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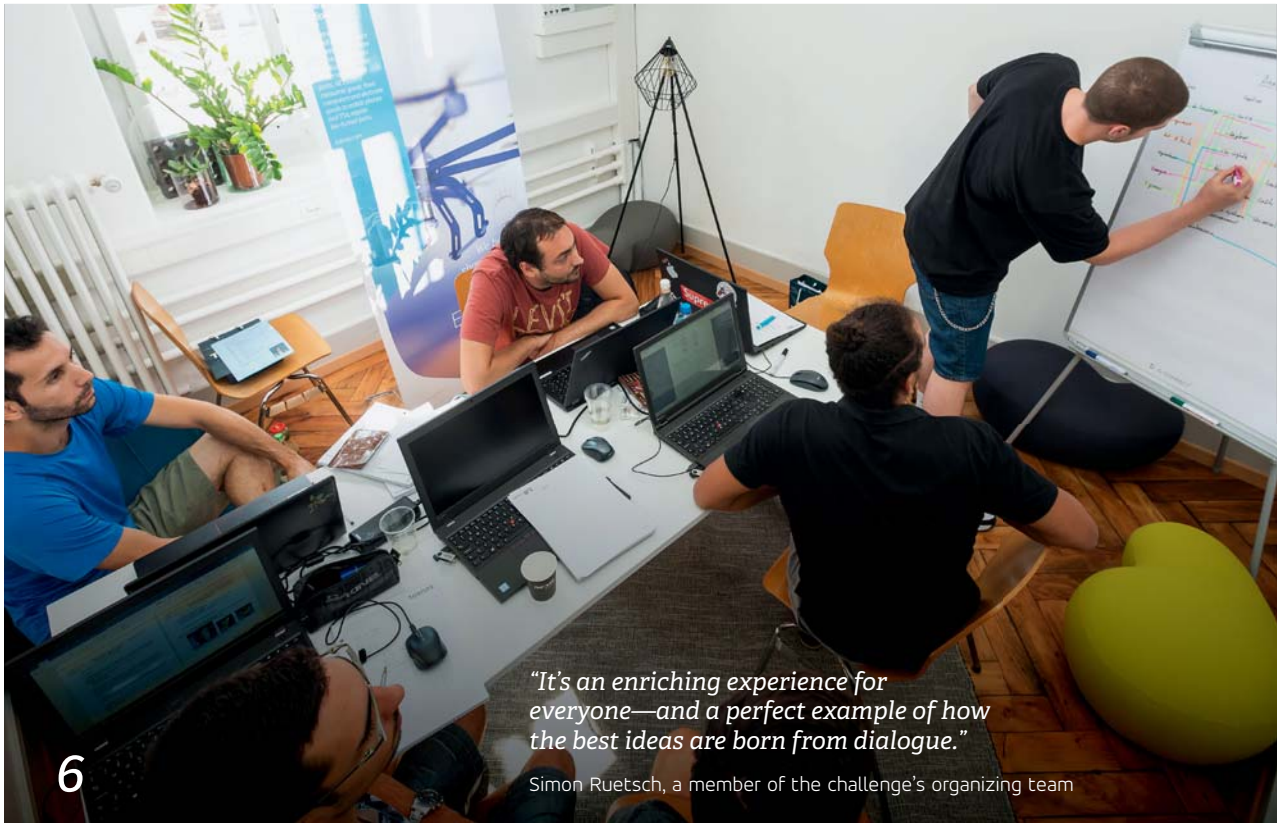

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Simon Ruetsch, a member of the challenge's organizing team

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IMPRESSUM

Circulation
17,000 copies

Available in
French / German / English / Italian / Spanish / Polish / Portuguese for Brazil / Chinese

Publisher
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CH-2740 Moutier
www.tornos.com
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DE-50825 Köln
Phone +49 221 387 238

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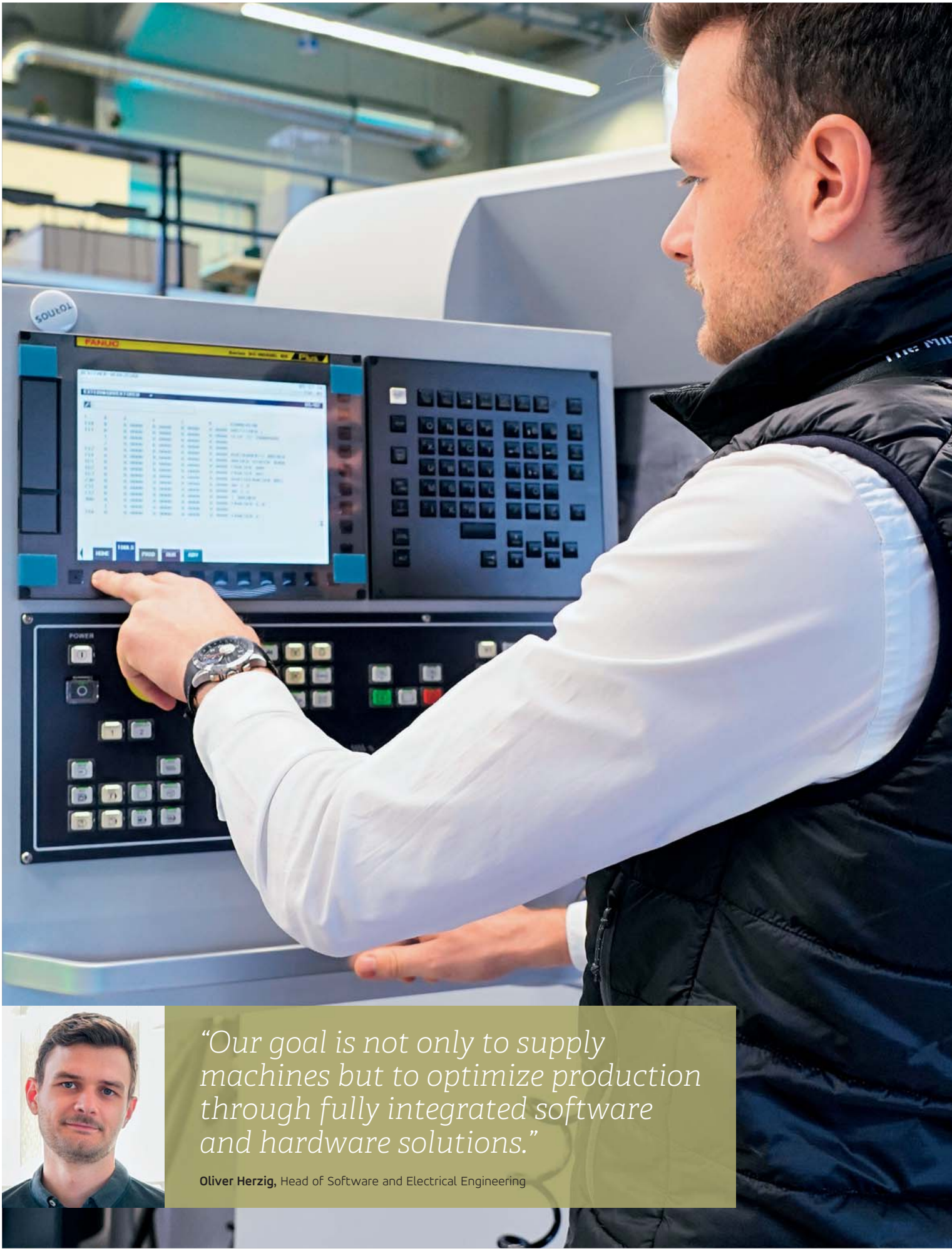
SUMMARY



"Our goal is not only to supply machines but to optimize production through fully integrated software and hardware solutions."

Oliver Herzig, Head of Software and Electrical Engineering

Thinking holistically about digitalization

Oliver Herzig, Head of Software and Electrical Engineering

Machine tools form the backbone of industrial production. Without them, it would be impossible to manufacture the precise components required for key sectors such as automotive, aerospace, medical, electronics, and watchmaking. Today, manufacturers of these components face major challenges: increasingly complex geometries, lower production volumes, and growing price pressure—even for the most demanding applications.

This is precisely where digitalization brings real added value. It enables more efficient processes, greater transparency, and better resource utilization. However, it also calls for new skills. Many of our customers possess invaluable expertise, gained through decades of experience in machining. Yet the digital transformation also requires additional know-how in areas such as data management, networking, cybersecurity, and change management.

To support our customers through this evolution, we are broadening our focus beyond the machine itself to encompass the entire manufacturing process. Our goal is not only to supply machines but to optimize production through fully integrated software and hardware solutions. In doing so, we are evolving from a machine builder to a true system partner.

