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EvoDeco 10:
Advantages at all levels

Tornos at
mediSIAMS 2011

Direct connection
to success

Symmetry Medical Asia

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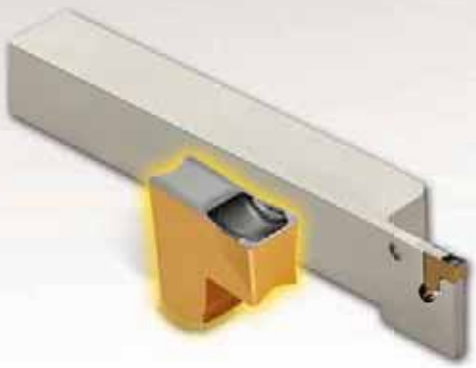
SUMMARY

3Productivity
Performance ■ Profitability

Qualität und Profitabilität in der Medizintechnik



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THE SWISS ARC JURASSIEN REGION CELEBRATES MICROTECHNOLOGY'S CONTRIBUTION TO HUMAN HEALTH AND WELL-BEING

The expertise of the Arc Jurassien in the field of medical microtechnology enjoys a long history, and can be sure of having significant potential for development in the future. This remarkable competence fits perfectly into the well-developed value creation process delivered by the highly interdisciplinary Swiss medical engineering industry.

Cutting-edge technology will be the theme for the forthcoming 3rd edition of the mediSIAMS fair, which will take place in Moutier in early May. Tornos will of course be present at this important event. Indeed, Tornos has for many years been the undisputed number one supplier of machining equipment and solutions for the medical sector. Our three product lines - single-spindle, multispindle and machining centre - are the benchmark not only for the world's leading players in the sector, but also for the majority of subcontractors operating around the world. This is all the more gratifying because our engineers are working tirelessly to develop new machining solutions. This will serve to consolidate our position as leader in the future. In the medical microtechnology field, the Tornos name is and always will be an asset.

Our position as a benchmark company is completely logical if we consider the environment in which it exists and develops. In fact, medical engineering is an important sector of the precision industry in the Swiss Arc Jurassien area. The rich tradition and exacting demands of the watchmaking industry have fostered the development of expertise in precision work, an undeniable asset for the medical sector. Tornos' number one position in the watchmaking industry has been instrumental in terms of gaining the enviable position of leader in the very buoyant medical technology market.

Our customers, users of technology in the fields of medical instruments, orthopaedics, dental medicine, cardiology, plastic surgery and various medical devices, or operating as subcontractors producing parts for these fields, know how exacting their demands are. Indeed, alongside machining precision and finish quality, other criteria must be met which are instrumental in satisfying these demands in terms of conductibility, durability, biocompatibility, physical resistance, etc.

All of these specialist disciplines will be represented at this year's mediSIAMS fair. Visitors will be able to quickly discover new Tornos products (strictly confidentially, just between ourselves, we're talking about

a world-first here) and also find out about the production techniques required by the medical engineering sector. This sector includes non-metabolic products, instruments, devices or diagnostic products which help prevent disease and/or improve quality of life.

Finally, visitors will also be able to learn about a subject which is of particular importance in the field in question, namely the requirements in terms of standardisation and CE marking. The medical sector is of course well-known for its stringency in this area. It is important to comply with these regulations intelligently and to benefit from them in order to respond as best we can to our customers' expectations, while at the same time enhancing and developing our quality processes to ensure the success and sustainability of our respective activities.

Ideally situated in the heart of the precision manufacturing region, Tornos and mediSIAMS will be demonstrating the power of the medical microtechnology sector and revealing the main components in this state-of-the-art industry.

Francis Koller, member of Tornos' Management and President of mediSIAMS

EVODECO 10: ADVANTAGES AT ALL LEVELS

Presenting a turning machine destined to replace the Deco 10 is no mean feat when it has made such an impact on its era. For over 10 years it has held the top spot for flexibility, precision, speed and productivity. Over 2500 turning machines of this type are in use today and although its drive train remains the most efficient available, Tornos wanted to make some modifications to allow this exceptional turning machine to better meet the needs of customers. Interview with Mr. Philippe Charles, Tornos Product Manager.

As with the EvoDeco 16 a year ago, the key idea for the EvoDeco 10 is to develop a successful machine rather than revolutionise it. *"The Deco 10 remains an extremely capable machine, certainly the best in its market segment,"* explains Philippe Charles. For example, the machine's drive train remains the same with its system of four independent and simultaneous tools. As for the changes that are immediately evident, as with the EvoDeco 16, the enclosure breaks with the tradition of the 'rounded' covers on the Deco machines. At user level, the setting ergonomics have improved leaps and bounds with the control mounted to an articulated arm to improve the general ergonomics, facilitate operator adjustments and reduce the setup time. It also has an additional axis for setting tools for secondary operation. With regards to machining performance, two powered spindles using identical-power synchronous motor technology are fitted, one for normal operation and the other for secondary operation. New multi-position tool holders make their appearance, as does central cyclic lubrication and the spray pump with self-cleaning filter is also among some of the main changes.

Let's consider these changes in detail:

Greater performance

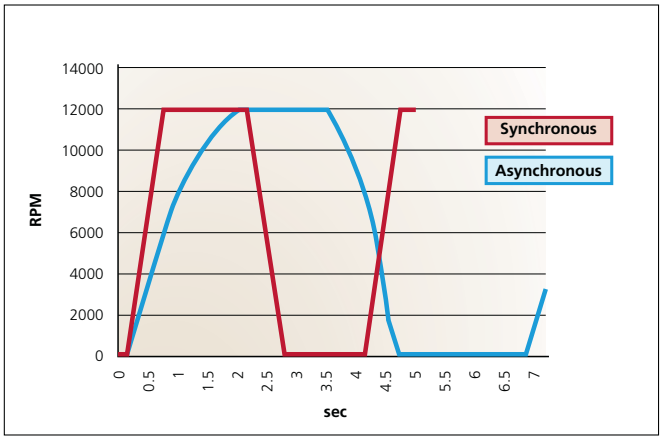
With outputs of 6.5 and 5.1 kW, the spindles and counter spindles are almost twice as powerful as on the previous model. Equipped with powered spindle technology, their reactivity is very high. This makes the spindles capable of going from 0 to 10,000 rpm in half a second. Synchronous motor technology

allows much greater reactivity; when machining complex parts requiring numerous stops, the time savings can be quite significant. Another advantage of this new spindle is that the maximum machining torque remains constant even at high rotation speeds (see graph).

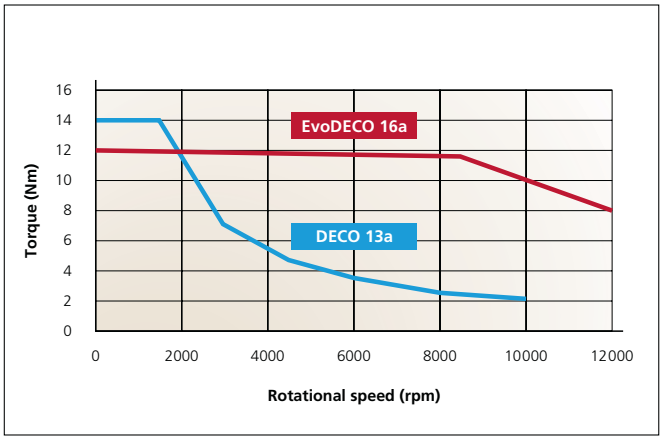
Greater precision

Thermal performance is of the utmost importance in terms of precision. The EvoDeco 10 also has many new innovations in this regard. Firstly, the cutting oil circulation pump continues running when the machine stops. This function can be adjusted (timer) and allows better thermal performance during production. The tests carried out show that after a stop, the temperature of the machine varies less and returns much quickly to the ideal working temperature. The spindles have a closed circuit cooling system that also allows better temperature management. For secondary operations, the new design for the tool mounting gives greater rigidity to the unit.

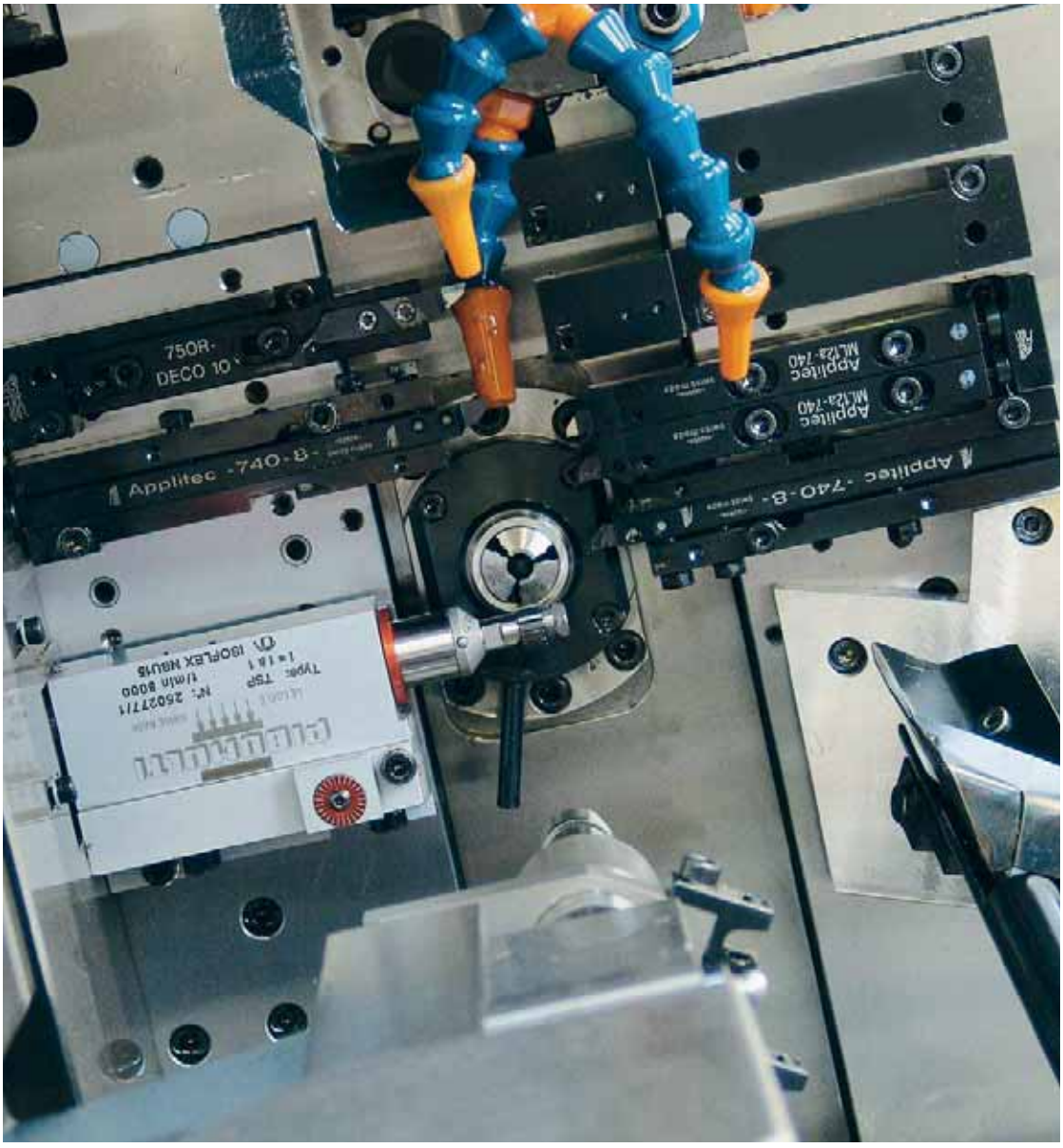
As for the EvoDeco 16, the overall shape of the machine breaks with the "rounded" tradition of the Decos. The control unit mounted on an articulated arm is a leap forward in terms of setting ergonomics.



Comparison of acceleration times between the two technologies



Comparison of synchronous and asynchronous motor torques



The kinematics of the machine are based on the success behind the Deco 10, namely four independent and simultaneous tool systems.

More adjustments (removal of mechanical setting of tools in secondary operations)

A digital centring Y-axis in secondary operation makes its appearance. With travel of +/-1 mm, this axis simplifies settings for secondary operation. Centring of tools during setup in this way is much quicker, repetitive and precise. This setting possibility makes it possible to develop new processes when required. For example, a gear hobbing operation can be added to the secondary operation.

Greater Ergonomics

It is now much easier to set the machine; the operator can pivot the control and at the same time access the machining area. This area is largely free and the new sliding door gives the operator full access. *"Accessibility is one of the keywords with this new turning machine. All the maintenance areas are accessible via removable covers, making operations by the after-sales service simpler and therefore shorter,"* noted Philippe Charles.

With regards to working comfort, the removal of belts has reduced noise by approximately 10 to 15 decibels, a difference that is immediately noticeable! The spray pump has a self-cleaning filter controlled by the NC, the removal of drilling fluid and particles to the swarf container can be set, during each bar change if specified. With this, the oil remains clean and the machine screens do not get misted and dirty. Maintenance in this area is therefore virtually redundant. Standard in the machine, the central cyclic lubrication system affords the operator regular lubrication operations. This increases the availability of the machine and ensures operating safety (lubrication never forgotten).

"Come and see an EvoDeco machine in the Tornos test workshop in the evening when all the workshop lights are out and compare it with other machines". Philippe Charles invites us to discover the LED lighting fitted to the new turning machine. The difference is illuminating. The lighting is much better, yet it uses four times less electricity.

Greater Compatibility

"Compatibility with the old Deco 10 machines is completely guaranteed. A program carried out with TB-Deco for the Deco 10 can be passed on to EvoDeco 10 virtually instantly, whatever the drive train (8 or 10 axes). Furthermore, the tool holders, devices and accessories for the Deco 10 can be mounted to the new turning machine with no problems". This compatibility, announced by Mr Charles, is the best news for customers who have used Deco machines for years and have thousands of programs and dozens of devices. It will be easy to switch to the new technology without having to make any compromises, without having to rework programs and without having to buy new tool holders.

