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THINK PARTS **THINK TORNOS**

67 04/13 ENGLISH

The most
powerful machine
on the market

Watch pinion
finished on
the SwissNano

Improved
utilization of sliding-
head machines for
machining medical
components

KIF Parechoc:
protector of
the timepiece

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for prototype machining

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SUMMARY

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A DYNAMIC COMPANY

I joined Tornos on 1st September 2013, just before the EMO trade show, and was immediately seduced by the company's dynamism. Between EMO 2011 and 2013, Tornos created a new stand as well as new machines featuring exceptional designs, with its teams working tirelessly to ensure it was able to fully satisfy the market's requirements.

2014 will again see a brand new range of entry-level and mid-range products roll off the assembly lines at the Xi'an factories in China and Taiwan, to be gradually introduced throughout the world. Another example of this extraordinary dynamism: The SwissNano, which was unveiled in February 2013 in Switzerland, was an overnight success, with its annual production volume selling in just a few days. During the EMO trade show, the SwissNano caught the attention of our customers and competitors alike, and we are delighted to be rolling it out elsewhere in Europe and the world.

The EvoDeco 32 machine was unveiled at the EMO trade show; it is equipped with two powered spindles with synchronous motors, and is, quite simply, the most powerful machine on the market! It enables our customers to handle the most extreme types of machining, and our tests have produced excellent results on materials.

In addition to its technological prowess, the machine features a brand new design which thrilled visitors – just like the stand itself.

The MultiSwiss machine, which was launched in 2011, has undergone further development and is now available in 3 versions: In addition to the entry level version, Tornos now offers a chucker version enabling the production of sintered parts and other billets, and a version with a Y-axis, which increases the machine's flexibility to expand the parts spectrum.

All these machines are continuously monitored by ISIS software, which not only allows the SwissNano and Swiss ST machines to be programmed but also enables the production of the Tornos machine inventory to be checked in real time using a desktop PC or tablet, via ISIS Tab.

Almac unveiled the BA 1008. Based on the SwissNano, this precision micro milling machine is designed to produce prismatic parts. It also underlines the renewal of the Almac brand and heralds the start of a new era.

I have rarely encountered a company as dynamic and innovative as Tornos!

Bruno Allemand
Head of sales and Marketing

HAROLD HABEGGER

Canons de guidage
Führungsbüchsen
Guide bushes

Type / Typ CNC

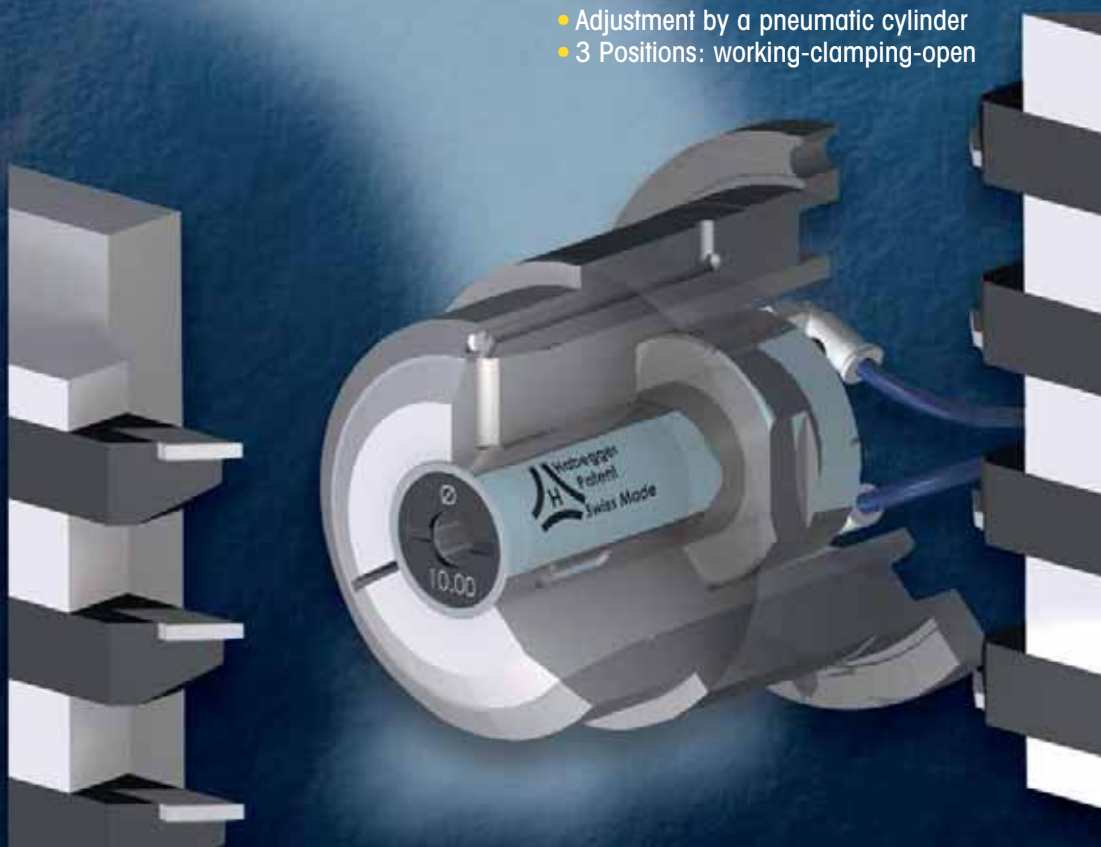
- Canon non tournant, à galets en métal dur
- Evite le grippage axial
- *Nicht drehende Führungsbüchse, mit Hartmetallrollen*
- *Vermeidet das axiale Festsitzen*
- Non revolving bush, with carbide rollers
- Avoids any axial seizing-up

Type / Typ C

- Réglable par l'avant, version courte
- Longueur de chute réduite
- *Von vorne eingestellt, kurze Version*
- *Verkürzte Reststücke*
- Adjusted from the front side, short version
- Reduced end piece

Type / Typ TP

- Réglage par un vérin pneumatique
- 3 positions: travail-serrage-ouverte
- *Einstellung durch einen pneumatischen Zylinder*
- *3 Positionen: Arbeitsposition-Spannposition-offene Position*
- Adjustment by a pneumatic cylinder
- 3 Positions: working-clamping-open



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1 Bushholder: 3 Habegger guide bush types!

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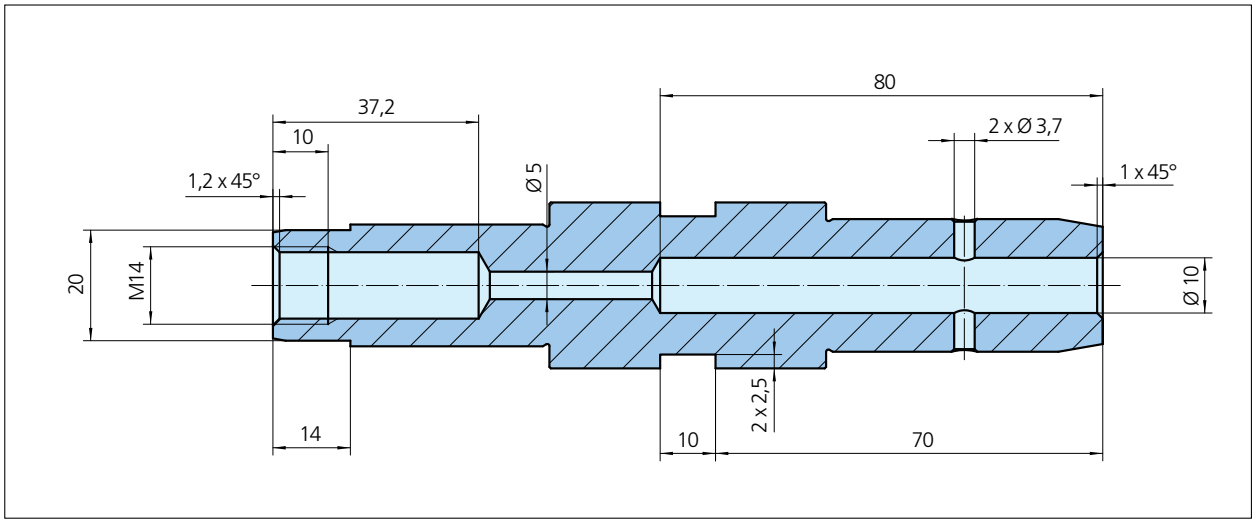
THE MOST POWERFUL MACHINE ON THE MARKET

During EMO, Tornos unveiled the EvoDeco 32 machine, a lathe with a remarkable design, which boasts surprising power both for spindle and counter spindle machining. We decided to focus a bit more closely on this powerhouse by studying the machined part.

Simple in appearance, the part is made from grade 303 stainless steel, and is machined from a 32 mm bar. To machine it, the machine must make a long drill hole of 150 mm, but also narrow the outer diameter from 32 mm to 22 mm over a length of 90 mm. Tapping, flat milling and drilling are all part of the process. *"The part is not dissimilar to one made by our customers from the same material; it is subject to very stringent controls in terms of dimensions. Furthermore, we wanted to adhere to market requirements; we need to work at speed and remain accurate",* revealed Arnaud Lienhart, EvoDeco 32 project manager at Tornos.

Exceptional spindles

The spindle motorisations have been pushed to the limit, with the machine generating a maximum power of 12.8 kW and a torque of 20.4 Nm. The power is the same in operation and secondary operation. It is, quite simply, the most powerful lathe available on the market in its category. The result can be seen during



machining: The EvoDeco 32 works with cutting conditions comparable to a fixed headstock. The spindles operate without difficulty despite the high loads, and thanks to the constant torque the speed of rotation barely drops, if at all.

Optimal kinematics

The kinematics allow 4 tools to be engaged in the material, and are the successor to the legendary Deco machines which made Tornos' name. Their kinematics are based around the plattens, while competitor machines use turrets. While turrets provide a wealth of tools, plattens are designed for speed and productivity. The part is finished in 130 seconds. Tests carried out with a competitor machine demonstrate almost 40% lower productivity.

A practical frame

To absorb the formidable power of the spindles, the machine frame has been redesigned and the reinforced guides allow the new machining dimension of the EvoDeco 32 to be taken on. Production is easy to optimise: the machine reaches the correct temperature quickly and remains stable throughout production. The EvoDeco 32 has all the attributes of a reliable and accurate machining partner.

