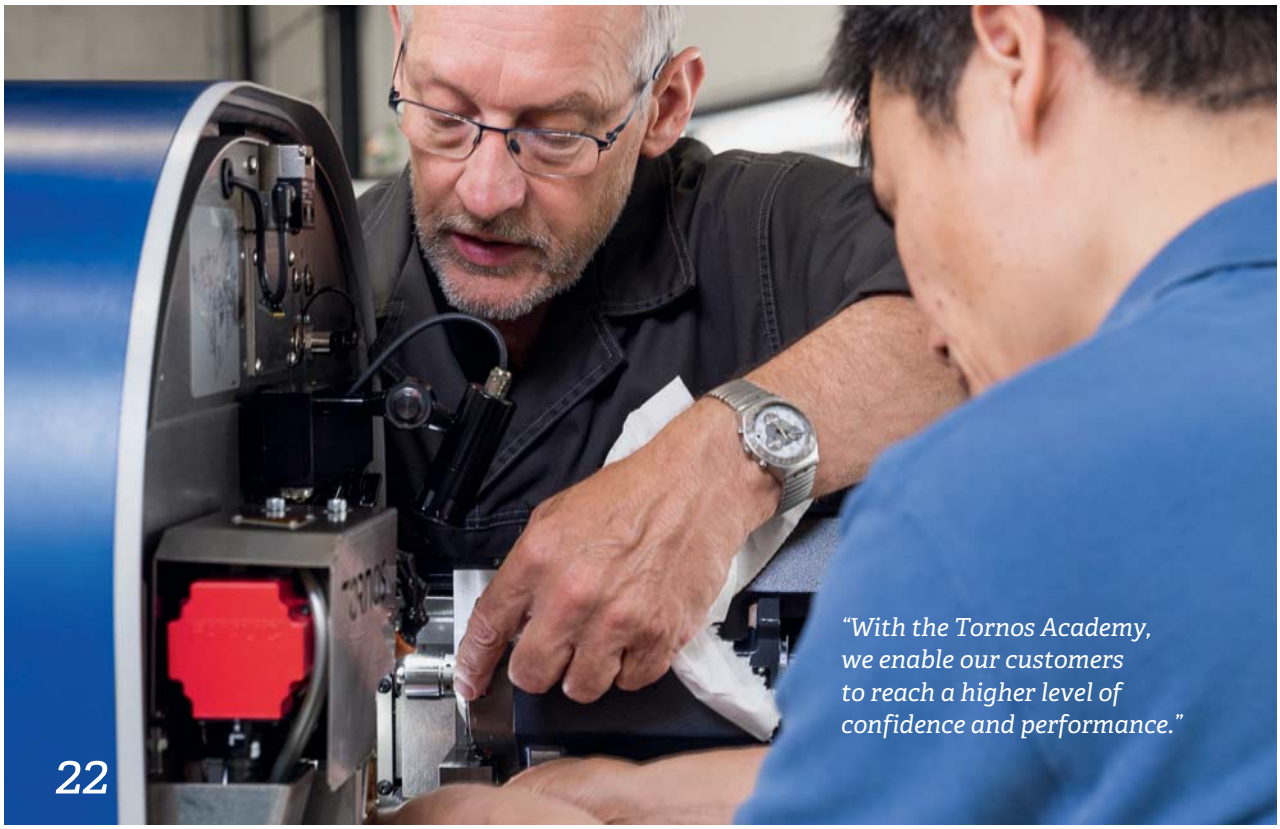
deco magazine

86 04-2018 ENGLISH



IMPRESSUM

Circulation
17'000 copies

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

Publisher
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CH-9403 Goldach
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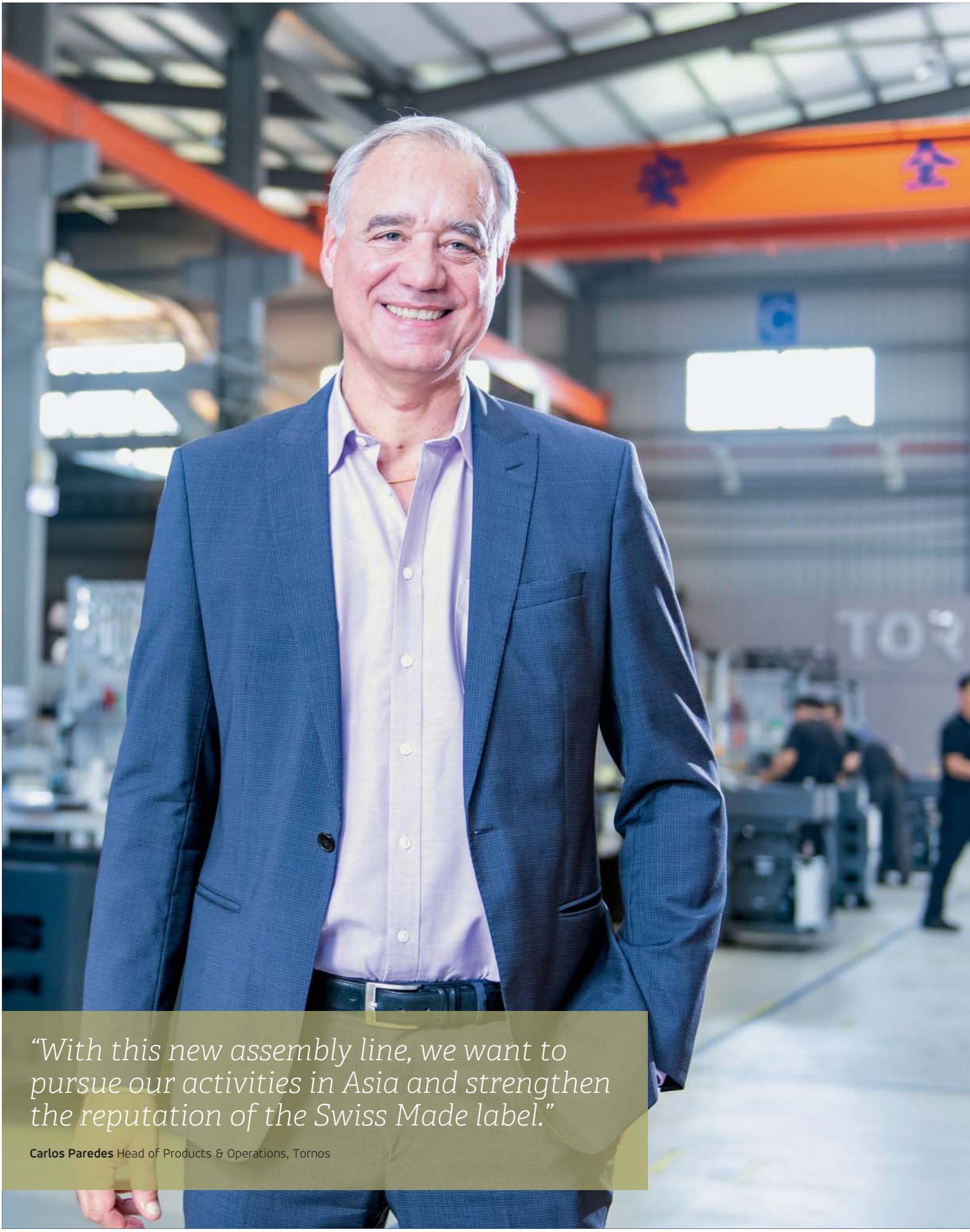
SUMMARY



"With this new assembly line, we want to pursue our activities in Asia and strengthen the reputation of the Swiss Made label."

Carlos Paredes Head of Products & Operations, Tornos

Taichung – at the heart of the Asian machine-tool industry

Carlos Paredes Head of Products & Operations, Tornos

In a fast-changing world, the industry has to challenge itself day by day, constantly adapting to actual market requirements. Our subsidiaries in Asia are no exception to this rule. And that is why we equipped our production site in Taichung with a new assembly line. In the course of a plant expansion, we decided to install a production line for lean production, just as it is installed at our production sites in Xi'an in China and Moutier and La Chaux-de-Fonds in Switzerland.

With this new assembly line, we want to pursue our activities in Asia and strengthen the reputation of the Swiss Made label by guaranteeing the same level of quality as through our production site in Moutier. Its quality standard is actually the same while the costs are kept on a much more attractive level. In fact, the key components such as spindles and guide bushes are still and will always be supplied by our plant in Moutier. The latter guarantees permanent support of our Asian teams; both in production and research & development issues. Furthermore, we assure the permanent on-site attendance of at least one Swiss engineer who provides the support required for us to achieve our goals.

Taichung – a veritable machine-tool cluster

The adventure began six years ago. In 2012, Tornos recruited a small team in Taichung for the purpose of putting the finishing touches on its Swiss ST 26 machines. Taichung is a veritable business cluster and an authentic hub of competitiveness. Seldom have I seen such a concentration of inter-connected companies and institutions active in the field of machine-tools in such a small geographic area. It's rather like the situation in our region, the Swiss Jura Mountains region. Even if it is sometimes ignored, Taiwan has an area comparable to that of Switzerland. An interesting fact as well, just like in Switzerland, the mountains cover a portion of around one third of the entire area of the country, while Taiwan's population is four times as high as that of Switzerland.

Taichung is located at the heart of this island state and the heart of the town beats with the rhythm of the machine tool, so to speak. All our suppliers are headquartered within a radius of less than 100 kilometers, a fact that significantly facilitates transactions and other trading.

Our team in Taichung has grown gradually. Meanwhile, the Taichung subsidiary has been focusing its activities on the Swiss GT series, i.e. medium-range machines that have found their market not only in Asia but throughout the world. The Swiss GT machines are advanced six-axis machines that enable our customers to efficiently produce a wide range of workpieces.

The production line recently installed in Taichung boasts high performance. Our center meets the highest demands, our plant is beautiful and modern and here, we have all we need to produce high-quality products complementing those we manufacture in Switzerland or China. In this way, we are able to cover a broader market.

