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3/05
SEPTEMBER
ENGLISH

THINK PARTS – **THINK TORNOS**

TORNOS is coming up with innovations on all fronts

Centre of excellence at the service of its clients

TB-DECO, developing for the marketplace

Cutting watch and clock pinions

Time for a new appointment

PUB
Utilis

Summary

Think **parts**
Think **TORNOS**

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TORNOS SA
Rue Industrielle 111
CH-2740 Moutier
Internet: www.tornos.ch
E-mail: contact@tornos.ch
Phone +41 (32) 494 44 44
Fax +41 (32) 494 49 07

Editing Manager:
Pierre-Yves Kohler
Communication Manager

Graphic & Desktop Publishing:
Georges Rapin
CH-2603 Péry
Phone +41 (32) 485 14 27

Printer:
Roos SA
CH-2746 Crémines
Phone +41 (32) 499 99 65

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PUB Göltenbodt

Technology

geared towards simplicity

When a Swiss engineer thinks of a "new development" he often tends to make his design "more complex". Even if such complexity is inevitable in certain instances, it is far from being a systematic requirement during machine design!

The message to customers is very clear – above all you need high tech equipment that is easy to use and offers the best price-to-performance ratio. This is why – in parallel with our current products we are now offering our [s-line] machines, which are governed by the basic order of the day, i.e. "technology geared towards simplicity".

Technology geared towards production

Our efforts are mainly geared towards specific sectors of activities such as the medical, electronics, automotive and watch making industries. In these areas we would like to provide our clients with global solutions specific to these sectors, this includes the necessary peripherals.

Cutting edge technology, high precision and strength are what we require of our machines – whether it is individual criteria or a combination of all three. From our latest technological innovations, we now offer the following: part pick-up and automatic palletization, spindle motorisation, new techniques to improve strength and enhanced software to name a few innovations. Our engineers have met the challenge of cost effectiveness and this is always subject to regular review.

Our aim: your satisfaction!

With the aim of intensifying customer relations we have set up business team meetings. At the meetings sellers, engineers and members of the TORNOS and customer management team can get together and have a constructive exchange of information in order to discuss and provide appropriate and relevant services.

Our overriding aim is for all clients to say: TORNOS understood our strategy and is helping us to achieve our goals. Our requirements have been identified and acknowledged and TORNOS will meet them.

To conclude, I am happy to confirm that following its restructuring TORNOS is now a healthy, efficient and successful company that can offer quality services and react to fluctuating economic trends of the marketplace.

Raymond Stauffer, CEO

TORNOS is coming up with

Following the April 2005 launch of the DECO 8sp and MULTIDECO 32/6c automatic lathes at Moutier; the Swiss manufacturer has announced that it will be extending its product range in June 2005. The new MULTIDECO 20/6be and DECO 20s machines will enable customers to execute simple parts efficiently.

At the EMO exhibition in Hanover, on 14th to 21st September 2005, TORNOS will present yet another new MULTIDECO – the 20/8d! The September launch will bring the number of new products presented by TORNOS to 5 within 7 months.

EMO Hannover 14-21·9·2005

TORNOS
Hall 17 - Stand D08

The Swiss manufacturer is astoundingly demonstrating how its policy of reviving innovation implemented in 2003, is now bearing fruit. All the new innovations admirably complement the manufacturer's existing product range without jeopardising the well established products already on the market.

Occupying a dominant place in the high added value sector, where the parts being executed require fairly complex to highly complex operations, TORNOS wants to extend its presence in alternate market sectors and provide machine tools that are more finely tuned to the complexities of various parts. Market trends are increasingly forcing component manufacturers to invest in products that are adapted to the parts being executed.

Hence with the [s-line] and MULTIDECO 20/6be, simple part segments will have their own finely adapted products. At the other extreme, the ranges are beginning to acquire further potential to execute more complex parts with the MULTIDECO 32/6c and 20/8d.

innovations on all fronts

Products to be presented by TORNOS at EMO:

Single spindle:

DECO 8sp: The most precise machine available on the market - machining to within ± 1µ! A Specialist machine catering for mini hard disks and other precise applications.

DECO 13a: Fully equipped machine to execute a highly complex medical part – a sector for which the machine works wonders.

DECO 20a: This machine produces alternate medical parts that make the best use of its vast machining facilities.

DECO 20s: World Première! The second machine in the [s-line] range. Simplicity is the key word.

[s-line]

DECO 8sp

[a-line]

DECO 13a

DECO 20s

DECO 20a

TORNOS is coming up with innovations

Products to be presented by TORNOS at EMO:

Multi-spindle:

MULTIDECO 20/6be: A well priced MULTIDECO machine with a guide bush to execute simple parts. Depending on circumstances, part execution is possible with savings of up to 30 % compared with the conventional yet impressive MULTIDECO machine.

MULTIDECO 32/6c: The facility of fully completing complex parts by way of back-operations is expanding! This machine also has part handling and an integral palletization system!

MULTIDECO 20/8d: World Première! The MULTIDECO 20/8d is a machine equipped with motorized spindle – offered for the first time by TORNOS. This technology was always rejected by the company because it was previously impossible to obtain sufficient power. TORNOS now offers a brand new motorized spindle system with power that is matched nowhere else on the market. The MULTIDECO 20/8d also offers another original innovation to maximise production time – the dual counter-spindle system.

EMO Hannover 14-21·9·2005

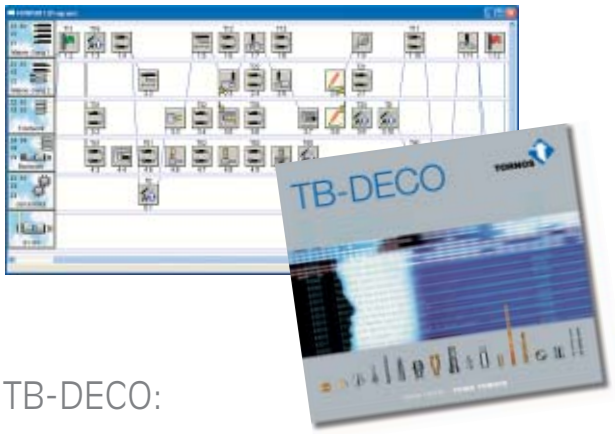
TORNOS
Hall 17 - Stand D08

MULTIDECO 32/6c

MULTIDECO 20/8d

MULTIDECO 20/6be

on all fronts



TB-DECO:

The exceptional programming software will be presented in its latest version – the TB-DECO 2006. This new version provides modules (ADV, CAM interface) so that you need only purchase those families with the required functions.

The entire commercial network of the company, throughout the world, is looking forward to presenting all these products to its clients on stand D 08, hall 17 at EMO in Hanover.

"Technology Centre":

Centre of excellence at the service of its clients.

How has TORNOS transformed its standard testing service provider to a centre of excellence? To answer this question, DECO magazine met Mrs Christine Jaquet and Mr Michel Rion, joint heads of this new structure at TORNOS.

DECO Magazine (DM): Good day to you. Centre of excellence and customer service are well known and somewhat clichéd concepts with every company trying to put labels on what has already been achieved... Can you direct us to your particular vision and tell us what makes you unique or different?

Christine Jaquet, in charge of operations at the Technology Centre (CJ):

We have several key skills at departmental level and it is true that we have vast expertise in machining operations. The concept of a centre of excellence is absolutely spot-on, since we adopt a global approach to machining problems. These include the materials, oils, tooling, coatings and so on.

DM: But is it really possible to have such a vast range of know-how covering all these areas?

CJ: Of course, we are not alone in providing this service. We work very closely with our partners, such as the carbide manufacturers. It enables us to retain our position at the forefront of technology.

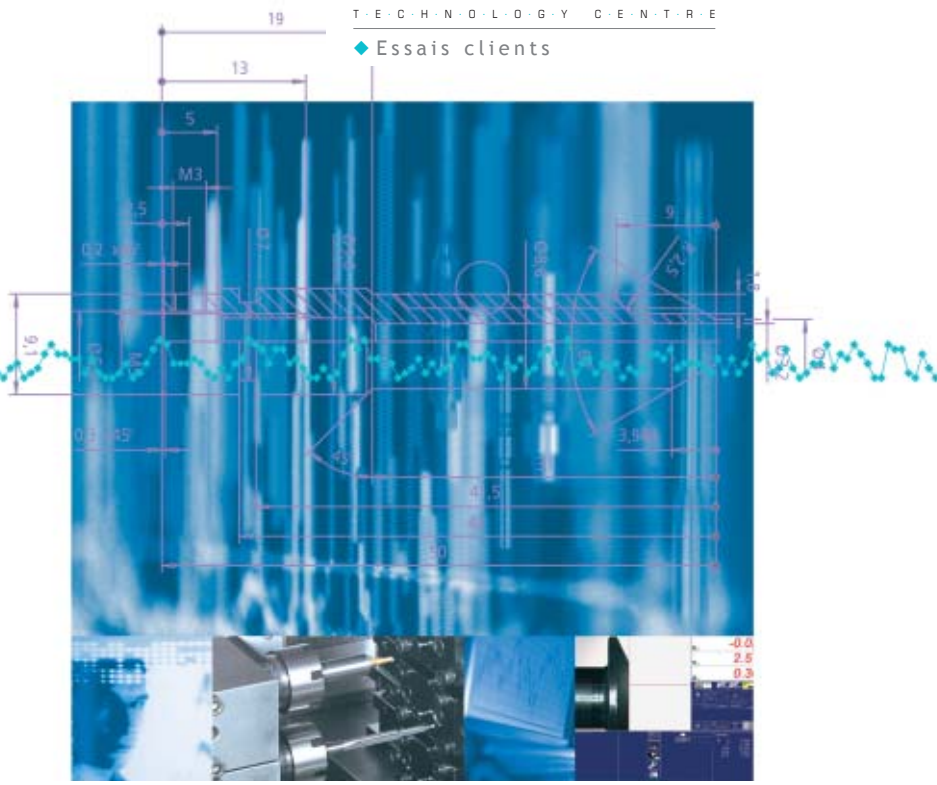
DM: To come back to the concept of "service"...

Michel Rion, Technical Head of the Technology Centre (MR):

The issue here is also a concrete affirmation, given the fact that our department also carries out tests on behalf of our clients. The question lies in working out how we can respond to very concrete enquiries, whether we are helping our customers produce brand new parts or improving processes.

DM: So you are not only involved at the pre-order stage to help in the sale of a perfectly adapted machine, but you also offer customer care services. How do you operate in such cases?

MR: In such cases, we operate a "coaching" system with our specialists visiting our clients to analyse the processes and methods deployed. We can then suggest concrete solutions based on our vast accumulated experience!



DM: Looking at things a little more broadly, at what point does the Technology Centre become involved – what are its resources and objectives?

CJ: The centre was first created in April, 2005. It came about as a result of organising the company into Business Units, where it forms the matrix with the two single-spindle and multispindle Business Units. It is a department which aims at combining the expertise of the two Business Units and benefiting from synergies. Currently, there are 18 people involved in the department, but not all work full time.

MR: In concrete terms our aim is to execute tests on behalf of the clients as well as R&D, machining and even laboratory tests. The department also has its own software specialists who are involved in developing new macros, machine models and so on. Customer training is also one of our skills.

DM: This new organisation is then in contact with TORNOS clients and its own company. So would you describe yourselves as a sort of link between the two?

MR: Because of the restructuring into Business Units, this gap has narrowed quite considerably. But it is true that this feed-back function is very important. From our daily contacts with the clients at technical and technological level we obtain a fair bit of information. This enables us to serve customers better in the short and long term.

DM: So it would seem that you have a highly efficient organisation. What is the situation regarding staff, given the well-known fact that they are usually the limiting factors of organisations?

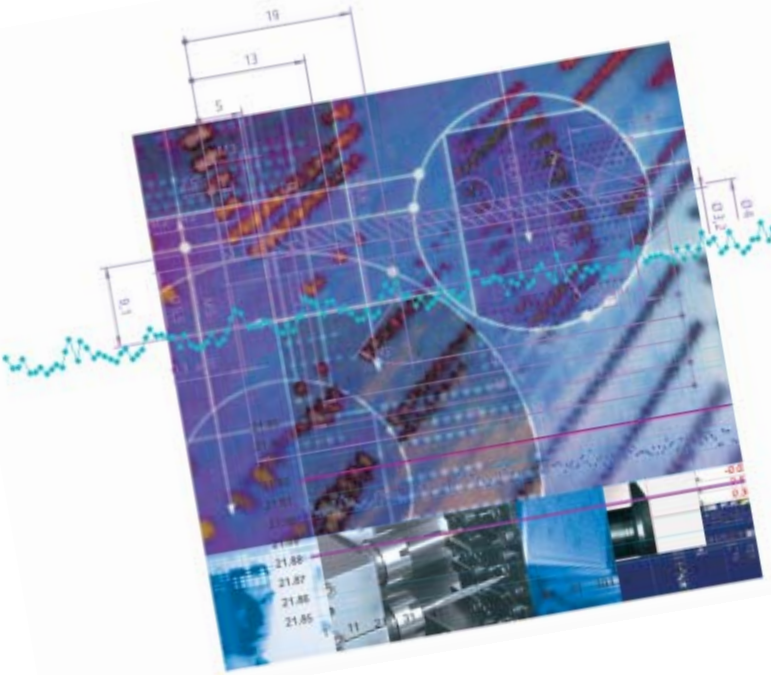
CJ: Our staff is made up of professionals in the trade, but this alone is not enough. We really must ensure that all the skills are kept within our scope. This is why we organise on-going training sessions for the products and other areas.

DM: Are there any differences in the skills between those people working in the Technology Centre and those in the "setting up" departments, for example – in other words is there a more "efficient route" for the customer?

MR: Not at all! All training courses and seminars involve the specialists of both departments!

DM: You carry out a vast number of tests. By doing this, can you detect any market trends and developments?