Cybersecurity is a key element of this transformation. We are investing heavily in developing our capabilities in this area, as customer demands continue to grow. With the European Union's Cyber Resilience Act introducing mandatory high security standards, we at Tornos aim to play a leading role in their implementation.

We are not walking this path alone. Together with our partners, we evaluate and integrate software solutions that bring genuine value to machining—whether through improved part quality, enhanced process stability, or optimized maintenance. These collaborations help us build an open, innovative, and sustainable ecosystem for sliding headstock and multispindle machines.

Innovation is born from cooperation. Together, we are shaping the production of tomorrow.

Brainstorming workshop: HE-Arc students work together in teams to develop their first ideas on the theme “Machine as a Service.”

TORNOS x HE-ARC CHALLENGE:

A week to reinvent

the factory of tomorrow

For several years, Tornos has welcomed students from the Haute École Arc (HE-Arc) to its flagship Moutier, Switzerland, site as part of the Tornos x HE-Arc Challenge—a technological competition that has become a key bridge between education and industry. The 2025 edition, held from September 1 to 5, brought together 25 students from two programs: Industrial Design Engineering and Computer Science and Communication Systems, with roughly 50 % from each discipline. Together, they worked on the theme "Machine as a Service," a topic central to current discussions around digitalization, sustainability, and user experience.

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Based in Neuchâtel, Switzerland, HE-Arc Engineering is part of the University of Applied Sciences and Arts of Western Switzerland (HES-SO). It trains multidisciplinary engineers in fields such as microtechnology, industrial design, computer science, and sustainability—skills essential for the region's high-precision industries. Its hands-on approach and close collaboration with local companies make it a natural partner for Tornos.

The challenge's objective is clear: to immerse students in the realities of industrial life while fostering creativity and teamwork. Over the course of a week, participants alternated between three days at Tornos in Moutier and two days at HE-Arc, supported by

Tornos' Research and Development team and various departments such as production, service, sales, and sustainability.
"The students get to see everything," explained Innovation Engineer Simon Ruetsch, a member of the challenge's organizing team. "Our specialists take time to answer their questions and share their expertise."

Over the years, both the format and the themes have evolved to reflect the changing industrial landscape. Earlier editions focused on highly technical, mostly mechanical topics, while today's challenges explore broader issues such as rethinking production sites, developing new business models, and integrating sustainability and digitalization into processes.

This evolution is also reflected in the composition of the teams: Initially, only mechanical design students participated, but the challenge now includes computer science and communication systems students, adding a complementary digital dimension to the projects.

This interdisciplinarity results in a wealth of creative ideas. Some proposals—like a vertical bar-feed concept presented in a previous edition—surprised Tornos engineers with their ingenuity.
"These young people aren't constrained by budgets or by 'the way things have always been done,'" noted Audrey Corbaz, also part of the organizing team. "They bring a fresh, open-minded perspective—and that's exactly what we're looking for."

A long-standing partnership and a pool of talent

The collaboration between Tornos and HE-Arc is far from new. The 2025 event marked the seventh edition of the challenge, which only paused during the Covid-19 pandemic. The relationship, however, dates back even further: Before the creation of the Tornos Research Center (TRC) in 2011, Tornos was already working with HE-Arc on development projects and hosting students for their bachelor's theses. Many current Tornos employees are, in fact, HE-Arc alumni.

The idea behind the challenge was born from a shared goal: to give students a concrete industrial experience before the start of the academic year, while enabling Tornos to advance internal innovation discussions, identify future talent, and strengthen its position as an attractive employer.

Each year, several students take the opportunity to complete their bachelor's theses at Tornos, and many are later hired by the company.

Since 2025, the collaboration has grown even closer with the arrival of students enrolled in the new dual program at HE-Arc—a four-year track that combines academic study with part-time professional experience, allowing future engineers to develop their skills directly in the workplace.

"It's a real virtuous circle," said Audrey Corbaz. "They discover our professions, we discover their ideas—and that exchange often leads to long-term collaboration."

The Tornos Research Center: bridging research and industry

Founded in 2011, the Tornos Research Center (TRC) embodies the enduring synergy between HE-Arc and Tornos. Within the company, a multidisciplinary team combining expertise in mechanics, software/TISIS, and automation manages the partnership and coordinates joint projects. Several of these are supported by Innosuisse, the Swiss federal agency for innovation promotion.

Research at the TRC focuses on digitalization, Industry 4.0, artificial intelligence, simulation, and human–machine interfaces—areas where HE-Arc's academic expertise complements Tornos' extensive industrial experience.

"With 140 years of history in machine design and manufacturing, HE-Arc helps us push further—especially in data management, ergonomics, and user experience," explained Innovation Engineer Simon Ruetsch.

Several tangible achievements have already emerged from this collaboration, including the TISIS software, the TISIS Tab mobile application that connects users directly to their machines, and the development of specialized macros that optimize machining cycles. These successes illustrate the strength of the partnership: HE-Arc provides technological vision and applied research, while Tornos offers an industrial testing ground—and, for many students, a chance to turn their academic projects into professional careers.

Innovation as a shared driving force

For Tornos, the challenge and the collaboration with HE-Arc represent two sides of the same ambition: to stay dynamic and open to the next generation of engineers.

Priorities may evolve—sustainability, circular economy, artificial intelligence—but the spirit remains unchanged: to foster creativity, knowledge exchange, and future talent.

"This must continue," Ruetsch concluded. "It's an enriching experience for everyone—and a perfect example of how the best ideas are born from dialogue."

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The Mini Factory MedTech & Dental brought together customers, partners and experts for live demonstrations, technical exchanges and an immersive experience at the Tornos Customer Center in Heimsheim.

Tornos closes 2025 with a focus on proximity and innovation

From Les Rousses, Switzerland, and Milan, Italy, to Heimsheim, Germany, and Flower Mound, United States, Tornos has held numerous meetings to share its passion for precision, attentiveness, and technical excellence.

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Tornos France Golf Tournament: precision on the course as in the workshops

At the heart of the Golf du Rochat, in the hills above Les Rousses, a new edition of the Tornos France Golf Tournament was held in November 2025, organized by Patrice Armeni and his team, in partnership with Bumotec.
Over the years, this event has become a real tradition, bringing together customers, partners, and employees from all walks of life every fall around a shared passion: precision, whether on the green or in the workshop.

In an exceptional natural setting, this day is marked by a spirit of sharing, respect, and camaraderie—reflecting the expertise and interpersonal skills that are unique to the Tornos community.
"This tournament embodies our spirit: closeness, enjoyment, and excellence," Patrice Armeni emphasized.
On the golf course as in their work, the participants cultivate the same high standards: aiming for accuracy, together.

Tornos France Open House: the Swiss DT 10, the new benchmark for electronics

From November 4 to 6, 2025, the Tornos Technologies France showroom in Saint-Pierre-en-Faucigny, in the heart of the Arve Valley, opened its doors for three days dedicated to innovation.

The star of the show was the new Swiss DT 10, designed to meet the demanding needs of the electronics industry, a key sector in the region.

Compact, fast, and with remarkable thermal stability, the Swiss DT 10 sets the new standard for productivity and precision in small technical parts.

It embodies the Tornos philosophy: listening to the needs of the market and responding with concrete, high-performance solutions.

The Swiss XT, meanwhile, demonstrated its agility by machining an exclusive ring bearing the Tornos logo. This symbolic part combined mechanics and elegance, illustrating the application of Tornos' expertise to the luxury and jewelry sector.

Alongside the SwissNano, the benchmark in micromachining, these three machines embody total mastery of bar turning, from the micron to the perfect finish.

Tornos Asia and Taiwan Open House: the Swiss DT 10 makes its debut

From September 10 to 12, 2025, Tornos' Asian subsidiary opened the doors of its Taiwan site for a highly anticipated event: the official launch of the Swiss DT 10 on the Asian market.

In a modern and inspiring setting, visitors got a behind-the-scenes look at Tornos production and experienced live demonstrations of the newcomer, alongside the Swiss GT and Swiss XT.

This winning trio embodies the complementarity of Tornos' expertise: precision, flexibility, and performance.

The launch attracted keen interest from players in the electronics, medical, and connector sectors, confirming that the Swiss DT 10 is ready to meet the challenges of miniaturization in one of the world's most demanding and dynamic markets.

Tornos Moutier Open House: microprecision, the hallmark of Swiss expertise

A week later, Swiss customers were invited to Moutier, the historic birthplace of Tornos, to discover the Swiss DT 10 in a setting that combines tradition and innovation.

But the event was also an opportunity to celebrate Swiss microprecision expertise with the presentation of the legendary SwissNano 7 and BA 1008.

True icons of micromachining, these machines embody the symbiosis between mechanical performance and craftsmanship excellence.