A team strictly focused on progress

The staff of our Taichung subsidiary are highly motivated. Strictly oriented towards Europe, they are proud of working for a company based in Switzerland. The core staff are steady; they are loyal

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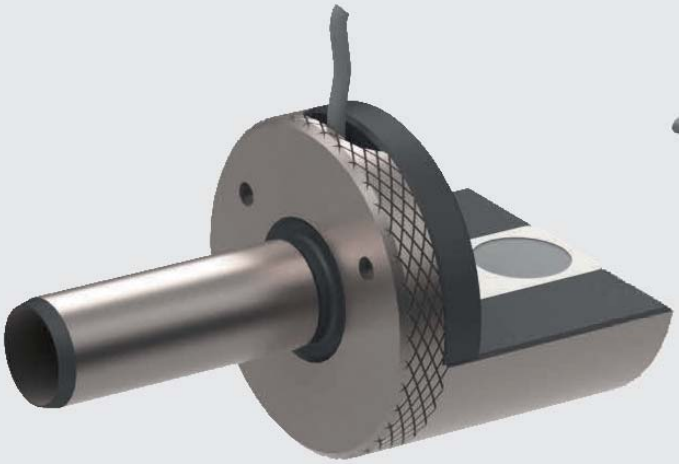

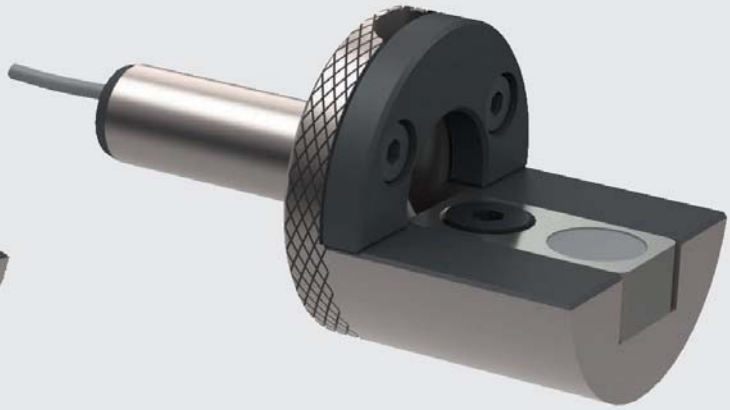

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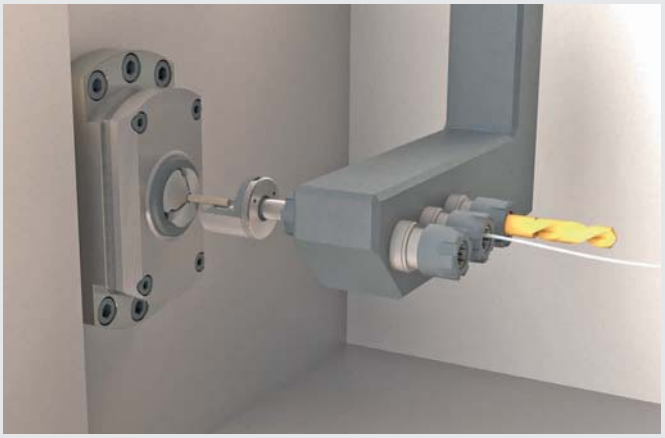

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to Tornos and intend to remain so. The team currently consists of 55 employees and will be expanded by further skilled collaborators in the next months to come.

The staff in Taichung stand out for their incredible flexibility and their thirst for knowledge and constant perfection. Driven by the desire to continuously improve, every employee is ready to commit himself to his work and doesn't hesitate to work overtime whenever he deems it necessary, without exceeding the legal limits. The Taiwanese labor legislation is comparable to ours and the applicable restrictions in this context are the same.

Heeding these basic parameters, we plan to further improve our performance. We want to push on our growth and plan to produce about 200 machines in Taichung in 2019.

The new assembly line allows us to increase our production capacity since, with it, we pursue the same lean-production principle as with our other production sites.

Taichung is at the heart of the Asian machine-tool industry, at the heart of our activities and of our expertise. By designing our machines from A to Z in Taichung, we are relying on the proximity advantage while further promoting our growth on the global level. We think this is the perfect fusion of Asian motivation and Swiss performance.

With the new Tornos Customer Center in Shanghai, the customers get the perfect opportunity to discover Tornos and the Tornos solutions.

TORNOS' CUSTOMER CENTER SHANGHAI:

Swiss operational excellence *for Asian customers*

Intent on offering Chinese customers the best possible service experience, Tornos officially opened the doors of its new Customer Center on November 7th, 2018. The Customer Center Shanghai is large enough to accommodate the entire range of Tornos machines and thus literally brings the legendary Swiss operational excellence to the doorstep of the Chinese marketplace. This strategy of being close to the customer makes clear that both existing and potential customers can count on Tornos – a company that is rooted in Switzerland but cultivates its global business interests.

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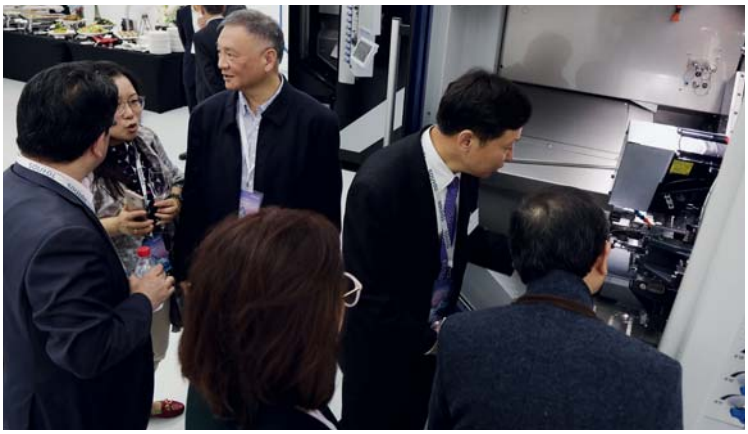
China unquestionably is the world's biggest industrial market. Based in Shanghai in the Pudong free zone, Tornos Shanghai provides customers all over China with its extensive services. Just as Shanghai is a thriving and dynamic town, Tornos is a dynamic partner that relies on constant evolution and innovation in order to supply its customers with the best available solutions.

The official opening of the new Customer Center substantiates the power of four legendary entities – Tornos, Switzerland, Shanghai and China – that all have a firm forward-looking attitude in common. Tornos has already been active in China for many years and opened its first subsidiary in 2004 in



On November 7th, the Tornos representatives and the representatives of the Shanghai Waigaoqiao Free Trade Zone officially opened the new Tornos Customer Center Shanghai. This is an important step in the Tornos strategy and a key element in terms of better serving the Chinese customers.

Shanghai. Both for Tornos and Shanghai, the past 14 years have been an extraordinary journey and an unprecedented and successful adventure. The new center will strengthen the regional presence while consolidating its position as the partner of choice for machine tools.

A long history in keeping with traditions

In 2018, Tornos is celebrating the 5th anniversary of its plant in Xi'an. For the company, internationalization is the first priority. Tornos increases its flexibility and advances based on innovation to enhance its operational excellence day by day. With the opening of its Customer Center in Shanghai, Tornos expands its line-up of unique solutions for the targeted market segments, an approach that has already been a great success in China.

And Tornos does not intend to stop now that the company is doing so well. In fact, the presence in this market region is going to be expanded. The Customer Center in Shanghai will play an important role in this strategy.

Machines specifically designed for the Asian market

The new Customer Center is way more than a mere figurehead for the Tornos Group. It will serve as a meeting place for the customers from all over China. The center will allow Tornos to even better provide its Chinese customers with its services and to support them even more efficiently when it comes to the applications of the four key markets (automotive, medical & dental, electronics and micro-mechanics). From here, Tornos will be able to assist its customers on their way towards Industry 4.0 (digitization), especially with the aid of TISIS.

Among the machines displayed in Shanghai, the Swiss DT 26S will stand out. This machine has been specifically designed for the Asian market and offers a unique cost/performance ratio. Ready for Industry 4.0, the machine unites all state-of-the-art technologies. It also features a modular machining area that makes the machine stand out from the other machines in this market segment. Like any Tornos machine, it has been designed with the operator in mind and is low-maintenance and easy to access.

The machine has aroused keen interest among the Chinese customers. This entry-level machine produced at our production facility in Xi'an perfectly meets the market requirements and aims for the heart of the Chinese sliding headstock lathe market. It's quite clear that the DT 26 S is a key element of Tornos' strategy for the Chinese market.

A Customer Center strictly centered on the Asian customers

The new Customer Center is equipped with state-of-the art technology and will supply the Tornos customers in Asia with high-quality support. It has a surface area of more than 1,500 square meters includes a training center, a showroom, an inspection room and a spare parts warehouse.
With regards to the applications, the center fully relies on the Tornos expertise in numerous industries, with the aim of being close to the market and supplying turn-key machining solutions. The technology center's objective is to provide the Tornos customers with maximum assistance for them to be able to produce parts in small or large quantities. This support unites pre-sales service and operator training with spare parts supply, technical support and programming guidance. Moreover, the customers will find competent advice and the best choice of tools and clamping fixtures.
So, all these aspects will have their share in writing a new chapter in Tornos' history in Asia. This will be based on continuing innovation, evolution, growth and collaboration.

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The Tornos Automation department can adapt automation modules to the actual demands or arrange customized modules that perfectly match the capabilities of the machine with the automation requirements of the customers.

Let Tornos whisk you away to the world of

automation

Automation is one of the keys to digital production and it is the core of the Industry 4.0 concept. Even if Swiss-type machines are already well equipped thanks to their bar feeder, it is becoming increasingly common that supplementary automation solutions are employed both for single-spindle and multi-spindle lathes to make them suitable to meet the actual demands.

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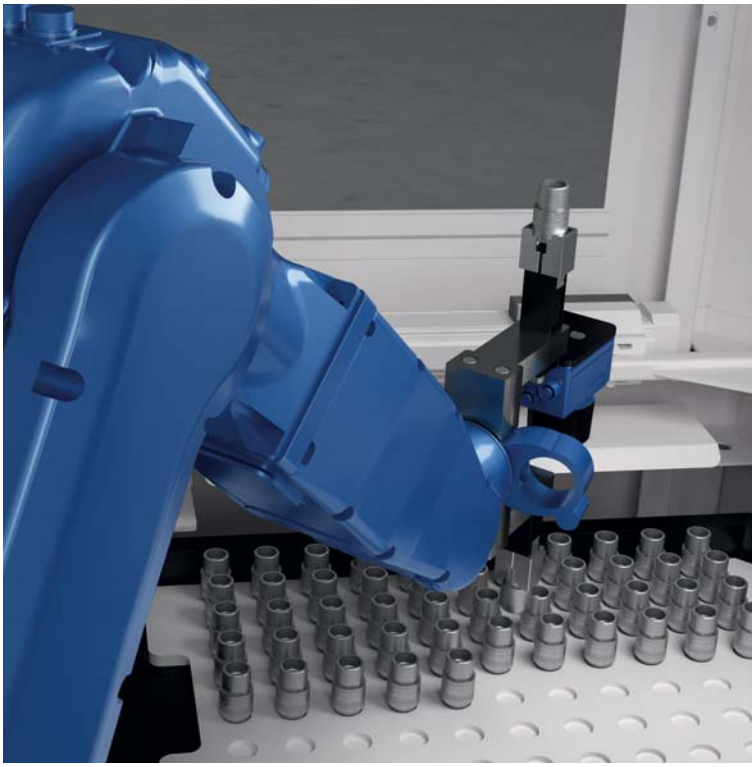
Palletizing as the basic demand

Palletizing is the automation principle most frequently used. By means of a palletizing system, the workpieces can be aligned on pre-defined pallets. It opens up a whole lot of possibilities and enables fragile parts to be handled gently. Since the parts are deposited on pallets in a logical order, sorting is facilitated e.g. in case of deviations. Besides a palletizing system, there is a full range of post-processing solutions the machine can be equipped with and which can be automated as well.