All the options

The machine has comprehensive basic equipment and benefits from a whole host of extra equipment developed for the Deco range, which gives it almost limitless flexibility. Mr. Lienhart concludes: *"To get an idea of the power of the EvoDeco 32, I would*

recommend that you watch the part being machined on the YouTube platform. For the purposes of the film, the part is made from brass, but our specialists would welcome the opportunity to demonstrate the power of the EvoDeco 32 to you on harder materials".

http://www.youtube.com/watch?v=huUg5S35gFk

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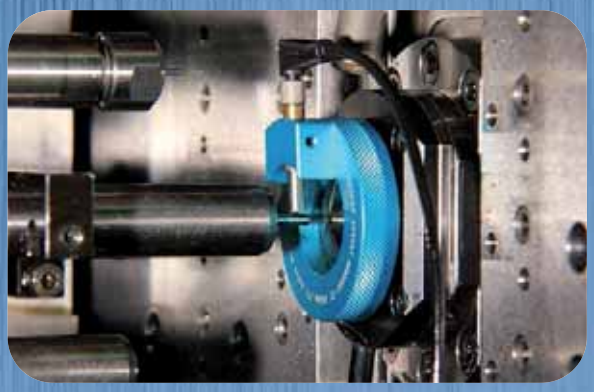

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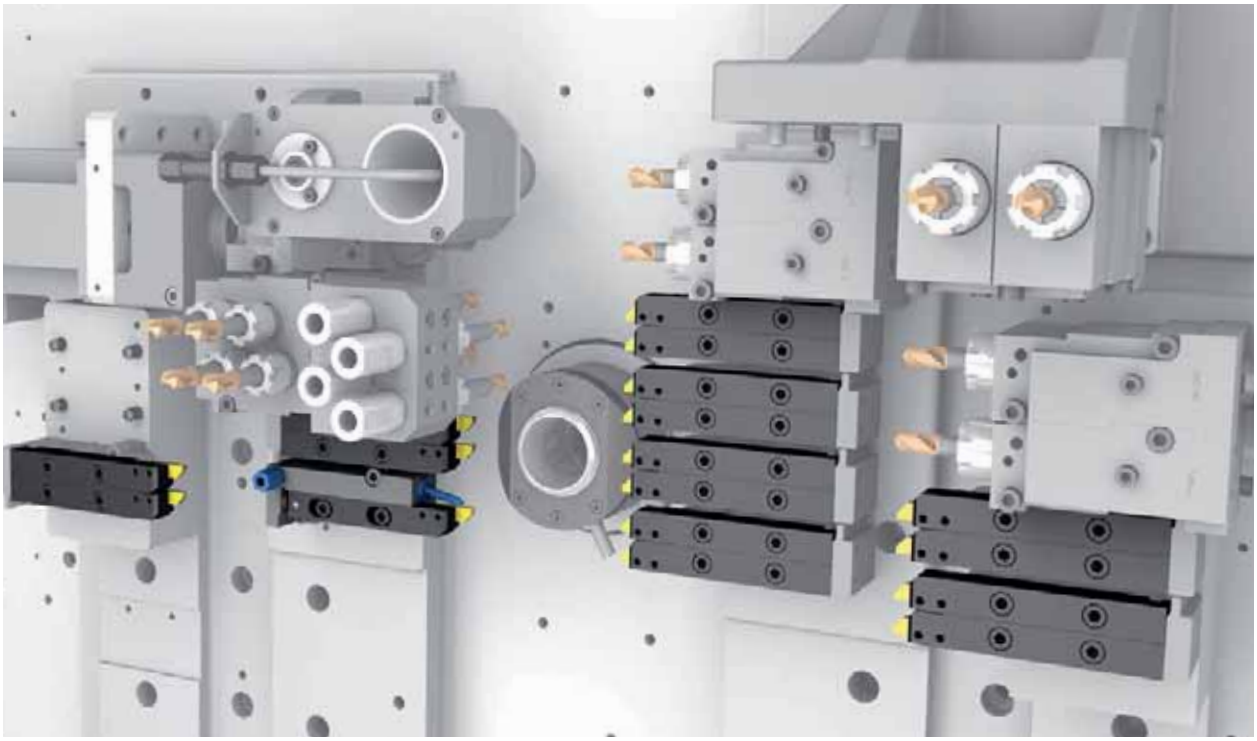
FLEXIBLE TOOL HOLDERS

One of the key advantages of Deco line turning machines is their independent tool holder systems. On its new Swiss ST 26 machine, Tornos is offering tool holder plates as standard, as on all competitor machines, but for users who want more flexibility, Deco 13 and EvoDeco 16 fixed tool holders and Applitec Modu-Line tool holders are also fully compatible.



As on Deco machines, it is entirely possible to fit Deco 13 standard tools and ST 26 rotating tools in parallel (see article on new W&F tool holders on page 40) with Applitec Modu-Line tools.

The Modu-Line concept

As a reminder, the Modu-Line tool holder concept is a system patented by Applitec and shared by several manufacturers operating in the bar turning tool supply sector. The insert holder is clamped to its base using two bolts through the cross-section of the tool body. The bearing surface with longitudinal teeth provides excellent rigidity and precise positioning. It is positioned lengthwise using a stop (fixed or adjustable) and it is held securely in place by the pressure exerted by a ball-spring. The two mounting screws are held tightly by the insert holder, which stops them getting lost and which makes tool handling easier.

More rigidity

Fitting Modu-Line tool holders on Swiss ST machines offers a number of advantages. François Champion, sales manager at Applitec told us: *"The Tornos tool holder system is the perfect complement to Modu-Line tool holders. On the new ST 26, you can now optionally fit tools with a cross-section of 16/16 although the basic standard is 12/12."* Philippe Charles, product manager at Tornos adds: *"For customers who want to use the machine's full power on tough materials, the 16/16 tools are an interesting*

option". The machine's swarf removal capacity has been significantly increased and simultaneous operations such as blanking/finishing enhance productivity.

More tool positions

The tool mounting system means that the overall dimensions of the tools are greatly reduced; the number of tool positions can therefore be significantly increased thereby increasing the machining capacities of the ST 26. Modu-Line tool holders can be fitted on the two plattens in operation and in counter-operation.

Quick tool changeover

Tool changing is very quick and straightforward. The principle for fitting the tools and for longitudinal adjustment guarantee the tools are repositioned accurately. The insert can also be easily changed off the machine without any prior adjustment, providing another opportunity to save considerable time. Machine stoppage times are reduced. For customers who are used to working in this way, the arrival of this standard on the ST 26 is excellent news.

Targeted cooling

If the tool tip requires targeted cooling, the Modu-Line System offers a guaranteed solution providing up to 100 bars at the outlet of the nozzle. Mr. Champion explains: *"The ability to accurately direct the high-pressure jet on the tool independently and in a very confined space has already won over a great many Modu-Line users".* In this system, the cooling device is integrated into the tool holder.

Tornos options

The new Modu-Line systems are available in two versions. The ML16 (DUO) tool holder compatible with two rotating tools, option number 1020 and the ML16 (JET) tool holder compatible with a single rotating tool with tool tip cooling, option number 1021.

Mr. Charles concludes: *"The ST 26 machine was a resounding success at the EMO trade show and the flexibility of the Applitec tool holder system proved very popular. A wide choice of tools and insert holders to adapt to the different cutting inserts available on the market, including ISO-type inserts, means that this standard is able to further increase the machine's options".*

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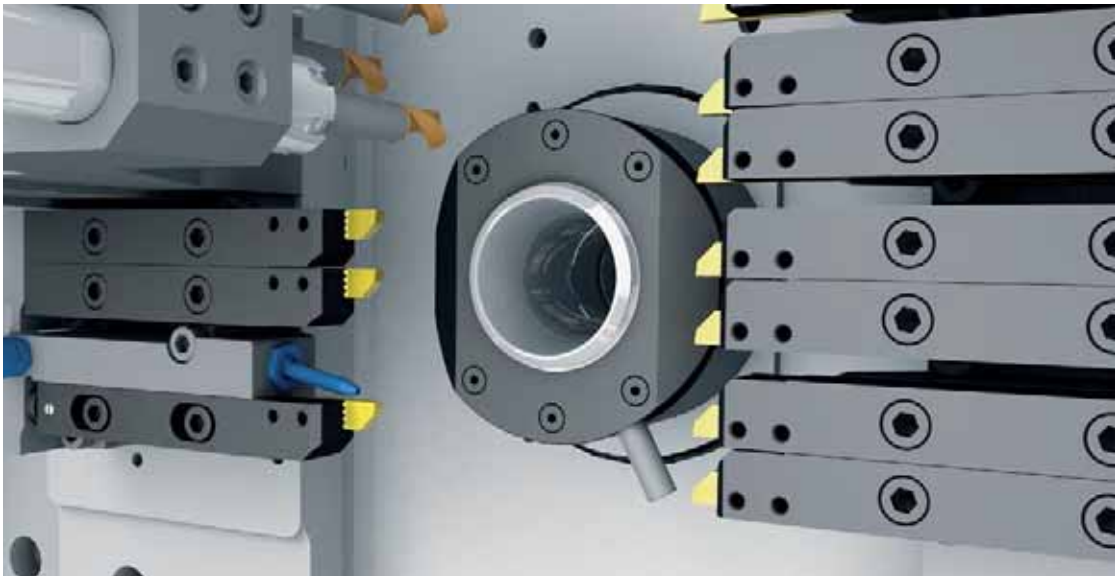


WATCH PINION FINISHED ON THE SWISSNANO

The first SwissNano machines supplied by Tornos have been integrated in customers' production lines. To find out more, we met with Stéphane Liechti, owner and director of Oxomedic in Saint-Aubin, and his son Allan, who is responsible for the SwissNano machine in the small bar turning workshop.

Oxomedic has just completed the expansion of its premises, and an area the same size as its current production workshop is in preparation.

Founded in 2000, the company now works exclusively with Tornos turning machines. The director tells us why: *"When I decided to start producing parts with high added value for the watchmaking and medical sectors (around half of the company's turnover comes from these two fields), I considered several manufacturers, but ultimately it was Tornos and the Deco machine that impressed me the most"*. He adds: *"I have never regretted my decision. The Deco machines are running well and whenever necessary I have always received great service from competent staff"*.

The search for a new machine

In early 2013, the company decided to invest in a new machine to expand its inventory and boost its capacity for small diameters. The director reveals that for work involving bars less than 3 mm in diameter, his SBF-type Robobars were not the best solution, therefore he decided to purchase a machine equipped with an LNS Tryton-type bar feeder. He explains: *"I analysed the market and compared the alternatives, and I had pretty much decided on another product when Mr. Almeida (sales manager for Tornos Switzerland) showed me the SwissNano.*

The size of the SwissNano machine makes it ideal for relatively small spaces.

The kinematics immediately won me over - they're simple and enable any type of operation". He adds: *"It really is ingenious, and although the machine has fewer axes than the direct competitor machine I looked at, it can offer the same and even more for a lower investment".* As with the Deco 13 years ago, it was the machine's design and kinematics that convinced Mr. Liechti.