Greater Feasibility

To increase the number of tools available on the plattens, Tornos has also developed a new line of multiple tool holders. With a new compact design, these holders allow three tools to be mounted in two positions, for both machining tools (8x8 section) and rotating tools (drilling, milling and slitting). A total of 21 tools can be mounted at the same time (as opposed to 15 for the Deco 10) of which 4 can be used to machine simultaneously. The new setting axis also allows the new gear hobbing device to be used for secondary operations.

A fully equipped basic machine

In order to have a tool that is immediately operational, the manufacturer offers a well-equipped basic machine. For example, all the motors and indexing of the spindles and C-axes are part of the 'standard package'.

With the EvoDeco 10, Tornos has eagerly taken up the challenge to develop a 'legend'. To conclude, Mr Charles tells us: *"This new turning machine incorporates all the evolving requirements of our customers that already use the Deco 10. We have integrated their remarks, ideas and comments so that we can offer them a precise solution tailored to their expectations".*

If you would like more information

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TORNOS AT MEDISIAMS 2011

The industry fair in Moutier, Switzerland, will see the machine tool manufacturer present a wide range of machines designed to produce parts for the medical sector.

Tornos' presence at the mediSIAMS fair is no accident. The medical sector is in fact an essential market for the Moutier based machine tool manufacturer. *"It represents around a quarter of the company's turnover",* reveals Philippe Charles, Market Segment Manager for MEDTEC. *"We have been pioneers in this market on a global level for around twenty years. Over the years we have developed a complete series of machining processes, enabling us to offer not just machines but solutions"*, he explains.

"Our background is in watchmaking, where it is essential to produce high-precision parts of a very high quality with an excellent surface finish. That is what has made us the market leader in terms of global sales" he explains. *"We are in the Top 3 in Asia and the United States"* he concludes. A statement based on the following facts: Tornos has around 300 customers in the medical sector, across 40 different countries.

In this sector, customers of the Moutier company specialise in the manufacture of parts for use in orthopaedics, traumatology and spinal column repair. *"The challenges our customers present us with mainly relate to the surface finish of the parts our machines produce",* states Philippe Charles. However, the relocation of production to China is a trend that is being felt more and more in the medical sector. *"That means we need to strengthen our customer support and increase our competency in this market",* he concludes.

A major world-first

This year, the major innovation on the stand of the Moutier exhibitor will be the EvoDeco 10 turning machine with mobile spindle, making its world debut from the 3rd to the 6th May 2011. This machine has been entirely rebuilt, based on a chassis developed using finished element calculation, synchronous spindles, an automated centralised lubrication system for the moving parts, a new ergonomic cover and a control unit mounted on an articulated arm. It takes over from the old Deco 10, which performed very well in the market, while reducing downtime thanks to the speed the powered spindles are able to start and stop. This CNC turning machine will show how it is possible to manufacture screws up to 10 mm for reconstructive surgery extremely economically and with a very high level of precision and surface finish. It will produce 3 mm diameter screws designed to attach a connector to a pacemaker in order to connect electrodes to the unit. Machining processes include deep drilling and milling operations (see article on page 6).

Machining on 5-simultaneous axes

The Almac CU 1007 machining centre will also be on show in a medical configuration on the MediSIAMS stand with a robot for loading and unloading parts. It will machine cervical vertebrae locking plates that are attached using polyaxial screws. These plates, which are complex in shape, have a convex, striated surface and each contain eight drilled holes. They can only be produced on machining centres that are able to operate on five axes simultaneously. The tool magazine is designed to hold up to 30 tools, however only around twenty are required to produce this particular part.

A machining centre operating using bars

The Almac FB1005 machining centre will show how intervertebral that are placed between the vertebral discs, can be produced efficiently in PEEK, thanks to its operation using bars. It can be equipped with eight frontal spindles, four vertical spindles, four lateral spindles and three pick-up spindles. The machining process includes milling and drilling operations on the B axis, which allows families of parts to be produced on a single machine by modifying just one of

the parameters in the programming cycle. The parts are completely finished on the machine, avoiding the need for secondary operations. This machining centre can be configured with three to six axes, allowing the position of the bar (B axis) to be altered between 0 and 20°. For short bars, the angle can be increased to +/- 45°.

The indisputable advantage of multi-programming

Exhibited for the very first time in 2010, the EvoDeco 16 sliding headstock turning machine will again demonstrate how families of parts can be produced one behind the other from a bar. This is achieved thanks to the multi-programming capability of the TB Deco numerical control. Visitors to MediSIAMS will see the machine in this configuration on the Tornos stand, where it will machine three parts as part of a complete production process for a dental implant comprising three distinct components.

Made to measure for better economy

Designed primarily for producing parts economically, the Gamma 20 turning machine is a great model that offers less flexibility in terms of machining variety. On this machine, visitors will be able to discover the advantages of the thread whirling technique for producing parts for the medical sector. For bone screws in stainless steel, which will be the parts used in the demonstration on the Tornos stand, this technique is used to obtain a high-quality sharp, self-penetrating medical thread. The hole in the screw's torx head is micro-milled simultaneously in concurrent operation time using a high-frequency spindle capable of turning at up to 60,000 rpm.

See it at mediSIAMS
Moutier, from the 3rd to the 6th May 2011
Stand C1, Halle 1.1

OPTIMISED RIGHT FROM THE DESIGN STAGE

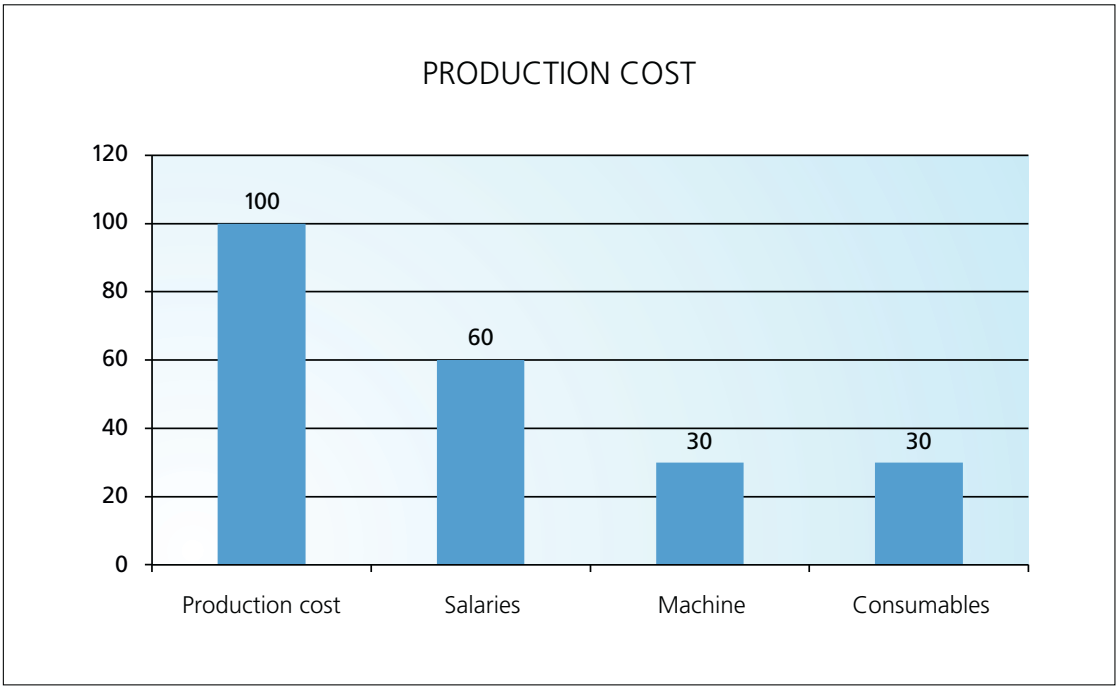
Today's markets are becoming increasingly competitive, with customers that own machine tools needing to adopt new, more systematic approaches to improve their performance. Concepts such as SMED, lean manufacturing, 5S and 8D are being used more widely. The production process is very important and the choice of machine has a significant impact on numerous parameters that directly influence the operating result of companies using them. To find out more, read the interview with Brice Renggli, Marketing Manager at Tornos.

With a few clicks on the internet you can access numerous studies that provide a breakdown of production costs for an industrial company. These can be highly precise, more haphazard or simply fantastical. Nowadays however, if we take a simple or even simplistic view, we can state that, roughly speaking - at least in Europe - for production with a value of 100, the costs can be spread as shown in the graph below.

These figures are debatable and depend to a large extent on the organisation of the company and many other factors specific to each company. Nevertheless, however we calculate, it seems evident that labour is the main cost driver. According to Willi Nef, Sales director at Tornos, in most cases when customers purchase a new machine they will only compare the purchase price and the cycle time (of the old machine and the competition). These are just two parameters amongst many others. Of course, Tornos is working on both cycle time and investment, but not exclusively…

Investment

EvoDeco machines benefit from more advanced and expensive technology, such as synchronous motors and the investment required from customers is around the same as that for the previous model, the Deco 13. This was made possible thanks to ever more rigorous work to control costs, and through the implementation of a modular system. Since 2008, thanks to the agreement between Tornos and Precision Tsugami, the Swiss company can offer two entry level Tornos machines. The Delta and Gamma machines open the door to the world of Tornos. Despite offering more



limited performance than an EvoDeco machine, these two models still represent an interesting proposition thanks to their low investment costs.

Cycle time:

Of course, each machine should be more efficient than the previous one. If we once again take the EvoDeco range as an example, its synchronous powered spindles enable extraordinary acceleration and deceleration, significantly reducing downtimes for parts requiring multiple stoppages. With its two identically powered spindles, easy-to-understand kinematics, robust chassis and deburring axis, the Sigma 32 is the ideal machine for parts requiring a balanced operation/secondary operation machining process and large-scale swarf removal. These examples are not lacking in technical improvements aimed at improving cycle time. The best of these is still the Deco range, which has undergone almost 15 years of technical development and remains one of Tornos' flagship products.

Investment and cycle time are two easily measurable parameters. However, they are only two of the many elements that determine the cost of a part. Tornos has undertaken projects in a number of areas in order to improve the performance of its machines and reduce the cost per part, which represents a key value.

Working in several areas

How can a machine manufacturer influence the other factors and help improve performance for its customers. This was the crux of the problem. The entire production process is involved, from programming to machining and including setup and maintenance.

Facilitating programming

Programming a machine using ISO code is not very user friendly. TB-DECO has greatly improved this situation, but with certain constraints that not all users were ready to integrate. Tornos is working to overhaul TB-DECO, and its successor already has a name: DECOdrive. After testing hypotheses and conducting a market survey at EMO 2009 in Milan, it quickly became apparent that this development was heading in the right direction. The aim of DECOdrive is not only to make machine programming much easier, but also to render the machine more accessible. An article was published on the subject in Decomag 2009 no. 50. Programming should of course be possible in concurrent operation time.

Maintenance and preparation time

Tornos is working on a number of projects in this area. In practical terms, the initial improvements appeared on the EvoDeco 16, in particular relating to centralised cyclical lubrication, preheating, continuous temperature stabilisation and self-cleaning swarf filters. Finished element testing of the chassis to obtain the optimal design also means the time required to reach operating temperature is shorter. These elements are gradually improving our products and will be complemented in the future by cutting-edge technologies.

Autonomy

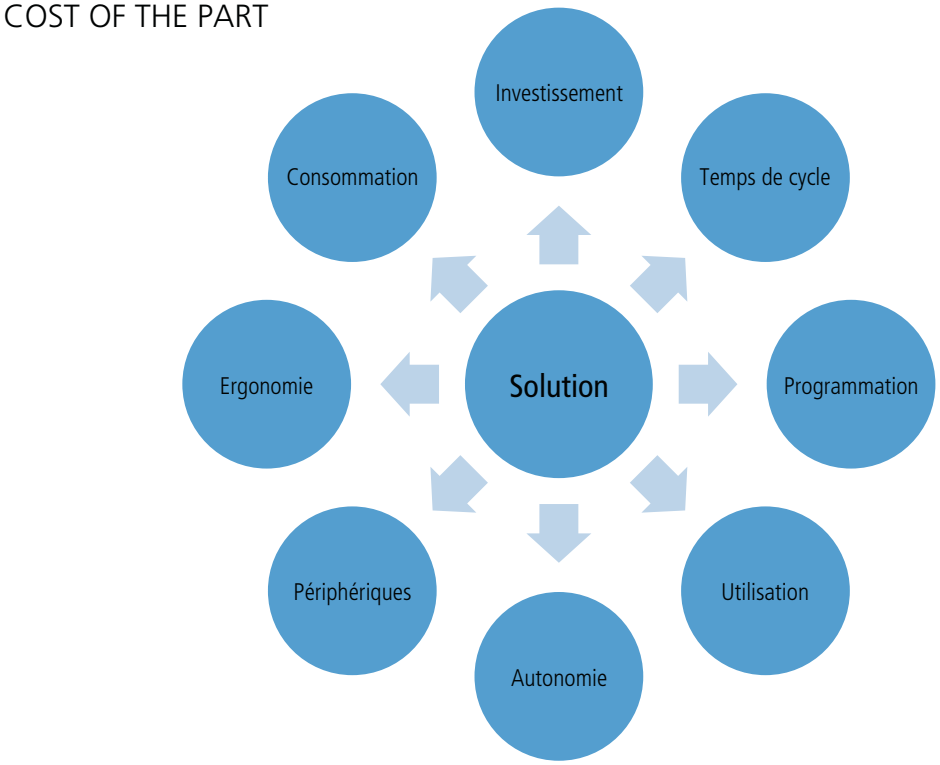
How do you guarantee perfect operation for at least 12 hours without human intervention? Such is the challenge faced by the engineers designing the products. It is a delicate balance; all the machine peripherals must be taken into account and the data varies considerably depending on the type of parts, the material being machined and even the chosen machining process. Rigidity must be sufficient to prevent premature wear of the tools; the swarf trays must be sufficiently large and the machine must be stable and reliable for at least 12 hours. The greater the machine autonomy, the greater the savings in personnel costs, and the higher the impact on cost per part. The aim for Tornos today is to offer genuinely autonomous machining solutions that meet the requirements of bar turners who need to work in 3x8 and who want production facilities that can run without an operator through the night.

