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69 02/14 ENGLISH

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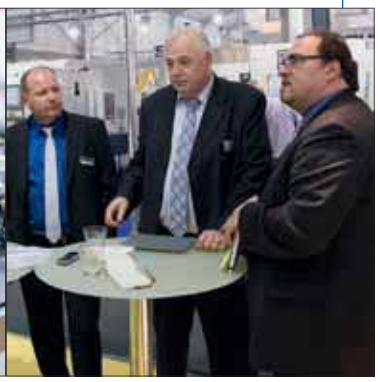

The considerable potential of high-precision micro-machining

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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 AG
CH-9403 Goldach
Phone ++41 (0)71 844 94 44

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

SUMMARY

Pinces et embouts · Zangen und Endstücke · Collets and end pieces

for

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ANDRÉ FREI ET FILS SA

Rue des Gorges 26
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www.frei-andre.ch

CH-2738 Court
Fax +41 32 497 71 35

WE ARE PASSIONATE!

Passion is the fuel which drives our daily work. We all need this fuel to help us excel and make the best choices, so that we can offer products to meet the market's needs at the right time.

Passion is in evidence on a daily basis at Tornos, as the following examples prove:

MultiSwiss

The MultiSwiss multi-spindle machine is one of Tornos' recent successes. We have now installed over 100 machines (in three years) in the company's key markets, which include the automotive, medtech and watchmaking sectors.

SwissNano

The SwissNano is obviously the global success story of the last 12 months. Thanks to its watchmaking specifications, it is the ideal machine for every workshop in this field and many users currently benefit from it. The electronics and medical/dental sectors have also seen the great potential of the SwissNano machine.

Swiss ST 26

The Swiss ST 26, launched in 2013, is also worth mentioning. The machine has universal appeal thanks to its kinematics – which is cleverly designed for maximum productivity – in addition to the wide range of equipment available and its attractive pricing.

EvoDeco

With the EvoDeco's 10, 16, 20 and 32 mm versions, our high-tech range has received considerable praise. It pushes back the boundaries in bar turning involving increasingly complex workpieces, and enables our customers to achieve ever better performance levels.

Share our passion at our open days

All these products helped us to project a strong and dynamic image at our 6th Journées Horlogères open days held from the 4th - 7th March. The high numbers of specialists who attended confirmed that we are working in the right direction. We are still fuelled by passion. We invite you to share our passion at our upcoming specialist exhibitions at Siams in Moutier and at EPMT in Geneva for the Swiss market I cover.

Carlos Almeida

Sales manager
for Switzerland

PS: Tornos operates worldwide. For more information, please see our new website: www.tornos.com

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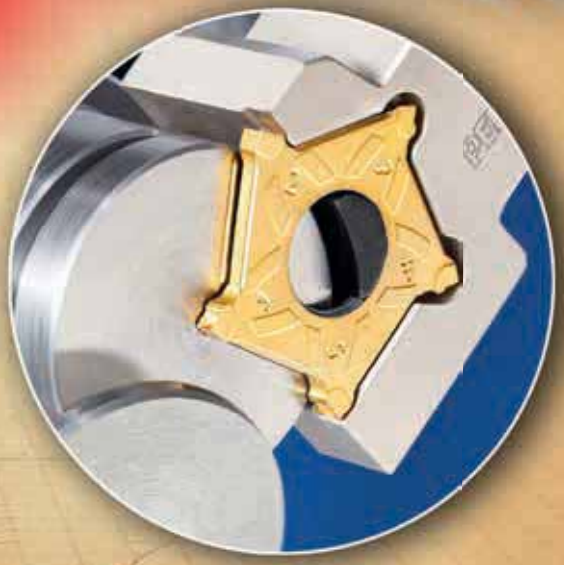

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INTERNATIONAL GLOBAL STRATEGY

After several conversations with customers, it is apparent that Tornos' strategy has not been clearly explained or understood and several myths are circulating, for example that SwissNano machines are manufactured in Asia to cut costs. To clarify the situation, an interview was held with Mr. Carlos Paredes, Development and Operations Manager at Tornos since 1st December 2013.

Techno-Center Moutier.

With 30 years' experience of managing machine-tool production sites in Switzerland and production project management in Asia, Mr. Paredes is now applying his expertise to strategy implementation at Tornos. Before starting, he told us: *"It is very exciting to be part of a company as dynamic as Tornos and to be able to call upon an extremely high level of expertise, not only for implementing new production methods in Asia, but also for modernising our production facilities in Switzerland."*

A clearly defined strategy

The company strategy is clearly structured around two key areas: firstly, developing innovative technological solutions and supplying high-end machining equipment; secondly, developing less sophisticated ranges of machines to meet all needs. Although the second area is mainly focused on Asia (with the CT, Swiss ST and Swiss GT machines in part designed to replace the Delta and Gamma machines), the first area of this strategy focuses on products which are designed and manufactured in Switzerland (SwissNano, EvoDeco and MultiSwiss). Almac uses exactly the same strategy.

Expertise and openness

When asked about his first impressions after a few months at Tornos, Mr. Paredes is very positive: *"I have found an extremely high level of expertise and professionalism." Many colleagues are very open and some have moved to Asia to guarantee the quality of our products made in the region. In terms of products, the ranges are quite new and there are a number of innovations that have recently been put to market. In addition, we have identified the key areas for development and launched projects for the products which are lacking in our product range."* He adds: *"These are important projects and they are*

progressing very well. There was a certain fear within the company that our strategy was turning completely towards Asia, but our colleagues now understand that production at Moutier is very important and that we will continue to develop it. The product ranges manufactured in Asia are supplementary."

Siting production as close as possible to the market

"We currently have three production sites across the world: One in Moutier (Switzerland) for the high-end machines, one in Xi'an (China) where we are the majority stakeholder and responsible party in a joint venture with a local manufacturer (CT machines) and one in Taiwan where we have a subsidiary which oversees the production of the Swiss ST and Swiss GT machines as well as the Almac CU 1007 machine," explains Mr. Paredes. The company's main aim is to produce locally to focus on meeting local needs but also to manufacture a range of straightforward machines designed for all markets. He is very clear: *"Both mid-range and high-end machines will continue to be developed and manufactured in Moutier".*

Very different markets

Nowadays, the level of knowledge and skill possessed by operators and companies means that a machine which is straightforward in Europe is very often too complex for the majority of customers in Asia. Conversely, the straightforward machines manufactured in and for Asia are often not advanced enough for the European and American markets. Of course, complex machines are also sold in Asia and very straightforward machines are sold in Europe, but in terms of volume, the figures speak for themselves. Several thousand straightforward machines are sold in Asia every year. When asked if Tornos plans nevertheless to relocate the production of high-end machines to Asia, Mr. Paredes responds: *"Take the SwissNano machine, for example: it offers the best value for money on the market and it is made in Switzerland, unlike its competitors, which are all manufactured in Asia. That proves that it is entirely possible for us to produce machines efficiently in Switzerland. Moreover, we have very ambitious objectives for Asia: our production lines will be working very hard to meet demand in these markets. We have no intention, nor the capacity, to relocate our high-end machines to Asia. It is simply not on the agenda."* With the SwissNano machine, Tornos is proving that it is possible to be competitive while manufacturing in Switzerland.

Accomplished teams in Moutier and La Chaux-de-Fonds

The new machines developed in Moutier perform well, and the customers appreciate and value their design, versatility and high level of quality. It took Tornos' engineers around a year to develop and fine tune the small SwissNano machine, and a few months after its initial launch it is gaining popularity on the market. Satisfied customers are increasingly seeing the SwissNano as the watchmaking machine of the future. When asked about the importance of this machine for Tornos, Mr. Paredes replies: *"The watchmaking market represents approximately 18% for Tornos, which is quite significant. We are also building our expertise in microtechnology, and this is benefiting all our customers in all business sectors."* Tornos' engineers in Moutier and La Chaux-de-Fonds stay in tune with the markets and are constantly looking for innovative technological solutions. He concludes: *"We are lucky: our two R&D and production sites in Switzerland rely on highly skilled teams for whom microtechnology holds no secrets."* The fact that they are located in the heart of this historic market is even more suitable.

Skilful partners in Xi'an…

In China, the company that produces Tornos machines is a joint venture led by Tornos SA which includes XKNC, a partner which is well-established with a "quasi-Japanese" culture and which produces milling and grinding machines in particular for Japanese manufacturers. The company has already supplied the Chinese market with around 200 3- and 4-axis automatic turning machines. Mr. Paredes explains: *"We have applied our knowledge and expertise as a basis for an existing straightforward machine. Our engineers have developed a new machine whose key components, notably the spindles, are still assembled in Switzerland. Our teams develop the product and bring it to life."* The resulting CT machine is straightforward. In the first phase, it has only been introduced and sold on the Chinese market. It will arrive in Europe in the second half of the year.

… and in Taiwan

The Taiwan office works on the basis of supply contracts with a partner company which produces over 2000 machines a year; here too the Swiss manufacturer relies on local manufacturing solutions which are tried and tested. The first machine to come off the production lines in Taiwan is the Swiss ST 26 machine which has now arrived in Europe after being launched in Asia and the USA. Mr. Paredes explains: *"This machine offers excellent machining capacity and is competitively priced. It is a lower performance machine than the EvoDeco but, for certain requirements, it is sufficient. We designed this machine in Moutier thanks to the expertise of our engineers who also developed the EvoDeco."*

Maximising the sales network in Asia

"The Chinese market is massive – we are talking about thousands of machines sold each year – so a highly effective sales network is essential. To sell straightforward machines like the CT, we can rely on our partner in Xi'an which has a sales and service network comprising 120 staff in 21 offices across China," explains Mr. Paredes. This network comes as an addition to the traditional Tornos network and enables the company to reach out to new customers for whom purchasing Tornos machines had not been on the agenda until now. The sales network is convinced that the Tornos brand, with its straightforward machines manufactured in Asia and more advanced machines in Europe, is a strong differentiating factor which enables the company to go from strength to strength in Asia and the rest of the world. *"The potential is huge,"* concludes Mr. Paredes.

Design by Tornos Switzerland

Like Apple, which outsources a large percentage of the manufacturing of its products to Asia, but which always displays the origin of its design (California), Tornos products manufactured in Asia are always designed in Switzerland. Mr. Paredes goes on to explain: *"The decision-making power is in Switzerland and will remain here."* The values of the Tornos brand are the same, whether the products are manufactured in Asia or in Europe. The design, development and quality all meet Tornos' high standards.

Are you looking for a quality machine for manufacturing simple or complex workpieces? With its new product range, which provides machines for all levels of equipment and complexity, Tornos is, now more than ever, a reliable partner which will enable you to find a machine perfectly suited to your needs.

The Tornos Xi'an team in front of one of the first CT20 machines.

Production of the CT20 machines at Tornos Xi'an.

Tornos Xi'an.