Setup-free control

No setup procedure is required to control the machine. Installation to production of the first workpiece takes just one week. Allan tells us: *"The machine is great. It has a huge access zone to the machining area, and because the control is pivoting, you can position it very easily to suit your needs. The training in Moutier is short and well-targeted, and there were no surprises once the machine was installed on our premises".* When asked about the differences compared to the Deco, he immediately mentions the inclusion of a proper handwheel as a very positive development. He continues: *"Of course, the machines are different, but we can clearly see that the SwissNano is much more modern".*

Simple gear hobbing

He talks more about the machine's modern features: *"For example, in terms of gear hobbing, everything's much quicker and simpler than on the Deco, which was already a quick, straightforward machine. We just enter the tooth data in the program and everything is synchronised automatically. Production can start immediately".* He continues: *"We programme on a PC and then transfer the program to the machine. If corrections are needed, we can of course send the information back to the PC".* The director adds: *"Personally, I think it's a shame that the SwissNano doesn't have the TB-Deco. Tornos was 20 years ahead of the game with that system and I hope one day we'll be able to use it to programme SwissNano machines".*

Accuracy? Immediate!

"We were very positively surprised. We produced our first workpieces, which were immediately good and there was no variation", explains the machine manager when we mention accuracy. He continues:

OXOMEDIC IN BRIEF

Founded:	2000
Staff:	2 bar turners, 2 workpiece checking and finishing operatives, one administrative employee.
Machinery:	1 Deco 10, 2 Deco 13 and 1 SwissNano
Workpiece size:	from 0 to 16 mm, the majority just a few millimetres. Primarily complex workpieces finished on the machines, including gear hobbing
Run sizes:	from 100 to 10,000 workpieces
Services:	Bar turning, gear hobbing, cleaning and finishing
Markets:	49.5% medical and 49.5% watchmaking, some customers in the connectivity business and other sectors

"Up to now, we have produced workpieces with tolerances of around 5 to 6 microns, which means we haven't really pushed the machine, however the SwissNano is incredibly stable, and there is no noticeable difference between the first workpieces produced on a cold machine and those produced at different points throughout the day". His father adds: *"Our Deco 10 was already very accurate, but the SwissNano is even more so"*.

Workpieces with high added value

Oxomedic primarily produces complex parts, or parts requiring advanced geometries or finishes, which is another reason why it chose the SwissNano. The director explains: *"That means we need to be very flexible and push our machines to their limits. We perform around 3 setup procedures per week, which means we must have machines that allow us to do this quickly and easily. Tornos' small watchmaking machine is ideal for these constant changes and adjustments"*. He concludes: *"The SwissNano will enable us to boost our range of services, particularly in terms of gear hobbing"*.

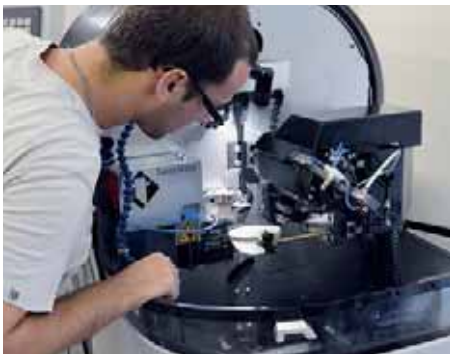
A three-axis counter spindle? Great idea!

On the subject of aligning the counter spindle for drilling, for example, Allan Liechti has nothing but praise: *"It's a pleasure to perform the alignment. Because the counter spindle is on three axes, there's no need to use a key and a dial gauge, which is a real bonus. In addition, with HF spindles for secondary operations we can perform all kinds of machining"*. His father adds: *"We can mill any shape in secondary operation, which is an undeniable advantage. We are looking at several machining and gear hobbing methods to make the most of this possibility"*.

Productivity? Even better!

We asked the setup manager what he thought of the machine's productivity. He was very clear: *"We switched the workpieces from the Deco 10 to the SwissNano and productivity increased. The machine runs faster, and it is much better suited to the type of workpiece that we produce than the Deco 10"*. The director adds: *"It's very clear that the SwissNano will not replace the cam-type machine inventory, which is used to produce vast runs, but it offers the*

"We are used to Deco machines, which are quite noisy. In the beginning I was always worrying that the SwissNano had stopped working - its so quiet", explains Allan Liechti.

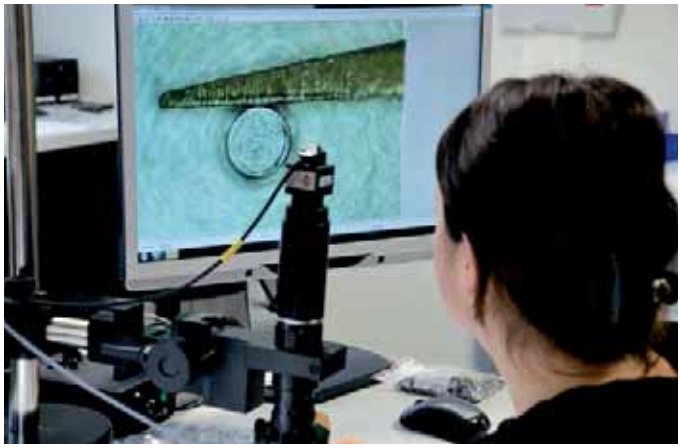


The machine's design is approved by Oxomedic, and its access, visibility and pivoting control make it a very user-friendly tool.

Oxomedic produces all kinds of machined workpieces finished on the machine, and the gear hobbing device is very easy to use.

The company is equipped to carry out dimensional and visual checks, and can check 100% of its production if necessary.

The SwissNano machine enables Oxomedic to completely finish its workpieces, including gear hobbing for components such as watch pinions (image from Tornos archive).



Two specialist staff perform the checking operations. Both the watchmaking and medical sectors require faultless performance.

same level of productivity and because we are much more flexible, I think we can also gain a share of this market".

A question of trust

"We purchased the SwissNano because we were immediately won over by its design and kinematics, but also because we trust Tornos and Mr. Almeida", explains Mr. Liechti. He concludes: *"And I was right to trust Tornos: we have been completely satisfied with the machine and the few questions we have raised have been dealt with efficiently".*

OXOMEDIC Décolletage Dental

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IMPROVED UTILIZATION OF SLIDING-HEAD MACHINES FOR MACHINING MEDICAL COMPONENTS

Medical devices have and are undergoing rapid change, generating pressure on the manufacture of components. Even some of the more basic parts such as screws have evolved as regards type, design, quality demands and delivery demands. In response, machinery, methods and tooling are developing to meet demands from a growing industry. The sliding-head machine provides an advantageous basis for very efficient machining – where parts are small but the differences in degree of utilization is large. A difference to a great extent determined by tooling and methods application.

In the machining of medical parts, batches are generally smaller, with shorter delivery times and more demanding materials and designs. The sliding-head machine is advantageous, efficient and flexible for this area but how well optimized are the machining operations, how many operations are needed and how long are the stoppages? Today there are new solutions for titanium machining and quick-change tooling concepts that make a huge difference to performance and results.

As far as small-part machining goes, making medical parts is often different. Batches are generally smaller, with shorter delivery times, materials more demanding and designs. Tooling and methods need to be closely suited to features to achieve satisfactory results. Long, slender screws in titanium is one example. Complete solutions are needed with the right tool and process know-how which needs to include measures ranging from the cutting edge to the way tools are held and changed.

These solutions are especially critical in achieving high efficiency of the multi-functional sliding-head machine. Here it is vital to prioritize not only the cutting process but also the non-cutting part of the cycle time to maximize output during the available production time. How long does the in-cut machining take, how many operations have to be involved and how long to change tools?

A systematic approach is needed to identify the operations required, minimizing them and grouping them

To be competitive in manufacturing, the external turning of dental screws should be planned to be a highly effective, secure and consistent process that overcomes any shortcomings with tool-life or speed. Insert shape, geometry, grade and cutting data are the key factors for optimization.

to achieve the shortest, safest cycle time. For example, performing drilling and internal turning to start with in the main spindle and taking the total depth of cut in one pass, carrying out most of back-working, etc. in the sub-spindle, leaving the main spindle free to machine other features on the part. The most suitable and best tooling solutions can then be established, proven and applied in production with qualified backup.

The production of some medical components which are manufactured in sliding head machines – such as dental, bone and spinal screws – have been shown to be optimized to new levels of efficiency. Batches seem to vary hugely in this area, from around thirty pieces to a thousand or more – which makes the switch-over time between tools and set-ups very influential to the economics of machining. Quick-change tooling makes a lot of difference to the extent of stoppages - especially for low- to medium-volume machining.

The following describes three typical medical components made on sliding-head machines with examples of machining operations and modern solutions that optimizes machining and make a marked difference to productivity.

Dental screws, …

… whether uniform-diameter or tapered, in titanium, make use of a dedicated sub-spindle chuck for some of the operations. These include external turning, thread turning, milling, parting off, drilling and boring. The external turning is one of the first semi-finishing operations and needs to be a highly effective, secure and consistent process, that overcomes any problems with short tool-life or even risk of tool breakdown.

The challenges involved in the external turning of the titanium screws include developing only controllable, continuous tool-wear. In so doing, maintaining a cutting edge line to achieve the required surface quality and accuracy consistently as well as no burrs. The right feed-rate span, linked to the nose radius, is a key factor here to minimize surface deviations: too low feed can generate an unacceptable surface finish and if excessive, surface cusps are formed. Wiper geometry may tend to generate excessive cutting forces on the screw so the right insert shape nose radius and geometry is critical to performance. Also chip control in turning titanium needs focus to achieve trouble-free cutting action and evacuation of chips from the machining zone.

A smaller, positive basic-shaped insert for medium-turning operations is the ideal choice here to minimize vibration tendencies along the long screw-body. The UM-type insert geometry is first choice in an

With bone screws being long, slender titanium parts, the thread-making process needs to be especially secure and efficient to result in a high-quality part. Thread whirling is ideal, being a productive, reliable process that avoids bending and vibration tendencies. Correct selection of tools, cutting data, programming and setting of the process is important to achieve optimum results but the productivity is superior.

Tulip heads for spinal parts are ideal for machining in a modern sliding-head machine. Milling is a dominant machining method to arrive at the head configuration and one that needs careful optimization. The combination of the right solid-carbide endmill and tool-path are decisive as regards efficiency and security. As important is the optimization of turning, thread-turning and grooving with the right tools. The resources of a modern sliding-head machine can be put to very advantageous use, resulting in good manufacturing economics.

application like this as it has a broad chipbreaking area for different types of materials, including titanium. The cutting edge of a D-shaped insert will steer chips away from the component being turned and with a depth of cut around 0.3 mm will generate a part prepared for thread-turning in the sliding-head machine.

