decomagazine

THINK PARTS **THINK TORNOS**

66 03/13 ENGLISH

EvoDeco for
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its ranges

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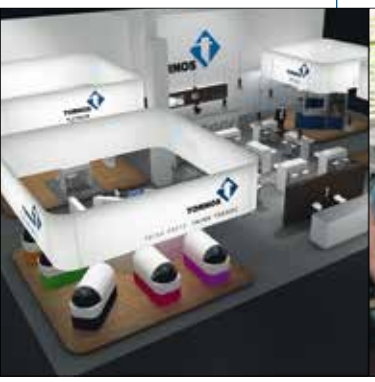

Tornos:
Swiss innovations

An entire workshop of SwissNano machines

Tornos Swiss ST turning center helps punch manufacturer reduce overhead costs by 66 %

Real thread whirling

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TORNOS S.A.
Rue Industrielle 111
CH-2740 Moutier
www.tornos.com
Phone ++41 (0)32 494 44 44
Fax ++41 (0)32 494 49 07

Editing Manager:
Brice Renggli
renggli.b@tornos.com

Publishing advisor:
Pierre-Yves Kohler
pykohler@eurotec-bi.com

Graphic & Desktop Publishing:
Claude Mayerat
CH-2830 Courrendlin
Phone ++41 (0)79 689 28 45

Printer: AVD GOLDACH
CH-9403 Goldach
Phone ++41 (0)71 844 94 44

Contact:
aeschbacher.j@tornos.com
www.decomag.ch

SUMMARY

HAROLD HABEGGER

Canons de guidage
Führungsbüchsen
Guide bushes

Type / Typ CNC

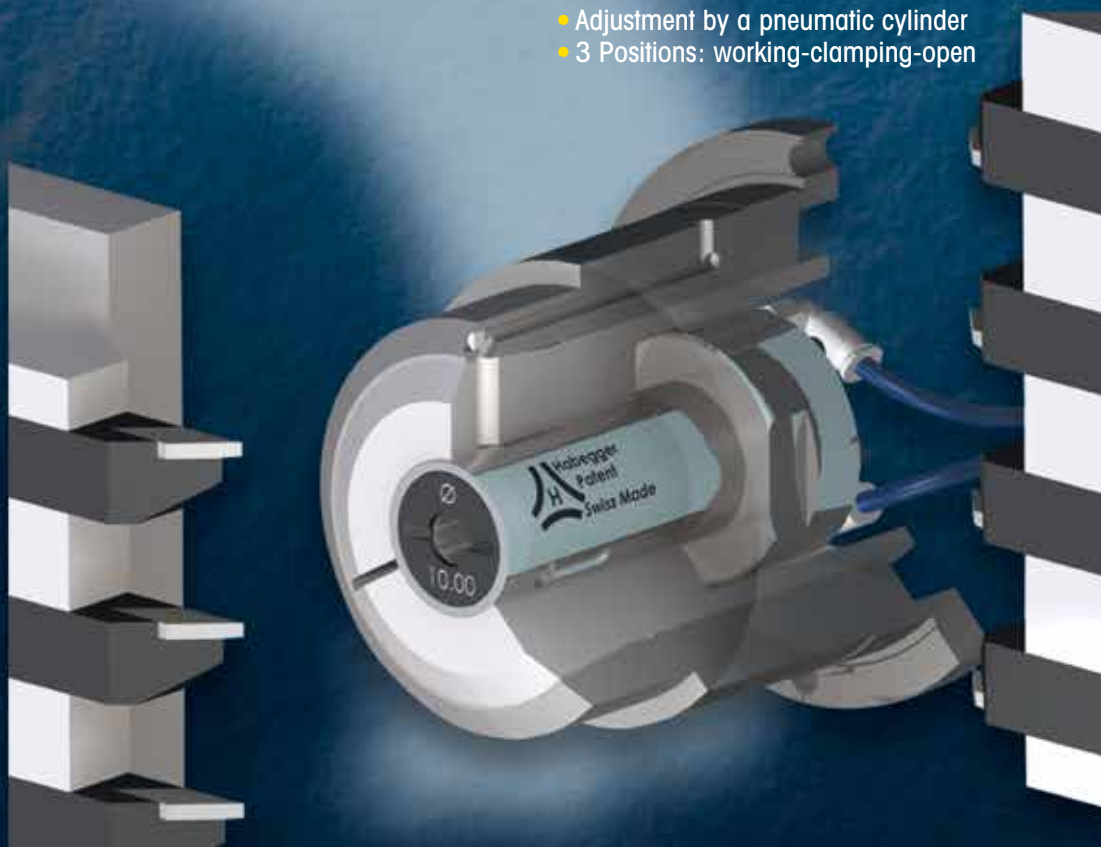
- Canon non tournant, à galets en métal dur
- Evite le grippage axial
- *Nicht drehende Führungsbüchse, mit Hartmetallrollen*
- *Vermeidet das axiale Festsitzen*
- Non revolving bush, with carbide rollers
- Avoids any axial seizing-up

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



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1 Büchsenhalter: 3 Habegger Büchsentypen!
1 Bushholder: 3 Habegger guide bush types!

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WORKING FOR OUR CUSTOMERS

Design working for our customers

In this edition of decomagazine, you will be able to discover the latest machines unveiled by Tornos at this year's EMO (see article on page 7) and, as you will see, the company is undergoing a true design revolution. It is immediately noticeable on the new EvoDeco 20/32 (article on page 10) and Almac BA 1008 and VA 1008 (article on page 14) machines. We had the opportunity to meet the designer of all these new machines and, as you can read in the interview on page 28, his approach is totally customer-focussed.

The integrated PC working for our customers

Another important innovation unveiled by Tornos at this year's EMO: The ISIS system (Iso Swiss Integrated Solution). This new programming and communication software for machines equipped with an integrated PC offers much more than a simple ISO editor, it's a true piece of management and communication software (see article on page 21). The first customers to try this out have been won over.

SwissNano working for our customers

After having introduced the SwissNano in our previous edition, we wanted to find out more and therefore met the heads of the company which tested this machine over several months. Their perspective of the machine is well worth sharing (see article on page 31). After their presentation at the open days and the first orders, SwissNano machines are now starting to arrive with customers and deliveries will continue during the coming months.

A number of offers are in progress for other fields of application and visitors to EMO can get more detailed information on the stand (stand B04, hall 17). All the machines are now equipped with the new ISIS programming system and TMI, which has won over initial users.

decomag working for our customers

You will also have the chance to read several articles with presentations from our partners, who are using this platform to shine a spotlight on their solutions. For 66 issues, our goal has been to keep you continuously informed and share with you the success of our customers: Your success.

Don't forget to share your experiences with us.

Brice Renggli
Marketing Manager

The entire Cyberis team around their first SwissNano.

Didier Muriset, CEO of Cyberis SA (left) and Carlos Almeida, sales manager for Switzerland.

SWISS LINE

New spindle centering system
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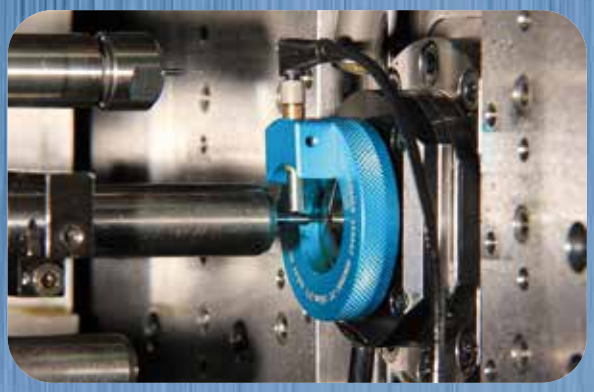
Video >>> www.wibemo-mowidec.ch



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www.wibemo.ch
Wibemo SA | CH-2832 Rebeuvelier | téléphone ++41 (0)32 436 10 50 | fax ++41 (0)32 436 10 55 | info@wibemo.ch

TORNOS: SWISS INNOVATIONS

As usual, Hanover will host the largest trade show for machine tools in Europe: EMO. This is a trade show for showcasing technology, where the various machine manufacturers will demonstrate their expertise and reveal to us their latest innovations.

Tornos will be there, in **hall 17, stand B04,** revealing this year's major innovations: no fewer than 5 new developments will be presented at the stand.

SwissNano

Now that the first machines have been delivered in Switzerland, the SwissNano will be on show, for the first time outside Switzerland, in Hanover. This small watchmaking machine is set to take over the world! It may seem surprising to present such a product in a country like Germany with such a thriving automotive industry. In fact, the machine – which has been entirely assembled in Moutier – has been designed by watchmakers. But the smallest machine on the market has already generated great interest from other business sectors looking for a small, high-precision machine at an affordable cost. The SwissNano will show off its high performance levels by producing a high-precision watch part on the stand.

The SwissNano family is also welcoming a new member with the arrival of the Almac BA 1008 machine. This bar milling machine manufactured by Almac, based on a SwissNano machine, is designed to machine complex parts requiring multiple milling operations (see article on page 14).

same output, in order to facilitate the distribution of tasks between operations and counter-operations. The machine has also been redesigned. During the trade show, the EvoDeco 32 will machine a grade 303 stainless steel workpiece in record time. Thanks to its 4 tooling systems, the EvoDeco 32 currently delivers the fastest machining times on the market. Competitor machines equipped with a turret certainly have more tools, but the turret indexing time makes them a less attractive option in production (read article on page 10).

EvoDeco 32

At the opposite end of the range to the SwissNano is the EvoDeco 32. A large diameter machine with 10 linear axes and two C axes. The EvoDeco 32 works on the same principle as the EvoDeco 10 and EvoDeco 16 machines, namely retaining all the benefits of Deco machines such as their unique kinematics and their tooling concepts, while enhancing their performance levels. This means the machine is equipped with extremely powerful built-in synchronous spindle motors. The spindle and counter spindle have the

Swiss ST 26

Equipped with 2 tooling systems, the Swiss ST 26 is a mid-range machine. Making its début in Europe, it is capable of machining material with two tools simultaneously on the guide bush. The Swiss ST 26 is equipped with the same type of built-in motor spindle as the EvoDeco 32. The kinematics, which offer two independent plattens, the rear of which can work on the bar and perform counter-operations, enabling several machining operations in concurrent time, and the identical operation and counter operation spindles which are both powerful and highly responsive. The combination of these two components enables a balanced set-up between the two sides of the workpiece being machined, and the production of relatively complex workpieces for such a "simple" machine. Three tools can be engaged simultaneously in the material. Counter operations are performed in concurrent operation time, while platten 1 allows work to continue on the guide bush. Affordable and flexible, the Swiss ST 26 is the perfect partner which satisfies the most stringent machining requirements and which can be equipped with multiple peripherals ex-works.

MultiSwiss

The MultiSwiss was presented for the first time at EMO 2011. The MultiSwiss is a revolution: it is a new line of products which provides the link between multi-spindle and single spindle turning machines. The MultiSwiss features 6 mobile spindles using torque motor technology to index its barrel. It is very fast and can deliver cycle times close to those of cam-operated multi-spindle turning machines.

In 2013, three major machine upgrades will be presented: the Silver edition, Black edition and White edition.

The MultiSwiss Silver edition is a machine working with bars; it is the fruit of the experience gained from hundreds of machines delivered, resulting in the best MultiSwiss ever designed to date. More complex, the Black edition is equipped with a Y axis on a slide, so that it can work on a broader range of workpieces, thereby increasing the machine's capability. The White edition is the Chucker model, which is designed specifically to respond to increasing demand for machining operations in the automotive sector.

Black edition.

Machining centres

The machining centres will not be left out because, in addition to the BA 1008 and VA 1008 (see page 14), Almac will be presenting the CU 2007 machine, with a 500x400x470 mm (X Y Z) stroke. The CU 3007 model of the machine is also available with an extended 700 mm X stroke. The CU 2007 and CU 3007 combine dynamic performance and outstanding reliability with Swiss expertise, enabling the Tornos Group to offer its customers a truly innovative solution. The comprehensive standard equipment, with the expertise of the Swiss engineers in La Chaux-de-Fonds and Moutier, together create the optimal conditions for producing complex parts. These machines can be fully tailored to customer requirements. Equipped with a HSK 40 tool holder cone, the CU 3007 can be equipped with various options. These include a 4th or 5th axis, a 40,000 rpm spindle (replacing the 20,000 rpm standard spindle), an internal/external palletisation system, large capacity tool magazines. Many other options are also available (see article on page 14).