Integrating the peripherals

Feeder, conveyor, filter, loading system… the machine sits at the heart of a system in which all the elements must interact perfectly. The manufacturer's offering also has an impact on performance. Tornos offers a wide range of fully integrate able peripherals for its machines (see in particular the information on the new paper filter on page 22, oil mist extractors on page 25 and the Fluid Manager on page 23). Mr. Renggli explains: *"The integration of peripherals is part of the company's global strategy. We are genuine suppliers of complete production solutions".*

Ergonomics

Ergonomics and the human/machine interface are two crucial factors for Tornos engineers. The machine must be pleasant to use; as an operator that feels comfortable whilst working will do so more quickly and efficiently. Tornos will also present a new, highly ergonomic machine concept at EMO Hannover. According to Mr. Nef, all Tornos machines are now developed for the operator, who represents a central link in the value chain. The designers aim to position the machine's operating components at a comfortable height to facilitate work. The machines offered by the Tornos Group benefit from a tested, stable



mechanical construction as well as a rapid, qualified after-sales service. The maintenance and servicing ergonomics are also optimised to ensure downtime is kept to a minimum.

Energy optimisation

Another parameter that has a direct influence on the result is the energy consumption of the production system. Tornos is considered a pioneer in this regard, as every one of its Deco machines produced since 1996 has included energy optimisation. Using the concept of virtual cams to manage all the axes simultaneously, the tool paths are controlled 'just in time', ensuring that no energy is wasted in unnecessary acceleration and braking. In the words of Mr. Renggli: *"Given current environmental concerns, this factor is increasingly important and we are already at the cutting edge in terms of reducing energy wastage".*

A full partner

Purchasing investment goods can have major consequences and customers can't afford to make mistakes, so it is reassuring to see that a manufacturer like Tornos takes all these factors into account when designing its machines. It's perhaps not a new thing. Some of these issues have remained unchanged since the golden age of cam-type machines. What has changed in real terms is the integration of all these parameters much further upstream in the design process. Mr Renggli concludes: *"When purchasing a machine tool it is important to take into account all these conditions in addition to the investment and cycle time factors. Of course, we are committed to reducing our costs and improving our performance, but we are increasingly taking all of these factors into account in order to have an optimal impact on the value chain and to maintain and increase the competitiveness of our customers".*

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NEW ALMAC FB 1005 BAR MILLING CENTRE

If you have come to visit a Tornos stand during an exhibition since 2008, no doubt you will have admired the Almac FB 1005 bar mill; an extraordinary machine that has been attracting and intriguing visitors.

Designed to guarantee precision milling in stiff steel as well as noble metals, the FB machine has an X slide guided on pre-stressed rails and moved by a ballscrew. The X slide supports the vertical Y-axis formed of a solid cast iron prism, on which a rectangular sleeve moves. Guided on 4 pre-stressed rails, this is also moved by a ballscrew and allows a unit equipped with frontal, lateral or vertical spindles to be fitted.

The first customers for the Almac FB 1005 were watchmakers. Today, thanks to the collaboration and synergies created by integrating Almac in the Tornos sales network, we have seen the bar mill take on new tasks in new market segments. The machine has proven to be particularly suited to a wide range of medical applications, notably in the dental industry where it can be used to create implants or even root implants in PEEK. The design of the machine allows for a very short swarf to swarf time, with a quick and user-friendly set-up; this is complemented by a B-axis that allows angular milling operations to be carried out in total freedom. This functionality is particularly effective for creating angled types of implants.

Modularity and productivity

Above all, it is the modularity of the machine that is impressing people. In fact, *"the machine adapts itself very precisely to the needs of the workpiece"*, explained Roland Gutknecht, head of the machining centre product line. The machine has between 3 and 6 axes, depending on the needs of the workpiece. In terms of tooling, the machine can house a front unit containing 4 to 12 spindles and a lateral and/or vertical unit; each containing a maximum of 4 spindles. This can be complemented by the machine's secondary options, allowing the 6th face to be machined and housing 2 or 3 spindles. The standard spindles provide speed ranges from 0 to 12,000 rpm (ESX 20/HSK 32-A), and it is possible to use high-frequency spindles up to 80,000 rpm. The B-axis allows angular

milling operations to be carried out between -5° and +45°, with the positioning being controlled digitally via the machine's CNC.

"What is surprising on this machine is the absence of a tool changer", added Roland Gutknecht *"this is its strength, as the swarf to swarf time is very short".* Although very fast, tool changers still represent a non-productive operation. It is clear that an Almac CU 1007 machine with 64 tool positions offers greater flexibility, but it has to be said that situations where this amount of flexibility is actually needed are very rare.

The FB 1005 will find its niche in the market between the EvoDECO 16 type sliding headstock machine and the generally more impressive bar milling machines, which are more complex but also more expensive. To meet this challenge, Almac developed the machine and the result was the new FB 1005 concept.

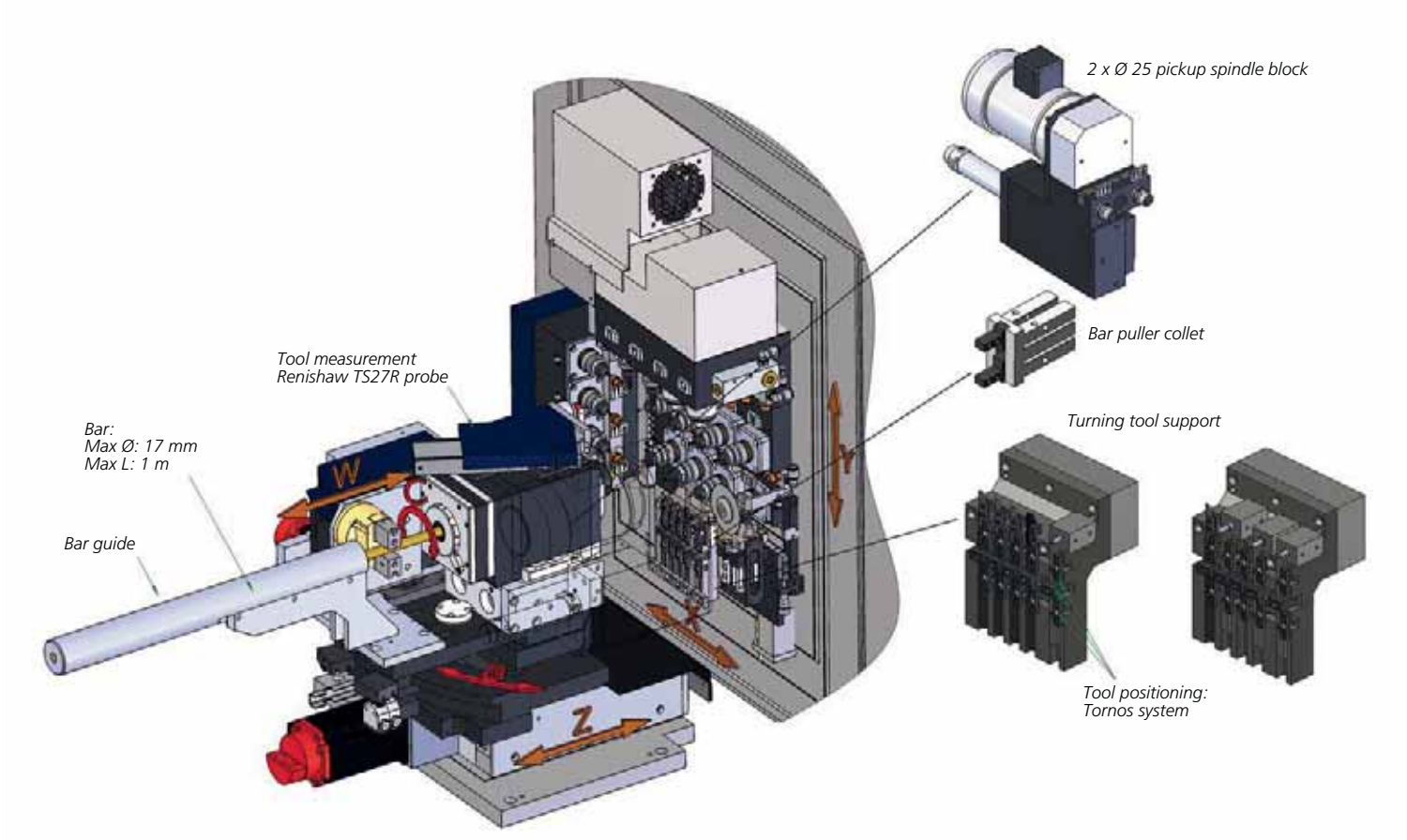
Improved ergonomics and rigidity

The central unit is made of cast iron, guaranteeing rigidity and providing overall damping. The Fanuc CNC is now removable and can be tilted to increase operator comfort. The numerical control cabinet has been integrated into the frame, reducing the machine's footprint.

And turning too…

Working with bars allows the flexibility of the machining centre to be combined with the productivity inherent in bar operations, so to build on the similarities between turning machine and mill, the new FB 1005 can also be used for turning. The system allows 5 chisels with a 10x10 cross section to be added and requires the addition of a D130 rotating divider with a rotation speed of 3,000 rpm that can take bars up to 17 mm in diameter. Waste is reduced to a minimum (20 mm), making the machining of expensive materials more profitable.

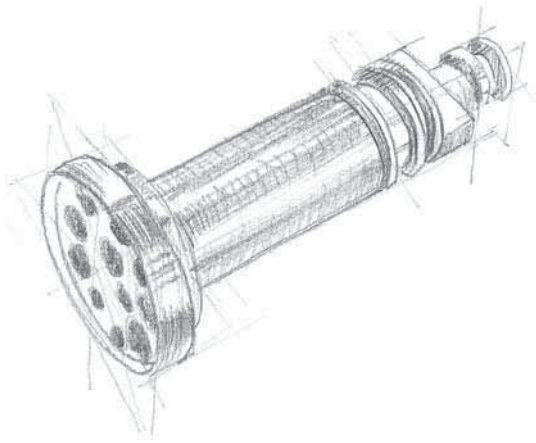
Thanks to these developments, the FB 1005 should continue to attract even more customers. You can come and admire this product at the mediSIAMS event in Moutier, which will take place from 3-6 May 2011. The machine will produce an intervertebral cage in PEEK.

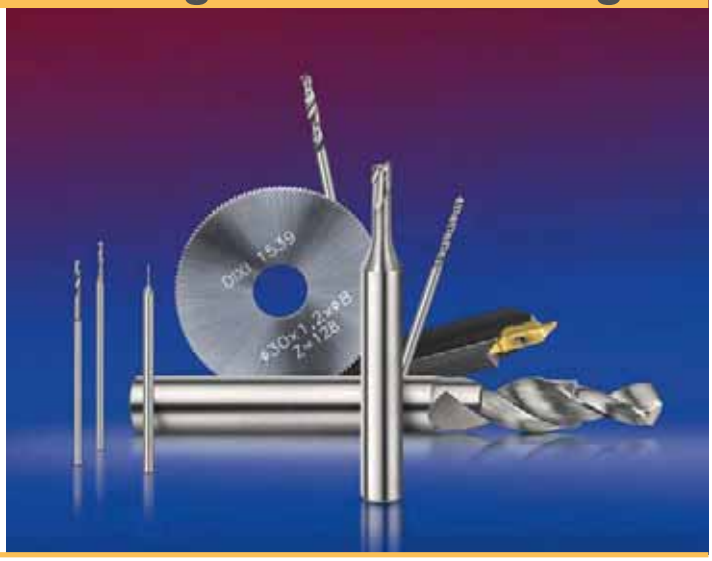


DIXI 4

Tungsten carbide and diamond precision tools

Turning-screw cutting





Our know how compliments your experience

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www.dixi.com

LONG TIP SPINDLES FOR 'GUIDE BUSH-FREE' OPERATION

Depending on the type of parts to be produced and the material to be used, guide bush-free operation may be a viable option. To date, Deco 20/26 and Sigma 20 machines have not been able to operate without a guide bush. The long tip spindle is fitted as standard on machines and allows quick and easy switching to 'guide bush-free' operation.

Option

This option has no number and is available on request and only as a special modification!

Principle

The clamping sleeve and the nut on the spindle tip are longer, and are fitted to the standard spindle. A special rotating guide bush guides the tip of the spindle, which guarantees optimal radial rigidity for machining. The bar of material is clamped in a collet just like in a machine operating without a guide bush.

Advantages of working without a guide bush

- Dropping or loss of material is approximately 2/3 shorter (the length of the guide bush does not apply). Depending on the price of the material, this may constitute a significant economic factor.
- The bar of material does not need to be of a very high dimensional quality such as h9 or h8 (sometimes requiring a rectification operation to ensure a consistent diameter for perfect guiding in the guide bush). Working without a guide bush enables these constraints to be overcome and as a consequence, is another opportunity to make savings.
- In some cases, working without a guide bush also allows geometric tolerances to be guaranteed, for example circularity. Such tolerances are difficult to obtain with a conventional guide bush, especially the rotating type.
- Finally, for all these short or delicate parts for which the guide bush is not of added value, the fact that an additional component does not have to be fitted and adjusted reduces set-up times and helps increase the productivity of the turning machine, which is the aim of every manufacturer of bar turned parts.

Advantage of the guide bush for long tip spindles

- All the advantages of working without a guide bush.
- The machine spindle remains standard, ensuring versatile switching from one operating method to another (with/without guide bush).
- With a part loader it is possible to feed Deco 20 machines with billets or blanks.

