is no need for a lead screw nut or the associated lead screw, nor for the associated lubrication and adjustment work. As the SLU operates on a servo-electric basis, no hydraulic oil is used. This facilitates clean, low-maintenance operation and use in cleanrooms.

Live at FAKUMA

At the FAKUMA stand, visitors were able to follow the motion sequence of the new SLU live using a working model. The system was controlled by Servomold's SMC (Servo Mold-Control), which was launched in 2025 and has won awards for its design. Key features include intuitive operation and automatic switching between different position-sensing systems. Alternatively, a video demonstrating the SLU's functionality is available at https://bit.ly/4zQ3iuW.

In addition, Richard Gane, Sales Director at Servomold, explained the operation of the SLU and other servo-electric linear actuators in his presentation entitled 'Servo-electric movements in injection moulding tools' at the Fakuma Forum.

In addition to the new linear unscrewing unit, Servomold presented a comprehensive range of standardised – and therefore cost-effective – servo system components at Fakuma 2026. These include servo-electric single to quadruple unscrewing units, screw extractors for unscrewing threads, ready-to-use unscrewing halves, high-performance servo drive units, space-saving index plate rotators, threaded core sets and rotating threaded core cooling systems for unscrewing units.



The new servo-electric linear unscrewing unit (SLU) from Servomold (Picture: © Servomold)

Sawing technology with a clear lead

Author:
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KASTO Maschinenbau
GmbH & Co. KG, Achern

Proven in practice for years and, now further developed: The new KASTOssb vertical bandsaw series is more compact, energy-efficient, and easier to access. Featuring an electromechanical saw feed and the new KASTO ProControl system, this series enhances ease of use and offers greater transparency.



The electromechanical saw feed featured on the KASTOssb AC 2.6 consumes power only when cutting is actually performed. Users benefit from lower energy consumption and reduced noise emissions

Since 1985, the KASTOssb has become known for its reliable sawing technology, outstanding versatility, and robust machine quality. The latest development of the new heavy-duty, high-performance KASTOssb automatic bandsaw draws on four decades of practical experience. This is particularly evident in the saw feed system: the engineering design team replaced the previous hydraulic actuation with servomotors. This electromechanical drive consumes power only when cutting is actually performed. The result: a more energy-efficient and quieter production process. Automatic feed control is included as a standard feature. With KASTOrespond, the system automatically adjusts parameters to suit each application, helping to optimise cutting times.



The rear door can be folded inward to save space, which simplifies maintenance



The new control system generation, ProControl, allows simultaneous access to various control and information screens while sawing is in progress

Chip conveyor: flexible and space-saving

The new chip conveyor can be installed on either the right or left side, allowing the customer to specify the preferred discharge direction when placing an order. This feature provides greater flexibility when integrating the conveyor into existing on-site production processes. Its upward-conveying design minimises the risk of blockages, complies with current safety standards, and reduces coolant carryover. Depending on the application, discharge heights of 600 mm or 1,050 mm are available. For easier installation and removal, the conveyor is now equipped with rollers. The new design allows for a 30-degree rotation when the conveyor is installed on the left side, making it easier to pull out. The modification reduces the space required for removal (when the chip conveyor discharge height is 600 mm) from 3.6 metres to 2.9 metres. This enhancement allows users of this already compact machine to save even more valuable space on the factory floor.

Improved maintenance and accessibility

Partitioned panels and hinged rear doors offer easier access to the bandsaw blade and other key components while allowing for more space-efficient installation. A new front inspection window provides a clear view of the working area, roller conveyor, and material infeed.

Intelligent software saves time and material

The newly launched KASTO ProControl generation of control systems enhances operation efficiency, intuitiveness, and transparency. The dashboard and Simple Mode are designed to assist with daily tasks, while features such as the material library, cutting plan, and intelligent cutting optimisation help save both time and materials. Additionally, diagnostic and analysis tools help pinpoint faults more quickly, reducing downtime.

Excellent sawing precision saves material and time

The new programming system also improves positioning and cutting precision. Machines in the KASTOwin 107 series, equipped with ProControl, have demonstrated exceptional consistency in cutting lengths within the specified tolerance range. This level of precision is also achieved with the new KASTOssb: in a series of measurements performed on a KASTOssb FC 2.6, using C45 round bar stock with a diameter of 90 mm and a target cut length of 10.00 mm, the average cutting length was 10.011 mm, with a standard deviation of 0.048 mm. These precise and reproducible cut lengths allow for smaller cutting allowances, leading to savings in both material and time during downstream processing operations.

Low-vibration and versatile design

A significant factor contributing to high cutting quality and productivity is effective vibration management. Consequently, a proven core element of the KASTOssb series that remains unchanged is the mineral cast saw head. This material is known for its excellent damping properties, which effectively reduce vibrations. The advantage is particularly important during bundle cutting, especially when cutting tubes and profiles with diameters of up to 260 mm, as well as when using carbide bandsaw blades. These blades are now explicitly included in the range of applications. Furthermore, there is an option to use a 34 mm-wide band.

From a standalone machine to a fully automated line

The KASTOssb is available in two versions: the AC 2.6, which can be used as a standalone unit or with a roller conveyor, and the FC 2.6, which features automated material loading along with infeed and outfeed capabilities. The FC version can also be expanded with

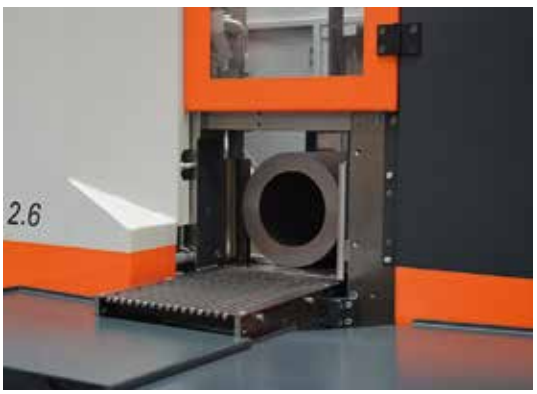


KASTOsort for automated robotic handling and integration with storage systems. These options offer a compact and scalable automation platform, making it suitable even for mid-sized companies.

The chip conveyor can be installed on either the right or left side and complies with current safety standards

Sawing, storage, machining – all combined in KASTO's new compact sawing centre

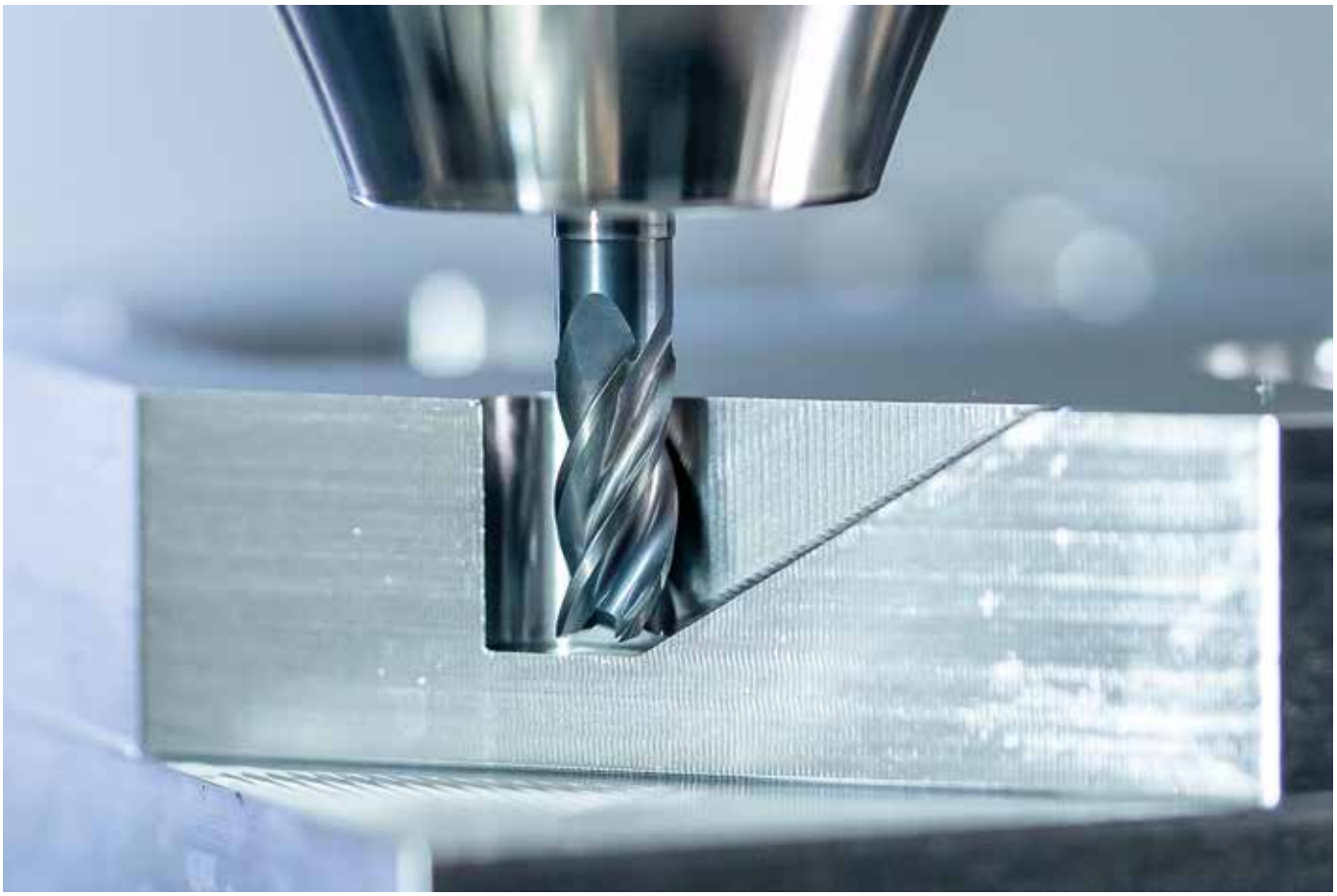
The KASTOssb can be seamlessly integrated into the new, fully automated KASTOcenter compact sawing centre. This modular system combines a tower storage unit, robotic loading and unloading, sawing, and downstream machining. Together, these features create a system capable of 24/7 operation within a minimal footprint.



The KASTOssb is suitable for challenging cutting applications involving solid material, tubes, profiles and bundles



Alexander Palli, workshop manager at EHG Stahlzentrum GmbH & Co. OG: "For over 20 years, we have relied on KASTOssb saws and other KASTO solutions. They are dependable, require minimal maintenance, and can be used for a variety of applications, including difficult-to-cut materials." (Pictures: KASTO Maschinenbau GmbH & Co. KG)



With new four-fluted versions for steel, cast iron and aluminium machining, MAPAL is expanding the OptiMill-HPC-Pocket portfolio with particularly powerful new additions

Efficient pocket plunge milling

The solid carbide milling cutters in the OptiMill-HPC-Pocket product family deliver maximum precision and efficiency in pocket milling and are extremely versatile. In April 2026, MAPAL added several new Z4 length variants to its portfolio and is now offering a very broad range for the cost-effective machining of steel, stainless steel, cast iron and aluminium.