Specialists from the Tornos Group look forward to meeting all interested visitors at our stand (hall 17, stand B04).

TORNOS

Tornos SA
Industrielle 111
2740 Moutier
Tel. +41 32 494 44 44
Fax: +41 32 494 49 07
www.tornos.ch

EVODECO FOR LARGE DIAMETERS HAS ARRIVED!

At Simodec 2010, Tornos unveiled EvoDeco 16 as the successor to the Deco 13 machine. One year later, the EvoDeco 10 machine was presented at mediSIAMS, taking over in style from the legendary Deco 10. At this year's EMO, Tornos is presenting the replacement for the last two Deco machines on the market, the Deco 20 and Deco 26.

Logically enough, these machines have been named EvoDeco 20 and EvoDeco 32. Interview with Philippe Charles, EvoDeco product manager at Tornos.

The missing link

Until now the upper limit of the EvoDeco line was 16 mm. Thanks to the launch of EvoDeco 20 and EvoDeco 32, Tornos can now offer a complete EvoDeco version line from 2 to 32 mm. The concept behind the EvoDeco line remains unchanged, which is to uphold the overall philosophy that has underpinned the success of the Deco line, while strengthening key elements in order to improve machining performance, thereby making the machines even more competitive.

Let's consider these changes in detail:

New spindle with built-in synchronous motor

This is a major improvement. The spindle is the heart of a bar turning machine, since it is largely responsible for determining the key elements of machining performance and precision. From the outset, the EvoDeco line was given added spindles equipped with synchronous technology. This technology is a first on a sliding headstock machine. Inaugurated on Tornos multi-spindle machines a few years ago, it was very highly rated by users of EvoDeco 10 and EvoDeco 16 machines.

The constant torque enables more substantial turning operations to be performed. According to the users, the biggest difference lies in the accelerations

and decelerations achieved by the motor. The cycle time of parts requiring numerous stops is therefore improved, in some cases by up to more than 30%. Synchronous technology is also part of Tornos' environmental policy, since synchronous technology provides better efficiency than asynchronous technology.

Optimising and reinforcing the frame

As with EvoDeco 16 and EvoDeco 10, the frame has been reinforced and optimised by finished elements, resulting in stronger tool gripping and better surface finishes. Philippe Charles here emphasises the importance of this work *"The performance and improvements made to the machine must be coherent".*

INTEGRATED PC

One of the criticisms of TB-Deco was the relatively sluggish operation when in use during adjustment phases. It's not unusual to have to transfer the program several times and, depending on the method used, this can take quite some time. The integrated PC means it is no longer necessary to transfer programs from an external PC to the machine control unit. Furthermore, in terms of efficiency, this solution means that we can do away with the workshop laptop PC. Integrating a complete PC also makes it possible to offer other services, such as the option of viewing the service instructions. This guarantees the highest level of responsiveness and increased efficiency.

New modular rotating unit

In order to increase the machining options, a new unit with 3 rotating spindles (ESX 16) is now offered for the EvoDeco 20 and EvoDeco 32. Thanks to this unit, which can be mounted on all workstations, the maximum number of rotating tools for the EvoDeco 20 and EvoDeco 32 has been increased to 19. This means that a greater range of parts can be produced on these machines.

Complete basic equipment

As was the case with the EvoDeco 10 and EvoDeco 16, they come with comprehensive practical basic equipment. The machine comes as standard with a C axis on the spindle and counter spindle. A self-cleaning oil filter and a centralised cyclical lubricating system. It goes without saying that the wide range of tool holders, units and other peripherals developed for Deco 20 and Deco 26 are compatible with EvoDeco, which can therefore offer a vast choice of solutions for carrying out high added-value operations such as thread whirling, deep drilling or angled milling, right from its launch.

Improved design and ergonomics

The huge, bright machining area, now lit with an LED bulb, provides the ideal working conditions for the operator. The ultra-fast industrial PC (Intel® Core i7, SSD technology) equipped with a touch-screen can be used to programme the machine directly.

EvoDeco offers user comfort and flexibility hitherto unknown on the market.

For further information, please contact your usual Tornos dealer.

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ALMAC RENEWS ITS RANGES

In the run-up to the EMO trade fair and an internal show in La Chaux-de-Fonds in October, Almac's customers are being treated to an updated image, new products featuring some remarkable design and solutions for various industry sectors. Interview with Philippe Devanthéry, Director.

Watchmaking customers have already had a sneak preview of the company's new logo at the EPHJ trade fair. Why the change?

A new beginning

Since the takeover of Almac by the Tornos Group, and the arrival of Mr. Devanthéry, the company has been undergoing a transformation, explains the Director: *"We have worked hard internally to improve our service and develop new products. We are now ready to market them, and we wanted to mark this new beginning"*. The new identity was developed to be consistent with the image of the Tornos Group, hence the inclusion of the colour blue and a square logo, which harmonise better with the Group's brands, and similarly the new machines feature a modern design which adopts the style of the MultiSwiss and SwissNano.

Adapted products

Almac has always produced machines which are finely adapted to the needs of the market, but now the company is pushing the limits even further by launching labelled products. Purchasers of the new CU 2007 Movement will discover a standard machine with finely-tuned equipment for machining parts. It's an elegant way to achieve a custom solution for a standard price.

New machine names

"We imagined all the possibilities for the future and decided to name the new products using a new, consistent logic", reveals Mr. Devanthéry. The machine designed to replace the CU 1007 is called the VA 1008 (V for vertical) and the new small bar milling machine, the BA 1008. Both are in the 1000 series, which features machines designed to produce the smallest parts.

The new machines in detail:

VA 1008
NEW AND PROVEN

In simple terms, and for connoisseurs of Almac products, the VA 1008 machining centre consists of a tried and tested CU 1007 base with significant modifications in the following three areas: Design and ergonomics, swarf removal and the number of tools available.

Designed to serve the user

A first glance at the VA 1008 produces the same sense of surprise as with the MultiSwiss: it is new, stylish and attractive. The machine is the same size as the CU 1007 but shallower, thanks to the integration of the entire filtration system in the enclosure. The single-unit window protecting the machining area can be completely removed to provide access over 90° to a height of 1.8 metres, enabling easier setup and adjustment. A vertical window at the rear provides total free access. The entire control panel pivots over 90°, which gives the user a perfect view of the machining area while working on the controls.

Design focused on machining

Mr. Devanthéry explains: *"The CU 1007 is renowned for its reliability and precision, but also for its function, offering fine tuning of the swarf removal during major machining operations. Our engineers have modified the frame to create a large free space under the machining area, which provides optimal evacuation".* The tray is accessed from the front via a door with a wide aperture. Watchmakers using the machine will be reassured to know that the VA 1008 can also be equipped with a wooden table.

Designed with up to 100 tools

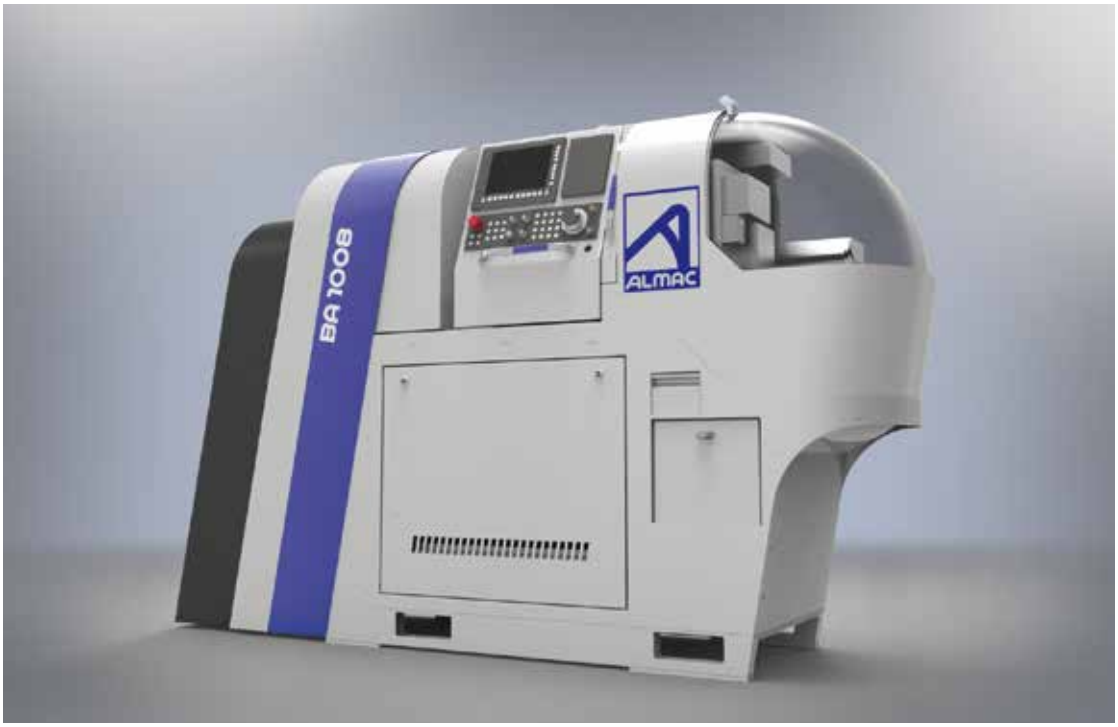
Always attentive to the market, Almac's specialists noted that existing machining centres were a little limited in terms of the number of tools available for certain machining operations, or simply because customers wanted to make the most of the machining options mounted permanently on the machine. Mr. Devanthéry states: *"This is not a new issue. We decided to address the request from certain customers because we could".* The new VA 1008 comes with a 30-position carousel as standard, however the customer can choose other, different configurations with 48, 80 or even 100 tools (HSK25). The Director explains further: *"Whichever the alternative chosen, the machine's enclosure is the same, enabling us to offer an optional 100-tool magazine with the same machine design."*

Modular machine design

Different machine configurations are available depending on the machining requirements: 3 axes, 4 and a half axes, 4 simultaneous axes or 5 simultaneous axes. Workpieces can be loaded and unloaded via handling and palletising systems. The machine can be equipped with a single rotary table and a range of clamping systems or 4- or 5-axis indexing tables from Lehmann. Mr. Devanthéry explains: *"There are numerous specialist companies, especially in the workpiece clamping field. We are not trying to reinvent the wheel, and are offering these proven solutions on the VA 1008".*

VA 1008:
MAIN CHARACTERISTICS

X/Y/Z travel:	280/120/230 mm
Machining feeds:	up to 8000 mm/min.
Rapid feed:	16 m/min.
Resolution:	0.1 µm
Electric spindles:	up to 45,000 rpm.
Power:	2 kW
Tool holder:	HSK 25A, HSK 40A
Installed power	10 kVA
Dimensions (LxDxH):	1300 x 2222 x 2650 mm
Presentation:	preview at the Almac internal show from 16 to 17 October 2013
Delivery:	from January 2014
Type of parts produced:	watch movement components



BA 1008
NOW WITH MILLING CAPABILITY

On first sight, this tiny bar milling machine reveals its close kinship with the Tornos SwissNano, and in no small way. Tornos Director Mr. Hauser tells us: *"We unveiled the SwissNano to lots of customers from the watchmaking industry, and they all confirmed that this machine is a game-changer in terms of the market".* Mr. Devanthéry adds: *"The compact size of the SwissNano is an undeniable advantage for watchmakers, and we wanted to make the most of these advantages on a bar milling machine".*

Intended as a replacement for the FB 1005 machine in the Almac range, the newcomer has some decisive selling points, in particular its ergonomics, productivity, compact size and value for money.

Ergonomic design

This article is particularly focused on design, however the images speak for themselves, and this is a major step forward for Almac. The frame of the BA 1008 bar milling machine is the same as that of the SwissNano. The upper section has been modified to integrate two multi-spindle tool systems, and complete accessibility is guaranteed using the same motorbike helmet opening principle as is employed on the SwissNano. The first customer to use the SwissNano also reveals the excellent ergonomic feature of this system on page 31. For watchmakers, a wooden table has been added and other options are also in development.

BA 1008:
MAIN CHARACTERISTICS

Bar diameter:	max. 16 mm
Spindles:	
– frontal:	4 spindles, 12, 35 or 60,000 rpm (ER8 collets)
– lateral:	3 spindles, 12, 35 or 60,000 rpm (ER8 collets)
– counter-operations:	2 spindles, 35 or 60,000 rpm (ER8 collets)
– parting:	1 spindle
Dimensions (LxWxH):	1800 x 650 x 1600 mm
Presentation:	EMO 2013
Delivery:	from January 2014
Type of parts produced:	appliques, settings, windows, movement and exterior components

The Director explains: *"We also want to produce a version of the machine on which the table acts as the operator's main workbench"*.