Designed for the watchmaking, connector, and medical sectors, they demonstrate Tornos' ability to constantly push the boundaries of what is possible, while remaining true to its DNA: combining precision with elegance.

EMO Hannover 2025: fruitful discussions and spotlight on the Swiss DT 13 S

From September 22 to 26, 2025, Tornos took part in Germany's EMO Hannover 2025, the global trade fair and showcase for the machine tool industry.

Presenting a Swiss DT 13 S, the Swiss brand focused on proximity and quality of exchanges rather than the quantity of exhibits.
This strategy paid off: The Tornos stand attracted many visitors eager to discover the company's innovations and talk to its experts.

Discussions focused on digitalization, TISIS connectivity, and the modularity of the Swiss-type range, topics that confirmed Tornos' role as a visionary player and trusted partner in a rapidly changing industrial environment.
A measured presence, but a strong impact: Tornos continues to impress with its technical expertise and attentiveness to the market.

Metalex 2025: the Swiss DT 10, star of the Asian market

From November 19 to 22, 2025, Tornos participated in Thailand's Metalex Bangkok, one of the most important industrial trade shows in Southeast Asia.

At the heart of its stand, the Swiss DT 10 took center stage, confirming its status as a key machine for expanding markets.

Combining speed, stability, and precision, the Swiss DT 10 perfectly meets the expectations of high value-added series production, particularly in the electronics, medical, and connector sectors.

Its launch in Asia marked a new stage in Tornos' global strategy: to offer each region local solutions based on Swiss technological excellence.

With Metalex 2025, the Swiss DT 10 continued its global rise and confirmed that, everywhere, precision has a name: Tornos.

Tornos Italia Open House: innovation and team spirit

From October 9 to 11, 2025, the Tornos Italia Customer Center in Rho (Milan) was transformed into a Swiss Made technology island, bringing together customers and partners around seven machines, including the Swiss DT 26, Swiss GT 32, Swiss XT 32/9, and MultiSwiss 8×26.

Through technical demonstrations, discussions, and conviviality, Tornos Italia confirmed its position as a hub of innovation and collaboration for southern Europe.

The Mini Factory in Heimsheim: tomorrow's production—today

On November 26 and 27, 2025, the brand-new Tornos Technologies Deutschland Customer Center in Heimsheim hosted The Mini Factory MedTech & Dental.

Alongside 15 industrial partners, including Starrag, Sylvac, Paul Horn, SolidCAM, and EcoClean, Tornos recreated a complete, interconnected production line, demonstrating how its technologies support sustainable and automated manufacturing.

The event, featuring live demos, technical presentations, and an after-event party, brought key players in the medical and dental industries together around a common vision: making innovation a tangible experience.

BoomBastic 2025: the global showcase for Tornos expertise

From November 12 to 14, 2025, Tornos took part in the BoomBastic event organized by TITANS of CNC in Flower Mound, Texas.

The largest CNC gathering in North America, the event was a true showcase of precision and industrial passion, attracting thousands of visitors: manufacturers, trainers, influencers, and technology partners.

Before the public exhibition, Tornos brought together its teams and dealers to strengthen their technical skills and their ability to offer the best possible service to their customers, an essential step before moving from "knowledge to action."

At the stand, visitors discovered the entire Swiss-type portfolio:

- *The **Swiss XT 16**, the most flexible and fast machine on the market*
- *The **MultiSwiss 8×26**, the champion of multispindle productivity*
- *The **SwissNano 7**, a jewel of microprecision*
- *The **SwissDECO 36**, a symbol of power and controlled complexity*
- *The **Swiss DT 26 and Swiss GT 32**, models of compactness and agility*

Through BoomBastic 2025, Tornos demonstrated its ability to combine training, expertise, and passion as a bridge between its teams, partners, and customers, built on a simple and universal value: the desire to do a job well.

We keep you turning: 2025 highlights

Proximity: *From Les Rousses to Milan, from Heimsheim to Flower Mound, Tornos has forged lasting relationships with its customers and partners. Being present in the field, listening to real needs, remains its greatest strength.*

Precision: *From the optimized cycles of the Swiss DT 10 to the micro-parts of the SwissNano 7, each innovation embodies Swiss technical excellence. At Tornos, precision is not a goal: It is a culture.*

Innovation: *Whether it's the unique flexibility of the Swiss XT 16, the multispindle productivity of the MultiSwiss 8×26, or TISIS connectivity, Tornos transforms technology into concrete value for the user.*

Commitment: *Through the Mini Factory in Heimsheim, Open House events, and gatherings such as BoomBastic 2025, Tornos demonstrates that listening, understanding, and sharing are an integral part of its DNA.*

We keep you turning.

Because the future of precision is built together.

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Flagship machines 2025

Swiss DT 10

The new benchmark for electronics

Designed for machining small technical parts, the Swiss DT 10 combines speed, thermal stability, and extreme precision. Compact and responsive, it is aimed at electronics and connector manufacturers who require continuous and reliable production.

SwissNano 7

The icon of microprecision

Specially developed for micromechanics, watchmaking, and dentistry, the SwissNano 7 excels in the manufacture of miniature components. Its compactness, rigidity, and micron-level repeatability make it a symbol of Swiss expertise, combining performance and elegance.

Swiss XT 16

The ally of luxury and complexity

Equipped with three independent tool systems, a plug-and-play B axis, and high-performance milling, the Swiss XT 16 embodies versatility par excellence. Capable of producing complex shapes with flawless finishes, it is a must-have in the luxury, medical, and connector industries.

MultiSwiss 8x26

Intelligent multispindle productivity

With its eight synchronized spindles and intuitive control, the MultiSwiss 8×26 combines the speed of a transfer machine with the flexibility of an automatic lathe. Ideal for medium and large-series parts, it is popular in the aerospace, automotive, and medical sectors.

Marco Müller and Sven Martin (Tornos) in front of the SwissNano 7, at the heart of the micro-machining project developed at Strub Medical.

STRUB MEDICAL: *precision* in the service of vision

The decision to purchase the Tornos SwissNano 7 marks an important step forward for Strub Medical GmbH & Co. KG in its efforts to achieve even more efficient production of high-precision microsurgical instruments. With owner and managing director Marco Müller at the helm, the company is taking on the challenge of manufacturing microcomponents from titanium—a strategic expansion made possible by the reliability, repeatability, and exceptional ergonomics of the SwissNano 7.

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A company with tradition and innovative spirit

Based in Neuhausen ob Eck, Germany, the company employs around 100 people and has a modern machine park with three Escomatic lathes, eight computer numerical control (CNC) lathes—including the SwissNano 7 – and state-of-the-art CNC milling machines. Thanks to this cutting-edge infrastructure, is able to manufacture workpieces of exceptional quality and precision. Rooted in the medical technology region of Tuttlingen, a global center for surgical instruments, Strub Medical combines traditional craftsmanship with state-of-the-art manufacturing technology. With Marco Müller, a passionate and visionary managing director, the company has continued to develop and now controls over 90 % of its manufacturing processes—turning, milling, grinding, and manual finishing—to ensure consistently high quality.

"Our strength lies in controlling every step of the process ourselves. This enables us to ensure perfect reproducibility—a decisive factor in our field," Marco Müller explained. As an industrial engineer specializing in lean management, Marco Müller has shaped a corporate culture at Strub Medical that focuses on innovation and continuous development.

New challenges: titanium and precision

Strub Medical has traditionally specialized in surgical instruments made of stainless steel—from microscissors to endoscopic instruments. In 2023, the company ventured into a new field: the manufacture of delicate titanium turned parts, products of the highest complexity and precision requirements.
"This production was completely new to us. Titanium is an extremely demanding material. But with the SwissNano 7, we can achieve the stability, precision, and repeatability required for tolerances in the submicrometer range," Müller emphasized.

The requirements for cleanliness, fineness, and uniformity are so high that only a machine with exceptional thermal stability and sophisticated ergonomics can meet this challenge.

SwissNano 7: Tornos precision as the key to success

The SwissNano 7, developed for high-precision turning of workpieces up to 7 mm in diameter, marks a technological milestone for Strub Medical. Compact, energy-efficient, and ergonomic, the machine is ideal for workshops where every square meter counts.

Thanks to its sophisticated design, the SwissNano 7 offers excellent accessibility: Adjustments, tool changes, and maintenance are effortless—a major advantage for operators.
"What convinced us was the consistency of the results and the ease of use. Once the machine is set up, it runs for days without any deviation. Despite

“The SwissNano 7 has enabled us to make a technological leap forward. It is a machine that inspires confidence, integrates perfectly into our production environment, and opens up new perspectives for us.”

its compact design, it remains extremely stable and hardly heats up. That's impressive,” Marco Müller said.

