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SUMMARY

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

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WHAT'S NEW AT AMB 2014

Most of our customers are curious about new technological developments at Tornos, and there's no better place to see our machines than at the AMB in Stuttgart.

It's a great representation of our current product line and we will be launching two new products at this year's AMB. We have the great pleasure of presenting two new machines from our mid-range product line, the CT 20 and the Swiss GT 26, which follow the Tornos - Delta and Gamma lines.

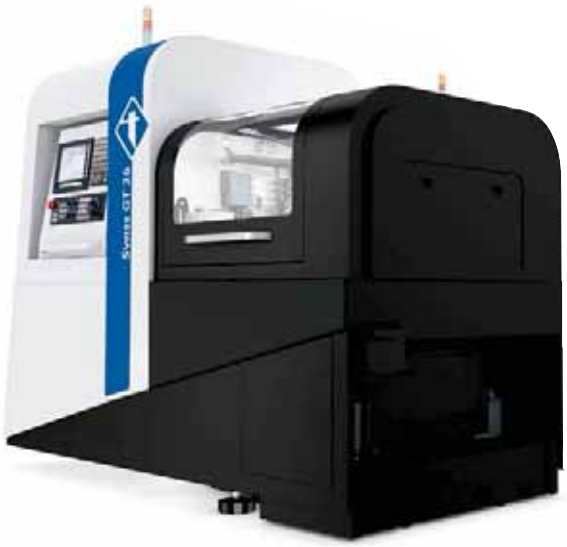
The CT 20 is highly functional and effective. Just imagine having one of the 5 axis models which features up to 10 rotating tools, tools which are sitting on a strong base allowing the machine to tackle hard or exotic materials. If you look at the Swiss GT 26 you can see that it's an extremely competent machine; the cartridge-type rotating tool allows the machine to cater for value-adding operations such as polygon milling or thread whirling, and, with its capacity of one inch, the machine is extremely well equipped to satisfy customers. The MultiSwiss will also be on display in the booth, where it will be demonstrating how hydraulic spools are produced. MultiSwiss is a truly revolutionary new line of products that bridges the gap between single-spindle and multi-spindle lathes. It is currently doing very well in Europe and Asia and has become a bestseller in Germany. Last but not least we will have the Tornos SwissNano and the Almac BA 1008. The SwissNano is a small high-precision Swiss-type lathe developed for high precision parts. Nearly all of our customers praise the outstanding accuracy of this machine, namely the microns and the excellent access to the machining area - a highly important feature for such small parts. The sister of the SwissNano, the Almac BA 1008, will also be at our booth to showcase its design that tackles the prismatic part for small dimensions, you will be able to see just how efficient this small milling machine is - it's a must-see. The CU 2007, a high-precision, highly efficient milling machine, will also be present at the booth featuring a 5-axis application.

Don't miss Tornos at this year's AMB!

Jens Kuettner
Managing Director
Tornos Technologies Germany

A FUTURE FIRMLY ORIENTED TOWARDS INNOVATION

Tornos has recently demonstrated a sustained process of innovation, with the launch of several products. This strategic vision for developing and introducing new products which are finely tuned to all needs enables the company to reach all market segments, from straightforward machines to more complex equipment.



Since the beginning of 2013, Tornos has introduced the SwissNano machine at the Tornos Journées Horlogères open days, the EvoDeco 16 machine with B axis and the Swiss ST 26 machine at the EMO trade fair. And that is not to mention the Almac machines! In addition to the many applications developed on the CU 2007 and CU 3007 machines, Almac unveiled two new machines in 2013: the VA 1008 and BA 1008. In 2014, Tornos is introducing the EvoDeco 32 then the CT 20, as well as several innovations for existing machines.

A dynamic team

We must acknowledge that the Tornos engineers have worked tirelessly throughout 2013 and 2014 and produced many innovative products. This is a result of teamwork and the constant desire to innovate which drives them.

The next new product to be introduced in Europe is the CT 20 (see article on page 12), an automatic turning machine with a sliding headstock and a diameter of 20 mm, available in 4 and 5 numerical axes. The highly attractive price of this machine ensure it stands apart from its competitors, as does the unrivalled flexibility offered by its 26 tools, 10 of which may be driven (on the 5-axis version). It will also be the first machine to be produced at the factories in Xi'an in China. The CT 20 is intended to compete with the products already being manufactured in China by Tornos' competitors. The company's "high-end" machines will continue to be manufactured in Moutier.

Towards a comprehensive range of turning products

The CT 20 machine will be followed by others; eventually there will be a complete overhaul of the Delta and Gamma ranges. The CT 20 machine is the starting point for this overhaul. The next step will be the launch of the Swiss GT machine, which replaces the Gamma 20 machine. This new machine will be fitted with 6 linear axes with a capacity of 26 mm. It will share the same spindles as the Swiss ST 26 machine. The Swiss GT 26 will be extremely flexible and boast

the same advantages which made the Gamma such a success, such as the option to work with or without guide bush or the richness and variety of tooling. However, both the provision of tools and the machine's power will be optimised to offer users an even higher level of performance. The clamping forces will be increased and the frame of the Gamma will undergo a complete overhaul to improve its rigidity. As is usual, the Swiss GT 26 will be unveiled in a world première at the AMB trade fair.

Universal programming

These products can all be programmed with the TISIS system, in development at Tornos since 2013. It enables machines to be programmed in an extremely visual manner thanks to the syntactic help provided by the ISO editor. In particular, TISIS enables programs to be transferred to the machine, modified on the machine and sent back to the original computer, if need be. This guarantees traceability and makes it easy to organise the workpiece library. TISIS can also be used for monitoring the production of the various machines in the workshop.

The best machine possible

In summary, Mr. Renggli, marketing manager, tells us: *"Tornos' aim is simple: we want to provide our customers with the best machine possible, whatever their turning requirements. It must be simple to programme and we must be able to offer it in such a way that our customers can remain competitive. This is our motto for 2014, and we would be delighted to welcome you at our various stands across the world, so you can experience our commitment to your business for yourself"*.

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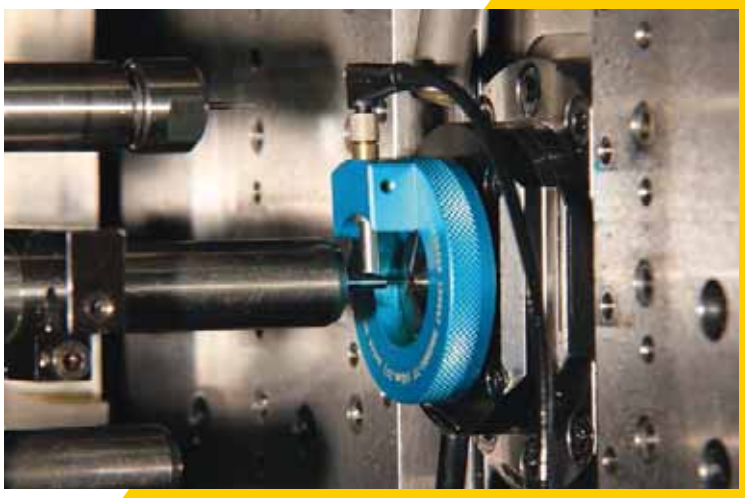

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SWISS GT 26 – A NEW GENERATION

Introduced at EMO 2009, the Tornos Gamma 20 has established itself as a high-performance machine with an unrivalled price/performance ratio.

Following six high-profile years on the market, it is now giving way to the new generation - the Swiss GT 26; this machine will take Tornos to a new level in terms of performance and functionality.

Proven kinematics

The Swiss GT 26 uses the same kinematics that made the Gamma 20 machine so successful. It allows operators to quickly get to grips with the machine. The cast iron base has been optimised to offer greater rigidity, and includes reinforced guide components. The Swiss GT line is made up of two models equipped with 5 and 6 linear axes. The 5-axis model is equipped with proven classic kinematics. Its platten comprises X1 and Y1 axes for bar turning. The counter spindle support carriage is mounted on 2 linear axes X4/Z4 which enables it to take the workpiece to the cut and to move laterally opposite the block independently of the counter-operation tools, which may be fixed or rotating. These kinematics enable simultaneous machining for bar turning work and counter-operations.

The 6-axis version has the same kinematics, but the difference is that the counter-operation block has a vertical linear axis. These kinematics have the advantage of being able to double the number of tools available. In total, 8 tools are arranged in 2 rows of 4 tools. A maximum of 4 of these can be rotating. These 4 additional tools increase the options for performing complex machining on the rear of the workpiece. This axis also enables digital centring of the tools on the counter-operation block and a work movement for cross drilling.

Multiple tools for outstanding flexibility

The Swiss GT 26 can be equipped with up to 39 tools, 16 of which are powered. The platten is equipped with a motor that can accommodate various types of tool holder, including special devices such as a polygon tool, a thread whirling tool or inclined milling and drilling tools. The equipment is compatible with that of the Swiss ST 26 to ensure optimal flexibility of the machine inventory of customers using both machines. The W&F tool holders and the quick change system are also available on this machine. This enables the Swiss GT 26 to respond to all kinds of market demands. *"This machine allows our customers to respond competitively to almost any kind of demand. A customer who buys a Swiss GT 26 gets a formidable tool with virtually no limits in terms of the workpieces it can produce"*, explains Philippe Charles, product manager at Tornos.

High-performance spindles

The two ultra-powerful spindles also have constant torque which enables them to provide high torque at high speed. Although the Gamma 20 had a 20 mm capacity, the Swiss GT 26 can machine 25.4 mm diameter bars with preparation.

Technical specifications		**Swiss GT 26/6** 6 linear axis + 2 C-axis 2 independant tool system	**Swiss GT 26/5** 5 linear axis + 2 C-axis 2 independant tool system
Main spindle (Z1 / S1 / C1)			
Max. bar capacity	mm	25.4	25.4
Standard workpiece length with rotating guide bush	mm	220	220
Spindle rotation speed	rpm	0-10,000	0-10,000
Spindle power	kW	9.5 (11)	9.5 (11)
Max. constant torque	Nm	12.1 (15.8)	12.1 (15.8)
Spindle stoppage time 0-8000 rpm	sec.	0.4	0.4
Platten (X1 / Y1 / S11 / S21)			
Number of rotating tool positions on guide bush		9	9
Turning tool section		16 x 16	16 x 16
Number of frontal tools (op/cop)		5 / (5)	5 / (5)
Positions for rotating tools (S11)		4	4
Positions for rotating tools (S21 modular positions)		3	3
Rotating tool speed of rotation	rpm	5000 (2500)	5000 (2500)
Rotating tool power (S11/S21)	kW	0.75 / 1	0.75 / 1
Counter spindle (Z4 / S4 / C4)			
Max. bar capacity	mm	25.4	25.4
Insertion length of workpiece into spindle	mm	120	120
Spindle rotation speed	rpm	0-10,000	0-10,000
Spindle power	kW	9.5 (11)	9.5 (11)
Max. constant torque	Nm	12.1 (15.8)	12.1 (15.8)
Stoppage time 0-8000 rpm	sec.	0.4	0.4
Position next to the spindle for spindle machining		2	2
Counter-operation (Y4 / S51)			
Number of tool positions		8	4
Positions for rotating tools		4	4
Rotating tool speed of rotation	rpm	5000	5000
Rotating tool power	kW	0.75	0.75
Max. total number of tools (with maximum options)		39	35
Operation/counter-operation tool distribution		23 / 13	23 / 9

With or without guide bush

The Swiss GT 26 can be equipped with a rotating guide bush thanks to a integrated synchronized motor guide bush. In order to boost the machine's flexibility and machine better meet the workpiece requirements, the Swiss GT 26 can also operate without a guide bush for short workpieces. This option reduces not only scrap lengths but also the quality of the required material, resulting in savings on materials.

Equipment designed to meet challenges

The machine comes with an extensive range of basic equipment, for example a 20-bar pump as standard (5 electromagnetic valves and 2 switchable filters). This makes demanding machining operations possible. Naturally, pumps with a greater pressure range are also available to meet your requirements. Options also include a long workpiece extraction device and our range of oil mist extractors.