Multi-spindle productivity

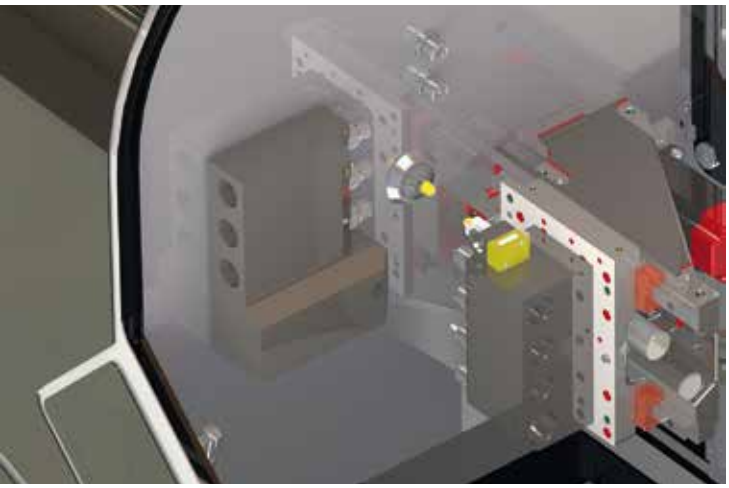
Bars are fed into the BA 1008 in the same way as on the Tornos version designed for turning, however the spindle cannot be used for turning operations. A divider system is used to load workpieces up to a diameter of 16 mm. Positioned machining operations and interpolation between the tool systems and the workpiece are easily possible. Equipped with 4 frontal spindles, 3 lateral spindles and 2 counter operation spindles, the machine has been designed for very precise workpieces. Mr. Devanthéry adds: *"This type of machine can only make an impact on the market if its offers the possibility of finishing parts - and this one does"*. He adds: *"In watchmaking, we aim in particular to produce dial components, appliques, settings and windows, as well as movement and exterior components"*.

Size and price: two advantages of the BA 1008

In the article about Krattiger AG, which has been testing the SwissNano for several months, Director Mr. Arrietta tells us that the SwissNano is the best watchmaking machine, and Mr. Devanthéry says the same about the BA 1008: *"The machine can be easily integrated in any watchmaking workshop. It is easy to use and the swarf and workpiece management systems have been sized specifically for this sector - it's the ideal machine"*.

Watchmaking is only the start

"For us, the BA 1008 is a strategic project that will help us to diversify the markets in which we are active. In particular, we are looking are outlets in the moulding and medical sectors", concludes the Director.



MARKET DEMAND: CU 1007 – REPRISE (SECONDARY OPERATION)

This new machine has been developed to meet a number of requests from customers for a CU 1007 machining centre designed for secondary operations.

This machine is designed to produce small runs, and is available with 3 axes and a 12- or 20-position tool magazine as standard. When we ask why a CU name rather than VA when the ranges are changing, Mr. Devanthéry explains: *"Strictly speaking, it's not a new machine - it's actually a specific solution based on an existing product, and this is also the case for the CU 2007 Mouvement (see below). We have reserved the new names for completely new products".*

Simple, proven solution

Based on a CU 1007 machining centre, this new version designed for producing main plates and dials is equipped with a spindle adapted for the parts to be produced, and is only available with a 12- or 20-position rotary tool magazine. The Director explains: *"We can work with 4 simultaneous axes and the attachment system is the HSK-32A which ensures the necessary positioning for secondary machining operations".*

Unveiled at June's EPMT trade fair in Geneva, this version of the CU 1007 was a runaway success.

CU 1007 REPRISE: MAIN CHARACTERISTICS

X/Y/Z travel:	280/120/230 mm
Machining feeds:	up to 8000 mm/min.
Rapid feed:	16 m/min.
Resolution:	0.1 µm
Electric spindles:	up to 45,000 rpm.
– Power:	2 kW
– Tool holder:	HSK 25A, HSK 40A
Installed power	10 KVA
Dimensions (LxDxH):	1300 x 1980 x 2650 mm
Presentation:	EPMT 2013
Delivery:	from November 2013
Type of parts produced:	main plates, bridges and dial apertures

MARKET DEMAND: CU 2007 – MOUVEMENT (MOVEMENT)

The CU 2007 machining centre was unveiled at the Prodex 2012 trade fair, with the focus on all industry sectors. To meet the needs of the watchmaking industry, Almac engineers developed a loading system integrated in the machining area.

In situations requiring frequent tool changes, a high-frequency spindle, a tool measuring system and a high degree of autonomy and precision - all relevant factors when producing main plates and bridges - the new CU 2007 Mouvement solution is the natural choice. Mr. Devanthéry explains: *"The CU 2007 is a great universal machine that, with a few adjustments,*

can be fine-tuned to meet the needs of various markets". And the company is naturally starting with its historic market - watchmaking.

A simple solution

"We developed the Pick and Place system because we noticed that there were very few economical alternatives of this type on the market", reveals the Director. He continues: *"The CU 2007 is a universal machine which perhaps can't produce the most complex or precise parts (a very small percentage), however for all other parts it represents an alternative that offers great value for money".*

Everything happens in the machining area

The new pick and place system is very compact, and located in the very heart of the machining area. Once the first workpiece has been finished, the manipulator arm picks it up while the magazine is opening. The workpiece is placed in an empty compartment, then the arm takes the next workpiece and loads it onto the jig. The workpiece is clamped and the magazine closes. The workpieces are well protected and the loading and unloading times minimal.

CU 2007 MOUVEMENT: MAIN CHARACTERISTICS

X/Y/Z travel:	500/400/470 mm
Spindles:	up to 20,000 rpm. up to 42,000 rpm (option)
Tool holder:	HSK E40
Tool magazine:	24 positions 40 positions (option)
Dimensions (LxWxH):	1580 x 2410 x 2500 mm
Presentation:	EPHJ 2013
Delivery:	now
Type of parts produced:	main plates, bridges and other movement components, as well as other types of small part machined from billets.

Vision for the future

All these new developments from Almac, a new image, a wide range of products… isn't it all rather a lot in one go? Mr. Devanthéry explains: *"Almac's ranges were getting quite old, and the market is extremely competitive. We have to present new solutions to our customers, both existing and future".* He adds: *"Almac is almost exclusively associated with the watchmaking sector, and it's very dangerous not to take a more diversified approach. Our new developments are the first step towards better distributing our turnover".*

A brand to be reckoned with

When asked what are the main challenges currently facing Almac, the Director concludes: *"With the company being taken over, and following the changes that resulted from that, it has taken us time to restart the organisation, analyse needs and create new products. We have not been as attentive to our customers as we should have liked. Our challenge now is to get back in touch with all of them to show them that Almac is back, with new products that will enable them to progress in their own markets, both in watchmaking and in other sectors".*

EMO - 16-21 September 2013 - Hanover

Almac internal show - 16-17 October 2013
La Chaux-de-Fonds

Almac SA
39, Bd des Eplatures
CH - 2300 La Chaux-de-Fonds
Tel: +41 32 925 35 50
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ISIS: THE WORKSHOP OF TOMORROW, AVAILABLE TODAY

EMO 2013 will see Tornos unveil new programming software for its machines operating without assistance from TB-DECO.

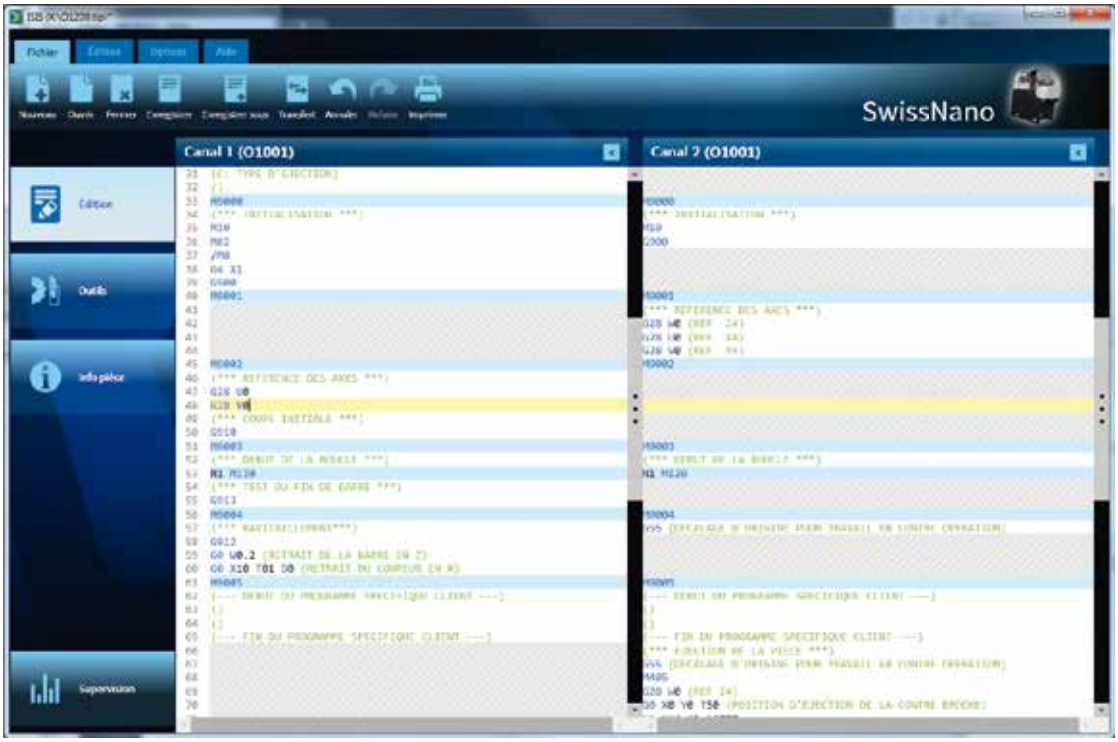
Already used by those who bought the first SwissNano machines, the new software, called ISIS, is much more than just an ISO editor with a pleasing design: it also enables direct communication with machines and allows their status to be monitored. decomag met with Patrick Neuenschwander, software development manager at Tornos, to find out more.

decomagazine: Mr. Neuenschwander, what exactly is ISIS and for whom is it intended?

Patrick Neuenschwander: ISIS is a programming system intended for machines controlled via an ISO editor, in particular SwissNano and Swiss ST 26 machines. It differs from TB-DECO, which is a horizontal editor. This editor, which can manage up to 3 channels, can display the ISO code vertically. The ISO code is automatically synchronised between the channels, and syntax highlighting is used to ensure easy identification of the various value codes.

dm: But isn't ISIS just a piece of programming software?

PN: Not at all. Firstly, ISIS will be associated with the "communication pack" option, which means it will be programming software and an industrial computer that can be added on to the machine's numerical control to communicate with it via an Ethernet



Vertical ISO editor.

CONFIGURATION

ISIS

- OS compatibility: Windows XP, Vista, 7 and 8.
- Requires the user to network the machines via a wired or WIFI network

ISIS Tab

- Android 4.0 or later
- Designed for 10-inch tablets

Virtual program transfer. The program can also be edited on the machine and transferred intuitively back to the computer.

port. ISIS is much more than just a piece of programming software; it allows you to really communicate with your machine and transfer machining programs virtually via a LAN network. The computer built into the machine will open up brand new horizons hitherto unexplored in our industry. An example of this is the Tornos Android application, which enables changes to the machine inventory to be monitored in the same way as ISIS.

dm: What are the advantages of ISIS compared to other ISO editors?

PN: There are several. One simple and very significant advantage is synchronisation error monitoring. Errors are displayed very clearly by a red icon on the screen, which prevents unnecessary journeys to and from the machine. However, the main advantage is management of the machine's tool catalogue; none of our competitors' systems offer this. Not only is it possible to monitor the machine inventory, but you can also transfer programs from your computer directly onto the computer built into the machine. The program created with ISIS can then be integrated in the numerical control, tested and, if necessary, corrected on the numerical control, and the corrections can be integrated in the desktop computer: everything is fully compatible! ISIS also integrates workpiece information such as diameter, material, date,

workpiece length, etc. It also allows the usual documents to be printed, namely: ISO code, workpiece information and tool catalogues. Another advantage of ISIS relates to its modern, highly flexible software structure. The interface is naturally multilingual, but so are the workpiece templates. It is now possible to programme a workpiece template in Chinese in a French interface, or vice versa.