In addition, its energy efficiency fits perfectly into the company's environmental strategy: The SwissNano 7 consumes little power yet delivers consistent machining performance. This is a decisive advantage for Strub Medical, which wants to optimize its resources without compromising on quality.

Precision as a growth engine

With the SwissNano 7, Strub Medical has successfully positioned itself in a demanding, high value-added market segment while reducing energy consumption and optimizing production space. The partnership with Tornos symbolizes the combination of precision craftsmanship and state-of-the-art industrial technology.

"The SwissNano 7 has enabled us to make a technological leap forward. It is a machine that inspires confidence, integrates perfectly into our production environment, and opens up new perspectives for us," Müller noted.

Precision and partnership as a recipe for success

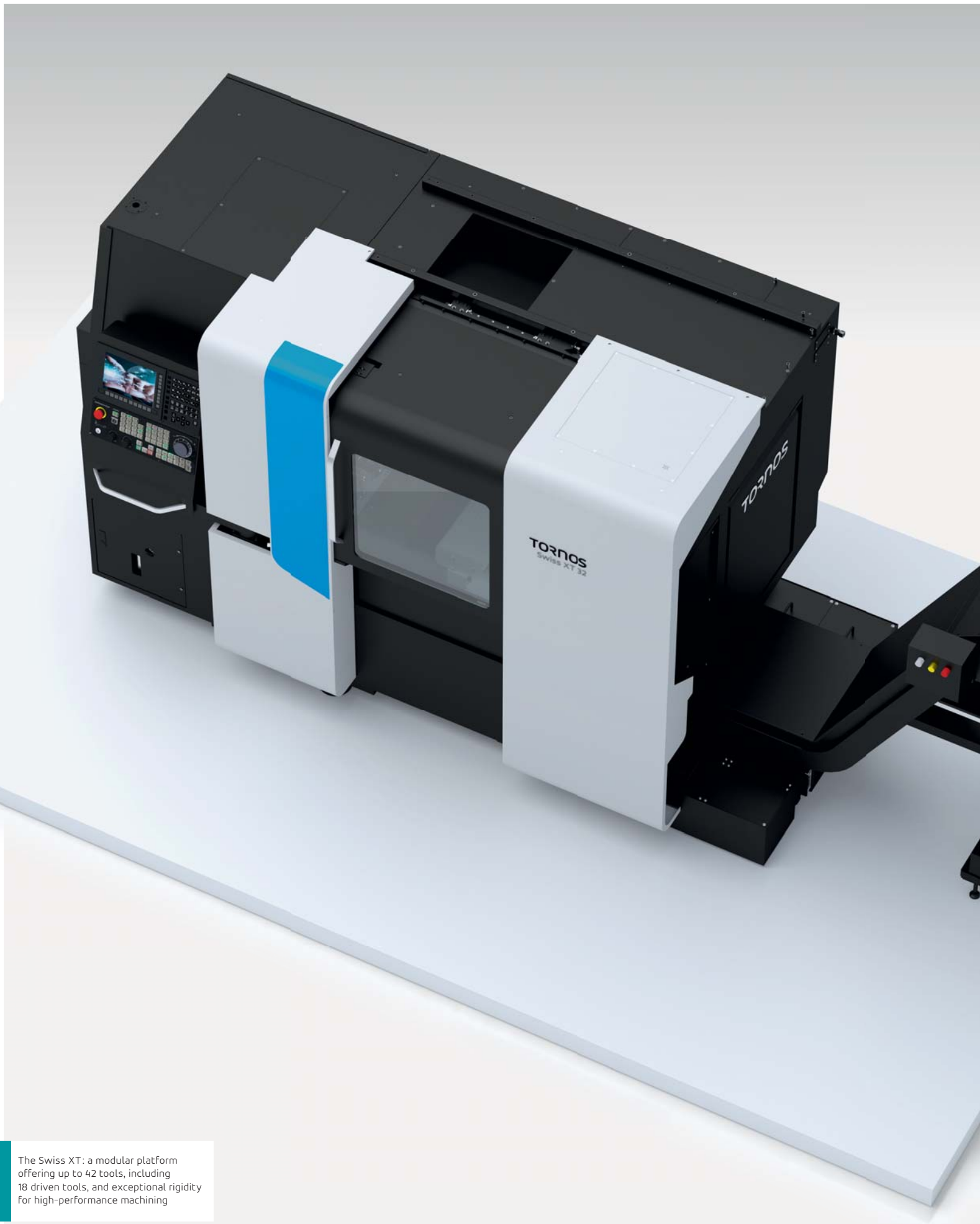
Strub Medical is located in the heart of a region known worldwide for its medical technology and precision manufacturing. Penetrating such a demanding field requires manufacturing technology of the highest standard—as offered by the SwissNano 7.

This decision has paid off: Strub Medical's expertise, combined with the precision and stability of the SwissNano, has opened up a new market segment for the company.

Tornos Germany always guarantees fast access to spare parts, support from experienced application engineers, and an outstanding sales team—ideal conditions for serving our customers, including Strub Medical.

Strub Medical embodies the innovative thinking that unites all Tornos partners: competence, passion, ergonomics, and precision in the service of health and mechanical perfection.

strub-medical.de



The Swiss XT: a modular platform offering up to 42 tools, including 18 driven tools, and exceptional rigidity for high-performance machining

SWISS XT:
the new generation of sliding headstock *automatic lathes*

The demands placed on machining are constantly increasing: Workpieces are becoming more complex, batch sizes more variable, and markets are demanding higher productivity combined with flexibility. In this environment, Tornos is sending a clear signal with its new Swiss XT series. These machines represent Tornos' ongoing development of proven Swiss concepts and are true game changers in the sliding headstock automatic lathe segment.

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A consistent and modular series

The Swiss XT series comprises three models, which differ in terms of their bar capacity:

- ***Swiss XT 16** for bars up to 16 mm*
- ***Swiss XT 26** for bars up to 25.4 mm*
- ***Swiss XT 32** for bars up to 32 mm, expandable to 38 mm without guide bush*

With these models, Tornos covers an extremely wide range of workpieces with a uniform platform—from delicate precision parts for medical technology to more robust components for automotive or fluid technology. The modular machine concept also facilitates adaptation to individual customer requirements.

Tool capacity and performance

One of the outstanding features of the Swiss XT is its tool capacity. Each machine has up to 42 tool positions, 18 of which are driven tools. This design empowers users to tackle complete machining in a single setup—even highly complex geometries, cross holes, or threading operations can be carried out efficiently.

Thanks to three independent tool systems, multiple operations can be performed in parallel. This drastically reduces cycle times and increases productivity without compromising precision or surface quality. Users benefit from a perfect balance between performance and versatility.

Axis configuration and flexibility

The Swiss XT is available with either eight or nine linear axes, supplemented by two C axes. This configuration allows for extremely precise coordination between the main and counter-spindles as well as between the tool carriers.

The nine-axis version also features a Z2 axis, which is particularly advantageous for deep drilling or simultaneous machining on the main and counter-spindles. In addition, the machine can be expanded with a B axis, which is integrated as a plug-and-play feature. This opens up new possibilities for inclined machining, the use of high-frequency spindles, or flexible tool indexing.

Extreme rigidity and perfect ergonomics

A key quality feature of the Swiss XT is its exceptional rigidity. The solidly constructed machine body, combined with highly stable tool carriers, ensures minimal vibration, maximum accuracy, and a significantly longer tool life. The clamping and mounting system is consistently designed for maximum stability—a basic requirement for tight tolerances and perfect surfaces.

The ergonomics have been just as thoroughly thought out: The Swiss XT is designed to give the operator optimum access to all work areas and tools at all times. Setup processes can be carried out quickly and safely without compromising productivity. The large chip container allows uninterrupted machining over long production intervals—a decisive advantage for companies with multi-shift operations or lean manufacturing concepts.