In addition, the Swiss GT 26 can be equipped with a Robobar SBF 326 bar feeder. Also available on the Swiss ST 26, this feeder offers a high level of reliability; the result is a price/quality ratio unrivalled on the market. Equipped with an automatic centralised lubrication system and offering excellent access for maintenance, the machine is easy to maintain and highly ergonomic for operators. The work area is without doubt one of the largest on the market for this type of machine, which also makes machine adjustments easier. *"The operator was the central focus during development of the Swiss GT 26. For us it is essential that the operator feels at ease on the machine and can work efficiently,"* reveals Philippe Charles, product manager at Tornos. In addition to its excellent ergonomics, the machine is also equipped with the TISIS programming system (see article on page 14) to facilitate machine management, and, of course, Tornos macros to aid programming are included as basic equipment.

The new Swiss GT 26 is a worthy successor to the Gamma range. To find out for yourself, visit us at one of these upcoming trade shows, where the Tornos teams will be delighted to welcome you:

IMTS, Chicago,
8 to 13 September, stand S-8566

AMB, Stuttgart,
16 to 20 September, stand C14, halle 3

BIMU, Milan,
30 September to 4 October, stand C03, Hall 13

PRODEX, Basel,
18 to 21 November, stand B46, halle 1.0

The Swiss GT 26 machine is available from the decomagazine publication date, and the first deliveries to Europe and the USA are scheduled for October. Deliveries to Asia are scheduled for the beginning of 2015.

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TORNOS CT 20: NEW ENTRY-LEVEL MACHINE

Tornos made its first foray into entry-level machines in 2008 with the Delta range, and this product very quickly won over the market with its ease of use and excellent value for money. Today, a new entry-level machine is ready to win its own converts: The CT 20. We took this opportunity to find out exactly what secrets this new product is hiding.

"The CT project aims to introduce a true 20-mm machine offering unprecedented flexibility for an entry-level machine," reveals Christophe Tissot, CT project manager at Tornos. The machine should enable excellent machining performance whilst guaranteeing a competitive price. *"It is difficult problem to solve, but the CT 20 machine solves it brilliantly. This very rigid machine will enable our customers to maintain their competitiveness with Tornos,"* emphasises Mr. Tissot.

One product, two kinematics

The CT 20 machine is an automatic turning machine with a sliding headstock and a bar capacity of 20 mm. Two versions of the machine are available with 4 or 5 linear axes. It can be equipped as required with two C axes which increase its machining capacity. The 5-axis version can take up to 26 tools (up to 10 rotating tools as an option), which makes it one of the best-equipped machines in its category on the market. By adding a modular tool system on

the platten, it stands out from other machines currently available on the market. In contrast to competitor machines which are often content with one fixed driven block containing radial drills, the CT 20 machine can accept other equipment in order to better adapt to the needs of the part to be produced. Components which, until now, required more complex machines and a higher level of investment, can now be produced on the CT 20 machine thanks to its excellent flexibility.

A more rigid frame

In order to guarantee a good surface finish as well as a secure fit for the tools, particular attention was given to the construction of the frame. As with Delta and Gamma machines, the design of the cast iron frame has been calculated to support major machining operations. Even within the limits of its capacity, the machine acquits itself admirably and will not be found wanting.

Greater flexibility

The machine has 4 compartments which can house special devices such as radial drills, and much more besides. The machine can also take frontal drills, a thread whirling tool and a polygon tool. *"It is therefore possible to machine parts with high added value requiring, for example, a thread-whirling operation on entry-level machines,"* explains Mr. Tissot. The numerous options such as, for example, the fire protection system, are the perfect complement to this flexibility. On the 5-axis model, it is possible to add two rotating tools on the secondary operation block, an option which even allows the 4 tools on this single block to be motorised.

Two high-power drills

The 5-axis kinematics has the disadvantage of being limited on deep drilling operations; a problem which the CT 20 also intelligently overcomes. In fact, the machine can house two driven drills for deep drilling, with the device using the counter spindle motorisation, which allows it to benefit from a greater level of power.

The manager finishes by saying: *"Intended to replace the Delta 20 machines, the CT 20 brings its own innovative features which enable it to offer much more than the Delta machines which have already seen much success, and we are convinced that it will quickly establish a strong position on the market."*

While this machine has already been on sale in Asia for several months, sales in Europe will begin from the AMB trade fair and in the USA from the IMTS show.

IMTS, Chicago,
8 to 13 September, stand S-8566

AMB, Stuttgart,
16 to 20 September, stand C14, halle 3

BIMU, Milan,
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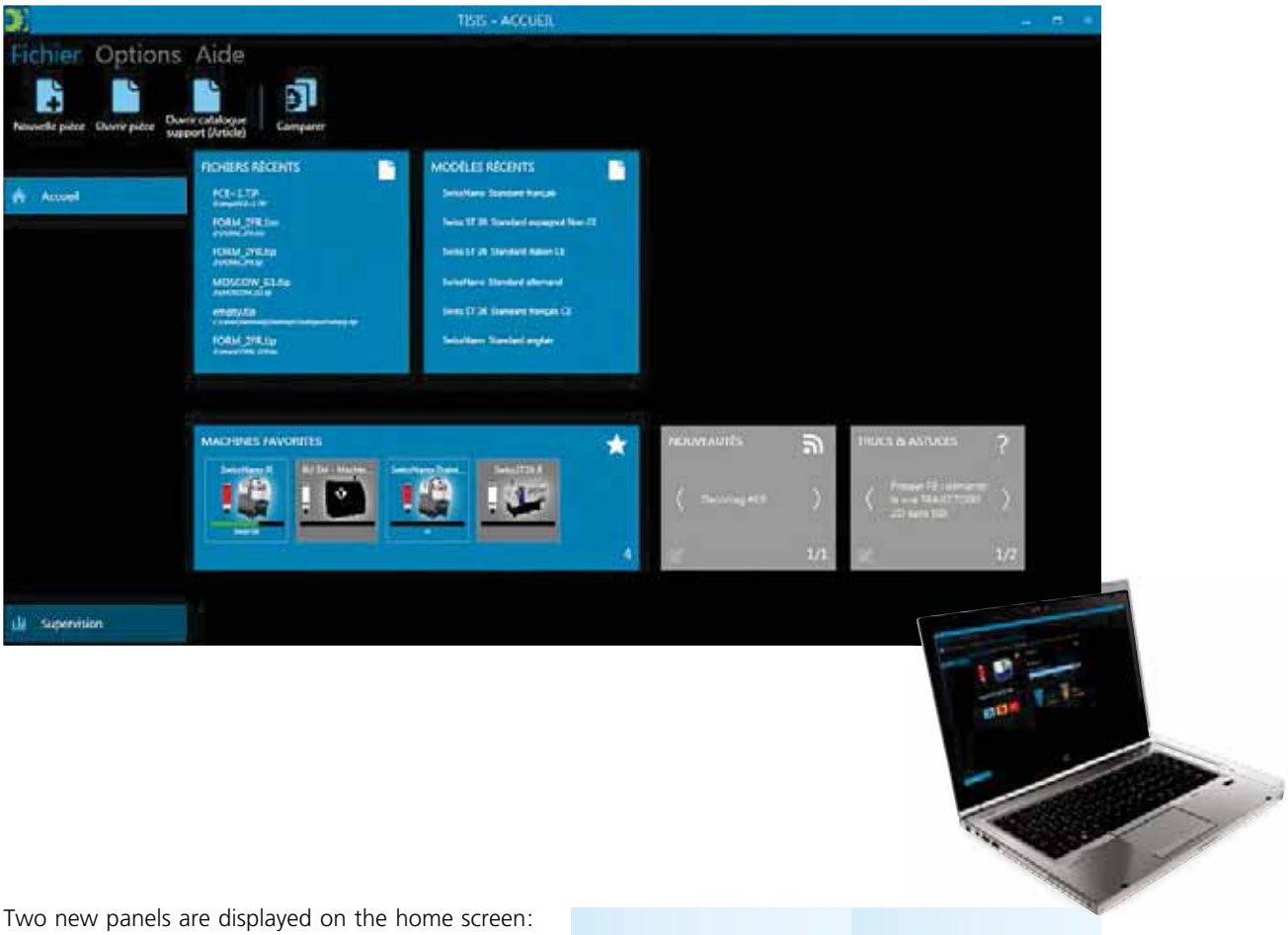
ENHANCED ERGONOMICS WITH TISIS

The new version of TISIS, which Tornos has unveiled today, features new functions and an elegant new graphic design based on the Metro style put forward by the Windows 8.1 operating system.



Two new panels are displayed on the home screen: Tornos SA News and Tips & Tricks for the TISIS software. The information displayed there is updated via an Internet connection. This display can be deactivated, of course, by simply clicking the button on the bottom left-hand side.

Faster access

To make the TISIS software easier to use, the designers have incorporated keyboard shortcuts (based on the Windows standard) to provide faster access to functions; a ribbon has also been integrated into the application's title bar.

KEYBOARD SHORTCUTS	PARTS EDITION FUNCTIONS
CTRL+S	Save
CTRL+SHIFT+S	Save As
CTRL+Z	Undo
CTRL+Y	Redo
CTRL+F	Find
CTRL+W, CTRL+F4	Close
CTRL+P	Print
F9	2D trajectory
F10	Transfer

It is now possible to open several parts programs in the same editor, to navigate more quickly between them.

The program can now be optimised and controlled, along with movement simulation, by the programmed 2D contour display function.

The print function has been enriched with a data preview feature and a choice of print options.

TISIS Compare: This is a new application for comparing any modifications or adaptations made, for example, to the part program on the machine. Parts information, the ISO code or the catalogue can be compared and synchronised individually.

Machine supervision has been enriched with new information on the machine status and now benefits from a new information display by machine category.

COMPATIBILITY

If using the TISIS with the connectivity pack, software updates must be performed on the machine. This includes the Connectivity Pack and the Motion Control, for the following versions: Connectivity Pack: 1.3, Motion Control SwissNano: 403, Motion Control Swiss ST 26: 28M.

OS compatibility: Windows XP, Vista, 7, 8 and 8.1 (32-/64-bit)

Recommended screen size: WGXA (1280 x 800 pixels)

Random Access Memory and Hard Disk Drive: RAM 2 GB, HDD 300 MB

The ISO code editing function and the tool catalogue management function are only available for the SwissNano and Swiss ST 26.

The TISIS Tab for tablets is now available from the Google Play Store.

It is also now possible to install different devices such as smartphones, phablets and tablets. This application is free.

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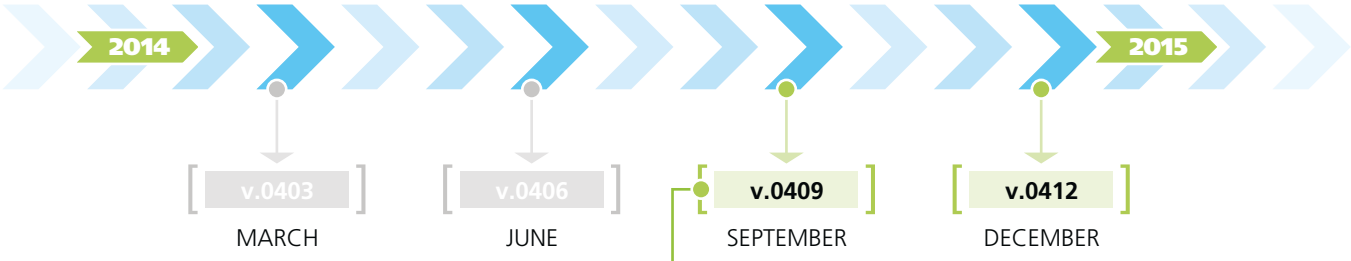
MACHINE CONTROL SOFTWARE: CONTINUOUS DEVELOPMENT AND IMPROVEMENT

At this year's AMB in Stuttgart and IMTS in Chicago, the company's specialists will be on hand to provide users with information on the new features of the Machine Control software designed for EvoDeco PTO, Deco PTO and SwissNano machines available this autumn. 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: 0409.00
- TB-Deco: 8.02.055
- TISIS: 1.3
- Connectivity kit: 1.3

New on version 0409.00:

- Control of the B axis on the EvoDeco 16 machine
- Multiple program management on the SwissNano
- SwissNano running without material

New developments for 2014:

- Automatic axis lubrication on the SwissNano.
- Connectivity pack for EvoDeco machines
- Vacuum system management for 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**

ALMAC : HIGHLY TARGETED PRODUCTS FOR GERMANY

Since its foundation, Almac has always been committed to providing tailor-made solutions, mainly targeting the Swiss watch market. Although its integration into the Tornos group has enabled it to develop internationally, its potential has remained largely untapped. The company is now turning a new corner by implementing a real strategy to enable German customers to benefit from the same advantages as Swiss watchmakers. Interview with Philippe Devanthéry, Director of Almac, and Kurt Kahlenbach and Michael Paulus, Regional Managers for Germany (see map).