Workpiece templates can be generated and saved.

Selection of a tool on the SwissNano; unavailable tools are greyed out. Mounted tools are shown in dark blue, and users have given this solution a unanimous thumbs up!

dm: What exactly do you mean by tool catalogue? What is the advantage for the customer?

PN: For each machine, ISIS has a database that contains all of the tool resources, for example chisel holder plates, thread whirling tools, polygon tools or milling tools. Each of these tools has its own constraints, and these are integrated in ISIS. So, if a tool is selected, only the positions where it can be fitted on the machine will be activated. ISIS also manages incompatibilities between the various tools. The user is guided intuitively through the use of his machine, and each tool has its own image to allow easy identification. Another advantage is that the default geometries are automatically displayed when a tool is selected; this means that when a cutting tool is selected, the standard tool geometries are directly incorporated. The user can easily access and change these in a table.

ISIS proposes default tool geometries; the user is free to correct them if necessary.

dm: With regard to monitoring, does it only apply to recent models?

PN: Yes, for technical reasons monitoring is only available on the latest FANUC CNCs. At present we can monitor the following machine models: EvoDeco 10, EvoDeco 16, EvoDeco 20/32, Swiss ST, MultiSwiss, Almac VA 1008, SwissNano, MultiAlpha, MultiSigma.

ISIS enables detailed monitoring of the machine inventory, and monitoring can also be performed via the Tornos Android application which was first integrated on the SwissNano. The functions are identical on both applications, but ISIS also offers advanced filtering options currently not available on the Android application. For example, machines can be filtered

TORNOS MACHINE INTERFACE

The new interface is set to make its first appearance on the SwissNano machine, and its aim is to simplify access to the numerical control and make it more ergonomic. As usual, it's about making life easier for the operator.

What is T-MI in real terms?

Firstly, we need to understand what an interface is. A graphic interface (otherwise known as a human/machine interface) is all the software pages on machines that allow the user to communicate with his/her machine.

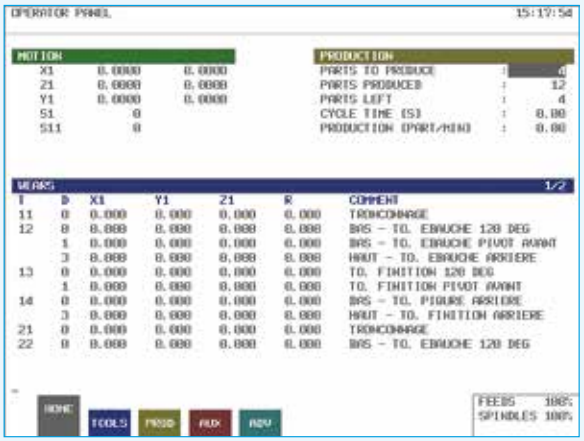
Previously, Tornos had been content to extend the possibilities offered by the FANUC pages, with similar design and usage capabilities as those of the numerical control manufacturer.

With the T-MI, Tornos wanted to go even further!

Why was the T-MI designed?

From year to year, the possibilities offered by Tornos machines have grown, resulting in more pages that can be used by the operator.

Following a survey of our customers, our engineers noticed one comment that came up again and again: it is easy to get lost in the numerous pages containing the machine control. We therefore had to act to remedy this issue. The new interface, which is based to a large extent on the logic of touch tablets, makes it much easier to navigate within the menus without getting lost in the meanderings of the numerical control.



How was the T-MI conceived?

The T-MI is not just an engineer's flight of fancy; it has been designed in close collaboration with users who work with the machines every day. Taking inspiration from the very latest technologies, the T-MI has been carefully designed to allow simpler, more comfortable use.

The basis of the T-MI concept:

The concept is entirely based on the notion of the user role. In fact, we instilled the role concept to make life even easier for users. We defined two roles: the OPERATOR role and the SETUP role.

The OPERATOR role is intended for operators responsible for monitoring and physically managing production (swarf evacuation, oil filling, lubrication, tool wear correction, reading workpiece counters, etc.). This role gives access to 4 very simple pages on a single level.

The SETUP role is intended for machine users responsible for setting up workpieces (managing programs, tool geometries, machine component adjustments, etc.). This role allows users to access a page with more comprehensive menus. The structure of these menus has been designed as part of the logic of the setup operations.

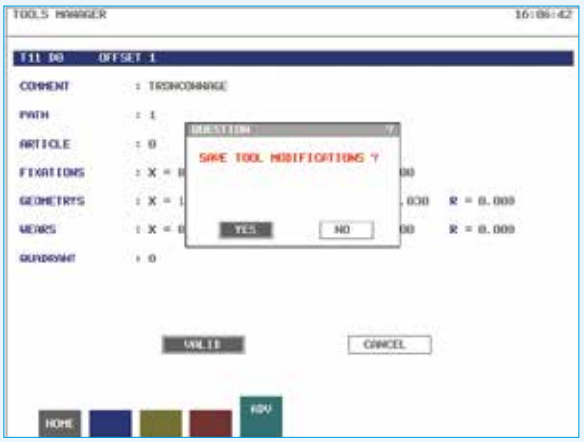
Does the T-MI have other benefits compared to older interfaces?

Yes, of course.

The new interface is flexible, which means it adapts itself according to the peripherals and options available on the machine in order to eliminate all the pages not required by the user, as well as the non-functional pages.

Colours and pop-ups have been introduced to ensure a clear design and simplify use.

Pop-ups are windows that appear in the foreground (as used by Windows).



Another new feature likely to impress users is the online help, available at the touch of a button. While navigating through the pages, the user can press the HELP button on the keypad at any time to open a page showing all the options available on the current page.

The T-MI will make its debut on the SwissNano. Why this product?

As you may have already read, the SwissNano is a new, completely innovative machine, which is perfectly in keeping with the spirit of the T-MI. If the interface is well received, it is highly likely that it will appear on other machines in the future.

Workshop status view.

Detailed monitoring of a machine in real time and monitoring of the production status. The drawing for the current workpiece can, for example, also be displayed.

according to their status. Monitoring includes not only the status of the machines in the workshop, but also an overview of current production: the workpiece counter, remaining production time and the name and drawing of the workpiece are available at any time.

dm: How can I get ISIS?

PN: ISIS and the "ISIS Tab" Android application (which allows the machine inventory to be monitored from an Android tablet) can be downloaded from the tornos.com store address. This is a webstore of applications similar to those available for smartphones. A secure login is required for download. ISIS is not currently available for all our products; I invite all interested customers to contact their nearest Tornos representative for further details.

Mr. Neuenschwander will be delighted to show you the benefits of ISIS on the Tornos stand (B04) in Hall 17 at EMO.

Tornos webstore: store.tornos.com

TORNOS

Tornos SA
Industrielle 111
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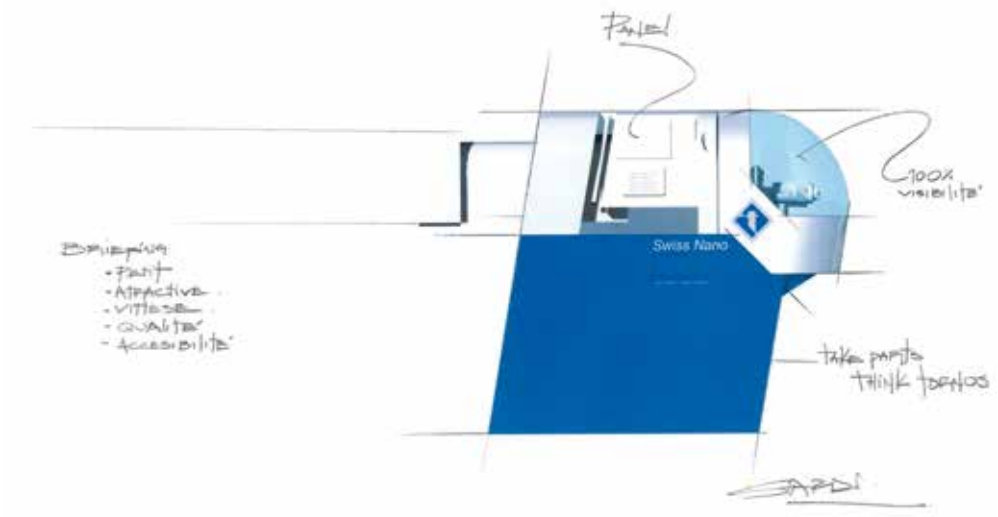
INDUSTRIAL DESIGN: IT'S A MUST!

For many, industrial design is a necessary evil, but for others it is essential. Often, it is dismissed because it involves additional costs and is not essential for the operation of machine tools. Customers also neglect it because, in the popular imagination, it often involves costs without bringing any concrete improvement in performance. Decomag met Enrique Luis Sardi, director of Sardi Innovation and designer of the MultiSwiss, EvoDECO 32 and BA 1008 machines, which will be on show at EMO, to discuss this subject.



decomagazine: Mr Sardi, what is your role as designer?

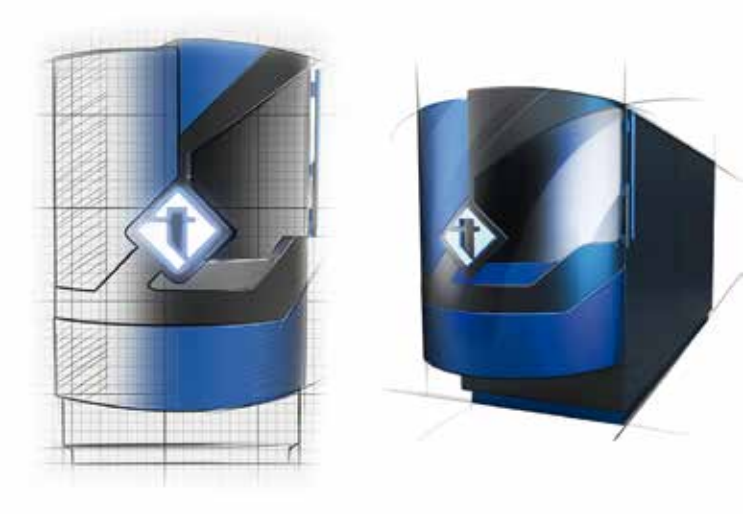
Enrique Luis Sardi: Design is often neglected within the industry, however it is a key differentiator which can bring real economic benefit. Innovation through design will bring you real added value compared to your competitors, and will also strengthen your brand image. We offer much more than design at our company: We are a team set up to offer innovation and bring new, iconoclastic ideas to entrepreneurs and large companies. We do not simply design beautiful machines, we support our customers in their search for solutions that ensure their product is more than just uniquely better, it is unique. Our mission is to turn crazy ideas into concrete, profitable business opportunities. We always have our eyes and ears open; it is a constant quest and battle to keep a company at the cutting edge; we need to plan the aesthetic innovation process almost two years in advance. The objects are simply the final realisation of this process.

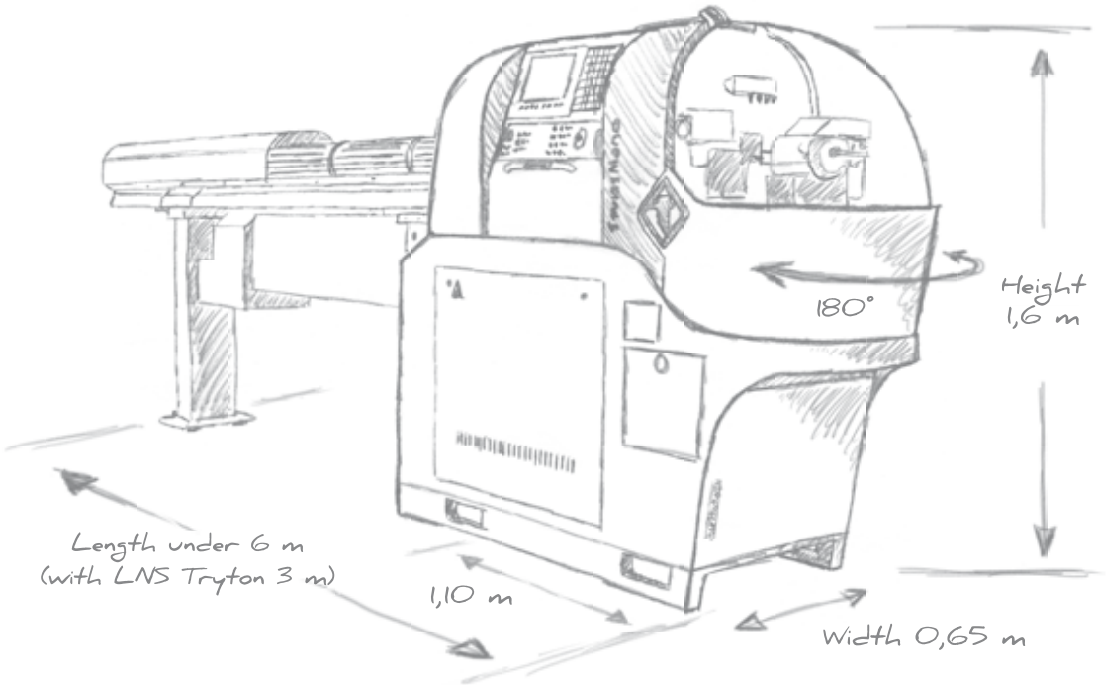
dm: Is ergonomics not more important than design in an industrial machine?

