decomagazine

76 02/16 ENGLISH

EvoDECO Gold Edition

Swiss DT 26
Even more features

Industry 4.0
How to take advantage of it with TISIS

Increasing
the volumes with SwissNano

The Jura
technology cluster

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The Swiss GT 13:
Your advanced
machining solution

Flexible machining
from the bar

Tornos electrifies
production for aerospace
subcontractor

Quality stitch
by stitch

IMPRESSUM

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SUMMARY

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

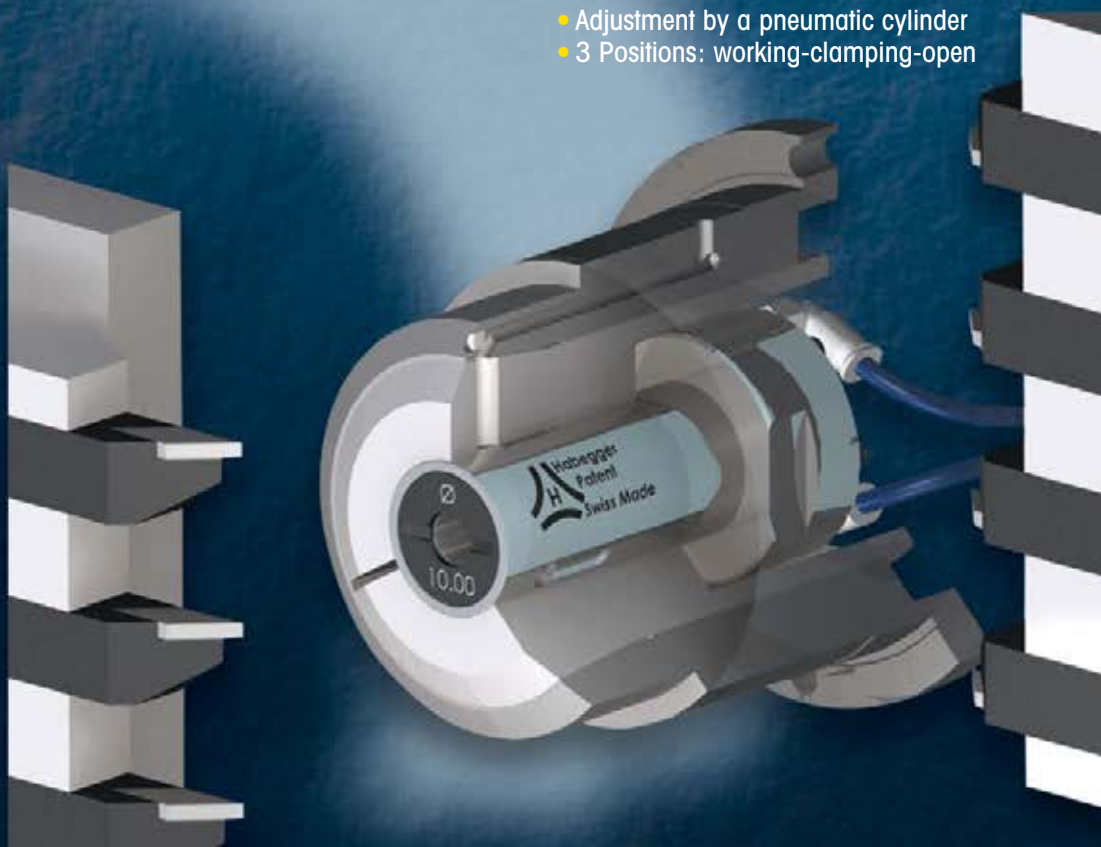
Type / Typ C

- 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

1 Porte-canon: 3 types de canon Habegger!
1 Büchsenhalter: 3 Habegger Büchsentypen!
1 Bushholder: 3 Habegger guide bush types!



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14-17.06.2016
PALEXPO GENÈVE

A RENDEZVOUS FOR THE WATCH MANUFACTURERS IN GENEVA

The EPHJ show is a major exhibition for the watchmaking industry. Its where the primary figures of the production supply chain exhibit their expertise in this exciting and unique industry sector. Taking place in Geneva, the show will be packed with the latest technology.

Tornos is globally engaged in various industries such as the automotive, medical and electronic industries; but being a Swiss business, it is no surprise that Tornos is an industry leader in the watchmaking industry.

The requirements of our watchmaking customers are getting more and more challenging in terms of part geometry and machining tolerances, but also in terms of surface quality. These are just a few of the reasons why Tornos excels in this key industry sector. To be able to always offer solutions that meet the highest performance requirements, Tornos provides tireless and close cooperation with the machine tool users. This precious cooperation develops an invaluable energy, something that is driven by mutual passion that is geared towards reaching or even exceeding the goals.

Tornos' determination in the watchmaking and also other sectors is something that clearly shows in the vast product range the company offers today.

As far as the single-spindle lathes are concerned, Tornos is going to present the Swiss DT 13 at the show while the new Swiss DT 26 will be available from the second half of this year. The EvoDeco and SwissNano series excel in the machining of watch parts. Thanks to the kinematics of the EvoDeco, complex workpieces can be machined and the capabilities are only limited by the imagination of the operator. As far as the SwissNano is concerned, its ergonomics, performance and its flexibility are the required assets that join to make this machine a formidable means of production that is especially appreciated by its users.

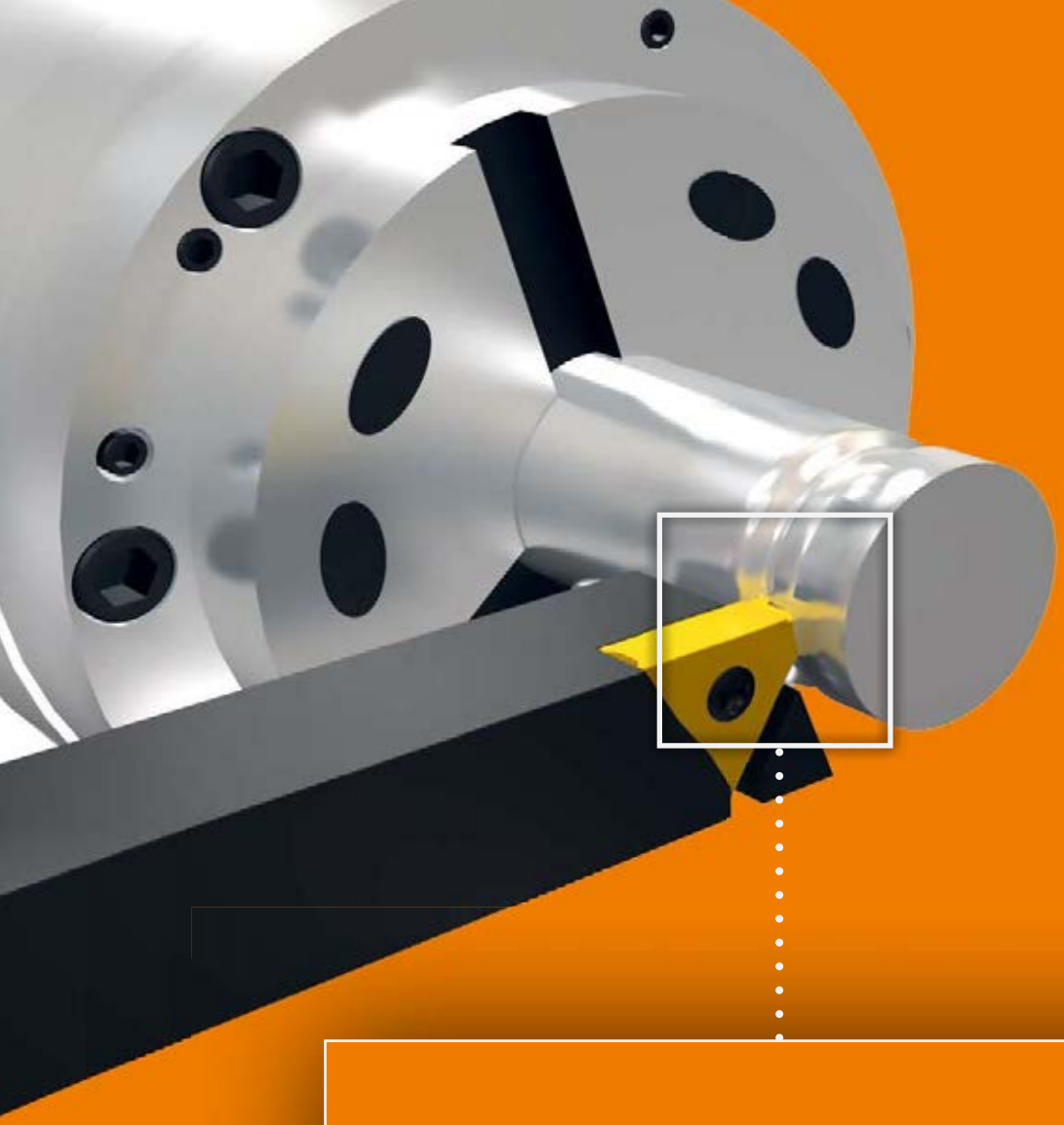
In the multispindle lathe range, Tornos has made significant investments to finely adapt the existing models to the requirements of users whilst simultaneously developing new models, such as the MultiSwiss 6x16. The distinctive feature of this machine range is its exceptional cycle time where every single second counts. Moreover, these machines are easy to program and thus are increasingly being used in the watchmaking sector.

My team and I will be delighted to welcome you on our booth B82 where you can discover the Tornos energy, innovation and enthusiasm throughout the Tornos product range and the staff. Among the machines exhibited, a strong focus lies both on the Almac BA 1008 that is based on the same structure as the SwissNano. It is a machine that has been designed to machine prismatic workpieces whilst the impressive Swiss DT 13 has uniquely been tailored for the watchmaking industry.

We look forward to welcoming you at the show.

Gérald Juillerat
Head of Sales Switzerland

OD GROOVING
WITH INSERTABLE TOOLS



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THE SWISS GT 13: YOUR ADVANCED MACHINING SOLUTION

Efficiency, versatility and ease of use are the hallmarks of Tornos' Swiss GT 13, an advanced machining solution conceived to yield measurable production improvements.

After just a year on the market, the Swiss GT 13 is proving itself a champion at delivering highly efficient production of even the most complex parts across a wide range of industrial applications. From components for electronics and medical/dental screws and implants to parts for watchmaking and jewelry fabrication, manufacturers take their turning operations to a new level with this solution.

The Swiss GT 13's advanced technical features and efficient six-axis kinematics make it ideal for a variety of manufacturing challenges – and breaking into new and lucrative markets.

With a maximum diameter of 13 mm, six linear axes and two C axes, the Swiss GT 13 can accommodate up to 30 tools, 12 of which rotate. Thanks to the intuitive Tornos Machine Interface (TMI) and available TISIS programming system, machine programming in ISO language is made easy and idle time is minimized. The TMI made its debut on Tornos' popular SwissNano, and TISIS software is renowned for its many onboard aids and macros that take the complexity out of machine operation.

Versatility – built in

With its very dense tooling capacity, the Swiss GT 13 positions you to tackle the market's most complex parts. With a modular tooling position that puts you on the fast track to advanced operations, you'll easily master thread whirling, polygonal milling, and angular milling.

Standard to the Swiss GT 13 is a counter-operation station equipped with a Y axis that can house eight tools. Operations and counter-operations are performed completely independently of one another. Increasing your freedom of programming are this solution's spindle and counter spindles with identical power ratings, so you can say goodbye to the days of choosing heavy bar operations due to insufficient power in counter operations.

Satisfying your need for speed

The Swiss GT 13 is, in fact, built for speed because every second counts in today's highly competitive manufacturing environment. Its motorized guide bush is supported by a liquid-cooled, 15,000 rpm motor spindle. Your cycle time is significantly reduced by the machine's direct rotary drive guide bush that paves the way to high-speed, accurate machining.

Easily work with or without a guide bush and realize the advantages of a comprehensive bar turning solution to drive your productivity and cost efficiency on complex parts. This solution can easily be converted into a guide bushless machine in fewer than 15 minutes with our easy-to-use kit. With our kit, your short parts will be easy to execute. A handy support for your guide bush can be found right next to the spindle – no time-consuming cable disconnection required. Experience guide bushless turning – an advantage that is unique to Tornos customers.

Optimizing your ease of use

With the Swiss GT 13, Tornos once again demonstrates its strong focus on ergonomics that optimize your autonomy and your machine operator's ease of use. Emptying the swarf container while the machine is running is a snap, and setup change over time is accelerated by the easily accessible machining area. Furthermore, the numerical control on the swivel arm and the handy tool box put autonomy within arm's reach.

Extending your ease of use is the Swiss GT's three motors to drive up to 30 tools – including 12 rotating tools; two of those motors are on the platen and the third is for back operations. Accommodating special attachments – and there are many to choose from – is a modular position. Rotating tools on the rear platen and the counter-operation station are easily exchangeable and compatible with the Swiss GT's big brother, the Swiss GT 26.