MR: Yes, very clearly! The requirements we have to deal with are getting more and more in-depth, whether in terms of geometric or dimensional precision, machine facilities and processes or even with respect to new materials. I can also see that the general trend is for the parts to undergo more operations and become more complex. There is a growing demand to fully execute parts undergoing complex machining.

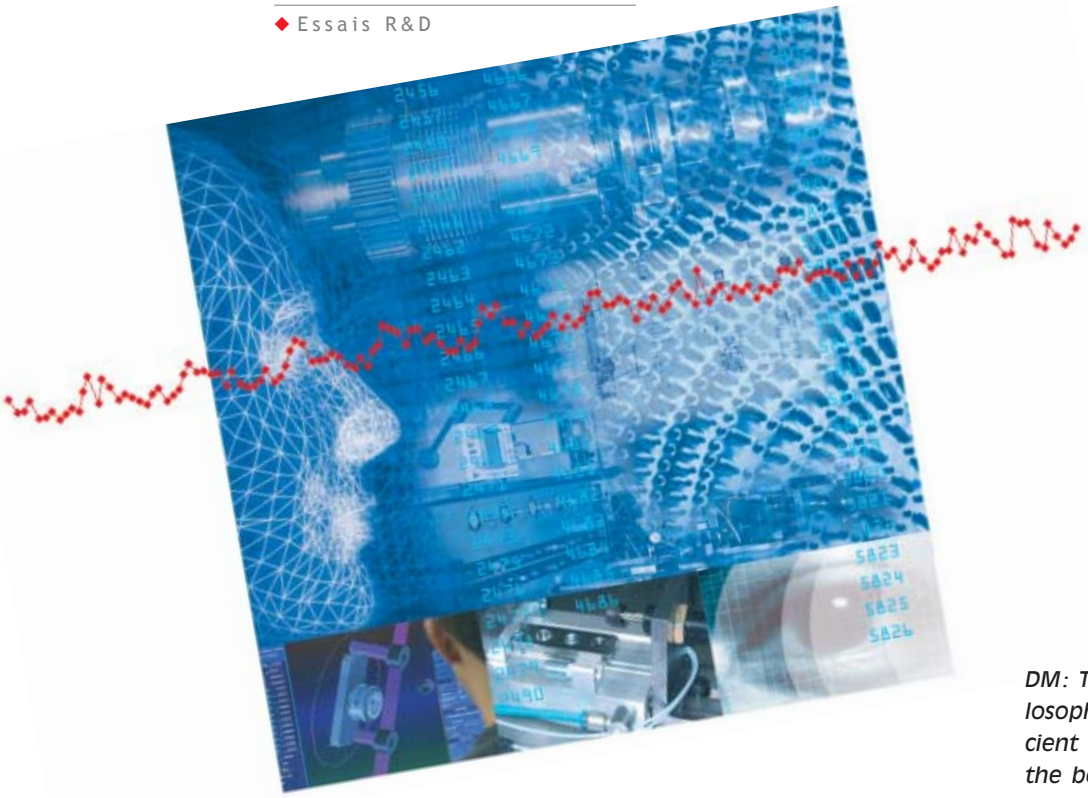


"Technology Centre":

Centre of excellence at the service of its clients.

T·E·C·H·N·O·L·O·G·Y C·E·N·T·R·E

◆ Essais R&D



CJ: This is also why it is our ambition to hold the key to mastering chip removal, tooling and machining. As already indicated, we cannot and do not want to replace our specialists but we must be able to incorporate their know-how so that we can match and even anticipate market requirements.

MR: If you talk of precision, for example, it clearly transpires that machining to the nearest 100th, which was considered essential a few years ago, is now completely inadequate.

DM: So what effect did this trend have on your equipment, in terms of measurement, for example?

MR: This trend could in fact be regarded as problematic to the extent that we must have more and more specific means of measurement to meet these requirements. If a client envisages fitting his machine with a dedicated measuring unit, this makes things much more difficult for us. We tend to fit more universal systems so that we can measure numerous types of dimensions. We frequently come across parts requiring more than 60 points of inspection, which entails the use of ultra high-performance tooling!

CJ: In addition to measurements the request is always to supply a package that includes these measurement facilities, protocols and samples. This enables us to provide our customers with complete and reliable documentation.

DM: This organisation and philosophy appear to be highly efficient and you are underlining the benefits to the customers. But what happens if you have to create specific tooling as part of a test, for example?

MR: The benefits to our clients are many. We can quote, in particular, the quality of our expertise and the solution offered, as well as the time spent in our department. We have a strict test run monitoring system and indicators showing that the time is kept to an absolute minimum! But speed is not to the detriment of quality. We have the necessary tooling and colleagues who help us achieve new tests very quickly. The "tooling and equipment production" department is also part of the Technology Centre. This provides us with great flexibility in the event of requests at this highly specific level. This department can also be called upon by the company as a whole, meaning that all the expertise and all departments are readily available on site!

CJ: To come back to the customer benefits. The first is already the speed in deciding whether to execute the test or not. All the tests carried out to date are centralised in a database, which avoids any duplication of testing. We can therefore quickly document those requests for which we already have the answers. This means that we can carry out the tests much more quickly and thoroughly, so that a client having to deal with a customer who is pushing him, knows that he can count on us!

DM: How do you charge for this service?

CJ: This service does involve the use of numerous resources and these must be paid for. What we can say is that there are invoicing rates for parts and if a machine is ordered, the cost charged for testing will subsequently be deducted from the setting-up charge.

MR: This is a guarantee that our service remains optimum. This is a value-adding service and we must ensure that we really devote the time and means required to achieve complete customer satisfaction!

DM: I would like to thank you, Mrs Jaquet and Mr Rion for your time and this fascinating insight into what is as yet an unknown department. You are still at the setting up phase, but during the course of our discussions you indicated that the future would be even more interesting and full of surprises. Before we conclude, could you just tell us a little more about this?

CJ: Our department is actually in the process of moving, so that we can become more central. But it's like the "home kitchen" which will help us improve our performance even more. To conclude, I can say that with the Technology Centre; TORNOS has provided the means to be truly professional, not only in pure product terms but also with regard to the system or solutions we provide.

MR: Our ultimate aim is to help our clients become more efficient and to achieve real benefits with our products and solutions. The Technology Centre is a fantastic tool available to our clients and we look forward to working with them.

DM: Many thanks. We would like to come back in a few months, if we may, to find out a little more on the developments of your services. Would this be possible?

CJ & MR: Of course! We would be delighted to see you soon…

T·E·C·H·N·O·L·O·G·Y C·E·N·T·R·E

◆ Base de donnée

If you would like further information about the Technology Centre, Mrs Jaquet and Mr Rion will be available on the following e-mail addresses:

Rion.m@tornos.ch
Jaquet.c@tornos.ch

Pub Habegger

TORNOS makes turning PTFE as easy as ABC

dalau
Specialists in P.T.F.E.

After 50 years of turning PTFE, Clacton-based Dalau has every right to call itself a specialist in machining this plastic material. Typical PTFE components made by Dalau include insulators for the electronics industry, connectors for the telecommunications sector and various aerospace and medical parts. Dalau makes over 100 million PTFE and plastic components a year, to help maintain a lead in the market, the company has been a long-term user of turning machines from TORNOS.

In the mid 1980s Dalau installed its first TORNOS cam-driven automatic, the company now has 45. In recent years the shift has been towards TORNOS DECO CNC sliding head models and the company now owns four DECO 20 and seven DECO 10 machines. The most recent addition is a pre-owned DECO 10, which was installed in January 2005.

"As a general rule of thumb, straightforward components that only require a single operation are loaded to the cam-driven autos, while anything more complex, perhaps involving PCD drilling, milling or second operations of any kind, will be put on the DECO CNCs so they come off complete," explains Philip Alston, production and QA manager for machined components at Dalau.

Although Dalau sometimes undertakes batches up to 1 million, typical batch sizes are around 500 on the DECO CNC machines, which means a fair amount of change-overs and set-ups. "All of our setter/operators are trained off-site at TORNOS and we have found this provides more than enough grounding for them to be competent at creating the programs offline and setting the machines," adds Philip Alston.

PTFE has become enormously popular because of its insulating properties, chemical resistance, low co-efficient of friction and high temperature resistance (up to 260°C). However, the excellent design characteristics of PTFE are countered by "difficult" machining properties.

The machine shop at Dalau is a temperature-controlled environment as PTFE components are subject to expansion at elevated temperatures making it difficult to hold tolerances in the realm of ± 0.015 mm. "Many subcontract machinists won't touch PTFE," says Philip Alston, "but with the help of the TORNOS machines we have gained the experience to make us a leader in our field. The reliability of the TORNOS machines is first class, which is exactly what we require for rapid throughput parts." In the past five years, Dalau has diversified into machining other plastic materials, which has become a growing market. Around 75 % of Dalau's output is exported.

Another problem with machining PTFE is the continuous "string" of swarf it produces when cut. To overcome this difficulty Dalau uses bespoke tooling with an exceptionally sharp edge. The company also says that one of the benefits of the TORNOS machines is the large recess under the spindle that allows swarf to fall away. Some machines produced by alternative suppliers do not have this, which allows swarf to accumulate and create problems.

TORNOS makes turning PTFE as easy as ABC

In negating this difficulty the design of the Swiss-made DECO sliding head machines allows Dalau to run lights-out operations overnight, a capability that has become critical in its battle with competitors from low wage economies. Quality is another key issue, Dalau has developed its own SPC system as part of its TQM system that is linked to the CNC control of the DECO machines. The innovative system allows operators at the ISO 9001:2000 accredited company to monitor every dimension and characteristic on every drawing in real time. If a problem occurs it can be rectified immediately and not after an entire batch has been produced. It also ensures full component traceability.

Contact:

John McBride
TORNOS Technologies UK
TORNOS House
Garden Road
Whitwick Business Park
Coalville
Leicestershire
Tel: 01530 513100
Email:sales@tornos.co.uk

Changes in the shareholder structure at TORNOS

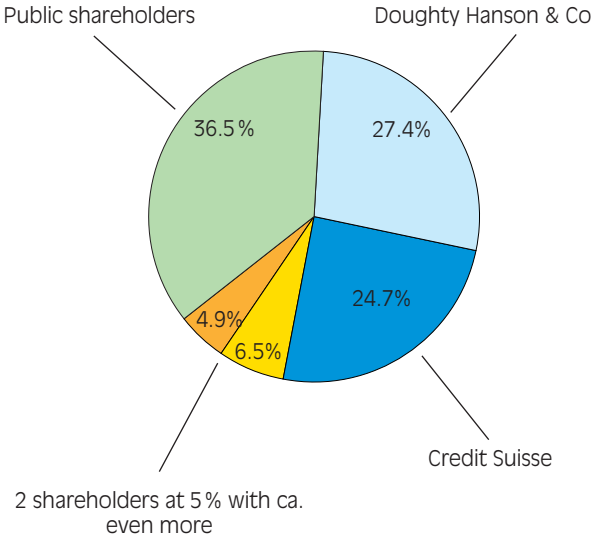
At the ordinary general assembly held on 19th April 2005, TORNOS informed about the intention of Credit Suisse and Doughty Hanson & Co. to divest their participation of 24.7 % and 27.4 % respectively in the capital of the group.

This intention was implemented under the lead of Lombard Odier Darier Hentsch & Cie, by placing all shares held by these two establishments with institutional investors and a group of shareholders formed by members of the board of directors and the management team of TORNOS. This group now holds more than 10% of the capital and is the largest shareholder of the company.

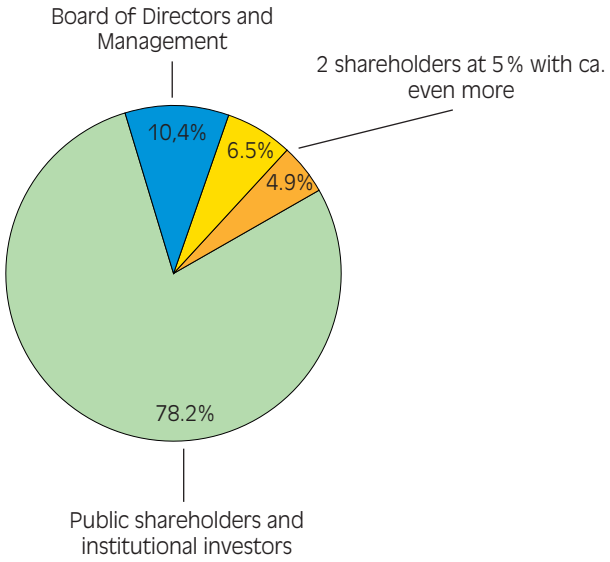
The board of directors and the management team of TORNOS appreciate these changes as they confirm the sound situation of the group and lead to a considerably higher free float of the shares quoted at SWX Swiss Exchange.

Shareholding

Until May, 2005



Since June, 2005



Complex parts at

Taking the car industry as an example, machined parts are becoming more and more complex. Against this, as a result of the pressure exerted by the buyers, their price is dropping from year to year, whilst competition is cut-throat. How can one meet these requirements? TORNOS has provided a competitive answer with its new automatic multispindle MULTIDECO 32/6c lathe.

In the sub-contracted car components market, the specialists believe that there is a 5 % price reduction per annum on the price paid for these parts. At the same time, the car manufacturers are looking for ways of reducing weight and hence, of reducing the number of parts. Consequently, the latter are becoming more and more complex and comprise a growing number of functions.

Even greater precision is required, given the increased automation at car component manufacturers. What is more, the demand for parts with zero defects is crucial and imperative, given the risk of vehicle recall. At the same time, the general trend in the industry is to reduce the number of suppliers. The sub-contractor thus finds himself exposed to the pressure provoked by customer requirements on the one hand and to growing competition with other potential suppliers on the other.