Customized cleaning, monitoring and marking...

Cleaning is usually the first post-processing stage and can be realized using a washing tunnel or any other device adapted to the specific machining process and the workpiece. Once the workpiece has been cleaned, various other post-processing stages can be added.

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For example, a measuring unit can be installed to check the dimensions of the workpiece and to send a feedback signal to the machine if required. Depending on the system adopted, closed-loop control is possible to enable offsets to be fed back to the machine in order to meet the pre-defined tolerances. In this way, the machine turns into a full stand-alone production unit. At the machine outlet, it is also possible to employ simple solutions such as a length or diameter measuring system. In the case of a negative measuring result, an alarm is triggered to warn the operator and request him to check production. For unmanned operation, the machine can even be programmed to stop under such circumstances.

Workpiece loading/unloading operations at the chucker performed by a robot

Depending on the market requirements of billet or blank clamping; a so-called "Chucker" version of the machine is required. Based on the specific requirements, workpiece loading can be realized in different ways (by means of gravity, linear axis or 6-axis robot).

Just recently, Tornos unveiled an automation solution connected to a Swiss GT 32 machine. This module is a cell that is provided with a 6-axis robot mounted to the machine. With this cell, it is possible:

1. *to load a billet into the spindle, thus enabling the Swiss GT 32 to be operated without guide bush,*
2. *to unload the finished part from the spindle or the counter-spindle,*
3. *to palletize workpieces, and*
4. *to realize pallet handling tasks.*

For automation, a 6-axis robot is used that is installed within the cell and can be separated from the machining area by means of a sliding door. Cell operation is fully synchronized and the cell is interfaced in a way to ensure operator safety and ease of use.

System expansion at will

The cell can most easily be re-tooled or re-programmed in order to adapt it to the requirements of each workpiece. The machine can always be equipped with a bar feeder. In this configuration, the cell can be used to unload and palletize the workpieces. It goes without saying that the standard part outlet can still be used.

To learn more about the automation possibilities, please contact your nearest Tornos representation.

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Compact yet efficient, the SwissNano 7 machine takes the combination of ergonomics and capabilities to the next level.

SWISSNANO 7 – *a machine that is prepared for* all demands

The machine that made its debut at the AMB in Stuttgart (Germany), certainly aroused keen interest. “This ultra-compact production centre is unrivaled in the market; its machining area is extremely flexible and enables various configurations to be realized. No matter what challenge you have to face, the SwissNano is able to meet it,” Marketing Manager Brice Renggli explains by way of introduction.

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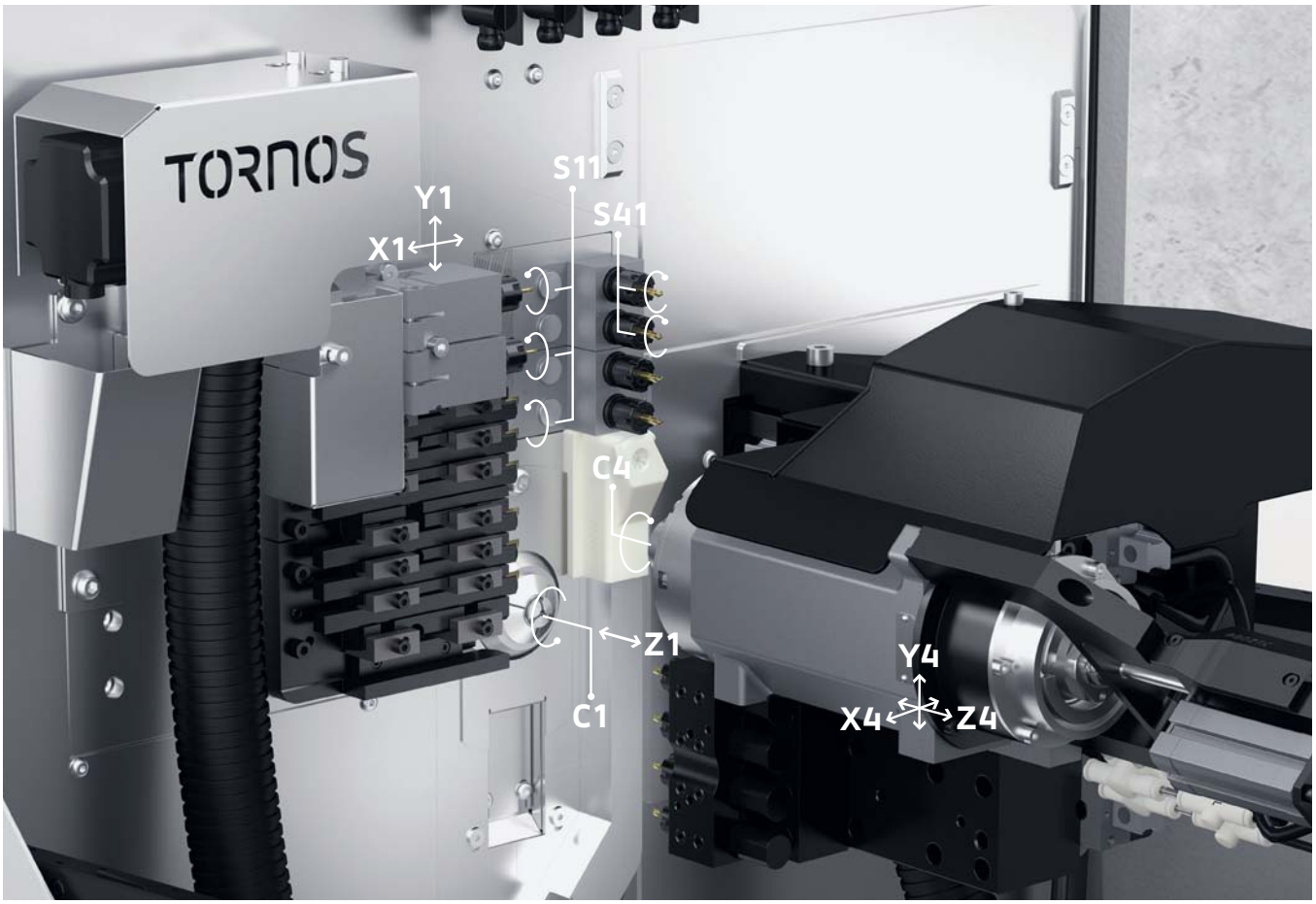
An outstanding kinematic system

“As a matter of course, the SwissNano 7 is equipped with the best kinematic system available in the market. The set-up of this compact yet efficient machine is extremely easy. Thanks to its unique design, the operator faces the counter-spindle which makes set-up and centering work a breeze. The most unique feature of this kinematic system unquestionably is the counter-spindle that is controlled in three NC axes. This is the great strength of SwissNano’s concept,” says Philippe Charles: He adds: “Since it boasts an ultra-ergonomic design, it’s a great pleasure to work with a SwissNano machine!”

A machining area of exceptional flexibility

The SwissNano 7 offers a multitude of capabilities that probably are the most unique in the market. The machine configuration can be adapted as required. Philippe Charles states some sample applications



are far from being exhaustive. He explains: "Do not hesitate to contact your nearest Tornos representation if you want to get detailed information."

Medical and dental industries

This is especially true for the medical sector with the addition of a thread-whirling unit. For instance, it enables the machine to be used for the production of maxillofacial screws. In addition, it can prove to be an excellent partner when it comes to the production of screws for dental implants or straight implants. The machine can also be equipped with high-frequency spindles for back machining operations. This permits the machine to mill hexalobular shapes (Torx®).

Electronics

The SwissNano 7 is also perfect for the machining of connectors. It can be equipped with a slotting unit for back machining that enables split connectors to be machined from both sides. Moreover, a polygon cutter can be installed for both main and back machining operations.

Micromechanics

This is the showcase application of SwissNano 4 and SwissNano 7 is even better in it. In particular, the SwissNano 7 enables processes such as gear cutting to be performed during main and back machining operations. In addition to the two main tool systems, the machine is equipped with a tool holder under the counter-spindle. This enables front drilling operations to be done or it can even support the workpiece during the machining process.

Philippe Charles concludes: "The SwissNano 7 has plenty of surprises in store. You are invited to discover them during a visit to our company in Moutier! Do not hesitate to contact us!"