The interview took place in the company's recently renovated premises in the La Chaux-de-Fonds. The premises are understated: the décor mainly promotes the new machine designs and the Almac brand features strongly… but we are at the heart of the Swiss watchmaking market. What is happening abroad? Mr. Devanthéry explains, by way of introduction: *"Almac is a fairly new brand on the German market. The brand is not yet very widely known and customers do not immediately think of Almac when it comes to precision milling and micro milling."* We have yet to build our reputation there.

Tried and tested machines

And this is the paradox currently faced by Almac outside the Swiss market: the company finds itself positioned like a newcomer to the market, even though the solutions it is offering have been validated by one of the most demanding and most dynamic

business sectors in the world. With over 1000 machines installed, the company is a renowned player in the "micro precision" sectors; these not only include watchmaking, of course, but also jewellery, medical and micromechanics in general.

Specialists

"In order to successfully build recognition of our products in this market, we had to take into account that the worlds of turning and milling – although convergent and sometimes very close – are also very different, and we wanted specialists in this field to reach out to customers" explains Mr. Devanthéry. The German market was therefore split in two, under the leadership of two milling specialists. The director adds: *"Although Almac is part of the Tornos group, we wanted to separate the sales"*. This is why Almac has set up its own sales network. Initially, the department will consist of 'milling' technicians from the Tornos network. Depending on the volumes, it is anticipated that Almac will expand this area.

A range which covers a broad spectrum of needs

Almac's current range includes several machines which meet clearly defined categories of requirements. The BA 1008 and the VA 1008 machines are aimed at companies wanting to perform very high precision milling operations on small workpieces. According to the machining requirements, various machine configurations are possible on the VA 1008: 3 axes, 4 axes, 4.5 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. The BA 1008 is a small bar milling machine which combines the expertise of Almac and Tornos. The CU 2007 and CU 3007 machines are universal machining centres equipped with the HSK 40E tool holder. These are therefore aimed at larger markets than the microtechnology markets targeted by the BA and VA ranges.

From tailor-made solutions…

One of the well-known market advantages offered by Almac is its commitment to adapt machines to customer requirements. Mr. Kahlenbach explains: *"With our current range, we did consider selling the machines (especially the CU 2007 and 3007) without developing tailor-made solutions, but this aspect is very important and our expertise sets us apart from the competition. We are now ready to begin feasibility studies, tests and developments on highly sophisticated solutions."*

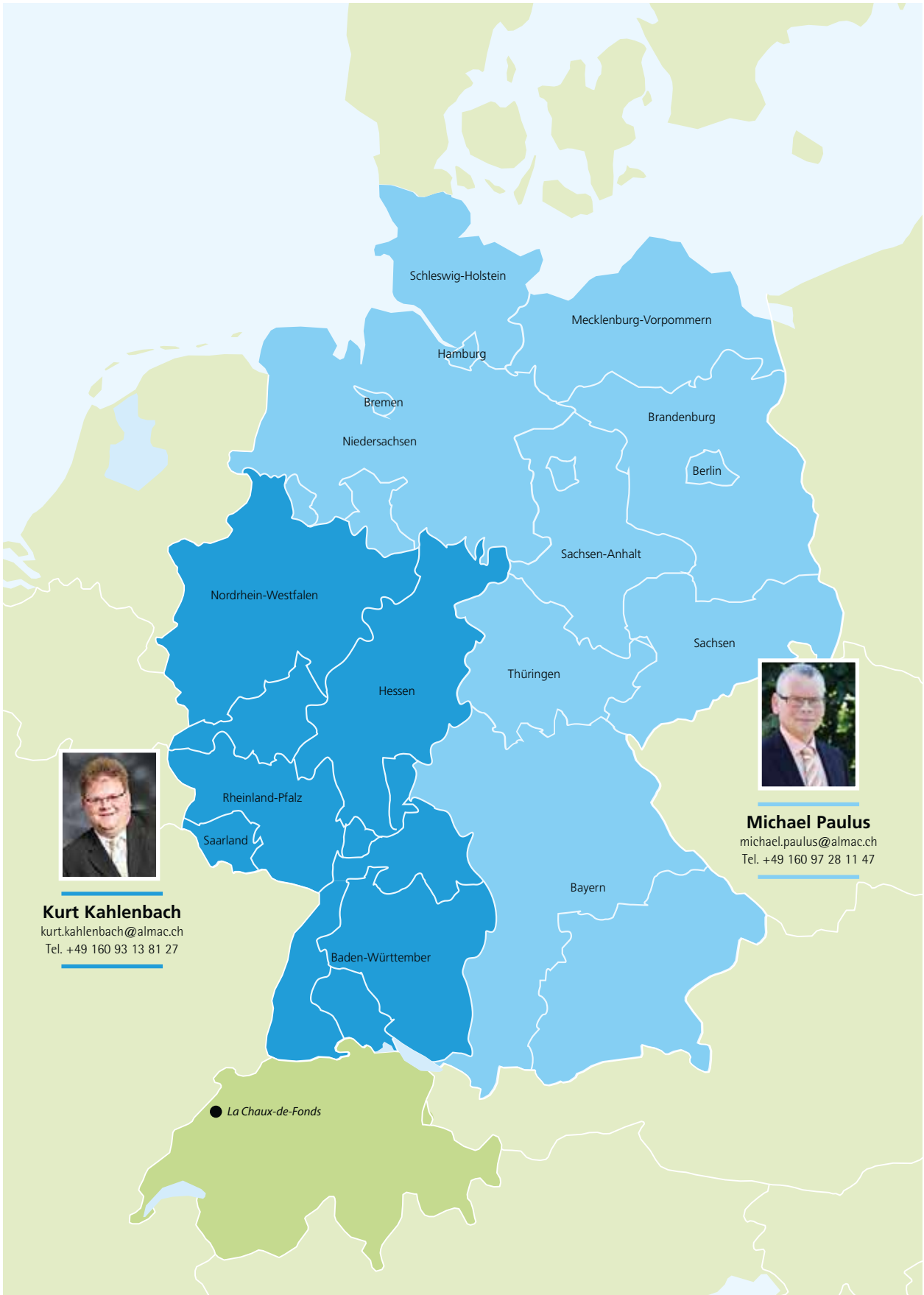
… to standard products

Mr. Paulus continues: *"Although we are well equipped to meet the demands of turnkey projects, we are also able to deliver standard machines. We simply need to promote this to the market."* But this is not so simple in a field where competition is so fierce. When questioned about the positioning of machine ranges vis-a-vis the competition, Mr. Devanthéry is clear: *"We are well-positioned in that our range of precision tools are competitively priced"*. And even though the 'Swiss Made' label is perhaps not as sought-after as it once was, the German market is still very sensitive to a Swiss brand which has made its name in watchmaking.

For many fields

The Sales Managers for Germany tell us: *"We have a lot of work to do in our country: there is strong demand for production equipment but, although our objectives are ambitious, we are confident. Our machining centres are perfectly tailored to requirements, particularly in the medical sector, where there are hundreds of companies continually looking for production equipment like ours."*

Boasting an appealing design, the new Almac machines harmoniously combine ergonomics and appearance.



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Highly experienced in the field of milling, these two Regional Managers are happy to help customers with any questions or to arrange a visit.
Kurt Kahlenbach – Kurt.Kahlenbach@almac.ch -Tel. +49 160 93 13 81 27 / Michael Paulus – Michael.Paulus@almac.ch – Tel. +49 160 97 28 11 47.

Pleasantly surprised customers

Customers who have seen the new Almac machines, and their eye-catching design, have been pleasantly surprised. The engineers at Almac have successfully developed products which combine ergonomic and visual aspects. Mr. Kahlenbach explains: *"When we talk with the technicians, they can quickly see whether our range meets their requirements, and they can also quickly discover the advantages of our solutions."* The Regional Manager is very pragmatic, adding: *"We do not have a unique selling point which completely differentiates us, but we do offer many benefits – including precision, flexibility and our expertise in applications in particular – which ensure we are well positioned in the market"*. Mr. Devanthéry adds: *"We must not forget that our expertise lies in our unique experience in the Swiss watchmaking market with its highly sophisticated constraints."*

Considering Almac? And why not!

Facing a classic marketing issue, outside of Switzerland, Almac is trying to attract customers who are not familiar with its brand. The quality of its products and the skills of its team matter very little if potential clients are not aware of the company's range. This must happen first for them to respond positively. But once this process has begun, customers will quickly notice that they are right at the heart of this Swiss manufacturer's concerns and that they immediately benefit from solutions which perfectly meet their requirements. Mr. Devanthéry concludes: *"This is a period of great potential for Almac, but also for our future customers. I invite them to get in touch with our representatives, who are well trained and well placed to offer them solutions which will enable them to succeed in their markets."*

What upcoming customer events will Almac be attending in Germany?

Upcoming events which Almac will be attending include the AMB in Stuttgart (September), Prodex in Basel (November) and the Turning Days in Villingen-Schwenningen (April 2015). The website includes an interactive map which customers can use to quickly contact the regional representative concerned.

Looking for a precision milling solution?

With its reduced footprint and innovative design, the BA 1008 bar milling machine is mainly designed for microtechnology companies.

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Guide bushes

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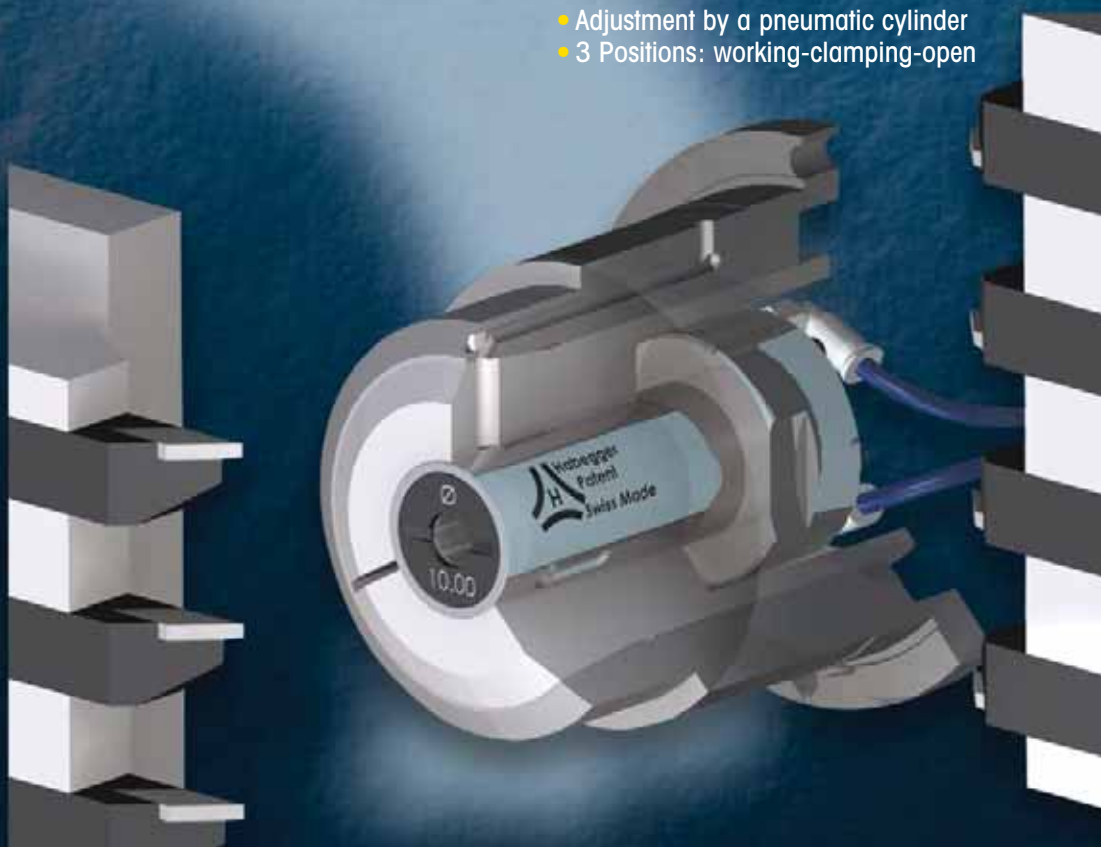
- *Vermeidet das axiale Festsitzen*
- Non revolving bush, with carbide rollers
- Avoids any axial seizing-up