Changing methods

Up to now, complex parts were often machined on lathes and then reworked for finishing, which required the necessary labour whilst also increasing operating costs and manufacturing time. In looking at ways of producing such parts more economically, the TORNOS engineers turned to the development of a new range of automatic, multispindle lathes, comprising a separate counter-spindle. This gave rise to the latest MULTIDECO 32/6c lathe. As its name indicates, this lathe is designed for machining bars with a nominal diameter of 32 mm and has six spindles at the front end. Compared with a single-spindle machine, the specialists are counting on this latest MULTIDECO to increase productivity by four to five times for an investment that may be three times greater.

A lathe within a lathe

Besides six spindles, the new MULTIDECO 32/6c lathe also has a counter-spindle. Multispindle lathes performing back operations already existed in the past but only had a limited range, with two or a maximum of three back-operations. This means of production did not allow the operator to execute all operations, such as turning, milling, drilling and others.

The TORNOS engineers designed a brand new multispindle lathe, with

competitive prices

the counter-spindle allowing the operator to avail himself of five largely dimensioned tools. Consequently, it is capable of executing five different axial or radial operations from the rear. Using this means of production, it is possible to execute a complete, complex part. This counter-spindle is therefore like a complete lathe incorporated in a multispindle lathe. The structure of the machine was designed so that the counter-spindle has four free axes.

With regard to power, the machine has a motor capable of executing turning work at 5'000 rpm whilst the motorized spindle can reach speeds of up to 8'000 rpm. This results in a saving of time. The new machine was fully designed to receive this counter-spindle, meaning that the ball screw was completely redesigned and cooling was improved to increase the thermal stability of the machine further.

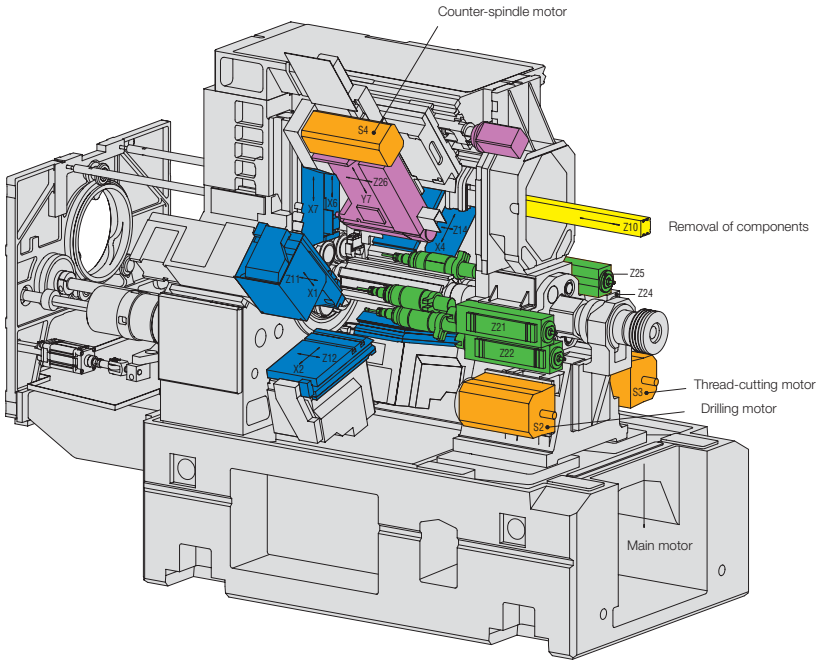
The counter-spindle therefore has several axes, of which "C" axis enables the machine to execute all operations from the rear of the part – even complex shapes are possible.

Precision benefits

The more elements that are fitted to a machine, the more, in theory, it loses some of its precision. The MULTIDECO 32/6c is designed so that the counter-spindle is supported by a very strong frame that is fully incorporated in the chassis of the machine. This allows it to work under exactly the same stable conditions as the other spindles. The counter-spindle of this automatic lathe is not, therefore, merely an additional auxiliary facility but a fully separate machine part that guarantees the strength and preci-

PUB Neukomm

Complex parts at competitive prices



sion of operations to the same extent as the other spindles.

Another major benefit is the fact that the part never leaves a given environment throughout all operations. The same conditions and working philosophy are maintained throughout the entire part operations, thus creating ideal working conditions and providing a significant contribution both with regard to precision and quality.

Multiple operations

The counter-spindle is designed as a complete, separate spindle and offers a wide range of facilities. It enables a full array of operations to be executed, as the operator has four different axes to hand. The most simple operations include rear threading and turning. Axial or radial drilling or milling are also possible, as is contouring by interpolation – all from the rear. A combination of "C" axis of the counter-spindle and the tooling makes it possible to produce the most varied and complex of shapes. Last but not least, we should not forget eccentric drilling and other such operations.

Even the parts designer, with the support of a shrewd automatic lathe operator, will find satisfaction, since the MULTIDECO 32/6c offers a wide range of facilities for shaping the parts. If he wants to execute a hexagon from the rear, then there is nothing to stop him.

A standard tool

The tool holders of the MULTIDECO 32/6c have been specifically designed for this machine by TORNOS. Any tool or accessory available on the market can be fitted to these tool holders. The machine can be fitted with pre-set tooling and sprinkling takes place via the core of the tools and even on the counter spindle.

Free access

The design of the machine is such that its ergonomy is well suited to the operator. Although the lathe has a counter-spindle for the complex operations, access to the range of operations and hence the tools, has been made much easier because of the relocation of the counter-spindle to the upper section of the machine. The operator now always has free access, without being impeded by handling devices or other elements.

For which series runs?

As far as the engineers are concerned, the batch size is no longer an issue. As the new CNC machines do not have cams, it is now easy to enter a new program for a new part. Any optimisation is now done quickly by numeric control – this multi-spindle machine requires no mechanical intervention, meaning that the series runs can now be much smaller.

The advantage of this machine is that it is a complement to the current fleet of machines. When designing a new part, the operator can perhaps manufacture pre-series parts on a single-spindle lathe and transfer the series production to the multispindle machine.

Complex parts at

Another advantage here lies in the fact that the single-spindle and multispindle TORNOS machines are all programmed with the same programming tool.

Easier programming

Is it not more complicated to program such a machine? The engineers are very reassuring on this point: an operator of another TORNOS lathe fitted with the TB-DECO will quickly find himself in an identical and hence, very familiar environment. Therefore, there is no programming difference between the current DECO and MULTIDECO machines of the manufacturer. Added to this is the fact that the control has various macros which support the programmer and facilitate the programming of even quite difficult elements.

This new machine provides the operator with a control covering all operations. He merely has to enter the dimensions into the macros and the latter will execute the operations according to the program.

The control also comprises, amongst others, an operations library and tool library for the benefit of the operator. This comprises the data relating to numerous pre-set and miscellaneous tools and is easy to install. The revolving tools are, of course, also included and these are lubricated directly by the machine. There is no need for the operator to intervene at this level.

One of the strong points of such a machine with counter-spindle is that all controls are grouped together on the same control console.

The astuteness of the operator

Although the MULTIDECO 32/6c provides multiple opportunities to simplify part programming, even for highly complex parts, the skilled operator can develop his entire know-how with this machine. Because of its numeric control facility, any optimisation is executed numerically. For example, the operator can enter an offset quickly and reliably during production, without having to stop the machine. What is more, he can take his time to balance the operations to be carried out on one part. If he sees that the counter-spindle is not used to full capacity during production of a specific part, then he may transfer one or more operations of a standard spindle to the counter-spindle, thereby refining production time and increasing the machine's output.

The operator is also no longer restricted to a choice of tools for the counter-spindle. It offers him more facilities than a simple machine. He can exercise his options – even if these are unusual – as the counter-spindle now provides him with an additional and convenient tool. Monitoring operations has suddenly become more extensive in an area where the operator's skills may come to fruition.

Additional training

TORNOS provides each operator with sufficient training with regard to the use and management of the new lathe. This allows him to become familiar with the numerous facilities offered by this new concept.

If the operator is not yet familiar with the TB-DECO software, TORNOS will provide complete training so that he can learn to understand and operate this machine very efficiently.

competitive prices

A saving in time and complexity

Although the actual time for executing the operations on a part is unchanged – despite the savings achieved through the skill of the operator – a saving in time and a gain in quality is obvious, because all additional operations, such as changing a machine part and the necessary intermediate processing operations, for example, cleaning, are now completely dispensed with.

Compared with a single-spindle lathe, the multispindle lathe is roughly four times faster, since several parts are machined simultaneously. However, the machine does not cost four times as much – it is more profitable and requires less space and personnel.

The new machine can execute more operations than hitherto. It can even proceed with deburring, which can be programmed on the machine. Consequently, the new lathe allows the operator to go much further with the finishing work. It is obvious that with this unit, the part leaving the machine will be finished to such a point where additional work is quite superfluous.

Competitiveness and opening out to other markets

The trend is towards more complex parts with more applications. At the same time, the designers are looking at ways of reducing the number of additional operations to be executed, such as grinding or other surface treatment. The main aim is, of course, to reduce the cost of the parts. Finally, the MULTIDECO 32/6c dispenses with reworking the parts, thus increasing its competitiveness in the low-price sectors.

Although the new automatic lathe is first and foremost designed for producing parts for the car industry, it can also be used in a multitude of industrial sectors, such as hydraulics, electrical engineering and electronics and also in the medical sector. Thanks to the facilities offered by this machine, the operator can also penetrate and execute parts for other markets, which hitherto, he would have been unable to do with a fleet of less efficient machines.

Complex parts at competitive prices

Chucker included

Although the MULTIDECO 32/6c is fitted with an integral bar feeder, the facilities of the lathe do not stop there. In fact, it is possible to fit this machine with a unit for rough unit parts (stamped, hot stamped) and others. This is the "chucker" version. This facility provides a whole range of benefits, such as parts handling and complex and complete part machining without handling the part once it is in the machine. The possibilities are such that they have not yet all been explored. As far as the TORNOS engineers are concerned, it is sufficient to position the unworked part to achieve the necessary, pertinent installation, since the machine has already been designed for this purpose.

The future?

The MULTIDECO 32/6c has all the usual ancillary devices. However, the engineers did not stop midstream. Perfect part production in ever shorter times calls for further facilities, which are not kept shut in some drawer, but are currently being worked on, or are even available.

The MULTIDECO 32/6c has a handling and palletization system which ensures that all the machined parts are properly treated until they are ejected from the machine. With ever smaller diameters, TORNOS launched the MULTIDECO 20/8d at the EMO. This is a brand new lathe, which pushes the concept of back-operations even further. This machine has twin back-operation facilities, thereby doubling the machining capacity at this level. Also, fitted with motorized spindles, this is another important innovation, which we will come back to at a later stage.

TORNOS SA
Rue Industrielle 111
2740 Moutier
Tél. 032 494 44 34
Fax 032 494 49 03
www.tornos.ch

APPLITEC

SWISS TOOLING

The latest range of Applitec MODU-Line tools proposes an ideal link between the cutting tool and the machine.

Production machining performance essentially depends on the quality of the machine, the cutting tools and the cooling liquid system deployed. However, an effective link between these various elements also contributes towards improving the performance of the machine as a whole.

Faced with ever more stringent production requirements (difficult to machine materials, tight tolerances, complex parts and exceptional finish) and a highly competitive market, operators of automatic lathes are seeking out even more high-performance solutions and means of production.

These performance requirements are mainly translated by the following:

- Reduction in machine down times.
- Improved chip control for very difficult materials.
- Optimising the useful life of tools.
- Increasing the number of tools available to manufacture complex parts.

Fully aware of these requirements, Applitec has developed a new modular tool system. It enables the turning tool configuration to be very easily adapted to specific production needs.

This new concept offers the following benefits:

- Simple and fast tool change, with the facility of pre-adjustment and adjusting along the tool length.
- Spraying facility – This is perfectly directed to the insert to provide an independent supply using a high pressure system.
- Increase in the number of tools available.
- Excellent strength with longitudinal grooves and large tool sections.
- Wide choice of tools for ISO and Applitec inserts.
- Great flexibility of use (can be combined with standard tools).

Pub Applitec

APPLITEC SWISS TOOLING

The APPLITEC MODU-Line concept (patent pending)

The insert holder is clamped in its support by two screws across the section of the tool.

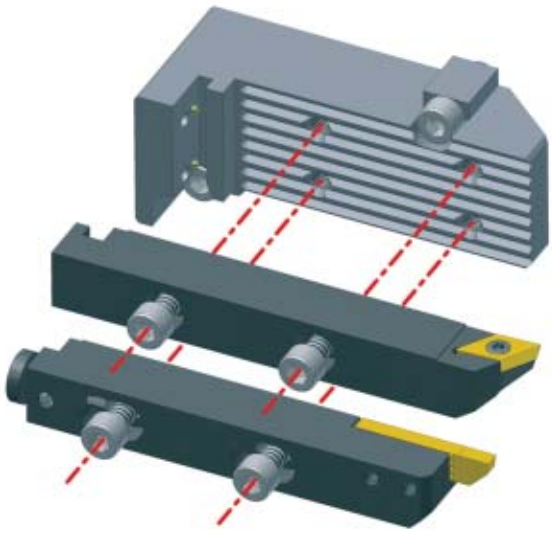
The bearing surface with longitudinal teeth provides excellent strength and precise positioning.

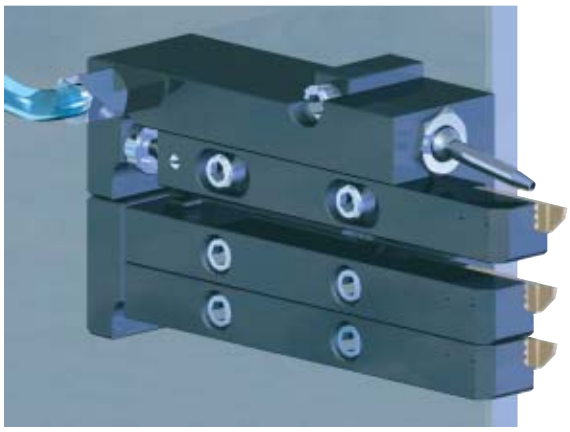
Positioning along the length is determined by a stop (fixed or adjustable) and support is guaranteed by the pressure exerted by a ball-spring. The two fixing screws are held tightly by the insert holder, thereby preventing them from becoming lost and making tool handling easier.