The solid carbide milling cutters in the OptiMill-HPC-Pocket product family are designed for long tool life and high process reliability. This is achieved through specially prepared cutting edges and wear-resistant high-performance coatings. Large chip spaces allow for fast and reliable chip removal, even at high material removal rates. The innovative tool geometry also plays its part, helping to prevent chip congestion and ensuring smooth machining with excellent surface finishes. The MAPAL OptiMill-HPC-Pocket is suitable for a wide range of applications thanks to its patented plunge face, featuring an innovative point thinning design and integrated drill tip. These applications include pocket milling, groove milling, grooving, helix milling, and fast ramping at angles of up to 45° – all at very high feed rates.

As short as possible, as long as necessary – the OptiMill-HPC-Pocket for steel and cast materials

MAPAL has been successfully established on the market for ten years with the three-fluted version of the OptiMill-HPC-Pocket for machining steel and cast materials. The new four-fluted version now enables higher machining speeds thanks to the additional cutting edge. MAPAL combines its proven pocket technology with experience in trochoidal milling, allowing deep cavities to be machined quickly.

While the Z3 previously came in three different lengths, MAPAL is now expanding the range to include the four-fluted version, available in short, long and overlong variants. In line with the principle of "as short as possible, as long as necessary," customers can select the optimum tool length to suit their needs. Shorter cutting edges and reduced carbide content save costs, especially in series production with high quantities. Shorter versions also benefit from faster circumferential machining. Whether you go for the Z3 or Z4 depends on the application. For applications that focus on face milling, MAPAL recommends the three-fluted version. Its more robust face geometry is particularly useful when the milling cutter frequently needs to plunge into the material. The four-fluted version excels in circumferential machining. With the fourth cutting edge, the tool is not only faster but also has a longer tool life..

Going even further in aluminium: Four-fluted version offers more length options

The OptiMill-Alu-HPC-Pocket is the dedicated product line for machining aluminium. Here too, MAPAL has expanded its portfolio, now also offering the four-fluted version in long and overlong options. This allows the tool manufacturer to meet market demands for significantly faster machining and higher volumes in aluminium.

The all-rounder reduces the number of tools required and optimises carbide usage

The milling cutters are available as standard in diameters from 3.80 to 20.00 mm with HB shank form; special radii and HA shank form are available on request. MAPAL also offers tool kits. For maximum process reliability, the MillChuck HB is recommended as the tool adapter. Now that the product family is complete, the OptiMill-HPC-Pocket primarily targets general mechanical engineering as well as mould making and deep working, with the aluminium models also covering the aerospace sector. With the OptiMill-HPC-Pocket, users have a true all-rounder at their disposal, eliminating the need for two to three other tools. This reduces tool changes and therefore increases productivity.



The OptiMill-HPC-Pocket enables particularly fast and efficient ramping at angles of up to 45° (Pictures: ©MAPAL)

The robust geometry delivers consistent results without fluctuation and, thanks to its process stability, enables reliable use in automated manufacturing environments even when the machining conditions are not ideal. The additional length options reduce costs and improve resource efficiency: users can select the appropriate projection length for each application – as short as possible, as long as necessary. This reduces carbide usage where cutting edge length is not needed, while at the same time increasing rigidity and process reliability compared to a universal milling cutter that has to cover all applications. Overall, MAPAL's complete OptiMill-HPC-Pocket product family delivers a double benefit in terms of cost efficiency: fewer tools in use and, thanks to application-specific length selection, optimised carbide usage. This keeps costs down while also increasing process reliability. It is precisely this combination that makes the OptiMill-HPC-Pocket an attractive solution for both series and flexible manufacturing.





Precision for a better quality of life: An artificial knee joint manufactured on a DMG MORI machine tool. The highest level of precision and a perfect surface finish are crucial for the implant's biocompatibility and durability



Precision for everyday life: The mold for the mass production of toothbrushes, manufactured on a DMG MORI machine, clearly demonstrates how high-tech manufacturing makes everyday bathroom products possible

From smartphone alarms to knee implants: One Day with DMG MORI

High-precision manufacturing technology for modern everyday life

From 20 to 24 April 2026, DMG MORI showcased the ubiquitous yet often unseen role of precision technology at the Hannover Messe in a special format under the slogan 'One Day with DMG MORI'. At its stand in Hall 27, the company demonstrated how frequently people come into contact in everyday life with products whose manufacture is based on state-of-the-art production. The focus of the trade fair presentation is on illustrating the development of process solutions for demanding key industries such as aerospace, mobility, and medical technology through the holistic Machining Transformation (MX) strategy.



For a flawless design in the living room: a high-precision injection mold for a TV housing. Manufactured on a DMG MORI DMU 65 5-axis milling machine, it ensures perfect surfaces and precise fit



Powering tomorrow's mobility: An aluminum electric motor housing that serves as a key component in electric vehicles. Manufacturing this complex geometry requires the highest precision, which is ensured by DMG MORI's machining solutions

“One Day with DMG MORI”: A day full of high-tech

Using a typical daily routine, visitors to the stand were able to see for themselves, reliability, and innovation of modern products. The journey begins in the morning and takes visitors through various scenarios from our everyday lives:
The Morning: The day begins with the smartphone’s alarm. Its microchips can only be manufactured using highly precise components for EUV lithography. In the bathroom, products like toothbrushes and hair dryers are shaped using precise injection molds.
Throughout the day: Whether in a car equipped with a complex engine block or in an airplane whose safety depends on heavy-duty turbine and fan discs – mobility relies on precision. In public transit as well, such as in a tram, robust clutch components ensure smooth operation.
Leisure: In our free time, efficiently manufactured bicycle pedals enable athletic activities, while precision-engineered golf clubs ensure a perfect game. In the field of medical technology, custom-fit knee implants restore quality of life.
After Work: In the home, appliances like vacuum cleaners do their job thanks to precision-engineered impellers. Even in consumer electronics such as televisions or toys like the classic Bobby Car, the production of precision-molded parts is crucial.
These examples shed light on what often happens behind the scenes: technological solutions that are indispensable to manufacturing.



A heavy-duty fan disk for an aircraft engine: precision-machined on a DMG MORI DMU 125 5-axis machine. For this component, the highest material integrity and absolute dimensional accuracy are critical to safety and efficiency in the aerospace industry (Pictures: DMG MORI)

From concept to finished product: The MX strategy as the foundation

As diverse as these products may seem in everyday life, their creation follows a common principle: a precisely coordinated process chain. DMG MORI makes this complexity manageable. With Machining Transformation (MX), the company combines process integration, automation, Digital Transformation (DX), and Green Transformation (GX) into a holistic manufacturing concept.
At the DMG MORI booth, you can see for yourself just how deeply modern manufacturing technology is embedded in everyday life.

Locating rings for precise mould attachment

With the new variants Z7517/…, Z7526/… and Z7527/…, HASCO is extending its proven locating ring range and offering mouldmakers even more possibilities for precise centring and reliable guiding of moulds when clamping on the injection moulding machine.
The new locating ring ensures, thanks to its 8 mm guide length, precise positioning on the machine side. The extended guide length reliably prevents any tipping of the mould, thereby increasing process reliability. Fixing holes enable reliable flush tightening, while flexible adjustment possibilities guarantee optimum integration in different mould constructions.

Perfectly coordinated with HASCO thermal insulating sheets

The new variants, with thicknesses of 6 and 8 mm, are coordinated with HASCO thermal insulating sheets. This ensures an accurate connection and high stability, even in demanding applications.



(Picture: HASCO)

Alongside the new variants, the HASCO locating ring range also includes a large number of diameters, installation depths and technical versions, as well as a variety of other designs for many different mould sizes and machine types. The entire range can be easily viewed and ordered via the HASCO web shop.
With these new locating rings, HASCO is expanding its product range with practical solutions that combine maximum precision, simple assembly and long-term process reliability.

New developments for Oerlikon HRSflow's pin-less valve gate solution

Hot-runner technology opens up new possibilities for polymer processing and applications

STARgate HRS™ hot runner technology, a revolutionary solution featuring a diaphragm-based gate shut-off system for precise control of melt flow into the cavity, is expanding its application range to cover an even wider variety of materials and applications.

The STARgate HRS™ hot-runner nozzle concept has been expanded beyond traditional PP and r-PP packaging applications. The pin-less valve gate solution is now also suitable for the injection molding of additional resins, including PMMA, ABS, PS, HDPE, LDPE, and filled polymers, extending its use across a wide range of applications and market segments. It is also suitable for components ranging from 40 grams to 2.5 kg.

Compared to conventional solutions, the STARgate HRS™ diaphragm concept provides optimized cooling performance, enabling cycle-time reductions of up to 20% and, consequently, higher productivity. In addition, the free-flow design in the nozzle ensures smoother plastic flow at a consistent melt velocity while minimizing stagnation areas. This allows faster color changes, resulting in lower scrap rates.

Experience at the Oerlikon HRSflow R&D Technical Center shows that, with innovative STARgate HRS™ technology, part weight reductions of up to 17% can be achieved. By enabling more efficient and uniform filling, and in combination with optimized application engineering, mold design, and injection molding machine settings, the technology allows wall thickness to be reduced, resulting in lighter parts.

Its innovative design eliminates the need for actuator installation space, which in conventional systems is typically positioned axially above the valve pins, allowing for reduced tool stack height. In addition, the pin-less configuration enables smaller nozzle diameters and reduced mold pocket sizes, making STARgate HRS™ an exceptionally compact solution.



STARgate HRS™ expands its range of applications and materials, including PMMA, ABS, PS, HDPE, LDPE and filled polymers (Picture: © Oerlikon HRSflow)

A real case study presented at Flow Beyond 2026

STARgate HRS™ was demonstrated live at Flow Beyond 2026, the international summit held in Italy in September. During a live production trial, a thin-wall 1.5-liter bucket made of r-PP was molded in a two-cavity tool developed by Inmold Group.

Thanks to the outstanding synergy between the injection molding machine, mold design, and hot runner system equipped with STARgate HRS™ technology, the 41-gram bucket achieved an ambitious cycle time of just 4.7 seconds without the use of a take-out plate, while delivering zero stringing and flawless part quality.

Project partners included ENGEL, Guztech Polymers, and Inmold Group. This achievement demonstrates that when the technologies involved in the injection molding process are perfectly matched, manufacturers can achieve a new level of productivity and process reliability without compromising product quality.