ELS: Design and ergonomics are just two sides of one reality; the design cannot precede the function, but it must be able to improve it as much as possible. Take the SwissNano, for example: You have a unique product combined with a range of ergonomic functionalities, the most striking of which is the bubble giving the operator 180° access to the machining area. The control is on a pivoting arm ensuring perfect ergonomics during adjustment operations. The top of the enclosure houses a support allowing tools to be deposited on the top of the machine without falling or damaging the machine. The feeder is integrated inside the machine. These layout issues would not be possible without in-depth analysis of the product and its everyday use. But ergonomics does not prevent you from having an attractive design; in fact, contrary to popular belief, a well though-out design often allows the manufacturing costs of the enclosure to be reduced.

dm: How would you define your work?

ELS: I have a unifying role. The projects I work on highlight the collective aspect of my work; I balance the energies of my innovation group in Milan with the needs of our customers. My goal is to unite the project team around common values, to get past the stage of thinking «its not possible», to analyse each constraint to see whether they are actually necessary and, if they are, then to work with these constraints. Through my actions, I hope to lead both the team and the project towards the road to innovation. Design is hidden in the details and is fundamentally the result of teamwork.





dm: You talked to us about the SwissNano, do you have any other projects in progress for Tornos?

ELS: Yes. I would urge everyone at EMO to visit the new EvoDeco 32 and the new BA 1008 from Almac, and we are currently working on other machines that I am sure will delight customers

Sardi Innovation
Via Felicita Morandi 13
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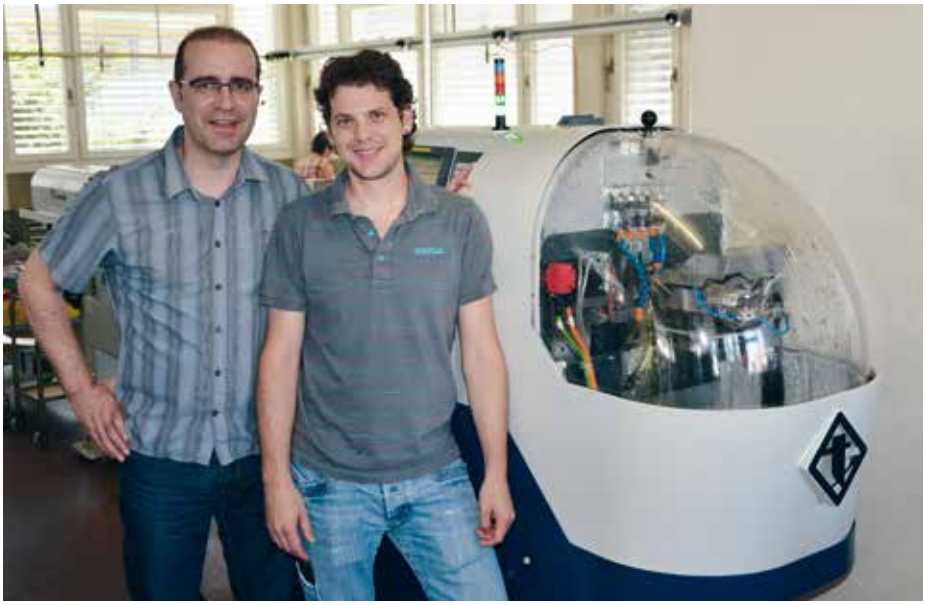
AN ENTIRE WORKSHOP OF SWISSNANO MACHINES

After our introduction to the SwissNano in the previous issue, we wanted to gather impressions from the first customers to use the machine and the partners who collaborated in its development. An interview with Juan Arrieta, CEO, and Clovis Brosy, Technical Manager at Krattiger SA, a supplier which relies on Swiss-made machines to produce parts for the watchmaking, connectivity, micro-mechanical and medical sectors.



Mr. Arrieta and Mr. Brosy (from left to right) think that the SwissNano is part of the watchmaking equipment of the future.

"When we saw it on paper, we thought that the SwissNano would the perfect machine to meet our requirements in terms of producing large numbers of watch parts. Looking back, about two months since the machine was installed, we have not been disappointed - quite the opposite in fact" begins Mr. Brosy. Mr. Arrieta continues: *"We already have EvoDeco machines installed, which are a great asset in the production of complex parts, but this equipment is too high-performance for 80% of watch parts. The SwissNano is the perfect complement to our machine inventory."*

The barrel arbor…

The machine runs 24 hours a day, 7 days a week. It was set up to produce a barrel arbor in 20AP steel. Is this really a part which falls within the 80% of simple to moderately complex parts? In the words of Mr. Brosy: *"As we had the opportunity to collaborate with Tornos in testing the machine, we decided to make quite a complex part to see what the machine was capable of. In future, we plan to make lots of simpler parts."* Mr. Arrieta adds: *"The results are encouraging, in terms of geometric/dimensional tolerances and surface finishes, we are right on target for our watchmaking customers."*

… produced on a very tight budget

The level of investment necessary to purchase a SwissNano machine is very competitive given the machine's functionality. Mr. Arrieta states: *"For an equivalent investment, the SwissNano offers more options. It is equipped with 5 axes and a counter spindle mounted on three axes, and both are highly responsive powered spindles. As they are cooled, they contribute to the machine's thermal stability."* Mr. Brosy also commented on the machine's excellent price point, adding: *"We equipped the machine*

For testing purposes, the SwissNano machine was installed away from the bar turning workshop. Its compact size and its design mean it will fit in any workshop. As there is no rear access, it can even be installed against a wall.

with a LNS Tryton, which is a very good bar feeder, but if we had an entire workshop of SwissNano machines, we would have to find a feeding solution requiring a lower level of investment."

This is no revolution

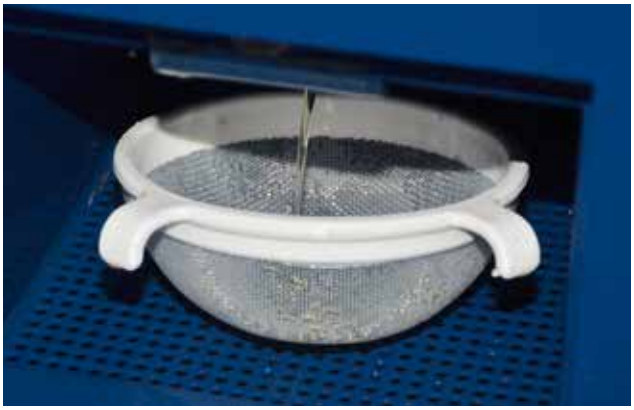
Although the design of the SwissNano is brand new, it makes use of technological solutions which are already known. On this subject Mr. Brosy states: *"The SwissNano is not a technical master-stroke and that's a good thing! You don't always need to reinvent the wheel."* He adds: *"The machine is well-designed; although we only received a prototype, we were quickly able to produce parts."* And the Tornos engineers could count on direct feedback from Krattiger AG.

Intuitive and simple to use

The design of the SwissNano has been praised by all the customers who have seen it, but what about its operation? Mr. Brosy explains: *"The machine is simple to program – it is a dual channel numerical control and is equipped with many Tornos macros, in particular for offsets and feeding. A programmer with knowledge of ISO could master it in no time."*

A PARTNERSHIP WITH TWO WELL-INFORMED EXPERTS

The two specialists who spoke to us are former Tornos employees: Mr. Brosy was Head of Single-Spindle Machine Validation and Mr. Arrieta was Head of Maintenance and QCI. They are therefore very familiar with the problems associated with machine design. Some years ago they also added the production of turned parts, in particular for the watchmaking industry, to their portfolio of expertise. It was therefore quite natural that they returned to partner Tornos in the development of the SwissNano. Mr. Brice Renggli, Head of Marketing at Tornos, explains: *"Although the SwissNano is a machine which is based on tried and tested solutions, in developing the machine we wanted to be able to work hand-in-hand and completely transparently; the fact that Mr. Arrieta and Mr. Brosy knew our development and validation procedures very well simplified our dealings."*



Built with watchmaking in mind, the machine is sized accordingly. The part outfeed system is simple and 100% of parts produced are collected.

In order to offer its customers a complete solution, the company includes various departments in addition to bar turning, for example, polishing or rolling. The barrel arbors produced on the SwissNano are tempered (by a partner company), then rolled and checked on site.

He adds: *"Tool changes are also very straightforward: the machining area is accessible and we can fit the standard tools of the trade without having to modify them, as is often the case on small machines designed for watchmaking."* Mr. Arrieta adds: *"The kinematics of the machine are well-designed, the counter spindle on three axes enables the tools to be centred with precision and end operations are simplified. With 13 tool positions (and double tool holders can be fitted), we can easily cover the range of 80% of watchmaking parts that we were aiming for."* Asked about the outfeed of parts, Mr. Brosy comments on the machine's excellent performance: *"The counter spindle takes up the ejection position and the workpiece is blown into a plastic collection tube; it's ideal and the parts are never damaged."*

The watchmaking machine par excellence…

Tornos developed the machine taking into account the requirements of the watchmaking industry. Did the test machine installed at Krattiger AG meet those requirements? *"A few years ago, customers wanted to purchase very well-equipped machines to "keep a reserve"', but today that is no longer the case: customers want machines which are perfectly tailored*

The barrel arbor is a part at the limit of the SwissNano's complexity. To increase the range of operations available on the SwissNano, Krattiger will soon be testing the cutting device.

Krattiger has a well-equipped workshop with around twenty EvoDeco and Deco machines. The premises are large enough to consider development including several SwissNano machines.

to their needs. The SwissNano machine is the perfect solution for the requirements of subcontractors working with the big names in the watchmaking industry" confirms Mr. Brosy.

… to better serve different markets

For two years Krattiger has diversified in 4 main areas of business: the connectivity business, watchmaking, micro-mechanics and the medical sector. Mr. Arrieta tells us: *"Today we are consolidating our position in these four areas and are widening our network of customers. The SwissNano is a machine designed for watchmaking and will open up new markets to us, enabling us to produce a category of parts which we were previously not able to do competitively."* In conclusion, the director explains: *"For us, the SwissNano is a vital component in the watchmaking workshop of the future. Eventually, we plan to use our bank of EvoDeco machines to produce the 20% of complex parts, and use a new bank of SwissNano machines to complete our capacity. This machine totally won us ove*r."

PRECISION AND STABILITY: THE STATE OF PLAY AT KRATTIGER AG

Asked about results, Mr. Brosy explains: *"At present, we only have data for a couple of weeks' production, but I can confirm that the machine is very stable: swarf is not broken and we have no problems with micro-vibration."* He adds: *"I was surprised by the concentricity between the spindle and counter spindle; it's perfect and we've obtained excellent results straight away."*

Krattiger AG
Hirsackerstrasse 1
4702 Oensingen
Tel. +41 62 388 04 40
Fax +41 62 388 04 49
info@krattigerag.ch

TORNOS SWISS ST TURNING CENTER HELPS PUNCH MANUFACTURER REDUCE OVERHEAD COSTS BY 66 %

For almost twenty years, Boise, Idaho company, Performance Design has designed and manufactured paper punching machines used by Staples, Kinkos and in-house printing departments of large corporations.

Left to right: Emmett Nixon, programmer; Randy Stewart, President; Steven Parker, engineer.