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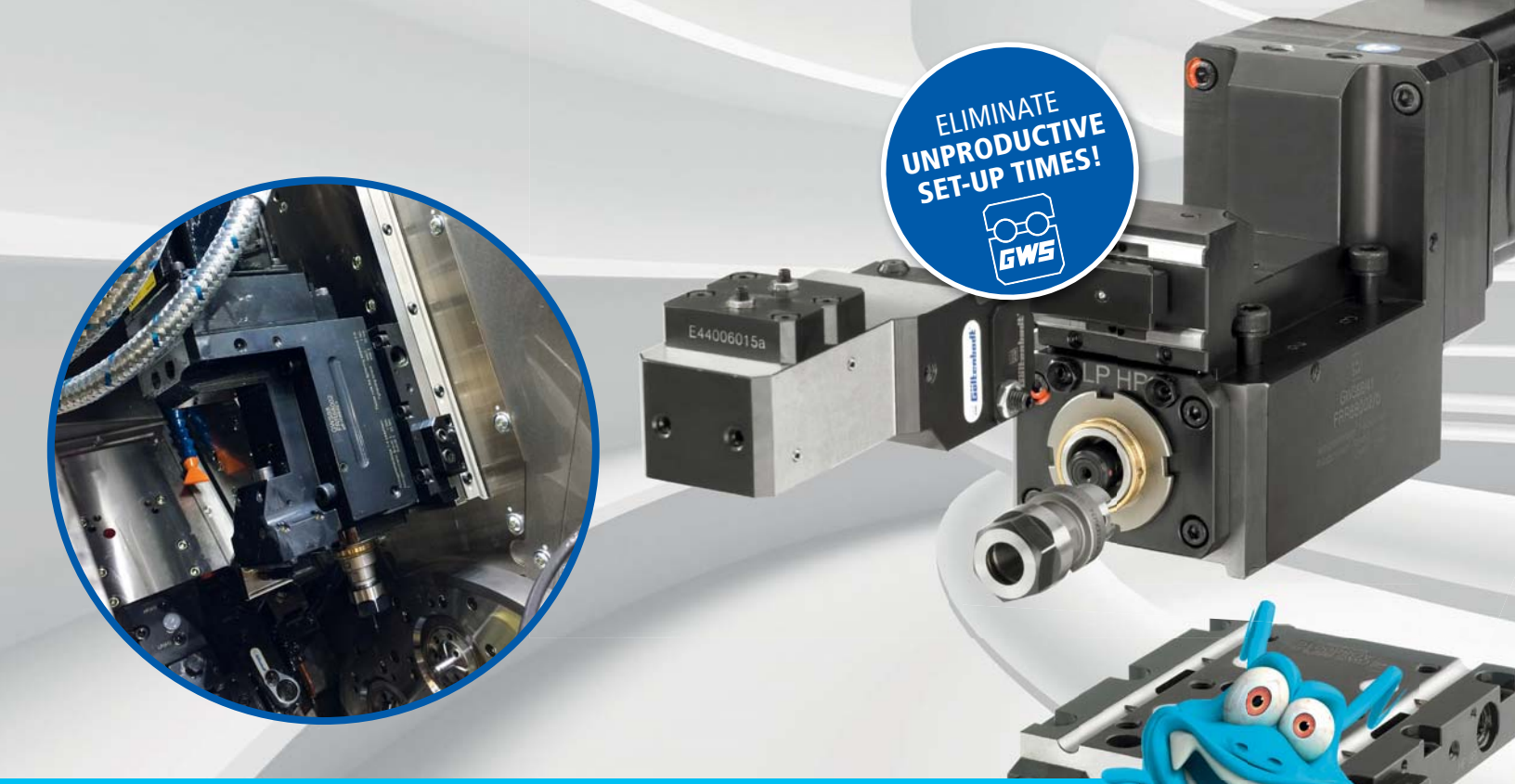

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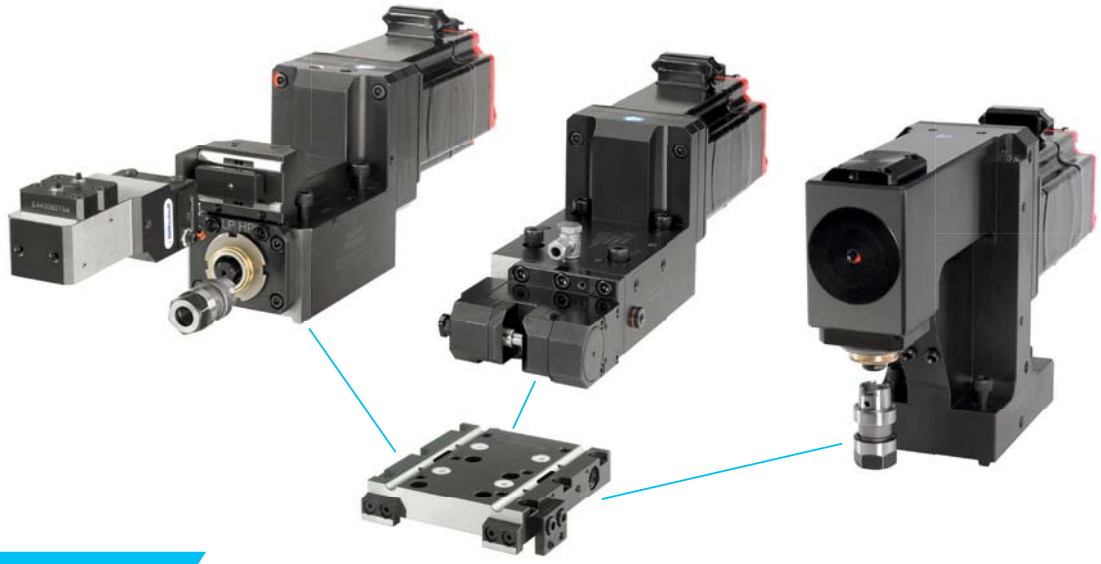

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With its Tornos Academy, the company wants to assist its customers throughout the service life of their machines.

TORNOS ACADEMY: *at the service of* your goals

"In a fast-changing world, you have to face the challenge of outperforming your competitors every single day. This is why the choice of appropriate production equipment is crucial. You have invested in a Tornos machine. Now it's your turn to optimize the productivity of this machine by tapping the full potential of the solutions available. The Tornos Academy enables you to develop the skills of your employees for them to be able to meet the demands of your customers," Olivier Rammelaere, Market Intelligence Manager and initiator of the Tornos Academy project, explains at the beginning of our interview.

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decomagazine: What was the idea behind the Tornos Academy?

Olivier Rammelaere: *At the beginning, there was the drive of the Tornos managers. We want to enhance our training activities at our premises or on site and also improve our application services. It's our clearly defined goal to provide every customer buying a Tornos machine with the best support and to extend this support beyond the period of machine purchase. For us, this support is not limited to the mere assistance during machine start-up; we want to provide it throughout the service life of the machine and in case of any changes that are necessary due to specific workpieces that are to be machined. It also comprises the training of new employees who can familiarize themselves with the machine and then work with; and fully utilize machine potential.*

dm: What are the objectives of the Tornos Academy?

O.R.: In addition to customer training, we intend to offer new application services that are aiming at getting various machining processes under control. With this offer, we want to address both new and existing customers. Our solutions are actually upgradeable. The services offered shall encourage our existing customers to try new things, for instance, to enter new markets they didn't dare to take-on in the past.

dm: That means the Tornos Academy has a modular concept?

O.R.: We are starting from a basic concept that was conceived for the majority of our customers to enable them to use our products in an autonomous way. We can then adjust our offer to the specific requirements of a market, a customer or a subsidiary. We intend to bring specific services both to Moutier and abroad. Our instructors are experts with vast experience. In the case of specific needs, we assess the customer's wishes based on an exact appraisal of the current situation at the customer facility. The instructors are supported by experienced set-up engineers. Jointly, we determine how to best make their expertise available to our customers.

dm: Is training therefore aimed at all customers?

O.R.: With the Tornos Academy, we enable our customers to reach a higher level of confidence and performance. In this way, we want to establish a systematic method of listening to our customer's needs. We will support our customers in the pre-purchase stage to guide their machine search. We will then attend commissioning to ensure the optimum machine set-up and will be available for the users during everyday work in order to help them address any challenges they encounter. Finally, we open up new perspectives for the machine users and help them find new markets and harness the full potential from their machines. We want to act as the driving force by offering continuous training at our customers' premises to enable them to improve their performance.

Let's take the example of a customer possessing an EvoDeco machine. We will help him impart the basic knowledge regarding product programming and operation to his machine operator and can keep on assisting him with parametric programming or with the teach-in of specific machining processes. Our modules are defined based on the particular customer expectations.

Both professional machine operators and professional teachers and instructors provide the customers with the required information.

“With the Tornos Academy, we enable our customers to reach a higher level of confidence and performance.”

We will jointly assess the range and the extent of the available options. The customer may either opt for the standard solution already defined or we can jointly organize customer training tailored to capabilities.

dm: What are the actual benefits?

O.R.: *The Tornos Academy allows better information of the customer and makes him more aware of the existing possibilities. He can draw on the help of the instructors and set-up engineers who will respond to his needs. Above all, however, the latter are proactive: they know how to assist him most efficiently in fully utilizing the potential of each machine in everyday work and in achieving a higher productivity and efficiency of the machine inventory. Moreover, we follow up the staff expertise and thus guarantee the optimum control of the Tornos products through the customer’s employees.*

In this way, every customer can learn how to produce new parts that enable him to enter new markets. Through the Tornos Academy, we impart our skills in the fields of gear cutting and thread whirling, to name but a few examples.

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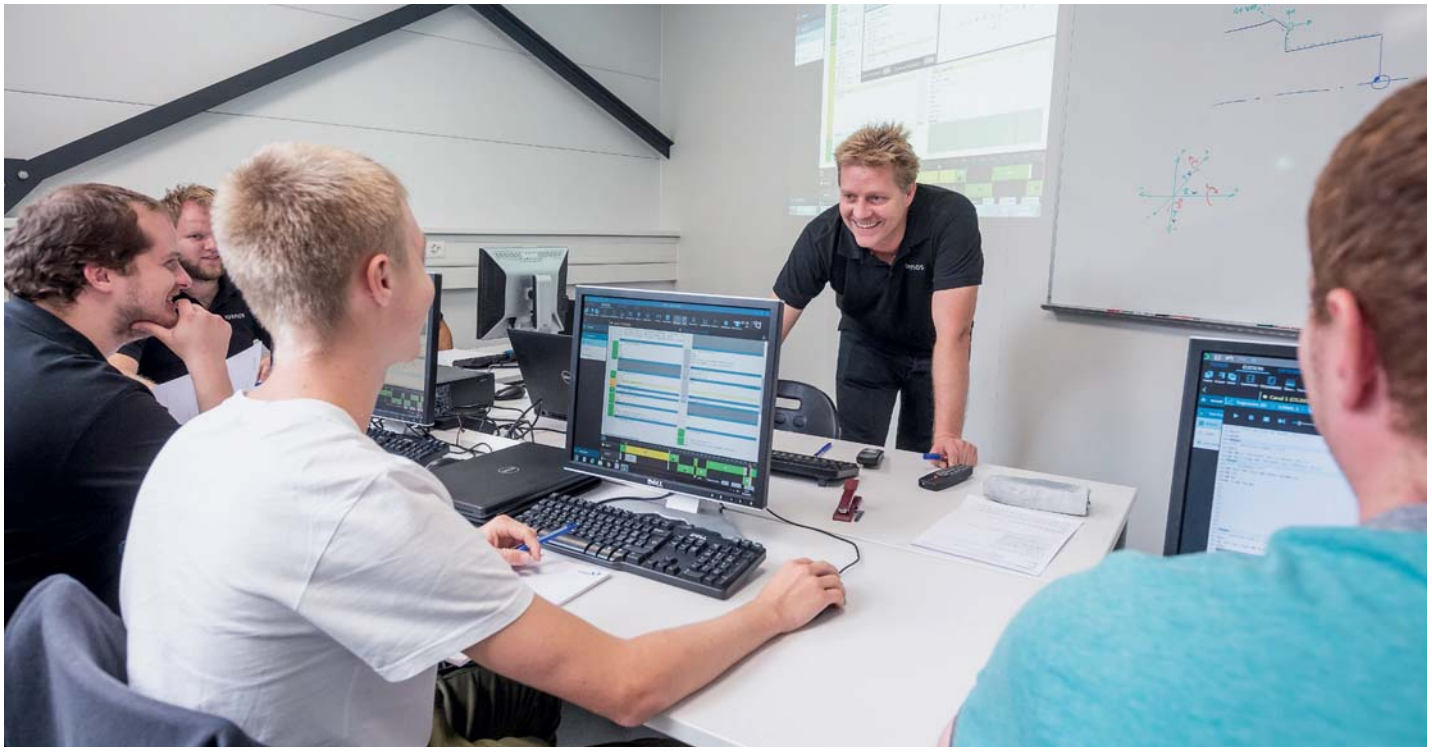
Whether the know-how sought by the customers refers e.g. to machining strategies, to the intended use of the machines, to machine service or maintenance or even to programming, the competent staff of the Tornos Academy will be pleased to provide assistance.