In order to achieve a good productivity level, a cutting speed sufficiently high for turning titanium needs to be achieved. The insert grade choice is therefore important and needs to be dedicated to the area of workpiece materials. In this case, involving sharp, positive inserts, the insert needs to have a thin PVD-type coating on a hard, fine-grained insert-substrate. Hot hardness, with good resistance to plastic deformation of the edge is a primary quality. The GC1105-type grade has been especially developed for demands in superalloys, titanium as well as stainless steels and will provide high performance for sharp edges and can be applied typically with speeds of 80 m/min for titanium dental screws. A dedicated uncoated insert, in a grade like H13A, with the right balance of abrasive wear-resistance and toughness for titanium, is often an advantageous choice for machining dental implants thanks to the sharp cutting edge that can be maintained

Bone screws…

… are also long, slender titanium parts, made in many different sizes, with part-holding critical in the sub-spindle for satisfactory performance. Made in variable batches, the screw-thread is a dominant feature as regards optimizing machining. The thread-making process needs to be secure, resulting in threads having a good surface finish and dimensional accuracy. Good chip control is vital to success. Ideal for these parts is a modern sliding-head machine, equipped with a whirling unit, dedicated sub-spindle chuck and a high-pressure coolant facility enabling turning, milling and thread-whirling.

Thread whirling is a productive, reliable process, resulting in high-quality threads. The process avoids bending and vibration tendencies. Correct selection of tools, cutting data, programming and setting of the process is important to achieve optimum results but the productivity is superior. The advantages of using a multi-edge cutter, as in thread whirling, when machining the growing amounts of screw-components, such as in the medical industry, are several.

Whirling is tangential, multi-edge machining and as such involves strong, secure cutting edges subjected to moderate mechanical loads and heat. Shorter chips is another advantage (often an issue in the longer thread-turning passes), as is the need for only one pass compared to that of several for turning a thread. Stability for longer workpieces is built into the concept of thread whirling with the tool close to where the workpiece is supported in the machine spindle. Thread whirling can today more easily be set to be very reliable, extremely productive and produce good results in demanding materials. The CoroMill 325 thread-whirling concept is a modern solution for optimizing this process in sliding-head machines.

Tulip heads, …

… which connect screws to a rod as part of spine surgery components and generally made of titanium, require several operations. This is an ideal part for a modern sliding-head machine, made from bar material through turning, milling and drilling. One of the

major challenges, in addition to competitive machining, is to avoid any burrs. Milling is a dominant machining method to arrive at the head configuration and one that needs careful optimization.

The slot for the rod to pass through has to be milled and is characterized by a non-uniform depth of cut, tendencies of tool deflection and potential burr formation at the internal screw-thread. The combination of milling cutter and tool-path are decisive as regards efficiency and security. A solid carbide CoroMill Plura endmill, with a square form and corner radius is the obvious choice here in a grade that is well suited to titanium, such as the more general-purpose grade GC1620 and GC1640, the best solution for more demanding operations, like machining under unstable conditions.

The slot can ideally be milled in three passes where the last part of the slot is generated by plunging the endmill all the way down to the centre of the component, with deburring on withdrawal. Side-faces of the tulip head are side-milled, with radial engagement of the endmill to make the radius of the part. Slot keys are ideally milled using grade GC1640 for optimum security. The CoroCut XS programme provide solutions for operations, such as turning, thread-turning and grooving, needed on the tulip head. For a part such as this, which includes the long screw being attached to the head, the resources of a modern sliding-head machine can be put to very advantageous use, resulting in good manufacturing economics.

Turning titanium…

… presents a challenge in chip control. Long continuous chips that may be problematic to break can be a hazard to operational security in the sliding-head machine. The use of high-pressure coolant, being applied through advanced nozzle technology has a proven effect on the ability to break and steer chips. Even at lower pressures, results of correctly aimed coolant jets are beneficial. The CoroTurn HP standard concept for external and internal turning has fixed-nozzle technology that gives parallel, laminar jets with high velocity, accurately directed at the right points on the insert in the tool. The precision and properties of the jets affect the way the chip is generated through a fixed, optimized jet-setting on the tool.

Quick-change of tools…

… is a vital part of maximizing the utilization of most machine tools. This is in addition to the optimization of actual cutting times. Quick change of tools minimizes down-times and is as such an essential part of making use of every minute the sliding-head machine is in production. The QS holding system provides fast and easy changing and setting up of cutting tools. Tools can be slid in and out quickly, automatically locked into place on centre-line, thereby improving repeatability and accuracy through the secure positioning in the tool post.

The system consists of a series of stops, wedges and short toolholders that replace conventional tool-post hardware. The cutting edge position is exact when the short toolholder is set against the stop. Spring-loaded wedges secure the holder to facilitate tool-handling. Insert-indexing time is reduced to a third of the time taken in the conventional way of clamping tools in the sliding-head machine. The QS holding system can also be combined with the high-pressure coolant facility for turning.

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MACHINES READY FOR THE CHALLENGE

In the high-end watchmaking subcontracting sector, the constraints imposed on workpieces are very strict in terms of size, geometry and appearance, bringing tough challenges for manufacturers.

Cyberis' vast machine inventory is undergoing constant expansion. The premises are very light, with excellent working conditions.

For many years, Cyberis has ridden this wave, with the company undergoing constant growth. It has also bought more than 20 production machines over the last two years, and plans to purchase several SwissNano machines in the next few months. Interview in Bassecourt with Mr. Muriset, the young director of this dynamic company with a workforce of around 30.

Does this signal the end of cam-type machines?

Cyberis works with several different types of Tornos automatic turning machines, namely the Micro 7, Micro 8 and Delta numerical control models and 25 MS-7 cam versions. Mr. Muriset explains: *"Although the operators are very versatile and able to work on cam-type machines, we are planning to replace our inventory of older machines".* The company has chosen the SwissNano as the replacement. The Director explains further: *"We are currently testing our first SwissNano on different workpieces, not only to replace the old cam-type machines but also to expand our inventory of micro machines".*

From Micro to Nano

"With the SwissNano, we are hoping for even faster production than the Micro 7. The machine is rigid

Next phase of development at Cyberis? The first SwissNano machine is being tested in Bassecourt.

and we are aiming for tolerances of +/- 2 microns". For Cyberis, Micro 7 machines are the best that Tornos has ever produced. Will the SwissNano eventually supersede them? We won't get the answer in this article, but we'll definitely return to find out in a future issue of decomagazine.

The quest for excellence

"We work for many of the major Swiss watch brands, in particular the very high-end names, and we can't afford the slightest error. We simply aim for perfection", explains Mr. Muriset. Of course, this applies to bar turning machines, but also to the polishing department, the staff, the management system and the checking methods. The entire company is on a quest for excellence.

Cyberis is planning to replace its MS-7 machine inventory rather than retrofit.

Workshop manager Fabien Neubeck at the machine he says offered the best performance on the market for watchmaking parts prior to the arrival of the SwissNano.

Flawless organisation

Cyberis has a cutting-edge ERP system and supply chain monitoring software which manages the whole production system. All operating procedures and lead-times are checked. *"Our service performance rates are good, even excellent for certain customers, and we want to be sure that we adhere to our promised lead-times. We build customer relationships based on trust and we keep our promises",* adds Mr. Muriset. This organisation also enables the company to offer highly flexible services. Depending on requirements and workload, it is not uncommon for Cyberis to produce parts in just one week to help out its customers.

Numerous investments

As we mentioned earlier, the company has invested heavily in its inventory of automatic turning machines over the last two years, however this investment has not stopped there. Almost all Cyberis products require polishing operations, and in order to offer its customers a high level of flexibility and quality, the manufacturer's inventory also includes machines (and expertise) that enable it to perform polishing, satin-finishing and mirror-polishing operations.

Mr. Muriset explains: *"We have an ambitious and progressive self-financing investment policy, and our aim is to equip ourselves with the resources enabling us to be a trusted partner to our customers across all sectors".*

100% inspection

This philosophy is producing results, with Cyberis supplying PQA (Product Quality Assurance) products directly to its customers' assembly departments without goods inward checks. *"We supply hundreds of thousands of parts per month to some of our customers using this model",* reveals Mr. Muriset. Depending on the parts, this requirement involves 100% inspection. The company has planned major investment in this field in 2014.

Machines pushed to the limit…

"The only thing that limits us in terms of innovation and performance is the capacity of our machines", explains the director. Cyberis frequently develops tools and equipment that push the limits of the possible. For example, the company's specialists have worked to develop stamping operations on the Micro.

… by a dynamic team

All of the staff working to achieve excellence in Bassecourt are well aware of the stakes. Those we met identified fully with the company and were proud to be working for such prestigious customers. Mr. Muriset concludes: *"We are a small, dynamic business working tirelessly to serve our customers. We have two objectives: to continue to build long-term partnerships with our existing customers and to develop our portfolio by attracting new customers".*

Mr. Carlos Almeida, sales manager at Tornos, explains: *"We are delighted to be able to play our part in enabling Cyberis offer its customers an exceptional service, thanks to our machines".*

Checking is instrumental to the company's success. It's the only way for customers to get guaranteed PQA.

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BIMU TOOLING FOR TORNOS SWISSNANO

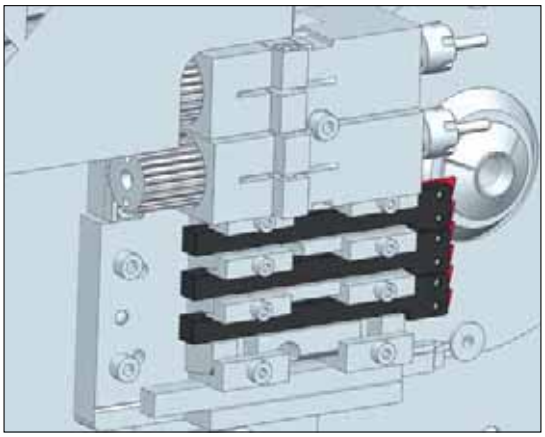
With the launch of the SwissNano, Tornos is delivering innovation in bar turning for the watchmaking industry and is offering a high-performance machine in terms of quality and machining capacity for complex parts.

Bimu extends the capacities of the SwissNano by offering simple solutions which can considerably improve drilling precision and increase the number of tools without the need to modify the original configuration of the machine. The ingenious Drive KD cooling system has also proved popular with its practical design and flexibility.