Specifications

Max. Rotational speed: 5,000 rpm

Max Z1 stroke: 50 mm

Max. Diameter: 26 mm

Collet type: F 25 or F30

Compatibility

Deco 20

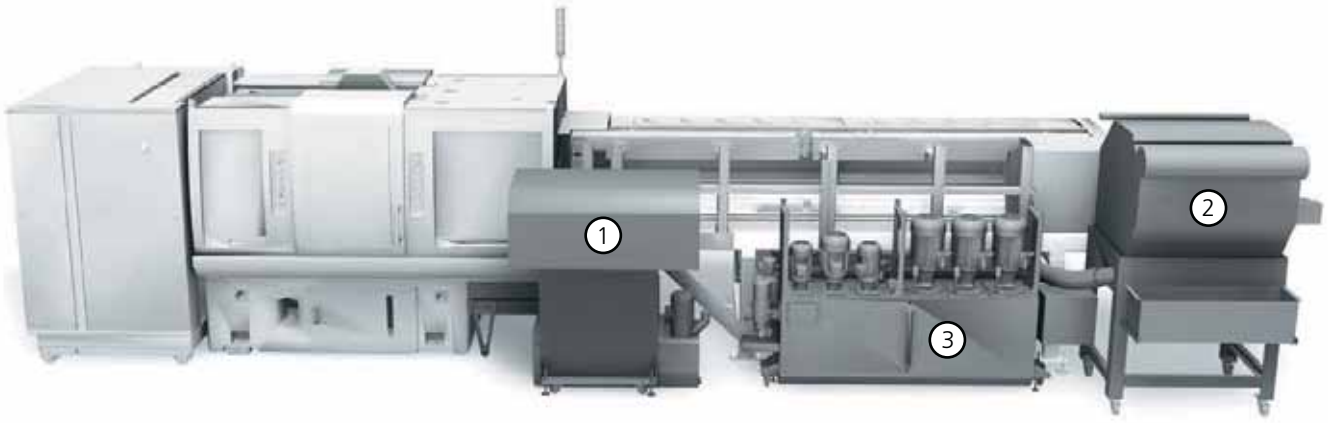
Available upon request for the Deco 26 & Sigma 20

Availability

The long tip spindle is available ex-works and can be retrofitted to machines that are already in service.

GUARANTEEING OIL QUALITY

Swarf and oil management is an important factor in the machining process. Depending on the materials being machined and the volume of swarf produced, their management may prove difficult. Tornos turned heads at the start of 2011 by integrating a hydrostatic paper filter into the base of its multi-spindle machines, and by offering the option of a new peripheral device on its single-spindle machines integrating a hydrostatic paper filter mounted on a 500-litre tank. This confirmed Tornos' technological filtration choice, which was extended to cover its entire product range.



MULTISPINDLE MACHINES

Option

This device is not an option; it is mounted as standard on all numerical multispindle machines that are supplied from 01 January 2011.

Principle

The oil is transferred from the chip conveyor (1) to the paper filter (2). The paper filter (2) is positioned at the end of the feeder. The filtered oil returns to the 2,000-litre tank (3) via gravity. The hydrostatic paper filter can process up to 400 litres per minute with a filtration threshold of 30 microns. This oil is pumped directly into the 2000-litre tank by the cooling pump and the high pressure pumps (up to 3 HP pumps with pressures ranging from 40 to 150 bar)

Benefits

- Increases machine availability
- All the machine's cutting oil is constantly filtered
- Eliminates machining sludge
- Reduces cleaning operations
- Better surface finishes
- Prolonged tool service life
- Prolonged accessory service life
- Prolonged cutting oil service life

Technical specifications

Dimensions: 1,200 x 1,200 x H 2,200 mm

Hydrostatic paper filter

Filtration threshold of 30 microns

Automatic paper roller

Supply on MSF HC

Compatibility & Availability

All Tornos numerical multi-spindle machines have been equipped as standard from 01 January 2011. The hydrostatic paper filter can also be retrofitted to machines equipped with a latest generation of Tornos/Mayfran oil tank. For more information, please contact your local Tornos dealer.

SINGLE-SPINDLE MACHINES

The new 'Fluid Manager' peripheral device includes a 500-litre tank and a hydrostatic paper filter as standard. As an option, it can be connected to two high-pressure pumps, a water/oil heat exchanger and an interface for connection to a centralised water network.

Option

Fluid Manager. No option number at present. For more information, please contact your local Tornos dealer.

Principle

The Fluid Manager is integrated in the 'machine + feeder' assembly. This pumps the oil around the machine, filters it and automatically refills the tank. The filtered oil is then drawn in directly by the machine's cooling pump and/or the high-pressure pumps. The hydrostatic paper filter can process up to 150 litres per minute with a filtration threshold of between 50 and 100 microns.

Benefits

- Increases machine availability
- Reduces footprint of hydraulic units
- Compact 'fully integrated' design
- No machine strainers
- All the machine's cutting oil is constantly filtered
- Reduces cleaning operations
- Eliminates machining sludge
- Better surface finishes
- Prolonged tool service life

Comments

It is recommended that the Fluid Manager is used for the treatment of sludge produced while machining titanium, brass or aluminium, drilling deep holes, milling or thread whirling.

Technical specifications

Dimensions: 1,900 x 800 x H 1,700 mm

Transfer pump included

Hydrostatic paper filter

Automatic paper roller optional

500-litre tank

Up to 2 HP pumps

3 types of HP pump available from 60 to 340 bar

5 configurations possible

Compatibility

All Deco, EvoDeco and Sigma machines

Availability

The Fluid Manager will be available as an option ex-works in the third quarter of 2011 for single-spindle products and also for retrofitting during the same period.

If you would like more information

Please contact Samuel Ventron by phone or email.

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A COMPLETE LINE OF SUCTION DEVICES

In the previous issue of the Deco magazine, we presented our suction device solutions for single-spindle turning machines. In this issue, we look in detail at those designed for multi-spindle machines.

Option

Oil mist extractor and pre-filter for centralised suction on all Tornos multi-spindle turning machines (different models, see table at end of article).

Principle

The full range of Tornos multi-spindle machines benefit from a new approach to the treatment of oil mists. Two options are available for each machine: a mechanical modification with integrated prefilter for centralised suction and a suction device with an electrostatic post filter. The new suction devices work centrifugally. A fan draws the smoke in through two pre-filter cells before directing it towards the electrostatic post-filtration system.

Benefits

- Integrated system, automatic operation
- Secure system with fire prevention device (motor/brake unit)
- Compact system with integrated vertical pre-filter
- The pre-filter reduces the concentration of oil drawn in
- Several suction points
- Reduced & simplified maintenance
- Machining area free from smoke and vapours
- Clean air re-introduced to the workshop
- Complete line of similar systems with very attractive price/performance ratios

TYPES OF FILTER AND MACHINE

Machine	Description	Option number
MultiDECO 20/8b	ELECTRO 2000 Centralised suction	265-1040 265-1041
MultiDECO 20/6b	ELECTRO 2000 Centralised suction	266-1040 266-1041
MultiDECO 32/6i	ELECTRO 2500 Centralised suction	264-1040 264-1041
MultiSigma 8x24	ELECTRO 2500 Centralised suction	272-1040 272-1041
MultiAlpha 8x20	ELECTRO 2500 Centralised suction	269-1040 269-1041
MultiAlpha 6x32	ELECTRO 2500 Centralised suction	270-1040 270-1041

Comments

The suction power levels are increased to provide 2 suction areas on the machine. Only the electrostatic post filter is available. This is linked to the machining and spraying restrictions. The pre-filter for centralised suction is common to both options.

Technical specifications

Depending on the machine, the suction power is either 2,000 or 2,500 m^3/h

Noise: 68 to 71DB depending on the model

Three-phase multi-voltage 1.1kW or 1.5kW motor/ brake unit compatible 400V/50Hz - 460V/60Hz

Compatibility

All Tornos numerical multi-spindle machines from the 3rd quarter of 2011.

Availability

Extraction devices are available ex works and can be fitted to machines which have already been installed.

HAROLD HABEGGER

Canons de guidage
Führungsbüchsen
Guide bushes

Type / Typ CNC

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

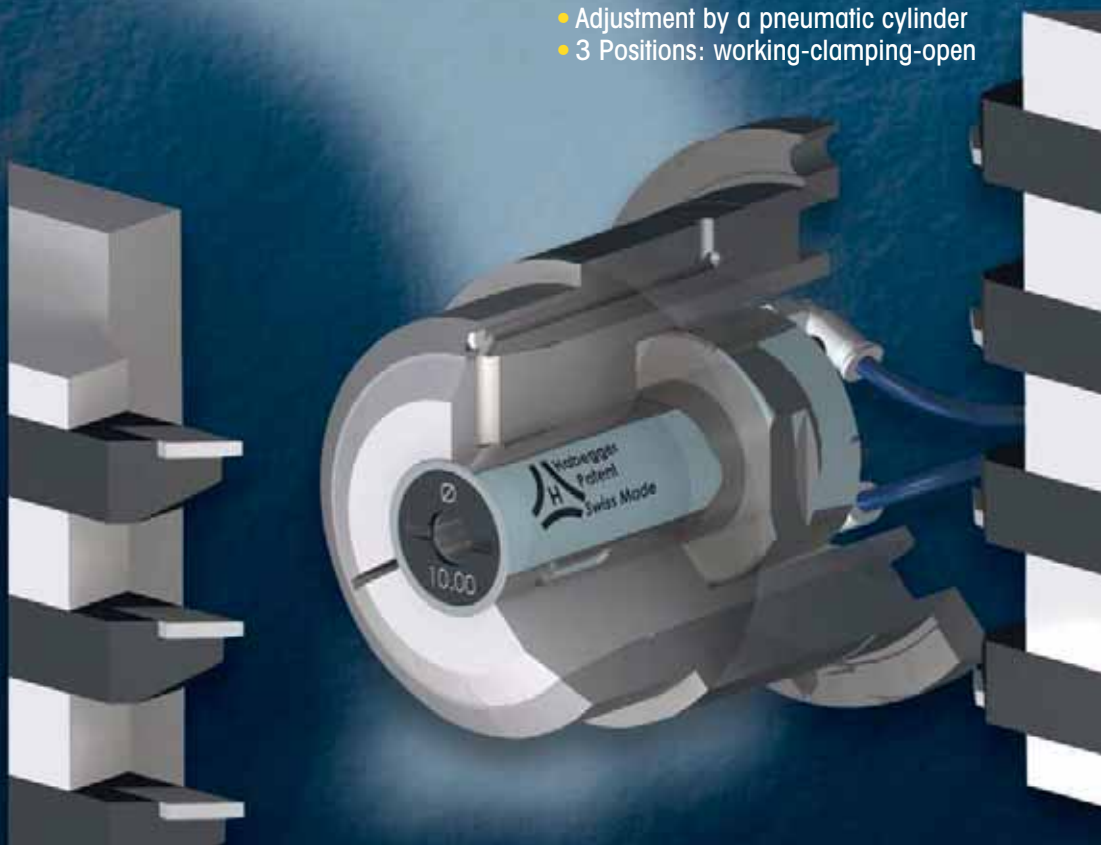
Type / Typ C

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

Type / Typ TP

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

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



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MEETING THE CUSTOMER'S EXPECTATIONS

It was with this definition of quality that my visit to the bar turning company A. Berger + Co of Delémont (Jura, Switzerland) started. It also perfectly summarises the philosophy of the SME that has been under new management for just over a year, headed by the triumvirate of Germain Siebert, Quality Manager, Alain Sonnleitner, HR, Finance and Administration Manager and Jean-Marc Frésard, Production Manager. This definition may seem quite basic and does not allow for differentiation… but the processes implemented and skills mobilised to achieve this goal really make the difference. Let's find out more…

This definition of quality encapsulates more parameters than usually assumed. Mr. Siebert explained: *"As part of meeting the customer's expectations, we include quality, delivery within the lead time, costs being correctly calculated and working continuously in collaboration with customers. This is because these parameters are essential for the quality of the workpieces produced"*. The management team was put in place just over a year ago and its main challenges were to align the means of production and management with these expectations of quality, responsiveness and performance.

Lead time for materials: 6 months…

One of the current trends is towards the shortening of lead times with the response to a quotation having to be made in just a few days. This also includes the technical discussion and orders too. Depending on the case, the entire process may take less than a week. Mr. Frésard told us: *"Sometimes we have to ask our materials supplier for quotations and sometimes we receive the order from our customer before we even have found out the exact price of the material"*. Often the lead time for the delivery of workpieces is shorter than the lead time for the delivery of the raw material… the company therefore often has to reserve and order for material in advance. Well before orders are received from its customers.

A supplier and a partner

As a specialist subcontractor, A. Berger + Co Delémont offers a comprehensive service to its customers. Mr. Sonnleitner told us: *"As part of a RFQ for production for the automotive sector, it is rare that we will be*

consulted about the design of workpieces, unlike our parent company that is more involved in the development process and has an influence on the details of the design, based on the machinability requirements. We produce according to drawing, within set lead times and at set prices. In other cases, our customers make use of our expertise to improve the workpieces or to reduce the costs by making small changes that simplify the machining process".

Indispensable technical expertise

Whereas the entire organisation has been reshuffled to make the company more reactive, even proactive, the challenges they face are often technical issues. Mr. Frésard told us: *"Our main sector of activity is the creation of complex workpieces that are difficult to produce, and this is where our strength lies. We have a level of technical expertise that allows us to find innovative machining solutions for our*

A QUICK GUIDE TO BERGER DELÉMONT

A member of the Berger group that comprises 13 production sites and more than 2000 employees.

Founded in Delémont:	1989
Staff:	31
Machining capacity:	Simple and complex workpieces from Ø 3 to Ø 28 mm
Materials:	Steels, stainless, brass, aluminium, titanium, inconel and all difficult to machine materials.
Machine bank	Multi-spindle: 3 Gildemeister, 1 AS14, 2 BS 20, 6 SAS 16 and 1 MultiDeco 26/6 Single-spindle: 1 Star 16 mm, 1 Deco 13, 2 Deco 26 and 4 Deco 20's
Main markets:	automotive industry, equipement manufacturing, sensors/measuring systems, hydraulics, electronics, defence.
Geographic coverage:	Germany, Switzerland, Austria, France, Poland, India

customers". Quality as defined at the beginning of this article therefore depends directly on the abilities of staff and the means of production available.

The cycle time is not everything, but…

It is in terms of the machining strategies adopted to produce satisfactory parts that the technical expertise of the company makes the difference. For instance, there is no point in producing the workpiece as quickly as possible if the machine has to be stopped because it is completely clogged up with swarf. Likewise, when managing the machine pool one must take into account the available resources and available time. What is the point of high speed production that increases tool wear or produces levels of swarf that are difficult to manage if, once production is finished, the machine has to wait for an operator to be available?