Peripherals to extend your versatility

To maximize your versatility and productivity, Tornos offers a broad range of peripheral solutions. For example, our Robobar SBF 213 bar-feeding unit – ramps up your Swiss GT 13's speed and precision while imparting greater vibration damping. Its side loading of up to 20 bars in diameters of 2 mm to 13 mm improves your operator's ease of use. Capacity wise, the SBF 13 is available in numerous models including two, three and four meters, with respective maximum bar weights of 330, 355 and 377 kg. Furthermore, this solution offers the same quality of guidance as a high-quality bar loader equipped with tubes, and its ergonomic design and innovative side loading make it easy for the end user to master and it can be used when the loader is in operation.

Other success-enhancing Swiss GT peripherals range from our radial polygon milling unit for main operations to our rotating milling/slotting attachment for saw for main and counter operations.

TISIS to the rescue

Enjoy simple, streamlined programming your Swiss GT 13, with our available TISIS communication and programming software. As your portal to the advantages of Industry 4.0, TISIS knows your Tornos machine fleet and can help you decide which machine to use for a specific part. Those advantages put you on the fast track to truly effortless programming and real-time process monitoring.

With TISIS, you can assess all of your machine's options, reduce the risk of collisions and productivity-limiting stoppages, and achieve greater production efficiency. As a smart and advanced code editor, TISIS does the thinking for you. It can help write your code and point out any coding errors – and it puts your code in color and can display your program in an attractive, easy-to-read Gantt chart. You'll easily identify critical paths and react quickly to optimize your processes, with TISIS at your fingertips.

Tornos Service

Like all Tornos products, the Swiss GT 13 is supported by Tornos Service with its geographical proximity to you and a keen understanding of your processes, applications and market challenges.

Buying a Swiss GT is much more than a business transaction; it's an investment in your future. Depend on Tornos Service's unparalleled continuity of support, including 12 Tornos Service Centers strategically located across Europe, Asia and the Americas, for start-up assistance; expert training and coaching; free hotline; on-site operations support and preventive maintenance; original spare parts seamlessly delivered worldwide; complete overhauls to extend the longevity of Tornos machines; and a range of operations and X-change Modules to expand your application capabilities and profitability.

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THE NEW SWISS DT 26: EVEN MORE FEATURES

In the last issue of the decomagazine, we presented the Swiss DT 26. It rounds off the Swiss DT range and it has a many of the benefits that we described in our previous issue. From now on, this machine will offer new options to enhance the capability potential.

Simple but robust kinematics

The proven kinematics of the Swiss DT 26 features five linear axes. Given the bar capacity and the performance of the machine, the Tornos engineers have prioritised good chip evacuation by arranging the gang tool post above the guide bush or the spindle. With its spindles that can deliver a power output of more than 10.5 kW during front and back machining and a bar capacity of 25.4 mm, the Swiss DT 26 will prove to be very efficient in this field.

Simple yet modular

In today's market, users face numerous challenges. One challenge is the ability to respond quickly to the requirements of clients in an often uncertain environment. It is therefore very important for Tornos to understand and replicate this quick response philosophy. From now on, every machine built by the manufacturer headquartered in Moutier will have modular machining areas. Even the entry-level machines can now offer advanced machining

operations. This ensures the new Swiss DT 26 machine is no longer confined to turning and milling tasks, but can be equipped with various tool holders that help the machine owner to quickly respond to a large variety of requirements.

Modular configuration for front machining

The machine comes equipped with four radial drills for front machining operations. This equipment grants the user high flexibility. To improve this flexibility further, the machine can be provided with a thread-whirling cutter or a polygon cutter. This will make it easier for the Swiss DT 26 to produce medical screws or to perform face milling tasks with these two attachments.

The thread-whirling cutter can be inclined by +/-15° and it can rotate with a maximum speed of 5,000 rpm and it is capable of machining diameters up to 10 mm. On the other hand, the polygon cutter can also reach a maximum speed of 5,000 rpm while the diameter of the polygon cutting tool is 80 mm.

Modular configuration for back machining

The modular configuration for front machining is a benefit that is highly appreciated for an entry-level machine. However, in the case of the Swiss DT 26, that's not all. The back machining post can be equipped with both stationary tools and driven tools. This post can also accommodate advanced tooling such as a high-frequency spindle for machining a Torx® pattern or even a slotting device.

A full set of equipment

The tool holders of the Swiss DT 26 machine are compatible with the Swiss GT 26, Swiss ST 26, Swiss GT 13 and the Swiss DT 13. Apart from these tool holders, Tornos offers a full set of equipment for its machines. Whether it's a bar feeder, a chip conveyor, a high-frequency spindle or an oil mist separator, Tornos can always offer a solution for your problem.

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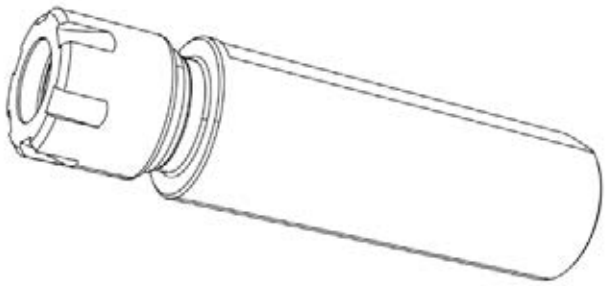
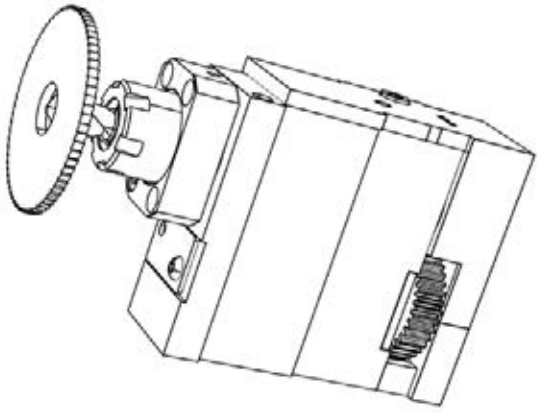
TAILOR-MADE MACHINES

For some time now, new Tornos machines have been launched one after another with the new Swiss DT 26 favorably rounding off a well-conceived machine family.



Collet holder

Swiss GT 26	Swiss GT 13	Swiss DT 26	Swiss DT 13	Swiss ST 26	CT 20
248-4240	256-4240	258-4240	257-4240	246-1240	247-2110



Milling attachment

Swiss GT 26	Swiss GT 13	Swiss DT 26	Swiss DT 13	Swiss ST 26	CT 20
248-1640	256-1640	258-1640		246-1640	

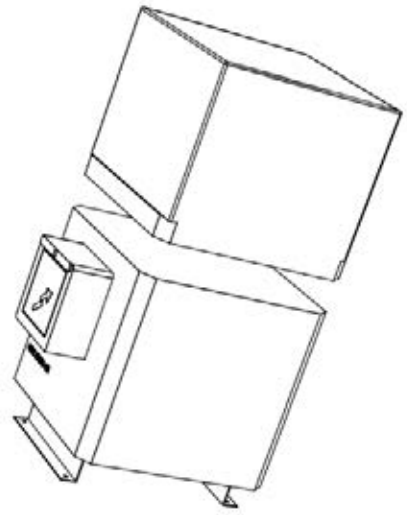
The quick succession of innovative products should not conceal the fact that Tornos does not only offer machines, but also a large range of options that complement the machines according to the user requirements.

A comprehensive equipment family

The tailor-made solutions developed by the Tornos engineers enable the users to enhance the performance and flexibility of their machines and thus to respond to the specific requirements of their customers. All machines of the Swiss ST, Swiss GT, and Swiss DT series share the same basic tooling system that guarantees perfect inter-changeability between the machines of a machinery pool. For example, a polygon cutter can smoothly be attached both on a Swiss ST 26 and on a Swiss DT 26 without any adaptation. This advantage should not be underrated as it allows flexibility while limiting the required investment. Moreover, thanks to the TISIS software, it is very easy to identify the various possibilities offered by the machine pool of each user.

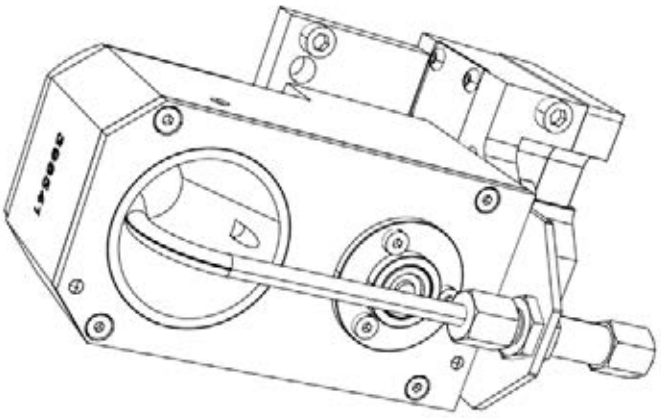
A comprehensive offer of tool holders

Brice Renggli, Tornos' Marketing Manager explains: *"Whatever the needs of our customers, our standard tool holder range is very extensive and covers most of the demands, including even the most advanced of them. This standard range is even rounded off by quick-change tool holders that offer added flexibility and possibilities. Whether you need axial or radial drills, polygon cutters or other thread-whirling cutters, we offer the appropriate solution."*



Oil mist extraction device

Swiss GT 26	Swiss GT 13	Swiss DT 26	Swiss DT 13	Swiss ST 26	CT 20
248-5436	256-5436	258-5436	257-5436	246-5436	247-5436



Thread whirling attachment

Swiss GT 26	Swiss GT 13	Swiss DT 26	Swiss DT 13	Swiss ST 26	CT 20
248-1900	256-1900	258-1900		246-1900	

Tool holders – and much more

With these diversified options, Tornos machines can be finely adapted to the various market segments. The range of equipment offered by Tornos is not limited to tool holders but also comprises high-pressure pumps, tool breakage detectors, fire-extinguishing systems or oil mist separators that are counted among the options that are offered by Tornos by default.

Available not only for the new machines…

The Tornos Service Department is always at the service of its customers in terms of upgrading installed machinery. The options offered for the new machines are also available through after-sales service. Mr. Renggli concludes: *"If you want to enhance the air quality in your workshop, you can install an oil mist separator from Tornos."*

For detailed information on the available options, please refer to the options brochure that is available on the Tornos website at the following address:

http://www.tornos.com/sites/tornos.com/files/data/Brochure/Options/tornos_machines_options_en.pdf.pdf

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MULTISPINDLE AUTOMATIC LATHE MULTISWISS 6x14 BY TORNOS

FLEXIBLE MACHINING FROM THE BAR

With the MultiSwiss line of products, Tornos offers a machine series that bridges the gap between single-spindle and multispindle lathes. The flexibility and high-precision machining of single-spindle machines forms a congenial symbiosis with the economic production cycle of multispindle automatic lathes.

Easy access to machining zone, versatile tooling configurations, optional Y-axis using the range of parts to be machined may significantly be expanded, compact structure of the machine with attachments are just a few of the main advantages of this series.

Machine structure

The machine structure is split into two segments: the machining section and the supply & disposal section, also called "container". Both elements are located on anti-vibration mountings and are made from gray cast iron in the machine bed and in the counter-spindle unit. The container is permanently mounted to the machine body, but may be separated for transport purposes. It is provided and mounted by a sub-supplier and includes the bar feeder, the coolant supply and recycling system and the chip disposal unit. The electric control cabinet and all further necessary supply units are also mounted there. This results in a virtual "all-in-one-concept" taking up little space at the customer with its small footprint.

The core of the machine is the barrel with the individual headstocks. The hydrostatic bearing of the central barrel and also of the individual spindles offers advantages with regards to the damping behavior of the complete system. Tool life and workpiece quality are also improved; so that Tornos comes closer to its aim of saving grinding cycles for the customer. This especially applies to machining

quality. The barrel is rotated and positioned using a torque motor that grants short turning cycle times thanks to the inherent dynamics.

On the barrel, 6 spindles are arranged, each having its own synchronous drive motor that accelerates to maximum speed (8,000 revolutions/second) within one second. The spindles are independent of each other and are moved in X direction by 6 slide units. Two slides on positions 3 and 4 may also integrate an optional Y-axis and thus allow for eccentric operations. The stroke in Z direction of the work spindles amounts to 50 mm. Using this function, the machine may operate like a single-spindle system at the workpiece contour. After the bar has been cut off and the workpiece has been taken up by the pick-off spindle/counter-spindle, the rear contour may then be machined by a further slide (X direction). The counter-spindle also moves on a slide (Z direction). This slide is used as a front end stop for the bar when loading the bar material; this allows for aligning the blank with high dimensional accuracy and thus for optimally utilising the material with very little material remaining.