The large number of milling cutters enables SwissDeco to machine even the most complex parts in the market. What's more, thanks to its high rigidity and performance, the machine can also realize simple parts at unrivalled cycle times.

SWISSDECO:

a machine capable of rising up to

any challenge!

The SwissDeco platform can meet various challenges of modern times such as the complexity of workpiece geometries that tend to increase significantly over time or materials that are becoming tougher and tougher. Thanks to the TISIS management software, the three independent tool systems of the SwissDeco machine can be programmed at ease. The three powerful yet flexible Z axes enable the machine to easily tackle operations such as deep drilling processes or the operation in differential mode.

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The Tornos experts have conducted a whole series of machining tests. This article presents various possibilities offered by SwissDeco machines for a number of selected workpieces.

Automotive industry: one of the key markets for SwissDeco

The automotive industry is the ideal market for SwissDeco machines. Tough materials, high operating speeds and precision are only some of the key issues of this market. The SwissDeco enables plenty of applications to be realized, not least because it can be provided with a gear hobbing unit. Furthermore, the Easyfluid system ensures optimum cutting oil delivery and chip management.

Michael Dünner, SwissDeco Product Manager, explains: We have conducted tests on several automotive parts. One of the first tests was performed during the production of a steering shaft and a drive shaft. On these workpieces, the machine performs

brilliantly. Gear cutting is possible both in main and back machining operations. Despite the tough materials to be machined, the feed-rates are very high.

We then decided to tackle a more classic part, the piston rod of a shock absorber. Here, it was to be proven that SwissDeco is a forward-looking platform. The machine can actually be expanded by an automation module enabling e.g. the machining of billets. For this workpiece as well, the SwissDeco is the ideal partner – despite its apparent simplicity. Due to the high performance of its two spindles, it is able to realize threading tasks with ease. Furthermore, the removal of long workpieces is facilitated; the machine can be complemented with a conveyor belt or gripper system used to remove the workpieces from the machine.

Another automotive part we turned our attention to was an internal drive shaft. For this component, it's the A axis (or, on SwissDeco's turret version, the B axis) that makes all the difference and allows inclined holes to be machined with ease.

Finally, we machined a hydraulic distributor – the spool, to be precise – on a SwissDeco machine. In the end, this part was easy to machine as well. Especially due to its simultaneous milling capability and its suitability for deep-hole drilling, SwissDeco offers significant benefits with regard to the cycle time. With each of the parts described above, we came to the conclusion that SwissDeco permits considerable cycle time reductions of at least 20-30% and hence saves cost."

Medical and dental industries: challenges that are perfectly met

The medical sector has several characteristics in common with the automobile industry; this applies especially to the material hardness and the complexity of the machining processes.
The Tornos expert continues: "To test the SwissDeco, we decided to focus on such parts that are currently pushing our machines to the limit of their capabilities. The first test workpiece was an orthopedic nail. This long and complex part benefits from SwissDeco's drilling capability. Thanks to the B axis of the turret or to the A axis of the gang tool post, milling in a tilted plane and deburring operations are possible. On the other hand, the Z2 axis allows the machining of grooves e.g. over the entire workpiece length. Finally, the gripper enables the part to be removed with ease from the machine, despite its size (length 360 mm).

Despite its dimensional constraints, the machine is perfectly suited for such types of workpieces.

As the second test workpiece, a spinal hook was selected. This part benefits from the 5-axis interpolation function of the A axis (machine version with gang tool post) or the B axis (turret version of SwissDeco). For the SwissDeco, the machining of such complex features is a waltz. The machine base is ultra-rigid and therefore simply ideal for this kind of milling operation. To even enhance the rigidity, the hydraulic brake of the 36 mm spindle can lock the bar in the correct position and thus guarantee perfect positioning.

The third part selected for the machining test was an intervertebral cage that, just like the hook, requires a lot of driven tools. This part, however, is made of PEEK, a material that requires dry machining and the cooling with compressed air being supplied via nozzles. Depending on the machining task to be performed, the cooling air can be cooled. Here as well, the machine is doing a marvelous job. This workpiece is actually the ideal part for the SwissDeco, partly because the machine is also able to automatically insert a marking pin. For this workpiece type, we have developed a dedicated automatic loading system. The pin enables the part to be detected when the patient needs to be X-rayed.

Finally, one of the objectives was to find a solution for the dental sector, in particular for dental turbines. These parts require a large amount of milling, including numerous eccentric drilling or milling processes. Operations requiring B-axis control are also common practice, both for positioning and 5-axis interpolation tasks. For this kind of workpiece, polygon cutting and gear hobbing are advantageous too.

A powerful production means at your service

"In a nutshell, the SwissDeco significantly improves the surface finish while the large number of milling cutters makes the machining of even the most complex parts in the market a walk in the park. What's more, the machine is also profitable for simple parts and its high rigidity and performance enable unrivalled cycle times.
The medical industry is full of parts that can benefit from the performance and capabilities of the new machine. This especially applies to the field of medical devices including surgical saws or even to toolmaking. The SwissDeco field of application is far from being confined to the automotive and medical industries. The machine can also be used for the production of lock components that are characterized by increasing complexity. Occasionally, we receive parts requiring a large number of milling passes.
As regards complexity, the connecting business is definitely as demanding as the industries mentioned above.
You are invited to visit us and see for yourself the capability of SwissDeco. Do not hesitate to contact us if you are interested in detailed information,"
M. Dünner concludes.

tornos.com

TEIXIDÓ: precision and passion

for complete customer satisfaction

Teixidó has been specialising in the mass production of precision parts since it was founded in 1952. Based in Catalonia, the bar turning company is the largest of its kind in Spain.

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Teixidó operates in the automotive, pneumatic, equipment and aeronautics industries. The bulk of its production covers diameters from 0.5 to 20 mm. As Spanish group sales director Xavier Teixidó Pont explains: "many bar turners are capable of producing these diameters, but what distinguishes us from our competitors is our ability to adapt to the tightest tolerances. Our 13,500 m² production facilities and the diverse technologies we use in our company enable us to respond rapidly to varying demand from our customers."

An integrated industrial approach

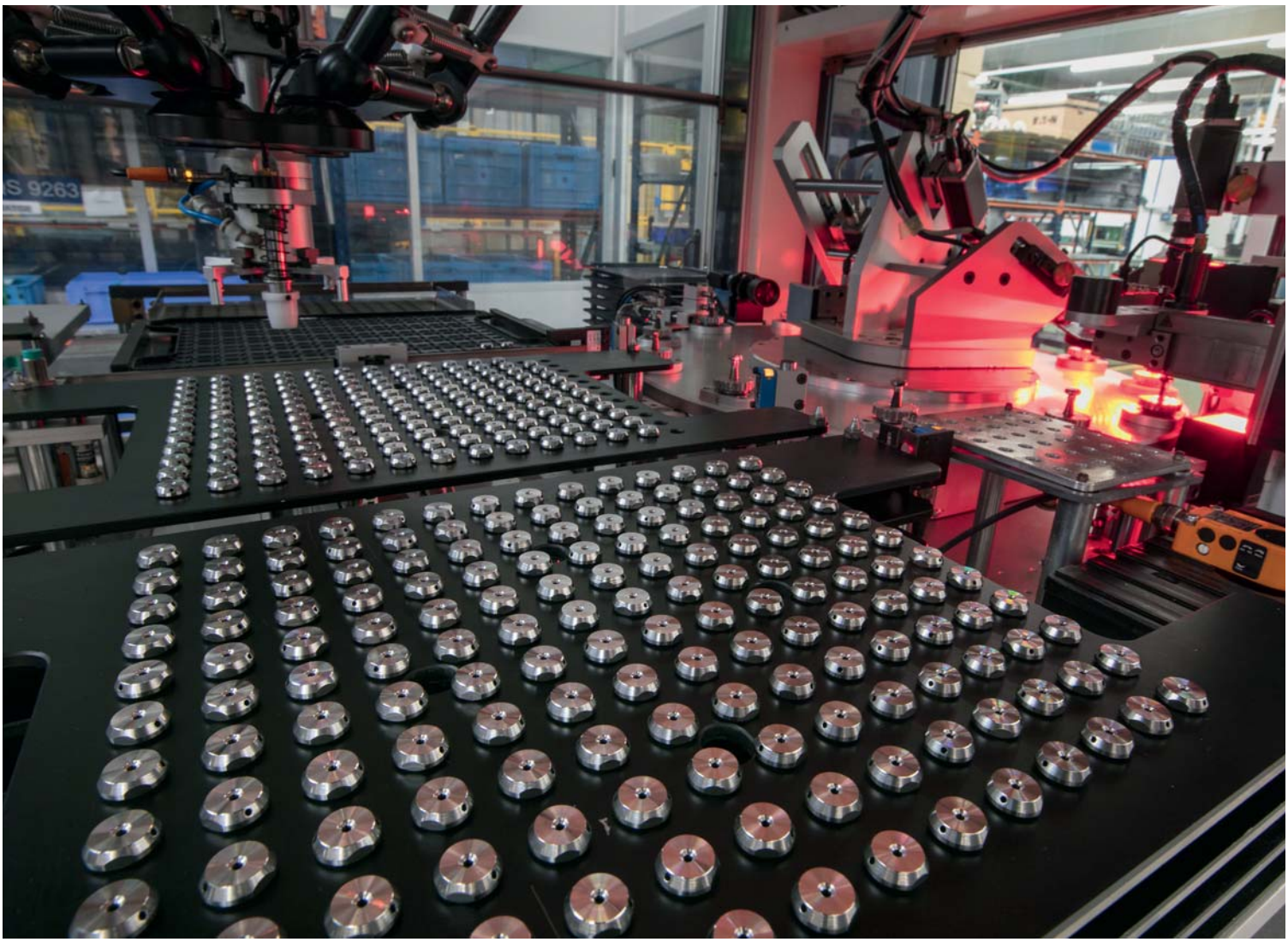
Teixidó is, first and foremost, a company offering very high performance and it is led by a team of highly-qualified specialists. With a workforce of 470 staff, the company has ISO 9001 (2008, IATF 16949 (2016) and ISO 14001:2004 certification. Able to meet the strictest cleanliness requirements, Teixidó has its own plating (nickel, zinc) and heat treatment department.
The company also performs deburring operations.
In addition to bar turning, Teixidó has a classic