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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TORNOS MULTISWISS 6X14

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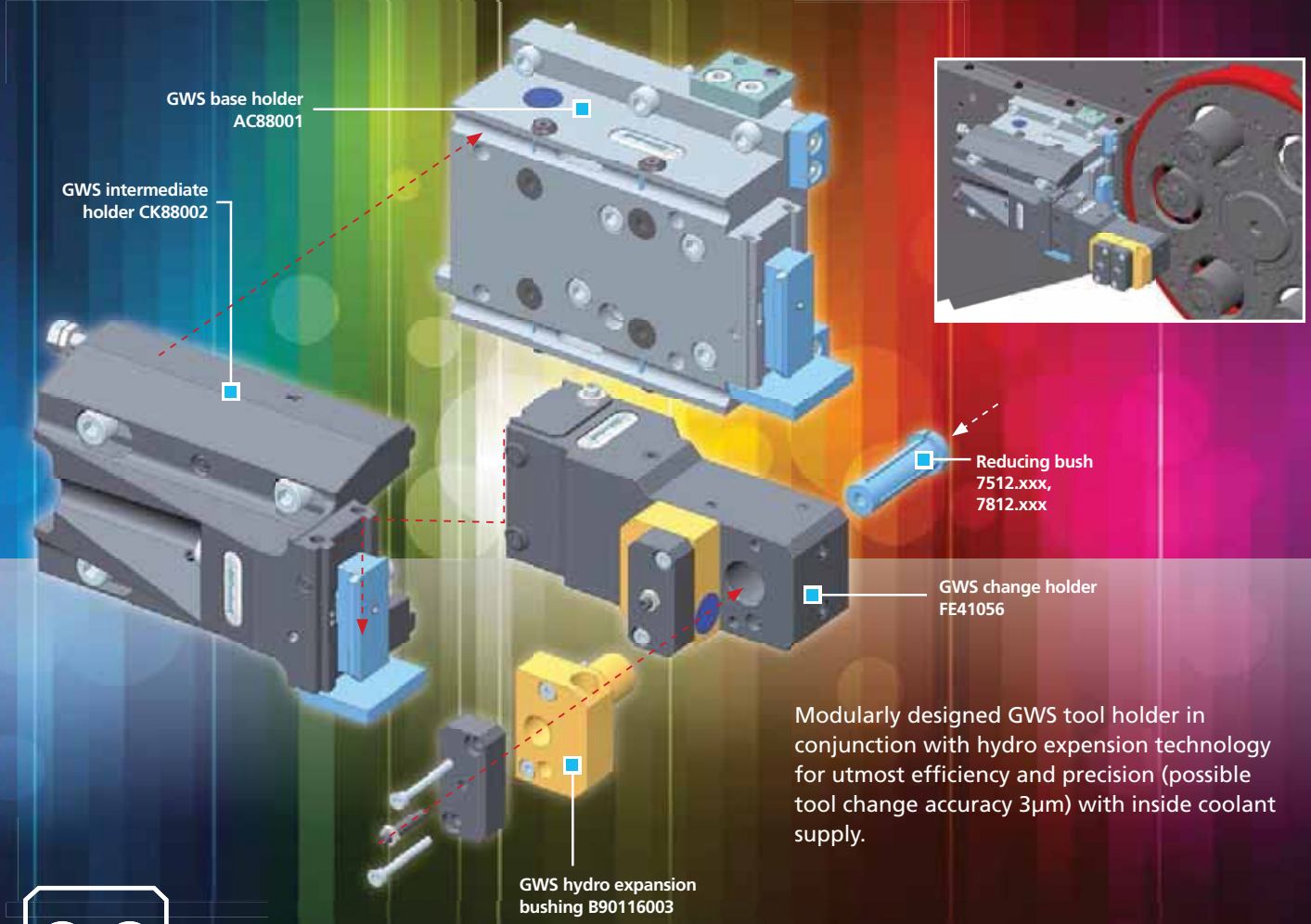

Modularly designed GWS tool holder in conjunction with hydro expension technology for utmost efficiency and precision (possible tool change accuracy 3µm) with inside coolant supply.

GWS

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TORNOS MULTISWISS AND ETA: A SYNERGY OF TWO COMPLEMENTARY INDUSTRIES

The Tornos MultiSwiss 6x14 machine was launched at EMO 2011. Since then, 100 machines have been delivered in various sectors including: the automotive industry, the medical sector, and even the connectivity business, where, due to their similar kinematics, they sometimes replace single-spindle machines.

Thanks to its exceptional performance, the MultiSwiss has also been able to meet the needs of the most demanding and highly sophisticated markets, such as the watchmaking sector. ETA has chosen to entrust this machine with the manufacture of watch movement parts at its new production unit in Boncourt, Switzerland.

ETA: Swiss-Made production at its best

ETA, a Swiss company belonging to the Swatch Group, develops and produces movements for watchmaking. The flawless quality of its mechanical movements and its quartz movements is world renowned. ETA is one of the leading representatives of Swiss quality worldwide. The company employs several thousand members of staff based at more than 20 production sites. An expert in producing mechanical movements of exceptional quality, ETA also produces quartz movements, a large number of the components for which are produced on the site at Boncourt.

A production site designed for quartz movements

The management of the Swatch Group and ETA decided to create this site to centralise its high-volume production, to establish a bastion of high-quality quartz movements and to optimise logistics flows; but that was not all: Boncourt is also the production site for a revolutionary, high-tech movement, designed for the SWATCH SISTEM51. This movement is proof – if proof were necessary – of ETA's place as

ETA quartz movement, Flatline collection E64.111.

a leader in technology. With the SISTEM51, ETA has challenged all the conventional principles of assembling a mechanical watch movement. The exceptional capacity for innovation and dynamic drive boasted by ETA and the other production companies in the Swatch Group means they are uniquely placed to bring such a revolutionary high-volume mechanical movement to the market.

High-volume production

The quartz movement comprises between 80 and 100 parts and the numbaer of movements produced annually number in the millions. High-tech production equipment is therefore required to produce these parts. This is where multi-spindle technology comes in: ETA needed a compact machine which could efficiently handle large production runs with very tight tolerances. Following the test phase in Granges, where the performance of the MultiSwiss was assessed against that of the competition, ETA chose the MultiSwiss.

High volumes of complex parts

To produce high volumes of several types of components, ETA Boncourt uses MultiSwiss technology, which has proven to be ideal for this role. It effectively replaces several single-spindle machines and offers great flexibility in quickly producing high volumes of parts. The components machined are small in dimension; Pierre-André Bühler, CEO of ETA explains, *"When we compared the market, the MultiSwiss from Tornos was the only single-spindle machine on the market to effectively use small bars"*. Its hydrostatic technology delivers excellent finishes thanks to the damping effect of the hydrostatic bearing's oil film.

Easy maintenance

The exceptional ergonomics of the MultiSwiss greatly facilitates its maintenance, as all the peripherals are integrated within the container. Maintenance is also simplified when it comes to software: alerts can be configured according to the machine status and thresholds can be defined as required. Mechanically, the fact that all the peripherals form a single unit avoids interface problems; each peripheral is specifically designed for the machine.

Equipped with cutting-edge technology, the MultiSwiss has found a place on the market by turning the traditional product hierarchy on its head. The gamble has paid off: it began delivering machines only two years ago and it has already installed 100 machines. Every day its technology and precision are challenged at ETA and the MultiSwiss goes from strength to strength.

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Link to the application film:

LOVE AT FIRST SIGHT…

At the beginning of last year, Le Locle-based company Metalem was in the process of deciding to purchase new machines to produce indices for watch dials. They were leaning towards another brand when the company's Industrial Director, Jean-François Thalheim, discovered the Almac BA 1008 machine project (at Baselworld 2013). *"After an hour-long meeting in La Chaux-de-Fonds, we purchased the machine"*, he states. What is the situation after five months of production?

The BA 1008 is connected to Metalem's centralised oil mist suction system.

This independent company has been making luxury dials and indices since 1928, and it employs around 230 people; the company has been using Almac machines since the product was launched. The company runs these machines 24/7, and it is still achieving great results on its bar milling machines which are more than eight years old. That said, when it came to purchasing new machines, the company was not blinded by its loyalty to the brand.

Minimal space and…

With two production sites in Le Locle, Metalem is tight on space. One site is undergoing renovation work to one floor and the other site is set to be extended (adding another two floors covering 350 m^2 each) between mid-2015 and the start of 2016. It goes without saying that machine dimensions are one of the determining factors in the purchasing decision. The director explains: *"When I first saw the BA 1008, I thought of a frame with a coffee machine inside, but we were immediately taken with both the design of the machine and its compact dimensions. For the same footprint as an FB 1005 bar milling machine, we can accommodate two BA 1008 machines."*

… optimal work ergonomics

Already experienced in bar milling, the specialists at Metalem had no trouble adjusting to using the machine. *"The machine's frontal system and protection, with its view of the entire machining area, provide our operators with the perfect working conditions,"* explains Mr. Thalheim. Although Metalem can produce indices in similar cycle times to its previous

Mr. Frank Comte, a specialist working at Almac, quickly adjusted to using the machine. In particular, he felt the machine's strengths lay in its ergonomics and small dimensions.

solutions (using half the floor space), this is not the only area where the machine offers major advantages. The Director explains: *"One of the undeniable advantages of this machine is its ease of adjustment and its ergonomics. On receiving the machine, it was operational immediately, and we were producing parts from the very first day."*

Reliability and consistency as a prerequisite

Ever since then, the machine has continued production almost constantly; it produces over 1000 indices every 24 hours with consistent precision. The company produced over 6 million indices on its various production equipment. Speaking of precision, the director is very clear: *"The parts we are producing require tolerances of a few hundredths of a millimetre: the machine is even more accurate than that and highly consistent."*

The machine is not all

Having the right machine is essential, but the service must also measure up. Mr. Thalheim adds: *"When we spoke with Mr. Devanthéry, he had just been appointed director at Almac, and we had the chance to clarify our needs in terms of service and responsiveness. Since then we have not had cause for complaint: the service is very fast and efficient."* When we asked him if the BA 1008 had required

BA 1008 - KEY SPECIFICATIONS

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 (LxDxH):	1800 x 650 x 1600 mm
Target markets:	mainly watchmaking, micro-mechanics and the medical sector
Type of parts:	indices, appliques, settings, windows, movement and exterior components

much servicing, he was straight to the point: *"Not at all! This machine works very (very) well and we have rarely had to contact the service and spare parts department; we have several Almac machines, and we expect the company to offer the same (excellent) service for all its products."*

Swiss Made machines:
another gem for Swiss watchmaking

Metalem produces watch dials for Swiss watchmaking companies and the fact that it uses Swiss Made production equipment is a significant factor. *"Depending on the dials, over 100 operations are required and we have to be able to rely fully on our production equipment – this is the case with the BA 1008. Where possible, we like to work with quality Swiss manufacturers"*, the director tells us. This high quality is then found in luxury watches and helps Switzerland reinforce its image of quality and precision. Metalem's assets are widely known and, if you look in its list of references, you will immediately notice that almost all the major Swiss watchmaking brands are there.