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- Reduced end piece

Type / Typ TP

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- Adjustment by a pneumatic cylinder
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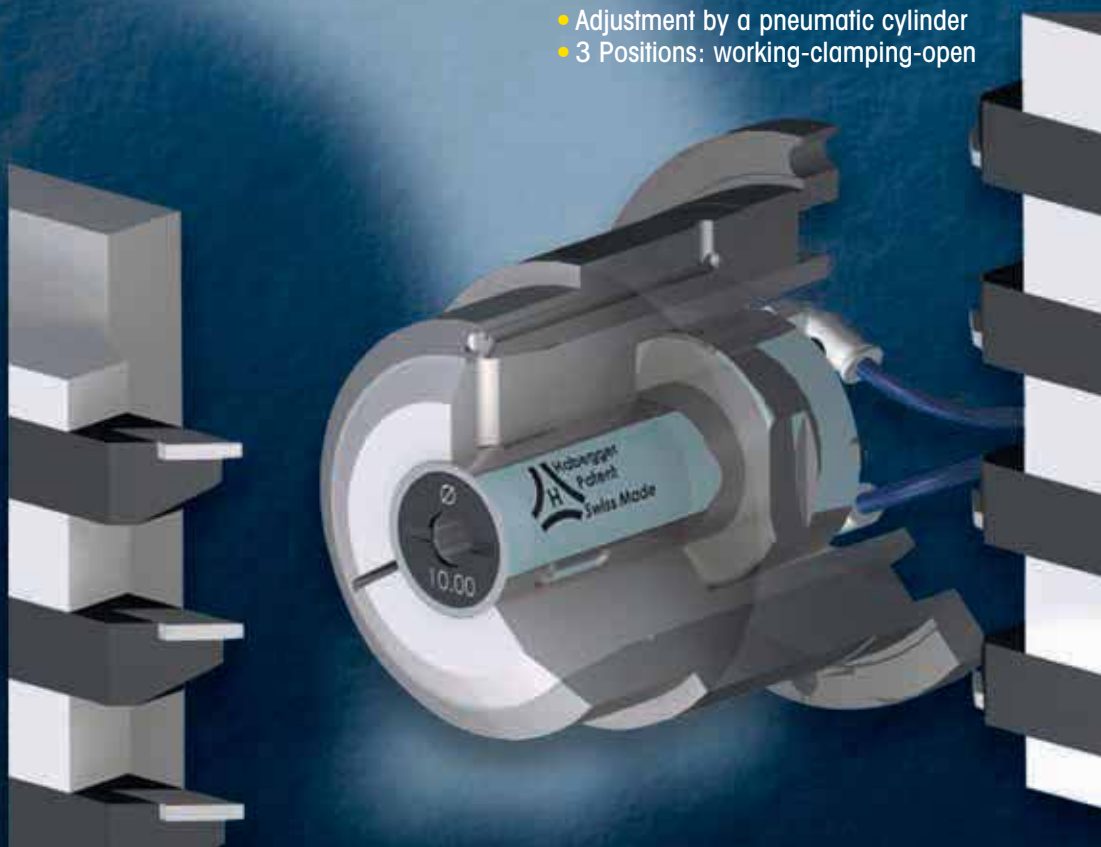

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A NEW ENVIRONMENT FOR THE SWISSNANO

Tornos' latest product launched – the SwissNano – is a remarkable machine in many respects. Produced entirely in Moutier, the SwissNano is assembled in an equally exceptional setting. A guided tour of the SwissNano Center by its manager, Giovanni Iadarola.

decomagazine: Mr Iadarola, what are the new developments at the SwissNano Center?

Giovanni Iadarola: Firstly, we have grouped together all the machine's assembly and adjustment operations in bright, modern premises. It's a real pleasure to work in this environment. The machine follows a logical flow through several steps. It all begins with receipt of the enclosure; once this arrives, assembly of the electrical cabinet can begin. Meanwhile, we also begin assembling the mechanical components here at the SwissNano Center.

dm: What does this assembly of mechanical components consist of?

GI: It all starts with the machine's cast-iron base, which is phase 1 of the assembly process. A significant proportion of the machine is assembled around this part. The cast-iron bases are placed on rotating jigs to facilitate the work of the assembly technician. The first phase in the assembly process lasts 8 hours. During this operation, the guide components are fitted in the machine. Rails, ballscrews, slides, motors and guards – all these components are attached to the base of the SwissNano. The spindle and counter spindle are also fitted to this central component. Once these two components have been adjusted, the guard is fitted and the base is moved to the assembly line on a special support. It should be noted that the necessary tooling is within arm's reach on each workstation, enabling our fitters to work quickly and efficiently and to consistently achieve the high levels of quality our customers expect from us.

dm: You talk about assembling all these machined parts. Where do they come from?

GI: The Swiss Nano machine is a Swiss Made product and all its parts are machined in Moutier. (For more on this topic, see the interview with Mr Paredes on page 7.)

dm: And am I right in thinking that the spindles are assembled not far from here?

GI: That's right. Once the spindle components have been produced, they are assembled in our 'spindle centre'. This centre not only assembles the spindles for SwissNano machines, but also for all the group's machines. The spindles are the core components which are the key to our machines' performance. They must therefore be assembled with the greatest care: there is no room for error, they must be flawless. Before being fitted on the machines, they are subjected to a battery of tests to check their performance levels.

dm: Once phase 1 is finished, is the cast-iron base joined to the enclosure?

GI: That's right! Just like a car production line, where the bodywork is attached to the chassis, our SwissNano cast-iron structure is assembled on the base which already contains the electrical cabinet of the machine. The assembly line is equipped with 3 workstations, two of which are designed for phase 2 of the machine's assembly. This means that two machines can be assembled in parallel. The 3rd workstation is used to prepare machines equipped with particular modifications and special options.

PICK A COLOUR - ANY COLOUR!

The SwissNano machine is available in the following versions:


Standard black
(Black graphite)


Green
(Green acid)


Pink
(Pink diva)


Blue
(Blue ocean)


Red
(Red passion)


Orange
(Orange pumpkin)


Purple
(Purple grapes)


Yellow
(Yellow Summer)

Special editions:


Black and gold
(Watchmaking)


Red with a white cross
(Swiss)

dm: So, while it is competitively priced, the SwissNano can be equipped with special options if necessary?

GI: Exactly. The SwissNano is perfectly in line with Tornos' philosophy of delivering machining solutions, not just machines.

dm: Let's return to this second assembly phase – what operations does this involve?

GI: As mentioned earlier, the cast-iron base is assembled on the enclosure, the base of the enclosure is pre-wired and we connect the various cables and pipes required to operate the machine. Each workstation is equipped with a feeder on which the pre-assembled units are prepared. Each unit corresponds to a specific step, and the assembly process follows a rational sequence steered towards efficiency. The feeders are visual – they are open and allow you to see immediately if a unit is missing – saving time and improving quality for our customers. Once the second phase is completed, the machine receives its last protection and the final adjustments are made. SwissNano machines must meet all requirements in every respect at the end of phase 2 before they can continue the process. Machines equipped with particular modifications move to phase 3 to be equipped to customer specifications.

dm: And what is the next step in the process?

GI: Firstly there is the running-in stage – an operation which takes over 50 hours; next, the machine is transferred and undergoes full geometric testing

following a detailed procedure. The SwissNano is then ready to machine its first workpieces; it is during this test piece stage that the machine's functions and precision can be definitively validated.

dm: And what follows this final step?

GI: The machine is ready for delivery. It is either transferred to the Techno-Center (if the machine will be delivered and set up) or our shipping team takes care of it and prepares it for delivery. Just before this step, the machine is labelled with its name and the Tornos logo.

dm: What about colours? The wall of the SwissNano Center shows machines in many different colours. Is there one popular option in particular?

GI: The majority of our machines are assembled in the standard colours. Increasingly, however, we are assembling the SwissNano in different colours. We have assembled almost the entire palette of colours available, on many machines.

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

IMAGINE YOUR FIRST MULTI-SPINDLE MACHINE…

EMO 2011 saw Tornos unveil the first numerical multi-spindle machine with sliding headstock, causing quite a stir. Today, a little over 2 years since the first machines went on the market, and with 100 machines sold, we asked Rocco Martoccia, the Product Manager who introduced us to the MultiSwiss 6x14 at the launch, for his thoughts on the product's success.

Developed to strict specifications, the MultiSwiss machine had to be not only simple, flexible, rapid and precise; it also had to fit into a price envelope which would enable customers to choose a multi-spindle solution that guaranteed a healthy return on investment.

An impeccable machine

"There have been some dissenting voices concerning our validation procedure, which has been seen as too careful, and which has "slowed down" the market launch of the MultiSwiss. Because we have developed radically new solutions such as the barrel without Hirth gearing and the hydrostatic bearings, we wanted to be certain that the machine was impeccable," explains Mr. Martoccia. And the statistics bear this out: there were no major issues when the MultiSwiss went on the market. The Product Manager adds: *"Having sold 100 machines, we are very pleased to note that our customers appreciate the great reliability and efficiency of the MultiSwiss, and that there have been no issues with the product."* Speaking of efficiency, Mr. Martoccia also tells us about a customer who achieved an availability rate of over 90%. One of the strong points cited by users is the increased service life of the tools compared to other machines. In some cases they only require changing once a month (we'll cover this point in more detail later in an interview with the customer).

A unique place in the market

"The machine has found its place in the market - our customers keep on buying them," reveals Mr. Martoccia. Asked about the typical MultiSwiss

user, the manager is surprised to note that almost 25% of customers were not from the multi-spindle sector, but rather worked on single-spindle sliding headstock turning machines. Could the fact that the MultiSwiss is a six-spindle sliding headstock machine explain this popularity? *"It's a new phenomenon for us, and we're proud to be able to say that the launch of the MultiSwiss has changed the competitive landscape. The machine's capacity and price mean we can propose it as a direct competitor to cam-type multi-spindle machines and/or single-spindle turning machines,"* adds the Product Manager.

Horology and much more

Nowadays, MultiSwiss machines produce parts to very strict specifications for the watchmaking industry, for example crowns or barrel drums (including cutting) and the medical sector, such as nuts (including thread-whirling and milling or broaching of hexalobular (Torx) forms). Mr. Martoccia adds: *"We have received enquiries from numerous sectors (aerospace, defence, etc.), with major luxury brands consulting us regarding a variety of parts for high-end products, and a number of mobile phone companies have also expressed their interest."* However, the automotive industry is still the most important one for the MultiSwiss.

CUSTOMER EXPERIENCE

Given the relatively large number of machines in production for two years, the designers wanted to find out how their designs and arguments were affecting day-to-day work in production workshops. The feedback from customers focused on the following points: 1) ease of use and quality, 2) precision and 3) the machine's user-friendliness. Let's look at these three points in detail:

1) Ease of use and quality

Whether specialists in multi-spindle or single-spindle machines, all the users cited the extremely simple programming (with the TB-Deco and an integrated industrial PC) and operation. The wide frontal access is very popular, as is the tool efficiency, which is between 20 and 300% higher than that achieved using traditional production methods. Mr. Martoccia explains the two main reasons behind this: *"The machine and tool holders are very rigid, but what really makes the difference is the increased damping offered by the hydrostatics and the shorter bar length, which minimises vibrations."* (we'll discuss this further later on).