“The after-sales service from Tornos Spain is very fast, which we really appreciate”

centreless large-scale grinding machine, and its services also include polishing and honing. It produces over 300 million parts every year, with an average PPM of 3. The company machines all kinds of material and offers hard turning operations. In addition to tempered steel, the offering covers an unparalleled range of materials such as bronze, aluminium, steel, brass, inconel, stainless steel, copper and titanium.

To guarantee perfect results, we have invested heavily in monitoring equipment; for example, we now have 23 measuring stations for automatically inspecting parts and a 3D measuring machine. Our philosophy is simple: customer satisfaction is our watchword, and to achieve it we rely on technology, quality and service. This has been our vision since the very beginning. It also guides Teixidó's management in its

Automated quality control.



relationships with employees and the environment. Training is a central pillar in Teixidó's strategy for maintaining a high level of quality. The company has its own waste water purification station, as well as almost 600 m² of solar panels installed on the roof of the factory. These factors combine to form Teixidó's rationale: a model for success and unrivalled performance.

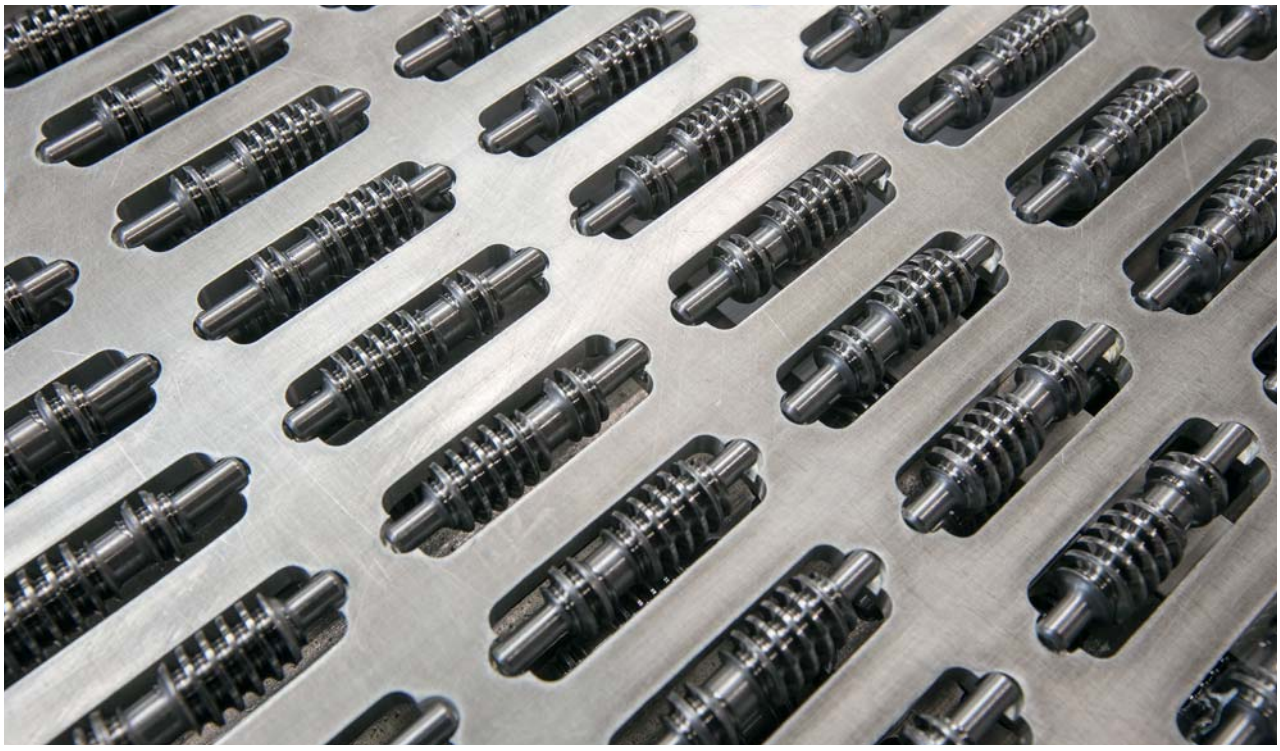
To realise this rationale, Teixidó has relied on Tornos and its machines since its earliest days. Teixidó still has around sixty cam-type machines, including R10s. It was one of the first customers to adopt the Deco, and the first Deco 10 dating back to 1997, is still running. The company now has several dozen Tornos CNC machines, including two EvoDeco 20 machines that replaced two old Deco 20s. "We have given

Fully automated stock.

Tornos a variety of challenges over the years," states production manager Josep Colina Vidal. "It must be said that we have always enjoyed assistance from high quality contacts, both in Spain and Switzerland. The after-sales service from Tornos Spain is very fast, which we really appreciate.

However, it's really Tornos's machines which, when adapted for our production, make all the difference. We have a number of multi-spindle machines as well as our Deco, Delta and EvoDeco fleets. We have

The company has extensive expertise in numerous business sectors.



Teixidó meets the very strictest customer requirements.

SAS 16, SAS 16.6 and BS 20.8 cam-type multi-spindles, MultiAlpha, MultiSigma and MultiDeco CNC machines and several recently acquired MultiSwiss 6x16 machines including 2 machines with Y axis."

"These machines can exceed the specifications required of single-spindle models, offering stable, highly precise machining. And their six spindles make them extremely productive; we can produce far more parts per square metre. This means a MultiSwiss can easily replace three single-spindle turning machines."

"It's a very high-performance machine, and I think it's fair to say we have been seduced by its performance. It also enables us to save time on setups, partly because we can avoid performing several identical setups on single-spindle turning machines, but primarily because the machine is highly ergonomic and changes can be performed very quickly. In addition, the machine is extremely compact thanks to its built-in peripherals, which is a big plus for us. To conclude, the MultiSwiss is an excellent partner for Teixidó, and the machine sits perfectly with our commitment to quality."

iteixido.com

Like any other Tornos machine, the CU 2007 can be configured at will. Various peripheral units are available: chip conveyor, high-pressure coolant system with through-spindle coolant supply, etc.

TORNOS CU 2007: 7 AXES –

A customizable

entry-level turning / milling center

Both with the milling center CU 2007 and its big brother the CU 3007, Tornos offers its customers an all-in solution with 3 to 5 axes. Thanks to the pooled know-how, these machining centers can be customized to a high degree. They can be equipped with an impressive multitude of options ranging from tool changers and high-pressure systems to full automation systems such as the pick-and-place system.

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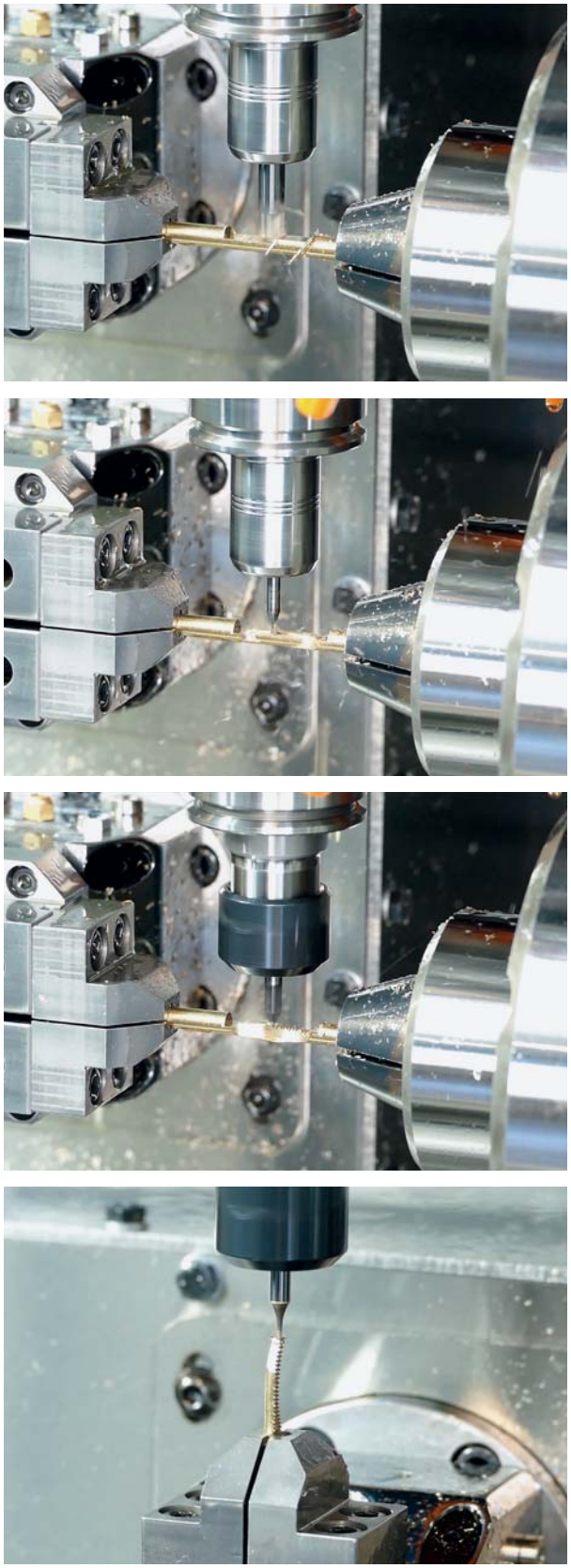
Today, this machining center enters the next stage of evolution – with a 7-axis version. Like all CU 2007 versions, this machine is equipped with a 5-axis dividing head which enables even extremely complex parts to be machined. Based on the large axis travels and the manifold automation systems, the idea of taking the machine to the next level came up. Currently, the purchase of an expensive turning/milling center is required for quite a lot of workpieces. Here, the CU 2007 with 7 axes is a real alternative that offers a most appealing value for money. This machine has a second dividing head that is provided both with rotary and linear axes and thus enables it to be converted into a bar feeding device. With these two additional axes, the machine can easily compete with much more expensive turning/milling centers. Not only does the second dividing head provide the machine with a means of feeding the spindle with bar sections of appropriate length but it also enables the sixth face to be finished as a matter of course.