The right solution

Apart from a few changes – in particular to the distribution of the high-frequency, mechanical spindles – Metalem requested a modification to the oil tray to enable a filter to be fitted when producing gold parts. Mr. Thalheim explains with a smile: *"This machine is ideal in terms of its size and dimensions, but the swarf tray is not quite perfect."* In short, we could do with a larger tray inside than the external dimensions of the machine! On visiting the workshops, the specialist working on the machine showed us the tray after one full weekend's round-the-clock production, explaining: *"On Monday morning, the tray is really full and we will not be able to work many more days without emptying it."* He added: *It certainly is small, but it does not adversely affect us.*

Love at first sight… completely justified

"*When we saw the machine, we immediately thought that it was made for us and, after five months' production with no issues, we can confirm that it is well-designed and we made the right choice,*" concludes Mr. Thalheim.

So much so that, as you read this, a second BA 1008 machine is in production at the dialmaker.

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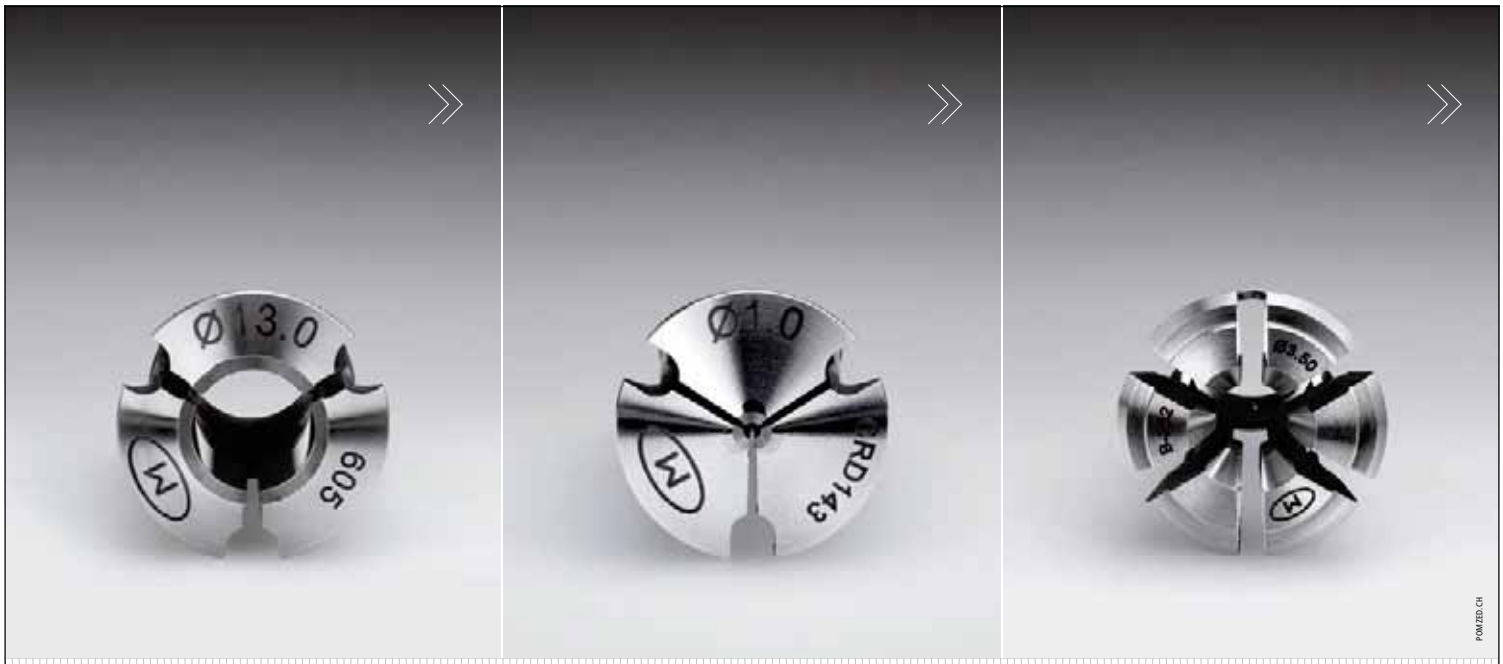

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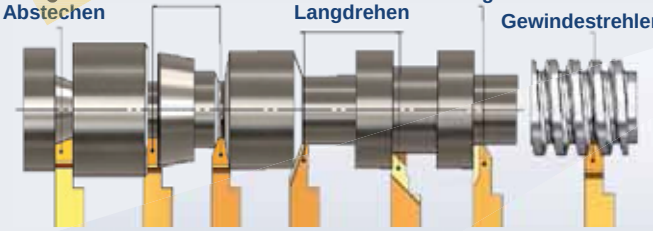

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HIGH-END WATCHMAKING SUPPLIER

Operating in the high-end watchmaking industry, Steulet Microtechnique SA was founded just under two years ago in Delémont, Switzerland. From the start, the company put its trust in Tornos. This decision has paid off, as the firm has experienced strong growth since it was founded.

To find out more, Decomag met Mr. Steulet, CEO and Mr. Ruegg, production manager.

Supplying manufactures and the major Swiss watch brands

The company quickly built a strong reputation by producing and supplying high-end watch components: *"Our strategy is clear: we want to finish pieces on the machines with as few second operations as possible; to meet our customers' needs, we need to guarantee them impeccable quality"*, explains Mr. Steulet.

All the components of the movement

Steulet Microtechnique SA is able to produce all the components of a watch movement, in record time. The CEO explains *"Our speciality is the production of all hobbed parts and balance springs; our 6 machines are all equipped with gear hobbing and high-frequency spindles to allow these types of parts to be made. EvoDeco 10 is one of very few machines on*

the market which can house up to 5 high-frequency spindles, which makes it the perfect partner for producing this type of watch component; furthermore, the machine's kinematics, with its 4 independent tool systems, enables us to save time. The EvoDeco is an excellent platform for integrating the high added-value operations that we offer our customers: diamond polishing, burnishing and even decoration. The machine knows virtually no limits, and enables us to quickly meet our customers' needs". The range of parts offered by the company is very impressive and the more complex these parts are, the more Steulet Microtechnique SA's expertise and added value will make the difference.

The best, or nothing

Steulet Microtechnique SA offers gear hobbing operations: *"A speciality"* reveals the CEO. Once again, this operation is dependent on the flexibility of the EvoDeco 10: It is possible to add three gear hobbing devices to the machine: two for main operations and one for counter-operations, thanks to the new Y4 axis. This axis greatly facilitates tool setting. The company does not carry out any tapping; all taps are made by thread-whirling to avoid burrs and ensure precision.

Programming and precision

According to Mr. Ruegg, the production manager, who oversees the performance of the machines, the EvoDeco 10 has proven to be a real joy as, despite its impressive performance, the machine does not move and retains the very tight tolerances, whilst guaranteeing finishes with no compromises, in line with the quality criteria expected in high-end watchmaking. The programmed workpieces are incredibly complex.

Thanks to the synergy between the TB Deco and GibbsCam, even the most complex operations are quick and easily accessible. *"Sometimes, we are even required to create just one single part"* Mr. Ruegg told us.

Supporting and managing growth

Less than two years after it was founded, the company now has five EvoDeco 10 machines and a Tornos prototype. Mr. Steulet concludes: *"We are developing within a very specific niche and we are offering services with high added value to our customers. In this context, our expertise must be backed up by exceptional machines, and this is the case"*.

STEULET
MICROTECHNIQUE

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SYNERGY AND THE PURSUIT OF CONTINUOUS QUALITY IMPROVEMENT

AUTOCAM GETS PERFORMANCE BOOST FROM TORNOS MULTISWISS

With 15 sophisticated lean manufacturing locations in North and South America, Europe and Asia, employing 2000 people worldwide making precision-machine components for all major OEMs and Tier 1 automotive suppliers, Autocam is an amazing success story. Celebrating its 26th anniversary this year with $300M in sales for 2013, Autocam started out with 1 customer, $9 million in annual sales, and 50 associates, says a recent press release issued by the company. They also began with a handful of Tornos machines.

Autocam machinist, Kirt Plude, at work on the Tornos MultiSwiss.

Today: 200+ Tornos machines globally

Mike Clay, Technical and Quality Director for Autocam, and Frank Zacsek, Manufacturing Quality Engineer, spoke to decomagazine about their experience with Tornos. Mike begins, *"We have around 200 Tornos machines today. We use them globally. And Tornos is an important partner for us."* In the Kentwood, Michigan headquarters Autocam manufactures ultra-precision stainless, alloy, and tool steel components for fuel systems, braking, transmission and other automotive parts on their Tornos machines.

How does Tornos fit into the Autocam equation? Like a fine leather driving glove.

"The market we're in is high precision or ultra-high precision transportation parts," Mike explains. *"We're turning tolerances of ± 10 microns and below. We provide the majority of our products into advanced fuel systems such as GDI and high pressure diesel. Many of these parts have complex geometries and materials that are very challenging to machine. To maintain our leadership position in these markets, we need a machine tool supplier who can provide us*

with a machine that is ultra-precise, rigid and partner with us to ensure the process runs optimally. This allows us to provide the highest quality products to our customers at a competitive cost. The relationship that we have with our machine tool suppliers is very critical to us. We know processing… we know the tooling, the materials, the part function and what's critical. We think we're pretty good at understanding the machines; but the machine builders know the machines better than we do. So we rely on our machine tool partners to play a key role in successful process development and optimizations."

Enter the Tornos MultiSwiss Team

When Autocam was looking to add 2 more CNC twin spindle machines to increase production on a direct injection gasoline engine pump component at the Kentwood facility, Frank Zacsek, and Matt Tufer, Senior Technician, convinced their Autocam colleagues to consider the new Tornos MultiSwiss machine. Frank had seen a presentation on the machine's capabilities and thought it looked like a good machine. Mike tells the story, *"The interesting thing on this (direct injection gas engine pump component) program is that the volumes did not require a fully equipped Multispindle CNC. So we wanted a machine that was more suited for this type of program volume that still required high precision. Therefore, it made sense to compare the MultiSwiss to a bank of competitive model CNC twin spindle machines".*

Frank and his team thought the MultiSwiss might be a more economical way to manufacture this part. The thinking was: *"if we can do it on one machine for roughly the same manufacturing cost as several single spindle machines, it's a better process for us and for our customer."* With high precision direct fuel injection components, surface finish damage to the part must be avoided – the less material handling and moving between machines for these parts, the better. Mike explains, *"The more that we have to handle the part and go through subsequent operations, the more possible opportunities for damage there are. Our CEO's philosophy is to stay on top of technology; and if there's a better technical solution out there that improves the quality or reduces the variation to our customer, we better pursue that even if we're going to spend more money."*

The purchase price of one MultiSwiss was higher than two additional twin spindle machines; but Autocam thought the ROI on the MultiSwiss looked promising. *"So John Kennedy (Autocam CEO) said, 'Pursue it. Get the cycle time. Work on the processing. Let's prove it out to see if we can actually manufacture this part on the MultiSwiss. And if we can, we'll make sure we place an order."*

Frank Zacsek, Autocam Manufacturing Quality Engineer; and Matt Tufer, Senior Technician in front of the Autocam MultiSwiss.

And that's exactly what happened.