Today, they've got a 20,000 sq ft facility with 25 employees where they manufacture and sell over 20 different product lines including their Rhin-O-Tuff™ brand punches, tools, binding machines, and accessories used to bind paper with plastic combs, crimped wire, and spiral plastic coils.

Until late 2012, though, they were outsourcing a key component in their equipment… the round, oval, square and rectangular metal pins used to punch the paper. The pins are between 1/8" and 5/16" diameter and about 2" in length which includes a 1/8" head gripped by the punch machine. Approximately an inch of the pin punches through the paper. The pins fit into a punch die which is interchangeable within the punch. The shape of the pin dictates the shape of the hole punched. As part of a company-wide "Go Lean" initiative that began in 2007, they decided that they needed to bring the pin manufacturing in-house, starting with their oval shaped pins.

Steven Parker, Project Engineer for Performance Design, explains the situation: *"Before the Tornos, we were having our pins made by outside vendors. But we wanted to reduce costs and get control so we could make what we wanted when we wanted it."*

US Manufacturers feeling the pinch

A blog post on the company website reveals additional detail. *"Since Performance Design is the only remaining USA manufacturer in the paper punch*

and bindery industry, they felt a responsibility to save manufacturing jobs in the US. Most of the company's competitors are based in China, Taiwan, Vietnam, and Portugal where their labor costs and overhead are lower. The company realized that in order to remain competitive in equipment pricing, their manufacturing processes needed to be changed dramatically.

"Rather than sending our production offshore, we decided to bring in Lean manufacturing experts to totally reinvent the way we manufacture our products. This impacted a lot of things, from the way we ordered raw materials to the actual manufacturing processes of our heavy duty punches and binding equipment," said John Lugviel Vice President of Business Development for Rhin-O-Tuff. (http://rhin-o-tuff.com/blog/rhin-o-tuffs-go-lean-initiative-led-to-dramatic-results-in-punch-binding-equipment-manufacturing/).

In order to accomplish their Go Lean goals, they had to investigate a new type of machine tool to add to their mix of horizontal and vertical mills. They needed to investigate turning centers.

IMTS 2012… the first stop

Like many manufacturers, Performance Design began their search for their new machine tool at IMTS. *"We went to IMTS and looked at four other turning machines,"* says Parker. *"But we didn't get around to looking at the Tornos. We had a full plate and ran out of time. A big reason for us to go to IMTS was to figure out what we were looking at in person for the first time."*

"Actually, we were just about ready to pull the trigger on purchasing a different machine right after the show; but then we met with our local Tornos salesman, Fred Huth, and he presented the specs on the Tornos Swiss ST 26 "Starter" machine. The Tornos looked like a great option and we were really surprised by the price that he was quoting. Comparing it to similar machines in the market, we were expecting it to be another 100K more than what he was saying. When we saw the features that the Tornos had for the price, we put the brakes on buying anything else. We had to start looking at that one real seriously."

As they investigated the Tornos capabilities, they realized they could not only make their oval pins; but that they could make their square and rectangular pins too – and make them out of the same round stock material they were going to use for the ovals.

Tornos US – the last stop

"Since we didn't get to see the machine at IMTS," explains Parker. *"We wound up going to Lombard near Chicago to see the machine in person, to get a demonstration, and see the Tornos facility. They were able to run one of our rectangular pins for us so we got to see exactly what we would be getting.*

"The way we used to make our square pins (and the way we were planning to make them when we decided to bring the work in-house), was with a square or rectangular raw material. We would make a couple extra features and then the final shape of the pin was based on the raw material that we got in. We had a lot of problems with out-of-tolerance dimensions due to varying raw material; but since the material had to come in such huge orders, sometimes we had to deal with it because we didn't have time to make a new order."

Once they determined that the Tornos could use round material to make rectangular pins, they were hooked. *"We went back to the other manufacturers to see if they could match the Tornos and their only answer would be jumping up to a $200,000-300,000 machine. They had nothing in the Tornos Swiss ST price range. They had a couple options with polygon turning; but for our application ithose weren't going to be viable."*

Pinch milling was the game-changer for Performance Design

"What we had to do is take the raw material from a round shape down to a square cross-section. If you do it normally with just one end mill, by the time you get down to your third or fourth flat, you have nothing supporting the cut from the other side. It causes all sorts of problems.

"The biggest thing that drew us to the Tornos was the ability for pinch milling. Every other machine we looked at in this price range only had one tool platen. Pinch milling took what would have been about six or seven raw materials down to just two.

"With the Tornos Swiss ST, we're able to have two identical end mills pinching the material and basically supporting it against themselves. They hold it nice and straight so we're not only able to get the raw material benefits – right now we're doing all thirteen of our different pin shapes out of just two raw materials, 1/4" and 3/8" round 12L14 steel – that helped us a lot right there. But we have also eliminated manual labor on pin head assembly."

Swiss ST 26 with parts carousel shown.

Before the Tornos, Performance Design square pins had a gripper head that required manual labor to assemble. Parker explains. *"When we were using the square material, we had to drill a cross hole and then hammer in a roll pin to act as that head. So it was additional labor for our assembly guys to have to do that on every one. Now, we actually leave a round head at the end of the square pins. It looks a lot better and it saves us a lot of labor time."*

The new pin head required just minor design changes to the punch design; and it was worth the effort. *"The retainer is the part that directly interfaces with that head, it had to be changed up a little bit and we had to do a series of in-house tests to verify that it was going to be as strong as the old one. The new design, in all the tests, blew away the old design. It was easily twice as strong as the previous design that took a lot more labor."*

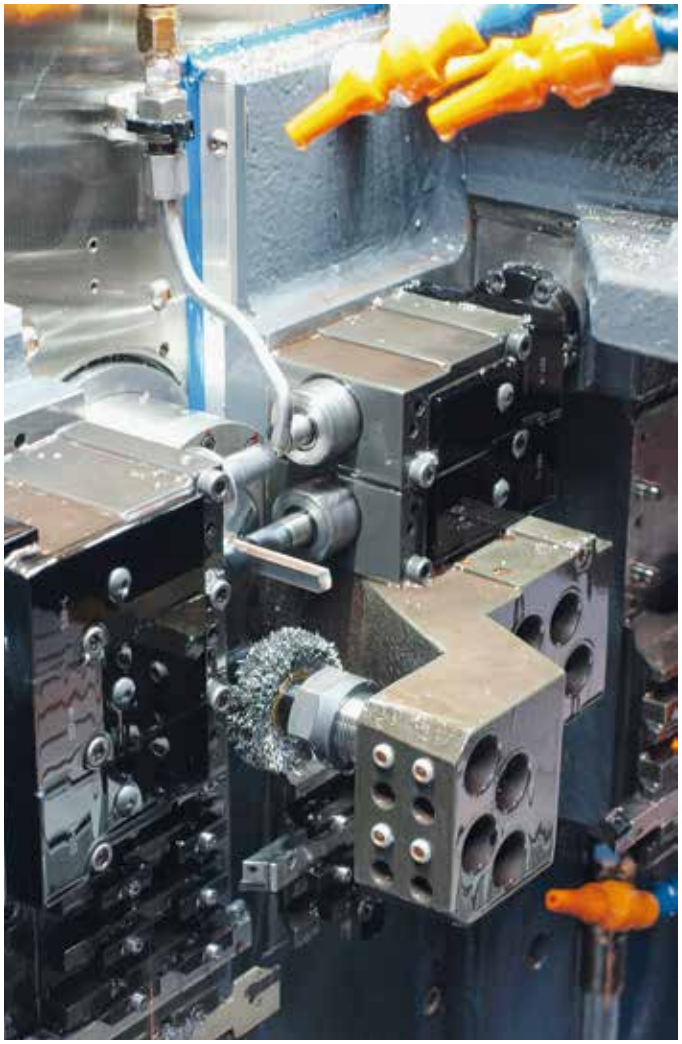
Less raw material and less manual labor takes "Tuff" to a new level.

Plus… Performance Design saves at least 21 hours a month on changeovers.

"With this being our first screw machine we were worried about the changeover times (changing out collets and guidebushings and everything) for each pin. But now that we only have the two raw materials, the changeover is really minimal. We're still pretty new to it… but the changeovers probably take us a good three hours. Right now, we're only having to do that full changeover… if we plan it right… once a month (vs. 7-8 times a month without the Tornos)."

Performance Design makes the pins one at a time and the average cycle time is around 60 seconds, unmanned. *"The simple round ones are actually quite a bit faster, right around 36 seconds. But the more complex, square ones are about 70 seconds. We accepted that the cycle times would be longer on the square pins; but it's unmanned and it's replacing the manual labor of pounding in the roll pins."*

Performance Design's parts carousel with fifteen bins holds a complete Rhin-o-Tuff pin set (a pin set is the same pin in fifteen lengths).



Punch pins being cut on Performance Design's Swiss ST 26.

Fifteen is another magic number

On a normal book – an 8-1/2" x 11" stack of paper that requires binding – there would be between 30-40 holes along the bound length. The pins are in a series of fifteen lengths to spread out the punching force so punching is easier and the acoustics are better. Says Parker, *"If you were to punch all fifteen in one shot, you would have a loud 'bang!'".*

To eliminate the noise and make it easier for customers to use the punches, Rhin-O-Tuff pin sets come in a fifteen pin stagger, which is the exact same pin in fifteen lengths. The length of the shaft of the pin changes just a little bit from pin to pin in the set. The pin sets were perfect for automation; so Performance Design investigated and purchased a parts carousel with fifteen bins on it. *"Our pins were already in a fifteen pin stagger and we found one that had exactly fifteen in it,"* remarks Parker.

"Tornos helped us set it up and they helped us out with a macro. So now we just program in how many we want of each pin; for example, we enter '200 of each length'. And it will make that length and then the macro built into each program will switch to the next length and index the carousel. It keeps the pins organized for us as it makes the different lengths.

"We're planning to be able to eventually run this lights out… get all of our pin production done during the night time and during the day we'll hopefully have some available machine time to switch to other parts that take a little more surveillance."

The company took delivery of their new Tornos Swiss ST 26 the last couple days of 2012 as an end of the year tax break rush. And already they project that they'll be making about 110,000 pins per year on their new machine. They are currently running 100 bars/month.

Lean on Tornos

"The accessibility of the machine was a real strong point when we were looking at it," says Parker. *"We definitely noticed a difference between the other machines we were looking at during IMTS and this one. There is WAY more room to see what you're doing. During set up and tool touch off especially, having access from both sides was a big plus because certain things you just can't reach too well from the one side. And I noticed in some of the other machines it was just kind of a small hatch and you'd have to reach in and contort yourself around to be able to see anything. So that was actually a pretty big selling point for us was being able to see what was going on and to lean in there and get a good picture of everything."*

Another thing they liked was all the tool slots. They can fit all the tooling for all the pins made from each size raw material in the machine at once – with spots still available. *"The different pins we make use different types of tools – most use five tools. There were enough available tool slots on the Tornos that we're able to leave pretty much all the tools in the machine for all our different pins. That means we're just changing the program and the pickoff collet when we go from one pin to another. Very rarely will we have to change out a tool. We only have to change out the guidebushings and collets, etc. when we switch to a pin that's a different material."*

Room to grow on the Tornos

"We're still n*ew to the Swiss machine and we're still trying to figure out how to run the simple parts we have now, but the plan is to eventually be able to do some more parts. We are still outsourcing some parts that we're just not ready to do ourselves yet. But according to our numbers on all the runtimes, we should be able to do all the pins and only use about 70% of this machine's runtime capabilities. So there will be some open machine time once we're fully up to speed on running it ourselves."*

The Tornos is helping Performance Design make parts so fast and efficiently that eventually, open machine time could allow Performance Design to become an outsource partner from the other side of the table.

"We're open to the idea of doing parts for other manufacturers someday and we've had a local business ask if we could build some parts for them. But at the moment, we're only doing our own parts."

In summary

The Tornos Swiss ST 26 Starter configuration was a linchpin for Performance Design's Go Lean initiative. The Tornos was a great fit on price and capabilities and helped them transform the way they manufacture a key component in their product line. The Blog from their website ticks off a few other benefits of their new lean approach:

Square and rectangular Rhin-o-Tuff punch pins:
old style shown left, new style shown right.

Performance Design's three-year process realized significant improvements in manufacturing and supply chain practices including:

- A drastic drop in the company's inventory needs. Their finished goods and raw materials inventory saw a 60 percent decrease with work-in-progress inventory cut in half.
- Improved quality control and less reengineering work.
- Faster order fulfillment time from 10 down to 4 days.
- Manufacturing processes made to be reactive to new orders which in turn reduces the need to rework products that have already been boxed up and placed into finished goods inventory.
- Implementing the use of Single Minute Exchange Dies, reducing machine set-up time, labor hours and costs.