Once the front face of the workpiece is in the second dividing head, cutting can be performed and the workpiece can be cut off the bar. Once the workpiece has been clamped, the rear face of the workpiece can be machined using the machine spindle. Upon completion, the workpiece can be safely ejected without leaving marks, provided that the machine is equipped with an ejector. The entire system remains extremely flexible and can easily be reconfigured depending on the requirements of the workpiece to be machined.

To even round off the autonomy of the machine, it can be equipped with a pick-and-place system. This simple yet economic and efficient automation system can be used to store bars up to a length of 330 mm in a magazine located next to the machining area and comprises a gripper system attached to the spindle block. With this solution, the machine footprint has been kept to the minimum.

Once the first bar has been finished, the magazine opens and the manipulator arm picks the following bar up to load it into the 5-axis dividing head. The workpiece is clamped, the magazine closes and the machining cycles can be re-started. The level of autonomy depends on the bar diameter and the length of the workpieces. The table below shows the maximum number of bars that can be stored in the magazine depending on the bar diameter and on the 3M mbar equivalence.

Bar Ø (mm)	Bar quantity	3 m bar equivalence (quantity)	Total bar length (m)
5	110	12.1	36.3
10	49	5.4	16.2
12	42	4.6	13.9
15	36	4.0	11.9
20	20	2.2	6.6
25	12	1.3	4.0
30	12	1.3	4.0



Movie - Surgical clamp.

Should the Pick and Place system be insufficient in terms of autonomy, the CU 2007 can be combined with a robot cell.

This unique solution avails itself of Tornos' comprehensive know-how. The six-axis robot can load and unload the workpieces and turn them over. An additional gripper system is used to handle the workpiece pallets. The integration of this robot provides the CU 2007 with a very high degree of autonomy in terms of movement. Loading, unloading, palletizing, turn-over and reloading of the machining unit are carried out with unrivaled precision. This unit can even undertake intermediate storage and return the workpiece to its previous position. Thanks to this automation system, valuable time can be saved and the repeatability and precision of the parts produced can be improved since manual operations, that often are potential sources of error, are eliminated.

You are invited to discover the flexibility of the CU 2007. In this video it is machining a surgical clamp.

https://www.youtube.com/watch?v=VIDREimWELE&ab_channel=AlmacChannel

The second video shows the machining of a PEEK cage. The machine shown is equipped with a pick-and-place system.

https://www.youtube.com/watch?v=MEOQpeowgIc&ab_channel=AlmacChannel

A machine that can be configured and reconfigured at will

Like any other Tornos machine, the CU 2007 can be configured at will. Various peripheral units are available: chip conveyor, high-pressure coolant system with through-spindle coolant supply, etc.

For instance, the machine has 3 types of tool magazine available that have a tool capacity of:

- *16 tools*
- *24 tools*
- *40 tools*

At the heart of the machine, the spindle can also be configured according to the workpiece requirements. There are three spindle types are available:

- *12,000 rpm for high torque*
- *20,000 rpm for high torque and speed*
- *40,000 rpm for high speed*

Versatile, precise, economic and customizable – both the CU 2007 and CU 3007 machines are efficient and unique machining solutions.

If you are interested in more detailed information, do not hesitate to contact your local Tornos experts.

tornos.com

Alternative long-part

ejection system for the Swiss DT 26

Sometimes, the biggest challenge we face is removing a workpiece from the machining area. Tornos offers various standard systems for a large variety of requirements. Brice Renggli, Marketing Manager at Tornos, explains: “Our engineers are always available, no matter how tricky the challenge. The best proof of that is the specifically developed system shown below.”

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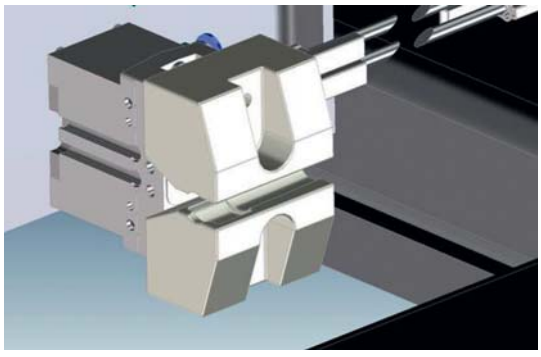
This system can be adapted to the Swiss DT 26 machine and enables workpieces with a maximum length of 320 mm to be collected. Parts difficult to eject such as workpieces with tapered ends – can be collected by means of a standard long-part ejection device (ejection through the counter-spindle).

The counter-spindle collet is made of plastics to make sure the workpiece is not damaged. The collet that has been produced by 3D printing technology can easily adapt to any workpiece shape. Parts discharge from the machine is realized by means of a conveyor belt used as a part outlet.

This system is available in a specifically developed design and can be adapted to any requirements. Do not hesitate to contact the Tornos experts!



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Ways to optimise cycle times #3

In a series of articles, Tornos expert Marco Dolci offers detailed information on the basics of bar turning and suggests ways to optimise the cycle times on machines working with ISO-code programs.

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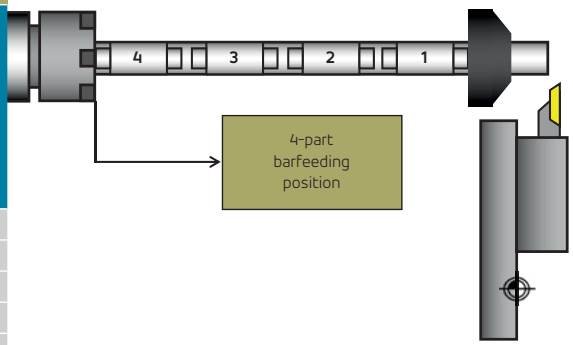
Indicative values	
Number of parts per clamping	Cycle time saver per part [sec]
1	0
2	0.75
3	1
4	1.125
5	1.2
6	1.25
7	1.285
8	1.312
9	1.333
10	1.35



Feeding several parts per clamping

The machine runs one part per clamping by default. If the main spindle stroke allows it, it may be interesting to feed several parts per clamping to reduce the average machining cycle time of a part.

This phenomenon occurs because the spindle collet opening and closing times, their respective delays and the end of Z movement delay during barfeeding are only taken into consideration once for the number of parts fed.

N.B.: The more parts are machined per clamping, the more the value introduced in the cutter width (G801 B_) has to be precise.

Bars

The bars used can also be important in terms of cycle time.

Their straightness is important and if it is ensured, the longer the bar is, the less often you will need to feed a new bar, so you will save in productivity.

Profiled bars can also be a good solution to save on cycle time. For example, with a 6-sided bar, this may avoid having to perform time-consuming machining. It is relatively easy these days to find profiled bars as well as shaped collets and guidebushes.

The machining of tubular bars may also be interesting, since it avoids drilling and part cutting is reduced since you do not need to cut all the way to the centre.

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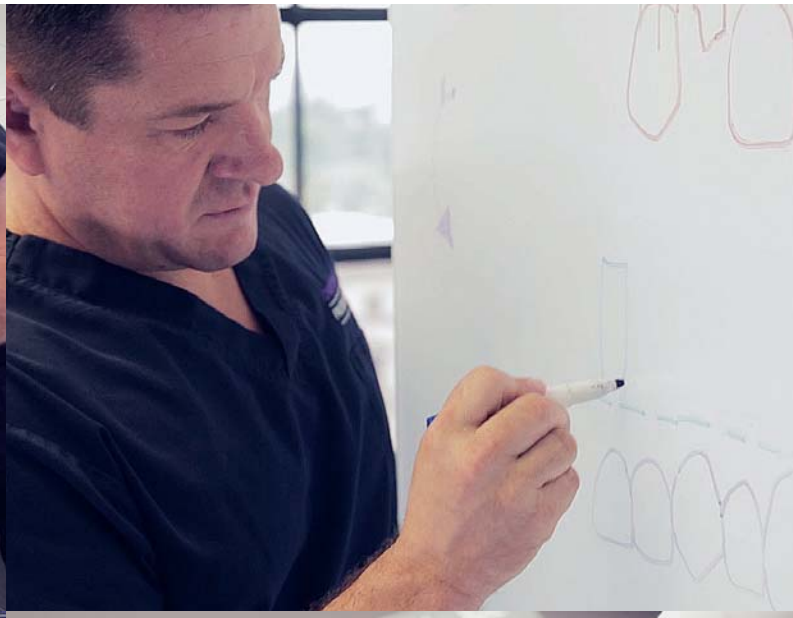