2) Precision

The machine has been designed to offer precision down to less than a hundredth of a millimetre under production conditions on the 6 spindles, with counter-operation precision of around five microns. Do these precision levels meet the demands of today's market? Mr. Martoccia provides some figures to answer this question: *"Within the diameters of the workpieces produced (from 3 to 14 mm), those that require precision in the order of 4 or 5 microns are quite rare. And the fact that the MultiSwiss has been validated by the major Swiss watchmakers praises for its capabilities."*

3) User-friendliness

The modern design and user-friendly operation of the MultiSwiss also make it easier for companies using it to find qualified staff willing to devote themselves to multi-spindle machining. *"The machine is as simple as six 2-axis turning machines, and programming is 90% standard ISO code with macros and help functions. The vast majority of our customers that use this machine are fully committed to the integrated PC*

and the TB-Deco tool, which makes life much easier," explains the product manager. Remote maintenance also keeps intervention and servicing costs down, thanks to improved diagnostics and more targeted operations.

What about 1.5 metre bars?

Since the market launch, certain customers have questioned the replacement of three-metre bars with 1.5 metre bars. Mr. Martoccia explains: *"We decided to work with shorter bars to improve space, precision and handling conditions". The feedback from users has justified our decision. And although the length cutting operation involves an additional cost, this is compensated by a reduction in material loss, in particular thanks to a significantly reduced drop length (5 times less than that on single-spindle turning machines and 3 times less than that on other multi-spindle machines). The increased feed precision compared to other multi-spindle machines, which feed to a bar stop, also reduces facing material loss. On short workpieces, this can mean a gain of 25%."* The lack of a precedent meant that the initial decision to use 1.5 m bars was highly ambitious. Certain suppliers now offer 1.5 metre bars as standard in their range (notably Ugine in stainless steel). This results in greatly simplified handling.

Tool holders: guaranteed flexibility

Supplied as standard with Tornos tool holders, the MultiSwiss machine can also be fitted with new quick-change GWS tool holders from specialists Göltenbodt. Mr. Martoccia explains: *"We started again from scratch and consulted several tool system manufacturers, before deciding to work closely with Göltenbodt."* The result: A quick-change tool holder system which is complementary and interchangeable with standard Tornos tool holders. Combinations are also possible, and the less expensive Tornos solution can be chosen for positions that do not require frequent tool changes, for example.

A dream come true

During the IMTS show, an American customer, who had come from Chicago to buy a new single-spindle turning machine to add to his existing inventory (numerically controlled single-spindle turning machines and outdated cam-type multi-spindle machines), discovered the MultiSwiss. This innovative and very competitively-priced Swiss-made turning machine suddenly turned his dream of purchasing a modern multi-spindle machine into a reality! Mr. Martoccia concludes: *"The customer has been working with the machine for a few months and is already planning to buy another of the same type. It has really opened up new markets for him."* The MultiSwiss represents a new gateway to the highly productive world of multi-spindle machining.

What if it were to become your first multi-spindle machine?

TORNOS

Further information:
Rocco Martoccia
Tornos SA
Tel. +41 32 494 44 44
Email: martoccia.r@tornos.com

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SWISSNANO – THE POSSIBILITIES ARE ENDLESS

Visitors to the 2014 Journées Horlogères open days could admire the SwissNano's remarkable capacity for producing watchmaking parts. Despite its simple appearance, the SwissNano offers outstanding machining options and is the most flexible machine on the market. The machine owes its flexibility to a large range of options, but also to a good deal of ingenuity. These options will be covered here.

The machine's 6-axis kinematics offers numerical settings in all dimensions. All users find that the counter spindle, with its 3 linear axes, is very comfortable to use. In addition to the counter spindle, the second platten can house tools under the counter spindle, which increases the SwissNano's machining capacity. Depending on the support, 2, 3 or 4 tools can be fitted under the counter spindle, enabling the machine to perform operations in parallel on the two plattens.

Simultaneous turning

This kinematic enables, for example, "roughing/finishing" operations to be performed, but that's not all: it is also possible to turn and drill at the same time, to deburr and to hob, or even to support a workpiece during delicate operations. To help you make the most of the kinematics, Tornos has developed a series of devices to enable the SwissNano machine to handle a wide range of workpieces on delivery.

Balance shaft video
http://www.youtube.com/watch?v=D1xwDbUKH6A

Thread milling devices

Occasionally used as a polygon tool, but more often as a device for milling threads on small screws, this device can be fitted as a tool which can successfully perform thread chasing operations. It is possible to achieve very fine threads: during the Journées Horlogères open days, one machine produced a screw with a thread of S 0.5. To see this operation in more detail, go to Tornos YouTube channel where you can admire the workpiece being machined up close.

Screw video
http://www.youtube.com/watch?v=NB6EL8Lq7qw

Gear hobbing

The SwissNano not only performs turning, milling and polygon operations; it can also perform gear hobbing. This means it can greatly simplify the value chain of your production and it is a very competitive solution for performing hobbing operations. Now this complex operation can be performed on a single machine. During the Journées Horlogères open days, a cannon-pinion and a sweep second pinion were machined. You can admire these parts being produced in the videos.

Hobbed cannon-pinion video
http://www.youtube.com/watch?v=cvaG4qwwZ5M

Sweep second pinion video
http://www.youtube.com/watch?v=sJ5Avvs_wHU

Guide bush: rotating, fixed or none

The SwissNano is the only machine on the market able to make such a simple conversion; the machine can switch from working with a guide bush to working with a collet in a matter of minutes. The machine is simple to use: its TMI interface fully automates switching between using fixed guide bushes, rotating guide bushes, or no guide bush at all; simply select your preferred setup in the interface and the machine automatically makes all the settings for the operator. This option further reinforces the machine's flexibility and truly makes it the perfect partner for machining small components requiring extreme precision.

High-frequency spindles

As a special modification, the SwissNano can be equipped with high-frequency spindles, in operation or counter-operation, as required by the parts. During the Journées Horlogères open days, was machined; a double plate with two front-mounted spindles; this is one of the most difficult parts to produce on a bar-turner and, as you will see in the video, the SwissNano did a marvellous job.

Double plate video
http://www.youtube.com/watch?v=Nsn_7LmNQ7A

Milling

In addition to high-frequency spindles, the SwissNano can also be equipped with 1 or 2 mechanical drills for performing drilling or milling operations. It is also possible to perform splitting operations on the SwissNano.

Foolproof repeatability and precision

The machine's structure is designed to meet the most demanding needs of the watchmaking industry in terms of precision, repeatability and surface finishes. Thanks to its flexibility, the SwissNano is a competitive solution which effectively meets the needs of the watchmaking industry (amongst others), proving to be the perfect partner for producing any type of small part. The SwissNano may be small, but you will be surprised at its great performance and flexibility!

You can come and (re)discover the SwissNano at the following exhibitions:

- SIAMS 6th - 9th May
- GEWATEC 26th - 28th June
- IMTS 8th - 13th September
- AMB 16th - 20th September
- BIMU 20th September - 10th October
- PRODEX 18th - 21 November

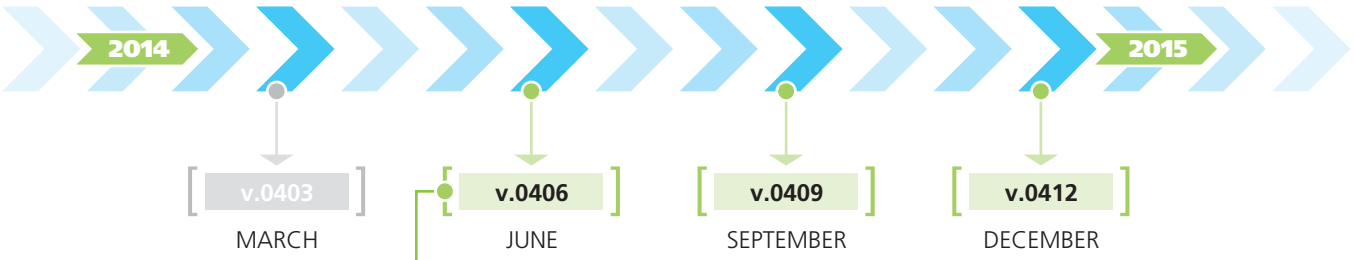
TORNOS

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

MACHINE CONTROL SOFTWARE: CONTINUOUS DEVELOPMENT AND IMPROVEMENT

The 20th June 2014 will see the launch of the new version of the Machine Control software for the EvoDeco PTO, Deco PTO and SwissNano machines. Tornos staff around the world have already been trained to help users upgrade to the new versions of the control software. As usual, Tornos' team of specialists will be on hand to assist customers. The company has also invited its customers to send suggestions to the address shown at the end of this article using a special form.

MACHINE CONTROL SOFTWARE RELEASE SCHEDULE



Tornos software version:

- Machine Control: 0406.00
- TB-Deco: 8.02.05
- ISIS: 1.3
- Connectivity kit: 1.3

New on version 0406.00:

- Managing bar end stoppage on the SwissNano.
- Programming in inches on the SwissNano.
- Optimisation of SBF 216 and 532 bar feeders.
- Automatic preheating option on the SwissNano.

New developments for 2014:

- Automatic axis lubrication on the SwissNano.
- Multiple program management on the SwissNano.
- Help page in TMI.
- IES management for the EvoDeco PTO and Deco PTO machines.
- Improved production management for the SwissNano.
- And much more.

For the latest news, or to ask questions or make suggestions, contact us at **www.tornos.com/softwarecontrol**

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Link to the application film:

NOWADAYS, BAR TURNERS NEED A CAM WHICH NOT ONLY CALCULATES THE CONTOUR POINTS, BUT MUCH MORE

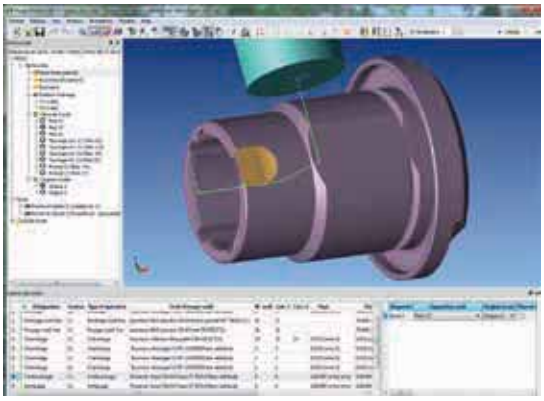
The real challenge for bar-turners today lies in being able to quickly program increasingly complex workpieces on ever more powerful turning machines with up to 5 simultaneous axes. Detecting collisions and off-strokes during a simulation is indispensable for reducing the setup time. Read Fischer Connectors' account of how it runs its machine inventory using the Mastercam Swiss Expert.

Products: Fischer MiniMax™ Series and Fischer FiberOptic Series

Fischer Connectors has chosen to run its turning machine inventory using the Mastercam Swiss Expert

Based in Saint-Prex, in the canton of Vaud, Switzerland, Fischer Connectors is a leading company in the design, manufacture and distribution of circular push-pull connectors and high performance wiring. Robust, sealed and compact, its products have proven to be reliable in difficult environments.

After giving serious consideration to several CAM solutions, Fischer Connectors has chosen to run its turning machine inventory using the Mastercam Swiss Expert. The evaluation included several presentations, visits to user companies, benchmarks and full production of a test piece. The following points were vital in the selection criteria: the chosen solution had to be able to run all the machines concerned including the TB-Deco and had to work in the machine's full environment with simulation of machining and special tooling. It also had to manage operations specific to bar turning and have a user-friendly interface. Finally, they were looking for a local company to provide CAM installation and training. Other convincing arguments for Fischer Connectors to install the Mastercam Swiss Expert included the opportunity to capitalise on the company's expertise, by making the most of what they already had, and the option to fully configure the specific production details. Fischer Connectors purchased several floating licenses with a customized package of training and support for the solution, along with sample parts.