OPEN MIND at Formnext Expo 2026

Seamless additive and subtractive processes

From November 17–20, 2026, at Booth A18 in Hall 12.0 at Formnext, OPEN MIND will demonstrate how the *hyper*MILL® CAD/CAM system supports additive manufacturing and subtractive post-processing of parts. Intelligent, end-to-end processes are not limited to hybrid machines. The BEST FIT function eliminates sources of error when switching between machines.

Whether using Direct Energy Deposition (DED) or Wire Arc Additive Manufacturing (WAAM), fully exploiting the potential of additive manufacturing often requires programming highly complex 5-axis simultaneous machining operations. DED additive manufacturing toolpath planning differs from the subtractive one in the sense that the first focuses on keeping a constant velocity to achieve a uniform material deposition, while the second on respecting precise position and orientation. With *hyper*MILL® ADDITIVE Manufacturing, NC codes for metal deposition can be programmed with ease. Thanks to *hyper*MILL® VIRTUAL Machining, the simulation of machine movements for collision avoidance is based on the NC code and the machine's digital twin. Unlike many other solutions, the ADDITIVE Manufacturing module is fully integrated into *hyper*MILL® and serves as a comprehensive software solution for efficient hybrid machining that combines additive and subtractive processes on a single machine.

Close to the final dimensions

While hybrid machines offer advantages in maintenance, prototyping, and small-batch production, a process chain involving multiple machines can be more cost-effective for larger production runs. Until now, one of the major challenges in post-processing 3D printed parts has been aligning the blank in the machine tool. Since high-precision machining is performed on 3D-printed parts that are already close to their final dimensions, OPEN MIND offers BEST FIT, an automated solution for precise workpiece alignment. BEST FIT replaces the costly and error-prone manual workpiece alignment process by adapting the NC code and machine simulation to the actual position and orientation of the part.

"From conformal cooling channels in mold manufacturing to innovative material combinations and customized medical implants, all the way up to lightweight structural components for the aerospace industry: Formnext exhibitors and visitors are well aware of the potential of the additive and hybrid technology. And in fact, many well-known companies in these industries are already using *hyper*MILL®'s additive manufacturing capabilities," says David Bourdages, Product Manager for Additive Manufacturing at OPEN MIND Technologies AG. "As additive manufacturing becomes increasingly established, it is equally important to create a robust, integrated virtual environment that supports all phases of production. This is where software plays a key role, and *hyper*MILL® is perfectly suited to meet these requirements. We offer seamless process chains covering the entire production process, from CAD to CAM programming for additive and subtractive manufacturing to NC-code-based simulation using a digital twin, the integration of CAD/CAM software and machines with *hyper*MILL® CONNECTED Machining, and finally production planning and control with Hummingbird-MES."



Pump impeller produced using additive manufacturing followed by subtractive machining (Picture: OPEN MIND)

Increased productivity and precision with 5-axis technology

High precision, complex component geometries, and increasing demands on quality and productivity characterize manufacturing in the aerospace industry. For Sonaca Brazil, high-performance manufacturing technologies are therefore a decisive factor in reliably meeting the requirements of international customers. Since 2018, the Brazilian company has relied on machining centers from GROB. With 14 machines in operation today – including the G750 installed in 2025—the collaboration has evolved into a long-term partnership.



Sonaca Brazil's manufacturing facilities produce complex components for the international aerospace industry

Sonaca Brazil is part of the Belgian Sonaca Group and has been operating in Brazil for 25 years. The company employs approximately 750 people there and is active in various business areas—ranging from assembly and component manufacturing to engineering and toolmaking services. Its most important customers include Embraer and Airbus, among others. A key focus is on the manufacture of aerospace components made from 2000 and 7000 series aluminum alloys.

Efficiently performing the task of machining complex components

The demands placed on the production of aerospace components are high – and continue to rise. Complex components must be manufactured with high precision while remaining cost-effective. This is precisely where GROB's 5-axis technology offers Sonaca Brazil decisive advantages.

"With GROB's 5-axis machining centers, we can produce complex components to a high standard of quality and with shorter machining times," says Matheus Belitato, Head of Manufacturing Engineering at Sonaca, describing the benefits of the technology. Especially for large components, simultaneous machining enables more efficient production and helps reliably achieve the required quality.

Although Sonaca Brazil already had 5-axis machines, GROB's technology has, according to the company, enabled a further step in development . The continuous improvement of manufacturing processes and the pursuit of higher quality are central components of their collaboration.

Significantly shorter machining times and less scrap

A specific project illustrates just how significant the impact on production can be. Compared to previous technologies, Sonaca Brazil was able to reduce the machining



Sonaca Brazil also manufactures large-format aluminum components for the aerospace industry

time for a component from about six hours to approximately two and a half hours.
At the same time, there was a significant reduction in the scrap rate. The actual scrap rate was only one-tenth of the value originally projected for the project. This not only significantly reduced production times but also improved process reliability and cost-effectiveness.
For Sonaca Brazil, this development is a key building block in meeting the growing demands of the aerospace industry while expanding production capacity for customers such as Embraer and international markets.

Technology development through close collaboration

A key factor in the project's success was the close collaboration between Sonaca Brazil and GROB. GROB's Technology and Application Center (TAC) in Brazil played a particularly important role in this regard. Since the implementation of the project presented new technological challenges for Sonaca Brazil, intensive support was required during the technology implementation phase. The very first component of the project was manufactured jointly at GROB's TAC. This allowed the processes to be developed, tested, and optimized under real-world conditions before the technology was transferred to series production.
"The close and strong relationship with GROB, especially with GROB's application engineers, helped us greatly in implementing the technology," emphasizes Everton Santos, Production Manager at Sonaca.



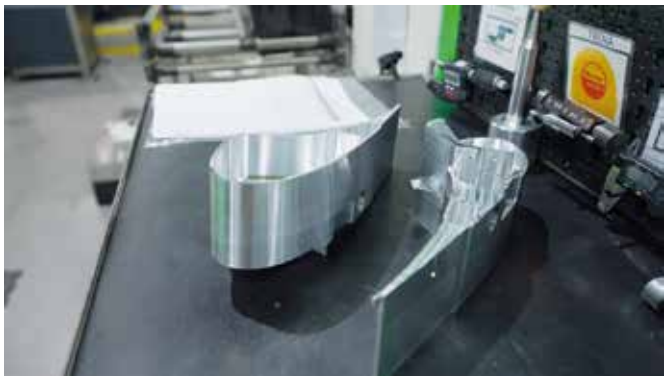
Complex aluminum components are part of everyday production at Sonaca Brazil

From machine supplier to technology partner

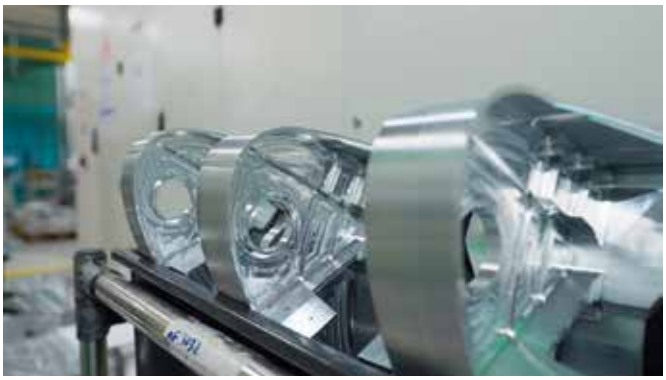
The collaboration between Sonaca Brazil and GROB is not limited to individual projects. Since purchasing its first GROB machining center in 2018, the company has also been utilizing GROB' technical support and services – ranging from spare parts and technical assistance to maintenance services. Today, GROB is therefore much more than just a machine supplier to Sonaca Brazil. When planning new projects, GROB machines regularly serve as a reference. "When we estimate a new project today, we consider GROB machines to be the benchmark," says Santos.
This long-term partnership combines machines, technology, service, and process expertise. Especially in an industry like aerospace, where high demands are placed on quality, precision, and process reliability, this holistic approach is a key component of Sonaca Brazil's manufacturing strategy.



A total of 14 GROB machines are in operation at Sonaca Brazil



GROB's 5-axis technology helps Sonaca Brazil manufacture components efficiently



The GROB machines are used to produce sophisticated components with complex geometries

High productivity for international markets

With 14 GROB machines now in operation, Sonaca Brazil has a powerful technological foundation for the task of machining complex aluminum components.



Precision and quality play a central role in every machining step; with GROB, Sonaca Brazil has found the right partner

The machines achieve high productivity, which Sonaca Brazil evaluates, among other things, using Overall Equipment Effectiveness (OEE). This enables the company to reliably meet the requirements of both Embraer and other international customers.

For Sonaca Brazil, this long-standing collaboration demonstrates the difference a partnership can make—one that goes beyond simply supplying machines: from the joint development and testing of manufacturing processes, through the implementation of the technology, to service and maintenance. "GROB doesn't just sell machines. GROB offers complete solutions," Belitato concludes.

For Sonaca Brazil, this combination of technology, application expertise, and long-term support forms the foundation for a partnership that is set to be further expanded in future projects.



A look inside Sonaca Brazil's production facility (Pictures: GROB-WERKE GmbH & Co.KG)

Designing mould bases and stamping dies efficiently

When designing mould bases and stamping dies, the fast availability of information, the right components and efficient digital tools are crucial. This is why Meusburger has brought together in their portal the content and functions that are especially relevant for designers. In the redesigned areas for mould making and die making, users can find configurators, CAD tools and also practical information and support for various design tasks, all in one place.

All configurators at a glance

The areas for designers organise the digital resources available by application area. In the mould making area you will find, among other things, configurators for entire mould bases, hot runner systems, ejectors and guiding elements. For die making, Meusburger offers configurators for entire die sets, plates, blocks for eroding, guide pillars, and cutting elements, among others. Solutions for individual design steps are also available. The material selection wizard is there to help when choosing the right material for a specific application, and plates can be configured step by step according to customised parameters with the plate configurator. The label configurator enables the fast creation of custom labels.

Finish configuration and move straight to the next step

The configurators guide the user in a structured manner through the selection of the required parameters. An intuitive display and 3D previews help in the selection of the right variation. Once the configuration is complete, the corresponding CAD data is immediately available for integration into the design. At the same time, users who have logged into the portal also receive immediate information on the net price and delivery times. This helps design tasks to be completed more efficiently and configured components to be integrated into existing projects without additional work steps.

Meusburger CAD tool for efficient design

Regardless of the CAD system in use, the Meusburger CAD tool supports efficient design. It is compatible with various CAD systems and can be flexibly integrated into existing workflows. The user has direct access to the Meusburger standard parts library and can use the tool both online and offline. Regular updates ensure the latest data. Configurable models, including installation space, as well as integrated wizards for mould bases and die sets support the design process.