The final result of the changes implemented was dramatic, with an overall reduction of 66 percent lower overhead costs. Because of improved engineering, the company is now able to increase the warranty of its equipment to an unparalleled three years, up from one year.

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REAL THREAD WHIRLING

"Thread Whirling" has become a popular process for Swiss machines, especially among bone screw manufacturers. Although most Swiss machine engineers agree that thread whirling delivers outstanding productivity with the highest efficiency vs conventional single point threading, not all engineers know the "Real Thread Whirling" process.

NTK first released thread whirling tools with (9) inserts back in 2008. NTK engineers never perceived thread whirling as a complicated process. The complication was not with regards to machining difficulty but in producing the perfect thread form described on the print itself.

The so called "Bone Screw" is a major part produced by the thread whirling process. It is quite unique, compared with the other industrial screws, since there are no female threads to mate. Bone screws are attached directly into human or animal bones for medical repair applications. The screw is not expected to be loosened at all once it is fixed in place. The characteristics of bone screws are: larger pitch size and larger screw depth and length as their key function is to be tightened into bones rigidly and as quick as possible.

As a result of this uniqueness, inspection of screw forms has become extremely difficult. Due to the larger helix angle to make a high pitch thread form, you cannot visually see the cross section at all with a common optical comparator. What you can check with an optical comparator is only the peripheral or bottom diameter of the thread.

The only way to measure the real thread form of a bone screw is to inspect it with a (CMM) Coordinate Measuring Machine. However, there are not many manufactures which use CMM type of measurement

machine for the inspection after machining. Most of them focus on visual inspection of thread form and surface roughness and use an optical comparator for the final inspection.

Another surprise for NTK engineers, is the fact that even in manufacturers that have the very latest machines, well experienced and highly educated staffs, the engineers make small adjustment on a helix angle or pitch size when they cannot get the ideal thread form. As you may understand, if you change the helix angle or pitch size, thread form itself could be totally out of print specifications.

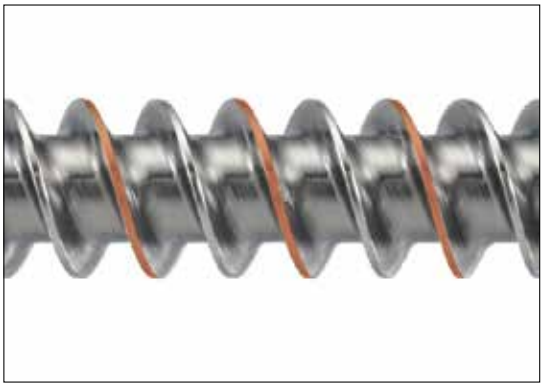
Why does this happen? One factor comes from the uniqueness of bone screw - no female thread. That is, if the thread form is made close enough to the print, the screw can perform its function to be tightened rigidly to a bone since there is no mating surface (female thread). The other comes from difficulty in designing thread whirling inserts due to complexity of thread form itself.

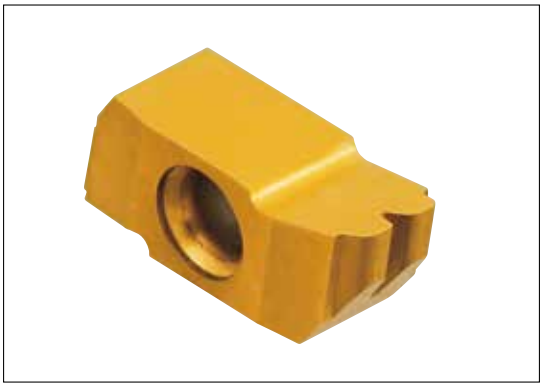
Having a visual image of thread whirling process in your mind is extremely difficult. Thread whirling inserts are set on the round cutter body and the cutter is attached to the spindle which is tilted with a helix angle. The spindle revolves at a higher rotation (like 3000 rpm) while the bar stock revolves in the same direction but at a much slower rate like 10-30 rpm. During this rotating process, each thread whirling insert machines the bar stock while they rotate much faster than the bar stock. The spindle and the inserts tilt to make thread form and the inserts shave or cut bar stock not only at the center of the bar stock but also the upper or the lower side of the bar stock.

Conventional, single point threading inserts are designed with exactly the same thread form as the thread itself because it always machines with regards to the center of the bar stock. On the other hand, thread whirling inserts cannot be designed with the same concept because the actual machining point always varies on the upper or lower side of the bar stock. However, there are some competitor's thread whirling inserts designed with the identical methodology as single point threading. With this incorrectly designed thread whirling inserts, bone screw manufactures are frequently required to re-make the inserts, in some cases, not one time but several times. Or, they are forced to make inappropriate manual adjustment on the helix angle or pitch size to obtain the thread form which looks closer to the prints specification.

NTK thread whirling does not require such guesswork process manipulation. Thanks to the design capability of our inserts we can obtain perfect threads right from the start. This process designing technology is now patented.

Recently, to reduce surgery hours, bone screws with double lead threads are becoming more popular. This industry trend is creating another challenge for most bone screw manufacturers. Producing double lead bone screws require longer machining times than single lead screws. Most manufacturers machine the 1st lead within the guide bushing length and then machine the same length with the 2nd lead while the guide bushing is still holding on to the bar stock. As a result, they need multiple passes to achieve a double lead thread form bone screw. If the bone screw is very long then this process has to be repeated the full length of the bone screw which is a more time consuming process.





As you can imagine, single pass machining of the double lead bone screw is the best solution to improve productivity. To enable single pass machining of double lead screw, both inserts must have a different geometry ground on 1st and 2nd threads. This is simply because thread whirling machining is calculated with regards to the upper and lower point of the screw's centerline. This process generates the double lead bone screw in a single pass cutting both the 1st and the 2nd leads at the same time.

NTK thread whirling designing technology and highly accurate insert grinding ability can produce the perfect thread whirling inserts the first time. This feature enables double lead bone screw manufactures to achieve single pass machining. We believe that you will appreciate NTK's highly advanced thread whirling system technology once you use NTK's double or triple thread whirling tools.

When your machine is equipped with the correct helix angle setting, correct tool setting and a NTK thread whirling system, you will experience "Real Thread Whirling" which can produce perfect thread form screws. NTK is looking forward to your inquiries from those who eager to have perfect thread form from the beginnings, of course with no incorrect manual adjustment, or to improve your double, triple lead screws productivity.

"MOGUL BARS" NTK'S HIGHLY RIGID I.D. BORING BAR SERIES

NTK offers an extensive line of high precision boring tooling designed for Swiss machines. One of these produce lines is called "Mogul Bar". The Mogul Bar system provides the user outstanding chip control and higher rigidity than most conventional tooling on the market.

Outstanding chip evacuation

The most notable characteristics of the Mogul Bar is excellent chip evacuation and chip control. Mogul Bars outfitted with NTK's "F" or "FG" chipbreaker inserts will evacuate chips backwards. This means that when a Mogul Bar machines an I.D. bore, chips comes out towards the bore entrance. The majority of boring processes on Swiss machines are done on the main spindle side and thus the bore itself is a blind hole. This machining process creates many issues if you use conventional boring bars designed for CNC lathes. Typical difficulties incurred during a boring process on Swiss machines are either chips remaining in the bore and rough surfaces caused by inconsistent chip control. However, Mogul Bars equipped with NTK uniquely designed chipbreakers, evacuate chips straight backwards and solves both of these problems at once.

NTK also engineered a larger clearance area behind the insert for chip evacuation on the bar itself. This feature was designed without losing rigidity and though coolant capability.

Excellent rigidity

Another important feature of the Mogul Bar series is high rigidity. Mogul Bars increased rigidity is a result of a newly designed bar head configuration and a minimal flat width on the bar. Steel shank Mogul Bars can machine as deep as L/D=5, a depth which normally requires expensive carbide shank boring bars. NTK carbide shank Mogul Bars can machine up to L/D=7 depth and this gives users flexibility of machining deeper bores in a single process. Rigidly and minimal flat widths reduce vibration.

Variety of insert grades

NTK offers both coated carbide grades and cermet insert grades for Mogul Bars. As most tooling engineers know, cermet grades can machine at faster speeds with higher productivity, provide better surface finishes and can achieve more accurate dimension control, than carbide grades. These benefits come from the fact that the primary substrate of cermet grades, TiN/TiC, are chemically stable compared with WC of carbide grades and have better adhesion resistance.

Mogul Bars are available from a minimum machining diameter of 5 mm. With the combination of NTK unique chipbreakers, you can enjoy better chip control and highly rigid boring bars. In comparison with solid carbide boring tools, Mogul Bars has cost advantage as well. If you are facing chip control or chattering issues, NTK believes that Mogul Bars can be the answer to your problems.

NTK CUTTING TOOLS

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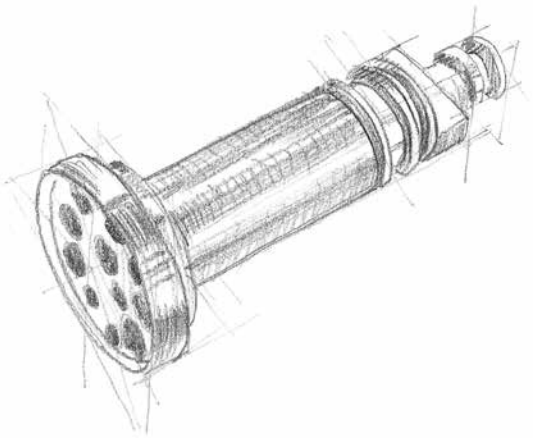
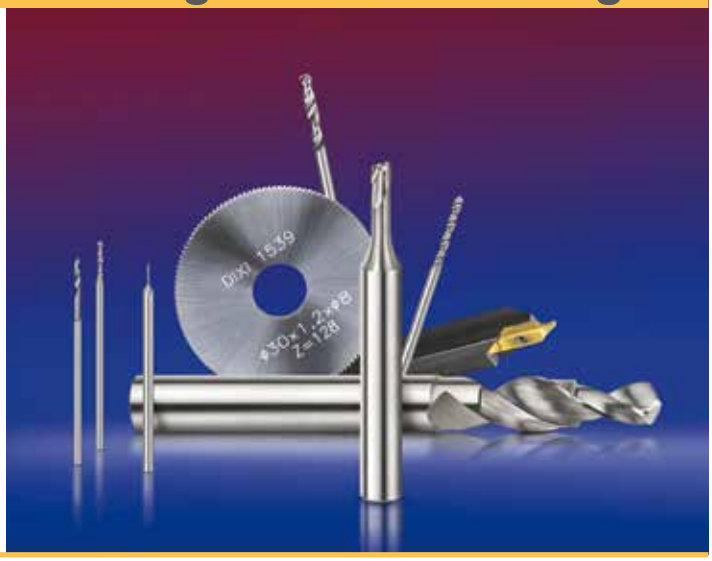
DIXI 4

Tungsten carbide and diamond precision tools

Turning-screw cutting





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HSX® STEELS FROM STEELTEC

FURTHER PROGRESS MADE IN HIGHER-STRENGTH STEEL SOLUTIONS

With their new higher-strength HSX® steels, Steeltec AG, part of the Schmolz + Bickenbach Group, has managed to balance high strength and good machining properties. While sulphur content typically improves machinability, the latest developments have allowed Steeltec to significantly reduce the sulphur content of HSX® steels, while at the same time maintaining good machinability. Components that are highly-stressed are more stable as a result.

Furthermore, the extensive characterisation of the HSX® series' physical properties is a further new development. This enables magnetic characteristic values to be combined with mechanical material properties for example. This sets a precedent for complex components to be designed in a completely new and exceptionally economical way in the future.

The drive shaft is an increasingly loaded component, which has to withstand a growing changing load when the input power increases.

Based in Switzerland, Steeltec AG is one of Europe's leading bright steel manufacturers. By focussing on high-strength and higher-strength special steels as well as special free-cutting steels, it has established itself as an important partner for the automobile, hydraulics and machine manufacturing industries. Steeltec collaborates with customers, suppliers and research institutes to further develop steel and steel production methods.