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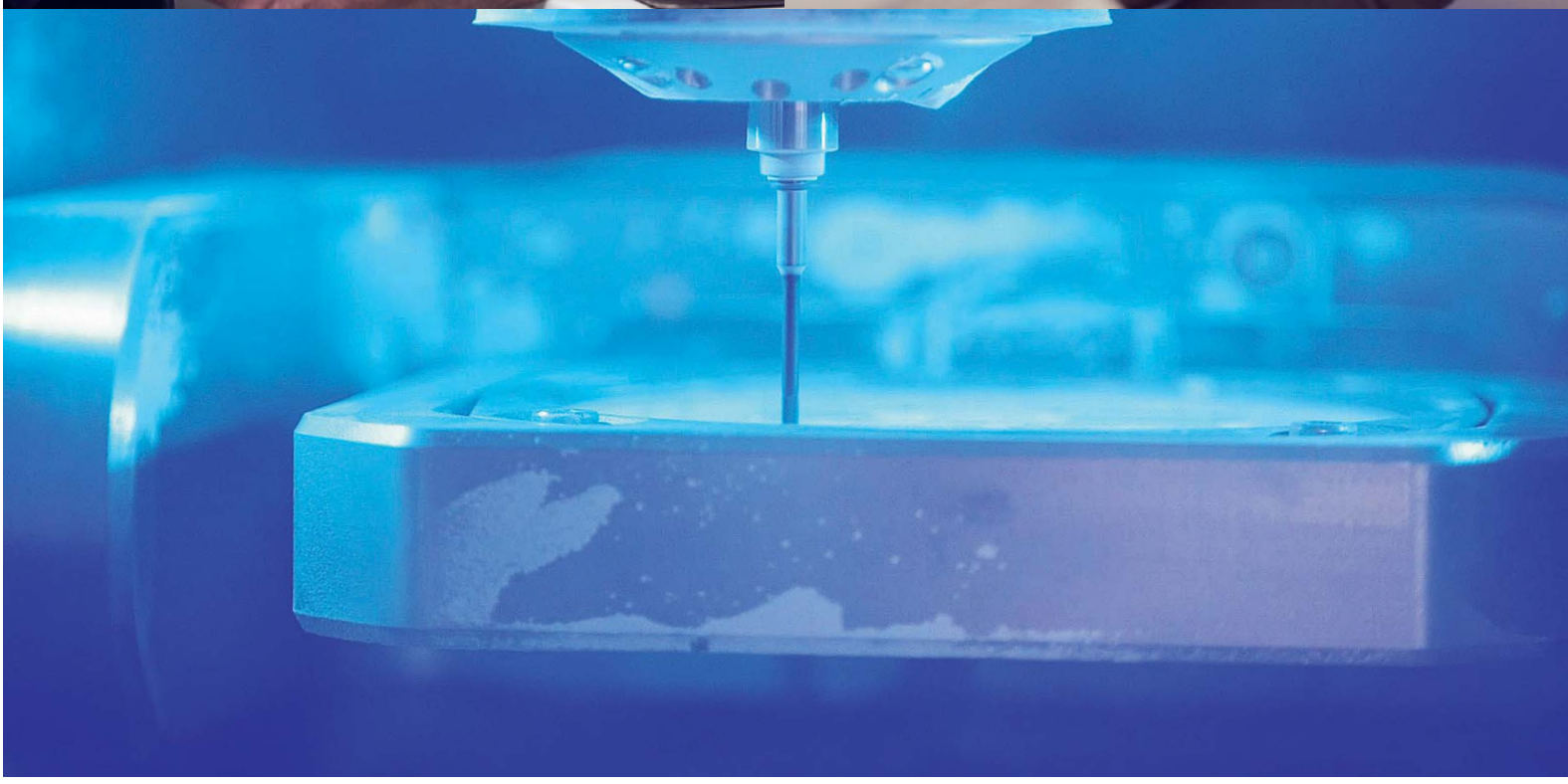

PARTMAKER:

Swiss quality meets

Australian ingenuity

Before he became a practicing dentist and even longer before his entrepreneurial spirit gave rise to PartMaker—a West Heidelberg (Victoria), Australia-based precision part manufacturing firm—native Australian Dr. Chris Hart had already fallen in love with Switzerland. Swiss dental training improved his scope of practice and, today, Tornos' Swiss-made single-spindle lathes are helping him redefine Australian manufacturing.

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An experienced prosthodontist specializing in pioneering practical and cost-effective solutions, Hart has made a name for himself as an innovator and leader in his profession. After earning his Bachelor of Dental Science from the University of Melbourne, he built up his expertise in a variety of patient care environments by working as a general dentist across Australia. After earning his Master of Dental Science degree, he was selected to be part of an international team of implantology scholars—an accolade that took him to the University of Bern in Switzerland, where he was mentored by world-renowned faculty member Professor Daniel Buser at the university's dental medicine clinic (ZMK) and in the university's department of surgery.

"With TISIS, it's a lot easier to generate programs for our parts because we are really just assembling programming modules"

Upon returning to Australia and working in both private practice and hospital settings, Hart discovered that he couldn't find adequate prostheses to serve the functional needs of oncology patients—so he decided to make those parts himself. Thus, Part Maker was born in 2012.

Describing himself as "an engineer trapped in a dentist's body," Hart's entrepreneurial spirit is driven by his passion to make a real difference in patients' appearance, comfort and confidence.

"Before we started making our own parts, we were heavily modifying existing parts. That means we were basically butchering really well-made parts in order to remedy simple problems, like patients not being able to open their mouths wide enough to accommodate available screwdrivers," he explained.

The solution was obvious: Hart started making his own parts and instruments.

"Back in 2012, we started making everything with milling machines. I even went to night school and earned a certificate in computer-numerical control (CNC) programming so that I could get a better understanding of manufacturing technology," he said.

Hart never intended to buy a lathe, but he found in short order that the dental implants and maxillofacial hardware he needed to produce were beyond the capabilities of simple milling.

"With so many dental parts being too long or too short, and with existing systems going in and out of fashion, I really saw a need for bespoke, custom dental and biomedical parts," he said.

Implants require turned parts, so among PartMaker's early purchases were a Tornos ENC 264 four-axis lathe and, in 2012, a Tornos Delta 20.

"Being new to Swiss-type turning and CNC machining as a whole, we had a pretty small wish list of parts to make. Peter Staebner at Tornos' agent SwissTec Australia was instrumental in helping me get our first few parts made with the Delta 20. I would go in to the shop after work and Peter helped me on the weekends, and we got our wish list accomplished," Hart said.

Before too long, Hart and team saw that Tornos' Swiss-type technology opened up a whole world of possibilities. Even running the Delta 20 all day, they were limited in the parts they could produce. Enter the simple and ergonomic Swiss GT 13, offering easy access to all tool positions and designed to drive successful production of long and short parts.

"It has six linear axes, so it allows us to make some parts that we can't produce on the Delta 20—and we can use 99 percent of our existing programming with the new machine," said Hart. "The Swiss GT 13 is so much easier to use than our old machine."

Forty percent cycle time savings

Accommodating up to 30 tools, including 12 rotating tools, the Swiss GT 13 had a Y axis that significantly increases machining capability in secondary operating and allows some complex workpieces to be produced without reworking.

Hart pointed out that the new machine is slashing PartMaker's cycle time on many parts simply because of the additional access it provides.

"It's easier to set up and its cycle times are significantly faster. In fact, because of the easier access, we're saving 40 percent in cycle time on a lot of parts. I know we're not using our Swiss GT 13 to its fullest capabilities yet, but that's the goal. It's already optimizing our manufacturing," he said. "Now that we have two machines running, our ability to keep on top of orders is significantly improved. It has enough tool positions that we've got it set up to make families of parts for the three main lines we make."

Significantly faster programming

Moreover, Hart is impressed with Tornos TISIS communication and programming software.

"With TISIS, it's a lot easier to generate programs for our parts because we are really just assembling programming modules," he said. "The software is easy to use and I estimate that it is saving us 50 percent in time spent on programming because we are not writing a new program for every part to be produced."

Plus, with the Swiss GT 13's high-pressure pump, PartMaker has its swarf control well in hand.

To say that Hart is pleased with his purchase is an understatement. One example, he says, is the "amazing job" the new machine does with an original PartMaker dental abutment featuring a complex taper geometry, external threading and a milled octagon. The part, with its M1.4 thread to a depth of 4 mm through a 1.2 mm, 1.5 mm deep hexagon, is easily executed with the addition of the Swiss GT 13.

"We are achieving results that we thought existed only in technical drawings," Hart exclaimed.

In fact, PartMaker has become so productive with its Swiss GT 13 that Hart has ordered an optional bar feeder.

"For the past five years, we've been relying on our own homemade bar feeder, but today we're chewing through the bars a lot faster," he said.

With Tornos technology, SwissTec expertise and his own ingenuity in his toolbox, Hart looks to the future with confidence.

"I have a dream for PartMaker to end up with six Tornos lathes and four milling machines," he said. "Of our customers, half are international, from the US, Canada, Taiwan and Mexico. With the increasing uptake of computer-aided design and computer-aided manufacturing in dentistry, dentists are realizing possibilities of what's available from dental implant companies, so we know the potential for custom machining is there."

partmaker.com.au

SwissTec Australia: a source of strength to customers

From production of bespoke dental implants to automotive components, customers of Berwick, Victoria-based SwissTec Australia profit from the company's more than 30 years of industry expertise and application know-how.

As a long-time distributor of Tornos Swiss-type, multispindle and micro milling machines, SwissTec offers new and pre-owned machinery throughout Australia, including specialized tooling for Swiss-type computer numerical control machines.

Founded in 2008 by Peter Staebner, SwissTec is backed by more than 30 years of hands-on experience in providing quality, reliability, punctuality, product knowledge and a "can-do attitude" to drive its customers' success.

From complete turnkey installations and relocations to rebuilds, spare parts and accessories, after-sales services, and fine tuning and modification of existing equipment, SwissTec is a source of strength to manufacturers across Australia.

But SwissTec's support doesn't end with hardware: SwissTec can support its clients with productivity and profit evaluations, factory relocations and just in time manufacturing management down to operator training & programming school, and OHS, as well as handling warranty claims when they arise.

"We are among the best companies offering the highest quality products, we do have a network of partners experienced offering a diverse selection of tools and equipment," said SwissTec's President Peter Staebner.

Furthermore, SwissTec satisfies customers' needs with a good section of secondary finishing technologies including find grinding, double-disc grinding, statistical analysis and horning. Fine blanking technology increases the shape accuracy of customers' products and assures final results without surface deformation or fractures.

To learn more about SwissTec, visit http://swisstec.com.au.

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MultiSwiss 6x32

The MultiSwiss 6x32 shares the same base as the MultiSwiss 8x26 machine. It is equipped with six independent spindles with hydrostatic bearings and can turn bars up to 32 mm in diameter. To achieve excellent machining conditions at these diameters, the 11-Kw motor has an increased torque of 27 Nm (S6). The maximum spindle speed is 6000 rpm and the maximum part length is 65 mm. As an option, the machine can also be equipped with three Y axes.

tornos.com

32 mm, 27 Nm, perfect for large diameters

MultiSwiss 6x32

We keep you turning