Benchmark: Fischer Connectors with the Mastercam Swiss Expert.

Florian Beccarelli, a bar-turner at Fischer Connectors, explained the selection process: *"We chose to install a CAM to limit the many sizing pages for workpieces which were increasingly complex to program manually. The main points included:*

- *standardising our programs by creating machining operation models*
- *estimating cycle times, and therefore costs, before performing machining operations on the machine*
- *considerably reducing programming time.*

From the very beginning of the training, the technical support team at Jinfo SA has been very quick to respond to our requests and very open to adapting the post-processor to our needs and our usage."

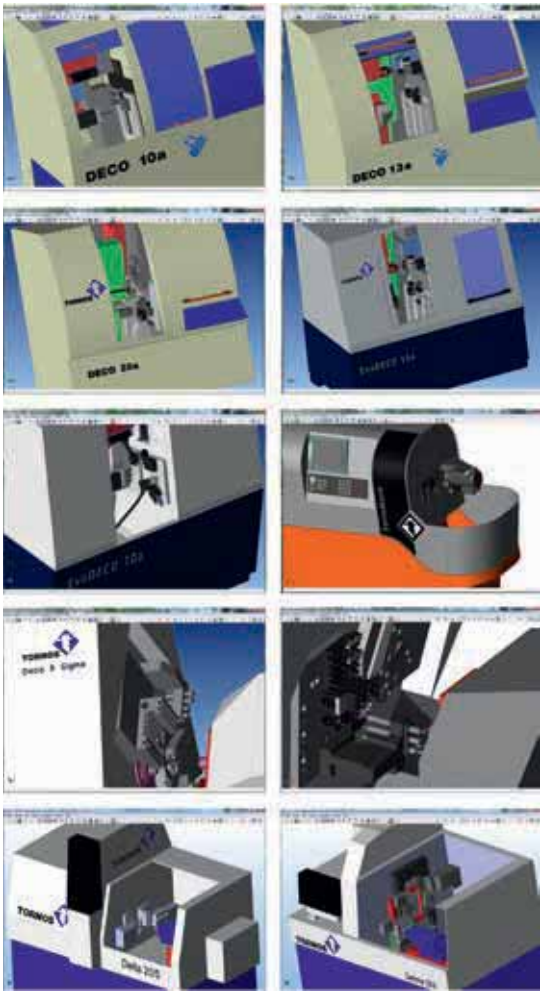
Integration of grippers and guide bushes

Always aiming to meet the actual needs of its users and respond to their demands, the new version 13 of the Mastercam Swiss Expert integrates and manages grippers and guide bushes. These are supplied as standard with the machine environments. Guide bushes and grippers can also be custom designed in 3-D, including special "long tip" grippers for detecting collisions with these elements.

Examples of grippers and guide bushes supplied as standard with the machine.

The family of controlled turning machines continues to grow

Currently, over 70 turning machines are controlled with full kinematics including management of off-strokes. Our customers are very satisfied with the new PTO operating mode on the EvoDeco. The post-processors are adapted on request and can be customized to the needs and specific requirements of our customers. Version 14, set for release this autumn, will include a new concept for integrating post-processor customisations.



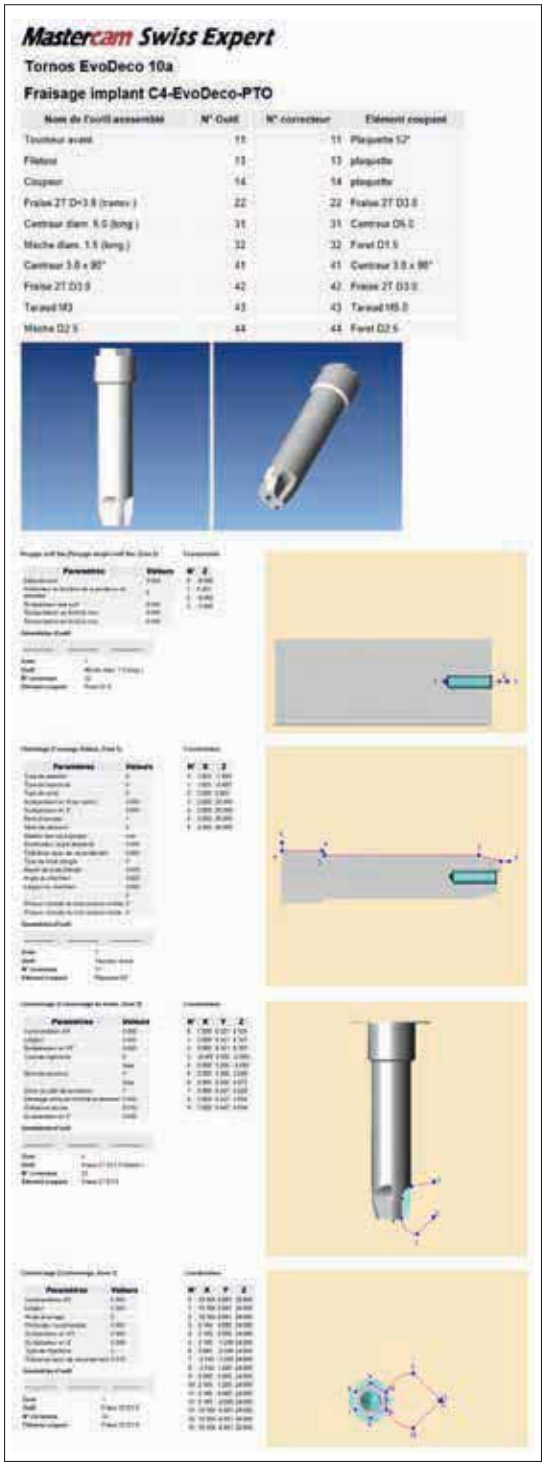
Some examples of Tornos turning machines fully controlled by the Mastercam Swiss Expert.

Automatic generation of phase plans

Following a request from one of our watchmaking customers, a revolutionary new "Phase plan" module has been developed. It is available on the market now. This module aims to support pre-existing workshop documentation to eliminate any guesswork and leave no room for interpretation in a program's tool paths. The document is automatically generated in .html format and provides the machine setter with

all the required setup information, saving him time when reading the ISO code.

The "Phase plan" serves as a visual aid of the phases for machining a workpiece, giving all the precise coordinates in a table according to the axes used. This document also serves as an aid to validate the machining operating procedure.



Some examples of automatic phase plan reports to make setting easier.

Integration of Mastercam 5-axis module

For over a year, the Mastercam Swiss Expert has been managing several turning machines with a B-axis for positioned or continuous machining. These options open up new opportunities to produce parts on turning machines, but manual programming can be tedious or even impossible.

The Mastercam Swiss Expert integrates powerful algorithms for 5-axis continuous machining on the Mastercam – the most widely used CAM in the world – providing bar-turners with tailor-made software offering all the performance of a milling solution.

Acknowledgements

Jinfo would like to thank Fischer Connectors in Saint-Prex, and bar-turner Florian Beccarelli in particular, for their help in producing this article.

Fischer Connectors
CH-1162 Saint-Prex, Switzerland
Tel. +41 21 800 95 95
www.fischerconnectors.com

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Call (800) 228-2877
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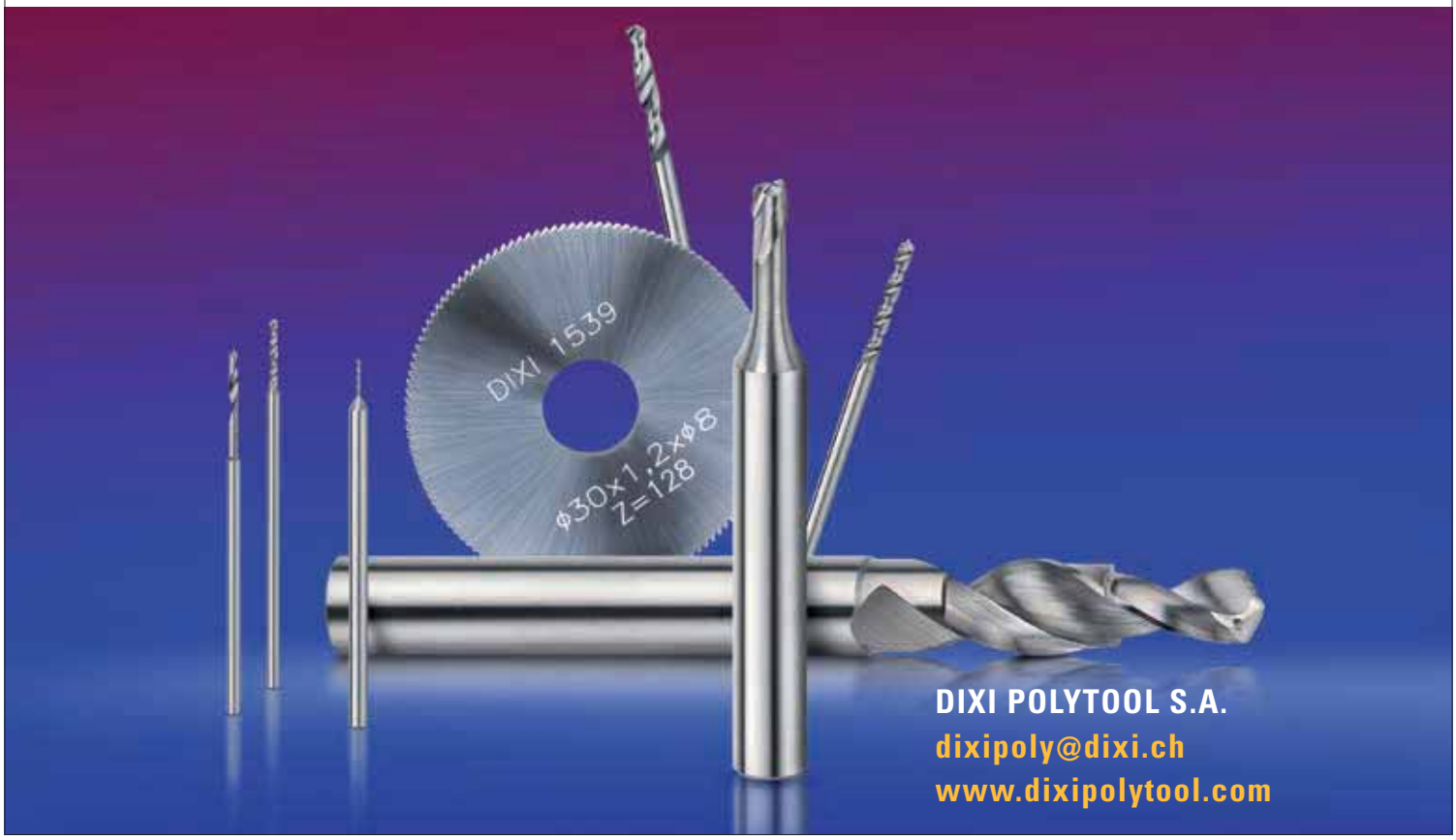

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dixipoly@dixi.ch
www.dixipolytool.com

POLYZED.CH

ROUTE DE CHALUET 8
CH-2738 COURT
SWITZERLAND
T +41 32 497 71 20
F +41 32 497 71 29
INFO@MEISTER-SA.CH
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PRECISION CARBIDE TOOLS

A FIRST-CLASS SERVICE IS NOT A LUXURY… IT IS ESSENTIAL!