For unloading the parts, Tornos offers various options - moving in a chute, removal by robot or discharge onto a conveyor belt. For the machining process, the same cutting oil is used for the hydrostatic bearings. In this way, the leak oil from the hydraulic circuit is drained from the machine together with the cutting oil so that no separate circuit is required. The only difference is that the hydraulic oil is finely filtered (5 to 6 µm) when being recycled and is selectively fed to the bearing pockets.

The self-acclaimed goal to deliver excellent grinding quality also manifests itself in thermal regulation throughout the machine. Cooling oil for machining and hydraulic oil for the hydrostatic system are kept within a temperature range of 3° C in well dimensioned cooling units (900 l cooling oil). Furthermore, sensors are located in the spindle units the output is used for calculations in the temperature management.

Modular multi-tool concept

Up to 18 different tool modules may be used on the linear slides of the 7 machining axes (X direction) and the two Y axes. In one module, up to 3 tools may operate, like e.g. polygon cutting, face drilling and high-frequency drilling attachments. To this end, Tornos may draw from a wide range of different application options.

Machining

During the machine check, the dynamics and machining flexibility of the MultiSwiss could be demonstrated by actually machining a part. In this connection, Tornos presented its solution for part disposal from the machine by also including additive manufacturing technologies, like selective laser sintering to quickly design a part-specific chute.

Control

As a control unit, the Fanuc 31i is used. Programming may be done using the well-known TB-Deco software. In addition, various macros for specific machining processes are available, like e.g. thread chasing, deep-drilling cycles and machining of complex workpiece shapes.

Moreover, Tornos now offers the TISIS Machine Programming and Communication software that also supports the communication among all Tornos machines used in the plant apart from programming and CAM. The software knows the functions of all Tornos machines in the plant, helps to program in ISO code, executes interference checks and outputs the programs to the control unit. All workpiece documents are archived allowing the insertion of related photos from smart phones. During production, operating data including the information as demanded by Industry 4.0, malfunctions and axis

MY OPINION

With the MultiSwiss, Tornos offers a machine that combines the productivity of multi-spindle machines with the operational flexibility of single-spindle machines. One MultiSwiss comprises up to 14 linear axes and 7 rotary axes. Together with the multi-tool concept and various automated unloading functions, the use of this machine is always an alternative to the production on several single-spindle machines. The temperature management and the hydrostatic system in the barrel and spindles improve the machining quality. The after-sales service reflects the excellent customer relations.

Edwin Neugebauer
Specialised journalist, Germany

loads may directly be retrieved via smart phone. During operation, the machine status is signaled by the color of the illuminated company logo (red error, green - operation, blue - set-up, orange - operator request); the logo is attached to the front side.

Service/TCO

The service is an independent business segment with operational centers throughout Europe. The service staff has direct access to all documented innovations stored in the database. In case of spare-part orders, the customer may check the availability online; in one exchange module, 350 components are available.

The data from the service calls are archived in a database by the employees. During the machine check, detailed evaluations could be inspected. A cost analysis of all series, cost lists per assembly groups and the monitoring results of the own service quality (KIP evaulation) were shown.

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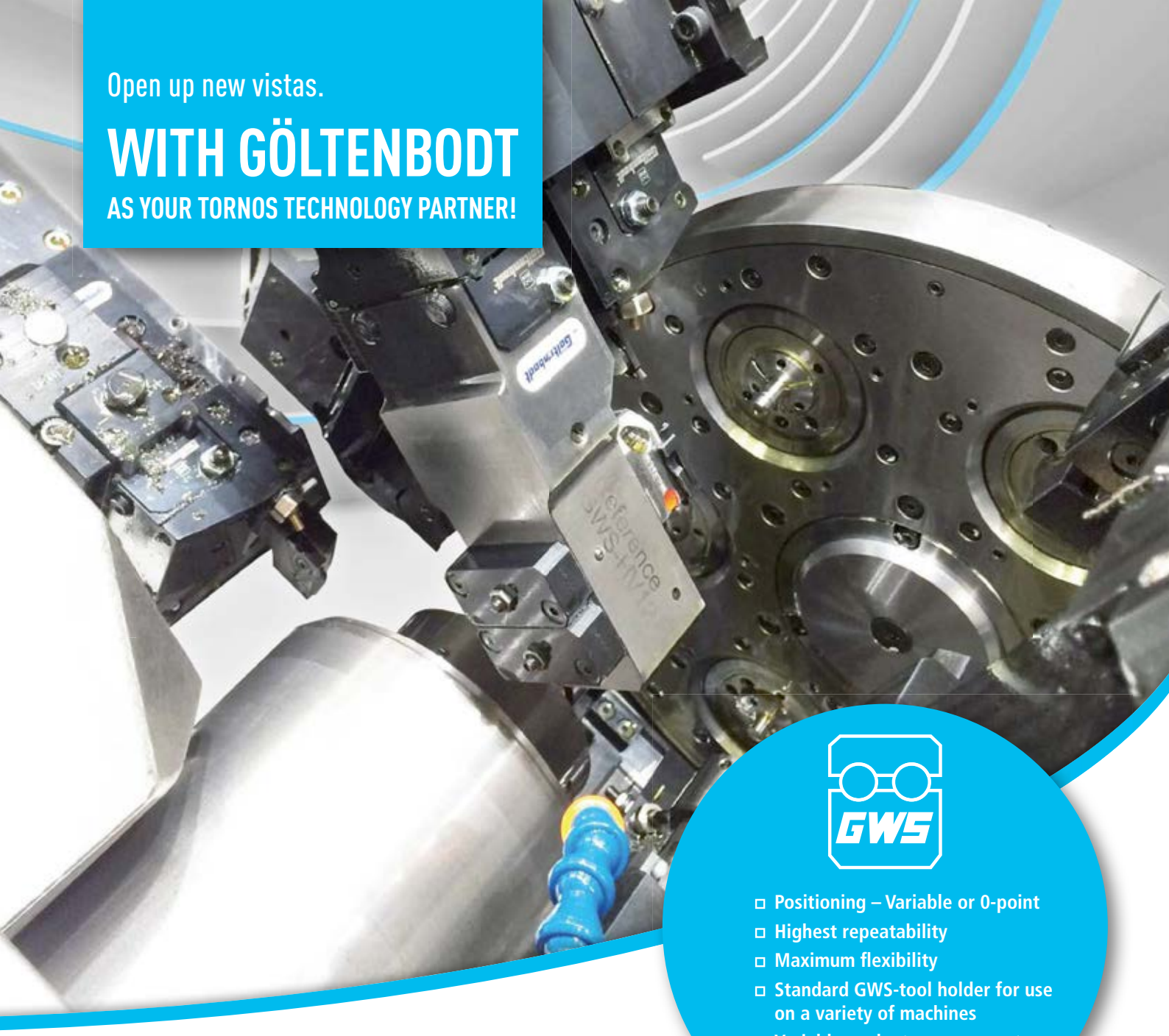

GWS

- Positioning – Variable or 0-point
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- Maximum flexibility
- Standard GWS-tool holder for use on a variety of machines
- Variable coolant management for choosing high or low coolant pressure

GWS TOOLING SYSTEM FOR TORNOS MULTISWISS!

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INDUSTRY 4.0 – HOW TO TAKE ADVANTAGE OF IT WITH TISIS

Today, we hear a lot about the famous Industry 4.0, the industrial revolution that is going to digitise production and completely change our current era of manufacturing.

There are many ideas and much information about this concept and how it can meet our actual requirements. In this article, we want to present practical applications in today's production that can be realised thanks to Tornos TISIS software.

Why Industry 4.0? On the whole, the advantages achieved by a turn towards the digital economy are the flexibility of production and the individualisation of the products that takes any conceivable parameters into account. The concept helps to create personalised mass products while stream-lining production. The ultimate goal is to deliver to the customers increasingly customised products and solutions at prices and with deadlines that are satisfactory for both the vendor and the customer. One of the consequences is the required programming flexibility.

A comprehensive range of services

The TISIS program is offered as an option that allows to manufacturers to program the complete range of Tornos products. It is available for rather simple machines working with ISO programs but also for more complex machines such as the machines of the EvoDeco type. The software allows machines to be programmed but also allows us to communicate and interact with them using a simple tablet computer or smartphone.

Connectivity Pack – an industrial PC as interface

To be able to link the world of production with the current concepts of Industry 4.0, the machines must be equipped with more intelligence. Against this

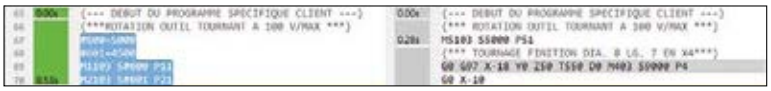
background, the machines of the various Tornos series have and industrial PC that serves both as data server and storage server.

TISIS – programming and much more

TISIS is offered in several versions: the light version allows programming while the comprehensive version includes programming, set-up and data management support functions as well as an optional CAD/CAM system that enables complex shapes to be easily programmed. The Connectivity Pack enables production tracking via TISIS Tab (mobile version for Android and Apple peripherals) and includes the optional TISIS i4.0 production tracking function and set-up support function via camera system.

Six simple stages

With TISIS, the overall production can be divided into six simple stages: programming, tool selection, data transfer to the machine, set-up, real-time production monitoring and tracking and finally, efficiency evaluation. In the following, we would like to study these stages in detail.



1 – programming

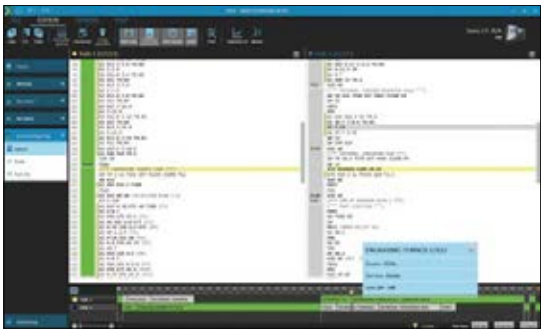
The programming wizard enables the comprehensive documentation of all workpiece data; by means of the mobile TISIS Tab application, it allows the registration and the visualisation of drawings and photographs that have been made or taken directly during set-up. When the program is restarted later on, any operator can thus directly check all parameters and characteristics in the programming software.

As far as actual programming is concerned, numerous refined functions simplify the operator's life. For instance, he can opt for highlighting certain parts by colors and decide to register recurring operations in a directory that can be called on request. An ISO-code data base is available at any time and thus enables the operator to always have the right code at hand. The various channels can be directly viewed on one single screen. With a 2D simulation system, the tool paths can be directly reviewed during programming which ensures considerable time savings.

Talking about time savings, it should also be noted that the cycle display (by GANTT chart) enables the tool paths and thus the cycle times to be optimized.

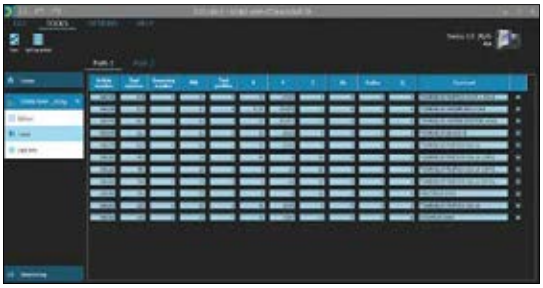
1 – programming of complex workpieces with TISIS CAM

Depending on the geometries to be programmed, the ISO code system is difficult to use (and for certain operations, it cannot be used at all without modifications). For such cases, TISIS comprises a CAD/CAM module that enables programming based on a 3D model. The program can thus be optimized where required by means of the TISIS editor and the GANTT chart.



2 – tool selection

The directory of the available tools is synchronized with the machine configuration. The arrangement of the tools in TISIS exactly corresponds to the tool layout in the machining area The software directly shows the position of the tools and thus avoids any risk of interference. Any assembly errors or incompatibilities are avoided from the very beginning.



3 – data transfer to the machine

Once the program has been carried out (and documented), it is transferred to the machine via a simple USB flash drive or directly via the company network. This connectivity is bidirectional and allows the stage described below.

4 – set-up

Based on tool selection and arrangement in TISIS, the actual tool set-up is simplified; just follow the virtual wizard (from stage two mentioned above). However, in certain cases, especially when machining very fine workpieces, the tool set-up may require special skills. For such situations, an optional macro camera is available that can precisely display the workpiece and the tools. A direct workpiece measuring system is offered as well.

5 – real-time production monitoring and tracking

Real-time tracking of the production enables the operator to view the production progress in real time and thus to determine the deadlines and the availability of the machines as realistically as possible. With this tracking function, it is possible not only to view the detailed machine parameters, especially the spindle and axis loads as well as the respective temperatures, but also to monitor the entire workshop. The connectivity ensured by TISIS Tab includes a function to immediately inform the user of unexpected events (or e.g. of the series end) directly via his smartphone.