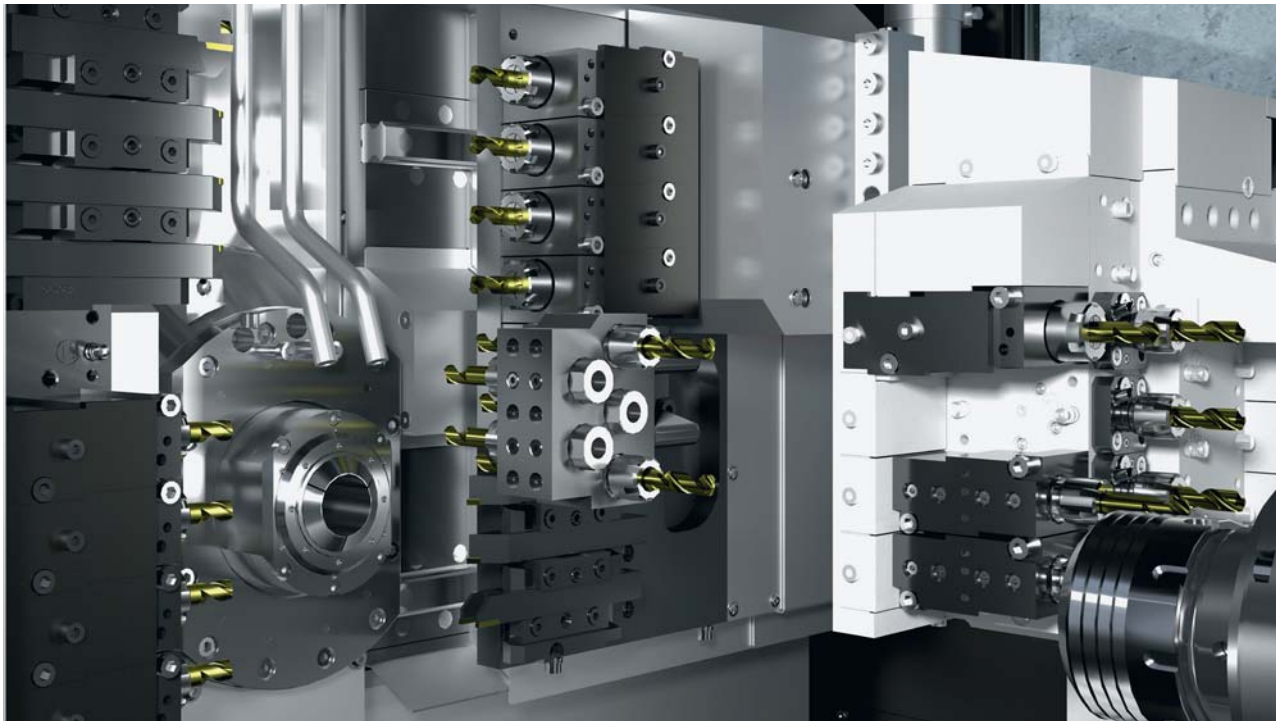
This combination of robustness and user-friendliness makes the Swiss XT a precise, extremely efficient, and user-friendly solution.

Ergonomics, software, and energy efficiency

In addition to its hardware, the Swiss XT impresses with its well-thought-out user-friendliness. The ergonomic machine design facilitates access to all relevant components, shortens setup times, and increases process reliability.

A key advantage is the TISIS software from Tornos. This user-friendly programming environment enables intuitive creation and synchronization of machining programs. Thanks to visual support and real-time simulation, sources of error can be reduced and commissioning times shortened by up to 15 %.

The Swiss XT also sets new standards in terms of sustainability: Functions such as Eco Mode reduce energy consumption in standby mode by up to 75 %.



The optional Active Chip Breaker Plus (ACB Plus) ensures optimum chip formation, extends tool life, and improves process stability.

Industry applications and economic benefits

The Swiss XT's versatility makes it an ideal solution for a wide range of industries:

- ***Medical technology:*** *high-precision bone and dental implants, surgical instruments*
- ***Automotive industry:*** *injection systems, sensor housings, safety-relevant precision parts*
- ***Electronics:*** *connectors, miniature housings, precision shafts*
- ***Micromechanics:*** *watch components, drive shafts, small fluid- technology parts*

The ability to manufacture complex components completely in a single clamping significantly reduces unit costs. At the same time, secondary processes such as reworking or reclamping become unnecessary. This leads to an excellent return on investment and gives manufacturers a decisive competitive advantage.

The Swiss XT series is much more than an extension of Tornos' existing portfolio. It is a forward-looking platform that brings together maximum precision, extreme rigidity, perfect operator ergonomics, and energy efficiency. With bar capacities from 16 to 38 mm, three independent tool systems, and up to 18 driven tools, the series offers the perfect answer to the increasing demands of modern markets.

For workshops that want to secure their long-term competitiveness, the Swiss XT is not just a machine; it is a strategic investment in the future.

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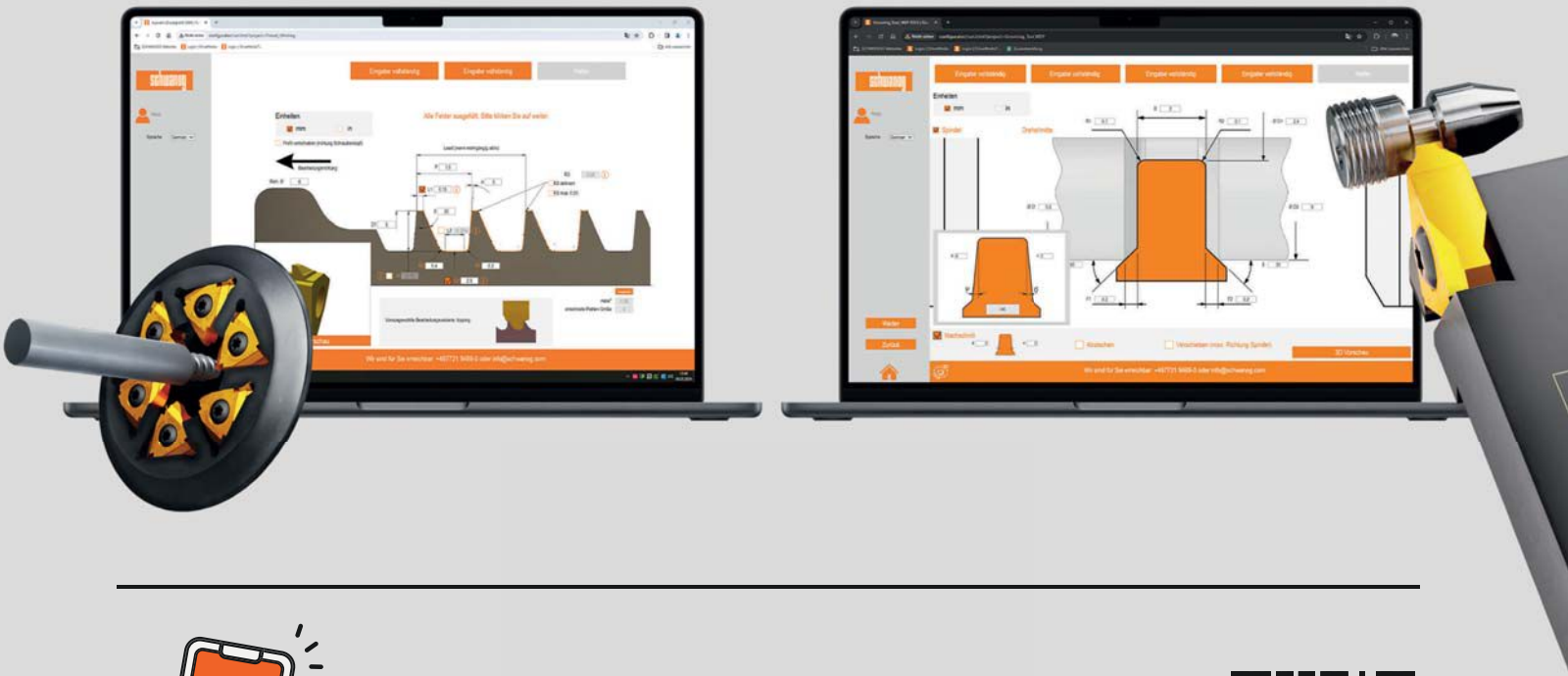

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The new Bumotec 1000/C^{neo} horizontal transfer center was developed on the basis of feedback from the field and optimises every step of the process: shorter cycles, lower energy consumption and easier handling. With its 32 motor spindles at 25,000 rpm and the new touchscreen interface, this Bumotec machine enables industrial companies to produce more while keeping energy costs under control.

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The developers of the new Bumotec 1000/C^{neo} transfer center did not start with a blank sheet of paper, but built on the practical experience gained from the previous model. "We wanted to know what factors were limiting the customer on their Bumotec s1000/C and what would allow them to increase the production speed," explains Sylvain Bapst, who is responsible for the development and design of the machines at Bumotec. "We first drew up a specification sheet and then developed a new machine on this basis."

First improvement: the interaction between man and machine. A human-machine interface (HMI) from Fanuc was chosen. In combination with the 24-inch touchscreen, this allows Bumotec to display more information for the operator. By integrating the WattPilote graphics application, the operator can

continue to operate their machine while monitoring the consumption of the spindles on the same screen. The operator can even add virtual buttons, e.g., a button for selecting the stations or shortcuts for the most frequently used M-codes. "We have thoroughly revised our HMI so that the operator can control their machine ergonomically and intuitively," assures Cédric Berger, Head of the Software Department. And he emphasises: "Our aim for our HMI was to make it easier to train new colleagues on a complex machine with 32 motor spindles and nine machining stations." Here, too, the company listened carefully to what customers needed: "In view of the shortage of skilled labour, companies often employ people who were not trained as precision mechanics in machining technology and who previously worked in other professions. For this reason, it is all the more important that the HMI is designed to be extremely user-friendly. That's why we put so much effort into its development."