For machines of the TORNOS DECO type, the base of the tool holder is independent for each tool position.

This type of tool configuration provides wide flexibility with regard to tooling composition.

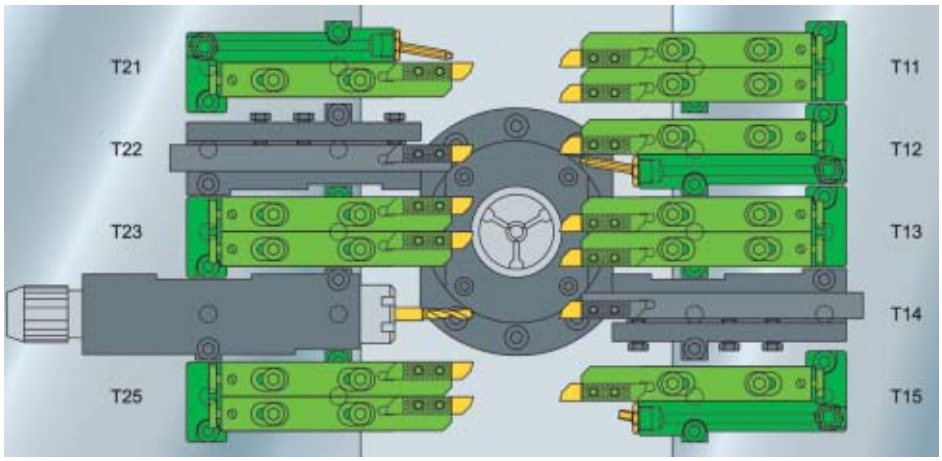
In fact, it is possible to use standard tool holders, Applitec MODU-Line tools and tools driven along a screw die side by side.





There are two versions of the MODU-Line tool holders for the TORNOS DECO:

- The tool holder with sprinkler.
- The dual tool holder, making it possible to have 2 tools in one position.

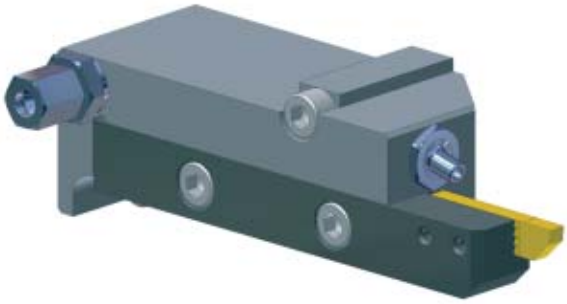


For machines with a monobloc tool holder plates, like the new TORNOS [s-line], a specific MODU-Line tool holder plate can replace the original one. The benefits in increased reliability and tool changeover speed are quite considerable. Operator convenience and handling is likewise increased. There is now no need to position the tools over their length by touching the bar with the end of the insert, thus eliminating the risk of premature notching of the cutting edge. In the majority of cases, a MODU-Line system allows the use of two or three additional tools.

To ensure excellent flexibility, it is also possible to use one or more standard, square tools as well as sprinkler modules.

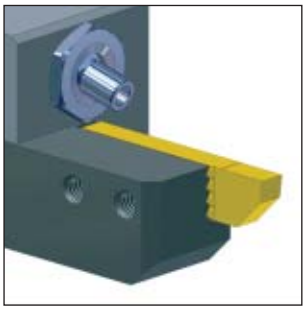
Pub Frei

APPLITEC SWISS TOOLING

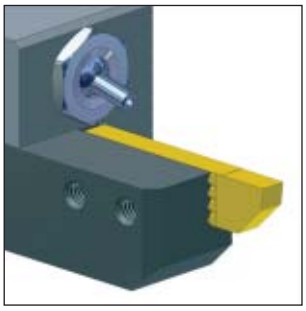


The use of additional, targeted spraying provides an excellent solution to controlling chip evacuation and the useful life of the tools. A choice of various directional nozzles enables spraying to be directed in a very specific way. These nozzles are made from stainless steel and can withstand very high pressures (up to 100 bar/1'500 PSI).

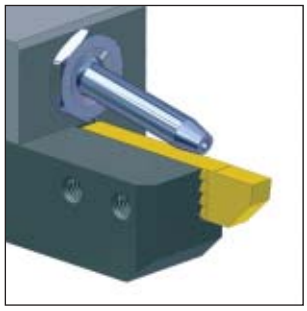
Each sprinkler module can be supplied separately, which is essential to guarantee high pressure at the location required and to reduce the formation of oil mist.



Standard high performance nozzle.



High pressure nozzle.



High pressure long nozzle.

APPLITEC offers a vast selection of MODU-Line insert holders. They are available for Applitec TOP-Line and ECO-Line inserts, as well as for the standard ISO inserts at 80°, 55° and 35°.

These different tool series provide a complete choice of several hundred different cutting shapes.

The new MODU-Line tool range fits perfectly with the APPLITEC product development concept. It completes what is already a very extensive, high-performance tool range designed in particular for equipping automatic lathes with tailstock.

The new MODU-Line range offers even greater potential.

This development can be followed at www.applitec-tools.com. The website enables visitors to download the latest updates of the documentation.

François Champion

APPLITEC
SWISS TOOLING

APPLITEC MOUTIER SA
ch. Nicolas-Junker 2
CH-2740 Moutier
Tél. +41 (0)32 494 60 20
Fax +41 (0)32 493 42 60
info@applitec-tools.com
www.applitec-tools.com

Productive and economic

Machining of the latest generation medical implants in only one process

Philippe Charles

The market for components and equipment dedicated to the various medical sectors has been growing consistently over several years and according to market analysts, this trend is likely to continue.

The annual sales generated by the medical device sector has exceeded 200 billion US $ for more than 2 years.

Various sources anticipate a global growth rate of 6-8 % per annum. Focussing on the various sectors that comprise the market as a whole, it can be seen that the anticipated growth rates may differ from one sector to another.

Orthopaedic products that comprise clearly defined sectors such as traumatology, spine (surgery on the spinal column) and instrumentation shows an average growth of 15 to 20 % over the past few years, according to sectors of activity.

The cardio-vascular field that requires the use of extremely small, high-precision parts, such as the components used in pacemakers and defibrillators shows a growth of between 10-20 % each year, depending on application and market.

Instrumentation and measuring devices (analysis instruments, pumps, metering devices, etc.) with their variety of work-pieces and precision turned parts made from different materials are also showing a marked upwards trend.

The dental sector, with its implants, devices and instruments required for surgical interventions has also witnessed a growth of between 10 and 15 %.

In general business terms, this can be summarised by stating that the activities in the medical and dental sectors have led to the highest and fastest rates of industrial growth in the world.

This trend is encouraged by various contributory factors, such as:

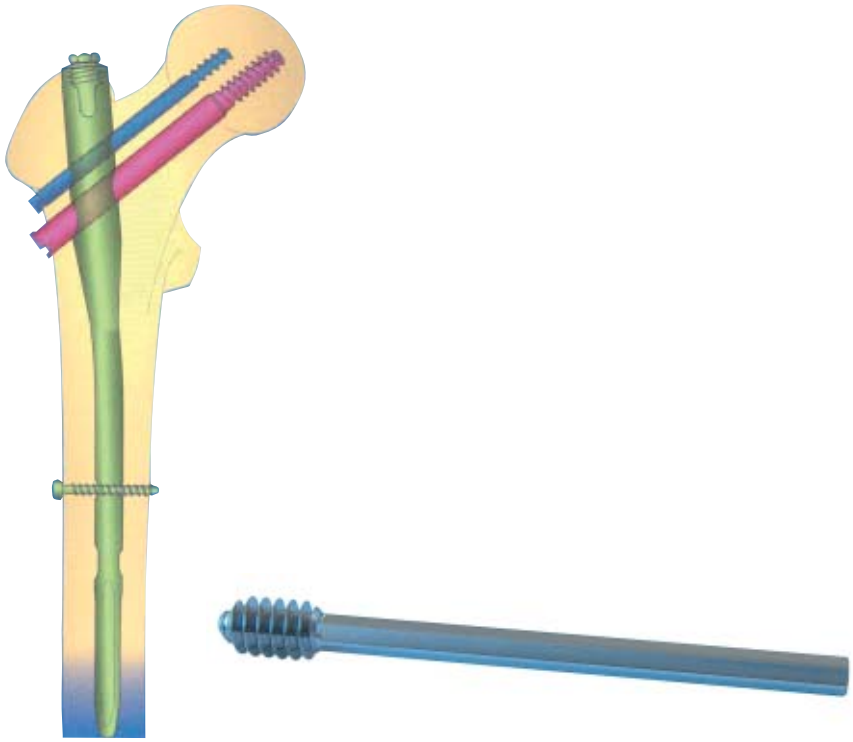
- An ageing population (greater life expectancy).
- A better quality of life.
- Aestheticism (dental in particular).
- Medical insurance (repayment of costs).
- Early detection of illnesses and faster treatment.
- Development of new products thanks to technological progress and modern technology.
- Emerging markets such as Asia and the Pacific region with considerable demand from the Chinese market in particular.
- Although the main world market leaders in the implant and instrumentation sectors all have large manufacturing facilities, the volume of parts being manufactured is constantly growing, especially in the production of parts for the spinal sector. The manufacturers (and designers) require an efficient network of sub-contractors capable of machining parts according to stringent quality requirements, in order to keep pace with the demands of the global market.
- In terms of this challenge, TORNOS is in a position to offer all manufacturers of medical components the optimum machining solutions to meet market requirements with regard to efficiency and productivity.

Over the past 20 years TORNOS has acquired the image of a market leader in terms of experience gained, machining solutions (turnkey) and product and equipment development. With respect to the peripherals adapted to the demands and requirements of the medical and dental sector, TORNOS is a clear market leader.

TORNOS is the first manufacturer to develop and adapt its loose tail stock lathes to produce the highly specific machining processes used

From amongst the many innovations produced by TORNOS, we would like to present one of out latest developments:

Machining hip screws on the DECO 20a without reworking



for certain medical and dental implants. This includes external and internal thread whirling in operating and back-operating modes adapted with a high-pressure spray deep drilling system as well as many other special machining operations.

These achievements and developments have enabled us to acquire unrivalled know-how, which was even acknowledged by our competitors in this sector. If a client needs any help in this area, he need only contact our specialists who will only be too pleased to provide advice regarding the best solutions with respect to:

- The choice of the best machining solution.
- Equipment and accessories/ peripherals adapted to requirements.
- An appraisal of productivity and the optimisation of the machining process.
- Technical support before, during and after product delivery.
- Development of specific tooling (thread whirling cutters, special tool holders, software macros to simplify the programming of complex shapes, etc).

Every year in Europe, roughly 700,000 people suffer a hip fracture, which is frequently linked to osteoporosis. The medical facilities currently available mean that rapid surgical intervention can be conducted to reduce the fracture by applying plates and retaining screws, thereby allowing patients to quickly regain their mobility and pursue their activities.

The hip screws used for surgery are highly complex parts that require numerous machining operations involving swarf evacuation. The highly resistant materials used in these implants including stainless steels (316 L VM) and titanium often entail several rough-working, finishing and deburring operations.

Without doubt, the best solution in terms of productivity and feasibility is to proceed with the complete machining of the parts in a single chucking operation using one machining unit. Thanks to the [a-line] products (the DECO 20a in this case) it is now possible to machine specific parts within minutes (between 6 and 9 minutes).

The DECO production tool is fully adapted to this family of parts. It drastically simplifies allocation of the various machining operations from the bar (main spindle) and for back operations (counter-spindle).

Productive and economic

Machining of the latest generation medical implants in only one process

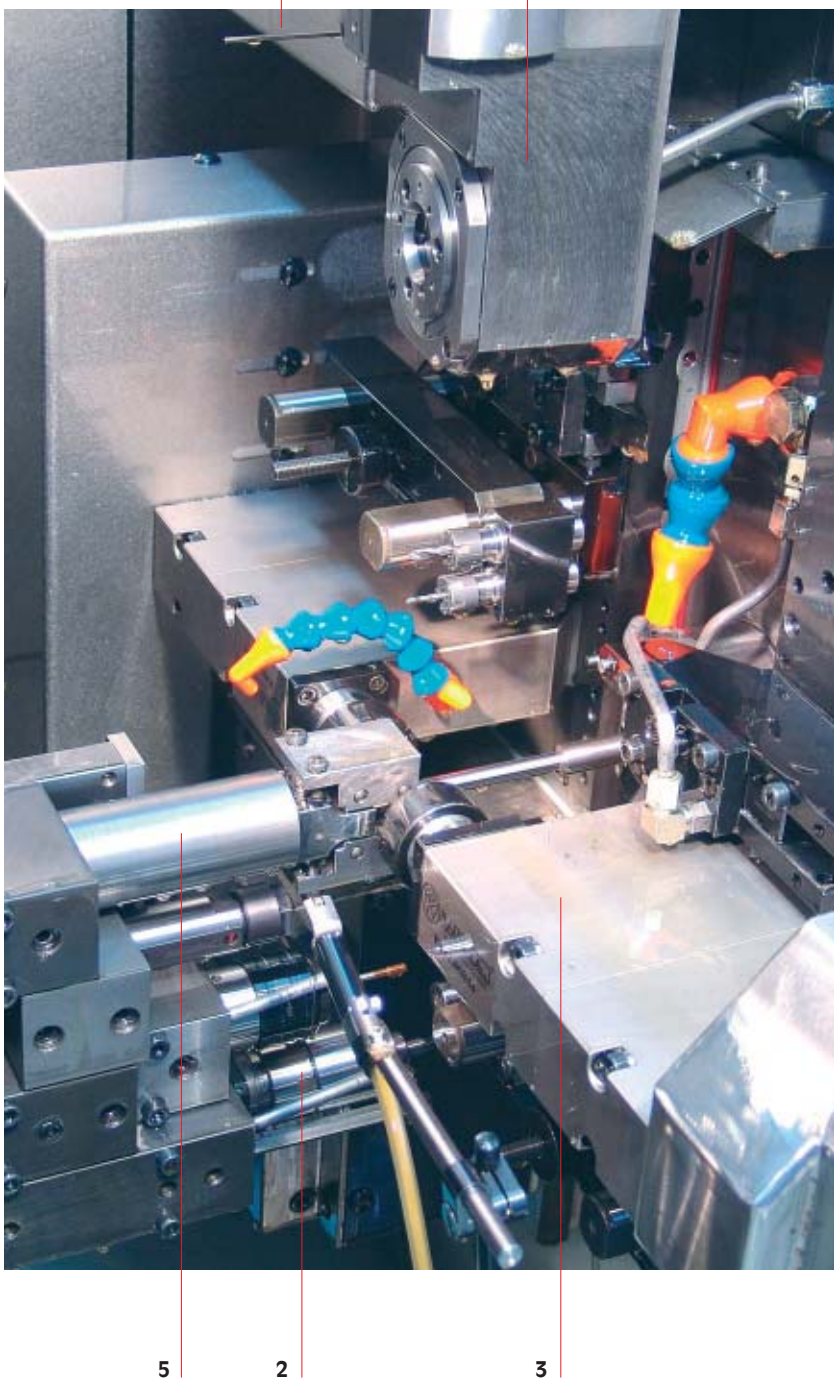
The kinematics of the DECO (12 numerically controlled axes all with simultaneous interpolation) allow up to 4 tools to be used simultaneously to execute back-operations 100 % in hidden time.