Thinking about productivity in terms of workpieces per minute must be supplemented by the notion of achieving good workpieces at the end of the day… and also good workpieces across the workshop as a whole. Nevertheless, if the machine pool is mostly made up of multispindle and Deco machines, cycle time would remain an important parameter. Mr. Frésard explained: *"Deco machines are quite clearly the most productive and, even though within our overall management of the machine pool we don't always push these to the maximum, the gains in terms of productivity are significant".*

Flexible, high performance machines…

Berger Delémont has two main workshops, one each for single and multispindle machines. These specialise in creating workpieces with high added value. Mr. Frésard told us: *"One of the main objectives we set ourselves when we took over management of the company was to maximise the use of our machines. We have a machine pool with Deco sliding headstock single-spindle lathes, CNC and cam controlled multispindle turning machines, and we can clearly get more out of these. In terms of single-spindle machines, we are unconditionally in favour of TB-Deco, as this software allows us to program workpieces much more simply and efficiently than with a NC with two channels does. The possibilities for optimisation are quite extraordinary".*

In terms of precision and quality, the specialists at A. Berger + Co Delémont are highly satisfied with their machine pool that enables them to fulfil on their customers' expectations. Mr. Frésard added: *"We are very satisfied with the after-sales service and the quality and availability of spare parts. Tornos' ability to react is excellent".*

… and high quality staff

The company is always on the lookout for staff for its single-spindle and multispindle workshops. Mr. Sonnleitner told us: *"Our staff are very versatile and some operators switch between workshops depending on the workload, but we are currently*

looking for skilled staff members". The machine pool runs 2 x 8 shifts from Monday to Friday. Mr. Frésard told us: *"We have yet more capacity in terms of means of production, and we have to enlarge our team to extend our service".*

Comprehensive service

Production is constantly controlled by an operator control (each operator has a control station) and a final inspection that is either carried out on each port or by sampling. In particular, visual inspections are carried out on 100% of some workpieces. The company is certified to ISO:9001 and a large percentage of its processes comply with the standard TS:16949. Of course, the company can provide all the protocols required by its customers.

A. Berger + Co Delémont has an ultramodern washing system and also offers additional services such as surface treatments, tempering, grinding and honing (amongst others) by cooperating with highly skilled local partners. Micro-technical assembly is also one of the services offered.

New challenges, new markets

New materials such as inconel or new steels with extraordinary properties of resistance are being used increasingly often, notably in the automotive sector. For example, a spark plug body offering improved performance… the machining of which is subject to certain constraints. And it is exactly in this kind of application where the skills and expertise of A. Berger + Co. Delémont work miracles. *"We can offer highly evolved means of production and we are highly proficient in the machining processes, which means we are able to develop original machining strategies and solutions that enable our customers to keep on innovating"* said M. Siebert.

Looking for new challenges

A. Berger + Co Delémont is an independent company in terms of the markets it is aimed at, but when needed, its managers can count on the support of the group that is financially very stable. If the Delémont company's customers wishing for a noticeable increase in production quantities, production capacity can definitely be extended. Mr. Frésard explained: *"Our objective is clear, we are going to develop the company using our skills, our machine bank and our ability to produce and deliver extraordinary workpieces. We are constantly on the lookout for new challenges".*

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RE-SHARPENING CUTTING TOOLS

Without excellent tool preparation, it is impossible to achieve great turning results. When using tools that can be re-sharpened, this operation is of prime importance.

Bandi SA is renowned for its expertise and its innovations in the field of bar turning for the watchmaking sector. The family business, established in 1970 in Courtételle in Switzerland, employs a workforce of 60, and is one of the highest performers in the production of very high-end components. The most complex parts in all alloys have become a daily process. Customer satisfaction has guaranteed the company's success as it continues to go from strength to strength.

Production quality depends on your equipment…

CEO of Bandi SA, Mr. Bandi is convinced that his company's success can be partly attributed to their choice of production equipment. It's not wise to try and economise on equipment if you want to continue to be successful in this market. This is why Bandi SA has its focus on high and consistent standards of quality when it comes to choosing our machines.

Agathon and Tornos began working together in the Courtételle workshops. In addition to the fact that the Agathon and Tornos sites are geographically close together, the two companies' experience in this sector has also been a crucial factor.

Mr. Bandi is convinced that running a bank of machines with 150 Deco units from Tornos without an Agathon 175 DIA would be unthinkable. The top priority at present is the re-sharpening of steel carbides. Without good tool preparation it is not possible to achieve good turning results. In this context, an Agathon 175 DIA is the logical complement to a Tornos machine.

The advantages of these two machines are very clear. During the training process for Deco machines at Tornos in Moutier, hard metal turning tools are sharpened on an Agathon machine. In this way, the knowledge acquired can be put into practice immediately once staff is back in the workshop.

A quality sharpening machine…

Even after purchasing a machine, we continue to work a great deal with Agathon, explains Tornos Marketing Manager Mr. Brice Renggli: *"When it comes to questions of application, we can immediately rule out a source of error if the customer is working with a hard metal tool sharpening machine from Agathon. Poor quality parts can sometimes be the result of using an insufficiently precise sharpening machine. In principle, this can be ruled out when an Agathon machine is used."*

Mr. Crevoisier, a specialist at Bandi SA appreciates the advantages of the Agathon 175 DIA machine: *"The micrometer approach and the angular adjustments*

deliver on their promises. The micrometer approach is equipped with a fixed drum that does not rotate when the tool holder oscillates, thus guaranteeing additional safety for the target dimension. Even when making angular adjustments with the basic tool holder the user can count on the accuracy of the angle set."

...offering many options

At Bandi SA, only bronze bond diamond grinding wheels are used on the Agathon 175 DIA machine. Compared to Bakelite bond grinding wheels, they last much longer, which more than justifies the higher purchase price.

Agathon offers a wide range of accessories for the 175 DIA. These are designed to cover almost any application imaginable. In addition to the standard tool holder, which is available in two sizes, it is also worth mentioning the manual sharpening table, the chip breaker grinder and the chip breaker sharpening machine. The hard metal tool sharpening machine can also be fitted with a device to sharpen milling tools for circular and conical sharpening.

To find out more, contact:

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PRODUCTION MANAGEMENT IS NO LONGER A COMPETITIVE ADVANTAGE… AND HOW!

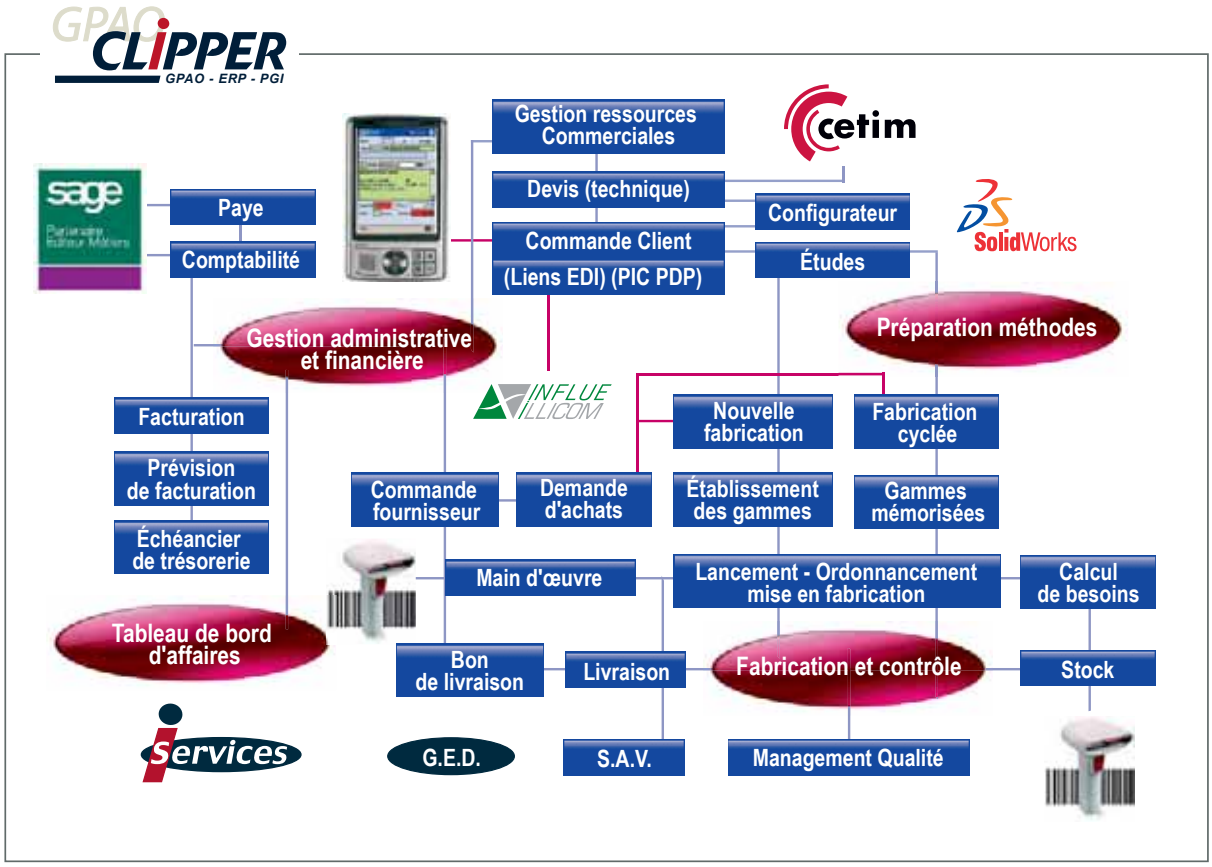
For many small and medium-sized business, production is still monitored "by hand" using Excel or Access and a lot of ingenuity. With growth, these kinds of businesses want to be able to use software to manage, schedule and monitor orders and production; simple software which can be adapted to their needs. But this area can be a frightening one. Everyone hears about integrated software solutions which cost hundreds of thousands and take months to set up and train users on. Between the two extremes cited above, manufacturers can rely on specially-adapted software. Clipper from Clip Industrie is such as example, an ERP-CAPM solution for companies of between 5 and 150 staff. To find out how this solution has been implemented at Almac, we met with Roland Gutknecht, CEO, and Yves Nanchen, Manager of Clip Industrie Suisse.

A highly intuitive piece of software, Clipper is particularly well suited to companies manufacturing their own products, mechanical, watchmaking, boilerwork and panelwork companies, and those specialising in long production runs and producing special machines.

When Almac was integrated into the Tornos group, the Clipper software was replaced by the Tornos ERP system. Mr. Nanchen explained: *"Tornos works with the SAP system which is principally designed for large companies and multinationals. Clipper offers a different solution adapted to other companies"*. This was the opportunity to return to the success of over 10 years of implementation and use at Almac. Mr. Gutknecht explained: *"We were really able to grow together with Clipper. As this solution is ideal for small and medium-sized businesses and since there are a large number of Tornos and Almac's customers still looking for a solution, it was time to talk about it"*.

"All-inclusive" software

Clipper's ERP-CAPM software is fully-integrated software. According to Yves Nanchen, it is "the shortest path from order to delivery". He explains: *"There are no additional modules, when you buy the Clipper solution, everything is included, from commercial to after-sales management, which naturally includes management of procurement and production.*



Clipper works in partnership with various specialist solution providers to offer seamless integration of complementary products such as Cetim for machining data, Sage for accounting, Solidworks for CAD or even Influe Illicom for EDI flow.

CHEAPER THAN YOU THINK…

This is quite a common advertising slogan, used for all sorts of products… but it really is true of Clipper. Mr. André Boryszewski, in charge of implementing Clipper at Almac, told us this anecdote: *"From time to time, Clip Industrie invites customers to visit us so that we can show them how we work and answer their questions. One day, the representative from a large German firm was asking me for a lot of details. I demonstrated everything to him and at the end of the day he said that the software met all of his expectations perfectly but that there was one major problem. None of his managers would believe that such a comprehensive product could cost so little".*

These are open modules which are easy to configure to suit the customer's needs. Users can use the modules as they wish".

A clear process

Putting a production management and monitoring system into place requires very close analysis, as an error is not exactly easy to bear. Choosing an ERP system is a bit like getting married in that you must be sure (as sure as one can be…). Mr. Nanchen explained the process to us: *"Often customers have heard about our solution but have never seen it in action. The first stage is therefore a demonstration and a discussion with the customer, lasting an hour and a half to two hours, to answer any questions and show them some solutions. Sometimes, we can see during this meeting that our software is not well suited. For example, for a service company which does not have a production stage, the system is too comprehensive for simple commercial use".*

If the demonstration is conclusive, we can start putting the system in place. Clipper specialists spend two days with the customer to analyse and configure the system and the project starts. With the retrieval of

Clipper Expert is an additional module which aids decision-making, providing an array of query, analysis and reporting tools via an intuitive interface. Making a decision has never been so simple!

Comprehending, analysing, deciding and acting immediately, accurately and effectively; these are Clipper's strengths.

data, the creation of good indicators and training, the transition takes three to four months. Mr. Nanchen told us: *"We have already managed to carry out a successful transition in a few weeks, it is possible, but we prefer to work step-by-step to give our customers the time to integrate the new system seamlessly"*.

Simple, quick and effective

Generally speaking, one person from the customer's company becomes the interface for Clipper, and will be trained and relay the training internally, and this same person will be in contact with Clip Industrie. A maintenance contract system guarantees customers have all the services they require. A hotline has been set up to answer all questions, and Clip Industrie can also control customer remote computers and react in real-time, but also send files and ensure updates (Clip Industrie is certified by Microsoft, so there is no problems when changing versions of Windows, for example). The maintenance contract is an integral part of the Clipper product.

Web conferences and user meetings complement these services.

Mr. Gutknecht told us: *"As a CEO, I need to be able to count on my ERP system, if the system stops working, it paralyses the company. We have always been able to count on Clip Industrie and can truly say that we have grown together"*.

An indispensable tool

A company is directly dependent on its management system, whether for knowing the exact cost of its products, stock rotation or delivery lead times for raw materials or other materials, everything goes via

The first machine tools company to use Clipper, Almac has grown with the software. Users are unanimously in favour of the simplicity and effectiveness of the system.

the system. The user must therefore have confidence in its supplier and in its software. Mr. Gutknecht explained: *"To begin with, we chose Clipper as it seemed straightforward and not too labour-intensive. We have never regretted this decision and even though we were one of Clipper's first customers (in 1998) to manufacture machines, configuring the system was straightforward"*. Mr. Nanchen added: *"Every company is different and unique, but their management and scheduling issues are very often the same. More than 1500 Clipper installations allow us to fall back on our extensive expertise. We are flexible enough to create customised indicators that meet everyone's needs"*.