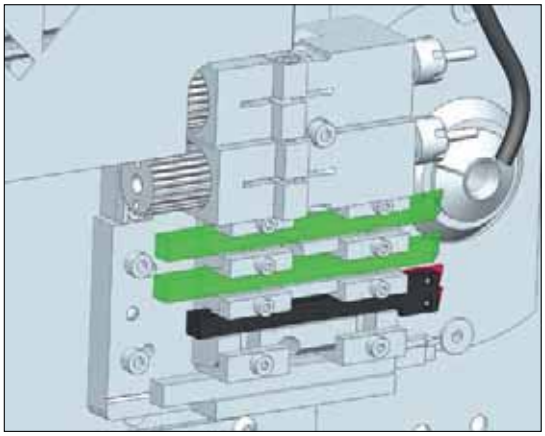
Increasing the turning tools on the platten using double tool holders

When the upper positions on the platten are dedicated to lateral drilling operations, the number of remaining turning tool positions is greatly reduced.

Bimu "408RD8" double tool holders have room for 2 inserts for each tool position; this means that the platten can house up to 3 additional inserts.



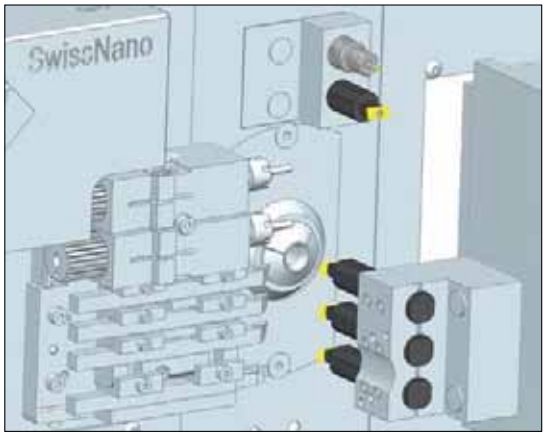
The advantage of this tooling system is the fact that the original configuration is retained and the bar-turner can use a double tool holder on one position while at the same time keeping his standard tools (brazing tools, PCD tools, tools with any type of insert) on the other positions.



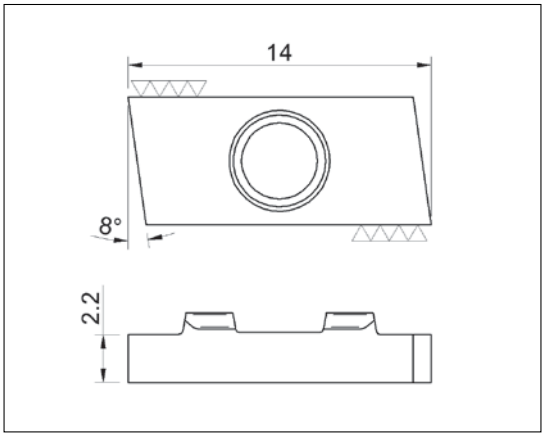
Adding turning tools to the drilling positions

Another option offered by Bimu is to replace one or more drilling tools with the 416 H6 turning tool holder. This enables bar turning inserts to be used on end-fitting equipment or for secondary operations.

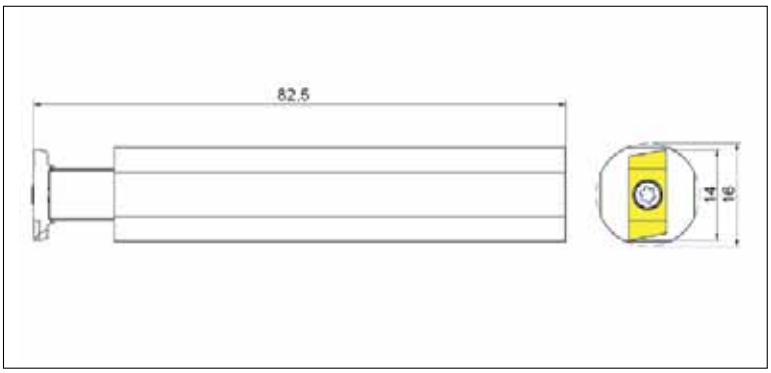
This variant makes it possible to increase the number of turning tools even if you want to keep all the standard tools on the platten.



The insert fitted on the 416 H6 is 14 mm long and therefore does not exceed the cross-section of the tool holder. It is therefore possible to remove the tool holder from the support from the rear, without having to dismantle the insert; this makes it quicker and easier to use.

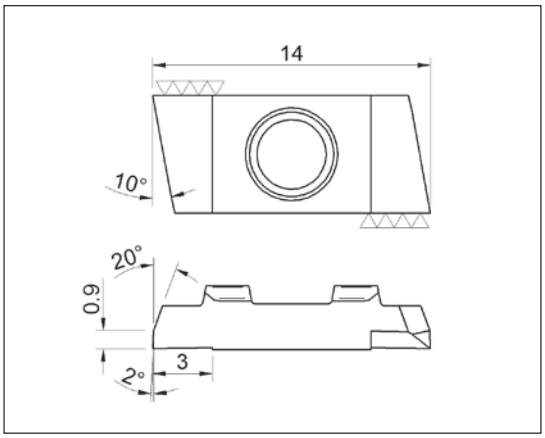


The 464RcK12BI42 variant is a front turning insert designed to meet the needs of the watchmaking industry. This tool has an AlTiN coating (known as "BI42") which prevents swarf from sticking and promotes better swarf removal.



The insert is made from K12 carbide, a hard metal which is particularly well-suited to machining watchmaking parts and which is available in 2 variants:

The 441R2, 2K12 variant is a blank insert with a polished upper surface to promote swarf removal. This insert is designed to be ground directly by the customer to give it the required geometry.



Double drilling for secondary operations

Thanks to the AL 1650 tool, it is now possible to double the number of drills in the T41 position on the machine, enabling 3 drills to be fitted instead of 2 for secondary operations. This tool is available for 2 drills of Ø 1.5 or 3 mm.

Drive KD cooling system

Thanks to a 200 mm-long tube which ingeniously combines a rigid metal inner section and an outer section made from flexible material, the Drive KD system can easily be pointed in any direction to target cooling where it is required.

Greater precision using the B8 collet holder

Thanks to its draw-type collet system, the B8 precision drill holder significantly improves precision compared to standard ER collets.

The B8 drill holder can be used for main operations and is available in 12 or 16 mm diameters to fit the different configurations on existing machines.

Standard ER collet holders

Bimu also supplies standard ER collet holders. These are available for ER 11 collets for main operations and for ER 8 collets for secondary operations.

SwissNano documentation can be downloaded from the following address:

www.bimu.ch/pr_nano_f.html

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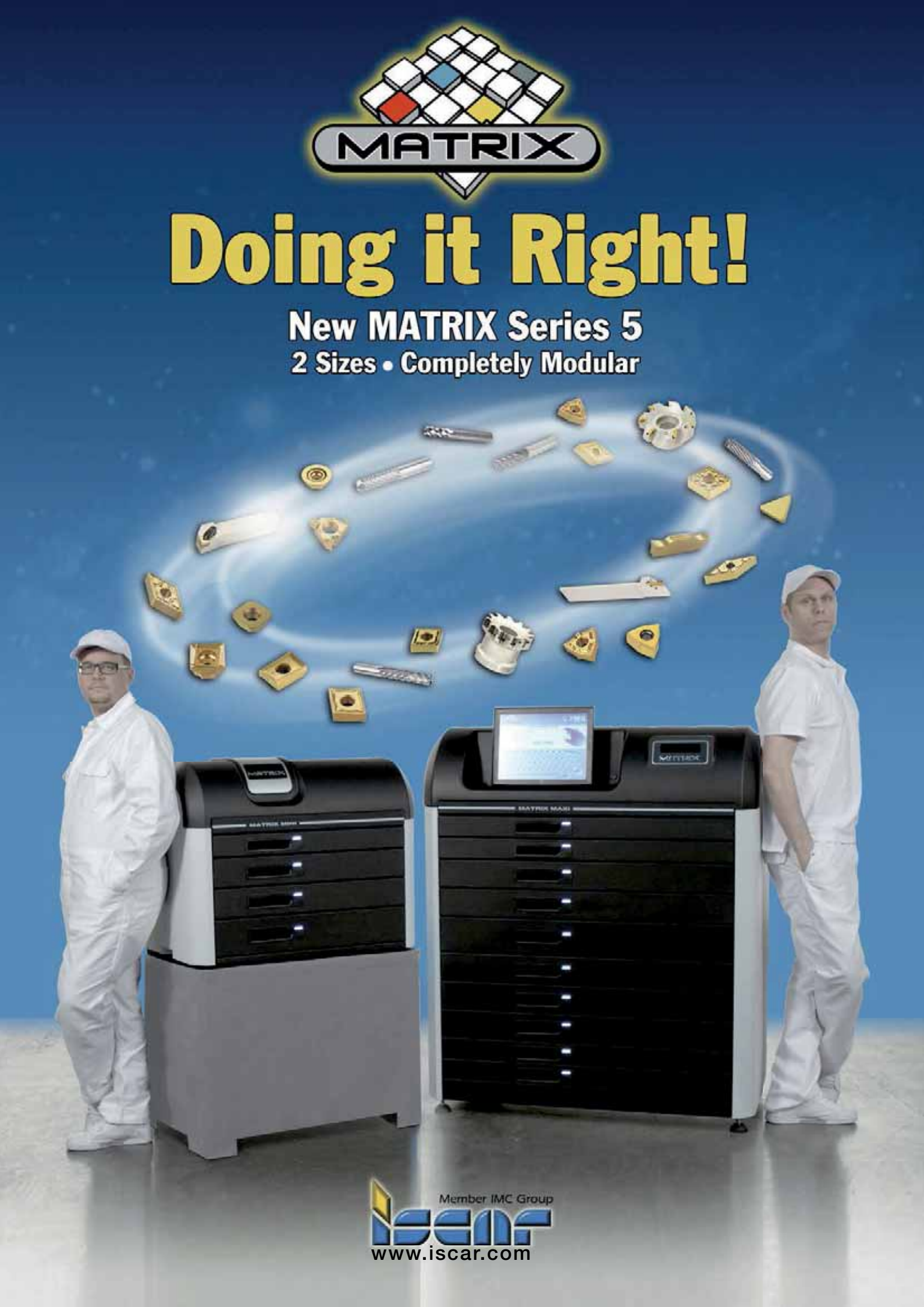
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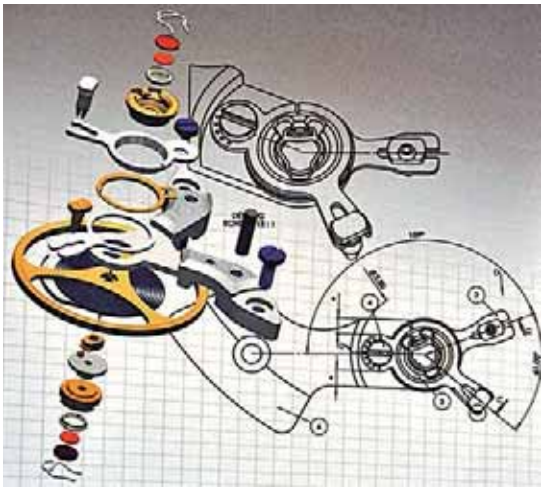
KIF PARECHOC : PROTECTOR OF THE TIMEPIECE

KIF Parechoc is part of the Acrotec group, an independent public limited company specialising in the development and manufacture of precision parts for the Swiss watchmaking industry. "Pare-choc" is French for "shock absorber" - an apt reflection of the company's product, as it provides effective impact protection for many brands of highly sensitive mechanical watchmaking parts. Based in Le Sentier, the company's watchmaking professionals use Motorex machining fluid in their production processes.