All companies aim to satisfy their customers both in terms of the products and the service they receive, and Tornos is no exception. The company make a point of ensuring its services are customer-focussed. It is common to say that, while the first machine is sold by the sales department, it's often service which seals the deal on a second machine.

To find out more about the Tornos service, decomag met with Simon Aebi, Head of Customer Services and Jérôme Gafner, Spare Parts Manager.

decomagazine: What range of services does Tornos offer?

Simon Aebi: We offer a full range of services from installation, machine repair and preventive maintenance to training and coaching; just recently, we have even begun offering complete overhaul of machines. We are here to help our customers in almost any circumstance, even before they have bought their machine. In fact, Tornos can even perform "proof-of-concept" or feasibility tests, thanks to our "Techno-Centre". After the machine is installed, coaching can also be offered, if necessary. Our customer support continues after their machines are installed. We want to work in close partnership with our customers.

dm: What geographical areas do you cover?

SA: Our services are available worldwide. We stock spare parts in several decentralised locations around the world, which means we can offer a rapid response wherever you are. (This edition contains a flyer with the contact details of our after-sales service teams around the world).

dm: What about training? Is this always up-to-date?

SA: Yes, more than ever. Our training rooms have recently been converted so that we can effectively teach our customers how to operate the SwissNano machine and use the ISIS software. Demand is strong in this area, and we provide the means to meet that demand. In Moutier, our targeted and condensed small-group training enables our customers to improve their knowledge of our production tools.

There is a broad range of courses, from machine maintenance to programming and medical technologies etc. All these courses can be customised according to individual needs.

dm: After training, who can customers contact if there is a problem?

SA: We offer one hotline for software and one hotline for general issues (see document enclosed). Customers can contact us at their convenience about programming issues or maintenance problems. Our specialists are there to answer their questions and guide them towards the solution. This may take the form of an on-site repair and/or replacement of a faulty or worn part.

dm: You spoke about machine overhaul – what is that exactly?

SA: It is a new service which we have recently launched: we service old Deco-type machines to restore them to their original condition. The condition of the machine is analysed and discussed with the owner. We have the skills and equipment to restore machines to their original condition. Once

IDENTIFY, ORDER… AND PRODUCE…

On a modern production facility, often working under extraordinary constraints, a need for spare parts often becomes arises. And should this happen, time is, of course, of the essence. In the event of machine downtime, it is vital to be able to restart production as quickly as possible. Any error in identification or delivery can cost dearly.

For years, Tornos has been looking to create a system that would centralise and categorise the references of all the spare parts for the machines we produce, and make these available to its customers. After a detailed conceptual design process, the system was set up. The first users were Tornos employees across the world. After intensive use of this system by professionals speaking different languages and thinking differently, the company then improved the system to make it even more efficient and "universal".

Once this second version had been validated, a test group of customers with large machine bases, who would therefore use this system intensively, was formed. After several months, minor changes were made and this tool was made available to the public in 2010. It has since been continually developed to ensure that it is as up-to-date and comprehensive as possible.

It is an online ordering and identification system, rather than a diagnostics tool. The user can search for the parts required in several ways. He can simply use the part names, or choose to browse through the parts lists (technical groups), or even make a visual search using intuitive image-based navigation. Once the part has been identified, its availability and price are instantly displayed and the user can place an order, at any time!

the checks have been completed, the machine is dismantled and each part is cleaned by our specialists and then it is rewired; the ballscrews and guides are replaced, along with the spindle motors and driven tool motors. Of course, we can perform partial overhaul on customer request.

dm: Could this be described as a solution for the future?

SA: Indeed it is. For customers who don't want to invest in a new machine, we are now able to fully service a Deco machine so that, when it leaves our workshops, it performs as well as it did when it was first purchased. Spare parts for these machines are still guaranteed to be available for more than 10 years. These machines are therefore reliable long-term production partners.

dm: You mentioned spare parts. What are the new developments in this field?

Jérôme Gafner: We have now extended our online ordering system to include all our products. This means that our customers can now place their own spare parts orders on our platform http://catalogue-spr.tornos.com/. This not only enables customers to easily identify their parts, but also instantly informs customers on the availability of parts. Customers using this system also benefit from a discounted price on their spare parts, making this solution modern, quick and cost-effective.

dm: There seem to be many benefits to this system – if a customer wants to access this system, what conditions apply?

JG: None! Customers simply go to http://catalogue-spr.tornos.com/ and subscribe by completing the form. We will process their request as soon as possible. I would like to encourage customers to contact me at gafner.j@tornos.com if they have any further questions.

TORNOS

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

TORNOS AT THE SIAMS TRADE FAIR: A WIN-WIN PARTNERSHIP

The Siams trade fair for microtechnology production tools was launched in 1989, primarily in response to industry specialists and entrepreneurs in the Jura Arc who expressed a need for an event to showcase their products.

Tornos has participated in the event each year and has presented many products at the trade fair. The company has used this platform to launch its EvoDeco 10 and Delta machines, to name just two recent examples. In 2012, around 450 companies exhibited at Siams and 15,000 visitors from all different backgrounds visited this exhibition. Tornos will be attending this year, as usual, promoting many new products and services; the company's stand will showcase not only turning machines but also milling machines. Decomagazine met with Philippe Devanthéry, (director of Almac SA), Carlos Almeida, (Swiss market manager at Tornos) and Patrick Neuenschwander (software research and development manager at Tornos).

decomagazine: What will visitors be able to see on show at Siams on the Tornos and Almac stands?

Philippe Dévanthéry: In terms of milling, we will present our Almac CU 2007 "Pick&Place" miller; this is an extremely versatile milling machine which is very competitively priced; we can use our expertise to adapt it for practically any application. On the demonstration model, we will be presenting an automation module mainly designed for producing watch cases. Instead of assigning the task of automation to a 6-spindle robot, we have developed a storage device on the CU 2007, with a gripper arm directly attached to the machine. This means that parts can be machined at extremely competitive costs! If required, this machine can also be equipped with a spindle rotating at 38,000 rpm, for even more powerful performance. We will also be presenting a BA 1008 machine on the stand, alongside the SwissNano machine, with both machines sharing the same base. The BA 1008 is designed specifically for machining indexes and prismatic parts; this makes it an excellent addition to the SwissNano which is a specialist turning machine.

Carlos Almeida: Although soon everyone knows the SwissNano, the same is not strictly true of its sister machine, the Almac BA 1008. The SwissNano adopts a bar-turner configuration where machining is performed through rotation of the bar: this is not the case for the BA 1008 where it is the tool which

rotates. On a daily basis, bar-turners find that they are forced to turn down orders for prismatic parts through a lack of rotating tools on their machine. This scenario inspired the BA 1008: a small, compact machine which fits into the prismatic part market at a competitive price. It enables our customers to make inroads into this field.

dm: Let's talk a little about the SwissNano – what has been the feedback from the market?

CA: We had to make a few corrective adjustments to the very first machines delivered, but these were made quickly, and now the results are truly exceptional across the board! The SwissNano achieves remarkable surface finishes: it is very precise, offering excellent dimensional accuracy. The best testament to this is that most customers who have invested in one machine have gone on to purchase another. Our customers are delighted with the cutting options, the machine's kinematic works wonders, and they all praise the advantages of the 3-axis counter spindle: the SwissNano fully accomplishes its mission. The brightly coloured machines are proving increasingly popular as investment decisions.

dm: What other new developments does this trade fair offer for Tornos?

CA: Visitors will also be able to admire the EvoDeco 32 machine featuring a medical setup. This is currently the most powerful machine on the market: its structure has been reinforced to allow large quantities of swarf to be removed and its kinematics achieves unprecedented levels of productivity. It's the only machine on the market to deliver such performance. Our showroom will also be open, providing visitors with refreshments and an opportunity to discover the Swiss ST 26 machine. This is an exceptional product offering a fantastic price/performance ratio. There will also be a demonstration of our new MultiSwiss with a Y axis. In addition to these two machines, visitors to Tornos will be able to see an EvoDeco 10 and discover the SwissNano assembly line (see article on page 11). And, of course, the main new development is the new version of ISIS – our machine programming software – which our development team has been working on, led by Patrick.

Patrick Neuenschwander: That's right. At Siams we will be rolling out a new version which visitors can download for free to their smartphones. Up to now, ISIS has only been available on 10" Android tablets; now we can support all types of screen, from smartphones to tablets with Android OS. The greatest new development lies in the application's design: we have adopted a new flat design which means more information can be displayed clearly.

dm: Is ISIS only available for the SwissNano?

PN: Currently ISIS can be used to program the SwissNano and the Swiss ST 26. But we will gradually be rolling ISIS out on our new machines. In terms of monitoring, we support the entire Tornos range plus the Almac range, as visitors will see when they visit Siams.

dm: Apart from the new design, what else is new with version 1.3?

PN: This new version allows automated file comparison, which means it is very easy to compare 2 tool catalogues or 2 ISO programs, for example. Isis now offers a display showing the tool trajectory. We also manage multiple documents, so several programs can be opened in the same editor; finally, it is also possible to generate PDF files automatically, in addition to the PDF print option. Gradually the ISIS application will become more and more powerful as we are already working on version 1.4 which has some great surprises in store – more on that in the next issue of Decomag.

Mr. Almeida, Mr. Devanthéry and Mr. Neuenschwander look forward to welcoming visitors to the Tornos stand (A4) in Hall 2.2.

The new version of ISIS can be downloaded for free during Siams from the store.tornos.com site. We encourage you to download it onto your Android Smartphone or tablet before visiting the Tornos stand!

http://store.tornos.com/packagedetails.php?id=1

WHAT CUSTOMERS WANT…

When a company is experiencing healthy development and everything is running smoothly, the risk of operating on autopilot increases, which can lead to problems. It was this pitfall that the organisers of Siams wanted to avoid. They carried out a large-scale survey of the event's exhibitors, both actual and potential, in order to better meet requirements. Interview with Francis Koller, director.

Siams 2014.

A specialist company carried out the telephone survey using a representative sample of customers and non-customers from both French- and German-speaking Switzerland. According to the specialist institute, the results are statistically representative and provide excellent scope for interpretation and use.

Why a survey?

"We had a good idea of the perception of Siams and the satisfaction of our exhibitors, but we wanted more "scientific" data to guide our decisions," explains the director. The result: Perceptions that correspond well with the Siams vision. So, was this survey a waste of time? Mr. Koller states: *"Absolutely not. Certainly we were very pleased to discover we were getting many things right, and that the positioning of Siams is almost unanimously clear, but we also identified several areas for improvement. I would also like to thank everyone who took the time to participate and answer our questions."* The average interview lasted 15 minutes, however some took over 45 minutes!