So, integrated production management, or not?

Whereas integrated production management is no longer as strange an idea as it was 10 or 15 years ago, a large number of small or medium-sized companies are wary of crossing over to a fully integrated system. Fear of losing their control perhaps, or a false image of these systems which are "not as labour-intensive or complicated as one might think". Clip Industrie has carried out a survey on return on investment with customers who have switched their internal solutions to the Clipper software. The results are conclusive: 92% of companies have increased their overall productivity, 93% have noted a rise in profitability and almost 90% have seen a return on investment in less than 18 months[1].

For Roland Gutknecht, this was never in question. *"With growth, the volume of purchases and work*

[1] *A brochure made by Clip Industrie containing the full results of this study is available to our readers. Contact: info@clipindustrie.ch, Tel. +41 27 322 44 60.*

CLIP INDUSTRIE IS LOOKING FOR A CHAMPION IN GERMAN-SPEAKING SWITZERLAND

After having ensured its development in French-speaking Switzerland, Clip Industrie Suisse is looking for a regional director for the German-speaking part of the country. With an understanding of the software sector and the industrial market in German-speaking regions, this person will be responsible for the technical and commercial aspects.

If you are interested in this forthcoming position, please contact Yves Nanchen using the details given at the end of the article.

in process increase, and management and monitoring follow this. Without a system like this, we simply would not be able to operate". Mr. Nanchen concludes: *"A customer called me recently to give me the example of creating a certificate of conformity. When the delivery slip is sent, the certificate is then edited and created automatically. In this case, the customer was delighted to be freed of certain administrative tasks so that he could concentrate on his management role".*

Can we say that Clipper frees up time for decision-makers?

"Absolutely!" was Yves Nanchen's reply. If we know that we can rely on an effective system which gives us the right information at the right time, all levels of the company will be freed up and can concentrate on value-adding activities. What is more, Clipper is often used as indicator of the health of a company or as an integrated management system in ISO. *"If you have a meeting with your bank manager and can provide him with all figures he requires directly from the system in front of him, you show that not only are your figures good but that your management system is too… ".*

To find out more about Clip Industrie and the Clipper software

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The CU 1007 machining centre is modular. Evolving in tune with the needs of its customers, the CU 1007 solution can integrate two centres connected by a robot.

MAKING LOCKS SINCE LINCOLN

For 150 years, padlock manufacturer Wilson Bohanan has done one thing and done it well. Spanning much of the Industrial Revolution, this company has survived and prospered by adapting to change both in product and process as evidenced by the company's recent installation of a CNC multi-spindle.

A member of Wilson Bohannan's sixth generation family ownership and president, Howard Smith, stands in front of the Tornos machine.

In 1860, Wilson Bohannan and his son started a padlock business in a Brooklyn, New York, garage. Since then, with a location change to Marion, Ohio, in 1927, this seventh-generation, family owned and operated business has made the solid brass WB padlock.

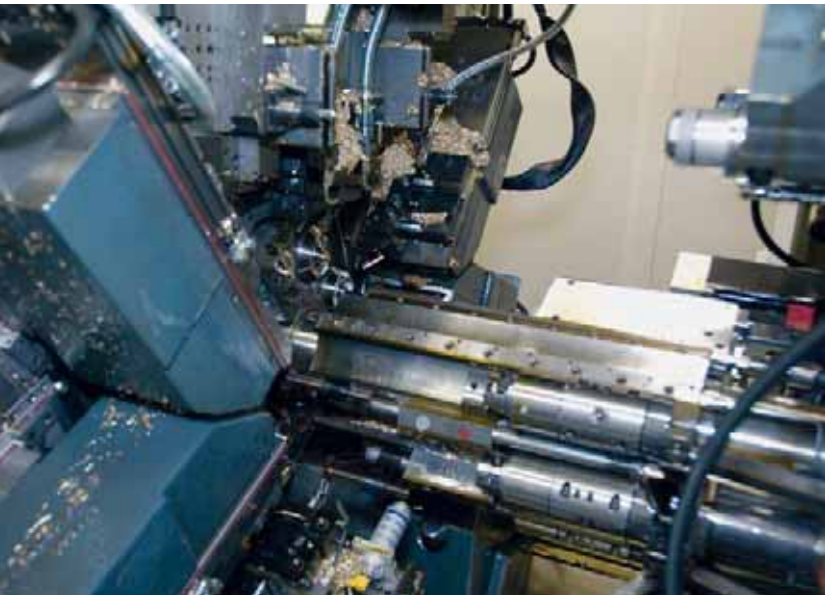
It found early success supplying all-brass padlocks for the growing railroad industry to secure freight cars, track switching gear and other outdoor applications where a rustproof padlock was mandated. By the turn of the 20th century, utilities, gas and electric became a growing market for WB locks for the same reason.

"When you've been around as long as WB, you're going to see some industries born, grow, mature and, in some cases, decline," says Howard Smith, the company's president and member of the sixth generation. *"You have to be able to adapt to survive and our family business has successfully managed to do that."*

Today, the company supplies its locks to government and military installations, refineries and manufacturing operations. Its 62 employees manufacture more than 5,000 locks a day in its Marion facility.

Rebuilding the Business

Mr. Smith joined the company in 1973 and took the reins as president in 1995. For the last 15 years, he has re-focused the manufacturing arm of WB by investing in new technology, equipment and automating processes where automation made sense.



One of WB's Tornos CNC multi-spindle's two gantry pick-off spindles is visible at right. The discharge chute (left) carries two finished parts per drum index using the machine's 2 × 4 machining capability

This rededication to in-house manufacturing was a result of competitive pressures and the strong desire on Mr. Smith's part to keep WB products completely made in America. *"In the late 1960s, we, like many manufacturers, began off-loading our manufacturing capability,"* Mr. Smith recalls. *"So by 1968, we sold our lock making equipment to another company to make the parts for us. It was outsourcing, but back then, it was outsourced domestically. By the time I came on board in 1973, we pretty much just assembled our padlocks.*

"The thinking of many businesses at that time was why invest in manufacturing anything?" he continues. *"So for about 20 years, we farmed out our manufacturing and simply assembled our locks."*

By the 1980s, WB's margins began to shrink, and there were quality issues. To remain competitive and grow the business, the company made the decision to re-introduce manufacturing to the company.

"We began buying machinery for ourselves, and phased out the relationship we had with a company that was manufacturing for us," Mr. Smith says. *"It also became evident that if we were to remain American made, productivity and process improvements had to be made in the form of high-tech equipment. That commitment is manifested in the new Tornos MultiAlpha 8×20 we bought last year and our continuing search to find better ways of making our products competitively."*

Mass Customization

In a way, lock making is akin to watch making. It tends to be a very specialized kind of manufacturing that often requires specialized machinery.

There are 34 component-machined parts that go into the WB padlock. However, the variations of these basic components that a customer can order take the possible permutations to the hundred and even thousands. As a result, WB makes its locks to order, which leads to a need for a streamlined production process. It's not mass production — it is mass customization.

While some might look at WB as an OEM because it makes a product, Mr. Smith operates the shop like a job shop. It is set up to respond to incoming orders rapidly and efficiently, using a pull-through production system.

"Even though we have invested in automation using robotics, CNC machine tools, automatic material handling and custom assembly machines — many made in-house — it is not our goal to remove the human element from our manufacturing equation," Mr. Smith says. *"I want people involved in our manufacturing process. We use the automation to help them do their jobs more productively, and that's where the direct cost savings come into play."*

Many of the machines used in the assembly area were designed and built in-house. The shop's V.P. of engineering, Mark Williams, is responsible for many of these. He's a 34-year veteran with WB.

"Some of the equipment we built for our own use simply because nothing like them is available commercially," Mr. Williams says. *"I use Solid Works to design the machinery, and we have managed to automate several previously manual assembly processes that have dramatically improved throughput and quality. During the design phase, I work with the assembly personnel to get their input, and the result is an effectively personalized machine ergonomically designed for the employee using the machines. It gives them ownership and makes their jobs easier — a win-win."*

To make the point about WB's ability to customize, both my photographer and I were presented with padlocks engraved with our names, which were made during our visit.

Enter the CNC Multi-Spindle

One of the last pieces in Mr. Smith's long road to manufacturing self sufficiency was a lock barrel (generally called a plug) that had been outsourced domestically. It was the last component part not made by WB.

The decision to bring this work in-house opened up opportunity as well.

In his search for technology that could provide the shop with lower costs for the outsourced parts and additional capacity for making more different parts as well as production and quality control, Mr. Williams looked at the CNC multi-spindle. *"My alternative was to put in a bank of single-spindle machines,"* he says. *"Instead, I chose to consider this machine as eight single-spindle machines on a single platform. Larger floor space requirements, longer complex setup and tear down time, longer cycle times for single-spindle machines all lead me to the multi. It could make parts fast, complete and at a fraction of the cost we were paying. The decision was a no-brainer."*

Because WB makes to order, lot sizes can be relatively low. Quick change-over is one of the CNC multi's strengths, especially when being used for families of parts that are similar, like lock cylinders. *"Sometimes change-over from one part to another is a simple programming change,"* Mr. Williams says.

The manufacturing arm of WB is set up to make any lock in the company's catalog. With a pull-through, on-demand system, lot sizes can be 500 or 5,000 depending on the lock. So the ability to change back and forth quickly was key to run variable quantities quickly, and then change-over.

He settled on the Tornos MultiAlpha 8×20. Quick specs: It's a 20-mm, eight-spindle with a maximum main spindle speed of 8,000 rpm, 10,000 rpm for the counter or pick-off spindles. All of the spindles are independently programmable. It has 26 programmable linear axes and 10 rotational axes. Backworking tools available are 2 × 5 for a total of 10. On the WB machine, some of the options include a Y axis on two endworking slides and Y axis on two cross slides. *"Several of the parts need off-center drilling so the Y axis is a huge plus,"* Mr. Williams says. *"It has a lot of bells and whistles."*

But one of the machine's features really sealed the deal for Mr. Williams. This machine uses two programmable gantry mounted pick-off spindles. These dual pick-offs were originally designed to reduce cycle time for backworking operation, which often controls the cycle time for a complex part by dividing the backworking time in half. But it also affords an additional benefit of running two simpler parts at one time.

V.P. of engineering, Mark Williams, is shown at his Solid Works terminal. He is a 34-year veteran of WB and is responsible for the design and build of many of the custom machines used on the machine shop and assembly floors

Two by Four

Double drop (or as Tornos calls it, 2 × 4) has been a production technique on multi-spindles for years. Obviously, making two parts at a time is more productive than one. However, this was generally confined to primary machining operations with backworking usually requiring a secondary operation.

The dual gantry pick-off spindles allow WB to make two parts at a time complete, including backworking. Each subspindle is capable of 10,000 rpm and can access five backworking tools, three of which can be live.

One example that was running on the day of our visit was a plug being produced using the 2 × 4 technique. Mr. Williams said he's getting two parts in 11 seconds compared with one part in 45 seconds on the single-spindle that previously ran it.

With this method, stations 1, 3, 5 and 7 are available to make one part and 2, 4, 6 and 8 are used for the second. That gives primary machining on three stations for each part; the fourth is used for cutoff. Once cut off, the dual pick-off takes the part to the backworking stations.

When complete, the pick-off hands off the parts to a manipulator (simple robot) that discharges them to an external chute. Normally, this manipulator uses grippers sized for parts, but WB's machine uses two baskets to convey the parts, which simplifies change-over.

Change-over on this machine from 2 × 4 production to classic 1 × 8 can be as short as 15 minutes. In the 1 × 8 configuration, the dual pick-off spindles take a part from stations 7 and 8 to backwork two parts at a time, halving the backworking cycle time. For high mix, complex and simple parts, like WB makes, this flexibility is very handy.

This is one of the custom assembly machines used to assemble WB locks. Although always looking to automate where practical, the company also believes the human element is a critical element of its operations.

Welcome Back

Mr. Smith is bullish on American manufacturing. Through the prism of his company's long history, many changes, good and bad, have occurred to our nation's manufacturing base. He is also an optimist; he sees the trend of re-shoring as encouraging. However, the erosion of domestic infrastructure is a concern.

"Many of the businesses that supplied our manufacturing base are gone," he says. *"This infrastructure must be rebuilt, which is an opportunity for companies like us, and one reason for adding capacity with machines like the Tornos. As we see labor rates rising in Asia and secure lines of supply being vulnerable to strikes, political upheaval, and even the weather, it's clear WB made the right decision to invest in domestic manufacturing."*

He continues, *"I see many of my colleagues that jumped on the outsourcing bandwagon coming back, and I welcome them. Competition is good for us. It makes us better. It's also an opportunity for us to really be a job shop by making parts for them that they previously had made elsewhere. Our commitment to invest in our manufacturing capability makes us part of the infrastructure renewal."*

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Article From:
Production Machining, Chris Koepfer, Editor

DIRECT CONNECTION TO SUCCESS

Binder Electronic Components in Grenchen successfully rationalised its fluid management by switching five different cutting oils to the Motorex Ortho NF-X universally deployable high-performance fluid. The company has therefore paved the way to working even more economically in areas such as purchasing, production, chip processing and part cleaning.

High-quality bar-turned parts made from different materials for connecting technology are manufactured at Binder Electronic Components AG in Grenchen.

Binder Electronic Components AG was founded in 1979 in Grenchen as a subsidiary of Neckarsulm company Franz Binder GmbH + Co. Elektrische Bauelemente KG. The company manufactures components for making high-quality electronic connections on more than 60 different machines (i.e. connectors). All chip-producing stages of production take place in the Grenchen factory. As a classical bar turning company, the 60 employees machine both bar material with diameters from 2 to 32 mm and ring material. Final assembly of the components then takes place in the parent plant in Germany.

Continuous innovation

Since the company was founded in 1979, the plant has been continuously extended and modernised. The company now has a production area of about 4000 m² and an extremely versatile machine pool that includes cam-operated lathes, CNC sliding head machines, multi-spindle machines and even rotary indexing tables. The lathe operators are skilled in all manufacturing techniques on the different machines, and process materials such as brass, bronze, aluminium and synthetic materials. Stainless steel is also becoming increasingly popular. *"In recent years, the proportion of components made from chromium steel has been on the increase",* says David Phan, the company production manager.