6 – efficiency evaluation with TISIS i4.0

The efficiency of each machine and of the entire workshop (OEE) can be requested permanently. It can be displayed most easily and the display gives a quick overview. The efficiency display is based on certain parameters that can be selected as desired – the efficiency can thus be viewed per machine or per machine group, per day, per week, per month or per year. The system is comprehensive and fully autonomous and the history of each machine is saved permanently. The analysis is thus considerably simplified.

With TISIS, TISIS Tab and Connectivity Pack, the user of a Tornos machine can work more efficiently and is better informed about the production status of the machine; in addition, however, the built-in intelligence helps to maintain consistent quality because all data are documented. While, normally, a change of the operator might affect the production quality, TISIS minimizes such risks.

A TISIS evaluation software version can be downloaded from the Tornos website under http://store.tornos.com/en. If you wish further information, do not hesitate to contact Patrick Neuenschwander, Tornos' Software Manager, under neuenschwander.p@tornos.com or your distributor.

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THE ALMAC BA 1008 FAMILY IS GROWING AND IT NOW HAS A NEW MEMBER - THE BA 1008 HP

Almac now introduces its new product that was brought to light at the recent Siams 2016 exhibition. The new BA 1008 HP can be considered as the big sister of the BA 1008. It offers a lot of advancements that will appeal to even the most demanding of customers.

What does HP stand for?

This is quite easy: it means "High Pressure" as this is the most striking benefit of this new machine, as it allows machining with high-pressure coolant supply through the spindle (120 bar). This is a huge advantage for this type of machine and it enables the reduction of the drilling times especially with deep-hole drilling while ensuring perfect quality and precision.

Perfect fluid, workpiece and chip management

The peripheral fluid management system has been conveniently mounted on the rear side of BA 1008 HP. This unit comprises a 120 bar high-pressure pump for through-the-spindle coolant supply, a 5 bar pump for shower coolant supply to the machining area, a plate heat exchanger for thermal stabilisation of the cutting oil and also a tank with a capacity of up to 300 litres.

Moreover, a transfer pan is installed on the machine side. This enables the cutting oil leaving the machining area to be filtered first through a filter bag (100 µm, 50 µm or 25 µm) and then through a 6 micron cartridge filter. This transfer pan has a an oil capacity of 70 liters and includes a large 30 liter chip bucket.

The oil leaving the machining area can thus be perfectly filtered and passed on to the high-pressure tank. In this way, the cutting oil is cooled before it is used for high-pressure coolant supply and shower coolant supply. The finished parts are carefully transported to a collecting tray that is easily accessible from the machine side.

The figures below illustrate perfectly how fluid management is done.

The ideal machine to machine for precious metals

Apart from having an optimum chip filtration system, the BA 1008 HP machine has been especially designed for machining precious metals. Actually, the machining area is provided with an enclosure with smooth walls to minimise chip accumulation and considerably improve chip collection. The machine operator can now collect up to 99.97% of the precious material for recycling in less than 20 minutes. Please note that this option is also offered on the standard BA 1008 models.

Perfect consistency of the design

Despite the large number of added features, the BA 1008 HP is still a very compact machine (998 x 3,200 x 1,690 mm). Moreover, the renowned design of the SwissNano and of the BA 1008 are perfectly

preserved. Today, Tornos and Almac offer a family of ultra-compact machines with a unique appearance. This is regardless of whether its a Swiss-type lathe, a bar milling machine or a milling/drilling center with through-the-spindle coolant supply.

A more-than-wise investment

As mentioned previously, the BA 1008 HP allows production with outstanding throughput and excellent quality. In this way, e.g. simple bracelet links can be realised from sectional steel with cycle times of less than 5 seconds. Depending on the type of the workpieces to be machined, it is therefore absolutely logical and most interesting to compare the investment in a BA 1008 HP machine fleet with a transfer-type machine.

A study carried out by Almac experts has shown that for the small or medium-batch machining of a bracelet link, it really makes sense to invest in three or four BA 1008 HP machines rather than in one single transfer-type machine. For an equivalent initial investment, the BA 1008 HP option offers higher production flexibility, considerably shorter production launch times, less floor space and a cost price reduction per workpiece by 10 to 20%.

To be showcased at EPMT/EPHJ

The BA 1008 HP machine is going to be showcased at the EPMT that will take place from June 14th to 17th at the Palexpo exhibition center in Geneva. Do not hesitate to visit us and have a look at this amazing machine at booth B82. The Almac representatives will be pleased to give you a full demonstration of the machine.

MAIN BENEFITS

- Compact
- Ergonomic
- High productivity
- Machining of precious metals
- Incremental investment
- Fast production launch
- High flexibility

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TORNOS EXPERTISE IN MEDICAL TECHNOLOGY

ARE THE DEMANDS OF MICRO-MACHINING BEING FULLY MET?

"Spare parts for human beings" are getting smaller and smaller and more and more delicate. Market analysts therefore see a bright future for micro-system technology.

It is expected that in medical technology, there will be a strong demand for small functional components made of materials that are difficult to machine. The production of such parts requires a great deal of expertise, both from the users and from the machine manufacturers.

Unique expertise and…

The Swiss lathe manufacturer Tornos, a pioneer in this field, boasts a worldwide unique expertise in the production of medical components. With more than 400 customers and more than 2000 automatic lathes installed in the field of medical and dental technologies, Tornos has developed an unmatched expertise. Its highly specialised skills range from turning and milling up to the perfect control of the complete machining process. This includes efficient swarf disposal, temperature control of the cutting oils or spindles with vibration damping and appropriate tools and much more. The main objective is to produce parts in one single set-up.

… customised production

With its automatic lathes, Tornos is able to offer total solutions that comprise various peripherals and tooling systems for the most efficient and cost-effective production of high-quality parts for the medical industry. Starting from standard machines, the machining process is tailored to each customer. The machining of materials such as titanium of different hardness grades, stainless steel refined by vacuum arc re-melting or cobalt-based alloy steels requires the use of specific machining processes.

Here are some of the specific requirements that must be taken into consideration: geometrical and dimensional accuracy of the implants and

ostheosynthesis screws, impeccable surface finish, optimisation of machining parameters and tool life, highest possible productivity (workpiece machining time) and finally perfect suitability of the product and of its features for the customer's demands.

A multi-spindle lathe for the medical industry…

The MultiSwiss machine is a perfect example of this philosophy and it is meanwhile well established in medical industry. This machine bridges the gap between single-spindle and multi-spindle lathes. It has 6 motor spindles and is programmed in the same way as 6 lathes with 3 axes. With the integrated PC with installed TB-Deco software, programming is a breeze. In contrast to conventional multi-spindle lathes, the tool change as well is very easy and fast on MultiSwiss. For the operator of a Swiss-type lathe, the machine is easily accessible and the operator can instantly start working in a most ergonomic manner as he enters the machining area which enables him to get close to the tool holders.

… to ensure higher productivity and consistency

However, the unique selling point of this machine is its productivity per m², that is praised as unrivalled by all users. Where a single-spindle lathe could produce two parts per minute so far, the MultiSwiss is able to manufacture ten parts and it boasts five times the productivity per unit area – with less time spent for programming, fitting and measurement. Furthermore, workpieces that are manufactured on a single machine are much more consistent in terms of precision, surface finish and tolerance than if they were produced on five different machines. Thanks to the unique MultiSwiss concept, tool wear and hence tool consumption is considerably reduced by up to 70%. The ultra-high rigidity, combined with a torque motor with hydrostatic bearings, turns out to be a huge benefit, especially when machining "difficult-to-machine" materials. Since, in the medical industry, it is not possible to do without thread whirling, the MultiSwiss machines have a suitable thread-whirling unit that ensures a substantial increase of productivity.

Thread whirling on MultiSwiss

The machining of all types of threads on medical screws and dental implants – from small to large threads and threads of various profiles – is counted among the most complex machining processes, but also among the most critical tasks in terms of quality. Threads for implantology are usually very fine and sharp and also have rather complex profiles for them to be able to be screwed into the patient's bone with minimum resistance and heat generation. The profile of such threads is very different from standard profiles. No burrs are tolerated and even if the threads are very fine and sharp, they have a zone of several hundredths of millimeters at their end that allows the elimination of potential burrs. The realization of such thread profiles is almost impossible using conventional machining methods for which forming and threading heads with mounted cutting tool are required. Tornos was the first company worldwide that used the thread whirling technology (for both internal and external threads) on an automatic lathe with sliding headstock and has continuously optimized this process for more than 15 years.

Swiss GT 26 – equally ideal for the medical industry

The Swiss GT 26 with B axis is the most recent testimony of these efforts. With its six linear axes, two C axes and three tool holder systems for a total tool capacity of 40 tools, including 14 driven tools, this machine, which was showcased at the EMO 2015, provides the user with remarkable flexibility and offers him unequaled possibilities. With the aid of the B axis, the CNC spindle can be indexed to the desired angular position which is extremely convenient for angular milling, drilling or even tapping. As the B axis is integrated in the main slide of the machine, Swiss GT 26 is not limited to angular machining tasks but can also perform movements in X and Y axis directions. It can therefore be used for main and back machining.

Well equipped for machining…

The innovative B-axis design of the Swiss GT 26 allows the installation of a station comprising 2 x 4 spindles for driven tools with spindle speeds of up to 9000rpm. This station designed for high-speed driven tools comprises a 1 kW spindle motor for the machining of materials that are very difficult to machine, a feature that is indispensable for medical engineering. Tornos holds the patent rights for this new B axis with its various features. Swiss GT 26 is thus the only machine with a B axis on which up to four fixed tools can be used. Furthermore, it is the only machine tool equipped with a B axis with an additional modular position for the accommodation either of a fourth drilling station or of a real thread whirling unit. The latter has a helix angle adjustment function that can be controlled by the CNC unit. This significantly reduces the set-up time and makes the Swiss GT ideal for medical technology. In addition, the machine's B axis unit has an integrated cooling unit and can also be prepared for the equipment with high-frequency (HF) spindles.

… and cooling tasks

Appropriate coolant supply is another must-have for micro-machining. On most small machines, the cutting oil heats up in no time which has detrimental effects on the thermal stability of the machine. Moreover, filigree workpieces can be damaged through excessive pressure. A pressure of 6-15 bar is often sufficient for effective chip removal. When drilling deep holes with a small diameter, however, high pressures are required that can reach values of up to 320 bar. Tornos takes these aspects into consideration and offers tailor-made equipment with a 500 l fluid controller, an additional medium-pressure pump, a cutting oil cooler, a preliminary filter and a 10 µm fine filter mesh, depending on the application requirements.

The solutions presented above are just a few examples of the advanced Tornos expertise in the field of medical industry. Please do not hesitate to contact Philippe Charles if you have any questions concerning specific machining solutions for the Tornos lathes: charles.p@tornos.com

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INCREASING THE VOLUMES WITH SWISSNANO

This year, the company Gérald Badan SA in Moutier celebrates its 50th anniversary and it is looking forward with optimism to its future. We have met Mr. Carlos Almeida, Managing Director and owner for somewhat more than one year now. He explains how the investment in SwissNano machines as a supplement to his Deco and cam-type machines has allowed him to advance his company.

The SwissNano machine has quickly won acceptance in the workshop. Even if he is specialized in Deco machines, the operator charged with machine programming and operation has quickly adjusted to it. The SwissNano rounds off the production capacity of the workshop.

To the decomagazine readers from Southern Europe and Switzerland, Mr. Almeida certainly is no stranger. He has actually worked for almost two decades for Tornos, first as an employee of the internal Sales Department for the Mediterranean markets (France, Italy, Spain and Portugal), before he moved to the Sales Department for the Swiss market (from 2001) and finally he became the Sales manager for this market (in 2011). At the beginning of 2015, he decided to take over Gérald Badan SA, an SME with about ten employees.

A smooth transition

Gérald Badan SA, a company that traditionally specialises in bar turning for the connection business, was up for sale due to the advanced age of the former owner. The arrival of Mr. Almeida was the opportunity to re-assure the customers and employees with regards the longevity of the company. After the purchase, the complete staff remained with the company and the familiar and kind atmosphere could be maintained. Mr. Almeida explains: *"My colleagues are most competent and are definitely one of the assets of our company. I am truly delighted that the transition has passed off very smoothly."*

A means of production to round off the machine fleet

With its 50+ cam-type machines for the manufacture of simple parts and large-scale production and four Deco 10 machines for the production of complex workpieces and smaller batches, the workshop did not have medium-range machines to round off the offer. *"We considered several solutions but the SwissNano was the machine that fitted our workshop best,"* the Managing Director makes

Gérald Badan SA is located in Moutier, at the heart of a downright talent pool of expertise and service which enables the company to be most flexible and responsive.

clear. And even the NC experts of the workshop that had been total fans of the TB-Deco had to find out that it was most easy to put TISIS and the SwissNano machines into operation and that they proved to be most efficient.