The machine has its own OPC UA server

Bumotec's software department has also been working on an Open Platform Communications Unified Architecture (OPC UA) server on which all the machine's information can be consolidated. "We have gone even further because instead of using Fanuc's OPC UA server, we have developed our own server to give users more flexibility so that they can decide for themselves what information they want to transmit at factory level," emphasises Cédric Berger.

New motor spindles

Regarding the machine's mechanics, Bumotec again hit the mark with several improvements, including up to 40 % shorter cycle times. It should be noted that Bumotec has replaced its 8,000 rpm motor spindles with 25,000 rpm models. "We developed the new motor spindles internally at a Starrag Group site,"

Bumotec has successfully optimised all aspects of the energy required to operate the Bumotec 1000/C^{neo}. Total consumption has been reduced by 30 %, compressed air consumption by 52 %, saving up to 2 kWh of electricity.

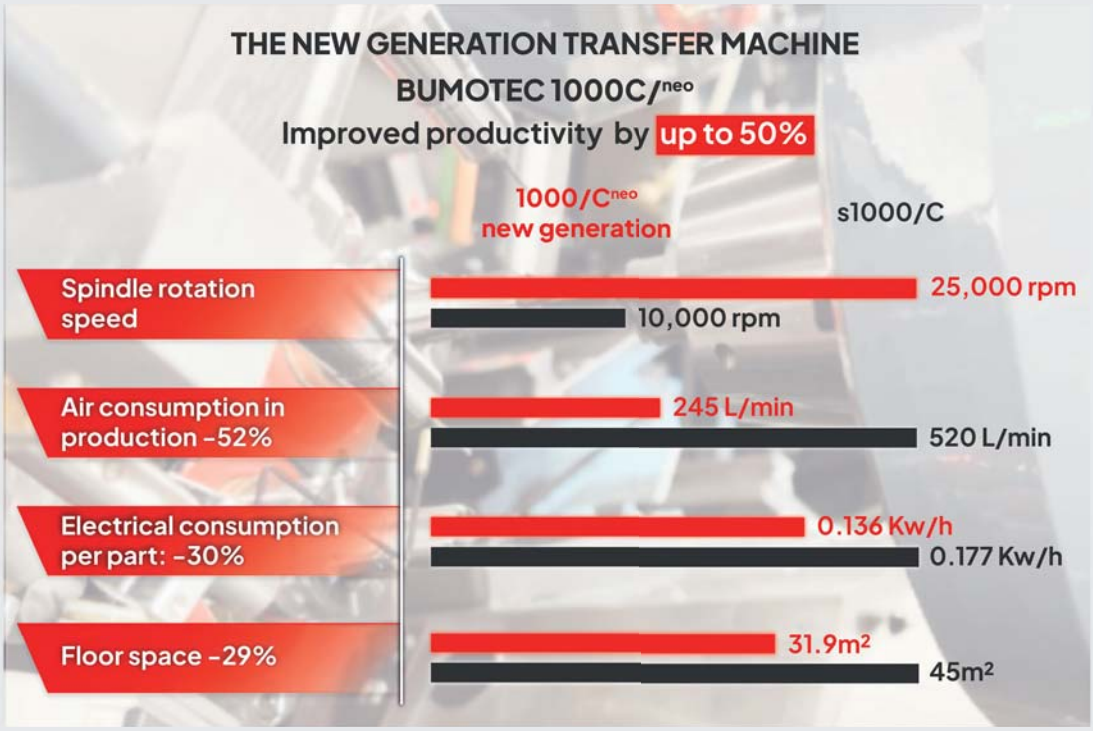
“Up to 40 % shorter cycle times.”

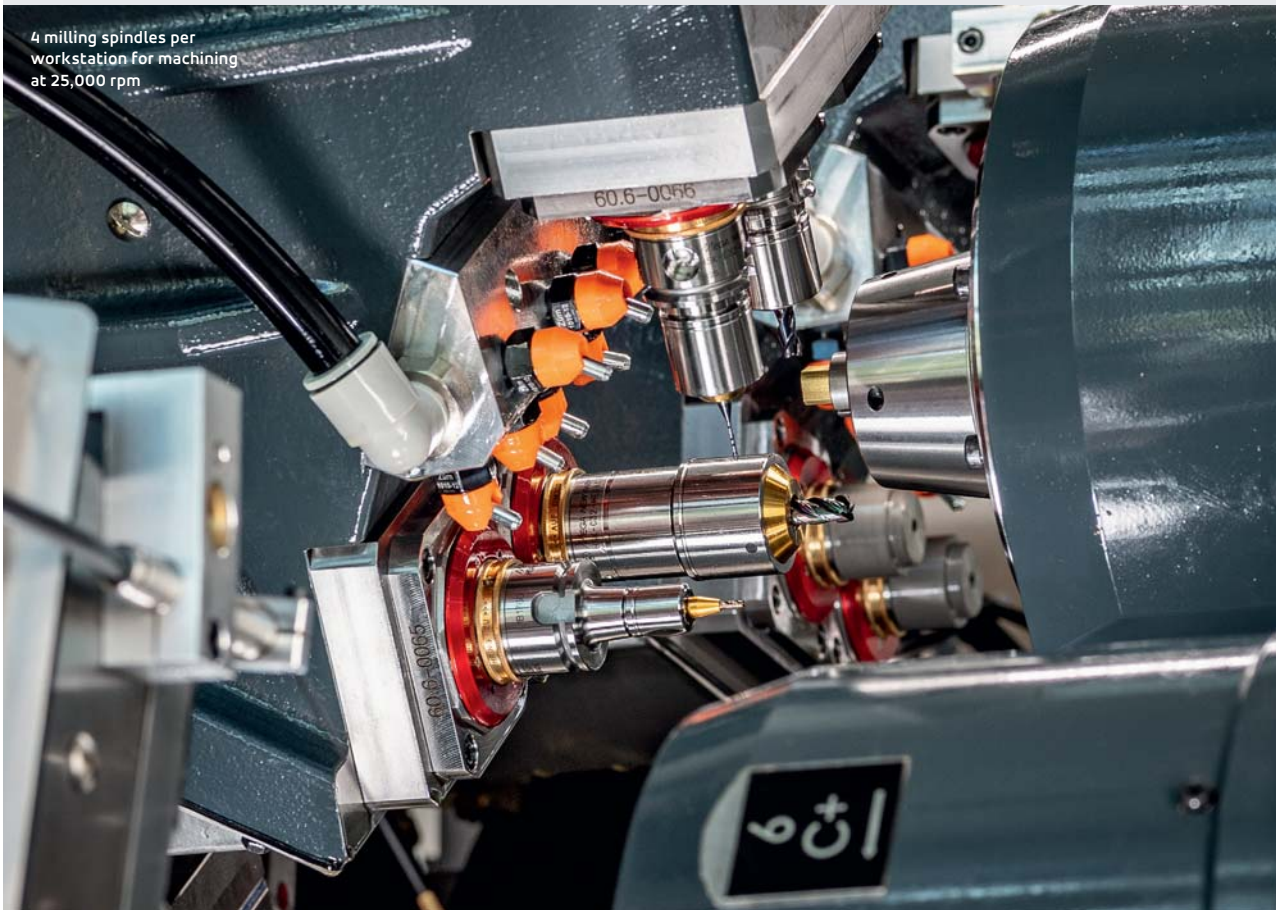
emphasises Sylvain Bapst. What’s more, these new motor spindles with direct drive require less maintenance thanks to the high-pressure internal cooling of the tool, which operates at 70 bar. The motor spindles are equipped with acceleration sensors to monitor their vibration patterns. This allows the user of the Bumotec 1000/C^{neo} to check the condition of the spindles and also enables the control system (NC) to optimise the cutting conditions. To shorten the cycle times, a pick-up arm was added that has vices with a shorter stroke. The time for a parting-off sequence is now specified as 7 seconds – a reduction of 30 % – and the machining time is 10 seconds – 51 % less compared to the Bumotec s1000/C model. Tool rupture can now also be detected via the machine’s software. For this purpose, a so-called “learning curve” for the current consumption of the spindle was created using a machining sequence. If there is a deviation, a “tool rupture” warning is issued.