Cutting oil - an influential factor

Until recently, the company used five different cutting oils. This did not just have an effect on production flow due to the availability of suitable machines, but also on tool selection, part cleaning and chip

processing. The collection and centrifuging of the chips was carried out by hand using simple machinery for many years. This was extremely strenuous and also demanding work, because the different types of oil had to be recovered and filtered separately, and then put back into the relevant machines. Mixing of different types of oil was not uncommon, which could also be seen in the cutting data in some cases.

Because of the wish to purchase a fully automatic chip centrifuge, it made sense to switch to a universally usable cutting oil. That which was nothing more than wishful thinking several years ago was poured into different machines for a series of tests by Motorex in the form of new high-performance cutting oil Ortho NF-X with ISO VG 10 viscosity.

Switch to Motorex Ortho NF-X

Motorex's recommendation to switch to the groundbreaking high-performance Ortho NF-X cutting oil and the convincing test results allowed the user to combine several benefits at the same time. It is now possible to carry out all machining processes with

Chips are produced by the ton during the manufacturing process at BEC. The recycling thereof and the reclamation of the cutting oil that is used are decisive for the calculation.

"Switching to the universally usable cutting oil from Motorex opened up the way to many other improvements in the manufacturing process. Several years ago this would have been nothing but wishful thinking, now it is reality. A good example that shows that visions really can be achieved!"

David Phan, production manager
Binder Electronic Components AG,
Grenchen

The reclaimed cutting oil is cleaned using a filtering system and fed into the machine tools together with a proportion of fresh oil.

Part cleaning is now a routine process that has also undergone standardisation and cost optimisation.

The switch to a single cutting oil also made it easier to reclaim oil using the fully automatic chip centrifuge.

350 TONS OF CHIPS PER ANNUM

Standardising the processing fluid that was used made it logical to invest in a fully automatic chip processing system. The company processes about 450 tons of metal per annum, producing about 100 tons of product and 350 tons of chips. This is because many of the parts have small diameters (clock industry standard!), which are manufactured from bar material that must be as stable as possible (i.e. thick). The chips, which mainly consist of brass, are led to the oil reclamation system automatically in mobile collection trolleys and centrifuged twice. The oil that is reclaimed is passed through a micro-filter (10 microns) and then returned to the machine tools. The chips, which are free of problematic substances such as chlorine and heavy metals, can then be recycled in the best possible way.

one and the same cutting oil and, thanks to the integrated Vmax technology, and not only the production volumes but the R_a surface values have improved. Particularly the surfaces of non-ferrous metals have undergone further optimisation, and now meet even the most stringent visual quality requirements. Motorex Ortho NF-X convinced the decision-makers at bec due to its many positive characteristics. Motorex Ortho NF-X

- makes it possible to machine all materials using just one cutting oil;
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- provides optimum lubrication and is odourless;
- increases the service life of tools;
- can be removed effortlessly from the workpieces;
- is free of undesirable, critical substances.

Because of the positive impression that has been made, Binder Electronic Components AG has switched the entire company to the new cutting oil. This has simplified purchasing, logistics, oil reclamation from the chips and part cleaning tremendously.

Simplified cleaning process
The cleaning process of steam degreasing with hydrocarbon in the closed system is completely problem-free, and can be carried out automatically apart from the feeding in and removal of the parts.

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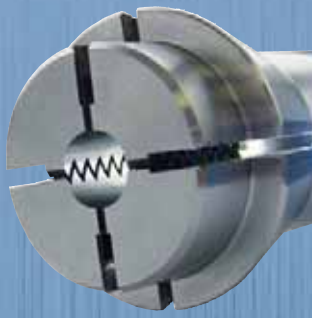

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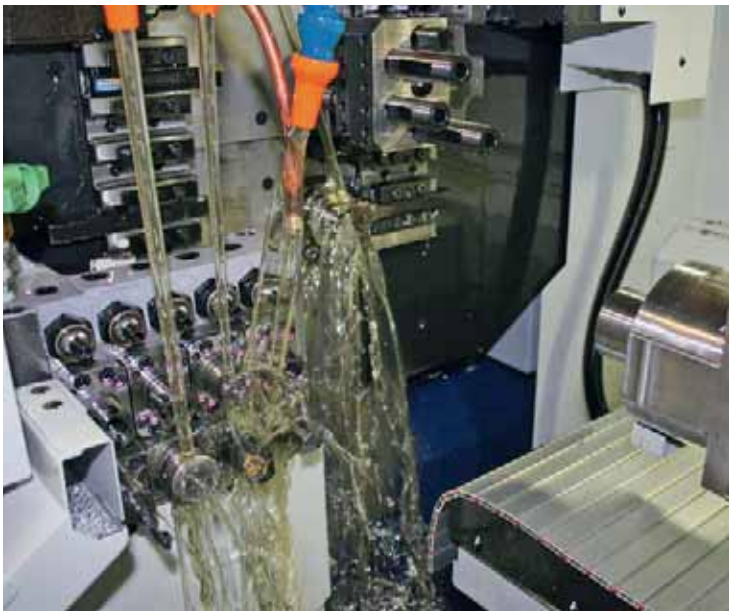
MUFFETT'S GEARS UP FOR PRODUCTIVITY WITH TORNOS

As the name suggests, Muffett Gears is a specialist manufacturer of gears, a niche that has enabled the company to comfortably steer its way through the recession without sustaining any loss of staff or significant downturn to its business. This has been credit to the company's investment in technology and a strategy that has seen it diversify into the medical, aerospace, hydraulic, marine and motorsport sectors as well as the development of its own range of gearbox products.

The company has been firmly entrenched in the manufacture of gears since it was started by Stanley Muffett in 1920, a tradition that has been maintained by Stanley's grandson and now Managing Director, Mr Tony Smith. Mr Smith is proud of the company's ability to retain all 38 employees through the downturn and maintain a healthy profit margin, something that Mr Smith attributes to the exceptional skill levels of employees and investment in the company. As Mr Smith states: *"Our average term of employee service is currently 19 years, demonstrating a very highly skilled and loyal workforce. This retention and a £300,000 investment in machine tools at MACH 2010, has sustained business levels at the tail-end of the recession and is now underpinning our growth."*

The investment includes a Mori Seiki machining centre and a Tornos Gamma 20/6b sliding head turning centre, both acquired for the production of the Tunbridge Wells based company's own range of worm gearboxes. The Mori Seiki NV5000 VMC was acquired for the production of aluminium gearboxes whilst the Tornos Gamma 20/6b was purchased to machine the gears and worm gears that are housed within the aluminium casings. As Chief Production Engineer, Mr Alan Kennard comments: *"We supply an ever increasing number of our own gearboxes. Each gearbox incorporates a number of individual components and many of these parts require complex operations on different machines. This situation has seen us historically run out of parts. So, we bought*



the machines to improve continuity of supply and to ensure we never run out of parts whilst significantly improving production times."

The gearboxes that are used for the motorisation and movement of gantry equipment, patient chairs and beds and additional cancer care equipment for patient scanning were labour intensive for the AS:9100 company, until the arrival of the Tornos Gamma 20/6b. At MACH 2010, the Kent company thoroughly reviewed the market, but it was the Tornos that won Muffett's acclaim and an order. The two main reasons were the ability of the 20 mm diameter capacity Tornos to successfully conduct thread whirling in one operation. The other reason was the ability to switch to a guide bush-less system during a set up that enables machining in the headstock and reduces material waste to circa 35 mm per bar.

As Mr Kennard continues: *"Before the arrival of the Tornos, we would turn the worm blank on an alternate sliding head turning centre and then do two grinding operations. This would be followed by thread milling on our Monnier & Zahner machine prior to hardening and assembly. The complete machining process was taking almost 14 minutes. The Tornos has taken this time to three minutes whilst eliminating set-up times, operator intervention and improving accuracy and repeatability. To put this saving into perspective, we do over 5,000 worm gears a year for just one customer. We knew that the Swiss and Tornos in particular are experts in the medical sector and have been developing thread whirling techniques for a long time. This expertise gave us more confidence in the Gamma's ability when compared to competitor machines and we haven't been disappointed."*

"The Tornos is more accurate than our other sliding head machine, so by moving the worm gear to the Gamma, we have eliminated the grinding and machining centre from the process. The back end working of the Gamma is more robust than our other sliding head lathe. When previously doing back-end working and cross hole drilling, we found cutting tools and drills would break, creating re-working or scrapped parts. The rigidity of the Gamma eliminates this aspect and improves our confidence, so we can leave the machine to run unmanned for long periods."

The multiple machine set-up is a common factor in a number of components at Muffett's; something the Tornos Gamma is continually eliminating with its 9 driven tools, 19 fixed tools and simultaneous back-end working. Since the introduction of the Tornos Gamma, the ISO:9001 company has also moved the production of its bearing posts to the Tornos. Previously the parts were machined on a turning centre and then moved to a grinder for finish machining; again drastically reducing cycle times on a frequently machined component.

Putting some perspective on the potential cost reductions the Tornos is delivering; the company was previously machining bronze pins in a time of 20 minutes

with four operations on two machines at a cost of £9 per pin. The parts are now produced on the Gamma in 1 minute 5 seconds at a cost of £0.80p per pin. As Mr Kennard continues: *"The exceptional capabilities of the cost effective Gamma machine have been remarkable. Its capabilities are allowing us to free up capacity on other machines whilst significantly improving cycle times and product quality. All these aspects have been a bonus for us, as we predominantly bought the machine for the proven thread whirling capability and the guide bush-less system."*

Tornos introduced the guide bush-less system on its cam automatics many decades ago and it has been a major factor in many customers purchasing decisions because of the potential material savings. At Muffett's, one example is highlighted with an aluminium bearing cap component that is only 2 mm long. Any sliding head machine without the innovative system would waste a considerable amount of material on small parts. As Mr Kennard continues: *"We are currently saving over 10% of our material costs with the guide bush-less system on the Tornos. The machine is about to start running 16 hours a day, so the material throughput and the potential costs savings are huge. As well as the material saving, the ability to take the cutting tool right up to the headstock is a major benefit, giving us improved capabilities and flexibility."*

Additionally, the cost effective Gamma arrived at Muffett's with a Tornos Robobar barfeed fitted as standard, a Fanuc 31i control system and a part catcher and conveyor. Commenting on the overall package, Mr Smith states: *"Our shop floor staff like the integrated barfeed as it simplifies machine setting, as does the Fanuc control that utilises a template program set-up that simplifies use and is very user friendly. The part catcher drops parts onto the conveyor, which moves the parts to an external part bin for long unmanned machining operations. All these elements make for an extremely friendly, flexible and productive machine that above all has been a very cost effective addition to our business."*

"Putting the acquisition of the Mori and the Tornos Gamma into perspective, we can produce higher volumes and have now reduced cycle times of our gearboxes by over 50%. We have projected a growth of approximately £400,000 for 2011 and without the two new machines, this targeted projection wouldn't be possible," concludes Mr Smith.

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SYMMETRY MEDICAL ASIA

Symmetry Medical Inc. is a leading provider of implants, instruments and sterilization cases to the world's largest and most successful orthopedic device companies. While based in the U.S., Symmetry has several manufacturing and/or design & development facilities around the world, in countries such as Ireland, the UK and France, as well as in several locations within the US.

In 2007, Symmetry chose Penang, Malaysia to serve as headquarters for its new Asia-Pacific Operations. Symmetry's Penang facility is a full-service business division, providing its customers with services from concept and design to complete, ready to use systems and products. Located in the heart of the industrial area in Penang, Symmetry is in full expansion mode, currently adding 30,000 sq/ft its existing 50,000 sq/ft building, as well as additional personnel.

As a part of its commitment to expansion in Penang and Asia, Symmetry Medical recently acquired two Tornos machines. Decomagazine met with Mr. Christopher W. Huntington, Chief Operating Officer Asia, Mr. Johnny Ong, General Manager – Asia and Mr. Peter Wong, Operations manager for an informal chat.

decomagazine: Why did Symmetry select Penang for its Asian operations?

Symmetry: From a multi-national company's perspective Malaysia and, in particular, Penang, provides an outstanding combination of attributes. We chose Malaysia for its commitment to Intellectual Property protection and access to the markets in the region. We also found Penang to provide an outstanding, skilled workforce. Additionally, we share the Malaysian government's commitment to development in Penang and appreciated its commitment to Symmetry Medical's success through investment in infrastructure and employee training.

Malaysia's stable political environment and western style legal system has already made it an established

hub for high-precision industries, such as medical device and the semi-conductor industry. Malaysia provides us with equal access to markets in India, China, Japan, Australia and entire pacific region. Accordingly, it was a truly appealing place for us to locate our initial Asian operations. The government's commitment to medical devices, beginning about 5 years ago, has resulted in medical device companies such as St. Jude Medical and B. Braun investing in and establishing operations in Penang. As a result, Penang has become a center for medical device manufacturing comparable to any other location in the world.

dm: How many employees do you have in Penang?

Symmetry: We currently employ approximately 200, although we are still growing, as evidenced by the 30,000 sq/ft expansion to our facility. We anticipate that over the next three years our headcount would grow significantly.

dm: How long have you worked with Tornos Solutions?

Symmetry: We acquired our Tornos machines last year to support our focus on growing our spine, trauma and reconstructive products in Malaysia. Tornos also provides continuity with our US operations, which also utilize Tornos machines.

dm: What are your priorities when choosing a machine supplier?

Symmetry: First, the machine has to be capable of performing the job to the high standards of quality we and our customers demand on a cost-efficient basis. In addition, one of the most important things we look for is the service provided by the supplier.

dm: Why Tornos?

Symmetry: In the spine, trauma and implants business, the name Tornos stands out. The brand also helps to reinforce to our customers the quality and reliability we believe they will find in our products. Regarding efficiencies, we have reports from our facilities in the US that with Tornos machines can perform certain tasks that were not possible with other technologies.

dm: Who are your customers?