Seen from a different perspective

Given that Mr. Almeida had been responsible for the sales of SwissNano machines when he had been working for Tornos, and that he is now user of these machines, we were keen to learn what he is thinking now that he is looking at the things from a different perspective. And that's what he told us: *"There were no unpleasant surprises. I knew the machine and the high quality of the Tornos service very well and my machine operators confirmed my belief. Both the SwissNano machine and the Tornos service meet our expectations."* We also talked to the operator who works with the SwissNano. He explains: *"At the beginning, I was not positive about this investment because I did not know the TISIS system and because the machine seemed to be rather small. Now, after one year, I'm rather fond of them. It was very easy to get familiar with them and the quality of the manufactured workpieces is excellent."*

A comprehensive solution with total interaction

The experienced operator who was used to work with cam-type bar-turning machines as well as with the Deco machines continues: *"If you are accustomed to the Deco, the machining area of the SwissNano might seem a bit scary and the available space is rather limited… However, it is true that the machine boasts a good view due to its front access and that it's only a matter of habit. A thing completely new to me was the LNS Tryton bar feeder suitable for tube feeding about which as well I had some doubts. But I was wrong – this bar feeder is really splendid and is working in total harmony with the machine."* Asked about the service, the operator tells us: *"I am full of praise for the Tornos service which is most efficient and prompt."*

A business plan comprising SwissNano

From the time he acquired the company, the Managing Director has planned to buy new NC machines for the production of medium-complex parts. After an appropriate analysis, two SwissNano machines have been bought in the first year. Mr. Almeida explains: *"It is clear that we had to round off our machine fleet and our calculation turned out to be correct because we could not only increase our working volume with our existing customer base but also open up new markets thanks to SwissNano. Today, the SwissNano machines are an integral part of our investment plan for the future."*

I'm really feeling at home

The SwissNano operator who has worked for Gérald Badan SA since 1999 declares: *"I am very pleased with the transition of the company management, we have the same attitude to work and share the same idea of quality. In addition, however, the arrival of Mr. Almeida has clearly given us an new kick. Since the management change I already had the opportunity to train in programming with TISIS, to discover a new machine with SwissNano, as well as a new bar feeder with LNS Tryton and to tackle the machining of a great deal of new workpieces and even new fields of activity. I'm having a great time. As far as the working atmosphere is concerned, I'm really feeling at home."* And this enthusiasm for their work can be felt with all employees of Gérald Badan SA.

A comprehensive offer in Moutier…

Even if today the company is primarily known in the connection business, Mr. Almeida is planning to enter other markets, especially the watchmaking industry. He explains: *"Even if it may not be the right moment to canvas customers from the watchmaking market, at least we are having good contacts."* However, the Managing Director does not hide the fact that, at the moment, his production capacity is fully exhausted. It should also be mentioned in this context that a new bar-turning machine operator has been recruited to complete the team. Mr. Almeida summarizes: *"With the arrival of SwissNano, we could reach a net increase of our production capacity – it has already paid off."*

… and in Europe

The company is advancing and the Managing Director asserts that his concerns, if any, are only "good" concerns (such as meeting the delivery deadlines) – even if the start was rather bumpy. The purchase of the company actually took place at the same time the Swiss National Bank (SNB) abolished the floor rate. *"Overnight, a huge pressure on the margins developed and the fact of being a Swiss company became a real disadvantage."* To counteract this state of affairs, a new company was established in partnership with a company headquartered in Portugal with ISO 9001, ISO 14001, and ISO 13485 certification. While Gérald Badan SA is specialized in the production of workpieces of diameters between a few tenth of a millimeter and 10 mm, the Portugal-based production site offers capacities between 11 and 62 mm. *"We are thus able to offer our customers a comprehensive range of diameters,"* explains Mr. Almeida and he adds: *"These are two separate entities and our development strategy for small diameters is based on our production site in Moutier"*.

Responsiveness?
One of our core competencies!

2015 has been a good year for Gérald Badan SA, and in 2016, the company got off to a flying start; the first quarter was excellent. The Managing Director analyzes this situation as follows: *"We are a small company and our responsiveness is our greatest asset"*. Quality certainly is still playing an important role but it is no longer a unique feature. Today, it is an indispensable prerequisite to stay in the market that does not suffice anymore. *"Apart from the advanced expertise or our highly qualified operators, our location is a major advantage for us: we are located at the heart of the micro-technology market, our machine supplier is a two minute walk*

The workshop of Gérald Badan SA comprises machines of three generations that enable the company to meet any demands up to diameters of 10 mm.

Even if today, the connection business is still the main market, the company is prepared to serenely tackle other fields of activity.

and 90% of our suppliers are located within a radius of 10 kilometers. All of them are also highly responsive if needed and thus enable us to quickly find the solutions required for our customers".

GÉRALD BADAN SA – SPECIALIZED IN CAM-CONTROLLED MACHINING… AND MUCH MORE

Recently, a customer of Gérald Badan SA (an American company) had problems in purchasing a complex workpiece. Its usual supplier (an American company too) was not able to meet the demands and thus Gérald Badan SA got the opportunity to excel. Mr. Almeida declares: *"This customer did not know us as a supplier of parts manufactured on NC machines but we could offer him our expertise. Within less then ten days, we could produce prototype parts on our numerically controlled machines and we could directly start series production"*. The customer realized that its small and dynamic structure as well as the advanced skills of its employees enabled the company to be much more flexible and responsive than many other companies.

That means no regrets?

After one year of heading the company and more than 40 million parts produced during this period, we asked Mr. Almeida about his state of mind and his objectives. Here is his answer: *"The daily work with SwissNano has shown that I was right in buying it – it even exceeds my expectations. As for me, I do not regret anything; the company is evolving well, my colleagues are highly qualified and are taking pleasure in their work. As far as my objectives are concerned, I look forward to continuing my diversification and my investment plan schedules new NC units for the near future"*.

GERALD BADAN SA

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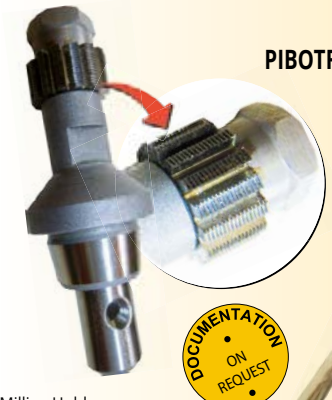
PIBOTURN - PIBOTRIFLEX
The turning tool-holder of the future

PIBOTURN High precision modular turning holder

Système breveté



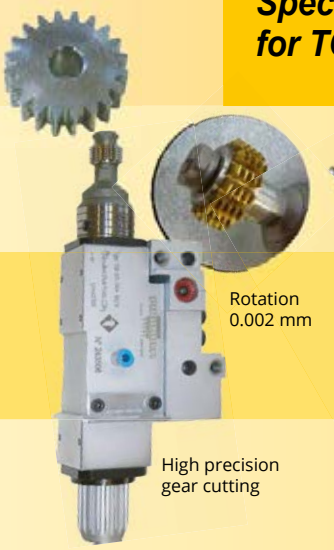
PIBOTRIFLEX High precision modular tool holder

DOCUMENTATION • ON REQUEST •

Milling Holder,
simple and precise fine adjustment,
required precision
< 0.002 mm

BMRB 0.20

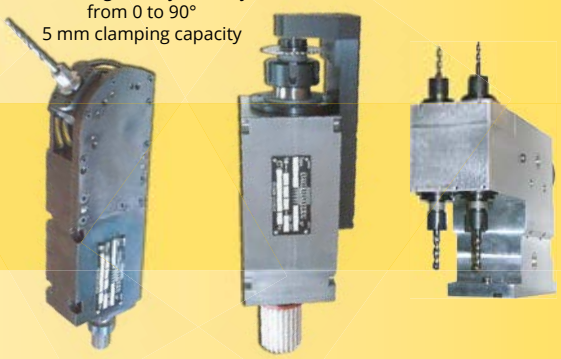
Specific equipment and accessories for TORNOS machines



Rotation
0.002 mm

High precision
gear cutting

Adjustable angle head
with range of adjustability
from 0 to 90°
5 mm clamping capacity



Polyvalent drilling and milling head
for heavy machining with speed-reducer
Usable with or without over-arm

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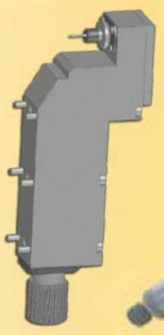


Right angle spindle speeder
5 mm clamping capacity
15'000 rpm

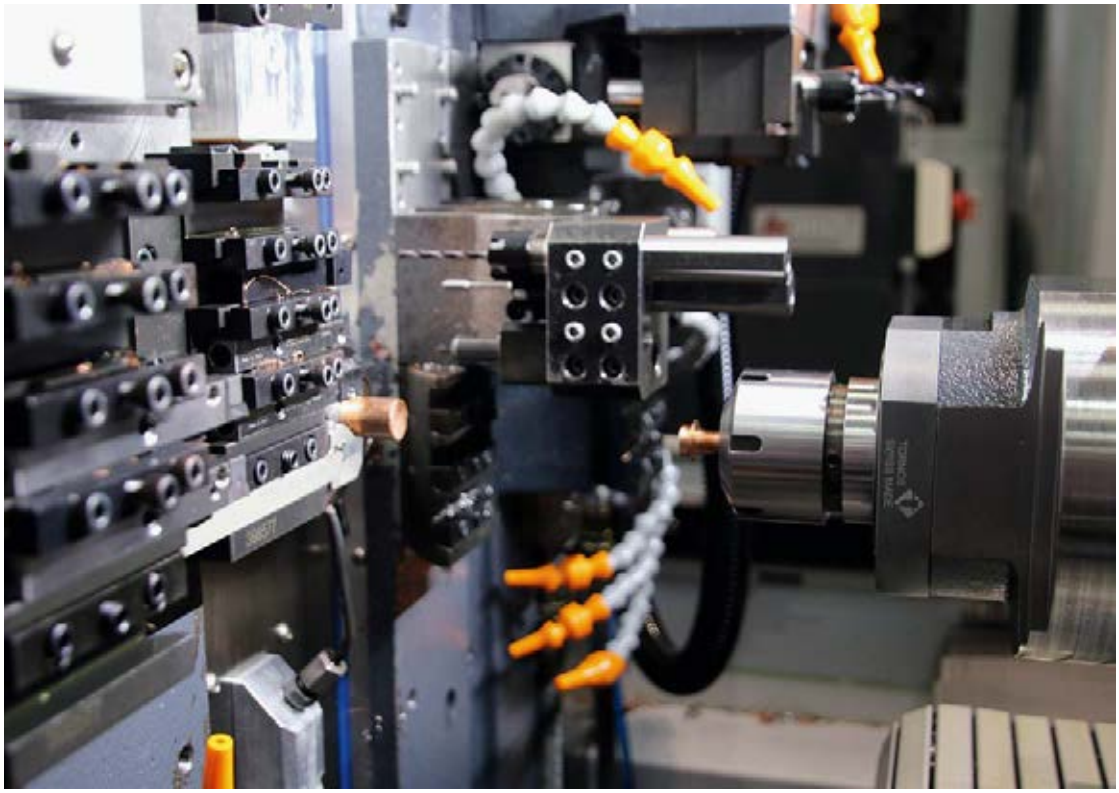
Modular tool holder

Whirling machine 27°

150130EN

TORNOS ELECTRIFIES PRODUCTION FOR AEROSPACE SUBCONTRACTOR

As the epitome of high speed automated production, RE Thompson is an industry benchmark for its approach to automation and 'cost down' production, something that has enabled the aerospace subcontractor to double its turnover in just five years. To achieve this, the company has invested over £7 m in plant and equipment, some of which has been installed at its new production facility in Andover.



Opened in November 2015, the new 20,000 sq/ft factory has so far welcomed a series of horizontal machining centres that are linked to a Fastems automation system. With 90% of RE Thompson production consisting of milled aerospace components, the Hampshire company recently made its first acquisition of a sliding head turning centre with the January arrival of a Tornos ST 26.

Commenting upon the new Tornos purchase, RE Thompson's Head of Sales, Mr. Matthew Shaw says: *"Our workload tends to be long term contracts with Tier 1 aerospace companies such as Meggitt, BAE Systems, GE and GKN. We primarily produce avionic housings, cockpit displays and also power and thermal management systems that are supplied to Boeing and Lockheed for installation on anything*

from the JSF to commercial airliners. One project we tendered for required 1,000 copper turned parts every week. After winning the business, we realised our Fixed headstock Turn/Mill centre was designed for larger parts and struggled to meet the production rates, so the search for a dedicated machine started."

For RE Thompson, shopping for the right machine was simplified by a set of distinct parameters. Firstly, the family of six copper parts had some dimensional deviations across the range, so the turning centre had to have unparalleled flexibility with regard to tooling configurations. Secondly, the setting and programming times needed to be kept to a minimum to eliminate machine downtime. Additionally, the specified machine had to be capable of running for long periods unmanned with production times that are considered the 'benchmark of the industry'. The Tornos ST 26 ticked all the boxes and outperformed the other 3 machine tool vendors involved in the tender process.

