DECO MAGAZINE

25
2/03
JUNE
ENGLISH

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

Perspective of the turning industry in Singapore

Perçage en bout Z1- Z3

DECO Produktivität in ungewöhnlicher Form

Show room permanente

Bearbetnings-kompetens för gjutgods




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

IMPRESSUM
DECO-MAGAZINE 25 2/03
Circulation: 12000 copies

Industrial magazine dedicated to turned parts:

TORNOS SA
Rue Industrielle 111
CH-2740 Moutier, Switzerland
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

DECO-MAG is available in two versions:
- English / French / German / Italian
- English / French / German / Swedish

E

F

D

I

Ireland, another DECO country!

Peter Dwyer of Premier Machine Tools Ltd has been selling TORNOS Machines in Ireland for the past 6 years. With over 40 machines now installed in Ireland, we have been very successful selling to a very varied market throughout Ireland. Our customers range from small subcontract shops to large multinational companies. The products manufactured by our customers are also very varied with components for the Medical, Aerospace, Automotive, Gas, Oil and Connector Industries.

Tom Benson of Benson Engineering with Peter Dwyer of Premier Machine tools Ltd.

Benson Engineering buys the latest specification product of the Enquip 2002 show award winning DECO 20a.

Some of TORNOS customers in Ireland

Our success is based on the high level of service and support we offer all our customers and the back up support we receive from T.T.U.K. The reliability, accuracy and speed of the DECO and SAS 16.6 machines have been well proven in the Irish market. Some of our customers currently have machines making batches of products from 500 up to 5,000,000. The ease of the DECO to manufacture simple and complex parts makes it the best choice machine. Our subcontract customers vary from old technology cam users to subcontract machine shops and all agree the ability of the DECO to manufacture parts complete in extremely fast cycle times and to very tight tolerances is a great advantage. The ability of the Irish Turned Parts to be shipped worldwide has improved and Ireland now supplies not only the home market but worldwide. The Irish Turned Parts Association has also adopted the DECO in their training school as has the Tralee Institute of Technology as operator and production management training is seen as necessary for world class production.

The next issue of DECO magazine will include the first part of a new batch of articles about Ireland. Don't miss it!

PREMIER MACHINE TOOLS

Tel.: 00 353 (0)45 522744
Fax: 00 353 (0)45 522977
E-mail: premiermachine@eircomn.net
www.pmt365.com

End drilling Z1 - Z3

Special features:

Drilling with single-spindle machines can be executed in two ways using the end-unit (tool T3x).

1. **Drilling movement executed with axis Z1**
2. **Drilling movement executed with axis Z3**

We shall provide more details on the first way, which frequently causes programming problems especially in absolute mode (G90). The tip we are examining will allow you to program all types of drilling from the origin of the part. The second way is easier to achieve because the drilling positioning and movement are executed from axis Z3.

Programming:

Drilling with an end-unit tool and axis Z1 requires programming to be carried out in 3 stages:

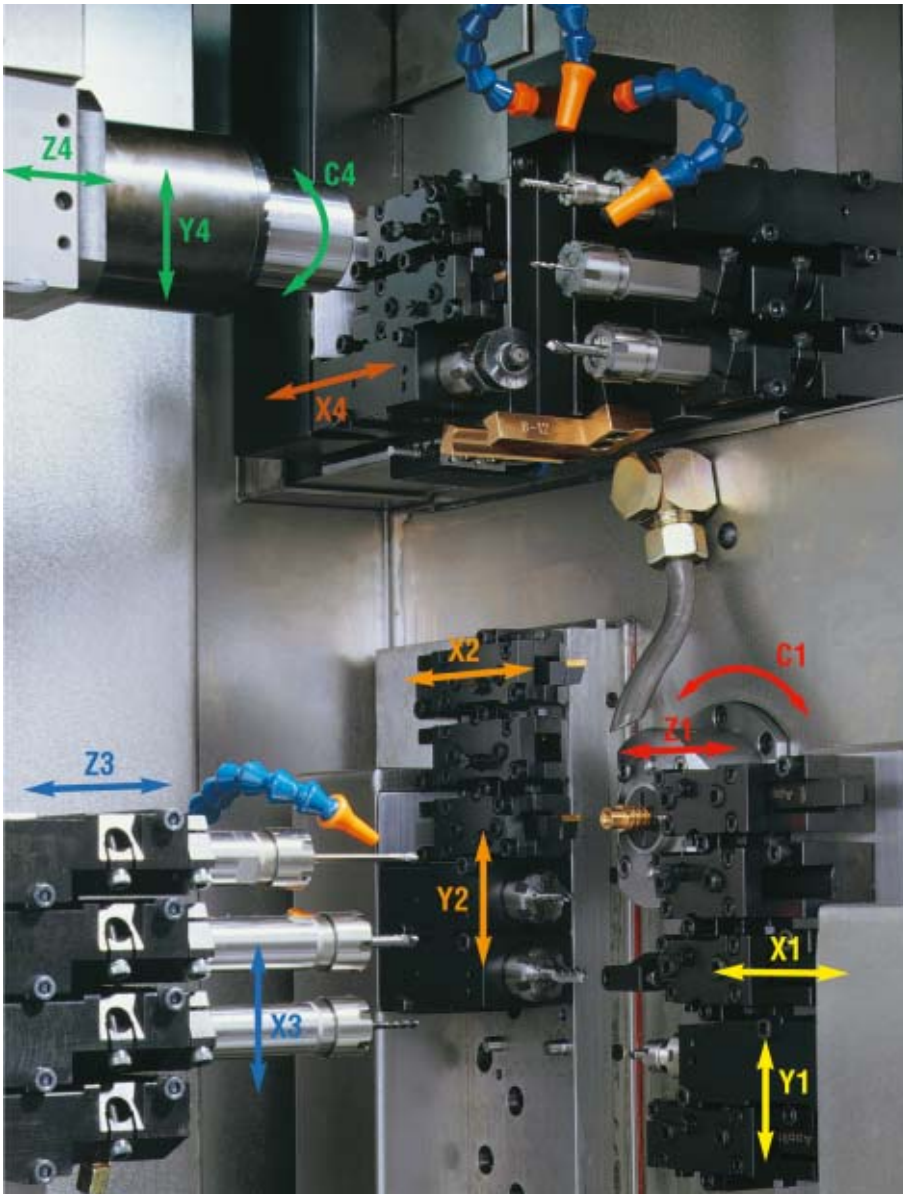
1. **positioning the part in Z1**
2. **positioning the tool in Z3**
3. **drilling movement in Z1**

Depending on the part being executed, drilling can be programmed:

a) **as an initial operation, immediately following the start of the loop**

b) **following partial machining of the part**

As case a above is most commonly applied, a future article will deal with case b.



The Z1 axis in drilling operation is – amongst other – used when using high pressure drilling.

Tip:

In order to achieve absolute programming for Z1 and avoid OFFSET problems, an additional tool geometry such as T60, will be used for drilling in Z1.

The value Z of the T60 geometry is determined as follows:

Z= standard gEomEtry in z chaser 1 and 2

(See HELP in the tool geometry heading "chaser 1 and 2")

for the DECO 7/10: -15
for the DECO 13a and 13b/bi: -25
for the DECO 20/26: -20

The T60 geometry must be combined with the last support used in the previous drilling operation, generally, the cutting tool.

Important:

The position values programmed allowing positioning of the part in Z1 and of the tool in Z3 must be strictly identical. For example, Z1=1 and Z3=1. If this is not the case, the drilling depth will be inaccurate. See figures below:

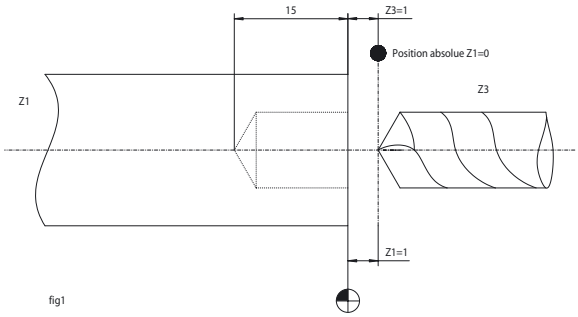


fig1

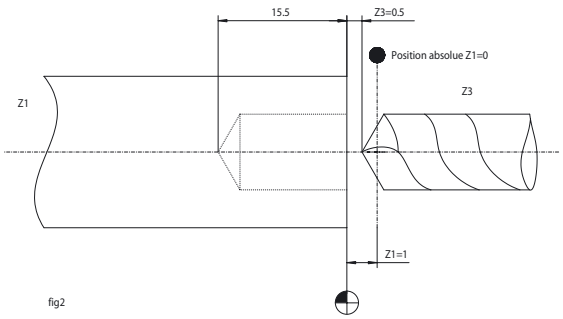
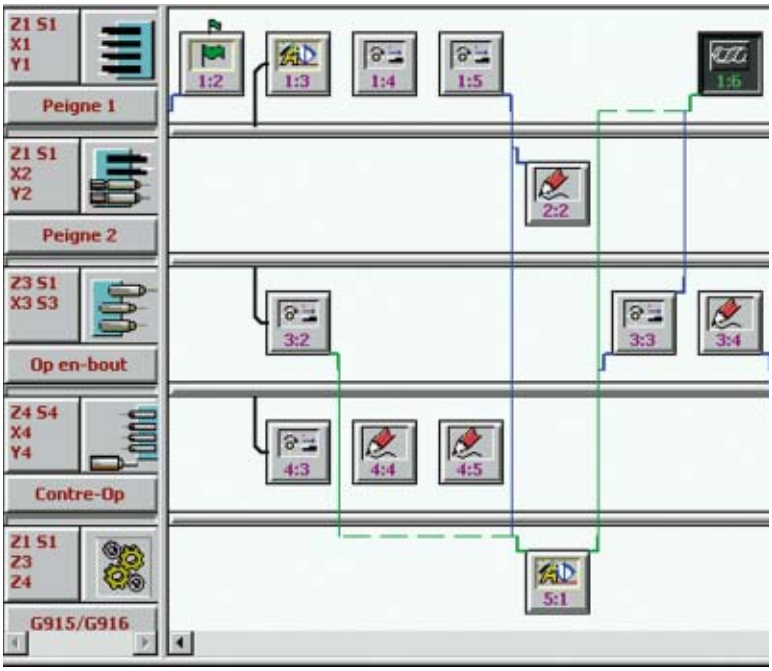


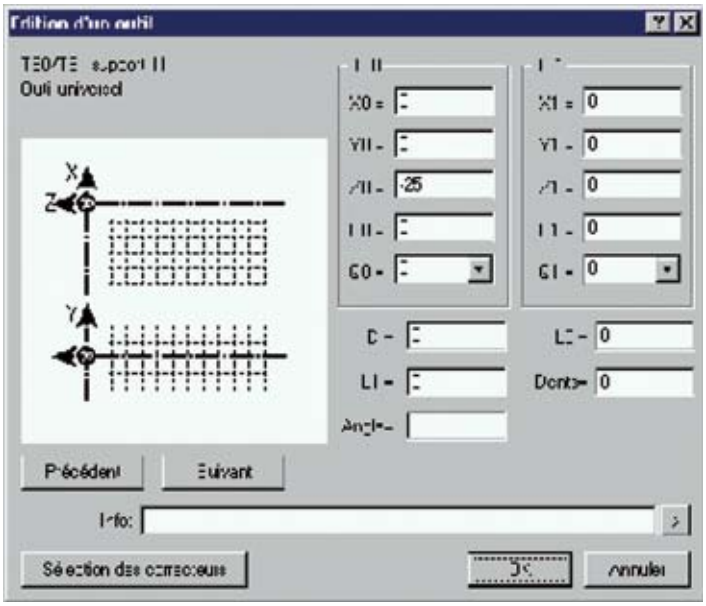
fig2

In the case depicted in Fig. 2, as the approach distance in Z3 is not identical to that of Z1, the depth of the hole will be 0.5 mm out.

End drilling Z1- Z3



T60 tool geometry:



Example 1 (for the DECO 13a):

Drilling tool T31 at the start of the program

Operation 1:5:	Positioning Z1=1, T60
Code ISO:	G1 Z1=1 G100 T60
Operation 5:1:	Macro G915
Code ISO:	G915
Operation 3:3:	Positioning Z3=1, T31
Code ISO:	G1 Z3=1 G100 T31
Operation 1:6:	Drilling Z1
Code ISO:	G1 Z1=-15 F0.05
	G1 Z1=1 G100

And the lathe is ready!