The lathe tool system and various devices developed to date (especially rotating tools) offer numerous facilities for different types of machining operations, using only one production tool.

Specific tooling / operations required to machine hip screws:

- Turning.
- Centering/drilling/reaming.
- High pressure drilling – 120 bar **(1)**.
- Tapping.
- Hexagon broaching/swaging **(2)**.
- External hexagon milling **(3)**.
- External thread whirling in back-operation mode **(4)**.
- Deburring operations.
- Part support **(5)**.
- More than 20 tools.

The DECO 20a loose tail stock lathe lends itself particularly well to hip screws credit to its dimensional geometry, chucking facility, re-chucking for back-operation and facility to change between main operations and back operations.

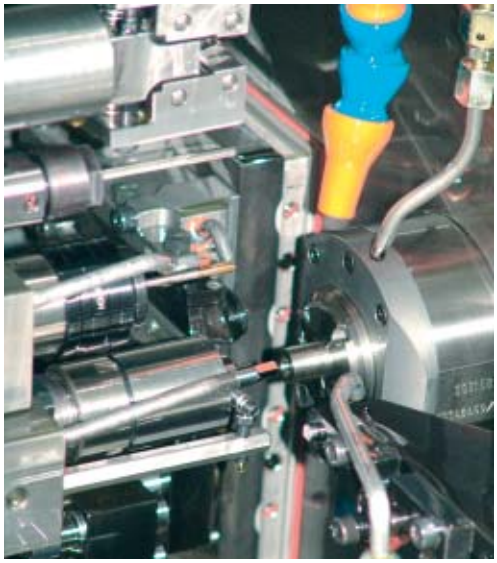


What are the main technical reasons behind further improvement to the overall machining process for these difficult materials?

- Pre-adjustable tool systems - available both for the fixed tools and rotating tools (with interchangeable mandrels), providing the operator with considerable versatility and flexibility during setting up work or when retooling. The setting up or retooling times are significantly reduced, which further reinforces the well-known productivity of the DECO lathes.
- The tool holders with the cutting liquid directed right towards the tip of the tool (turning, drilling, thread whirling, high pressure drilling) brings about improved swarf management and crushing.
- Simultaneous machining facility with respect to rough working and finishing (turning, milling, thread whirling) leads to good swarf management, increased tool life and improved surface qualities.
- Optimum choice of cutting tools based on the materials undergoing machining (grades of carbide, grinding, coatings).
- Optimised cutting rates bearing in mind the best compromise between cutting rate and tool life.
- Use of next generation vegetable cutting oils (Motorex/ Switzerland) that are free from heavy metals and chlorine. These oils also lead to an increase in tool life and are compatible when machining titanium or stainless steels.

Sources:
Julius Bär – Medical Device Link
International Osteoporosis Foundation
Ernst and Young – Knowledge Enterprises
TORNOS – Product Management

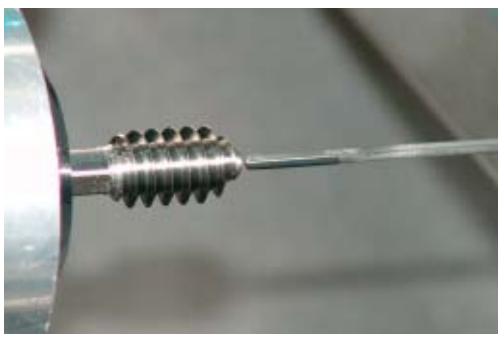
Main sequences for machining a hip screw on the DECO a lathe



Hexagon swaging.

External hexagon milling with 2 tools simultaneously and end piece support.

Back operation thread whirling (3 rough working passes and 1 finishing pass) in hidden time.



Back-operation high pressure drilling at 120 bar using the guide bush.

TB-DECO, developing for the marketplace!

The re-organisation of TORNOS into Business Units has had an impact on all aspects of the business including the software. This has enabled Mr Wyss, Head of TB-DECO and CNC, to offer specific products to the market that comply with the customers clearly identified requirements.

In DECO magazine no 33, Mr Wyss presented the TB-DECO 2005. It achieves a 10 % saving in programming time plus the TB-DECO ADV 2005 option, which offers numerous additional functions (see DECO Magazine no 33). Despite this new option, the pace of development at TORNOS now sees a new version already being proposed. To get some more information regarding this development, DECO Magazine interviewed Mr Wyss.

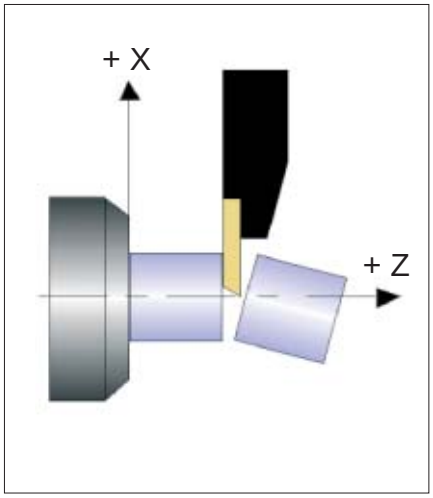
Hello Mr Wyss. After launching the TB-DECO 2005 software in May, 2005, you are now offering its replacement – the TB-DECO 2006. From a technical aspect, what more are TORNOS offering with this latest version?

This version is even more finely tuned to our clients and their requirements with regards to simplicity and programming speed. It also provides new functions, such as turning at a constant surface speed – G96 – as well as related programming operations.

The TB-DECO software already has a "constant cutting" G904 function. What is the difference between G96 and G904?

In both cases, the speed of the spindle driving the bar increases whilst the machined diameter is decreasing. However, constant cutting – G904 – is limited to a shift in X. We can therefore only use this function when executing a single cut to the part (without Z movement) or when facing it.

The G96 function provides the facility to execute any type of turning operation (with movements in X and Z) whilst guaranteeing a constant surface speed. The new G92 function also provides the facility of reducing the maximum spindle speed to a value below that defined for the machine.



G96 - turning at a constant surface speed

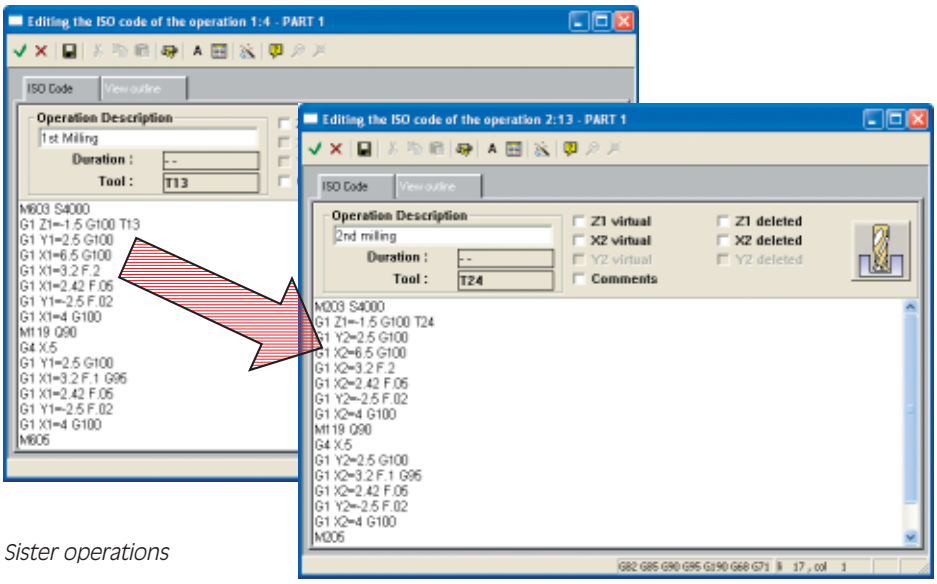
So therefore, the G96 function will replace G904?

In fact, the G904 function will be disappearing in one or two years' time.

TB-DECO, developing for the marketplace!

Thanks for this clarification. You referred to related operations – what is the purpose of these?

The related operation function means that the same operation can be inserted at several points in the program. When carrying out a modification to one of the related operations, all the others will be automatically updated.



Sister operations

What are the applications?

First of all, [2x4] configurations with the MULTIDECO 20/8. This configuration allows us to machine two parts in parallel. The related operations will enable us to program the part on the first 4 stations and then duplicate the operations on the last 4 stations, so that we can obtain the second part.

Another example is the use of related operations on the latest MULTIDECO 20/8d, which we will be exhibiting at EMO. This multi-spindle machine is fitted with complex dual back-operations. The fact of doubling the back-operations means that parts can be executed over the duration of two cycles. Again, we find ourselves faced with a duplication of operations.

So it's a function reserved for the multi-spindle machines?

No, there are other applications as well. On a DECO, the related operations will allow us to easily execute programs with several parts being machined using only one clamp.

In time, we shall exploit this function with the TB-DECO models, so that we can provide our clients with the program loop. We can then guarantee that the tool position at the start of the program (green flag) is always absolutely identical at the end of the program (red flag).

A year ago, TORNOS marketed the first option of the TB-DECO software – the TB-DECO ADV. What will become of this option?

The TB-DECO ADV has also been upgraded to its 2006 version. It will improve programming by way of graphic assistants. This is a highly appreciated addition. We now have 100 clients working with the TB-DECO ADV software, who are glad that they invested in the leading product for automatic lathes. (Note: more than 3,000 people are currently working with the TB-DECO software).

I fully understand the arguments concerning the range and development, but do you not think that the rate of change is somewhat difficult for a client to follow? We have the TB-DECO, TB-DECO ADV, 2005, 2006... how does one decide?

We are dealing with the logics of the software industry. We offer new versions as soon as possible so that our clients always have the option of working with the most advanced versions. Obviously, it is not always necessary to change to the next higher version – this always depends on the needs and preferences of our clients. This is why the TB-DECO and TB-DECO ADV are separate products – so that our clients can purchase the product they actually need.

But wouldn't a client who has just purchased the TB-DECO ADV 2005 be a little frustrated at not having the 2006 version?

We are quite conscious of this fact and all those clients having purchased the TB-DECO ADV 2005

version will be given the opportunity to change to the 2006 version free of charge. This does not mean that in future, all updates come free of charge. Just like word processing, you have the facility of purchasing updates.

In addition to the TB-DECO ADV software, you are offering a second TB-DECO option – namely CAM interface. What exactly is this?

Some of our clients have requirements, which the TB-DECO ADV cannot satisfy. An example of these requirements include the facility to program different models and types of machines with only one software package or the facility of importing a 3D CAD model, to program complex paths. By offering a CAM interface, we are allowing our clients to go that bit further in industrial logic that goes beyond the scope of a single manufacturer. It opens the way to additional TB-DECO products.

What CAM software are you working with?

We place no restriction on the number of partners we work with. In February 2005 we opened up the TB-DECO ADV to the PartMaker software for the USA, and from August 2005 we shall do the same with the AlphaCAM, Esprit, Gewatech, GibbsCAM and SylvieXpert software. To provide our clients with a better understanding of these CAM software packages, we asked our partners to present their software and DECO Magazine agreed to go along with us. In this issue, we shall start by presenting a Swiss product – the SylvieXpert software.

This is quite an arduous task, but we also found out that you were going to propose other PC software packages?

Yes. Before the end of this year, we shall introduce another interface: an OPC server dedicated to TORNOS machines. This OPC server is designed to provide a PC with a lot of information contained in the numeric controls of our DECO or MULTIDECO machines.

How will you collect this CNC information?

This information can be downloaded from the Ethernet. The advantage of the Ethernet as a machine interface is that it is not restricted by the volume of information, unlike the electric outputs.

What's the purpose of all this information?

This information can be used to monitor production and work out OEE (Overall Equipment Effectiveness). We are currently working with ICAM in Switzerland, amongst others, which are offering such a production monitoring software package.

I would like to thank you, Mr Wyss. Would you like to add any more to this new software presentation?

I would like to point out that all the DECO and MULTIDECO machines fitted with a memory board reader can also be equipped with an Ethernet connection.

Following this interview, Mr Wyss reminded our journalist that if anyone has any questions on the TB-DECO they should contact either the hotline numbers below or himself, and he would be pleased to discuss any queries. He also indicated that the specialists at TORNOS, both in the subsidiaries and agencies are also able to deal with this type of enquiry. He then indicated that documents will soon be available showing the differences between the various software and its versions. DECO Magazine will keep its readers fully posted.