Turning On The Bottleneck

Their existing method was turning each part in 8.5 minutes, a production time that led RE Thompson to subcontract out some of its production to keep pace with the order. Commenting upon the situation, Mr. Shaw recalls: *"Our existing fixed headstock lathe is an exceptional machine, but it's designed for larger complex parts with robust milling operations. We always knew we needed a slider for the project and it was more apparent as the fixed headstock capacity was being overloaded with the copper part project. Despite this, we took our time selecting the right machine for the job. After all, the contract requires 1,000 parts a week for 3 years. After 3 years, we can envisage the project potentially continuing for another decade, as aircraft projects tend to span upward of 15 years. The Tornos arrived in January and it wiped out subcontract work, freed capacity on the fixed headstock and has even given us extra turning capacity for parts up to 26 mm diameter."*

The Tornos ST 26 has achieved this by slashing the cycle time from 8.5 minutes to less than 3 minutes per part. The power generation components for the 777 airliner consist of three different diameters and lengths that are all machined in 1000-off batches in just two days. In fact, the speed of the Tornos ST 26 means the copper parts only take 30% of the machine capacity with other small jobs taking another 10% of capacity. This is now enabling RE Thompson to look for more orders for this workhorse.

Why Pick The Tornos?

When looking at the various vendors, RE Thompson engineers wanted a machine tool partner with a 'can-do' attitude. Unlike alternate suppliers, Tornos recommended a machine that could be configured to the exact needs of the customer. As Mr. Shaw says: *"The Tornos approach was very flexible to our needs, the machine has 36 tool positions that can be configured in a number of ways. This allows us to leave the core tool positions set for our main copper pin job whilst reconfiguring remaining platens and positions for alternate jobs. The result is that we keep our extremely short set-up and changeover times."*

The dedicated ST 26 blew the previous machining time out of the water and also made a mockery of competing tenders. This is down to simultaneous front and rear working and the kinematics of the Tornos that keeps the tools close to the workpiece to shorten cycle times and keep tool indexing to less than 0.5 seconds.

The Next Step

RE Thompson is completing the copper parts by running the Tornos ST 26 for little over 12 hours a day, so the next step is 24 hour production. As Mr. Shaw continues: *"The copper is a special grade that is impacting upon our tool life. The ST 26 with its*

SBF 326e barfeed is geared for 24/7 production with its innovative multi-stacking system incorporated for non-stop production. The only thing holding the machine back from 24/7 production at present is tool life. We have tool probing on the machine and we also utilise the Tornos TISIS software to monitor the machine remotely, so we just have one final hurdle to overcome. Once we get past this, we'll be running lights-out and we will also cut our cycle times way below the existing 3 minutes per part."

"As a business, we have always invested in the most current technology from industry leading brands. Brand loyalty is a key factor for our business. We bought the Tornos because the company was attentive to our needs, flexible with the machine configuration/package and they offered us next generation technology like the TISIS software. The service and support has been exceptional and we have little doubt that when the opportunity arises, we'll be buying another Tornos," concludes Mr. Shaw.

R.E.THOMPSON
PRECISION ENGINEERS

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BERNINA INVESTS IN NEW TORNOS SWISS GT

QUALITY STITCH BY STITCH

Since the end of the 19th century, the Swiss sewing machine manufacturer Bernina has united quality, tradition, and innovation. Millions of Bernina machines that have been delivered over more than 120 years stand for Swiss perfection. To meet this quality standard, the company invests both in its workforce and in state-of-the-art technology. Against this background, a Tornos Swiss GT machine was purchased, this machine has been running to the utmost satisfaction of Bernina.

For more than 120 years, Bernina has been headquartered in Steckborn in Switzerland and the company bears its name for good reasons. It is named after Piz Bernina, the only four-thousand-meter high mountain peak of the Eastern Alps. The latter stands for ambitious goals. These were pursued by Karl Friedrich Gegauf when he invented the hemstitch sewing machine in 1893. This machine can sew 100 stitches per minute. It was the world's first machine of this type that caused a major sensation also abroad. By 1900, already 70 to 80 people were employed in the workshop that thus had become a small factory. In the meantime, the Bernina group has evolved into a market-leading, global company. As a family-run company, Bernina produces products that stand out due to true values and that will be a reliable companion for their owners for many decades to come.

"Our philosophy 'We're always at the beginning, never at the end' is based on values that only are valuable when they are lived with passion. Of course, we always manufacture our products to exacting standards, but in the course of the process, we already have new ideas for the next project. Due to the fact that we take our time to manufacture our products we are able to reach the high

level the customer is expecting from us. Our products represent Swiss quality and reliability and are made for the use by more than one generation," Ueli Blaser, Prototype Construction and Mechanical Manufacturing Manager, emphasizes in the deco-magazine interview.

Below, he describes the purchasing process of the new Swiss GT. It is remarkable in itself that less than 12 weeks have passed from approval to commissioning. The fact that two of the existing CNC lathes had got a bit long in the tooth and thus had become susceptible to failure was the decisive factor for the investment. At the same time, the new machines were intended to expand the production range as well as to provide additional capacity for spare parts, accessories, prototype runs, pilot runs and for emergency situations. As Ueli Blaser saw it, the new machine should bring about more flexibility, shorter cycle times and, as a whole, a more efficient production. He hoped that it would enable the company to return to in-house production for parts the production of which had previously been outsourced.

Several models available in the market were examined meticulously and compared to Bernina's objectives. It did not take too long before Tornos opted for the new Swiss GT. It is one of the most advanced machines in the market and exactly came up to Bernina's requirements. This Tornos best seller had been introduced in the middle of last year and impresses with a great many of innovative features such as a B axis that has further enhanced the awesome versatility of this machine. With its six linear axes, two C axes, three gang tool posts for a total of 14 driven tools and all in all up to 40 tools, the Swiss GT 26 offers the users a remarkable flexibility and opens up undreamt-of possibilities. The B axis enables the user to index the spindle to any desired angular position by means of the CNC program which is especially useful for processes such as angular milling, drilling, and even tapping. As the B axis is integrated in the main carriage of the machine, the Swiss GT 26 is not restricted to angular positioning but certainly can be moved in X and Y axis directions as well. Main and back machining can thus be performed. As opposed to competitive models, the B axis is supported by two solid mounting points since the ultra-capacity spindle motors at the stations designed for driven tools require maximum structural rigidity. This is the only way to improve stock removal rate as well as precision, surface quality and uniformity of the finished parts.

After the first weeks of use, this quality leap compared to the machines that had been used by then

became most evident. The flexibility and the shorter set-up times are further aspects that have been rated positively. The higher number of standard tools on the machine reduces the required set-up times and thus considerably speeds up the machining process. Thanks to the integrated bar feeder, Bernina has been able to increasingly use its Swiss GT for unmanned overnight and weekend operation by now. This, of course, increases productivity and Ueli Blaser succeeded in snatching back some outsourced orders to process them through in-house manufacturing. He thus has also taken another major step towards his long-term objective to maintain and expand the manufacturing expertise at the Steckborn location. This makes clear that Bernina is prepared to conquer other peaks and deliver many additional top performances in the field of sewing machine technology. Tornos will do everything in its power to support this customer and all its other customers in their efforts with innovative top-quality machines.

BERNINA
made to create

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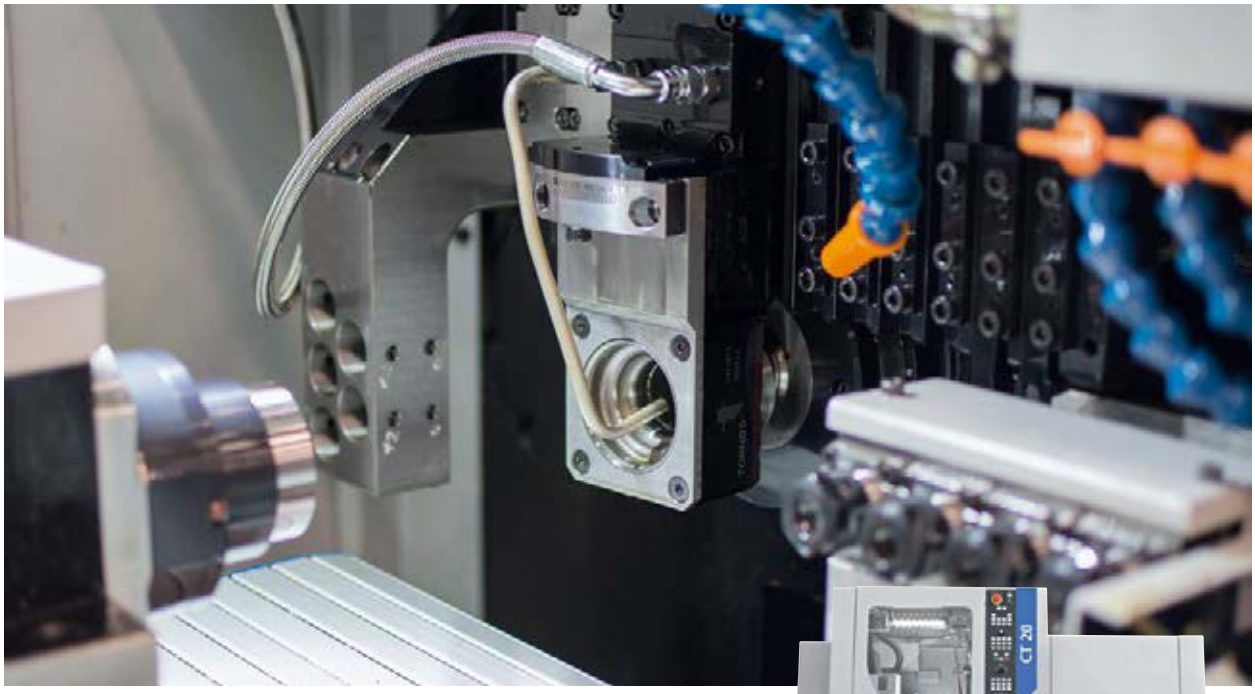
CT 20 – NOW WITH A THREAD WHIRLING FUNCTION

The Tornos CT 20 is a turning centre that has been designed to meet customer requirements with regards to the production of simple to medium-complexity components. With its extraordinary ease-of-use and productivity, the powerful CT 20 machine is the ideal choice for end users that want to achieve a quick return on investment. From now on, this machine will have the potential to conquer the medical market with the addition of a new option, a thread-whirling cutter. This new device enables the users of the Tornos CT 20 machine to successfully produce simple medical screws.



The thread-whirling device is mounted tool positions T130 and T140, where it can be oriented in both directions – its standard orientation is +/-15°. On a case-to-case basis, this attachment can also be mounted in other positions. Moreover, it can be easily connected to the high-pressure system of the machine. This option is available as a specific development. For detailed information, do not hesitate to contact the Tornos staff.