Linear guides in the X, Y and Z axes

To improve the accuracy of the new horizontal transfer machine from Bumotec, the rigidity of the machining stations has been increased in the X, Y and Z directions. To achieve this, the manufacturer from Vuadens (canton of Fribourg in Switzerland) no longer works with dovetail joints, but instead uses linear guides with slides, as Sylvain Bapst emphasises, “with the aim of maintaining the same rigidity.” “We carried out simulations in the workshop and confirmed them with measurements. As a result, we realised that we had not only increased the rigidity, but also reduced the friction so that we could move faster on the axes. So you could say that we have managed to achieve the same precision as a machine with just one rod.”

Bumotec has opted for a semi-autonomous cutting oil filter system. As Sylvain Bapst explains, “thanks to a new concept in which filtration takes place through




4 milling spindles per workstation for machining at 25,000 rpm

“Total consumption has been reduced by 30 %, compressed air consumption by 52 %, saving up to 2 kWh of electricity.”

filter bags on the outside, the machine no longer needs to be stopped.” To unload the finished parts, Bumotec has opted for a blowing system with which the part is conveyed into a plastic cup without being knocked. The cup, which is mounted on a linear arm, then places it on a belt.

Reduction of the energy footprint

Another highlight of the Bumotec 1000/C^{neo} is the monitoring of energy consumption. Thanks to the integrated sensors, the Bumotec 1000/C^{neo} can display relevant values for compressed air and power consumption on its 24-inch screen. And the temperature conditions too. Cédric Berger explains: “To cool the cutting oil, cold water is fed into the machine, which is then heated and flows back into the company’s ice water network. So we installed sensors at the inlet and outlet to obtain information about the machine’s heat consumption, i.e. the energy required to keep the machine at the right temperature.” The WattPilote system also plays a role in the quality of the parts produced. “By gaining a better understanding of certain machine phenomena, we were not only able to increase production, but also improve the surface quality of the workpiece,” explains Sébastien Campalto, application engineer at Bumotec. He continues: “WattPilote is a small oscilloscope that measures the power consumption and creates a curve while the tool is machining the workpiece. This means the operator knows in real time whether the machine is working properly or not.”

Costs in watt hours per workpiece reduced by 30 %

The new HMI also offers various operating modes in accordance with ISO 14955: “OFF”, “STANDBY”, “READY”, “HEATING” and “PRODUCTION”. “In particular, the operator can switch more easily from one operating mode to another. When production is finished, for example, the operator can choose whether their machine returns to Standby mode, i.e. practically everything is switched off. Or the machine returns to Heating mode because a new production run is about to follow. If production has still not started after one hour in Heating mode, the machine switches back to Standby. Everything is well thought-out and designed so that the customer can save on the energy bill for their machine,” says Cédric Berger.

Bumotec has successfully optimised all aspects of the energy required to operate the Bumotec 1000/C^{neo}. Total consumption has been reduced by 30 %, compressed air consumption by 52 %, saving up to 2 kWh of electricity. The machine now requires only 245 litres of air, just 6 litres of hydraulic oil and 600 litres of cutting oil to operate. Depending on the workpiece and production conditions, the costs in watt hours per workpiece were reduced by 30 %. This corresponds to a production efficiency of over 98.3 % and a reduction from 0.177 kWh to 0.136 kWh. Sylvain Bapst explains how such results were achieved. “The machine was perfectly tailored to the customer’s needs. Take the

“The machine was perfectly tailored to the customer’s needs.”

Sylvain Bapst, Head of Mechanical Design, Starrag Vuadens

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motor spindles, for example. They have been specially dimensioned for the customer's production, and as there are 32 spindles, this also results in a factor of 32 in terms of savings. We have also selected the latest generation of components in each case. All axes are equipped with new, less energy-intensive electric motors, and the high-pressure cooling system is also more favourable in terms of consumption. We have reduced the inlet pressure of the compressed air unit. It is a mosaic of many small pieces that has enabled us to achieve such values."

Bumotec worked together with the company SIGMATools on this project. The company developed a multi-channel measurement technology that can be used to carry out detailed analyses of all components and operating states of a machine and then generate reports for optimisation measures.

Finally, and this should not be underestimated, the footprint of the Bumotec 1000/C^{neo} has been reduced by 29 %. The various functions and peripherals have been developed to minimise the space required. With a length of 6,445 mm, a width of 4,950 mm and a height of 3,251 mm, the new Bumotec transfer centre takes up less than 32 m² in the workshop.

Watchstraps: Bumotec cuts times in half

The new Bumotec 1000/C^{neo} has now been in operation for several months at a company that manufactures elements for watchstraps. According to initial feedback, the manufacturer's expectations were even exceeded. "The increase in productivity is between 40 and 50 % compared to the same workpiece machined on the Bumotec s1000/C. The customer was able to go from one minute to 30 seconds," confirms Sébastien Campalto, application engineer at Bumotec. He emphasises that the customer has also noticed a "better end result" for their workpieces, which is also "achieved in less time", with a 30 % improvement in surface quality. "That is simply enormous," says Sébastien Campalto. "The simultaneous increase in productivity and surface quality is incredible." This machine, which he describes as a "great success" in this respect, could open the doors to new markets for the customer: Sébastien Campalto is thinking of medical technology and general mechanical engineering.

starrag.com

Easy access to the parts conveyor belt for quality control and unloading

A vacuum carousel specially developed by Tornos for the reliable collection of ultrasmall parts using a controlled suction system

VACUUM CAROUSEL:

a Tornos innovation

for miniature parts

A tailor-made solution born out of a need in the watchmaking industry

At Tornos, every specific project is an opportunity for innovation. With this in mind, Tornos engineers designed a vacuum-part recovery carousel equipped with 10 cups (Ø 38 x H 50). This development, created to meet the needs of several customers in the watchmaking sector, allows finished parts—even the smallest ones—to be automatically sorted and collected directly at the machine outlet.

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Designed for ultradelicate parts measuring just 0.5 mm in diameter and 1 mm in length, this system ensures reliable collection without aggressive contact, while maintaining optimal productivity.

Zero loss, maximum productivity

When machining components of this size, even the slightest loss of parts can become critical. Thanks to its controlled suction principle and the precise positioning of its cups, the vacuum carousel guarantees efficient recovery and automated batch management, thus limiting any risk of loss and maximizing yield.

A vacuum carousel specially developed by Tornos for the reliable recovery of ultrasmall parts thanks to a controlled suction system

An adaptable and scalable solution

Designed for SwissNano and EvoDECO machines, the system can also be adapted to other Tornos models. It can be installed from the outset or added later to machines already in service, offering remarkable flexibility to workshops wishing to modernize their production line.

The ability to create separate batches at the machine output also facilitates statistical controls, ensuring full traceability throughout the manufacturing process.

Excellence in the service of precision

This specific development perfectly illustrates the Tornos philosophy: listening, designing, and implementing tailor-made solutions to meet the most demanding requirements. Combining reliability, compactness, and intelligent design, this vacuum carousel embodies the spirit of innovation and Swiss precision that are Tornos' strengths.

Tornos' teams are ready to work with manufacturers to design solutions to help them overcome their challenges.
Get in touch today to learn more about Tornos' specific developments.

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SWISS MADE

CLOSING THE LOOP:

the latest innovation

in high-volume production

The concept is simple but the impact is powerful. You produce your parts and measure them as usual. The difference? Instead of relying on machine operators to manually adjust the machine based on measurements, the software takes care of it automatically.

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You configure the software once for your part and from that point on, it continuously handles tool corrections in real time. No more wondering: Should I apply a correction now? In X+ or X–? How many parts did we lose before the correction was made?

The Closed-loop manufacturing advantages

With Closed-Loop Manufacturing (CLM), the system automatically calculates and applies the correct tool offsets based on the latest measurement data.

The benefits are immediate and measurable:

- ***Smoother, more consistent production***
  Because every measurement can trigger a small correction, production runs become more stable.

You may even be able to extend your measurement intervals. Scrap is reduced, as the system adjusts continuously rather than waiting until tolerances are exceeded.

- ***Eliminates guesswork***
  No more trial-and-error corrections. The software determines automatically whether a positive or negative and how much adjustment is needed. Once configured, it runs reliably without further manual input.

- ***Reduced operator workload***
  Operators only handle the initial setup and occasional checks. Instead of spending time entering correction values, they can focus on optimizing processes and addressing real issues, which improves overall quality and efficiency.

Proven results

Companies that have implemented closed-loop systems on full scale report impressive results:

- *Up to 90 % reduction in scrap*
- *Up to 75 % reduction in manual intervention*

Even our own Tornos Setup Department has seen remarkable success. During the setup of a highly complex defense component where manual tuning could not bring all values within tolerance, the CLM software completed the setup efficiently and accurately. The result: a high-quality setup, a satisfied customer, and a significant time saving.