Photos: KIF Parechoc/www.ae-werbung.ch

KIF Parechoc's patented shock absorber provides effective impact protection for highly sensitive components in mechanical watchmaking movements, throughout the entire lifetime of a watch. As well as fine adjustment mechanisms (index assembly), KIF Parechoc also manufactures two strategic components that are essential to precision watchmaking.

The human race has always had an irrepressible desire to measure time, a fascination that doubtless stems from the awareness that life is finite, and that a person's time on earth is limited. Historically, the measurement of time has been a key factor in maritime voyages and countless scientific discoveries. The mechanical watch was invented in the 13th century – although the use of a spring to store the drive force only appeared towards the middle of the 15th century. The latter development opened a number of new possibilities for measuring time, which have had a marked influence on watchmaking in the modern era. The spiral spring consequently became the regulating component for mechanical clock movements. It oscillates, driving the balance - a precision-made, metal wheel, mounted on an arbor that is guided by pivots at each end. The spiral spring combined with the mass of the wheel make up an oscillating system. The precision of the oscillations determines the accuracy of the watch, which, where necessary, can be adjusted using regulating organs.



This drawing represents the complex structure of a watchmaking mechanism, with the index assembly and shock absorber system components.

KIF Parechoc - at the very heart of many watches

KIF Parechoc was founded in 1944, and has been part of the Acrotec Group (www.acrotec.ch) since 2007. Some 120 people currently work at the company's head office, which is located in the one of the leading watchmaking regions, Le Sentier, in Switzerland's Joux Valley. As a conventional bar turning company, it has drawn upon its two main areas of expertise - fine adjustment ("index assembly") and shock absorbers - to forge a reputation as a leading supplier to renowned watchmakers, both in Switzerland and internationally. Two KIF Parechoc components that contribute to watch accuracy can be found in many watchmaking mechanisms:

The parts are measured using the latest measurement technology, and the values used within the quality control system.

A. The index assembly

The balance-spring system shown here is a single unit. The ring-shaped balance serves as a regulator. Supported by the barrel arbor and driven by the spring, the balance oscillates according to a set moment of inertia. The spring must be fixed at two points for the assembly to operate correctly: on one side, at the centre of arbor, by means of a collet (small split cylinder), and on the other side, on the balance bridge (see below), which watchmakers also refer to as the "balance cock".

The oscillations of the spring occur along its entire effective length, allowing the working rhythm to be adjusted. All the fastening components (balance-spring stud and balance-spring stud support) and regulating organs (pin, regulator key and regulator) are instrumental in precision adjustment.

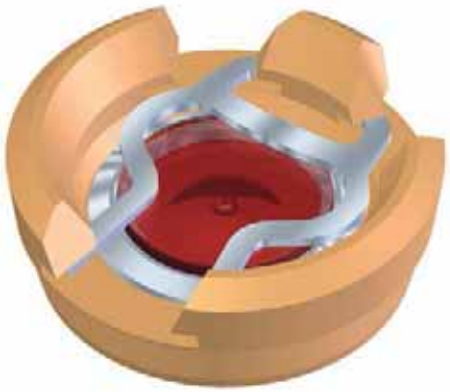
B. The shock absorber

It is not hard to appreciate that the index assembly system - the "heart of the watch" - is highly sensitive to movement. Accordingly, it is crucial to protect it from impacts. The degree of sensitivity can be better understood by visualising the dimensions of the

components in question: the average diameter of a balance shaft is 7/100 mm - in other words barely more than the diameter of a human hair!

This has led to the development of a shock absorber system that fulfils several functions at once:

1) It reduces friction, thereby improving the working mechanism, whilst at the same time reducing pivot wear.
2) It protects against radial, axial or combined impacts.



A shock absorber system is generally made up of an assembly. This comprises a frame and a setting, or metal ring, in which two watchmaking jewels (synthetic rubies) are set - one hole jewel and one cap jewel (sometimes called a domed jewel). The metal ring serves as a bearing, and is inserted into the frame along with the free moving jewels. It remains mobile by means of a lyre-shaped spring (see above). This sophisticated design protects sensitive components from impacts throughout the lifetime of the watch, whilst also being an essential part of the working precision of mechanical masterpieces.

Components or complete sub-assemblies

Its experience gained over many years and its wide-ranging expertise have ensured that KIF Parechoc is now deemed to be one of the flagship companies in this target market. *"In order to be the best, we have to be stringent in all respects",* explains Pascal Brubacher, who heads up the bar turning department. Between 55 and 60 million parts leave the KIF Parechoc production workshop each year. That said, an increasing number of complete sub-assemblies are delivered pre-mounted. KIF Parechoc products are manufactured from various types of metal, such as brass, copper ferrite, steel, stainless steel, nickel silver, etc. This is also why, when selecting the most suitable machining fluid, attention is focused primarily on multiple uses, performance and a high degree of compatibility with the metals listed above.

Convincing results from Motorex

In their constant search for the best solution, it did not take long for KIF Parechoc to strike gold in the lubrication technology sector. The close collaboration between Motorex and Tornos led to the unanimous decision to fill 50 machines with Motorex Ortho TX 15. This cutting oil is free from both chlorine and heavy metals, and is more than capable of meeting the highest demands. Even in the most complex machining processes, using the widest variety of materials, it always guarantees outstanding results. Motorex cutting oil's low volatility and mild odour make it very popular with operators too. In addition, Ortho TX does not foam, and nor does it generate excessive oil mist, even in the most unfavourable working conditions. It remains in the machine for longer. With regular filtration and compensation of the oil consumed by each machine, the machining fluid is entirely used, and therefore does not require changing or discarding. This both increases profitability and plays its part in conserving natural resources.

With the naked eye, it is almost impossible to distinguish between the many filigree precision parts that make up mechanical watchmaking movements.

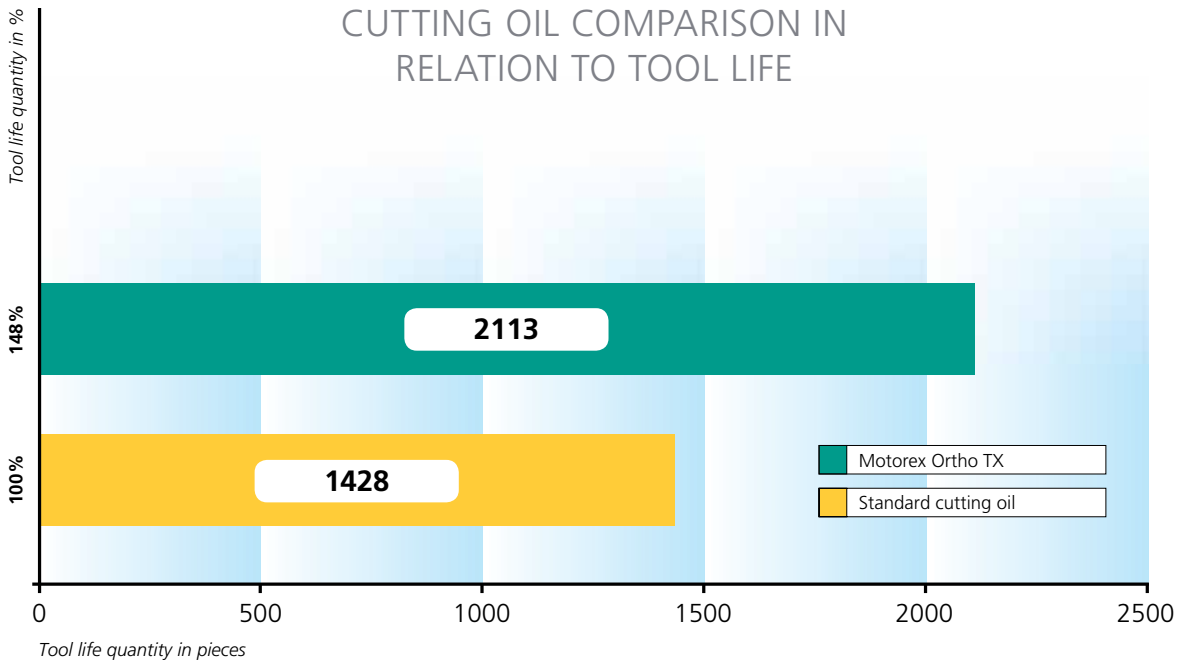
The oil supply tank stores not only lubricants, but also evacuated swarf and filtered machining fluids.

An impressive number of Tornos bar turning machines of different generations operate entirely on Motorex lubricants.

Increased flexibility and durability

As we mentioned above, KIF Parechoc products are manufactured from a wide variety of materials. This impacts on machine availability, giving rise to a certain amount of flexibility in production planning. Production flexibility has increased dramatically as a result of the universal applications of Motorex Ortho TX. In comparison with the previous cutting oil, another positive result has been the marked improvement in machine life. This has led to an increase in tool life of over 48% in the manufacture of a mass-produced part made from 4C27A.

Using the Motorex Swisscut Ortho TX not only extends the lifespan of tools, but also significantly improves performance, in particular thanks to the reduction in downtime.



The choice of machining fluid impacts directly on tool productivity and lifetime.

The skills and expertise brought to the KIF Parechoc by Hubert Calderoli (right, Acrotec Board Member) and Cyrille Mathieu (left, company director) have been instrumental in the company's success.

Synergies are a crucial factor for success

The Acrotec Group, led by François Billig, CEO, currently comprises 7 companies, all united by common synergies and with a clear-sighted focus on customer service. The most recent Group member is K2A, founded in the autumn of 2012. This company specialises in the assembly of complex mobile components for mechanical watchmaking movements. Machines ensuring complete automation and synchronous quality control have been specially developed and built in line with this specialism.