For all contacts:

Hotline F	+41 (0)32 494 46 99
Hotline D	+41 (0)32 494 46 98
Hotline EN	+41 (0)32 494 46 99
Hotline e-mail	Software@tornos.ch
	Wyss.m@tornos.ch

Presentation of the

SYLVIEXPERT la FAO d'exception software

Version 2 of SylvieXpert, which will be available in September 2005 will allow users to control your TORNOS DECO machines (starting with the single-spindle machines) and provide the following benefits: simplicity of use, automatic retrieving of 3D geometries, rationalisation of the production of complex and similar parts, real 3D simulation and control of a company's entire machine fleet using the same software.

SylvieXpert, CAM software for the new generation of NC machine tools

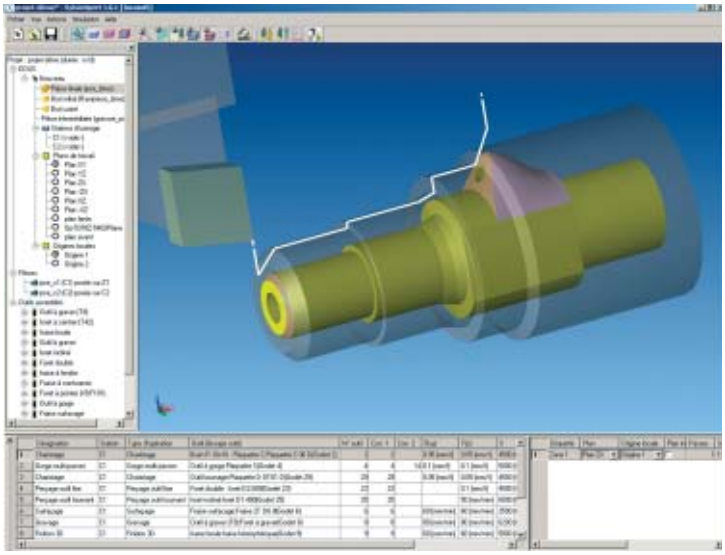
SylvieXpert software, published by Jurasoft SA and marketed in Switzerland by Jinfo SA, has been designed to control the new generation of NC machine tools, such as machining centres executing milling and turning and for the small parts turning machines. Jurasoft SA employs 10 staff and together with the support of Jinfo employees, the current product represents 20 man years of development.

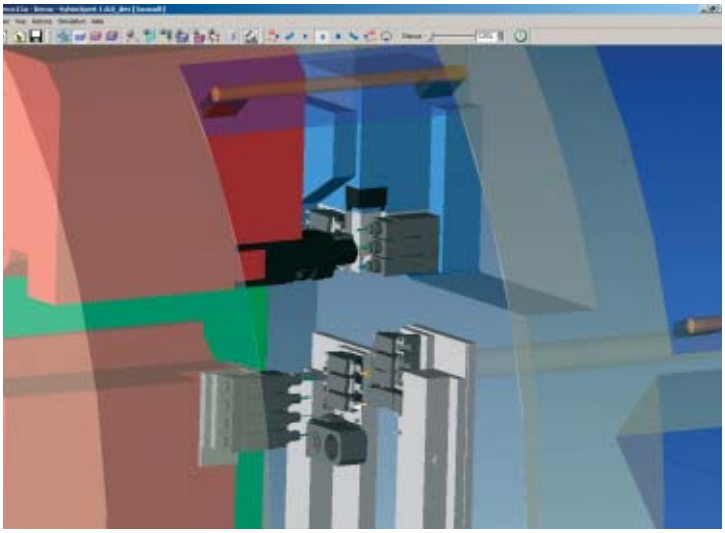
Entirely based on 3D models

In order to have optimum control of the machine tools indicated, the software has to take account of the complete kinematics of the machine, the tools, the materials and component being machined. The benefit of working in 3D, apart from managing the machine kinematics, is that the operator benefits from automatic machining data on the depth, clearances and management of the raw material. The description of the geometries being machined is drastically simplified, thereby resulting in considerable time-savings.

Geared to turning / milling and small parts turning with an unlimited number of axes

SylvieXpert was designed to control the latest machine tools, such as 5-axis machining centres, single





spindle lathes (with tailstocks or headstocks) executing milling and turning operations and multi-spindle lathes. The application was developed right from the start, taking into account those machines that have an unlimited number of channels and linear and rotary axes.

Automation of production of similar parts

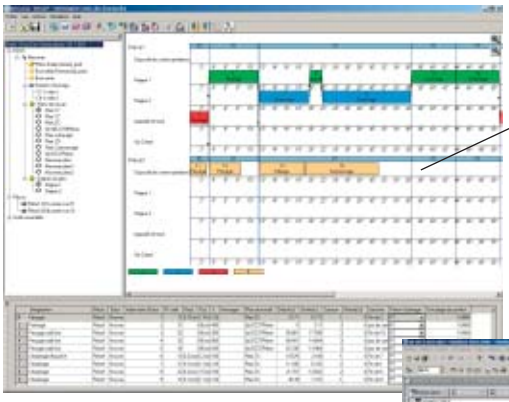
Each company often uses the same tools and same machining parameters. In order to automate the production of similar parts, SylvieXpert provides the user with a unique way of working and allows the user to capitalise on know-how, by creating their own tool libraries and operating sequences. A standard library of more than 500 tool elements is included.

How does SylvieXpert work with TB-DECO?

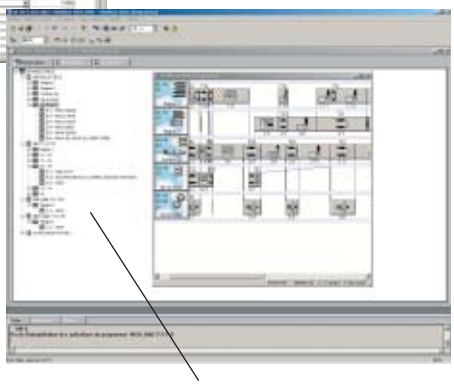
The machining sequence is defined in SylvieXpert together with the 3D geometry of the part undergoing machining, such as for a small parts turning machine operating to the ISO code. The tools are assigned to each tool group as if the user were standing in front of the machine. This means that he can finely tune the program with great precision. A "project" range makes it possible to define those operations being executed simultaneously on the main or counter spindle with the help of synchronisations. The system automatically proposes the "synchronisations" or the relevant "constraints".

Actual 3D simulation allows the user to see the machining operations according to the precise machine kinematics. Automatic collision detection indicates problems before setting up the machine.

When the project is ready, SylvieXpert generates the «TTFt» (TORNOS Text Format) text file, which is transferred to the TB-DECO. It then works out the PNC file that is intended for use on the DECO machine.



Glove diagram with snchronisation of operations in SylvieExpert



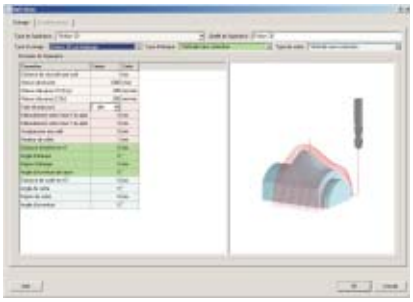
Find SylvieXpert draft machining in your TB-DECO programm

Database of cutting parameters

Version 2 of the software also includes the incorporation of a database, which automatically determines the cutting parameters. This development is being jointly financed by the Committee for Technology and Innovation through a partnership of engineering establishments in the Jura region of Switzerland. The system proposes values for cutting speeds, feeds and machining strategies (e.g. drilling with or without chip removal) in relation to the material being machined, the required surface state, tool, etc. What is more, the system is enhanced by values that are actually used, thereby making it possible to refine the cutting parameters in relation to experience for a given machine.

Simple to learn

The description of the machining operations on 3D models, with management and display of material discharge, is, in itself, a natural and simple way of working. What is more, every type of operation including machining and tool parameter is displayed in an identical dialogue box. This is accompanied by an image, thereby making learning very easy.



For further information, please contact:
www.sylviexpert.ch

Pub
Gloor

Programming a recess with interrupted cut

Following on from the article on parameterized programming, which featured in DECO Magazine no 33, we would now like to show you another example of PELD programming.

Machining a recess can sometimes lead to problems with the chips that wind around the part thereby jeopardising the surface quality. In some instances, they can cause tool breakage. The programming example below allows you, during honing, to include small back movements so as to break down the chips.

The versatility of parameterized programming allows the user to enter a specific number of parameters when generating the tables. This data is entered by way of the dialogue boxes.

Using these dialogue boxes, the user may enter the following data:

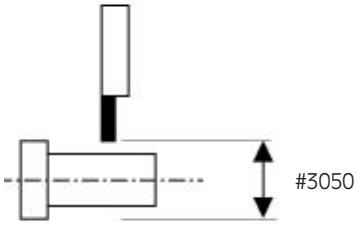
1. Starting diameter.
2. Feed diameter (base of recess).
3. Depth of hobbing between each back movement.
4. Rate of feed for the various hobbing passes.
5. Feed for the last pass (finish).

This programming example enables the following operations to be continued:

- Fast feed approach.
- Initial hobbing.
- 0.1 mm back movement.
- Continued hobbing up to a diameter greater than that of the base of the recess + 1 mm.
- Final hobbing with reduced feed.
- Back-movement to a diameter slightly in excess of the bar diameter.

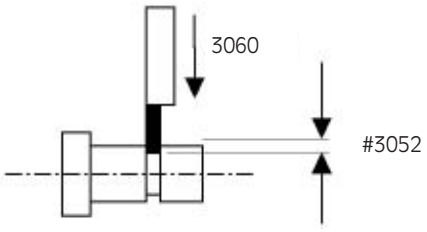
Explanation of the continuation of operations and of the contents of each variable.

1) #3050 → Starting diameter (mm).

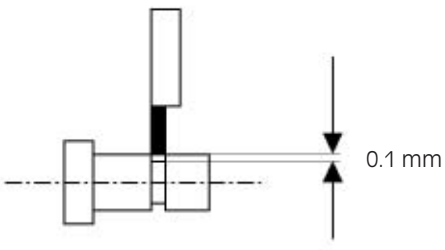


#3052 → Hobbing value between each back movement (mm).

#3060 → Feed value during hobbing (mm/t).

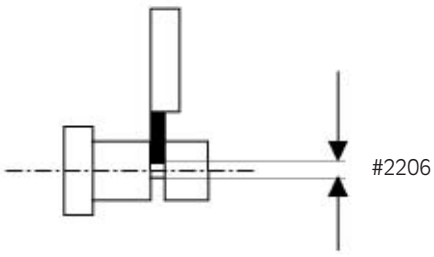


3) 0.1 mm back-movement to crush the chips.

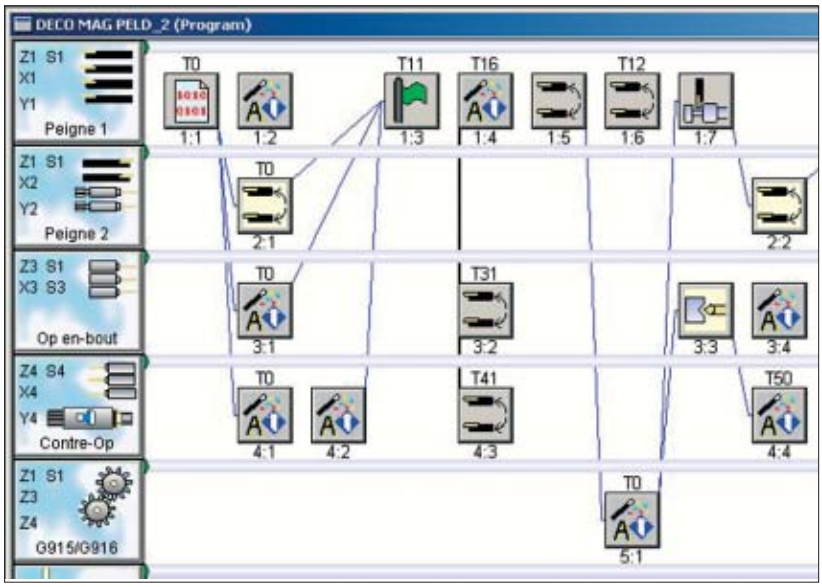


Programming a recess with interrupted cut

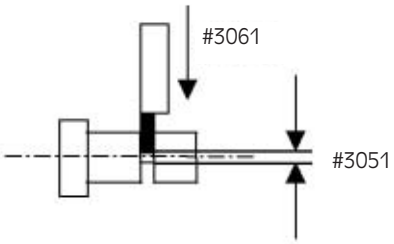
4) #2206 → Diameter at the base of the recess + 1 mm (blank).



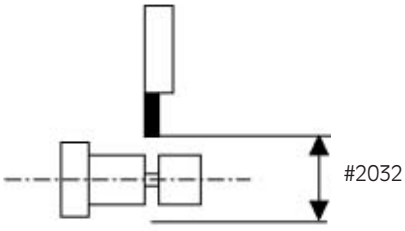
Programm:



5) #3051 → Diameter at the base of the recess (finish).
#3061 → Feed value for finishing (mm/t).



6) #2032 → Back movement to the bar diameter + safety distance.



Operation 1:1

```
[
#3050:=DLG_INPUTF("EXTERNAL DIAMETER OF THE RECESS", "Enter initial diameter", #3050);
#3051:=DLG_INPUTF("DIAMETER AT BASE OF RECESS", "Enter feed diameter", #3051);
#3052:=DLG_INPUTF("DEPTH OF PASSAGE", "Enter the depth of the passage", #3052);
#3060:=DLG_INPUTF("HOBBING FEED", "Enter feed rate", #3060);
#3061:=DLG_INPUTF("FINISH FEED", "Enter finish feed rate", #3061);
]
```

Operation 1:7

```
G1 X1=#3050 G100          (Initial diameter
[
#2205:=#3050;             // At the first turn, variable #2205 contains the initial diameter
#2206:=#3051+1;           // Variable #2206 contains the bottom recess value + 1mm
WHILE(#2205>#2206)DO      // You remain in the loop as long as the contents of variable #2205 remain
                          above the diameter at the bottom of the recess
]
G1 X1=#2205 F#3060        (Hobbing with a feed defined in variable #3060
G1 X1=0.1 G100 G91        (Incremental 0.1mm back-movement to crush the chip
G90
[
#2205:=#2205-#3052;       // The contents of variable #2205 must be equal to the value in
                          // variable #2205 for the previous turn less the passing depth (#3052)
ENDWHILE;
]
G1 X1=#3051 F#3061        (Hobbing at the bottom recess diameter (#3051) at a feed rate defined
                          in (variable #3061
G1 X1=#2032 F.5           (Back-movement to the external bar diameter + safety distance
```

Reminder:

This program is partly in PELD programming language but also includes standard ISO language.