CUSTOMER BENEFITS

- Good surface finish
- High dimensional accuracy
- High productivity

TORNOS

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THE JURA TECHNOLOGY CLUSTER

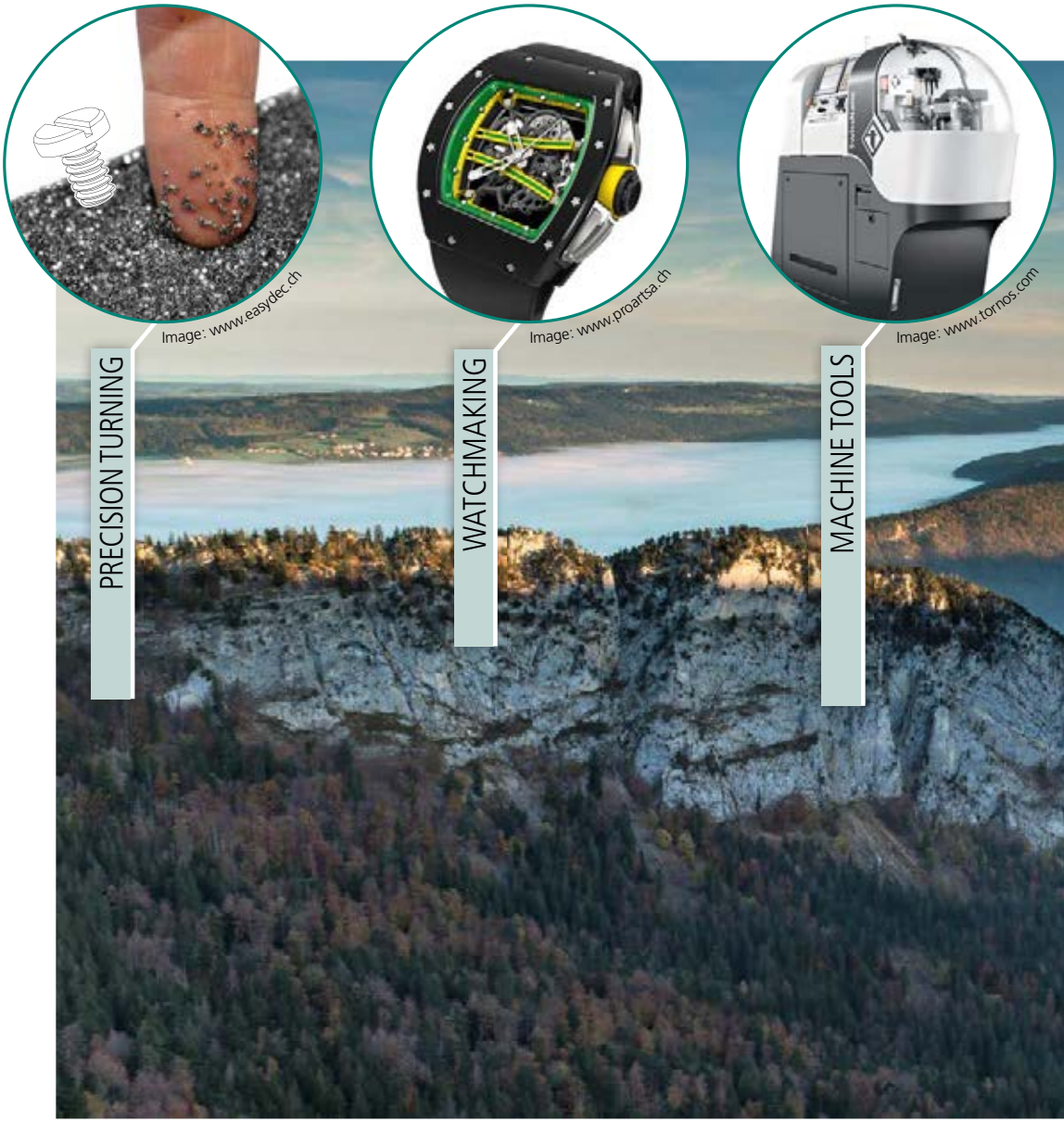
People who have experienced the Swiss Jura understand its unique fascination. Nowadays, the word "Jura" is often used to refer to the entire region surrounding the Jura mountain chain. Once a peripheral region, over the centuries it has cultivated a tradition of craftsmanship. It is no surprise that many leading suppliers of precision technologies and products from Switzerland make their home there today. Many of them turn to Motorex for their lubricant needs.

Innovative machining fluids are the key to masterful achievements: inspecting the fluid technology has become part of the factory routine.

Because of the Jura's relative isolation, the farmers who lived there were accustomed to doing everything themselves – making their own weapons, doing their own plumbing and locksmith work and so on. In this way, they accumulated a wealth of technical knowledge and practical skill. As a result, the watchmaking industry in particular gradually took shape in the area around Neuchâtel in the 17th century. The inhabitants of the region may not have invented the art of watchmaking, but it certainly found fertile soil there. In particular, two groups of craftsmen contributed to its development: the locksmiths and the goldsmiths. Over time they increasingly built their own time pieces as well as repaired and upgraded clocks and watches. Eventually the watch industry itself arose, flourishing to the point that, in the early 20th century, more than half of all watches sold worldwide came from the Jura.

Skill builds on itself

Today, the "Arc Jurassien Suisse" has become an industrially driven and extremely well developed technology center, distinguished by its wide range of highly skilled workers and specialised education system. Working closely with the precision industries (metalworking, mechanical



engineering, micromechanics and micro-technology, medical devices and watchmaking), Motorex has been a reliable lubrication partner for many years. Often taking on a "secret ingredient" role, Motorex's areas of expertise include such key areas as:

- consulting on all processes involving machining fluids
- synergy projects, i.e. joint development projects
- the "Easy Tank" customer-focused just-in-time logistics solution
- technical seminars and advanced training at Motorex
- expert technical customer service, including on-site service

Success through sharing

Whether it's a new application, improvements in an existing process, enhanced performance or optimisation of a diverse product range, wherever machining and operating fluids contribute to a production process, continuous dialog with Motorex is a key to long-term success. Motorex has a long

tradition of knowledge sharing that is testimony to many distinguished customers' trust in the brand. Another strong selling point is the highly trained team of chemists and engineers that is ready to get straight to the root of any lubricant technology application using its state-of-the-art laboratory infrastructure.

There can be no doubt that Motorex, with its various cooperation activities and pioneering Swissline products, never loses sight of the aim of bringing measurable benefits to customers.

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TORNOS ALLEVIATES PRODUCTION WOES FOR WASTE DISPOSAL OEM

When waste disposal and sewage treatment manufacturer, Haigh Engineering Company Ltd introduced a new product line to its portfolio, the company immediately had a precision, quality and capacity issue to deal with. An issue that needed a new turning centre from Tornos.

The OEM manufacturer has an extensive range of innovative waste disposal solutions for the healthcare sector and the water-board utility PLC's; and as an environmentally conscious manufacturer, Haigh developed its Quattro Pulp Disposal unit to reduce the running costs for customers and also the OEM's carbon footprint. From its 60,000sq/ft facility in Ross-On-Wye, the 94 employee business manufactures over 4,000 different turned parts to support the assembly of its diverse product range. With parts ranging from 4 mm to beyond 300 mm diameter, Haigh has pushed its plant list of existing Mori Seiki MT and SL turning centres to capacity.

Operating 24/5, the quality issue for Haigh was created by new small diameter components that fit into the Quattro product line. The parts demanded tighter tolerances and surface finishes, something the larger machines couldn't easily achieve. With regard to its capacity issue, Haigh was subcontracting upwards of £15,000 per annum of work out to local subcontractors. The subcontractors also had difficulty obtaining the tolerance and surface finish demands of the parts. This led Haigh Engineering's Manufacturing Manager, Mr. David Brown on a quest for an appropriate turning centre. The result was the acquisition of a Tornos ST 26 in August.

Why pick the Tornos?

The development of Haigh Engineering's new Quattro Pulp Waste machine some 12 months ago, required the machine shop to add another 50 different turned part variations to its existing 4000+. With the majority of parts being small, intricate and often complex, the Tornos ST 26 has been brought in to produce 40 of the 50 small part families; alleviating the pressure from the larger twin spindle machines.

Following extensive trials with alternate sliding head turning centre manufacturers, the selection process came down to three key factors. Firstly, Haigh

noted the diameter capacity of alternate machines wasn't appropriate. As Mr. Brown recalls: *"We trialled a series of parts with two vendors. We wanted a machine to manufacture a variety of parts up to 25-26 mm diameter. One vendor offered a 20 mm diameter capacity machine that could be pushed to a limit of 25 mm. Their only other option was a 32 mm capacity machine. The 20 mm machine was too small and the 32 mm machine was too large and it also pushed the price beyond our expectations."*

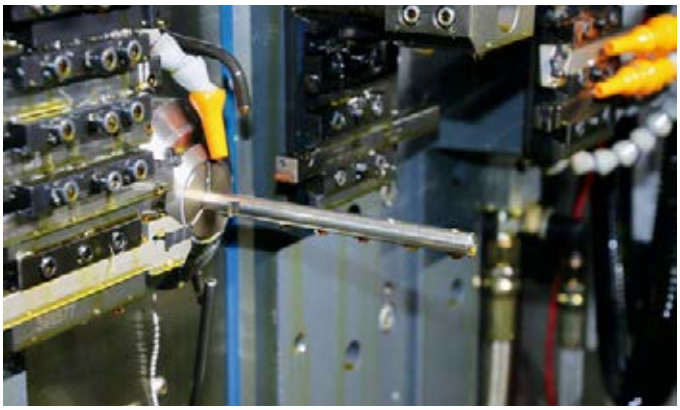
"This inability to fit with our 4-25 mm diameter demands, instantly made the Tornos ST 26 our primary choice. Additionally, competitor machines looked like they haven't been updated since the 1980's. It was apparent that Tornos has invested in the aesthetics of its machines and not just the technology inside. Tornos has also given consideration to factors like machine access. The ST 26 has a sliding door that gives the operator access to the machine from the front and rear of the machine."

In addition to its ability to fit in with the dimensional demands of Haigh, the Tornos was also selected for a number of other reasons. Firstly, the Tornos was offered with a Fanuc control similar to the company's existing machines. This reduced the learning curve for the operators considerably. Furthermore, the rigid and robust platform of the ST 26 delivers impeccable surface finishes and tolerances, something that was a key decision factor for Haigh Engineering.

The benefits of buying a Tornos…

The robust nature of the ST 26 improved process stability for Haigh, as one of the company's Senior Technologist, Mr. Jeremy Allen says: *"We produce spring rod components that are part of an intricate spring assembly. The 303 stainless steel rods have a 7 mm shank with a tolerance of +0/-0.036 mm with a surface finish of 0.2Ra. Our larger machines couldn't achieve the surface finish and our subcontractors couldn't achieve the finish with their machines. So, our only remaining option was to turn the parts then roller burnish the finish, which ironically was too good. The Tornos ST 26 gave us the desired finish within the right tolerance band without secondary finishing."*

This scenario also occurred with an aluminium bush housing that forms part of the same spring assembly.



As Mr. Allen continues: *"The spring assembly gave the machine shop a host of challenges that the Tornos has overcome. In tandem with the spring rod, is a bush housing that has a 40 mm deep bore. Within the bore are 7.25, 11.38 and 16.09 mm diameters with tolerances of +0.04/-0 and +/-0.05, all in the H7 and H9 range. With high pressure through coolant, the ST 26 comfortably produces these parts where our subcontractors tooling left a spiral score in the bore."*

And the capacity issue?

Unlike many of its other machine tools, the Tornos ST 26 can confidently run lights-out. As Mr. Brown continues: *"On each shift we run batches of 100-500 parts and then we set the machine to run overnight unmanned, so the machine has very little downtime. Added to this, it can produce parts up to 75% faster than our other machines. This is because the sub-spindle on our older machines cannot conduct simultaneous front and back end working like the Tornos. This releases capacity from the larger machines."*

Looking to the future…

"Across our portfolio, we export over 30% of our products globally. At present sales of the new Quattro system are very strong and we project significantly higher production schedules in the future for both UK and export markets. This may well lead to more investment in Tornos and Mori Seiki turning centres."

When questioned over the philosophy and choice of machine tool vendors, which has seen the company invest over £1 m in the last 5 years, Mr. Brown concludes: *"We are not under the same market pressures as subcontractors who are looking to shave a few tenths of a second off part production. We are a prestigious OEM with a marquee brand. Whilst we invest in the latest production technology to support our product design department and most importantly production schedules, our ethos is to invest in high quality plant that will stand the test of time. Tornos is certainly a brand with that reputation."*

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WAYS TO OPTIMIZE CYCLE TIME

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.

The cycle time is the time the machine needs to produce one workpiece; it is thus a most important factor in the manufacturing world where production prices have always been under cost pressure. The faster a machine can machine parts, the more workpieces can be produced within a specific time and the higher the profit will be for the company.

Every second counts

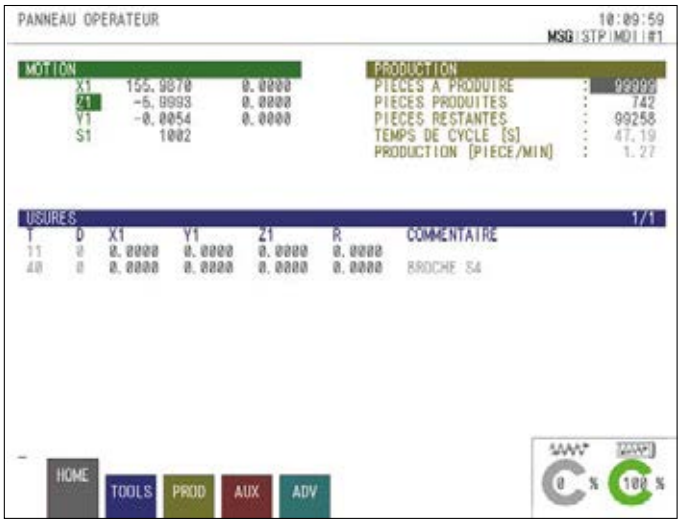
Lets imagine a workpiece series that must be manufactured in large-scale production for a period of one year by means of a machinery fleet consisting of 10 machines. These machines are producing 24/7, the cycle time for one workpiece is 65 seconds and the price amounts to 1 per workpiece. The maximum workshop capacity is 4,851,692 workpieces per year, which corresponds to a turnover of 4,851,692 per year. With a cycle time optimisation of just 2 seconds, the maximum production capacity and with it the turnover will rise to 5,005,714 workpieces per year or 5,005,714 per year, respectively. The 2 seconds that have been saved for each workpiece entail an additional profit of 154,022.

WORK SEQUENCE FOR THE MANUFACTURING OF A WORKPIECE

Each stage of workpiece manufacturing is equally important to reach the optimum cycle time. The definition of the operation schedule also incorporates the tool list, workpiece programming, set-up, program set-up on the machine (production of the correct workpiece) and optimisation of the cycle time by adapting the program.