In a recent interview, Acrotec SA Board Member Hubert Calderoli said: *"KIF Parechoc's customers include many different watchmakers. Our shock absorbers and index assembly components are consequently designed with specific watches in mind. We also provide support to the customer during this process, with our technical consultancy services. It is often necessary to carry out adaptations of existing components, and it goes without saying that the manufacture of prototypes is of the highest quality. All work is inspected by experts from the Design and Technical department as well as the Research and Development department."* Hubert Calderoli sums up the strategy in just a few words: *"The steady rise of the Acrotec Group to date does not stem from each company viewed individually, but from the Group as a whole - because the whole is greater than the sum of its component parts!"*

If you would like to find out more about the new generation of Ortho cutting oils and the possibilities for optimisation within your business area, then contact us at:

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SWISS ST 26: NEW ROTATING MODULAR TOOL HOLDERS

The German manufacturer W&F has just unveiled an adaptation of its famous WFB system designed for the Swiss ST 26 machine.

The WFB system is a patented system which is used to rapidly change tools. It is a quick, accurate and economical system.

A universal solution…

The W&F system can be used for both milling machines and lathes, and the adapters are all equipped with internal cooling. The system can house both fixed tools and driven tools. All the adapters can be preset outside of the machine to reduce machine downtime as much as possible.

… saving you time

Easy to use and simple to clean, the WFB system is extremely compact. Its construction ensures it provides excellent static rigidity and an excellent loading

capacity. This exceptional rigidity means the service life of tools is significantly increased. Tools can be easily fitted into the adapter, and the positioning precision of the taper in the adapter is accurate to less than 2 microns. The WFB adapters allow set-up times to be drastically reduced. *"It is incredibly easy and quick to change tools with the WFB system"* confirms Mr. Philippe Charles, product manager at Tornos.

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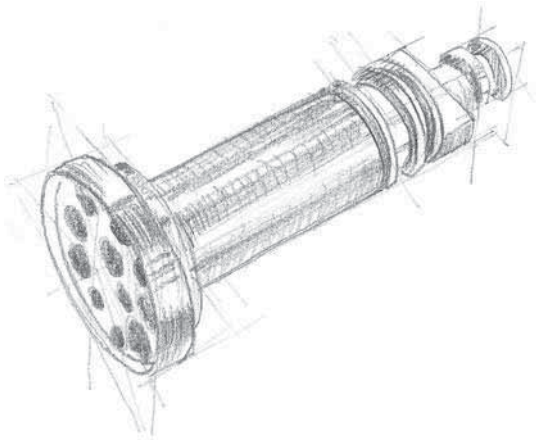

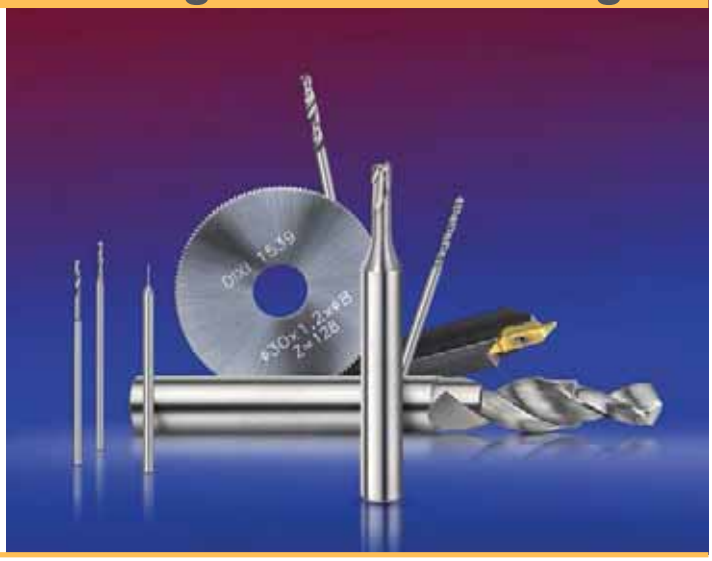

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TiNi AEROSPACE TURNS TO SWISS ST 26 AND PARTMAKER FOR PROTOTYPE MACHINING

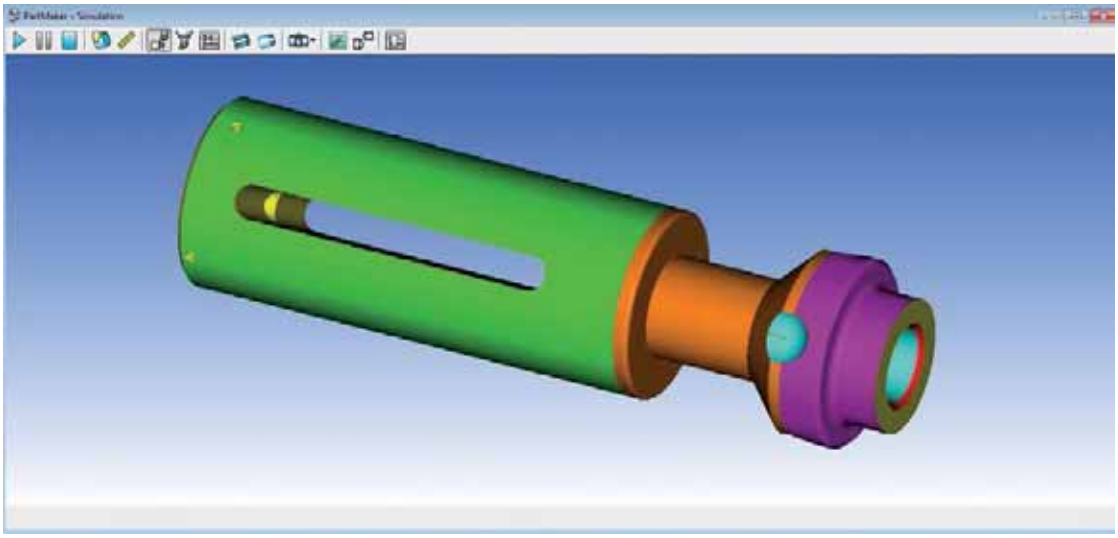
Northern California-based Specialist Aerospace Manufacturer takes the plunge into Swiss.

Richard Cosman, the Tornos CNC Swiss programmer at TiNi Aerospace, has had great success with PartMaker in programming parts on the company's new Swiss ST 26.

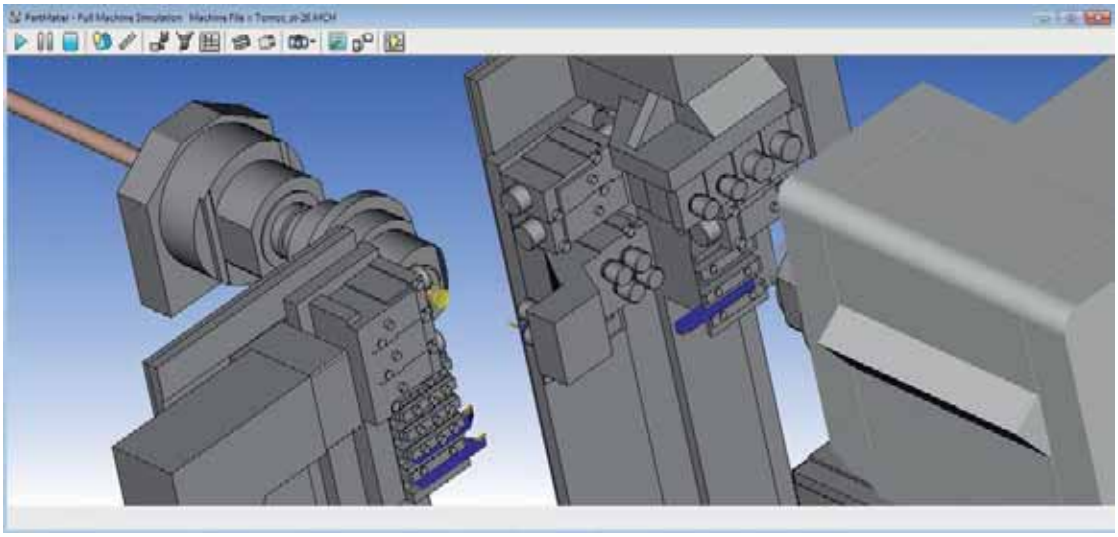
Located in the technology hub of the United States, in Northern California's Silicon Valley, TiNi Aerospace is an innovative specialty manufacturer of mechanical release devices for the aerospace industry. TiNi's products are used in a broad range of aerospace applications, but primarily for helping aerospace manufacturers test their products strength. TiNi's products can be used in place of single use pyrotechnic testing mechanisms.

Historically, TiNi has outsourced much of its machining work to shops in the Bay Area, but more recently decided to bring some its parts appropriate for Swiss applications in house specifically for the purpose of being able to turnaround small lot sizes for use in their own internal R&D and testing efforts. TiNi chose to make their first Swiss-machine a Swiss ST 26 based on the combination of functionality to price that it offered against other machines on the market. To better harness the power of the Swiss ST 26, TiNi chose to invest in Delcam's PartMaker SwissCAM to tackle the programming of titanium bolts it makes in small lot sizes to support its own R&D efforts.

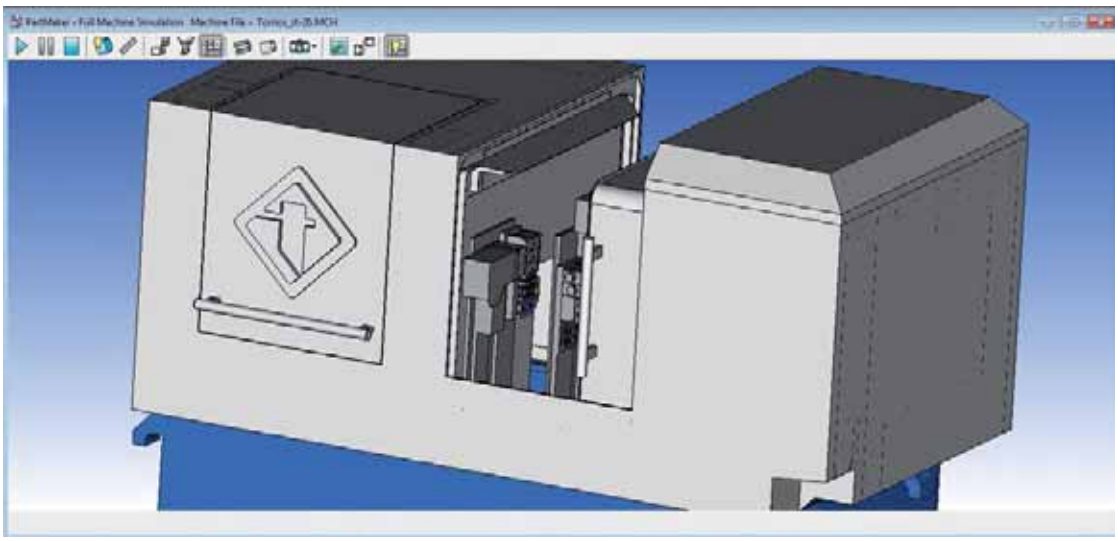
PartMaker SwissCAM is a CAD/CAM system specifically dedicated to automating the programming of Swiss-type lathes. PartMaker SwissCAM supports the full line of Tornos Swiss-type lathes, including machines programmed with the TB-Deco software and standard ISO G-code programs. The developer of PartMaker and Tornos has been partnered since 2005 when PartMaker became the first off-line CAM system to integrate with TB-Deco.