The PELD language must always be preceded by the symbol: open inverted quotes "[",

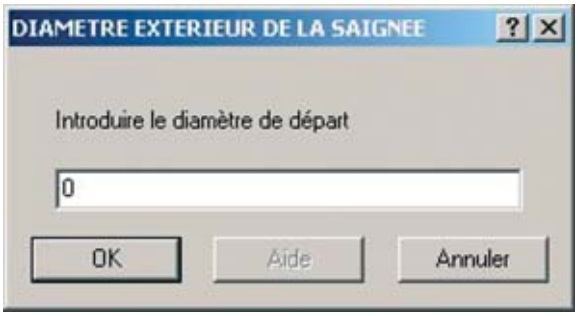
and be completed by the symbol: close inverted quotes "]"

The comments to be added to the line already in PELD language must be preceded by the following symbols: //

Any comments added to the line in ISO language must be preceded by the following symbol: (

Programming a recess with interrupted cut

The following dialogue box appears when tables are generated:



The initial diameter is entered in this dialogue box.

Once the "OK" button is clicked, the following dialogue boxes appear and the other parameters can be entered in the same way.

Remarks:

When generating the tables for the second time with the button:

"Regenerate all (F8)" 

The dialogue boxes reappear. It is sufficient to click on "OK" if no change is required.

If you do not want the dialogue boxes to appear after the second generation of tables, use the button:

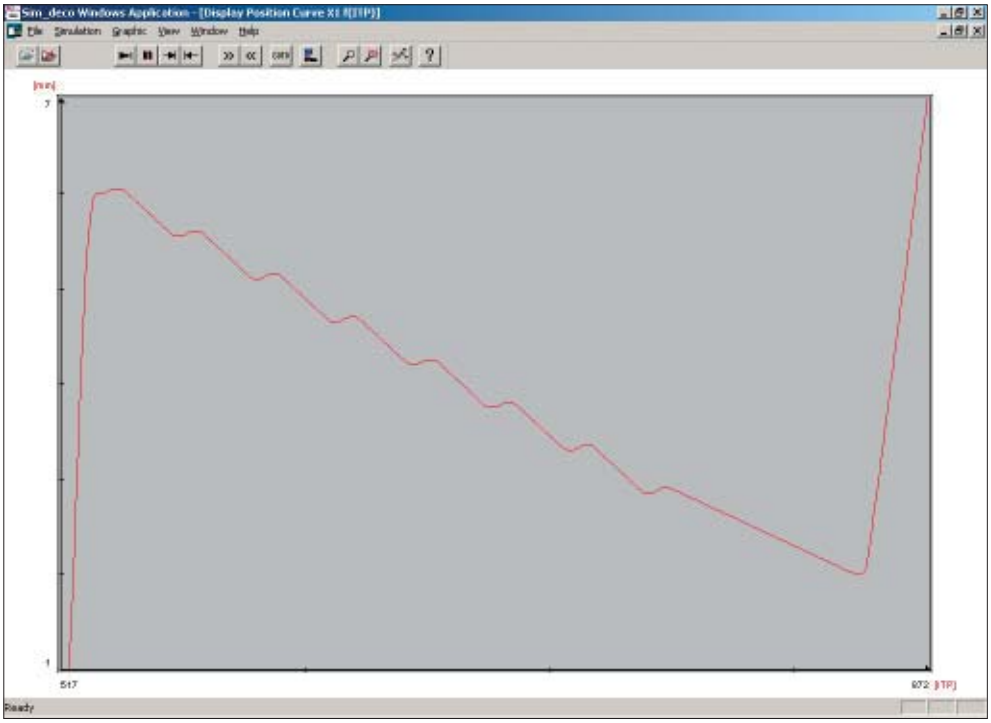
"Generate (F7)" 

In such cases, despite everything, you will have to "Regenerate all" before transferring the program to the machine.

If a 2nd identical recess has to be executed, you can copy the contents of operation 1:7 and paste them to the new operation.

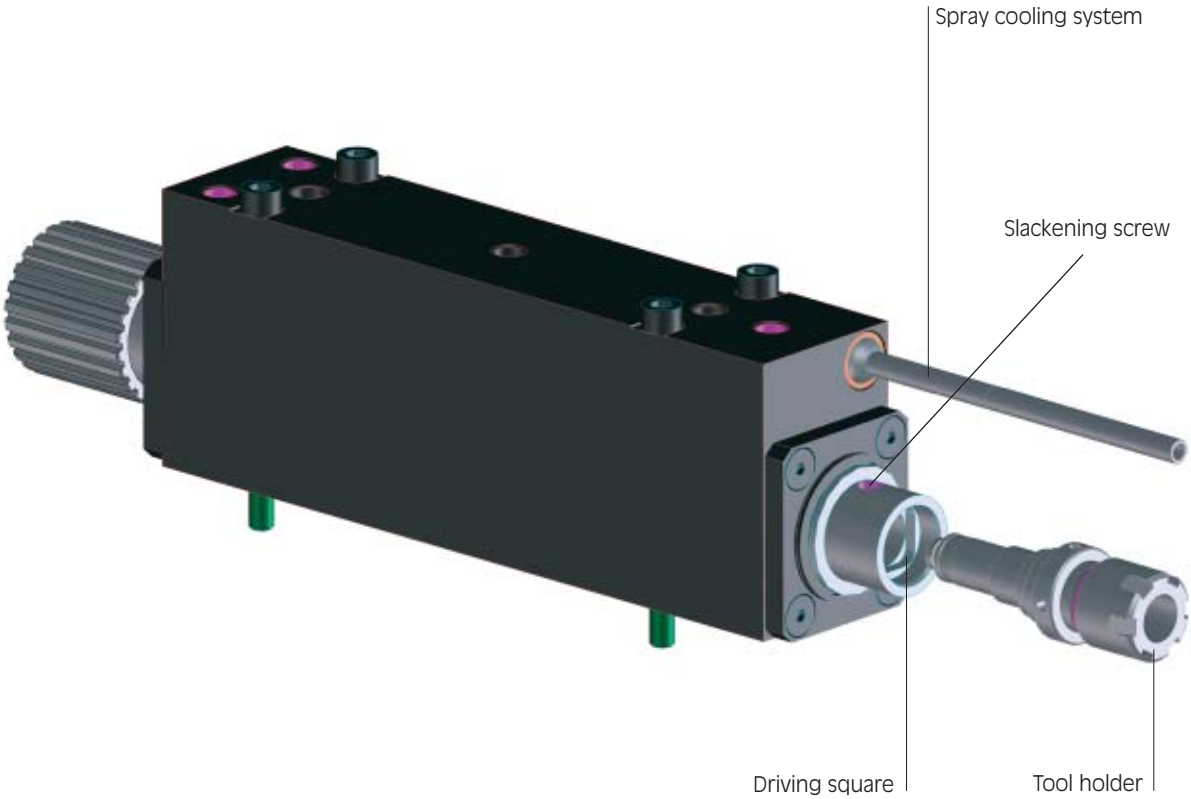
If a 2nd different recess has to be executed, operation 1:1 must comprise 5 lines to define the variables #3000 used for machining the 1st recess and 5 other lines to define the other variables #3000, which will be used for machining the 2nd recess.

Display in “Graphic” mode in the simulation:



Quick change spindles

This device does not yet have an option number.



Application

Tool changes can take up a considerable amount of time, which may become restrictive when performing frequent changes. In order to provide greater flexibility during these operations, TORNOS has now developed spindles fitted with a special system that allows rapid changes of the tool holder. The tool holder can be removed simply and efficiently by using a screw located in the spindle.

Advantages

Tool changing times are reduced and ease of use is vastly improved.

Tool holders can be directed at an angle by the square used both for positioning and above all for the drive.

A presetting device makes it is possible to change the tool with few turns of the spanner.

Technical properties

Tool holders are designed to be fitted with the commercially available ESX, EX and ER collets.

Available for ESX 16 and ESX 20 in different lengths.

Replaces option 1600.

Compatibility

DECO 20a and 26a.

Availability

Available immediately ex-works.

Cutting

watch and clock pinions

How to combine a hundred years of knowledge with high-end solutions!

High precision gear hobbing device

Option

This device does not yet have an option number as it is still undergoing development and testing.

Application

In the Watch industry, cutting very small parts often entails reworking, which has a detrimental effect on cycle times. The new gear hobbing device allows such parts to be completed in one single operation.

Advantages

- Dispenses with reworking operations.
- Avoids any loss of concentricity as a result of reworking.
- Savings in time.
- Can be perfectly incorporated into the machine and programming system.
- Improves product quality.

Technical characteristics

The following are required to automate precision cutting:

- Driller-miller with tight geometric tolerances.
- Fixed guide-bush with modified clamp.
- Conical drive torque of honed S2.
- Module miller.

Special features

Geometric rotation precision between tool and part (~< 0.002).

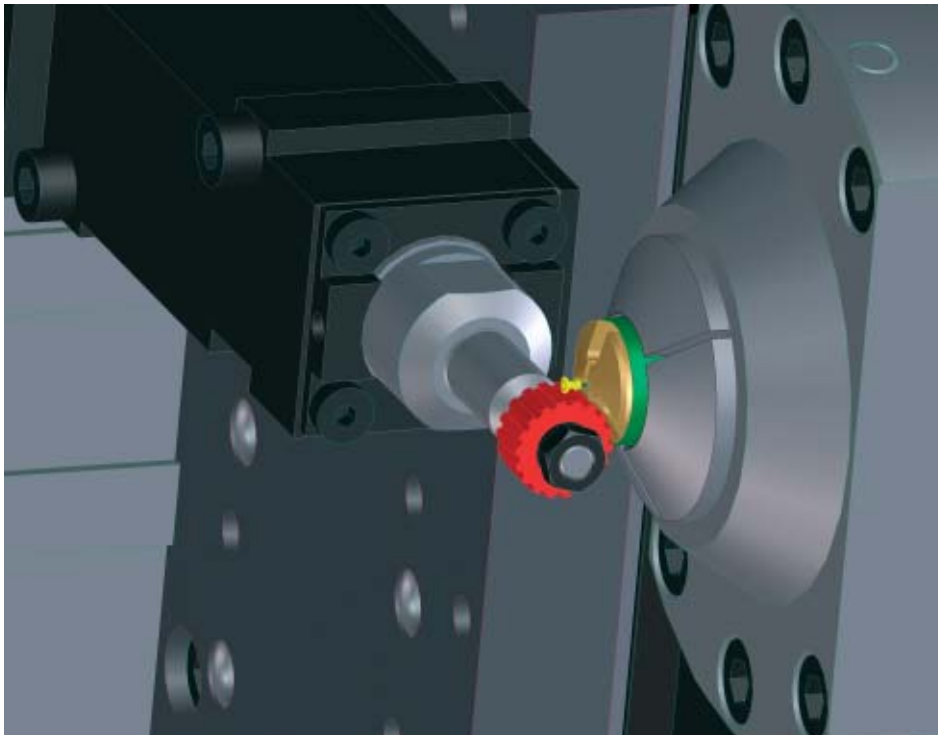
Synchronisation precision between S1 and S2 (S2 = ZxS1) ~< 1 rpm.

Compatibility

DECO 10a only.

Availability

This unit is available ex-works as a specific development model. The solution TORNOS proposes is built according to the part being executed and includes the cutting of test parts according to customer requirements. It should be pointed out that in certain cases the Business Unit may supply sample parts on request.



Drilling oil versus ORTHO NF-X: Deep drilling in materials that are hard to machine

Deep holes of "x-times D" with single-lip drills can nowadays be achieved with high precision by ingenious, deep-drilling machines and drills on machining centres. The machining fluid used plays a central role in this, because, apart from deep drilling, it has to take on process-safeguarding functions during further machining stages.

To enable deep drilling to be performed on a machining centre, such as a TORNOS DECO 20a, a deep drilling device and a powerful high-pressure cooling device are required. When deep drilling high-alloy and stainless steels, as used in medical engineering, the machining fluid continuously flushes chips from the hole at extremely high pressure.

Implant made from INOX 1.4441

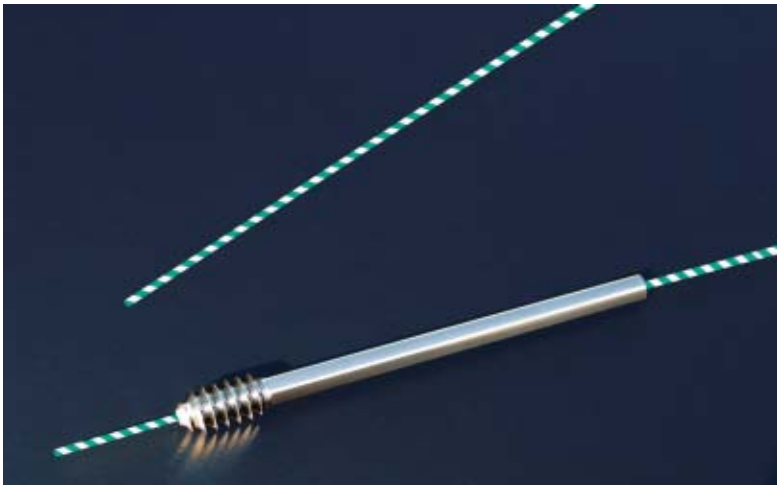
The machining processes on the implant shown include turning, thread whirling, deep drilling, external hexagon milling, parting and finishing. If all the operations are carried out on the same machining centre, then the cutting oil has to perform at maximum capability. No conventional deep drilling oil is up to the job. Manufacturing the workpiece demands that the cutting oil should have the following qualities:

- Outstanding high-pressure characteristics (Extreme Pressure), because the machine pumps the oil at pressures of up to 350 bar.
- High air release capacity in all temperature ranges.
- Extreme cooling performance, particularly during deep drilling.
- Optimum cutting edge protection during whirling and drilling.
- Above-average wetting and lubricating action.
- No odour or oil mist emissions.