Higher-strength special steels: HSX®

The HSX® series stands out even in delivery condition thanks to its higher strength and good machinability. It comprises four higher-strength steels, which differ in terms of strength, toughness and structure. Steeltec has made it possible for customers to modify materials and make them even stronger according to application requirements. The company offers variations in sulphur content for each HSX® steel. This means that the optimal balance between strength

In chain production plants, HSX® steels can be drawn, stripped and ground in line with requirements.

Thanks to higher strengths, ETG® 100 and HSX® 130 also withstand greater loads at a smaller shaft diameter when compared to standard quenched and tempered steels.

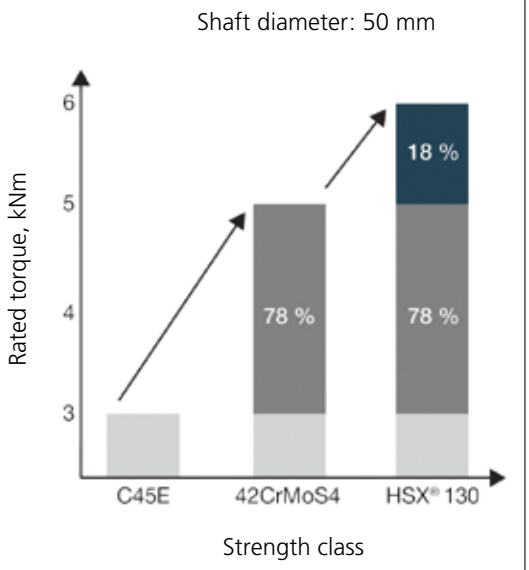
Thanks to their outstanding properties, the four HSX® steels can replace 20 normal steels and, as a result, optimise production processes and reduce storage costs.

and machinability can be defined for each application. Depending the requirement, sulphur content can be almost completely reduced. This significantly lowers the risk of cracking in thin-walled components, such as the pump cylinder in anti-locking systems. *"Despite the reduction in the sulphur content, our HSX® steels are considerably more machinable than traditional quenched and tempered steels,"* assures Dirk Ochmann, Head of Sales at Steeltec. *"We are happy to advise machinists and design engineers on how to achieve the best results in machining and applications."*

One improvement is the extensive characterisation of the HSX® series in terms of physical properties, such as the magnetic characteristic values. Design engineers use this knowledge to make more efficient models: The higher-strength HSX® steels can be joined to a component, which nowadays comprises a combination of magnetic materials and standard materials. When it comes to the production of solenoid valves, for example, the steels prove their worth – in the past, a complex design process would have been required to fulfil these requirements. Here, the HSX® steels present another benefit and further differentiate themselves: As opposed to with the standard quenched and tempered steels, certain production stages, such as a downstream heat treatment, are no longer needed. This also precludes the necessity for related add-on operations, such as reshaping, grinding and deburring the components. This leads to shorter processes and significantly reduced logistics applications.

figure 1

Greater torque at the same diameter



	$R_{p0.2}$ N/mm²	R_m N/mm²
C45E+QT	370	630
42CrMoS4+QT	650	900
HSX® 130	1'300	1'350

In comparison to standard quenched and tempered steels with drive shafts of the same dimensions, HSX® 130 shows a significant increase in performance.

Example: Compact component designs

HSX® 90, HSX® 110, HSX® 130 and HSX® Z12 special steels are suited to manufacturing highly stressed precision components in machine, vehicle construction and hydraulics manufacturing industries. High strength and high contour accuracy, make it possible for drive shafts to be more efficient and/or smaller, for example, even in asymmetric machining. When compared with standard materials that are widely used in machine and vehicle construction, the benefits of the higher-strength HSX® 130 are significant. The unalloyed quenched and tempered C45E steel is used for less-stressed components in propulsion technology. When stress is greater, design engineers fall back on 42CrMoS4.

A comparison of the drive shaft torque and steel performance demonstrates the effect that the steels' properties have on operational capability. At a constant shaft diameter of 50 mm with changing loads, HSX® 130 can transmit 96% more force than C45E and 18% more than 42CrMoS4. Yield strength and tensile strength are important parameters for performance. When compared to widely used standard quenched and tempered steels, HSX® 130 displays between two and three times as high a yield strength at 1300 n/mm². HSX® 130 is also considerably in the lead when it comes to tensile strength at 1350 N/mm² (see Fig. 1).

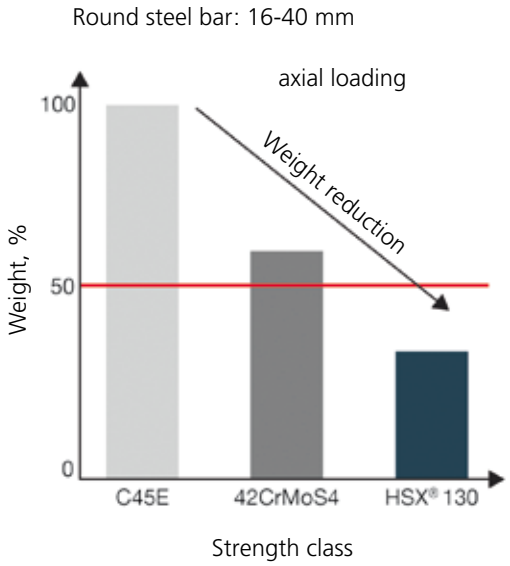
HSX® 130 also demonstrates higher strength in the demand for more compact component design methods and reduced weight. For a drive shaft made of C45E standard quenched and tempered steel, a rod diameter of 40 mm is necessary. With HSX® 130, the diameter could be practically halved with a 16.1 mm reduction, and the weight could be decreased by 64%. If 42CrMoS4 is replaced by HSX® 130 when stress levels on the drive shafts are increasing, the component weight can be reduced by 38%. Performance of 42CrMoS4 with a diameter of 30.3 mm is matched by the performance of HSX® 130 with a diameter of 24.0 mm (see Fig. 2).

Application-oriented steel solutions

In addition to HSX® 130, Steeltec manufactures three other HSX® materials to suit your mechanical properties for a variety of applications. HSX® 110 is used when high mechanical strength properties are required for improved toughness. HSX® Z12 provides increased toughness for components with higher transmission of force and additional impact load.

figure 2

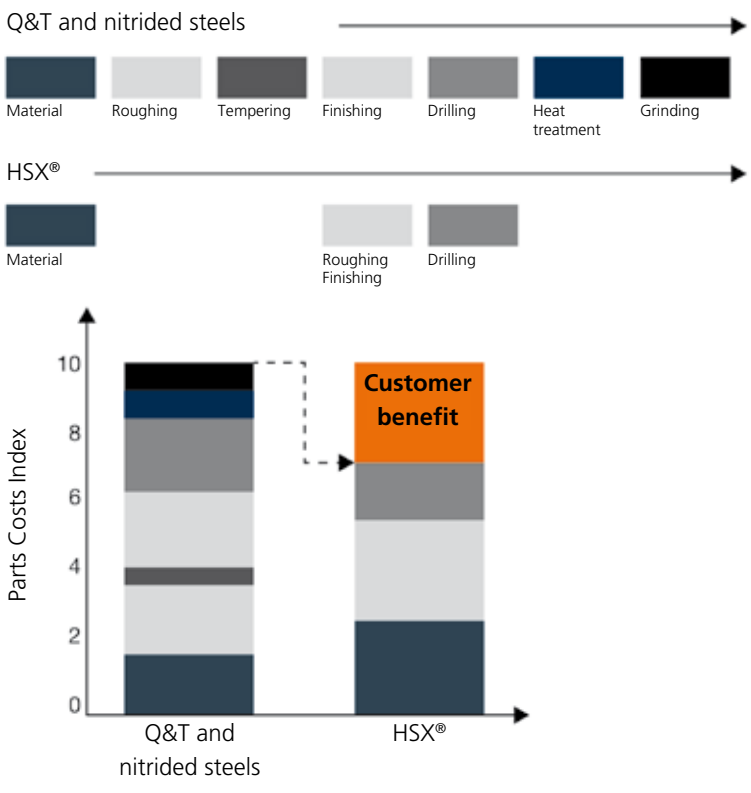
Weight reduction through the use of high-strength steels



When compared to quenched and tempered steels and when requirements are constant, HSX® 130 makes it possible to design more compact components and reduce weight.

figure 3

Shorter processes - Lower parts costs



Thanks to higher machining performance at high strengths and a shorter manufacturing process through using HSX® steels, part costs are lower when compared with the use of standard quenched and tempered steels.

A new arrival to the product range is the modular special material HSX® 90. This highly individualised steel solution was designed by Steeltec in development partnerships with customers according to specific component production and application requirements. The bainitic material is characterised by its high solidification properties and excellent Ra values for cold-forming, such as thread rollers, inside and outside rollers. Furthermore, this special steel displays excellent properties in terms of gas pressure density and proves excellent for laser beam welding.

The entire HSX® range benefits from uniform mechanical properties irrespective of the rod diameter across the whole cross-section and is therefore particularly suited to compact component designs.

Noteworthy cost reductions in the component manufacturing process

"The bottom line is that design engineers save by switching from standard quenched and tempered steels to our special steels," states Ochmann. *"Because up to 85% of part costs arise in the component manufacturing process. Therefore, it is the process costs, rather than the price of materials, that is key to more cost-effective components. Our HSX® steels ensure short processing times. On delivery, they already have very good mechanical properties and outstanding machinability. Despite comparatively high material costs, the manufacturing process using HSX® steels is significantly more efficient and as a result more efficient when compared to using standard quenched and tempered steels."* (see Image 3). HSX® steels have special properties thanks to special methods. Depending on requirements, the rods can be drawn, stripped and ground. In a chain production plant, it automatically runs through the processes from drawing/stripping, straightening and sawing, through to the quality check and finishing. In delivery condition, the special steels already display high strength, which quenched and tempered steels can only achieve following heat treatment.

Conclusion

Steeltec AG's higher-strength HSX® steels present an cost-effective alternative to standard quenched and tempered steels both in standard applications and for highly-stressed precision components. The combination of high strength in delivery condition, outstanding machinability and shorter manufacturing processes for customers follows the trend towards higher performing and lighter components. The user is provided with a modern, efficient material while at the same time seeing total costs fall.

ABOUT STEELTEC AG

Steeltec AG is one of Europe's leading bright steel manufacturers. By focussing on high-strength and higher-strength special steels as well as special free-cutting steels, it has established itself as an important partner for the automobile, hydraulics and machine manufacturing industries. Steeltec collaborates with customers, suppliers and research institutes to further develop steel and steel production methods and to thus increase competitive strength across the entire value chain. Within these development partnerships, Steeltec develops the strongest steel solutions for the relevant application.

STEELTEC
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Steeltec AG
Dirk Ochmann
Head of Sales
Tel. +49 (0)7728 649 110
Fax +49 (0)7728 649 121
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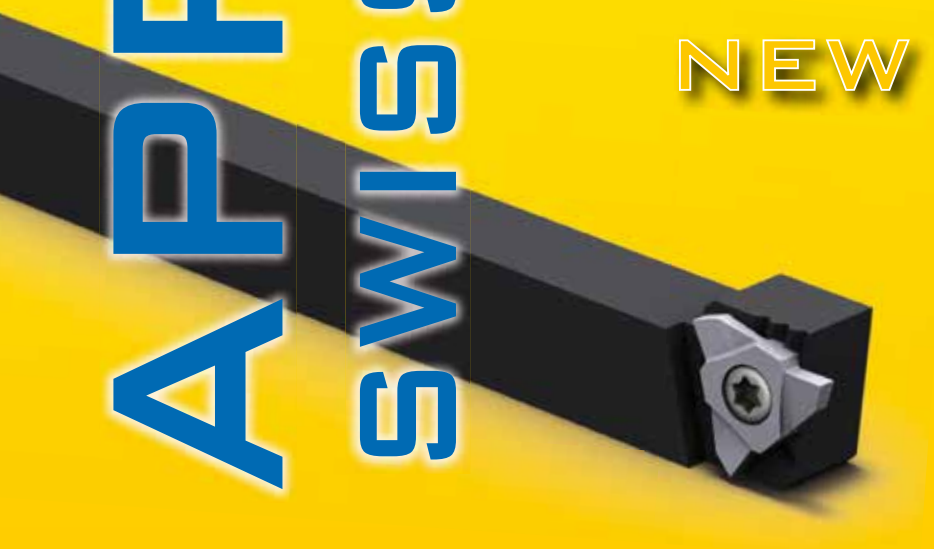

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Ch. Nicolas-Junker 2
CH-2740 Moutier
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