The part above is a latch part used in one of TiNi Aerospace's unique mechanical release devices.



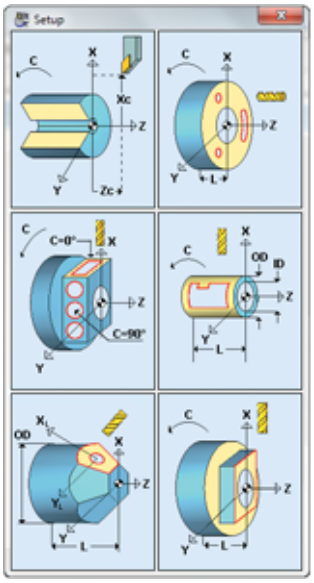
PartMaker's Full Machine Simulation is based on actual solid models of the Swiss ST 26, thus providing a photorealistic machine simulation to the user assuring his program will run error free and without collisions.



PartMaker's Full Machine Simulation allows the user to see the entire machine housing or just inside of the machine.

"The challenge we have is achieving tight tolerances at short volumes. We don't have a long production run to dial our process in. Everything is slightly different than the previous job," says company Operations Manager David Bokaie. *"PartMaker has worked amazingly well in helping us manufacture our designs on the Swiss ST 26."*

"Particularly being new to Swiss and given the capability of the Tornos machine, PartMaker really helps us tap into what the machine can do for us," continues Bokaie.

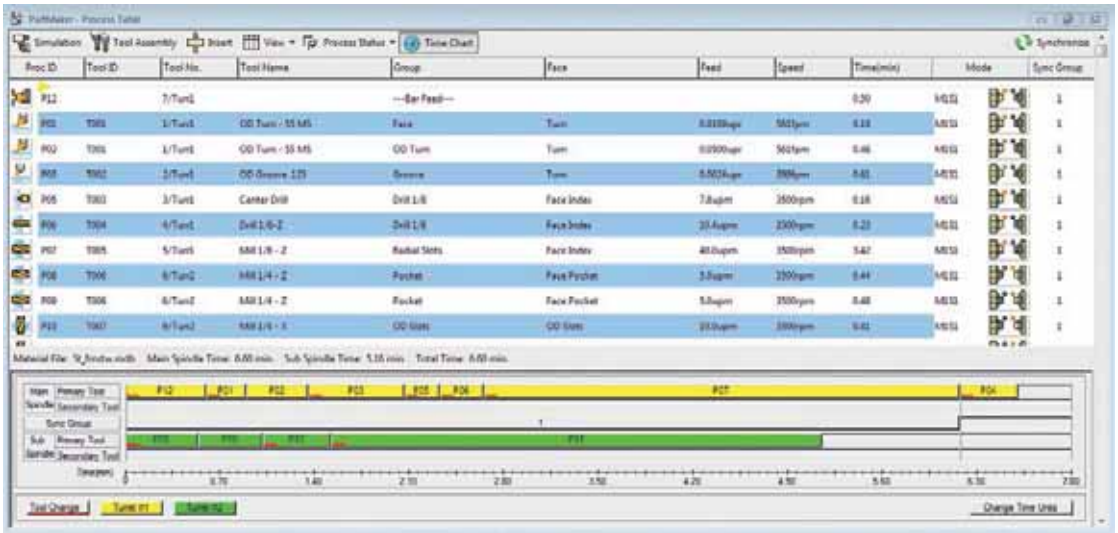


PartMaker SwissCAM applies a patented Divide and Conquer programming strategy to automate the programming of parts with a number of Turned and Milled features such as the ones manufactured by TiNi Aerospace.

New to Swiss, Ease of Use

As the Swiss ST 26 was TiNi's first Swiss-type lathe, it was imperative that they chose a programming platform suited to the task of programming the machine productively and intuitively. PartMaker applies two patented technologies in automating the programming of the Swiss ST 26. The first of these patented technologies is called "Divide and Conquer." PartMaker's Divide and Conquer programming approach lets the user break a complex part with a number of turned and milled features down into a series of simpler operations. Once part features have been created, the user can automatically optimize the part's process using PartMaker's second patented technology, its visual synchronization approach. By using PartMaker's visual synchronization, the programmer is relieved from having to remember the synchronous machining programming syntax required by a multi-channel machine like the Swiss ST 26. Instead, the user just chooses a picture that corresponds to what they achieve and the software does the synchronization automatically. If the user tries to synchronize operations the machine cannot achieve, the software will provide a warning. Once the optimization is completed, PartMaker displays a graphical time chart indicating the degree of overlapping that has been achieved.

"PartMaker is really easy to use, the learning curve has been awesome," says Richard Cosman, TiNi's CNC programming responsible for programming the Swiss ST 26 .



PartMaker's Patented Visual Synchronization approach allows TiNi Aerospace programmers to optimize the cycle time of parts being machined on their Swiss ST 26.

Faster Programming, Better Cycle Times

With introduction of the combination of the Swiss ST 26 and PartMaker into their manufacturing process, TiNi has been able to program quickly and achieve better cycles times.

"PartMaker helps us produce a good part the first time which means a lot faster turnaround. Parts we previously would have to do in two setups, we are spitting out in half the time" says Cosman.

TiNi has also been impressed with the quality of the technical support provided on PartMaker. Both Cosman and Bokaie note that PartMaker's technical is both highly responsive and expert. In business in which "failure is not an option" according to Bokaie, this superior level of responsiveness has been particularly helpful to TiNi in meeting the high demands it has of its products.

"The support I have received from PartMaker has been incredible. If I ever have problem, their support team is right there with solution," states Cosman.

Collaborating for a Solution

Much of the success TiNi has enjoyed with PartMaker can be attributed to the close cooperation between Delcam and Tornos engineers. Tornos provides the developers of PartMaker a great deal of information that helps them develop robust programming solutions for Tornos machines. This has particularly been the case of the Swiss ST 26, which is a relatively new machine in the Tornos line-up. By working together proactively, Tornos and PartMaker engineers were able to assure the PartMaker solution for the Swiss ST 26 was robust before putting it into customers hands. Additionally, Tornos supplied PartMaker actual solid models of the ST 26 which PartMaker incorporates into its Full Machine Simulation technology. Since PartMaker's Full Machine Simulation is based on actual solid models of the ST 26 provided by Tornos, PartMaker users are able to achieve an almost virtual reality-like simulation of a part cutting on the ST 26 offline at their PC before sending the CNC to the machine. This realistic level of simulation combined with a robust post processor for the ST 26, makes PartMaker SwissCAM a very powerful, reliable and easy to use programming platform help users program their Swiss ST 26 more productively. PartMaker's ease of use and strong technical support assures users they will become productive quickly.

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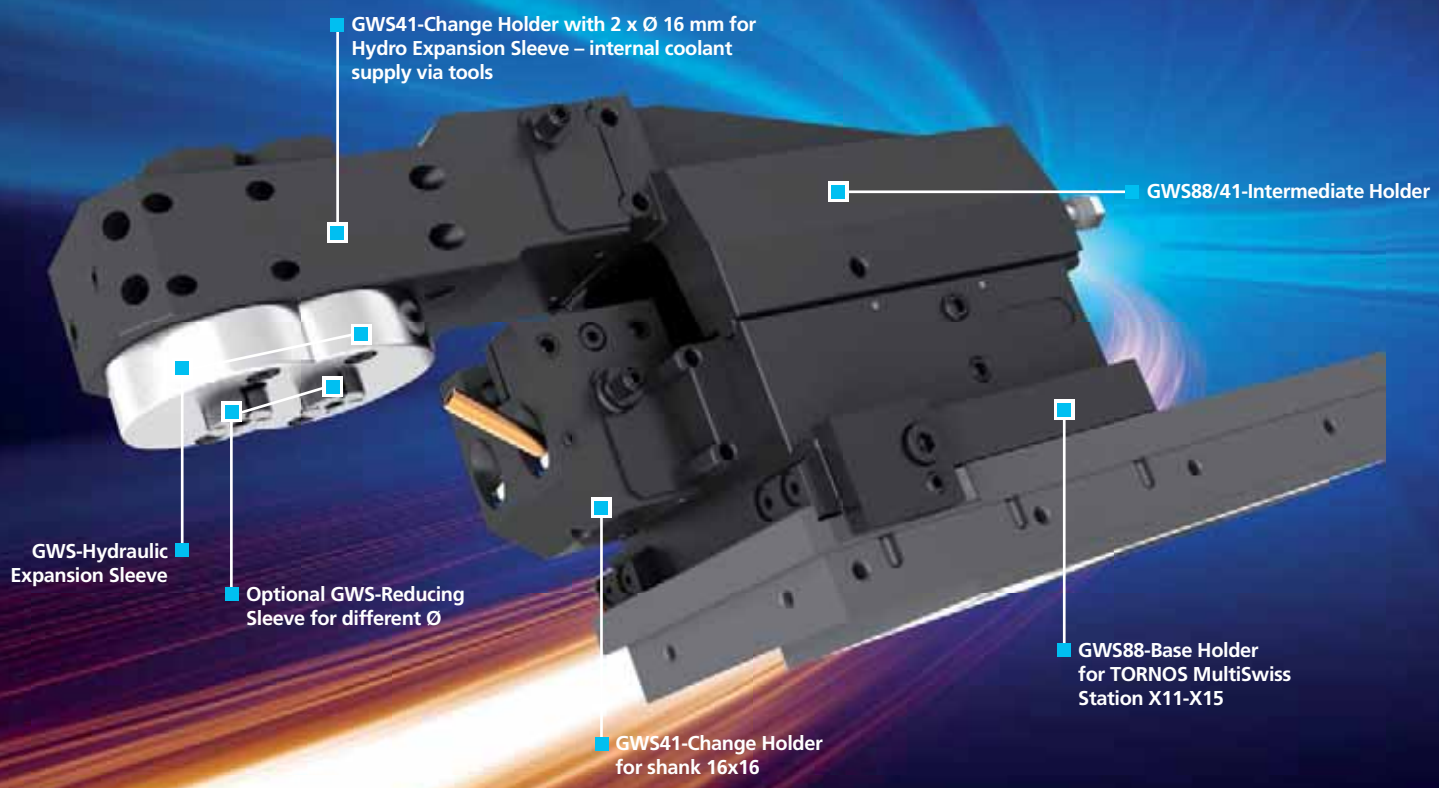

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