Let's look at the results in more detail

Siams is a targeted, specialist trade fair

The institute asked customers to define Siams in three words, completely spontaneously. Siams is perceived as a serious, highly specialised trade fair. *"If Siams had only been perceived as welcoming and enjoyable, without the specialist aspect that meets very specific requirements, we wouldn't have been satisfied, because we never forget that our main aim is to enable our customers - the exhibitors - to make contacts and do business,"* explains the

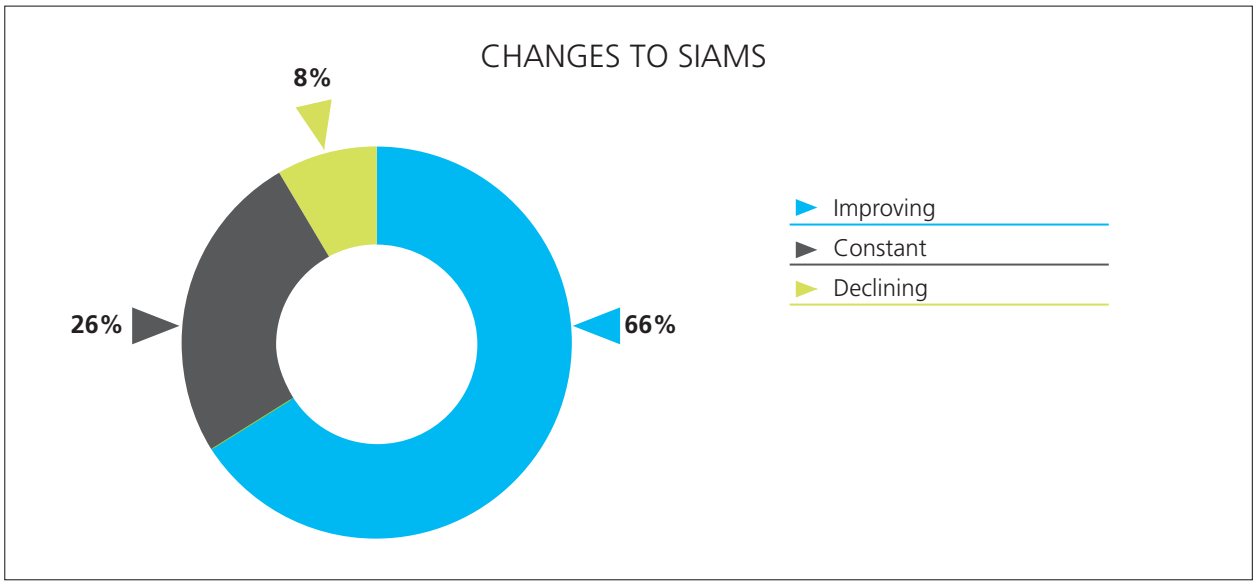
director. He adds: *"The survey found that the main element that justifies the participation of exhibitors at Siams is clearly the quality of visitors, with 83% of the responses. The survey also revealed a visitor satisfaction index, with an excellent score of 5 out of 6. The exhibitors and visitors are in agreement, which shows that our efforts are paying off, but we must continue."*

Siams is a welcoming, enjoyable trade fair

For over 40% of customers, the welcoming aspect of the trade fair was its main asset. The director explains: *"We knew that the exhibitors appreciate the politeness and availability of our staff, and we are not surprised that the quality of the trade fair's atmosphere was noted."* This aspect was also raised as one of the trade fair's strong points.

Siams is an extra-regional trade fair

Another significant point raised by the survey was that Siams is actually perceived as a trade fair that covers an area much larger than the Jura Arc. Numerous exhibitors mentioned the high proportion of extra-regional and foreign visitors. Despite the disappointment of some exhibitors at the trade fair's location in Moutier - far from the Lake Geneva region - the fact that the trade fair takes place at the heart of the economic fabric of the Jura Arc region's microtechnology production industry is a real plus.



When asked their opinion on the changes to Siams, 66% of exhibitors at the 2012 event stated that the trade fair was improving, while 26% judged the quality to be good and constant.

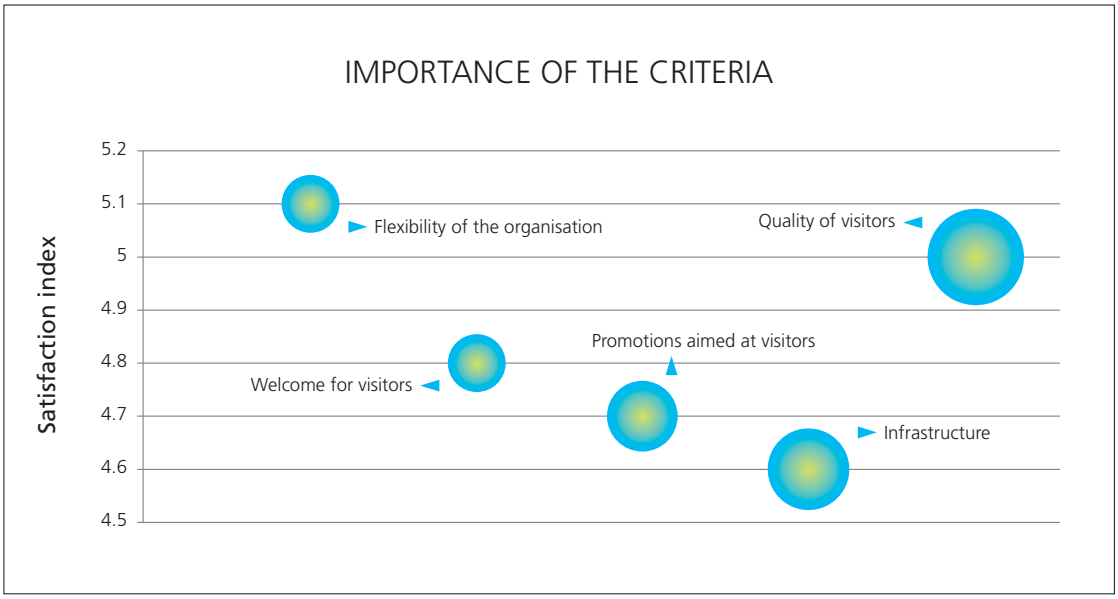
Siams is undergoing constant improvement

"More than 60% of the survey respondents feel that Siams is improving year on year, which makes us very happy," reveals Mr. Koller. The elements cited are the infrastructure, the organisation and the quality of the exhibitors. Some of the surveyed companies feel that Siams is in decline. What does the director think? *"We need to be careful with surveys; individual opinions can quickly take on a disproportionate significance simply because the survey brings them to light. But it is important to note that after closely analysing these few comments, it transpires that they relate to details. Details that we will rectify!"*

Clear objectives for 2014…

A few months before the event, what were the important points to take into account, and what are the consequences for exhibitors and visitors? Mr. Koller explains: *"We have a list of potential improvements and, naturally, we will work to implement them. This list includes elements as varied as infrastructure, the quality of the service offered by the supervisory body, Siams communication methods, among others."* The director continues: *"We welcomed around 15,000 visitors to the last event, and this year we expect even more."* The director also hints at his disappointment that certain exhibitors do not *"fulfil their obligations"*, relying entirely on promotion from the trade fair itself or other exhibitors. The organisers will also provide exhibitors with effective assistance in order to motivate and help them to invite customers. This is also in response to requests for improvements issued in the survey.

When asked to evaluate their satisfaction during the trade fair, exhibitors gave a score of 5.2 to the quality of the assistance provided and 5 to the quality of the visitors (good). The quantity of visitors, the quality of the welcome provided and the infrastructure were deemed to be highly satisfactory.



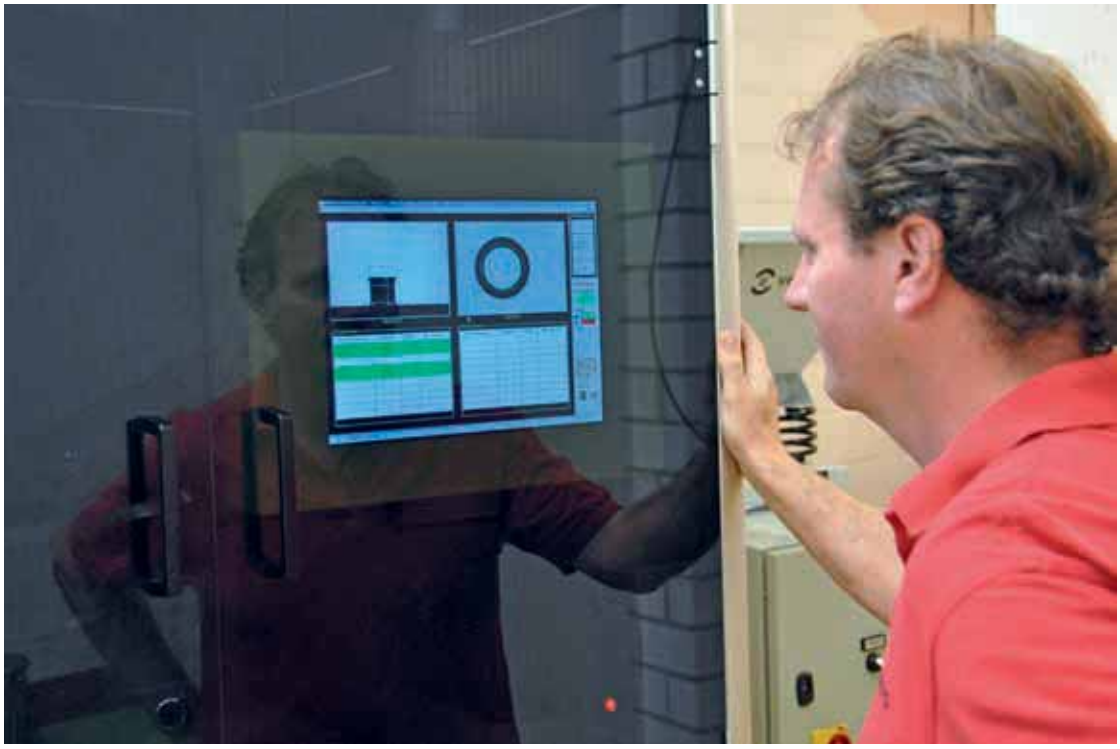
The flexibility of the organisation was awarded a score of 5.1, but its position on the horizontal axis and the surface of the sphere demonstrate that this is a less important factor. The most important factor was clearly the quality of the visitors (top right) which was awarded a score of 5. The welcome for visitors (4.6), promotions aimed at visitors (4.7) and infrastructure (4.6) were deemed more important than flexibility and showed signs of improvement.

… and in 2015

The organisers of Siams have capitalised on this satisfaction survey to find out exhibitors' views on the possible organisation of an annual Siams. The results are conclusive: exhibitors currently feel that Siams is a very important part of their marketing strategy every other year. Mr. Koller concludes: *"We have drawn clear conclusions, and we will not organise a Siams trade fair in 2015."* However, this does not mean that the Siams brand, which is closely linked to the microtechnology production industry, will be invisible in 2015. The organisers are already developing ideas for continuing to provide valuable services to their customers, even during the year without a Siams trade fair.