The Meusburger CAD tool is compatible with various CAD systems and can be flexibly integrated into existing workflows (Picture: Meusburger)

Supporting structured design processes

Alongside configurators and CAD solutions, Meusburger also offers a specifications document template for mould and die making. The template, developed by design experts, helps to systematically identify relevant requirements and prepare the selection of suitable components. With the areas for designers, Meusburger brings together digital tools, product information and practical resources for a range of tasks in mould and die making.

Further information and the digital resources for designers are available in the Meusburger portal: www.meusburger.com/designers

Humanoid robotics on the path to industrial scaling

Hardly any other technology is currently attracting as much attention in the industry as humanoid robots. Whether it's announcements from major technology companies, new investments, or initial practical applications in factories and logistics centers, this field is gaining momentum worldwide.



Humanoids are robotic systems modeled after the human form and designed to perform complex tasks. Initial applications are focused primarily on industry and logistics, where they can assist with repetitive, physically demanding, or hard-to-staff tasks. Experts predict that the production numbers of humanoid robots will rise into the millions in the coming years. This brings a new industry into focus – one that is on the verge of transitioning from technological development to large-scale production.



The transition from development to mass production

Humanoid robotics is currently reaching a decisive turning point. Many manufacturers are moving beyond the pure development and prototyping phase and are poised to transition to industrial mass production.
However, as production ramps up, so do the demands on manufacturing: In the future, components must be produced cost-effectively, reproducibly, and to a consistently high standard of quality in order to meet the expected production volumes. Manufacturers and suppliers are therefore challenged to establish the appropriate production structures early on and prepare their manufacturing capacities for upcoming market developments.



Production expertise for the rollout of humanoid robotics

GROB-WERKE GmbH & Co. KG, based in Mindelheim in the Unterallgäu region, has decades of experience in the development and implementation of highly automated production systems for high-volume production. With technologies for the manufacture of electric drives and battery systems, as well as solutions for the machining of precision structural and functional components, GROB covers key areas of the humanoid robot value chain. In addition, the company offers automation and assembly solutions for the assembly of complex subassemblies, as

well as the intelligent integration of robotic systems into modern production lines.
A key factor for success in new markets is the scalability of production. To achieve this, GROB relies on modular production concepts that can be gradually adapted to increasing production volumes. Production capacities can thus be flexibly expanded without having to fundamentally alter existing structures. As an innovation leader, GROB has already successfully implemented its first series production projects in the field of humanoid robotics and supported well-known manufacturers during their production ramp-up.

Actuators as key components of humanoid robots

Actuators play a particularly important role in humanoid robotics. They generate all movements and are also among the most technically challenging and cost-intensive components of a robot.
Humanoid robots – excluding the hands – often have more than 30 electric drives. Depending on the complexity of the hands, numerous additional miniature motors may be required. The requirements for efficiency, precision, dynamics, and safety are exceptionally high, as actuators play a decisive role in determining the mobility, stability, and performance of the entire system.
GROB offers a wide range of manufacturing technologies for the production of these drive systems. Whether for frameless torque motors, brushless DC motors (BLDC), or permanent magnet synchronous motors (PMSM): With a variety of winding and manufacturing processes, suitable solutions are available for the production of stators, rotors, and the assembly of complete electric motors.



(Pictures: GROB-WERKE GmbH & Co. KG)

GROB as an "Enabler" of a future industry

With the expected rise of humanoid robotics, demand is growing for high-performance, scalable, and cost-effective production solutions. This is exactly where GROB comes in. Thanks to years of experience in assembly technology, machining, automation, and digitalization, GROB supports manufacturers and suppliers in successfully making the transition from development to industrial series production. In doing so, the company is making an important contribution to the development of an industry that is likely to be among the most significant growth markets in the global manufacturing sector in the coming years.





Hydraulic components for efficient processes in mould making

With its coordinated hydraulic range which includes hydraulic cylinders, sensors and hydraulic connections, Meusburger offers comprehensive solutions particularly suited to mould making. Users benefit from immediately available components with transparent prices that can be ordered directly without a quote request. Standard FKM seals enable reliable use at temperatures up to 180 °C, while the availability of CAD data including installation spaces supports fast and error-free design. The coordinated range ensures high process reliability and reduces the effort required throughout the entire development and procurement process.

Hydraulic cylinders for sophisticated applications

Meusburger's range includes hydraulic cylinders that are particularly suited to the requirements in mould making and can be used in diverse installation situations and applications. FKM seals, fitted as standard, ensure reliable operation at temperatures of up to 180 °C. A hardened piston rod, combined with a double seal, ensures long-lasting, clean and reliable operation. Compact cylinders for attachment as well as compact, exclusive build-in cylinders for integration into the mould plate can also be found in the range. The range is complemented by locking cylinders designed for applications involving high injection forces. For the design, the CAD data including installation spaces is available immediately. This allows components to be integrated directly into the design, helping to prevent design errors at an early stage.

Accessories and sensors from one source

Alongside the hydraulic cylinders, Meusburger offers a wide range of accessories and maintenance components. Included in this are couplers for mechanical connection, seal kits and assembly tools for maintenance and repair work. Users can therefore find all the relevant components from one source and benefit from reliable functioning of the cylinder. For electronic position monitoring, select compact cylinders are available with magnetic proximity sensors. The sensors can be easily positioned and adjusted in the groove. Matching cables, connectors and logic distributors facilitate signal transmission. By combining several signals via logic distributors, the amount of wiring required can be reduced whilst minimising the risk of voltage drops.



Meusburger's range includes hydraulic cylinders and accessories that are particularly suited to the requirements in mould making (Picture: Meusburger)

Coordinated hydraulic connections

For the hydraulic connection of the cylinders Meusburger offers suitable fittings, screw plugs and flat-sealing hydraulic couplings. The low-leakage versions ensure safe operation and a reliable connection within the hydraulic system.

Efficient design with standard components

A significant advantage of the hydraulics range is in the support of more efficient development and design processes. Immediately available CAD data and already included installation spaces enable fast integration into the design. The standard solutions from Meusburger reduce the design effort, minimise potential sources of error and accelerate the process from planning through to realisation. Users also benefit from transparent pricing, high availability and the option to place orders directly without having to request a quote first. This shortens the procurement process and creates additional planning security for mould design and production.
Further information on the hydraulics range can be found in the Meusburger portal: www.meusburger.com/hydraulics

Blocks for eroding for every application

Meusburger blocks for eroding are especially suitable as starting material for the manufacturing of cutting punches and die plates. They feature maximum precision and high flexibility and are thus an optimal solution for mould and die makers for demanding machining operations. Furthermore, the blocks for eroding are available from stock at the standard parts manufacturer, even in hardened versions.

Maximum precision for demanding applications

Production of the Meusburger blocks for eroding is subject to the strictest quality checks, so the blocks guarantee maximum dimensional accuracy. This is especially important for making precision moulds and dies, for example for the automotive industry, for medical technology or for producing complex plastic parts. The precise machining of the blocks enables efficient further processing and contributes significantly to improving the quality of the final products.

Maximum flexibility due to various versions

In order to respond to the different requirements in mould and die making, the blocks for eroding are available in a wide range of sizes and materials. This enables flexible use of the blocks for eroding in different applications and machining processes. The steel selection and working hardness depend on the sheet thickness and the strength of the material to be cut. The greater these two, the higher the loads on the die. An overview of the Meusburger range is available here: www.meusburger.com/blocks-for-eroding

Configuration of custom blocks for eroding

The Meusburger portal offers customers a practical option for customising blocks for eroding: they can have starting holes introduced in the blocks. Up to 200 freely configurable starting holes with a diameter of 1 mm enable maximum flexibility when designing the EDM contours. Except for the materials CF-H25S+ and CF-H40S+ (carbide), this option is available for all blocks for eroding, whether heat-treated for stress relief or hardened, and spares users the usually necessary introduction of starting holes for wire EDM, which can be quite cost-expensive. Moreover, the company also offers the possibility to introduce threads from M4 to M10 according to individual specifications into the already hardened blocks for eroding, so the fixation of contour punches is further optimised. This in turn contributes to an even more efficient and smooth production process.
The configurator for blocks for eroding can be tested here: www.meusburger.com/configurator-for-blocks-for-eroding



Usage example: Meusburger blocks for eroding with starting hole and thread

(Picture: Meusburger)

Chips as the limiting runtime factor

Ossenbrüggen Feinwerktechnik machines large components in just one clamping setup using a 5-axis mill-turn version of a HERMLE C 62 MT. This creates the ideal conditions for tight tolerances and ensures greater process reliability and flexibility for the contract manufacturer.



Using a 5-axis mill-turn version of the C 62 MT, Ossenbrüggen Feinwerktechnik manufactures large components in just one clamping setup (Pictures: HERMLE)

While the 5-axis machining centre machines a component – which typically takes 20 to 40 hours – the next workpiece is ready and waiting at the setup station. To make full use of this time overnight and at weekends, it is not enough for the program and machine to operate properly. Tool storage, pallet handling, chip removal and quality control also form a coordinated, overall system. At Ossenbrüggen Feinwerktechnik, these processes work together seamlessly in everyday production. The contract manufacturer machines large workpieces with tight tolerances in just one clamping setup on a HERMLE C 62 MT with rotary functionality.

The goal: The component should no longer transfer between a turning centre and a milling centre. Each additional step requires another clamping setup and additional measurement tasks, which increases the risk of position deviations and damage. “We aim to avoid these interfaces, especially when machining large workpieces that require long runtimes and need to meet tight dimensional and positional tolerances,” says Daniel Kiefer, production manager at Ossenbrüggen. Previously, components were first turned and then transferred to a milling centre for further machining. Today, the company combines several machining steps on just one machine.

Many industries, small batch sizes, tight specifications

Nearly 10,000 square metres of production space, around 75 CNC machining centres and components for the laser, analytical and medical technology sectors, as well as for the semiconductor industry and mechanical engineering: At Ossenbrüggen, large-scale production meets an array of parts. Whether producing small series or machining large components, the company must complete every order reliably and cost effectively.

Ossenbrüggen Feinwerktechnik GmbH & Co. KG was founded in 2000 and is now based in Moorrege, which lies northwest of Hamburg. It employs around 240 people and machines aluminium, stainless steel, steel, non-ferrous metals, plastics and, occasionally, titanium. Batch sizes vary from prototypes and small pre-series production runs to recurring orders involving large quantities of workpieces. “Components, regardless of their size, have become significantly more demanding in



The C 42 MT combines milling and rotational machining in one machining centre



Thanks to the standardised Siemens control, staff can be deployed flexibly across various machining centres

terms of their dimensional accuracy in recent years," claims Jens Ossenbrüggen, managing director and company founder.
For example, additional specifications apply for components used in laser technology. Cooling lubricants must not be left on the surface for too long, as any residues will subsequently evaporate. "That can damage lenses or mirrors inside the laser systems," the managing director explains. These requirements have led Ossenbrüggen to realise that a successful production process involves far more than machining alone. Cleaning, material flow and quality control are just as much a part of component safety as the actual machining process.