"With the MultiSwiss, we're able to develop processes that finish critical dimensions, especially surface finish or flatness," explains Mike. *"And we're able to do that complete in the machine where a lot of other companies would have to do a face grinding operation."* The fact that the parts don't have to travel from machine to machine to complete all the necessary operations and instead stay in the MultiSwiss where turning, drilling and milling are done in six sequential spindle stations with up to 3 tools per position means they have a leaner process with reduced chance for part damage. *"The Tornos equipment allowed us to improve the process,"* Mike continues. *"Autocam's mission is the relentless pursuit to improve quality and reduce variation… Tornos equipment allows us to be able to do that. We understand that many manufacturing companies inspect quality into the part, so they'll have high variation throughout the product features; however we have very tight distributions. We operate on the Taguchi Loss function."*

Working together – Creating synergy

A key characteristic of a good relationship, according to Mike, is the ability to react quickly. *"We understand we're a difficult customer… we ask a lot.*

Tom gets a lot of calls at 5:30 on Friday telling him we have to have something on Monday." Tom Broe, the direct sales agent for Tornos in Michigan, (who began working with Autocam as a Tornos technician back in 1987 when Autocam had just 7 Tornos machines), chuckles and then explains how the MultiSwiss program began. *"We were pushing the envelope with this part on the MultiSwiss. It's not an easy part. There are some tight tolerances and difficult material. I felt confident that the part could be done and so I had to convince Rocco (Martoccia, Tornos Product Manager), and Rocco, in turn, had to convince a few people."*

Pushing the limits of the MultiSwiss required a little fine tuning

The part required turning, drilling and milling operations on 440C material with a 7.3 mm diameter and a length of 24 mm. Tolerances on the part are ±30 microns on length; ±20 on ODs. The part was going to push the length-to-diameter limits of machining. Mike adds, *"I think if you talk to Rocco, I'm sure he was a little uncomfortable. He knew… from the tolerances and cycle time target that we had to hit… and with the material and part geometry, that it was going to be challenging. And he was very up front about that. This is where we work well together. We pushed him a little bit. And we all decided to take the risk."* Tom continues the story, *"One by one people bought into the idea of pursuing the MultiSwiss for this fuel injection production part. Donato Notaro (Product Engineer for Tornos SA) did a lot to work with Autocam to develop the part. He was involved in writing the program and developing the sequencing of the operations… working with feeds and speeds to optimize the cutting operations. On the multispindle machines, each position is optimized because each position works independently."*

Frank adds, *"Donato's involvement was pretty critical to the success. We had 2 people in Switzerland for about 3 weeks or more. I think in developing this particular process, both organizations really worked together to make it a success."* Mike elaborates, *"When we saw some issues, neither one of us walked away. Together we solved it and developed a robust process. We got it to a point where it looked like it was going to be viable, and then transferred it over to the US. And it's been a great process for us."* Though a lot of time and effort went into proving the MultiSwiss for the direct injection pump production component, Autocam doesn't buy machines to manufacture specific parts. As Mike explains, *"We look at how we're going to use the machine in the future as well."*

What Autocam likes best about the MultiSwiss

In addition to the excellent service Tornos has provided to Autocam over the years, and the ability of the MultiSwiss to get the job done and help Autocam

make money, the group has other great things to say about the machine. *"One of the nice things about the MultiSwiss,"* begins Frank, *"is you can optimize the spindles. This will allow us to hold even closer tolerances on future products. We can bring each spindle into its most capable state."* Each spindle runs independently so if you need to increase or decrease the speed in each position you can do it. Frank also likes the ergonomics of the machine. *"Most of the tools are a little bit higher than a standard multispindle, so you're not bending over quite as much. And when you open the door, everything is right in front of you. It's definitely an improvement over other machines where everything is over your head and you are taking a shower. It's much better for the machinists."*

AUTOCAM STATS

Founded: 1988

Number of employees: 2000

Global manufacturing facilities: 15 on 4 continents. 750,000 square feet of manufacturing space.

Approximate number of parts made per year: 500 million

Tornos equipment:

~160+ > SAS 16, SAS 16DC, SAS 16.6
~25+ > BS 20, BS 20.8
5 > MultiDeco 26/6
3 > MultiDeco 20/8
1 > MultiSwiss 6x14
3 > MS 7
5 > Deco 20

Mission statement:

Our mission is to be the worldwide leader in the manufacture of precision components for customers with whom we develop long-term business relationships. Our mission will only be met by focusing on continually improving our process, thereby improving our products and services to meet and exceed our customers' expectations.

With 130 Tornos operators on staff in Kentwood alone, ease of use is also very important to Autocam. Explains Mike, *"The development time – the learning curve – is generally much steeper for machinists on multispindle machines. But I like that when a machinist or engineer looks at the MultiSwiss, it's not threatening. Because of the way it's laid out, you can break it down pretty quickly in your mind and get your head around the processing and the management of it. The MultiSwiss is comparatively easier to understand and operate."* Mike continues, *"At Autocam, we do not have operators who merely check parts. They are true machinists. They understand machines. It's a continuous challenge to find qualified machinists. The MultiSwiss aids in developing machinists fairly quickly." "I really like the integrated coolant lines,"* says Mike. "With our parts, the material is very difficult to break into small chips. The MultiSwiss design means we don't have all those oil lines in there catching chips. When we look at processing a part, chip flow is a very real thing that needs to be considered. A lot of machines will have a significant amount of downtime because we have to open it up and pull chips off of oil lines and other miscellaneous components. With this machine, Tornos basically eliminated the problem. We have better uptime because of that. *"Also, since the majority of our equipment is temperature controlled, the ability to integrate the MultiSwiss with our temperature control system is nice too."* Frank adds, *"Workplace organization and cleanliness is important to us. And this machine with its enclosed design and maintenance prompts on the control helps with that."*

The Future: Staying ahead of the curve

In recent years, the most significant thing that has impacted business for Autocam was the development of gasoline direct injection. Mike explains, *"That was a technology shift. There was a huge learning curve for the industry on manufacturing direct injection components because the material is more difficult to machine at high volume with the extremely close tolerances. The surface condition is much more critical because injectors are going right into the cylinder. On the pump side, the clearances are smaller and the fit of the parts is substantially tighter. So any damage or knick or ding is very detrimental to the pump. That whole technology shift over the past few years has really driven the process development on all the machines at Autocam. We expect the same results from the MultiSwiss in the future – for the next generation of components. We know that the technological development is going to continue. The drive for better emissions, better fuel economy, and reduced manufacturing cost is always going to be*

there. We need to be ahead of the curve. That's a big part of my responsibility and John Kennedy pushes for it… we're always looking at the next generation of product. When we evaluate machines we need to think about how it is going to help facilitate the next technology leap. With the MultiSwiss, we're well positioned for the products of the future."

In fact, it looks like the MultiSwiss may be a key Autocam "program" for the future. Autocam sees real advantages to progressive type machining operations with CNC flexibility for process development. Mike says it gets them through continuous improvement faster. *"Tom, plug your ears because we've got to negotiate price first. But the MultiSwiss is one of our machines that we'll be utilizing in the future for production."* According to Tom, that means there will be lots of brother and sister MultiSwiss machines filling the Autocam facilities in the years to come.

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TOOL OPTIMISATION

Challenges and available resources in the metalworking field are constantly evolving. New application methods and tooling systems are being introduced to optimise and update working practices. Below is a presentation of the new Multidec-Lube device, as well as advances in thread-whirling recently unveiled by well-known manufacturer Utilis.

Bar turning specialists are some of the most meticulous technicians and operators in the field of metalworking. Every day they must demonstrate their competence in terms production tools and equipment. Tooling is a much more decisive factor in developing the machining capability of a sliding headstock turning machine than any other type of machine tool. As such, these machines are considered jewels of technology thanks to their multiple operating possibilities - very much like a racing car. However, just like a racing car, the sliding headstock turning machine must be prepared and equipped to enable it to be pushed to the limit of its multiple operating capacities. Certain equipment transforms it into a racing car designed for long, straight lines, i.e. long runs of workpieces in the shortest timeframe. Other equipment turns it into a rally car, able to adapt to precise adjustments carried out with the briefest possible downtime.

Preparation - an indispensable foundation

First of all, the work space must be prepared and optimised. An experienced bar turner knows that this optimisation translates directly to the profitability and efficiency of the run to be machined. The choice of tooling, its adjustment and position represent the main challenge to be overcome.

Speed and precision… under pressure

More and more sliding headstock turning machines are equipped with a high-pressure pump delivering up to 150 bar of pressure. High-pressure cooling directly affects swarf management and workpiece cooling, particularly when machining stainless steel or more unusual materials such as titanium or inconel, or simply materials that generate long pieces of swarf. The major obstacle is measuring the efficiency of the cooling and the cutting tools with a view to ensuring optimal performance of the latter. Up to now, the traditional method has been to direct the cooling distribution towards the working axis of the cutting tools for optimal management of the swarf and temperature. This configuration is made using flexible plastic tubes and steel or copper pipes which are usually bent. For the user, this assembly and adjustment is always random, and therefore never precise.

Lubricate wherever necessary…

The innovation proposed by Utilis involves equipping static tools with high-pressure integrated cooling. The principle is inspired by the system integrated in the tool holder, thus allowing oil to circulate through the tool. Utilis has developed a clamping system which uses and adapts itself to a clamping wedge. The special wedge is connected to the high-pressure pump. The clamping systems, called Multidec-Lube, are connected to the oil inlet affixed to the wedge. Each cutting tool is therefore lubricated directly in an optimal and stable manner during cutting.

This saves time and improves quality

It also significantly reduces the time required to assemble and adjust the oil inlet network. Another advantage of this system is that it eliminates the risk of the cooling becoming misaligned due to the nozzles vibrating when the tools are changed. This ensures that the delivery of high pressure on the cutting edge remains optimal for the cutting conditions. The integrated cooling, in addition to the assembly and adjustment speed, represents a significant advance in terms of the quality and repeatability of work.

Thread whirling that boosts productivity

Equipping a sliding headstock turning machine with a thread whirling system constitutes a fundamental improvement in terms of boosting productivity. External thread whirling offers an opportunity to significantly reduce thread tapping times. It represents the fastest and most reliable way to produce a run of long threads. In a variety of situations, the application for standard diameters, as well as complex shapes, demonstrates excellent performance in a single pass and without burrs. However, this system is not limited to complex shapes. It can, of course, produce standard threads in optimal cycle times. Independently of a fast, reliable application, thread whirling prevents the need for several passes when creating threads (as with thread chasing, for example). A single pass prevents burrs from forming.

Specific machining

Some setting technicians still remain sceptical with regard to thread whirling. In fact, in most cases, the thread whirling ring is confused with a die. Thread whirling is a milling operation with swarf removal: the thread whirling ring is fixed to a driven tool adapted to the machine. The ring is then driven in the same direction as the spindle. The tool drive starts from one of the four clockwise positions (12; 9; 6; 3). The bushing and adjustment of the assembly in relation to the spindle ensure that vibrations are kept to a minimum. Utilis has designed various ring configurations: number of teeth, high pressure, adapted to the workpiece diameter, cutting conditions (speed, feed) and adapted to the type of thread. The type of run (large or small) is taken into account to propose the optimal thread whirling alternative.

Always on the lookout

Many applications have proven their effectiveness over the years - why change?

Like custom thread whirling or the Multidec-Lube high-pressure cooling system, the technical developments underpinning new machines and equipment are a source of added value and a competitive advantage.

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THE HEAD OF W&F WERKZEUGTECHNIK, MIRKO FLAM,
TALKS ABOUT MODULAR, ROTATING TOOLS FOR BAR TURNING

"MODULAR TOOL SYSTEMS ARE OFFERING COMPLETELY NEW OPTIONS"

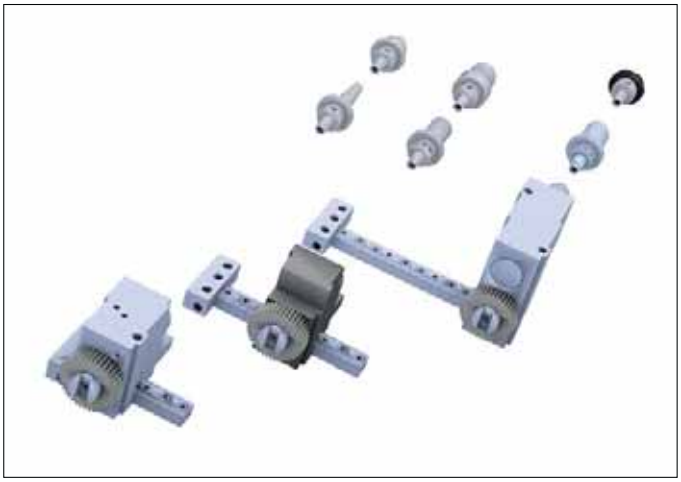
Smart rotating tool systems are opening up great new potential for Tornos users.

The WFB modular design system offers a wide range of different drive units and adaptors, which allow you to combine suitable tool solutions for almost any machining task.

Together with the engineers from Tornos, W&F has developed completely new tool concepts for an extremely wide range of Tornos machine series. As a result, both modular rotating tools and static tools can now be offered for all of the machines in the Deco series.