Available from Q1 2026

Tornos will offer its own CLM solution starting in Q1 2026 in Switzerland, Germany, France, and Italy. Other countries will follow. It's available in two versions:

- ***Tornos CLM OnMachine***
  This locally installed application runs directly on your machine. It's easy to integrate into your existing environment, with no additional connectivity hassle. Tornos will help you connect your measurement systems.
  Available for EvoDECO, SwissDECO, and MultiSwiss machines.

Initial setup
Set up the machine as you usually would. Preset all tools by touching off and as precisely as you can by hand.

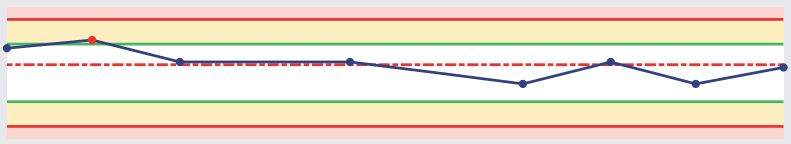
Outcome

During setup

Accurate measures and tolerances are achieved from the second part onward.

During production

Dimensions remain consistently within tolerance, with no need for human intervention.



- *Tornos CLM Cloud*
  A fully hosted cloud solution, integrated into your IT infrastructure, Tornos CLM Cloud is ideal for small and medium-sized manufacturers who want the benefits of advanced digitalization without building a complex IT system themselves.

If you prefer a self-hosted version tailored to your workshop, Tornos is also ready to discuss alternative solutions.

Build your closed-loop future
Interested in taking your production to the next level?
Contact your local Tornos sales representative for support in finding the right CLM solution for your needs.

tornos.com

The Tornos Connectivity Pack: a secure gateway for easily connecting your Tornos machines to TISIS and your external systems

YOUR MACHINES, YOUR DATA:

seamlessly connected

with the Tornos Connectivity Pack

Digitalization is all about integration. Connecting systems, machines, and data into one smooth flow enables all advantages. Yet, in practice, the hardest part is getting all the interfaces to talk to each other correctly.

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With the Tornos Connectivity Pack, this challenge becomes simple. Acting as a secure gateway, it connects your Tornos machines with external systems such as ERP, MES, DNC, or TISIS programming software seamlessly and reliably.

Each Connectivity Pack is installed individually for every machine. At its core, the base option (735-2410 Connectivity Pack TMI or 735-2420 Connectivity Pack Pilot) enables all connected functionality between your TISIS programming and monitoring software and your Tornos machines.

With the Connectivity Pack, you can:

- ***Send part programs directly from TISIS to your machine****—no more USB sticks or memory cards required.*
- ***Load existing tool configurations*** *from your machine into* ***TISIS.***
- ***Check the current status of your Tornos machines*** *directly from within* ***TISIS***

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TITANS OF CNC TORNOS

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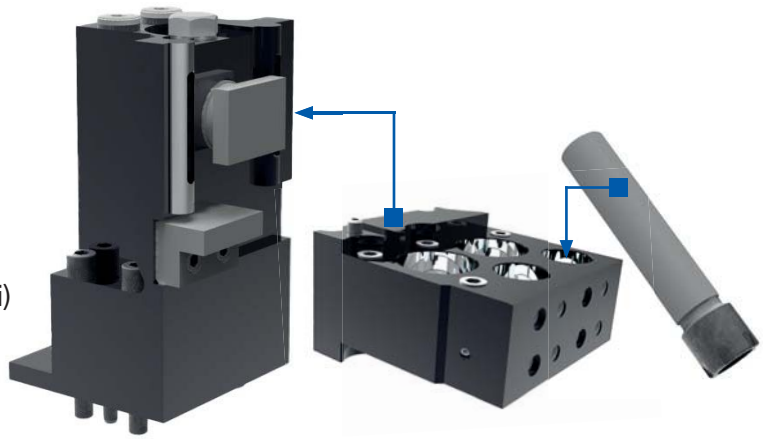
With column guide for faster tool changes

- Precise positioning and highest repeatability
- Presettable off the machine tool
- Quick changeable
- Standard shank tools applicable independently of cutting insert supplier
- Integrated and targeted coolant supply up to 100 bar (1.450 psi)
- Modular GWS-drill block for machining at main and counter spindle
- Safe and easy handling (minimized risk of injury)



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Do you use a DNC system and prefer a simple FTP connection? The base Connectivity Pack (735-2410 / 735-2420) already includes a built-in FTP server. By connecting your DNC to the FTP on the Connectivity Pack you can easily exchange part programs either from your DNC or from TISIS.

Connecting to external systems with OPC-UA

If you're using external systems such as ERP, MES, or DNC to monitor or manage your production, the OPC UA interface is the best way to connect.

You can choose from three OPC UA configurations, depending on your needs:

1. *735-2700 – OPC UA Interface Monitoring*
   Collect all key data on machine and production status. If your goal is to monitor how your Tornos machines are performing in real time, this is the option for you.
2. *735-2710 – OPC UA Interface Production Management*
   Take the next step in your digital journey. This option allows you to send part programs directly to the Connectivity Pack via OPC UA and retrieve them from the machine.
   It also enables manipulation of CNC execution variables, unlocking a new level auf automation. For example: produce 100 screws at 10 mm, then 250 screws at 15 mm, all in one setup, automatically. The Production Management interface lets you create that kind of dynamic, data-driven production.
3. *735-2720 – OPC UA Interface External Tool Offset Correction*
   This option allows external systems to send tool offset correction values directly to the machine. If your measurement system continuously calculates offsets based on the last measured part, this is the right solution.

Most major software providers are already compatible with Tornos OPC UA interfaces. And if you're looking for a ready-made closed-loop manufacturing solution, stay tuned! More details are coming soon.

Need help choosing the right option?
If all of this sounds a bit too technical, don't worry! Your local Tornos sales representative will be happy to help you choose the right Connectivity Pack and integration setup for your machines, ensuring that your production data flows smoothly and securely between your Tornos machines and your IT systems.

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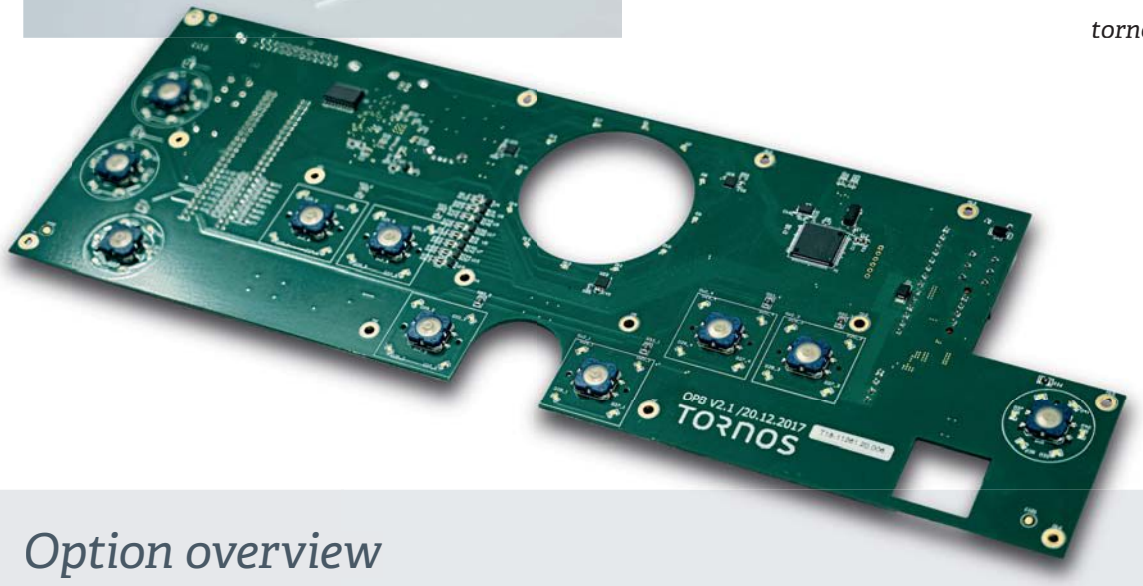

Option overview

Below you can see the available options for the different machine lines. You can configure them individually for each machine, or choose the bundle that includes all options at an attractive price.

Machines	*Swiss DT / Swiss GT / Swiss XT / SwissNano*	*EvoDECO / MultiSwiss / SwissDECO*
Base option connectivity	**735-2410** *Connectivity Pack TMI*	**735-2420** *Connectivity Pack Pilot*
Base option OPC-UA	**735-2700** *OPC-UA interface Monitoring*	
Extension OPC-UA	**735-2710** *OPC-UA interface Production Management*	
Extension OPC-UA	**735-2720** *OPC-UA interface Ext. Tool Offset Correction*	
Bundle option	**735-9010** *TISIS Bundle Industry 4.0 TMI*	**735-9020** *TISIS Bundle Industry 4.0 Pilot*

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