For the test, the specialists chose MOTOREX ORTHO NF-X, which overall should be as good as a conventional deep drilling oil, particularly during the "deep drilling" operation.

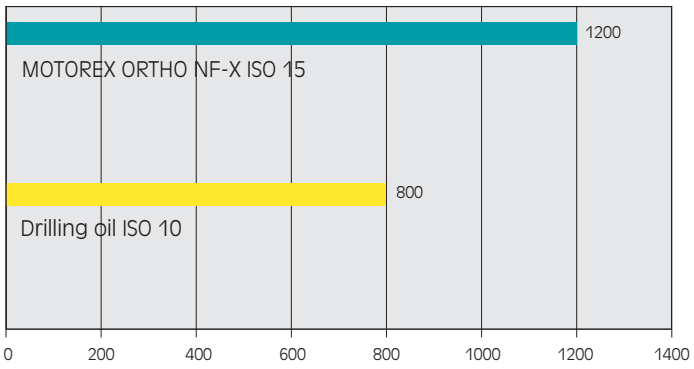
Revealing reference series

Complete machining of the workpiece from tough implant steel at Stuckenbrock Medizintechnik GmbH in Tuttlingen/Germany, visibly made demands on all production factors. The reference series was produced on identical TORNOS machining centres, using the same tools. Special attention was paid to the deep drilling results, using a conventional deep-drilling oil and MOTOREX ORTHO NF-X. The extreme demands made on the high pressure stability and cooling performance of the cutting oil during



This high-precision implant is produced by several operations at Stuckenbrock Medizintechnik GmbH in Tuttlingen/Germany, from 1.4441 implant steel, using a deep drill.

Service life of drill when deep drilling



Drilling distance in cm per drill
(hole diameter 1.15 mm/hole depth 60 mm)

deep drilling (hole diameter of 1.15 mm and drilling depth of 60 mm) revealed distinct differences even after a short time.

One big advantage of ORTHO NF-X, with a viscosity of ISO 15, is also its ability to bridge the "gulf" between a viscous oil, e.g. 32 cSt, for thread whirling and a thin oil for deep drilling, without any loss of performance. Whilst the surface qualities were almost identical for the operations up to that point, drastically improved operating life (see graph of drill operating life) was measured for deep drilling with ORTHO NF-X at an optimised Ra value.

Carbide drills, such as the BOTEK single-lip drill, now have to withstand increasingly high feed rates and loads. High tech is the only answer to this.

Overall performance was also massively increased by an impressive 47.6 %. The reason for this is a complex package of additives, which all MOTOREX ORTHO cutting oils with ᵛmax technology contain. MOTOREX ᵛmax technology produces beneficial chemical synergies at the crucial moment, when machining in specific temperature ranges, thus resulting in maximum production rates.

Deep drilling with a positive side effect

For deep drilling on a machining centre, a so-called pilot or starting drill is fitted for the start drilling operation. During the drilling operation with the solid carbide, single-lip drill, the tool is supported by the guide bars on the hole wall. This produces a smoothing effect and the high surface quality (Ra value) characteristic of the deep drilling method, as well as the maximum tolerance and geometrical accuracy of the hole. This can otherwise only be achieved by an additional operation, such as reaming.

Modern deep drilling tools are high-precision, high-tech products, which represent an important factor in calculating manufacturing costs. An ideal interaction of tool, machining process and machining fluid can be clearly calculated from the extended tool life.

Do you have any questions about deep drilling? MOTOREX is available with moral and practical support for your lubrication problems. Further information can be obtained from:

MOTOREX AG
Customer service
Postfach
CH-4901 Langenthal
Tel. +41 (0)62 919 74 74
www.motorex.com

TORNOS SA
Customer service
Case postale
CH-2740 Moutier
Tél. +41 (0)32 494 44 44
www.tornos.ch

The American Market for Medical Devices – Getting FDA Approval

The American market for medical technology is of strategic importance to companies that supply products to the medical sector because it is the largest and most sophisticated in the world with $ 71.3 billion sales in 2002. Yet despite its size, this market remains limited to those foreign device manufacturers who have complied with the same FDA (Food and Drug Administration) requirements as U.S. manufacturers. These requirements differ from the CE requirements which are applicable in the European Union. It is important to note that CE marks are not recognized in the US.

The FDA is one of the oldest consumer protection agencies. The agency was first established as the Bureau of Chemistry in 1862 and in 1930 the name was changed to the current Food and Drug Administration. The FDA's mission is to protect the public from unsafe and ineffective products. No medical device can be marketed until it is approved by the FDA. In order to obtain approval, the manufacturer must submit documentation that proves the device is safe and effective. In some cases, this can require extensive animal and human testing that can last for years and cost millions of dollars.

Medical devices are assigned to one of the following three classes based on the potential risk to patients:

- Class I: This class includes devices like stethoscopes, blood pressure monitors, or surgical scalpels that pose a very limited risk to the patient. Products belonging to class I must be registered with the FDA by their maker at least 90 days before marketing. The manufacturer has to conform to good manufacturing practices (GMP). Such GMPs are controls that prohibit misuse and alterations.
- Class II: Devices falling under this class include endoscopes, surgical lasers, or X-ray machines that entail a moderate risk. Products belonging to this group require performance standards, post-market surveillance, and patient registries.

- Class III: This category includes products that entail a significant risk such as hip or knee replacements, implantable defibrillators, pace makers, or stents. In order to gain approval, the manufacturer must submit to the FDA clinical studies demonstrating the device's safety, reliability, and effectiveness.

Unless a device is exempt from such requirements, the process of U.S. market approval for medical devices follows one of two distinct procedures: (1) The FDA pre-market notification process known as 510 (k) requires a demonstration of substantial equivalence to approved products already on the market. This "smooth" process is available for Class I (if required), Class II, and a limited number of Class III devices. Or, (2) The FDA premarket application (PMA) process which is applicable in many cases to those wishing to market Class III devices. This submission typically contains a significant amount of animal testing, human clinical trials, manufacturing and other data, all of which the FDA carefully scrutinizes. Also, after a PMA is submitted, the FDA usually assembles a panel of physicians and other experts that may hold a public meeting. The panel will evaluate the device and then state a recommendation whether the device should be approved, approved with conditions, or not approved.

The following table summarizes the major distinctions between 510(k) and PMA:

	510 (k)	PMA
Devices Subject to Requirements	Few Class I, most Class II, and some Class III pre-amendment devices.	All Class III post-amendment devices and some Class III pre-amendment devices.
Clinical Data Requirements	Most are not supported by clinical data.	Clinical studies usually required to support submission.
Evidence of Safety and Efficacy Required	Information and data to support "substantial equivalence" to a predicate device.	Clinical data and/or scientific evidence supporting "safety and efficacy" claims.
Marketing Barriers	Low barrier to competitors.	High barrier to competitors.
Average FDA Review Time	Approx. 75 days [traditional 510 (k)].	411 Days.
Regulations on Device Changes	Must file new 510 (k) if change could "significantly affect" the safety or efficacy of the device.	Must file a new PMA or other filing depending on the nature of the change.
Advisory Panel Review	No APR for almost all 510 (k) devices.	APR for some, but not all PMAs.

Source: Darren W. Alch, Jenkins & Gilchrist, Houston TX, FDA Related Issues, published in: The US Market for Medical Devices – Opportunities and Challenges for Swiss Companies, Chicago 2004

For additional details, please refer to the excellent web site of the FDA (www.fda.gov), Chapter 13 of the Swiss Business Hub USA's publication "The U.S. Market for Medical Devices – Opportunities and Challenges for Swiss Companies", Chicago 2004, and to Standard & Poor's Industry Surveys "Healthcare, Products and Supplies".

Martin von Walterskirchen

Martin von Walterskirchen, Director of Swiss Business Hub USA, previously councilor of the Swiss embassy in Moscow, Swiss chief negotiator for services (GATS) during the Uruguay Round of the GATT, general secretary of the Swiss federal office for foreign economic affaires, personal advisor to the Swiss minister of justice and police and to the Swiss President. The Swiss government conferred him on September 21, 2001 the title of Minister. MA economics (honors) of the University of St. Gallen, Switzerland.
Contact: martin@swissbusinesshub.org

Rx for healthy manufacturers

A $ 20 billion fix

By Jim Lorincz[1]

There is a definite attraction to being a manufacturer in the medical device manufacturing industry today. However you slice the numbers, globally or domestically, the orthopedic (a.k.a orthopaedic) segment of the industry is somewhere in the neighborhood of $ 20 billion annually worldwide with almost two-thirds of the market, or $ 12.5 billion, in the U.S. Rates of growth are going through the roof with year-on-year growth of anywhere from 18 to 22 % in the last three years.

And that's just considering invasive or minimally-invasive products and the instruments necessary to perform the procedures, or as Mark Saalmuller, Sales and Marketing Manager for TORNOS Technologies USA, describes their purpose: ossia fracta reficere, trans: "to fix broken bones."

While the aging population is one obvious source of this growth, i.e. for hip, knee, shoulder, dental, etc. replacement surgery and implants, just being alive and active creates its own demand. According to M. Saalmuller, worldwide there is one bone fracture every 14 seconds, one spine fixation every 60 seconds, and, in the U.S., 700,000 injuries from exercise, biking, bowling, racquet sports, hiking, and the like each year.

M. Saalmuller, who was presenting a the PMPA's National Technical Conference at the biennial PMTS 2005 exposition in Columbus, OH (USA), in early May, enumerated the trends that will continue to fuel the rapid growth of medical device industry:

- An aging population – more baby boomers.
- More active and longer-lived population.
- Increasingly obese population.

- Increased marketing directly to consumers by orthopedic companies, surgeons, and hospitals.
- Growth from market penetration in less-developed nations.
- Expanded application of orthopedic procedures to younger age groups as technologies allow.

One of the possible reasons that medical manufacturing is attractive to U.S. manufacturers is the heavily regulated nature of the industry. Many manufacturers regard the stringent FDA requirements as somehow insulating them from offshore manufacturers.

M. Saalmuller says that getting into medical device manufacturing is probably not as difficult as one might think for a well-run shop that either has or will make the necessary investment in the advanced technology and processes that are required. Shops that are poorly run, violating most good machining procedures and "house keeping" rules of cleanliness and safety, will have a much harder, if not impossible, time of it.

"Anyone considering entering the medical device manufacturing market will have to meet the certification requirements, which include having their ISO certifications (9001/14001) in place and documented GMP (Good Manufacturing Practices) compliance," says M. Saalmuller. It's hard to imagine companies without ISO certifications at this point, but once ISO certifications are received, it could take from three weeks to two months to get the necessary approvals. Having an in-house QA/QC department that is able to furnish necessary information doesn't hurt, either, says M. Saalmuller who outlines exactly what the GMP regs entail:

"GMP regulations promulgated by the U.S. Food and Drug Administration have the force of law. They require that manufacturers, processors and packagers of drugs and medical devices take proactive steps to ensure that their products are safe, pure and effective. And they require a quality approach to manufacturing, enabling companies to minimize or eliminate instances of contamination, mixups and errors."

M. Saalmuller suggests visiting The GMP Institute (www.gmp1st.com) as a good starting point to learn what's involved in compliance with the regulations. The regulations spell out management responsibility, design controls, document controls, identification and traceability requirements, production and process controls, and changes in process (that must be approved prior to production), as well as remedies for errors.

For any manufacturer considering entering the medical device manufacturing industry or for veteran members of the medical manufacturing supply chain, a good starting point is making the pilgrimage to Warsaw, Indiana. It's where the orthopedic device industry was born in 1895 when Revra DePuy began manufacturing and selling a flexible fiber splint that replaced barrel staves, which from time immemorial had been used to set broken bones.

Rx for healthy manufacturers

A $ 20 billion fix

In the early 20th century, DePuy was the breeding ground for the industry as former salesmen and managers, like J.O. Zimmer and Don Richards, struck out on their own to establish medical device manufacturing companies. By 1950, DePuy, with annual sales of $ 3.2 million, was the largest medical device manufacturer. Today, DePuy is a member of a broadly-based health care company, Johnson & Johnson, which had first quarter 2005 sales of $ 12.8 billion of which $ 4.8 billion was accounted for by its Medical Devices & Diagnostics business.

Warsaw is still the capital of the global orthopedic manufacturing industry. In addition to various DePuy companies, Zimmer, Medtronic Sofamor, Biomet and a host of others still manufacture medical devices and related products there.

If pilgrimage for purely business reasons isn't in your future, you might want to take in one of the successful trio of Medical Design and Manufacturing (MD&M) expositions that are held each year in California (January), New York City (June), or Minneapolis (October). It is said that you'll learn a lot about the industry just by visiting with exhibitors who might be your customers, suppliers or even future competitors.

Other sources of information can be found through the Internet and print media. A number of publications are focused on medical design and manufacturing. For ISO information, visit www.iso.org.

Mark Saalmuller concluded his presentation at the PMPA conference by encouraging shops to explore attracting more medical business. "It's an industry that will continue to grow for all the reasons we discussed earlier. We at TORNOS have gained a lot of knowledge in this area over the last 20 years. We're here to share it with you to help ensure your success."

Mark Saalmüller – Sales and Marketing Manager
TORNOS Technologies USA

[1] Jim Lorincz is Editor-in-Chief, Tooling & Production Magazine, USA

PUB
Bimu

PUB
Applitec