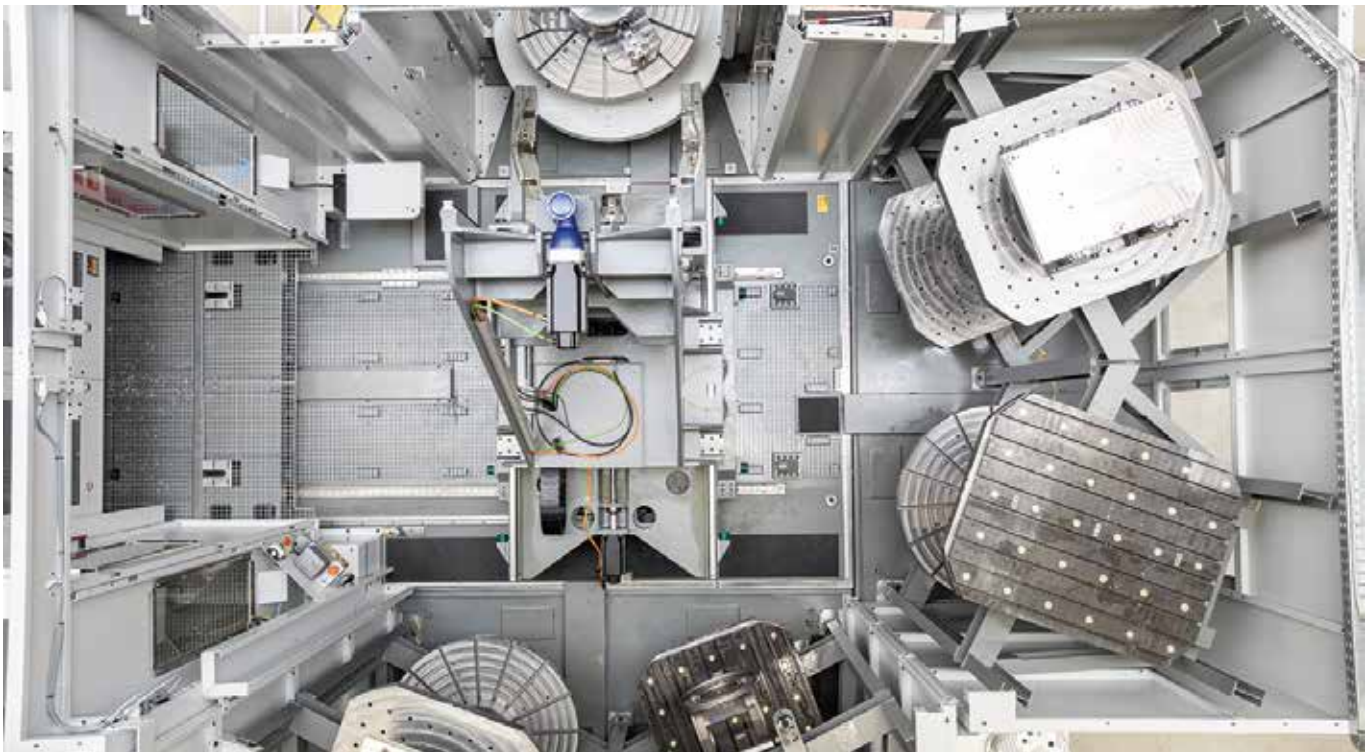
Better to be steady than just fast

For Ossenbrüggen, evaluating machining processes means more than simply achieving the fastest possible cycle time. A program that manufactures a product faster may have its drawbacks if it places greater strain on the milling head and the machine. Tool breakage during an overnight production run brings the machining centre to a halt for hours. In the worst case, it could also result in damage to the component. "If the program runs two minutes longer, we might have taken a bit longer than planned. But there was no downtime, and the next morning, precision parts are waiting in the rack storage of the pallet changer," says Jens Ossenbrüggen.



After starting the program, the C 62 MT machines components for 20 to 40 hours

For the contract manufacturer, success depends on reliable overall performance: a stable process, perfect results and machines that make the most of the runtime available.
When market demand increases, the number of orders can rise at short notice. Production planning and customer service must then



The pallet changer PW 3000 boosts unmanned runtime



Geometrically complex components can also be manufactured in just one clamping setup (left)



Ossenbrüggen Feinwerktechnik manufactures components for the laser, analytical and medical technology sectors, as well as for the semiconductor industry and mechanical engineering (right)

quickly adapt delivery schedules, machine capacities and runtimes. An additional system must therefore do more than just machine individual orders; it should also ease production bottlenecks and free up capacity to accommodate varying orders.

Standardised control facilitates detailed planning

In 2025, Ossenbrüggen expanded its machinery to include, in addition to a second C 62 MT, a C 42 MT GEN2, a C 32 GEN2 and the robot system RS 05-2. This allows the company to allocate workpieces of various sizes more precisely to the most suitable machines while further boosting its level of automation. For instance, the C 62 MT is the ideal choice for large and complex workpieces. It is the second machining centre of its kind at the company. Jens Ossenbrüggen's strategy for retaining flexibility is having several machines of the same type. Milling centres with identical designs or similar technical specifications offer greater flexibility during peaks in orders or when a system is out of service. For the contract manufacturer, this additional capacity is crucial, as it allows production staff to respond quicker to changes. The operating logic of all HERMLE system is identical. “This enables us to deploy our staff more flexibly,” says production manager Daniel Kiefer. And that facilitates detailed planning. When it comes to the control, Ossenbrüggen also relies on standardised processes: All the CNC machines operate with Siemens. This enables qualified employees to familiarise themselves faster with machining centres, regardless of which one they are working on.

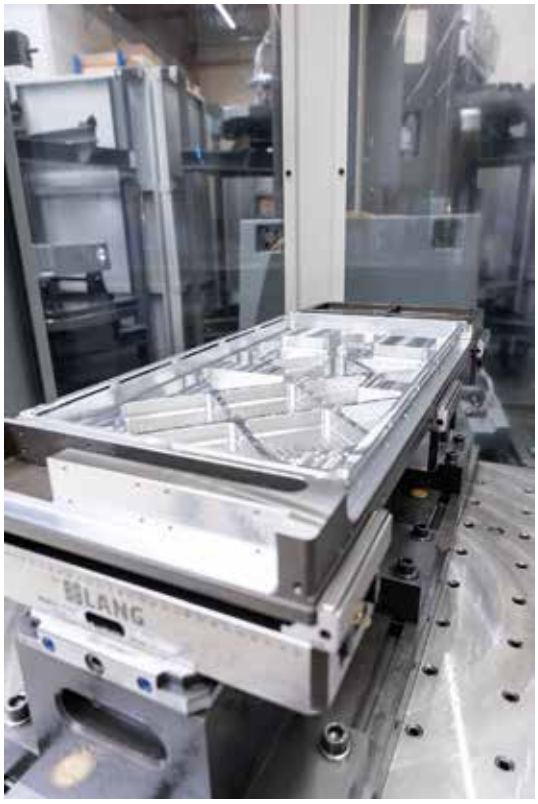
Automated machining of large workpieces

The turning and milling centre C 62 MT machines workpieces weighing up to 2,500 kg and can accommodate parts measuring up to 1,200 mm in diameter and 900 mm in height. The additional magazine ZM 260 is

Besides dimensional accuracy, customers also demand perfect surfaces



While the machine is busy at work, the next workpiece can already be set up





The MT version combines 5-axis milling with rotational machining. This enables several machining operations to be combined in just one clamping setup



The component geometry develops step by step: The C 62 MT machines the workpieces with outstanding precision

configured as a double tower and can hold up to 260 tools – which complement the 50 tools in the machine. This enables the contract manufacturer to prepare machining operations that require a large number of tools without having to interrupt the process due to a tool change outside the magazine. At the new C 62 MT, the adapted pallet changer PW 3000 stores prepared components in eight pockets. “Automation allows us to extend production time through additional unmanned hours,” explains Daniel Kiefer. When machining large workpieces, however, there is more to unmanned runtime than simply leaving the machine running. Chip removal can also be a limiting factor. During periods of intensive machining, collecting containers need emptying roughly every two hours. In this case, a qualified employee would normally have to replace the carriage, even though the machine could continue milling. “We therefore use the chip presses C 62 MT, especially with large CNC machining centres,” says Daniel Kiefer. They reduce the chip volume to approximately one-eighth of its original size. At the same time, Ossenbrüggen is able to recover cooling lubricant. The briquettes are easier to handle and can be disposed of more efficiently. The example shows: Reliable and extended runtimes are made possible through the coordination of automation, tool supply, pallet handling, chip removal, material planning and quality control.



Production manager Daniel Kiefer: “The standardised operating logic across all HERMLE systems offers plenty of flexibility in terms of staff deployment. Our qualified employees are able to work on an array of machines with ease.”

In Moorrege, which lies northwest of Hamburg, Ossenbrüggen Feinwerktechnik manufactures components for a range of industries across 10,000 square metres of production space





Production manager Daniel Kiefer, CNC milling operators Alexander Huhsch, Christopher Böttcher and Mika Ossenbrüggen, together with Ina Ossenbrüggen and Jens Ossenbrüggen, both managing directors (from left)

UNITED MACHINING SOLUTIONS presented five world premieres at AMB 2026



AGIE CHARMILLES CUT P 600

Five world premieres, two strong brands, and a broad spectrum of state-of-the-art manufacturing technologies: UNITED MACHINING SOLUTIONS presented five new machines to the public for the first time at AMB 2026 in Stuttgart. AGIE CHARMILLES unveiled three new products in the field of EDM, while WALTER introduced two new solutions for tool machining and metrology.

WALTER HELICHECK COMPACT



Together, these world premieres demonstrate how UNITED MACHINING SOLUTIONS addresses diverse manufacturing requirements with precise, productive, and future-oriented technologies.

AGIE CHARMILLES: Three solutions for the most demanding requirements

With the CUT P 600, AGIE CHARMILLES presents a solution for premium precision in wire EDM. It combines ultra-fine detail machining with precise process control and reliable automation. This makes the machine particularly suitable for manufacturers of high-quality workpieces who require reproducible results with minimal dependence on operating personnel.

The CUT S 600 brings advanced technology to automated production environments. Its symmetrical machine architecture, modern automation concept, and unrestricted taper capability ensure consistent precision even over long machining cycles. The machine truly demonstrates its strengths, particularly when dealing with complex geometries and automated manufacturing processes.