PRECISION TURNED PARTS, 100 % QUALITY CONTROLLED

Dimensional accuracy is a basic prerequisite for the production of turned parts. RB-Cema AG in Biberist, which specialises in automatic turning machine components, not only produces high-precision parts, but checks the parts one by one. The "zero-defect quality" achieved in this way is the result of a meticulously coordinated process.



RB-Cema AG produces series of up to 1,000,000 parts per week. As part of the process, every part is individually measured and checked according to precisely defined quality criteria.

RB-Cema AG was founded in 1993 by Hubert Brülhart and Rudolf Renfer, with four Tornos multi-spindle machines with the aim of manufacturing high-quality automatic turning machine components. In 2004, Hubert Brülhart took over RB-Cema completely. Today, the family company, which is based in Biberist in the canton of Solothurn, is managed by his sons-in-law, Patrick Schlatter and Michael Wächter. Over time, the number of machines has been increased, automation has been implemented and, as a ground-breaking milestone, visual 100 % quality control has been introduced.

"Zero defects" as a competitive advantage

Special turned parts, which are frequently included in assemblies, must have a high degree of dimensional accuracy. Imagine that a hydraulic switching block or a similar part with 20 identical components has a defect, simply because one of the individual turned parts fitted inside does not comply exactly with the required dimensional accuracy. More and more customers are therefore requesting fully checked turned parts from suppliers. The flexibility of RB-Cema AG enabled it to recognise this quickly and the company now has a state-of-the-art machine inventory to

The RB-Cema machine inventory includes test equipment which is designed specifically for the requirements of different customers. Scrap can be significantly reduced thanks to high standards.

Motorex Ortho NF-X is ideally suited to all of the multi-spindle machines used by RB-Cema. The Tornos MultiSwiss 6x14 was developed with NF-X and uses the cutting oil in a wide range of functions.

The quality is made visible thanks to the documented checking of all production batches. Along with the weight, the surface quality (Rz value = corrugation and roughness) is also defined.

Along with a tape filter, the MultiSwiss 6x14 also has several internal filters which filter the oil to a fineness of 5 µ. This is especially important for the hydrostatic mounting of the six spindles.

completely control its production batches. As a result, four machines can be used for visual checking, and one machine can be used to check for cracks.

Making quality visible

The company machines parts with a diameter between 4 and 16 mm. With approximately ten specialist employees, the strengths of the company lie on one hand in the production of high-quality parts and on the other, in its guarantee of 100% quality. The fact that all parts are checked means that they are already of above-average quality before the final check. In comparison with other providers and sectors, the scrap rate is extremely small. However, as already explained, it only takes one single turned part which does not correspond in full to the required quality standards to render an entire assembly unusable. Of course nowadays, hardly any customer wants to pay an additional charge for the relatively complex checking process for each part. However, it was precisely these requirements which have made RB-Cema what it is today.

Satisfaction right from the start

When the company started its business activities, four Tornos AS 14 multi-spindle turning machines and one Motorex cutting oil station were able to be used. Today, the company has approximately 20 multi-spindle machines from Tornos, which also includes an ultra-modern and highly efficient MultiSwiss 6x14. *"The collaboration with Tornos and Motorex was actually an accident"*, explains the senior manager Hubert Brülhart, who scaled down his activities at the end of 2013. So far, this "accident" has turned out to be an especially fortunate one: Thanks to the close collaboration of Tornos, from development to

The new generation: With the purchase of a Tornos MultiSwiss 6x14, the efficiency of RB-Cema was able to be significantly increased. From left: Michael Wächter, Hubert Brülhart and Patrick Schlatter.

Before the automatic cleaning process, the parts are washed in the powerful tunnel washer. At RB-Cema, approximately ten employees place their knowledge and skills at the service of customers.

In the production hall in Biberist, parts are produced efficiently around the clock. In production, RB-Cema AG uses exclusively multi-spindle machines from Tornos.

The Motorex Ortho NF-X cutting oil is especially low in volatility and can be easily centrifuged from the swarf. In this way, oil discharge can be reduced to a minimum and fresh oil is only added from time to time.

application, with the Swiss lubrication technology company Motorex, many valuable practical insights could be gained. Ideal requirements for advancing into the highest classes of quality.

Three times faster and extremely precise

At the end of March 2013, RB-Cema AG commissioned a MultiSwiss 6x14 CNC multi-spindle turning machine from Tornos. In comparison with the CNC single-spindle turning machine, the MultiSwiss works up to three times faster and is also always extremely precise. The purchase of the pioneering MultiSwiss was based on a regular high-volume order of a complex nozzle housing made of type 1.4305 stainless chromium-nickel steel. Along with turning, drilling blind holes, thread cutting and milling, the more than 10 operations also include internal lathe machining, which must been carried out to an accuracy of 3 µ. Thanks to the six sliding headstocks and the powerful torque motor used for indexing the spindle drums, the machine is extremely quick and ideally suited for complex machining operations.

Multi-purpose Motorex Ortho NF-X

Like many other machines from Tornos, the MultiSwiss 6x14 was developed with the universal high-performance cutting oil Ortho NF-X from Motorex. With Swisscut Ortho NF-X machining fluid, which is free from chlorine and heavy metals, Motorex has, using this very same cutting oil, succeeded in perfectly machining high-alloy types of steel or implant steels, as well as non-ferrous metals and aluminium. This is an absolute first in modern manufacturing technology, and ensures a maximum of latitude for the user. This means that various types of time-consuming work are no longer required, e.g. separate production lines during mixed machining, untimely washing of non-ferrous metal workpieces, and the mixing of different types of machining oils during the production process. Motorex Ortho NF-X 15 has a high-strength molecular structure and is therefore also ideally suited to hydrostatic support of the spindles in the MultiSwiss. It is enough to consider the hydrodynamic demands made of the cutting oil, ensuring that it functions at a pressure of 80 bar and at speeds of up to 8000 rpm, thereby acting as a sort of liquid bearing. Moreover, the machining fluid is used throughout the whole of RB-Cema AG without restrictions, for all machines and machining processes.

Freshly washed for measuring

Before the produced parts can be measured fully automatically, they are washed thoroughly. If this step was omitted, the measuring result could be distorted, not to mention the undesirable oil discharge. Samples are measured regularly during production. All of the produced parts are checked one by one after cleaning. Thanks to this rigorous quality control, not only can scrap be reduced, but the quality and customer satisfaction can be brought to an extremely high level.

We will be pleased to provide you with information about the new generation of Ortho cutting oils and their influence on process capability:

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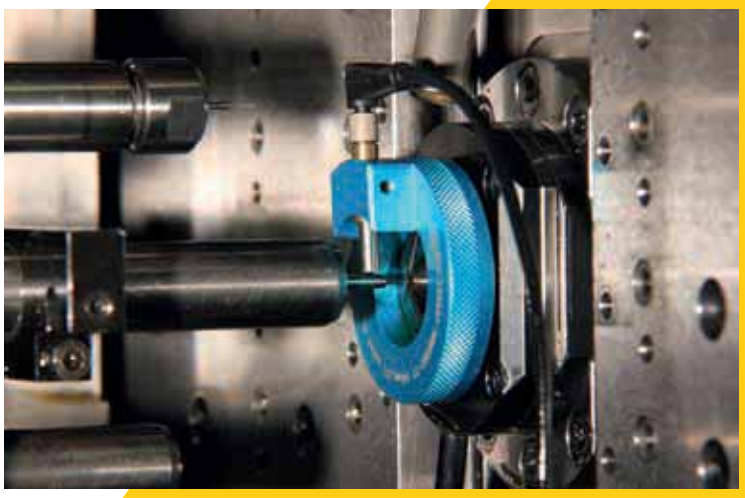

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THE CONSIDERABLE POTENTIAL OF HIGH-PRECISION MICRO-MACHINING

At a time when it is possible to manufacture tools with a diameter of 0.02 mm which are not only reserved for niche sectors, high-precision machining of the smallest parts is more than ever the key to innovation in electronics or in medical engineering. Leading experts in micro-machining met to discuss requirements to which each link in the value production chain is subject.

The circle of experts (from left): Roland Gerlach, Sales Director at Schaublin, Martin Ruck, Product Developer at Zecha, Arndt Fielen, Sales Director at Zecha, Jörg Schwartz, Director of Schwartz Tools and more, Hans-Joachim Günther, Product Manager at Tornos, and Michael Urnauer, Key Account Manager at Hommel+Keller Präzisionswerkzeuge.

High-precision machining of exotic materials, including in the smallest diameters, without losing sight of the issue of profitability, does not depend on a single factor for its success. On the contrary, it is the harmonious interaction between the machining centre, the tool mounting system and the tool itself that enables the supplier to satisfy the requirements of the customers. And optimum results are achieved when the specialists in the field come together to address the vital questions and challenges of micro-machining, with a view to constant improvement of the overall concept.

Expertise network

Together, Schaublin GmbH – which manufactures high-precision turning centres and clamping devices, Schwartz Tools and more – an expert in turning tools, as well as Zecha Hartmetall-Werkzeugfabrikation GmbH – on the strength of nearly 50 years of tradition in the development of tools for micro-machining, constitute a genuine expertise network in micro-machining. They have all long since established themselves as trustworthy contacts through the various trade fairs in the world of small-size parts. Other companies are also involved, in

"Thanks to our wealth of knowledge, together we can cover the complete range of micro-machining," explains Arndt Fielen, Sales Director at Zecha, *"and put it at our customers' disposal."*

"Thanks to this exchange, we get to grips with the materials or applications of the moment, and teach each other," remarks Hans-Joachim Günther, Product Manager at Tornos.

particular during the seminars, such as Hommel+Keller Präzisionswerkzeuge GmbH, the world leader in knurling tools, and the Swiss company Tornos SA, which manufactures single- and multi-spindle turning machines, as well as machining centres for highly complex precision parts. As Arndt Fielen, Sales Director of Zecha Hartmetall-Werkzeugfabrikation GmbH, explains: *"Dialogue with the manufacturers enables us to build up a unique wealth of knowledge, so that together we can cover the complete range of micro-machining. For our respective customers, this results in optimised products, processes and services. Thanks to the active and productive exchanges that we have set up, we are able to resolve the most complex tasks."*

A comprehensive solution instead of a straightforward service

"By virtue of their requirements, our customers are increasingly focused on comprehensive solutions, thereby obliging us for many operations to seek the advice of our colleagues from other sectors." Thanks to the excellent level of collaboration maintained by our companies, we have real advantages when faced with particularly tough tasks," continues Roland Gerlach, Sales Director at Schaublin GmbH. Jörg Schwartz, Director of Schwartz Tools and more, summarises the situation as follows: *"This collaboration gives rise to a host of synergistic effects! Since today's materials are constantly more delicate to machine, we are frequently faced with the limits of human, machine and system capabilities. Thus a host of factors comes into play, and they are not restricted to the knowledge of the network alone. For example, the coolant plays a major role in the machining process. Hence, everyone must keep their eyes open! That is the most difficult aspect of our profession, but also the finest."*

Impetus provided by the watchmaking industry

Watchmaking products are characterised by extremely small high-precision parts. So any manufacturer aiming its production equipment at this sector must be able to fully master tolerances to the order of a micron, and handle parts with extremely small dimensions. Tornos SA, based in Moutier, develops and produces turning machines especially tailored to the watchmaking industry. *"We started supplying machines for the watchmaking industry from the 1800s. The requirements, already numerous at the time, have constantly grown since then; we take on a variety of challenges by offering small and quick CNC turning machines. They stand out for their low heat loss, and provide the best finishes and short cycle times – with the corresponding high-precision tools,"* explains Hans-Joachim Günther, Product Manager at Tornos Technologies Deutschland GmbH. In order to be able to also offer optimum solutions, beyond the concept of automatic turning machines, Tornos also swaps notes with tool manufacturers such as Zecha or Schwartz Tools and more. *"In this way we can take the pulse of the market, get to grips with the materials or applications of the moment, and teach each other,"* continues Hans-Joachim Günther.