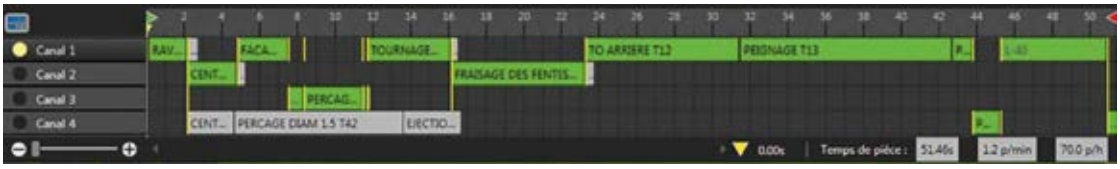
OR DO YOU WANT TO DISPLAY THE CYCLE TIME?

On ISO-type Tornos machines of the latest generation, the cycle time can be displayed via the T-MI interface (CNC screen). Simply go to the "HOME" or "PROD" page of T-MI.



You are advised never to rely on the first cycle time only. To get a representative time, you should always wait for the second program run. It should be noted that there might be slight fluctuations between the cycles due to real-time keeping.

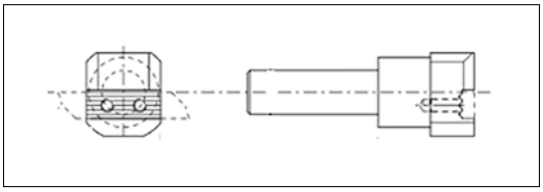
The TISIS programming software allows the assessment of the cycle time.



Definition of the operation schedule

To achieve an optimum cycle time, operations should be performed simultaneously to a maximum degree. The intelligent establishment of the operation schedule is thus required to make sure all machine channels are utilised in the best manner. On a simple two-channel machine, it may make sense to realise the turning operations in back machining mode to ensure the best equilibrium of the machining times between the two channels.

It may be interesting to know that certain tool manufacturers offer solutions with a tool holder that is able to perform facing operations. This means that more turning operations can be performed in back machining mode, which is a clear advantage.



In the example below, we have shifted the process "Tournage 5" to the back machining operation list and could therefore save four precious seconds of the cycle time.

TOOL SELECTION

To achieve the optimum cycle time, it is important to cut down the machining times (the time the tools are effectively cutting material) as far as possible. To do so, the tools most suitable for the workpiece to be machined should be selected. When selecting tools, the tool characteristics, the coating, the rigidity of the tool holders, the number of teeth (in case of end mills) and the possibility to provide through-tool coolant supply should be taken into consideration.

Working with high-quality tooling is an important investment. If tools allow higher cutting feed rates or higher stock removal rates during roughing, the cycle times will lower the net costs for the workpieces.

SELECTION OF THE MACHINING PROCESS

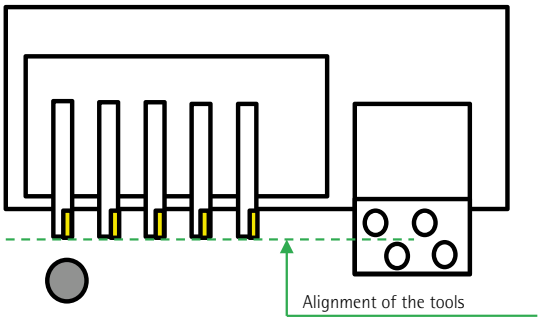
It is always an interesting question whether the selected machining process is the best process in terms of cycle time. For cutting screw threads, it might make sense to consider the machining processes such as thread chasing (several passes) or thread whirling or rolling (one pass). If several faces are to be machined on the workpiece, polygon cutting might be faster than cross milling.

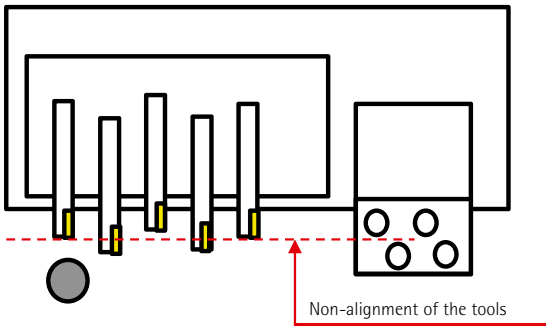
MOUNTING THE TOOLS

The mounting of the tools is of fundamental significance for the cycle time. The following aspects should always be taken into consideration: tool geometry, cutting direction of the tools, tool scheduling (based on the process) and approximation of the tools. Now, let's look at these aspects in detail.

Tool geometry

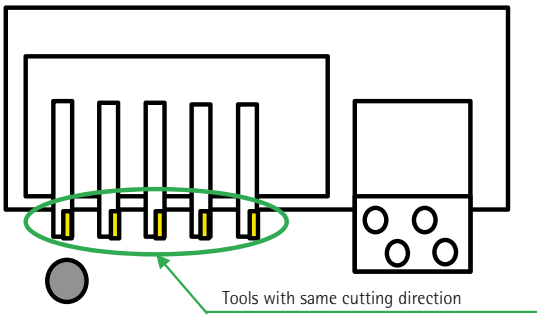
It is important to try to provide all tools of one system with the same geometry (X and Z). In this way, axis movements during tool indexing can be kept as small as possible.

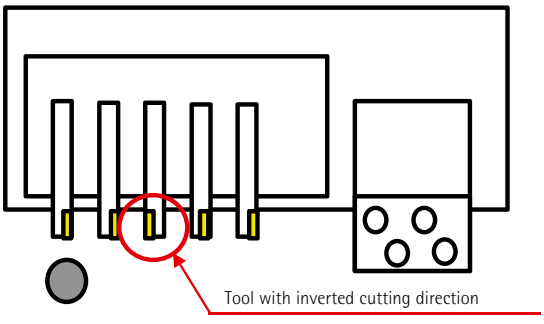




Cutting direction of the tools

The tools (tool holders) should always have the same cutting direction. In this way, any changes of rotational direction of the cutting spindle are avoided that would otherwise be at the expense of the cycle time.

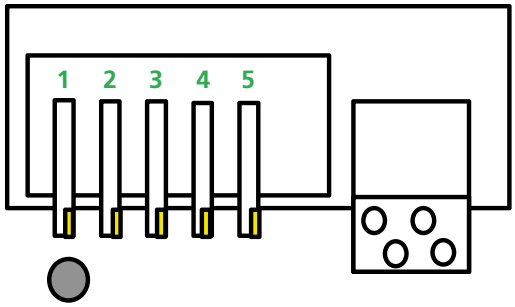


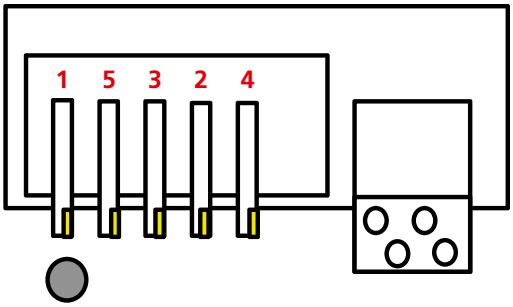


Interestingly enough, the counter-spindle always turns counterclockwise [M404] when the workpiece is clamped. This is due to the cutting direction of the cutters. And very often, we use the counter-spindle for back machining using drill bits. That means that the counter-spindle must always change its direction of rotation [M403] which may affect the cycle time. To avoid such direction reversal, it might be interesting to use left-hand drill bits.

Tool scheduling

It is most important that the tools are arranged in the order in which they are used for machining. That means the tool that is used first must be arranged next to the second one, the tool that is used as the second one must be arranged next to the third tool and so on. In this way, unnecessary back and forth movement of the tooling system is avoided during tool indexing.

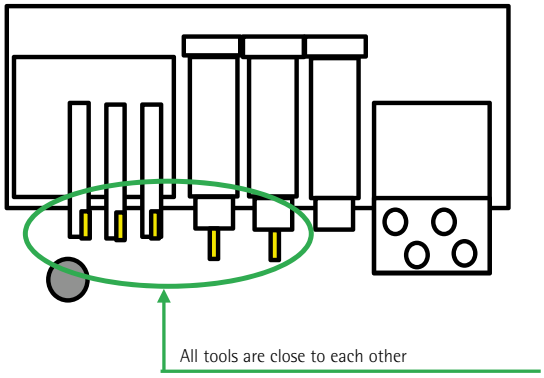


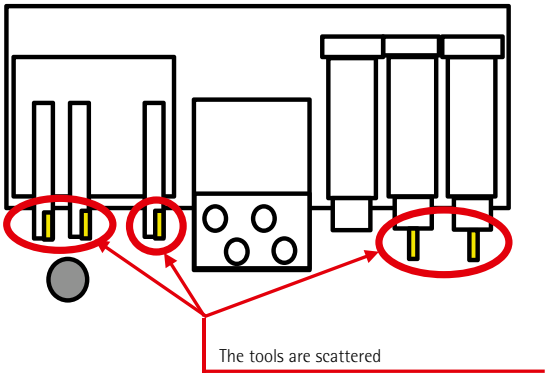


Approximation of the tools

It is most important to try to arrange the tools as close as possible to each other before they are used.

This as well is intended to minimise any axis movements during tool indexing.





It should also be noted that certain tool manufacturers offer tool carriers that enable the maximum proximity between the tools. In some instances the number of tools that can be used on the machine can also be increased. This kind of tooling system delivers the additional advantage of shorter tool indexing times.

Workpiece pickup by the guide bush

Where suitable for the workpiece, Tornos offers solutions for directly picking up the workpiece with the guide bush. This avoids any part pickup by the counter-spindle and thus saves a lot of time.

Working without guide bush

Many Tornos machines can be operated without the guide bush. One of the advantages of operation without the guide bush is that the remnant length is kept short. With shorter remnant lengths, considerable material savings are possible and in addition, less bars are required for feeding. We are thus able to save time. This may be interesting for large-scale production. In the working mode without guide bush, Tornos recommends not to machine workpieces to a length that is three times larger than their diameter.

The bar material

Even the bar material used may have impact on the cycle time. Its straightness is very important and as long as a bar is perfectly straight, the productivity can be increased thanks to the fact that the longer the bar, the less often a new bar must be fed. Profiled bar material can be used as well to achieve cycle time optimisation. With a hexagon bar, time-consuming machining processes may be avoided. Nowadays, it is rather easy to find profiled bar material as well as collets and guide bushes for special bar profiles. The machining of tubes may be interesting as well. This is because hole drilling processes can be avoided and the amount of cutting can be reduced because the tube does not need to be cut down to the center of the material.

High-pressure pump

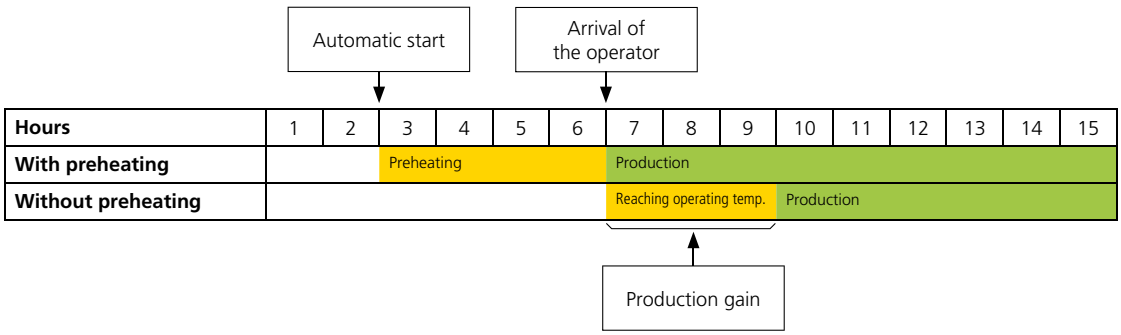
Tornos offers various high-pressure (HP) pump solutions. As far as the cycle times are concerned, these HP pumps are interesting for two reasons: they permit better chip discharge and better heat dissipation. This often brings about a slight increase of the cutting feed rates. Thanks to the better chip discharge, machine stops for manual chip removal are avoided.

Part machining the other way round

Did you ever think about machining a workpiece in the reverse direction? Or to be more precise, did you ever think about back machining the part of the workpiece that is normally machined by front machining and vice-versa? Such considerations are often interesting. Sometimes, you can even gain time. It may also be interesting to know that certain tool manufacturers offer solutions with tool holders that are able to perform facing operations. This means that more turning operations can be performed in back machining mode and this is a clear advantage.

Optional machine warm-up function

Tornos offers an optional machine warm-up function for highly precise workpieces. With this function, the machine can automatically be started at a pre-determined date and time without material having been loaded. Idle times for reaching the correct operation temperature are thus avoided.



In the next edition of the decomagazine, Marco Dolci will present possibilities to optimise the machining process by suitable tool indexing, approach and retraction and by simultaneous machining. Later, he will explain more programming tricks that allow time savings.

APPLITEC

IN-Line

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