Both companies have been able to develop a completely new and revolutionary tool concept for the **ST 26 automatic turning machine**, which was only recently introduced by Tornos.

All tools can be charged with high or low pressure via special coolant channels. This means that complex, intrusive coolant hoses are now a thing of the past.



The standard range from Tornos now also includes mill holders/high-speed grinders/angular spindle holders with or without internal cooling.

The fully modular thread-whirling units with interchangeable inserts that are precise to the µ are also a world first. The whirling unit remains in the machine – and the whirling insert that is equipped with interchangeable inserts can be changed in less than one minute. This really saves time and money.

The patented and high-precision taper/planar support interface with cylindrical pilot/support collar also guarantees considerably improved concentricity when compared to cylindrical interfaces. This also contributes to a significant increase in productivity.

The "WFB adaptor pool"

With well over 100 WFB adaptor variants, you now have new machining options.

What is special about modular tool systems from Tornos/W&F is their complex design, their extreme rigidity and their high levels of precision.

The WFB interface transfers large forces and is ideal for both a high milling performance and high speeds. The concentricity and tool change repeat accuracy lies below two micrometers. This leads to high-quality machining and a long tool life for milling cutters and drills. Our tools can be fitted extremely quickly and therefore offer maximum freedom and flexibility when they are used on Tornos machines.

The tool change mechanism is extremely simple, fast and safe to use.

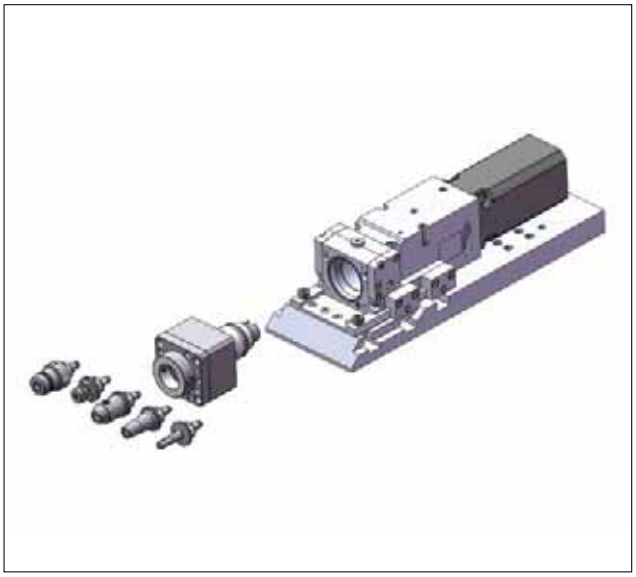
The WFB adaptors are all designed for internal cooling. All of the adaptors can be preset outside of the machine, meaning that long set-up and changeover times are finally a thing of the past. Set-up and changeover times are close to zero, which significantly increases productivity.

Used for all machines

The Tornos/WFB system can be used across machines and in all machine series.

A large selection of over 100 different adaptors, such as collets (ER8 to ER25); Weldon/Whistle notch; milling arbors; threaded chucks; hydraulic expansion; boring bar holders, etc. and shrink chuck adaptors in an extremely wide range of diameters and lengths, all offer completely new machining options.

Especially when using the shrink technology with WFB shrink inserts, you can achieve extremely high levels of manufacturing quality while, at the same time, achieving a tool life increase of up to 300%.



Tornos / W&F drive units

The drive units are manufactured to the highest levels of quality.

We use improved bearings and special sealing technology.

All of the components are high-quality – this is the only way to guarantee the required level of quality and durability of the Tornos/W&F toolholder. The machine and tool form a single unit. Thanks to the modular holder concept, a large number of special options that were previously required can now be replaced by standard toolholders. This leads to a high level of availability and to a reduction in costs.

A true high-speed machine

The new development of a true high-speed machine – the multi-spindle machine from Tornos (Multideco/Sigma/Alpha) – is revolutionary

The high-speed machine, with a speed of 27,500 rpm, is available as a modular design with WFB and with or without internal cooling.

WF Micro for the miniature sector.

The Tornos/WF Micro system was presented for the first time at the SIAMS.

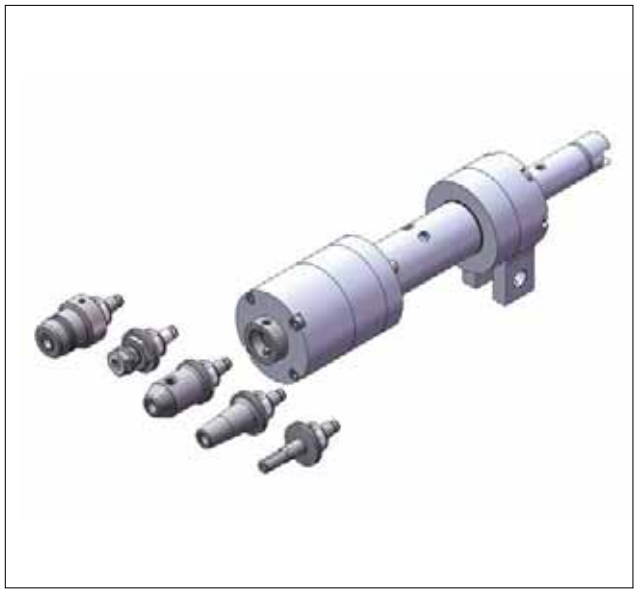
This W&F interface, which is the smallest on offer, can be used for rotating units (e.g. Deco 10) and also for static toolholders.

System partnership

At the end of 2013, a partnership was established between the turning-machine manufacturer Tornos and the tool manufacturer W&F. This is a system partnership in the rotating and static toolholders sector. In addition to its many advantages, globalisation also puts a lot of price pressure on products. The unit costs are important – especially during bar turning.

It is therefore absolutely necessary to permanently improve and increase productivity.

Users are demanding short set-up and changeover times, as well as an extremely high degree of flexibility. Thanks to the Tornos/WFB system, we are able to fulfil these requirements for you. The new machine and tool concepts leave almost nothing to be desired.



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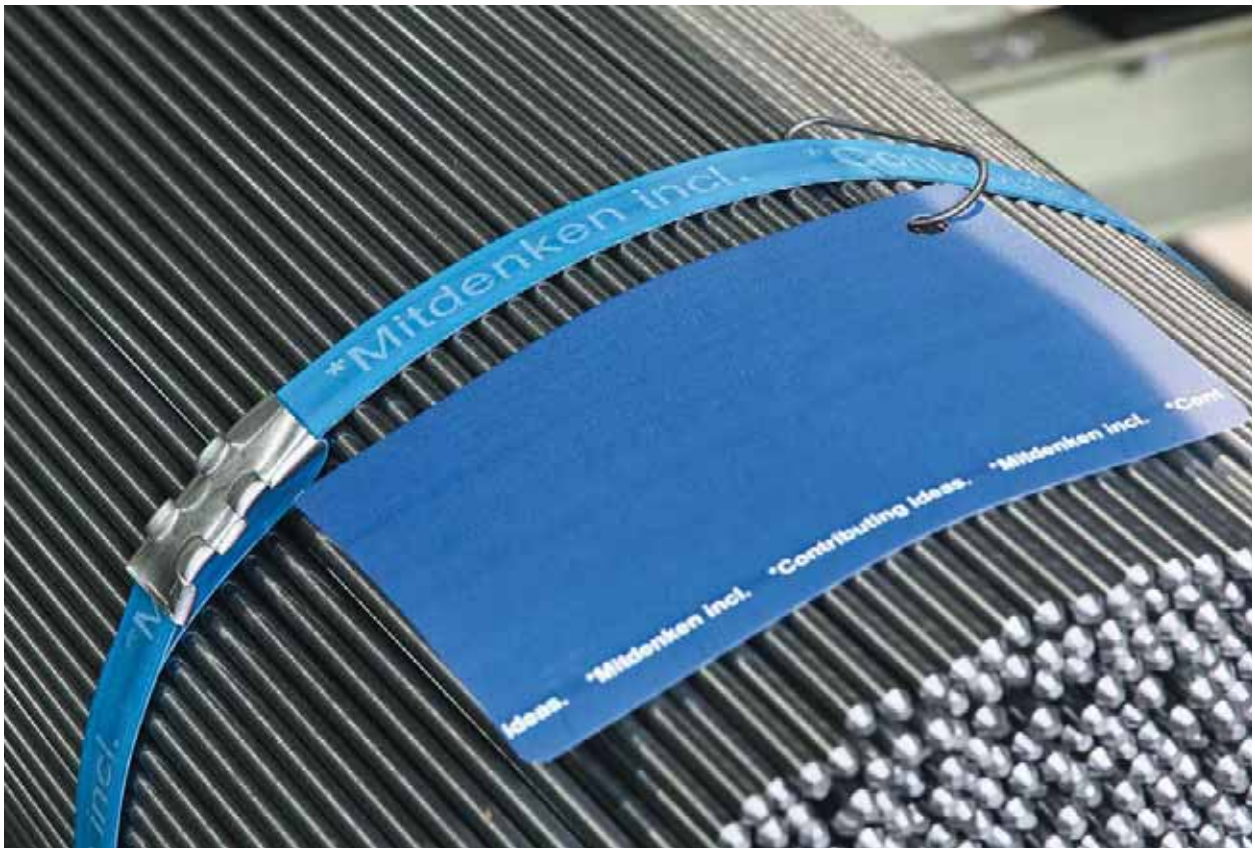
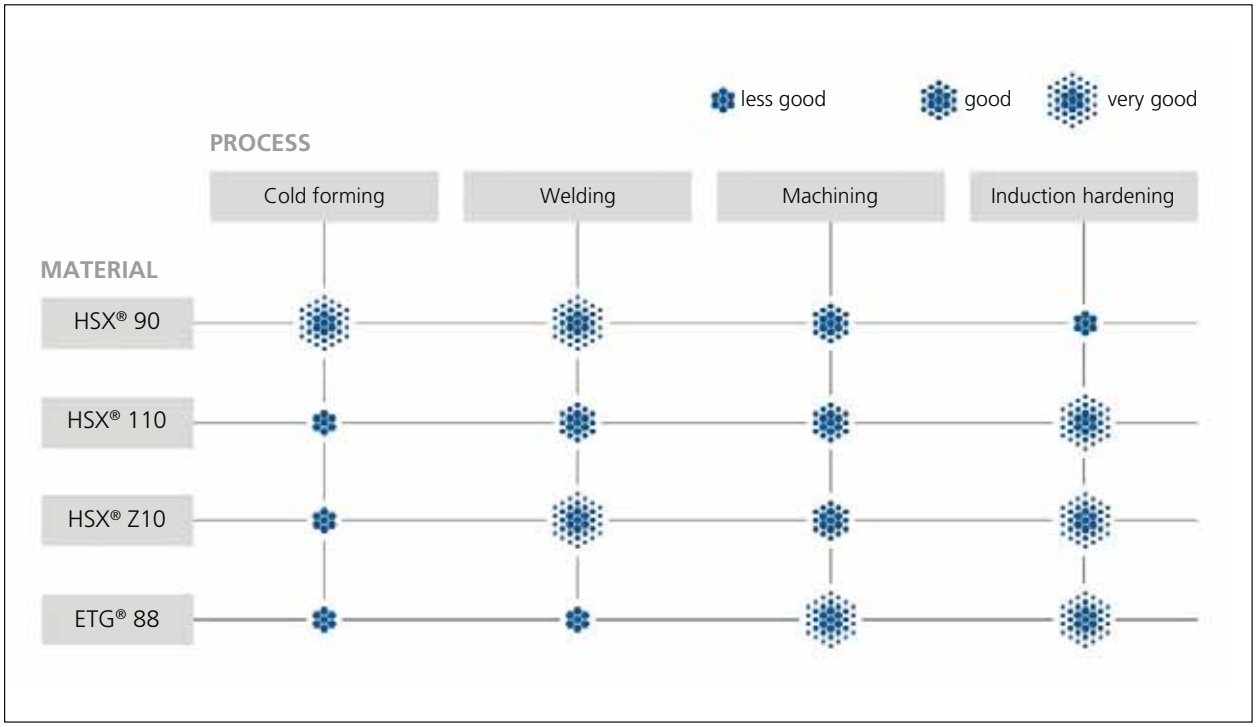
STRONG BRIGHT STEEL SOLUTIONS FOR PRECISION COMPONENTS

Making steel stronger and better – this is the objective of Steeltec AG, part of the Schmolz + Bickenbach Group. The bright steel experts work continuously on new materials solutions to meet the increasing demands from the automotive, mechanical engineering and hydraulics industries: The new modular steel known as HSX® 90 allows for a great deal of flexibility in terms of the mechanical and technological properties. This makes it suitable for applications that not only require a high degree of strength, but also require a material that is ductile and is easy to form and machine. The new steel known as HSX® Z10 really proves its worth when used for precision components that are subjected to high static or dynamic loading.