Zecha also started up with the watchmaking industry, *"Which means that our staff are enthusiastically committed to perfecting the smallest tool diameters,"* says Arndt Fielen. *"In micro-machining, the feeds per tooth are of the order of one micrometer, and systems are becoming increasingly fine. The radius of a cutting edge is now measured using a scanning electron microscope, as it is quite simply impossible to view it otherwise on such small tools."* Martin Ruck from the Zecha product development team expands on this idea: *"With an axial backlash tolerance of 3 µm which we adhere to for drilling and also milling, with diameters as small as 0.02 mm, there is no room for a grinding machine or an abrasive, even first-rate ones. You need to picture that for a corresponding grain, the cutting edge on the grinding wheel measures only 4 to 5 µm."* In such cases, the sets of grinding wheels must run smoothly without jerking, to be able to generate a cutting geometry. Martin Ruck is well aware of this: *"A small tool is completely unforgiving! Even the smallest errors have much greater consequences than with larger tools: An insufficient relief angle or too small a clearance, an inaccurate groove clearance, chipped edges, an*

incorrect radius, insufficient finish quality – and shear forces will develop under the slightest pressure. There is a long list, but it is precisely these points that we are seeking to minimise on our tools. There is a world of difference between a tolerance of 1 and 5 µm, and none of our customers would accept it!"

New materials, new challenges

Knurling is a crucial process for cycle time. If used properly, it can save a lot of production time. On the strength of 80 years' experience in this technology, Hommel+Keller Präzisionswerkzeuge GmbH has a whole arsenal of knowledge in terms of applications and processes for helping the operator harness added value at every level.

Michael Urnauer, Key Account Manager at Hommel+Keller Präzisionswerkzeuge GmbH, believes that some branches such as electronics or medical engineering – besides the "grand classic" industries, i.e. automotive and aerospace, or mechanical engineering – could drive major developments: "*Consumer goods such as smartphones always see strong demand, while medical products such as prostheses, artificial heart valves or pacemakers are essential items for ensuring the best of health for senior citizens. In both these segments, the choice of materials has expanded considerably over recent years, and the requirements imposed on tool manufacturers have also increased, in order to be able to offer tools suitable for all applications. For us companies, this means a certain dedication to research and development.*"

Medical engineering seminars

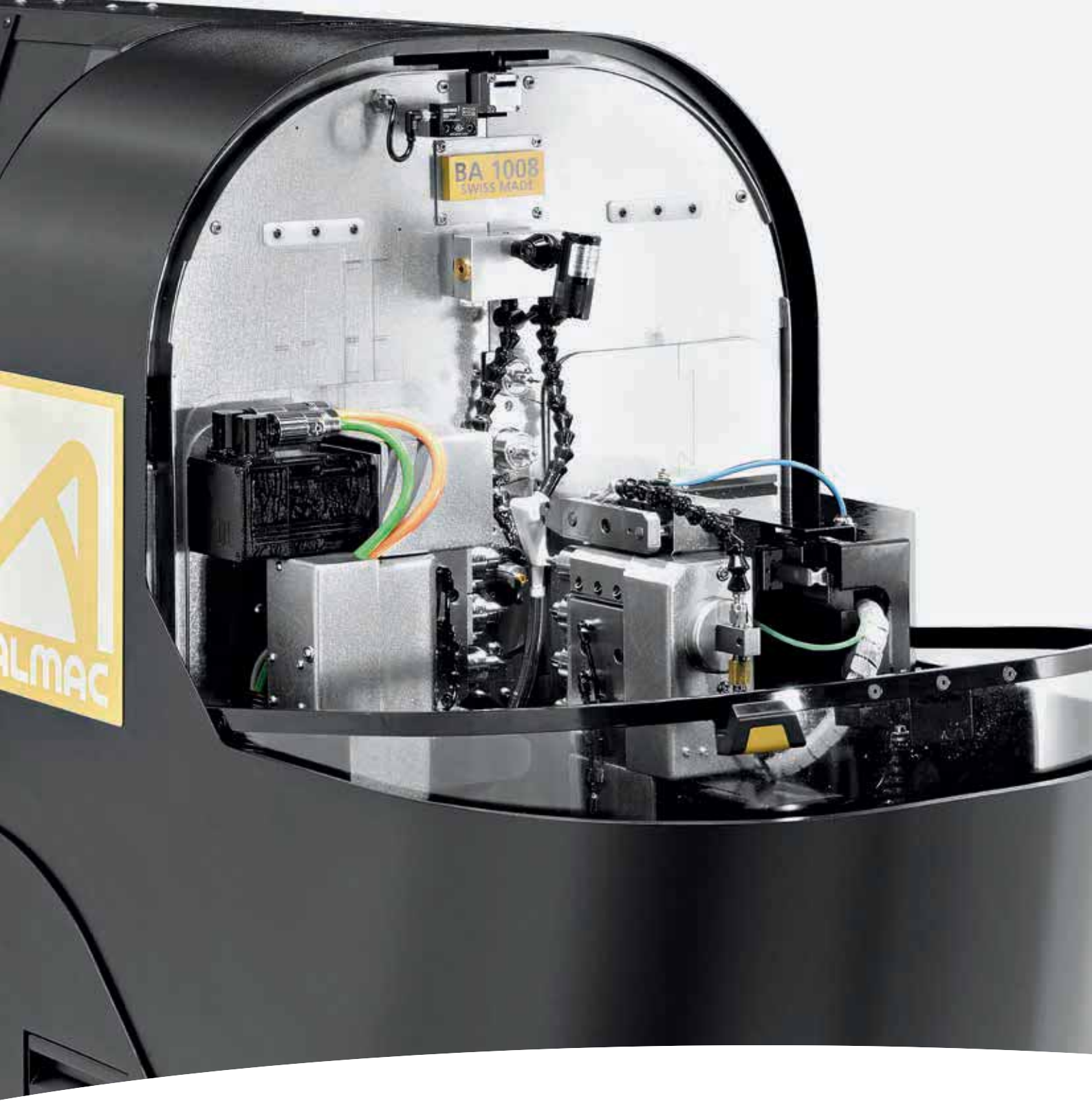
At the medical engineering seminars, Tornos gathers important information about the new materials and their use, as Hans-Joachim Günther explains: *"Chromium-cobalt, platinum or iridium alloys are no longer exotic materials nowadays – most of them have even become standard for machining. However, it is quite a different matter for materials originating from research laboratories. It takes numerous series of tests and experiments to be able to treat them conventionally."*

The imagination alone sets the limits

From certain dimensions, we should ask ourselves what are the restricting factors that could hold back or even prevent any development in the machining sector. Generally speaking, the companies believe that these limits are imposed less by materials or applications than by human imagination: *"As long as we are all prepared to see beyond the end of our nose, to allow free rein to our imagination and to think laterally – but also are able to do so – then new ideas will keep emerging, to be implemented by companies specialising in machining!"*

TORNOS

Tornos SA
Rue industrielle 111
2740 Moutier
Switzerland
Philippe Charles
Product Manager
Tel.: +41 (0) 32 494 44 44
Fax: +41 (0) 32 494 49 03
info@tornos.ch
www.tornos.com



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NEW RANGE DEDICATED TO WATCHMAKING

The production of very small parts, in particular for watch movements, requires turning tools designed specifically for this type of machining. In 2012, Applitec launched a number of inserts dedicated to the watchmaking field, and demand has increased considerably since then. To such an extent, in fact, that Applitec is now launching a new complete range of turning tools for machining watch parts.

Watchmaking bar turners have increasingly requested specific dimensions and angles which have substantially exceeded those covered by the original offering. Technical manager Pascal Kohler explains: *"With brazed hard metal tools, each bar turner would sharpen his or her tools as habit or requirements dictated, whereas nowadays they all request the same operations on our reversible inserts."* And although the company still offers special customised solutions, it has undergone significant rationalisation and now offers a wide range to cater for all needs.

A top range

The new range of dedicated watchmaking products is called Top-Watch, and draws on the strengths of the Top-Line range (reversible ground inserts) well known to users, notably the positioning and clamping system of the offset tooth inserts, which offers unparalleled rigidity compared to traditional clamping systems.

Standardised production

One of the tendencies noted by the tool manufacturer is the increasing importance of standardising production. Sales manager Patrick Hirschi explains: *"Just like the automotive industry several years ago, watchmakers want to minimise machine downtime and ensure the repeatability of their production. With the new Top-Watch tools, that's now possible. They can quickly and easily change their special insert, allowing production to restart under the optimal conditions."*

Really sharp edges

There are various treatments involving ultra-fine layers to prevent cutting edges from being rounded, but are they always enough? According to Mr. Kohler: *"For extreme cases, we offer an insert with a coated blank, on which the tapers are sharpened after coating."* He adds: *"The coating on the cutting surface prevents sticking, and the lack of a coating on the taper is not a problem. That means we can offer an ultra-sharp cutting edge."*

Anti-vibration tool body

When it comes to very high-precision part machining, vibrations can be a problem. To counter this, Applitec offers high-density metal insert holders that absorb micro-vibrations. This means better finishes, higher overall quality and lower tool wear.

An enthusiastic response

When asked about the success of the watchmaking range and anti-vibration insert holders, our contacts were very satisfied, stating: *"The feedback from our*

THE TOP-WATCH RANGE ON SWISSNANO

The Top-Watch range is perfectly adapted to the SwissNano machine, in terms of both the 8x8 cross section standard insert holder system, with which watchmaking type inserts are compatible, and the Moduline solution. Indeed, Applitec offers its specific Moduline tool holder system to SwissNano. It also offers the following advantages:

- Presetting of tools takes place away from the machine
- Increased number of tools
- Repositioning repeatability

This option is also available to purchase ex works from Tornos.

customers has been very positive - they are delighted with the performance of these tools. They have asked us for numerous special features, and these requests have enabled us to create our standard range." Although the standard range is perfectly equipped to meet the needs of watchmaking customers (and others requiring tools to produce very small parts), Applitec naturally still offers a completely confidential custom tool service. Mr. Hirschi adds: *"In many cases, watchmakers have decided to move across to the standard tools we offer, and although some of their characteristics differ considerably from those of their usual tools, they have been delighted with the results."* Standard tools require less investment than special custom tools - an important consideration.

The new watchmaking range is available in stock and will be on show at the EPHJ trade fair in Geneva, on the Collin Outillage stand.

The new watchmaking range is available in stock and will be on show at Siams in Moutier, on the Applitec stand, C15, Hall 1.2.

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Applitec Moutier SA
Swiss Tooling
Chemin Nicolas-Junker 2
CH-2740 Moutier
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info@applitec-tools.com
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