Symmetry: Symmetry is active in three main product lines, including, implants, instruments and cases. Our customers are leaders in their field, companies such as Johnson & Johnson, Depuy, Zimmer, Stryker, Biomet, Medtronic, Smith & Nephew and Asian companies such as Japanese Medical Materials or JMM.

dm: Are there particular trends or evolution in your field (e.g. series reduction, price pressure, additional operations such as surface treatment etc...)?

Symmetry: Efforts to reduce cost is an important trend in any field. To continue to develop in a competitive market innovation is key - especially in the medical device industry. As a result, Symmetry places a great deal of focus on innovation and R&D from both a process and product perspective.

dm: How often do you have to change the application set up of your machines?

Symmetry: The implants we produce are mainly high mix and low volume, so we are running small batches of each type. Accordingly, there are fairly frequent modifications to settings. Flexibility, ease of settings and consistency are important machine characteristics.

dm: Is the cycle time very important in your industry?

Symmetry: Yes, the cycle time is important in our industry. Innovation and development of our processes is a perpetual activity designed to more efficiently meet our customers' requirements.

dm: What are today's critical factors for your company?

Symmetry: Product quality and on-time delivery are the foundation of our business and constitute our primary success factors. We need to provide quality products and we need a quality system that meets both FDA and our customer's standards. Certainly cost is important, although success starts and ends with good quality.

dm: Do you believe there will be changes in relations between subcontractors and customers in the future?

Symmetry: In the current heavily regulated environment, maintaining a robust quality system is a major factor for our largest customers. Some contractors may not have the capacity to invest to the degree needed to implement a quality system that meets these requirements. Symmetry is the largest supplier to the major OEMs and we believe we can acquire market from others who fail to make the investment in quality. As with the aerospace industry, the

medical device industry is experiencing a consolidation of suppliers.

dm: We are talking a lot about innovation in today's world. According to you, in which products is innovation most important for the emerging markets?

Symmetry: Innovation in both instrumentation and implants will make a critical impact in getting new products into developing markets. We have seen scenarios where disposable instrumentation and reusable instrumentation innovations allow for greater access to products for more people.

dm: Today, manpower is important. We talk about motivation, teamwork, and attitude etc… is this really important when we have access to the most modern production tools?

Symmetry: Teamwork might be even more important today than ever, and we believe our Teammates are vital to our continued success. As mentioned before, we specialize in high mix, low volume production so we depend on our Teammates' skills to set up the machines frequently and maintain our commitment to constant high quality. Of course, the machine is important, but it's really the people who make things happen, and therefore they are our most important asset.

dm: How do you rate your operators' training?

Symmetry: We invest a great deal of time and money in training our people to ensure the best trained people are running our equipment. In the medical device industry there is no room for error since the products we produce are going into people's bodies. Accordingly, we prioritize maintaining a very robust training regime. Symmetry is fortunate to have a global footprint so we can leverage experience from many markets into Asia. The cross-border training works both ways. For example, some of our UK employees came to Penang recently to provide some training, yet they told us that they learned as much from our Penang operators as they feel they taught them. This was a true win/win for the Symmetry organization.

We have also appreciated the strong training and educational system in Penang, particularly the technical training school called PSDC. Many of Symmetry's machinists have been through the preparation provided by PSDC. Accordingly, they come to Symmetry with a good basic foundation.

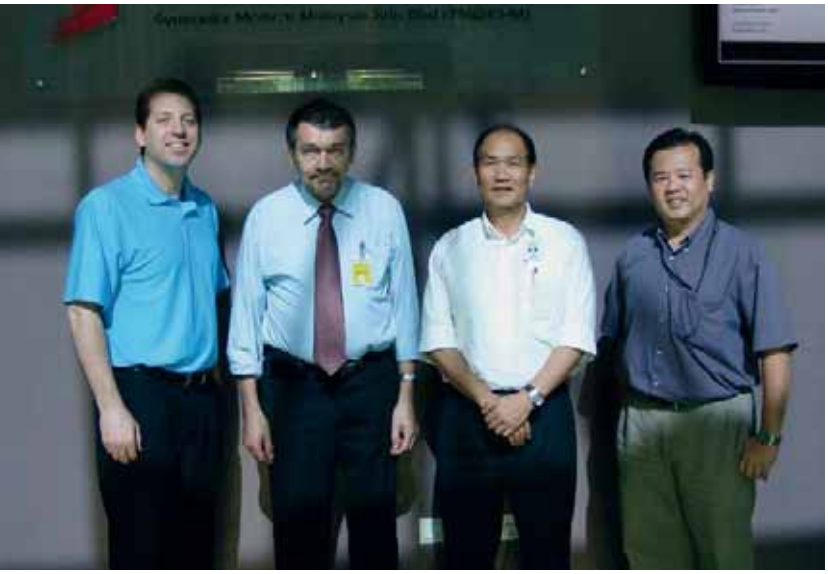
dm: Partnership and transparency have received greater emphasis recently. What is your opinion of these issues and Symmetry's acceptance of them?

Symmetry: Symmetry is one of the largest suppliers to medical device companies in the world and we truly are partners in providing their products. Symmetry's business model is one of providing Total Solutions®, meaning that the customer can rely on us to provide services from design to finished delivery of the product. Without complete transparency and partnership in that relationship Symmetry would not have been so successful in this industry.

dm: We are increasingly talking about reactivity and ability to provide customers products and services "just in time." What are the risks and benefits of this trend?

Symmetry: "Just in time" and "first to the market" are two of the trends that have greatly influenced the industry in recent years, and constitute two of our customers' significant expectations. When customers launch a new product, they want to be the first to the market with that product.

I think the trend of "just in time" for production is an ongoing trend which is going to increase in the future because it increases efficiency and decreases inventory costs for the customer. This concept can be quite complex, but done well it can provide a successful supplier with a competitive advantage because it



From left to right, Christopher W. Huntington, Gerald Musy, Johnny Ong and Peter Wong.

requires successful management of vendors, inventory and stock in sufficient quantities to ensure customers' needs are met.

The medical device industry is complicated, requiring expertise in labeling, packaging, delivery and sterilization, to name only a few of its complexities. Success in this area requires a sophisticated approach to the supply chain.

dm: What are the general trends in industry in Malaysia?

Symmetry: Malaysia's previous prime minister has set what he called "vision 2020" under which Malaysia will move away from low-end high-volume production into more sophisticated higher-end, higher-level products. You see industries utilizing new technologies being established all over the country. The medical device industry is just one of many fields where the government is encouraging investment in higher end production and products.

Manufacturing will be a key driver for Malaysia, and we see it starting to create a much more sophisticated product.

dm: Is Tornos' response to this trend appropriate?

Symmetry: We have just worked with Tornos in Malaysia for 3 to 4 months, but we wouldn't be at this meeting now and wouldn't have Tornos equipment here if we didn't have full faith and confidence that Tornos was a good business partner. In fact, I believe that Tornos has a tremendous opportunity in this area to become a key supplier for certain medical device companies.

dm: How do you see the future in general?

Symmetry: We think that Asia exciting and full of opportunities!

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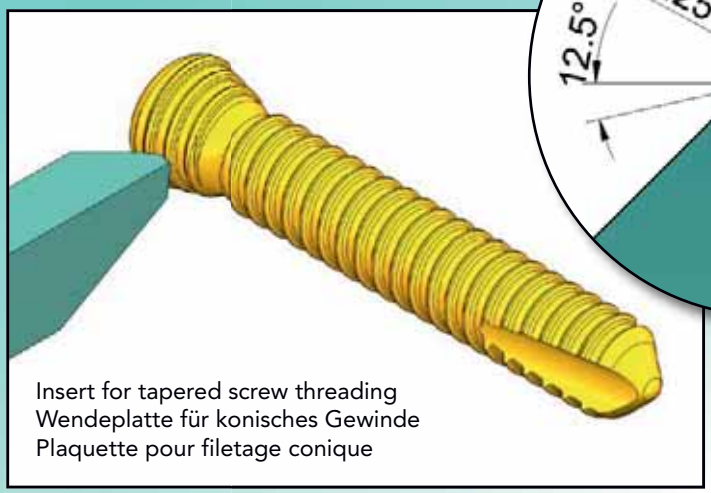

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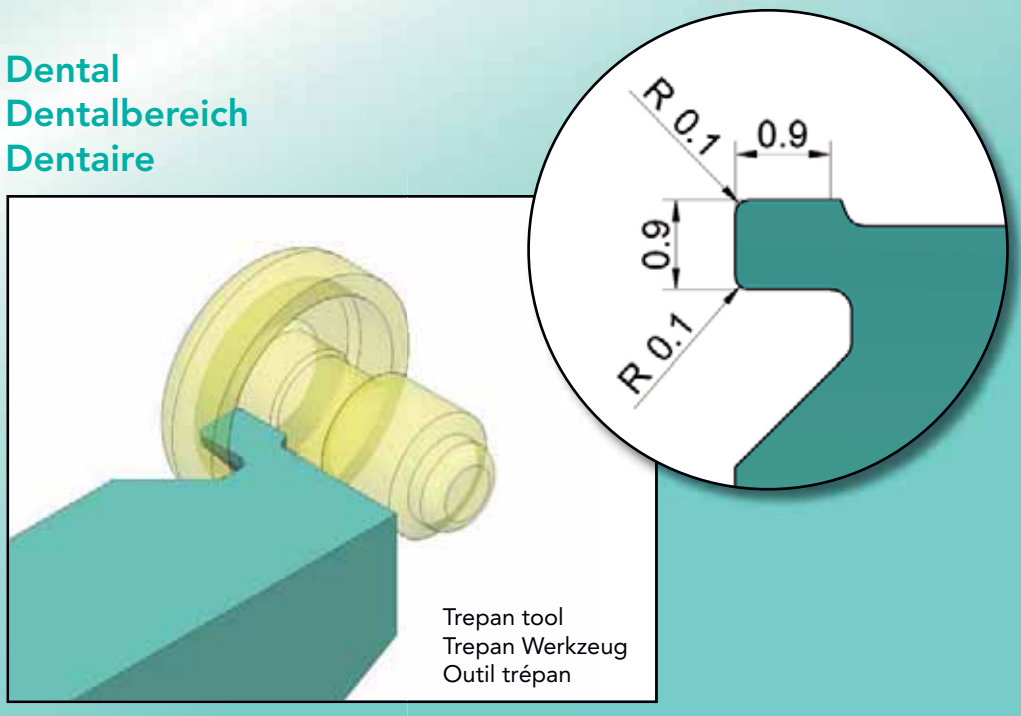

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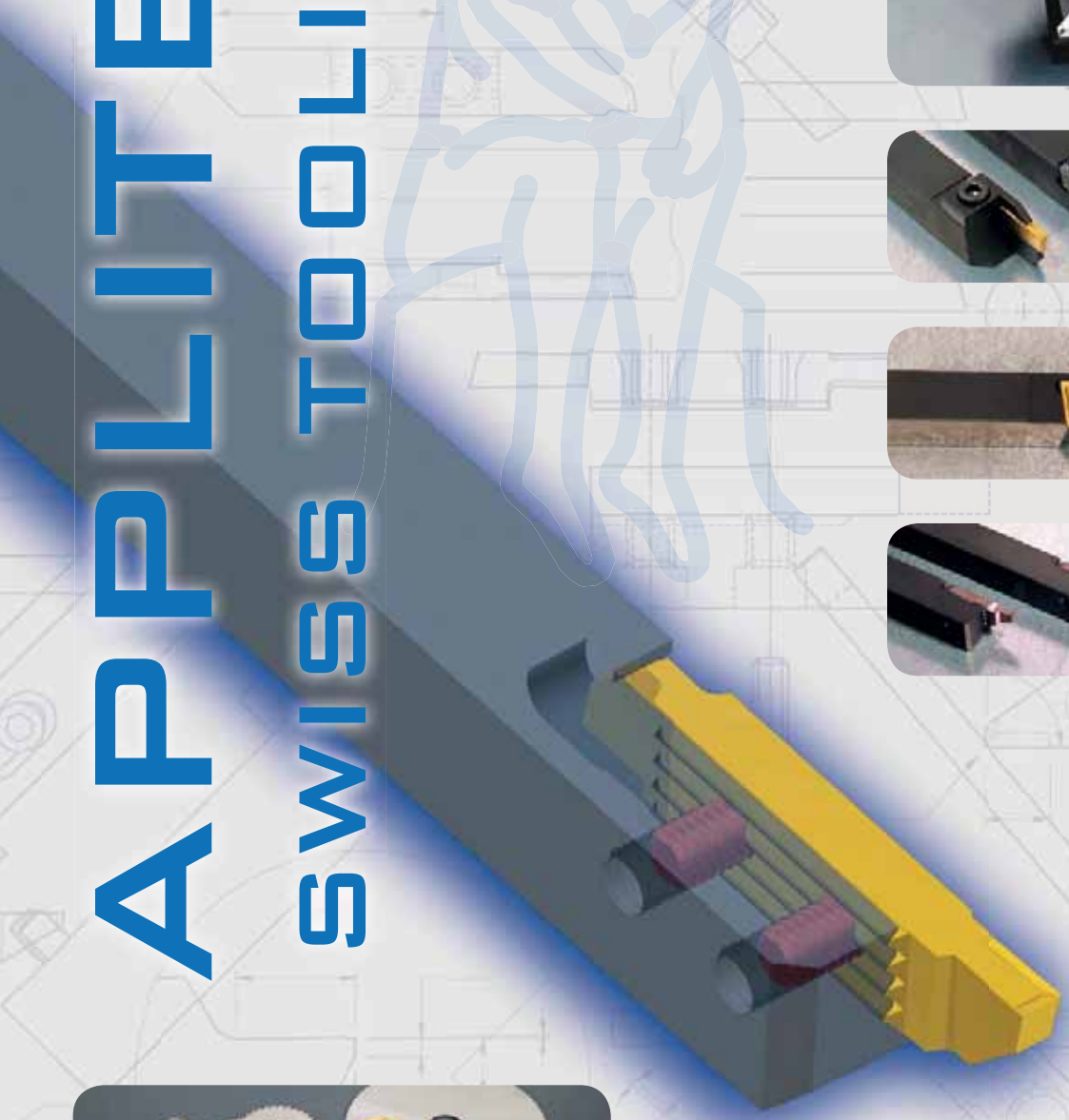

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