As supplied, the high- and higher-strength special steel grades from Steeltec AG exhibit high strength, whilst at the same time being easy to machine.

Thin-walled parts and components that are subjected to high pressures and must be sealed against internal and external pressure are used in applications, such as assistance and safety systems and modern passenger car engines. In some cases, they must be able to withstand both transverse and longitudinal loads. Materials that have a pure, homogeneous microstructure and highly isotropic properties have proven themselves to be highly robust and reliable in use. Bainitic steels fit this description. This is precisely why Steeltec AG – one of the few suppliers of special steel – have decided to include a new bainitic steel in their portfolio. *"A high purity microstructure is not by itself a recipe for success. The various*



Cold forming, welding, machining or induction hardening: The high- and high-strength special steel grades from Steeltec AG have the various manufacturing technologies in component production covered.

different application areas once again place completely different specific demands on the material," explains Guido Olschewski, Head of Quality Management and Development at Steeltec, which is part of the Schmolz + Bickenbach Group. To develop the most flexible steel solution for a wide variety of components, the bright steel experts designed a modular material: HSX® 90 steel. One of the key features of HSX® 90 distinguishing it from other steels is that its technological and mechanical properties can be modified to meet the specific requirements of a particular engineering application. The tensile strength can be adjusted from 700 to 1000 MPa, while the elongation after fracture can be varied between 10 and 20%. The precise magnitudes for the properties of the steel are decided in collaboration with the customer. The specific design, production and construction requirements are used as the basis for these decisions, and Steeltec translates these requirements into materials properties.

Distinguishing features of HSX® 90 steel: Modularity

As a company specialising in high- and higher-strength special steel grades, the bright steel manufacturer uses its process expertise to optimise the material for the customer's specific requirements: The company achieves the high level of flexibility in terms of mechanical and technological properties by setting the parameters during drawing. As supplied, the special steel exhibits high strength and yet can still be easily machined. At the same time, it is suitable for cold forming, for example for producing threads, and for welding. This makes it an attractive option, even for more complex designs. HSX® 90 steel has already undergone successful testing, for example for airbaig capsules, which obtain the propellant that rapidly inflates the cushion in the event of a collision. Before the airbag is triggered, the capsule is under permanent high pressure. To produce the delicate component, a hole is drilled into the steel rod.

If the capsule is made from HSX® 90, it can be welded shut in a very short space of time so that the propellant inside the cavity cannot escape.

To reap the benefits of the modularity for the production process, Steeltec varies properties such as ductility. A worm gear shaft, which is used in conveying and drive technology, is often manufactured using cutting processes. Reducing the ductility makes machining easier. Worm gear shafts produced by cold forming, on the other hand, require a high level of ductility from the material. For the loads on the component, Steeltec uses Haigh diagrams and S-N curves to calculate the ideal fatigue strength under periodic

Example application: Worm gear shaft
Diameter < 15.0 mm
Comparison of physical and machanical properties

	ETG® 25	HSX® 90	ETG® 88	ETG® 88 C+
Rp 0.2 [MPa]	> 660	> 850	> 685	> 820
Rm [MPa]	800-900	> 880	800-950	960-1150
A5 [%]	> 12.0	> 12.0	> 7.0	> 7.0
Microstructure	Ferrite / Pearlite	Bainite	Ferrite / Pearlite	Ferrite / Pearlite
Machinability				
Weldability				
Cold formability				

Evaluation criteria: less suitable  very suitable

A worm gear shaft is often manufactured using cutting processes or by cold forming – either of these processes can be used on HSX® 90 steel, depending on how the mechanical and technological properties have been engineered.

ABOUT STEELTEC AG

Steeltec AG is one of Europe's leading manufacturers of bright steels. With its focus on high-strength and higher-strength special steels and special free-cutting steels, Steeltec has established itself as an important partner of the automotive and hydraulic industries and the mechanical engineering sector. Steeltec works closely with customers, suppliers and research institutions to continually improve the production and engineering properties of steel, driving competitiveness across the entire value chain. Working within these partnerships, Steeltec develops high-performance steel solutions that meet its customers' application needs.

compressive and tensile loading, as well as the operational fatigue strength of the steel in the particular application – this is also relevant with regard to highly stressed lightweight engineering structures.

Another attractive feature of HSX® 90 is that it is well suited to applications requiring magnetically soft materials, such as solenoid valves or components in electric motors.

As HSX® 90 can be optimised to have a relatively high resistivity, this can reduce energy losses in a.c. applications.

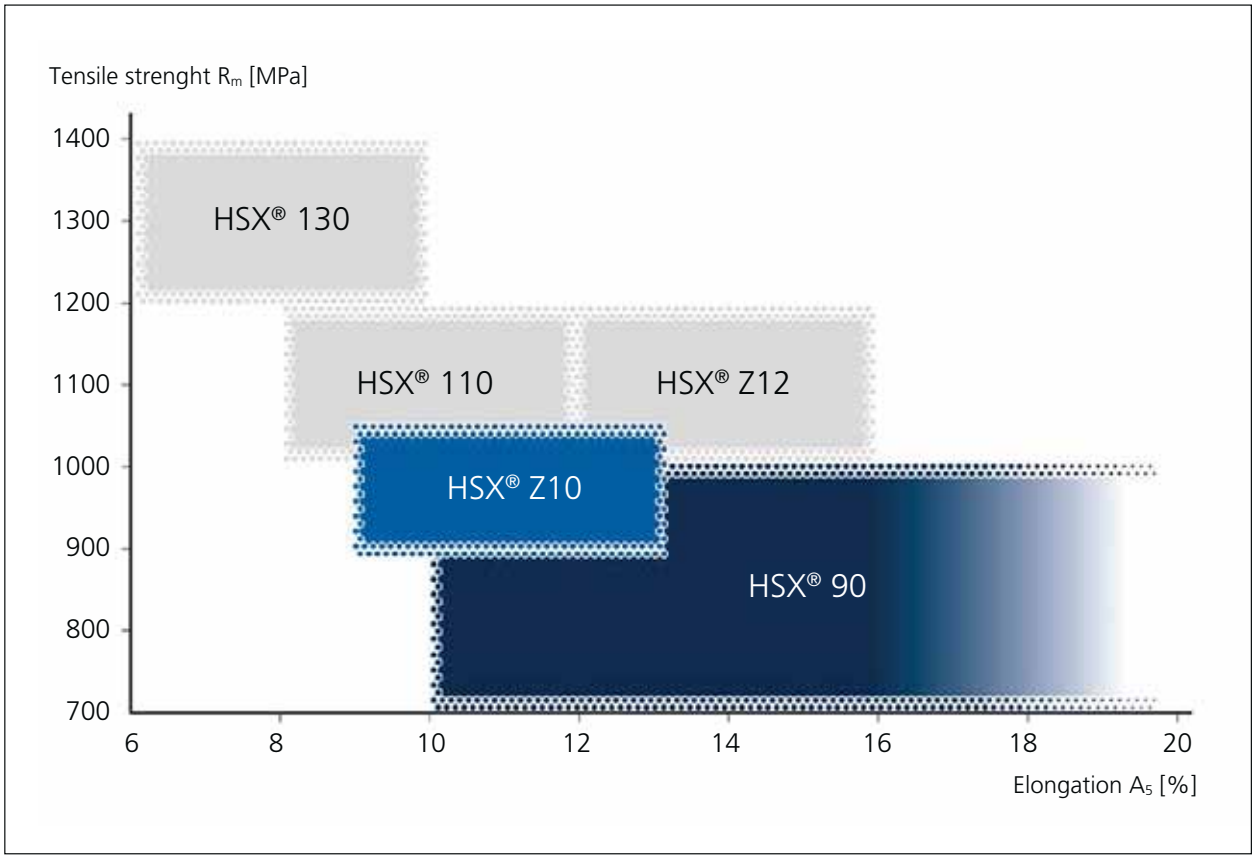
Bainitic special steel

HSX® 90 is based on a bainitic steel manufactured by Swiss Steel AG, an affiliate of Steeltec AG. *"As inclusion defects can reduce the reliability of the material, we decided to take a very high purity bainitic steel as our base material,"* says Olschewski. *"This prevents cracking during use and achieves an incredibly high level of formability. This material is also superbly well suited for high-precision laser welding work."*

By conducting many different materials tests and examinations – such as tensile strenght determinations, microstructural examinations, hardness measurements and impact testing – over the last two

One of the ways in which the company alters the mechanical and technological properties of the special steel grades is by setting the parameters during the drawing process.

years, Steeltec has been investigating the effect of the different process parameters during drawing on the properties of the steel. In addition, the "Institut für Werkstofftechnik" [Institute for Materials Technology] in Bremen (Germany) analysed the effects of post-production heat treatment on the steel, and how these processes could be used to optimise the steel. The comprehensive characterisation of HSX® 90 steel, including its dynamic and magnetic properties, has provided the bright steel experts with



The mechanical and technological properties of HSX® 90 and HSX® Z10 steels broaden the range of applications for the high- and higher-strength HSX® special steel grades.

the knowledge they need in order to fine tune the drawing process to produce a bright steel tailored to a customer's specific needs. One of the controllable parameters in the bar drawing process is the draft (the difference in the original and final stock diameters), which can be varied by selecting the appropriate draw die. The greater the reduction in the diameter of the bar when it is pulled through the die, the higher the strain hardening in the drawn bar. The calculated use of temperature also allows the bright steel manufacturer to control the mechanical and technological properties. Targeted heat treatment processes can be used to improve the material, for example with respect to its wear resistance. The wheels have been set in motion to establish a standard definition of HSX® 90 steel under material number 1.5519, to make it easier for users to obtain approval for its use in production. Customers can purchase the steel bar with dimensions from 4.15 to 36.0 mm from Steeltec.

HSX® Z10: High-strength and ductile

HSX® Z10 special steel has been available from Steeltec since April 2014. *"With our new ferritic-perlitic* HSX® *Z10 steel, we have developed an efficient solution for heavy-duty applications in the automotive, mechanical engineering and hydraulics industries,"* explains Olschewski. The steel easily meets the demands to which, for example, shafts or pump parts are subjected, specifically transverse loads and high internal pressure. As supplied, it has a tensile strength of approximately 950 MPa and an elongation after fracture of 12%. The fatigue strength of 400 MPa under a circumferential bending load demonstrates the material's excellent dynamic loading capacity, which is made possibleby selected micro-alloy elements. *"At 0.3%, the carbon content is relatively low,"* says Olschewski. This makes HSX® Z10 steel ideally suited for welding, but also for surface hardening. A value of 55 HRC can be achieved through induction hardening. Another advantage that is characteristic of all high-strength and higher-strength special steel grades from Steeltec is that, as opposed to standard quenched and tempered steels, additional production stages are not required, such as downstream heat treatment and subsequent additional processing stages such as reshaping, grinding, and deburring. The result of this is shorter production and cycle times. Parts costs drop noticeably.

Conclusion

Steeltec AG collaborates with customers, suppliers and research institutes to develop the best steel solution for every application. The steel experts engineer the new modular HSX® 90 material to meet the specific demands of highly stressed and thin-walled components. Compromises and unnecessary concessions are therefore a thing of the past. The new HSX® Z10 steel masters the balancing act between high strength and ductility. This makes it an efficient solution for components subjected to dynamic loading. When using the special steel grades, component manufacturers benefit from cost-effective processes and a long-term boost to their competitive edge.

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