The CUT 1000 NANO9 is designed for applications where micrometer-level precision is no longer sufficient. Motion control at the nano level, the machining of ultra-fine wires, and exceptional repeatability enable the highest precision. As a result, the machine is ideally suited for demanding applications in optical connectivity, micro-stamping technology, the watchmaking industry, and medical technology, among others.

WALTER: Efficiency and precision in tool machining

The HELITRONIC FUSION combines tool grinding and integrated automation in a particularly compact machine design. Tool and workpiece changes can occur simultaneously, while a newly developed wheel changer enables rapid changes. High thermal stability, a vibration-damping mineral cast bed, and a symmetrical axis design ensure manufacturing accuracy. At the same time, optimized cooling, exhaust, and glass scales without purge air reduce energy consumption and operating costs.

With the HELICHECK COMPACT, WALTER offers high-precision tool measurement technology at an attractive entry-level price. The measuring machine offers a level of measurement uncertainty that is otherwise often reserved for significantly more expensive systems. The proven granite construction ensures high repeatability, while the latest C.O.R.E. technology and the WALTER Metrology Center software enable modern and versatile tool measurement.

Mold-Masters® DeXa® side gate technology receives Innovation Award at Fakuma 2026

DeXa Side gating technology delivers precision process control for demanding medical and high-cavitation applications

Mold-Masters® is pleased to announce its new DeXa® side gate solution received the inaugural FAKUMA Innovation Award 2026 in the injection molding category. Designed to overcome the challenges associated with high-cavity side gating, DeXa's advanced solution optimizes part quality through precision process control.

"Understanding application-specific limitations is key to innovation, and we are honored to receive the FAKUMA Innovation Award for our DeXa side gate nozzle," says Thomas Bechtel, Sr. Director, Global R&D. "By developing solutions that improve molding performance and reduce risk, we help customers achieve better outcomes and create greater value."

DeXa features individual precision tip heat control which enables cavity-specific process optimization and balance adjustments to improve part quality without affecting neighboring cavities. By comparison, conventional side gate systems use group temperature control methods, meaning there is only one temperature zone for a group of parts (up to 8). Therefore, adjusting processing temperatures to improve the quality of a single part affects multiple parts. In addition, DeXa's SPEED-LOK™ center bolt design simplifies maintenance and reduces downtime. For more information visit DEXA | Mold Masters.



(Picture: Mold-Masters®)

The Fakuma Innovation award was presented by organizer, Schall Messen, and trade publication, K-ZEITUNG, during a special ceremony at the Fakuma International Trade Fair for Plastics Processing. The new award program recognizes groundbreaking technological advancements in the plastics industry.



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Innovations in tool manufacturing



Exterior view of the HELITRONIC FUSION



HELITRONIC FUSION exterior view (side)

Two world premieres, one stage across two continents: At IMTS in Chicago (September 14–19) and simultaneously at AMB in Stuttgart (September 15–19), WALTER unveiled two world premieres at the UNITED MACHINING SOLUTIONS booth – the HELITRONIC FUSION and the HELICHECK COMPACT. With an elaborately staged show at both trade shows, WALTER delivered one of the most talked-about appearances of the year and underscored its commitment to actively shaping the tool grinding and measuring machine market.

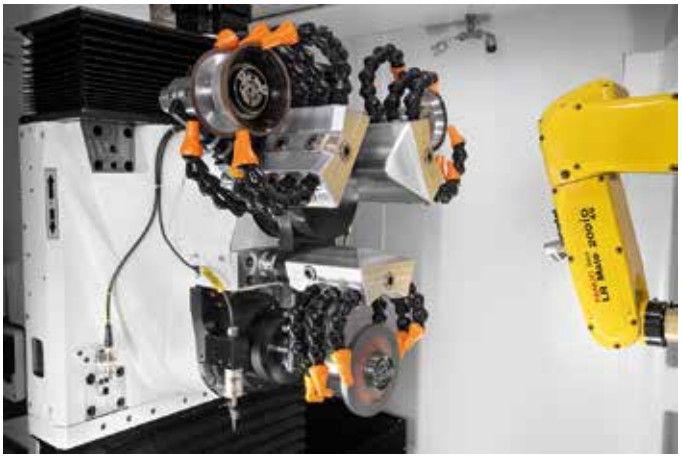
Two world premieres at once

Anyone who manufactures cutting tools for the automotive industry, mechanical engineering, or aerospace knows the pressures of the market: maximum precision, short turnaround times, and decreasing operating costs must all be achieved simultaneously. WALTER re-sponds precisely to this with its two new machines. While the HELITRONIC FUSION takes the production of rotationally symmetric cutting tools to a new level of efficiency, the HELICHECK COMPACT targets those new to the world of measurement technology: high-precision tool measurement at an entry-level price.

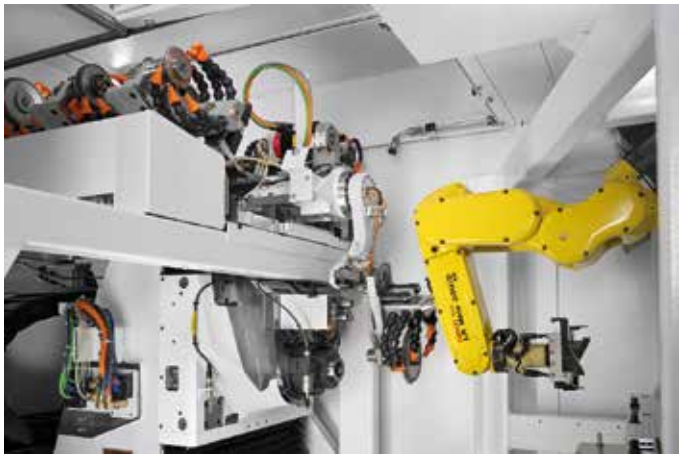
Fully integrated automation reimagined

The HELITRONIC FUSION was specifically designed for the production of drills, end mills, profile tools, countersinks, and reamers, and is one of the first machines in its class to combine fully integrated automation for workpieces and tools with a compact footprint. Despite a maximum grinding length of 380 millimeters and tool diameters up to 260 millimeters, it re-quires significantly less floor space than comparable machine designs. This is the re-

HELITRONIC FUSION 3-disc changer



HELITRONIC FUSION 8-disc changer



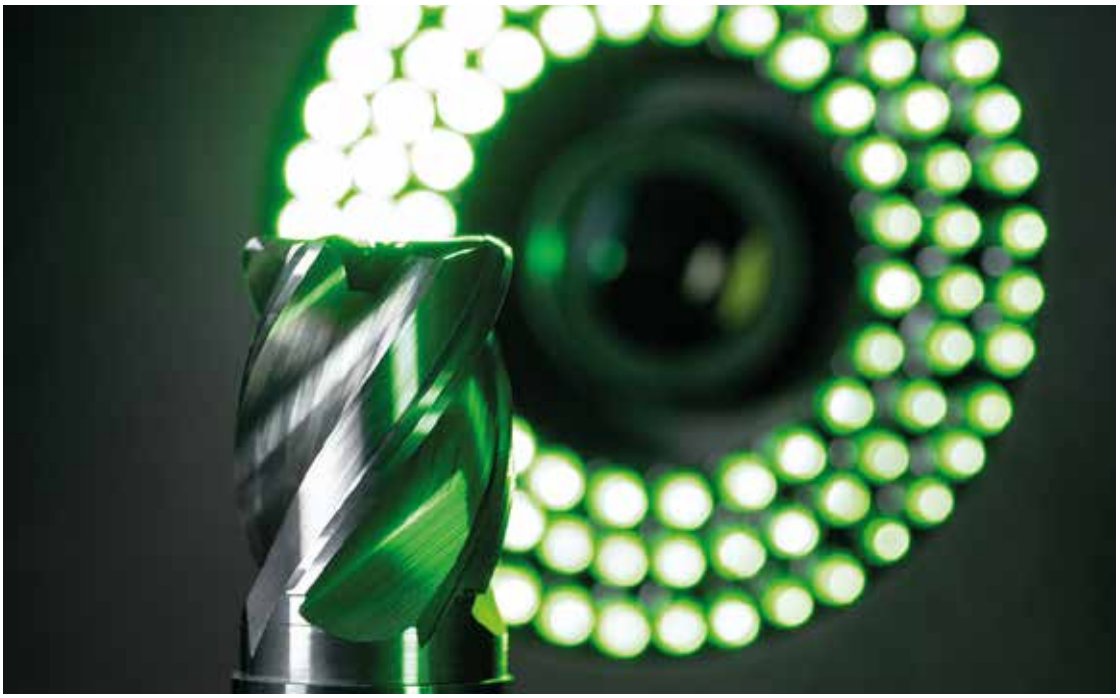
sult of a new cross-bed design featuring high thermal stability, as well as static and dynamic rigidity with symmetrical kinematics.
Users achieve the greatest productivity gains in the details: tool and wheel changes occur in parallel. The wheel change itself takes only a few seconds. This is made possible by a newly developed wheel changer. A vibration-damping mineral cast bed with a symmetrical axis lay-out also minimizes vibrations and ensures consistently high manufacturing accuracy, even over long production runs.
WALTER has also set new standards in energy efficiency: For the first time in its product portfolio, high-precision glass scales are used entirely without blocking air, which significantly reduces energy consumption. Drive cooling sized to meet actual demand and optimized ex-haust systems further lower operating costs. The package is rounded out by the intuitive C.O.R.E. technology with a large touch panel, IoT connectivity, and the latest generation of the optional Fanuc robot.



HELICHECK COMPACT exterior view

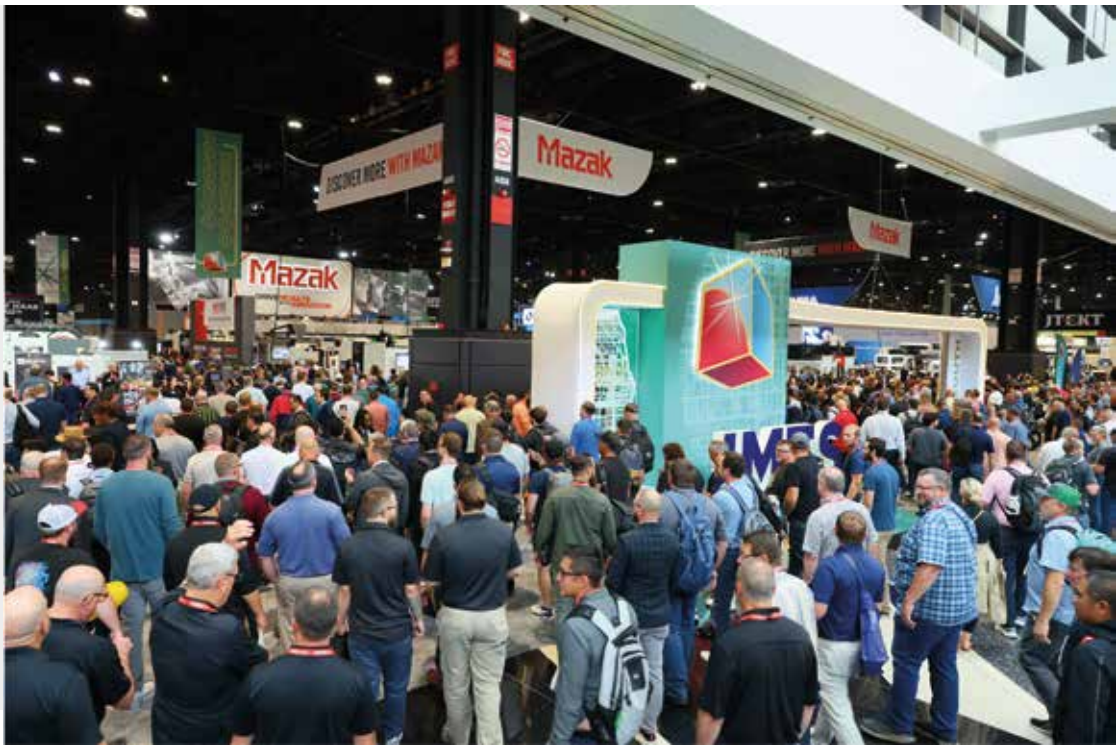
New tool measuring machine

At the same time, WALTER introduced the HELICHECK COMPACT, a new tool measuring machine specifically designed for those new to the world of measurement technology. Pre-mium measurement technology at an entry-level price, based on the proven design of the HELICHECK series.
With a measurement uncertainty of EUX, MPE = 1.4 + l/300 µm, it performs at a level typically reserved for significantly more expensive measurement systems. The key specifications speak for themselves: maximum tool diameter of 255 millimeters, 180 millimeters using the throat gauge principle, and a maximum tool length of 365 millimeters on the SK 50 base.
The proven monolithic design based on a granite block ensures incredible repeatability. It runs on Windows 11 LTSC and utilizes the latest C.O.R.E. technology. On the software side, all features of the WALTER Metrology Center software are available, including EASY Check and the new grinding wheel measurement function. The new measuring machine is IoT-ready, ensuring compliance with the requirements of the Cyber Resilience Act.
A new measuring machine for all tool measurement applications and for all transmitted and reflected light measurements.



HELICHECK COMPACT tool measurement (Pictures: Walter Maschinenbau GmbH)

IMTS 2026 attracted 91,295 registrants, including 14,447 students and representatives from all 50 states, Washington, D.C., Puerto Rico, and 114 countries. The show featured 1,788 exhibiting companies and 1.17 million square feet of exhibit space. What differentiated IMTS 2026 was the strong focus on how manufacturing technology and investment are renewing America's industrial capability and strengthening the U.S. economy, industrial base, and national defense



IMTS 2026 Accelerates Technology Adoption, Shapes Next Chapter of Manufacturing

U.S. manufacturing momentum, AI-driven solutions, advanced technologies, and strong conference participation expanded the IMTS manufacturing ecosystem.

The 2026 edition of IMTS – The International Manufacturing Technology Show, which ran Sept. 14-19, reflected dynamic changes in manufacturing investment and how people view the industry, as well as an expanding ecosystem of technologies emphasizing AI and automation. IMTS 2026 attracted 91,295 registrants, including 14,447 students and representatives from all 50 states, Washington, D.C., Puerto Rico, and 123 countries. The show featured 1,788 exhibiting companies and 1.17 million square feet of exhibit space.

"What differentiated IMTS 2026 was the strong focus on how manufacturing technology and investment are renewing America's industrial capability and strengthening the U.S. economy, industrial base, and national defense," said Douglas K. Woods, president of AMT – The Association For Manufacturing Technology, which owns and produces IMTS. "Manufacturers and job shops came to find technologies that could immediately increase productivity, and they were joined by investors, Fortune 500 and Silicon Valley companies, government agencies, universities, and a new generation drawn to industrial AI, automation, space, and advanced manufacturing."

To put IMTS' importance in perspective, U.S. manufacturing generates $3 trillion in annual output – enough to rank as the world's eighth-largest economy if it were a country. This scale underscores the importance of recent momentum: On Sept. 13, AMT reported that manufacturing technology orders exceeded $500 million for the fifth consecutive month – only the second time this has occurred since AMT began collecting data in 1998. At the same time, durable goods manufacturers face a shortage of 435,000 workers, increasing the need for technology that helps companies overcome labor constraints. The Reshoring Initiative projects that approximately 400,000 jobs will have been reshored

by the end of 2026, while U.S. and foreign companies have announced $11.2 trillion in U.S. investment commitments.

Growing the Defense Industrial Base

Investments also include defense initiatives. Presentations at IMTS included those from Vice Admiral Robert Gaucher, director, Submarine Programs for the U.S. Department of War, and Capt. Jason Deichler, chief of staff, Direct Reporting Portfolio Manager Submarines at the U.S. Navy, and Capt. Kevin Moller. Two of America's largest shipbuilders, General Dynamics Electric Boat and Huntington Ingalls Industries, have been awarded a joint $76.6 billion contract to build 14 nuclear-powered submarines. Gaining the tens of millions of man-hours necessary to increase production requires engaging the defense industrial base and removing supply-chain bottlenecks. "As we build the future submarine fleet, we must take advantage of technology and advanced manufacturing from the start," said Gaucher. "IMTS 2026 shows our industry partners are ready to meet this challenge. Robotic assembly, automated tools, and additive manufacturing are exactly what we need to generate immediate output to support our warfighters at scale."

Innovations Spur Adoption

"IMTS 2026 highlighted how quickly manufacturing technology is moving from concept to application," said Mike Cicco, president and CEO of FANUC America and chairman of the board at AMT. "Manufacturers are looking for practical ways to improve productivity, increase flexibility, and address workforce challenges, and many of the conversations throughout the show were focused on technologies that can help them achieve those goals today. The strong interest in AI-enabled solutions and advanced automation reflects an industry that is actively evaluating how to translate innovation into real-world results."
IMTS featured exhibitors such as the new IMTS Industrial AI Arena, Boom Supersonic, Intrinsic Innovation (an AI robotics group at Google), and SpaceX, as well as speakers and conference participants from Lockheed Martin, Oracle Red Bull Racing, Amazon Web Services (AWS), Google Cloud, Microsoft, financial institutions, innovators, investors, and others drawn to the convergence of machine tools, advanced manufacturing technology, and the levers strengthening the industrial base.



"More than ever, IMTS 2026 brought together every part of the manufacturing technology ecosystem," added Travis Egan, chief revenue officer at AMT. "Our mission is to advance manufacturing technology. IMTS accomplishes three core goals: It builds awareness of new technologies, accelerates understanding of their benefits, and promotes adoption through at-show purchases, discussions with peers on a similar journey, and connections with solution providers."

Demand Fuels Buying Activity

Economic investment coupled with the need to boost production while increasing efficiency and flexibility fueled at-show purchases.
"We asked customers to strike our gong with every sale, and it rang more than 100 times by Friday morning, including a 24-machine order that broke the gong," reported Tim Thiessen, Okuma's senior vice president



of sales. “You can’t make this stuff up!”
An exhibitor offering an AI-powered software solution reported six-figure sales. Tsugami America reportedly sold every machine on its show floor. Tom Bassett, owner of precision job shop ProCam Services, purchased two DN Solutions DVF 5000 5-axis CNCs at IMTS 2026.
“We bought our first DVF 5000 last show. It created a backlog because we have so much work that needs 5-axis capabilities, so we purchased two more this year,” said Bassett.
Visitors such as Tavis Vaughn, vice president of engineering at CNC Machine Products, embody the value of IMTS. He came to the show seeking a solution for producing a thin-wall bearing race for an aerospace customer. He explored Mazak’s new Integrex J-300 for milling, turning, and drilling, potentially pairing it with the new RoboJob pallet loader with an AI-enhanced vision system and a



custom lathe chuck from Schunk with quick-change jaws or a collet system. For quality assurance, he evaluated new CMMs, such as Renishaw’s Equator-X (touch probe and comparator capability), Hexagon’s Optiv S (15% shorter inspection cycle times and AI for smarter measurement), and MAESTRO (scanning probe and laser scanner combined for part capture in a single setup).

AI Accelerates Adoption

The appeal of AI continues to increase because it eliminates the need for users to be experts in programming or software.
“Smaller machine shops are the backbone of manufacturing, and we empower them to use automation for the high-mix, low-volume applications that they constantly encounter,” said Simon Lapeyry, head of revenue at Intrinsic Innovation, an AI robotics group at Google. “As an example for machine tending, we combine AI with a camera to remove the need for fixturing and for robot reprogramming when introducing a new part. By removing these bottlenecks, AI enables your operators to focus on being CNC experts.”
CloudNC’s CAM Assist is an AI plug-in for existing CAM platforms (Autodesk, Mastercam, Siemens, etc.) that speeds up toolpath generation so that users can get to making chips faster. It uses physics-based AI to determine the cut depth, width, feeds, and speeds, and flags potential issues to the programmer so they stay in control of the overall output.
“CAM Assist turns something that might take you two days to program into five minutes inside CAM Assist and 20 minutes to clean up on the back end. Now you can make 10 times more parts in the same day with the people and machines you already have,” said Dan French, head of sales, CloudNC.
Steve Blackwell, leader of AWS’ Product Engineering & Services Center of Excellence, said, “A year ago, we were talking to customers about the potential of agentic AI. This year at IMTS, we have seen that leading manufacturers are already deploying AI across their operations and are realizing immediate increases in efficiency, quality, and agility.”
“Smart manufacturers understand the urgent need to adopt digital technologies as a means to gain more productivity from existing capital equipment,” said Ryan Kelly, vice president of technology at AMT. “With the shortage of skilled labor – some 435,000 people in durable goods manufacturing – we need more solutions that act as force multipliers to shorten the development cycle and increase output per person.”

Creating Speed and Flexibility

Kelly cited the AMT Emerging Technology Center (ETC) as an example of how digital technologies collapse the development cycle. The ETC’s convergent manufacturing platform for drone production, led by the Manufacturing Demonstration Facility at Oak Ridge National Laboratory (ORNL), connected machine tools, automation (robots, cobots, and a pallet changer), metal and polymer AM, and other technologies. It demonstrated how to quickly surge production capacity using equipment on the IMTS show floor, as well as production flexibility by producing three

different sizes of drone bodies.
Sandia National Laboratories and its partners used AI, advanced computing, and metal AM to accelerate the development of the Aires Tide flight-test vehicle by about seven times and reduce its cost by 15 times compared with traditional manufacturing.
The ETC also demonstrated the need for the MTConnect protocol to foster interoperability between controls, devices, and software applications. Because it delivers machine data in a way that AI can interpret and software can understand, Kelly predicts AI will accelerate MTConnect adoption.

Technology Brings the Manufacturing Community Together

IMTS fosters people-to-people connections through hundreds of conference sessions, attractions, and industry-organized events designed for specific interest groups.
"No matter what you make or the role you play in manufacturing, you can find people who share your interests, challenges, and priorities. That's why IMTS always feels like home," said Michelle Edmonson, vice president – exhibitions at AMT. "The communities coming together at IMTS created an energy at McCormick Place that was incredible. We heard story after story of connections made here that will lead to new ideas, solutions, and opportunities long after the show ends."
At IMTS, the manufacturing community came together in force. Groups such as SME, New American Industrial Alliance, Illinois Manufacturers Association, Women in Manufacturing, Defense Industrial Base Institute at Northeastern University, Centrepolis Accelerator at Lawrence Technological University, international associations, investor groups, and others held meetings and led show floor tours that turned IMTS into a hub for collaboration. Industry voices including Endeavor Business Media, Manufacturing Happy Hour, Practical Machinist, and MakingChips hosted live podcasts throughout the show, drawing fans, exhibitors, and attendees into conversations that extended the community beyond the aisles.
Interest in specialty programming grew at IMTS 2026 as audiences sought focused education on Industrial AI, investment, international opportunities, job shop performance, leadership development, and defense-related manufacturing. Highlights from conferences included:



- The inaugural IMTS Industrial AI Conference reflected strong industry demand for practical AI applications in manufacturing and sold out twice after capacity was expanded.
- IMTS Investor Summit attendance grew 118%.
- IMTS ELEVATE Conference (professional development) grew 34%.
- IMTS Job Shops Workshop grew 34%.
- IMTS LATAM: Conferencias Técnicas comunidad de América Latina grew 200%.
- EBITDA Growth Systems' "Mission-Ready Manufacturing: How to Win Work in DoD, Space & Aerospace" conference grew 227%.

"IMTS and the LATAM Conference are premium events and very important to international market leaders like us. It's been essential for me to attend every IMTS," said Aldo Rodriguez, director of Aalberts Surface Technologies in Monterey, Mexico. "All the presentations offered useful insights, but what really caught my attention was the international trade projections. They shared figures on the opportunities for Mexico and the U.S. to partner on exploiting future opportunities. Our company will be doing more research on international trade and taking advantage of that huge opportunity."
"It's really important for us to invest in the women in this industry because a lot of times there aren't women represented. At our company, we're really making strides, especially in our engineering group," said Liz Steffick, chief financial officer of Methods Machine Tools in Sudbury, Massachusetts. "We brought several members of the team to ELEVATE so they know they're valued

and appreciated by the company."
Roger Buccolo, plant manager at Teledyne Oil & Gas in Orlando, Florida, came to IMTS 2026 specifically for the inaugural Industrial AI Conference to learn how to bring artificial intelligence onto the manufacturing floor.
Volta Global is a permanent capital investment firm that specializes in private equity and real estate. Analyst Colin Weber said, "I attended the Investor Summit because we're investing in precision manufacturing for the long term. I found the information about automation and the reshoring movement very interesting, and I met several business owners I'll be following up with."
Weber said he appreciated featured speakers from Nvidia and Google Cloud "who covered how manufacturers are using automation and vision systems to improve efficiency. With skilled labor this tight, that matters to every shop owner I talked to."

Attracting the Next Generation

The Smartforce Student Summit attracted 14,447 students. Wendy Lawrence, a retired Navy captain and former NASA astronaut, spoke for the third time at IMTS, sharing these inspiring words:
"For the students who are here, definitely consider manufacturing as a future. What a fun job to have. At the end of the day, you get to walk away and look at everything that you manufactured. As somebody who got to ride the space shuttle four times, for all the people in manufacturing jobs, thank you very much. I never would have been able to go to space without your tremendous abilities. I appreciate all the hard work this country has put into the manufacturing sector."



Companies such as Reader Precision Solutions sponsored the attendance of 153 students and educators at IMTS 2026 through its Operation Exploration initiative, giving participants the opportunity to explore advanced manufacturing technologies, meet industry professionals, and learn more about career pathways in modern manufacturing firsthand.

More Production Per Machine

Exhibitors focused on CNC systems that enable more operations in a single setup, expand unattended operation, increase output per employee, and automate repetitive tasks so operators can get machines into production faster.
Control highlights emphasized more intuitive operation, graphical programming, and AI-based assistance to reduce programming effort and help operators work more efficiently, and execute natural-language instructions.
"Our job is to bring technology to our customers in a usable way – to automate what we can and make the machinist's day a little easier," said Paul Gray, executive vice president of engineering at Hurco.

Smarter Robotics Move Toward Practical Adoption

Robot and cobot themes at IMTS 2026 centered on systems that are easier to deploy, safer to operate around people, and more adaptable to changing production needs. New collaborative robots emphasized integrated vision systems, advanced end effectors, and cleaner connectivity, reducing the complexity of installation and redeployment. Safety-focused sensing technologies, including scanners and proximity detection, showed how cobots can slow or stop automatically as people or objects enter their work zones. AI-enabled automation demonstrated how handwritten instructions and natural-language commands can be translated into manufacturing tasks and robot programs.
"The real magic is how we make the user experience as powerful as possible," said Will Healy, director of product and industry marketing, Universal Robots.

Tooling to Bridge the Gap

Exhibitors in the Tooling & Workholding Sector centered on new integrated software, sensors, and advanced geometries to improve tool life, productivity, quality, and visibility

in toolroom operations. The skilled labor shortage and demand for higher productivity have driven solutions that promote faster and easier changeover for high-mix, low-volume operations.

"All industries are seeing skilled machinists and workers with manufacturing knowledge retire, so we need technology to help bridge that gap," said Sean Cox, senior manager of operations at Collins Aerospace, which won the ZOLLER Toolroom of the Year award and sent a cross-functional team of six people to IMTS 2026. "We need advanced technologies to standardize processes, produce parts cost effectively, drive continuous improvement, and improve lead times as the aerospace industry ramps up."

AM Integrated with Metal Removal

At IMTS 2026, the Additive Manufacturing Sector was located adjacent to the Metal Removal Sector to reflect how the two technologies are used together. To highlight demand for AM, consider that the U.S. Navy presenters on the IMTS+ Main Stage cited AM as a critical technology.

"Currently, the demand for our systems is off the charts," said Glynn Fletcher, president of EOS North America, which launched its M4 ONYX metal 3D printer at IMTS 2026. "When we exhibited for the first time at IMTS 2010, there were hardly any metal AM machines in the U.S. With an installed base of several thousand machines and metal AM literally taking the Main Stage at IMTS, it's clear metal AM occupies an essential role in the U.S. industrial base."

The Momentum Continues on IMTS+

Every IMTS has its own character. IMTS 2026 combined emotions that were purely human with advanced technology to make people and machines more productive and connect them in new ways.

"The energy and optimism of IMTS 2026 were unlike any I've ever been to, and I've been to lots of IMTS shows," said Paul Van Metre, co-founder of exhibitor ProShop ERP and co-host of MakingChips. "There is so much demand for machined parts right now that shops are actively looking for technology, automation, new equipment, and software. The show was just wild and really fun."

News from IMTS 2026 will continue on the IMTS+ digital platform, which will air videos from IMTS+ Main Stage presentations and feature continued reporting from around the show.

(Pictures IMTS)



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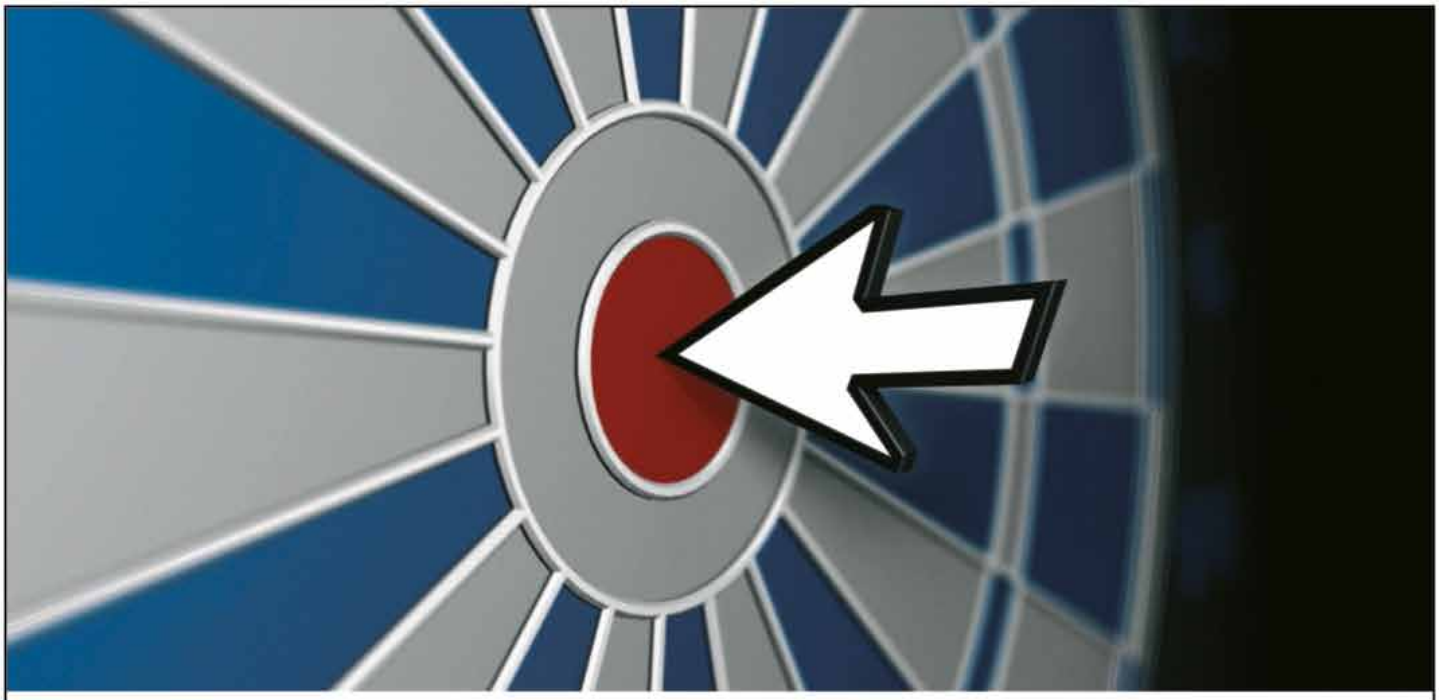

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