Perspective

of the turning industry in Singapore

In this issue of DECO-Magazine we feature a Singapore company which has become one of the biggest users of TORNOS DECO 2000 CNC sliding headstock machines in Asia since their first purchase of 4 machines in November 2000.

The first Swiss-type cam automatics were probably introduced into Singapore by German camera makers in the early 1970. We interviewed the founder and the Managing Director of Spindex Industries, Choo Heng Thong for his perspective of the turning industry in Singapore and his decision to adopt DECO 2000 as its mainstay turning equipment to spearhead Spindex into the next phase of growth with better technology and entry into new market.

Spindex Industries Limited was founded in 1981 in a twenty square meter factory with one Escomatic coil-fed automatic making headless screw for household appliances. Today, it is a highly integrated solution-provider of precision-machined components and assemblies with strategic manufacturing locations in Singapore, Malaysia and China and annual sales turnover of S$ 50 million. In 1998, the company was listed on the Stock Exchange of Singapore and achieved the rare distinction of being the first quintessential turning company in South East Asia to become a public company. Spindex serves diverse market sectors comprising global customers in imaging products (office automation), machinery, automotive systems, telecommunications, domestic appliances, consumer electronics and data storage. It entered in earnest the demanding automotive systems market in 2000.

From 1981, Spindex expanded aggressively by specializing in workpieces of material diameters between 0.4mm and 50mm and by 2000 has a fleet of more than 200 CNC machines consisting of Citizen, Star, Tsugami, Miyano and conventional cam-operated machines like multispindle TORNOS and Escomatic. These turning machines are complemented by a whole host of ancillary equipment and machinery to provide flexible and customized solutions to meet the individual needs of its customers.

In December 1998, Spindex received an Internet enquiry from a world leader in automotive sensor. It was also coincidental, as the management had earlier identified the automotive industry as a potential market to reduce its dependency on its existing market sectors. By then, Spindex was already embarking on QS9000 certification as it is a prerequisite to enter the demanding automotive industry. The first prototype was produced on its existing Citizen machine. Mr. Choo said, "Although the various models of Citizen machines we have are excellent machines which have served us well since our first Citizen F-16 in 1987, they have their limitations beyond certain markets and applications. We thus embarked upon a thorough study and evaluation of various makers of Swiss-type automatic turning centers to identify our next generation of machines to upgrade our capabilities and to spearhead our entry into higher value-added components of greater sophistication and complexity."

After a yearlong evaluation process, Spindex installed its first four DECO 2000 in November 2000. Mr. Eddie Lee, Spindex Engineering Manager who was instrumental in conducting the evaluation has this to say. "We selected the DECO 2000 because of the following features and benefits that it brings:

1. The ten independent axes and a counter spindle that almost duplicates the main spindle capability allows for maximum process synchronization is a top selling point of the DECO machine.
2. The TB-DECO programming software is a great productivity tool that allows offline programming and simulation for process optimization and avoidance of tool crash in the comfort of the office or home. It is also an excel-

Perspective

of the turning industry in Singapore

lent tool for deriving cycle time estimate for quotation to our customers.

3. The ability to pre-set our tools has eliminated much downtime and loss of work piece. It eliminates to a great extend the reiterative tool offset process of most conventional CNC Swiss-type automatic lathes.
4. The tool holders are common for the front and back spindles and most of the power driven tools and attachments are modular and can be mounted and dismounted with ease. Even some motorization of attachments can be done retrospectively.

5. We also like the generous chip bin and ergonomics of the machine. Tools are well layout to prevent the accumulation of chips around the cutting zone.

Mr. Choo said, "I particularly like the aesthetic and ergonomics of the machine. The pre-set tool change concept has definitely made our work less skill dependent and more in line with today's manufacturing environment. This has enabled us to attract young and talented people to join our industry that is fast becoming a knowledge-based industry. It augurs well for the future of the turning industry as a whole".

Having achieved great success with the first four DECO 2000, Spindex committed continuous investment in this technology and as at March 2003, has 28 units of DECO 2000 machines.

Mr. Tan Kin Tatt, Spindex General Manager said, "Besides, technological considerations, we would not have the confidence to put our faith in millions of dollars of investments on DECO machines without the good service that is provided by Munger Machine Tools and the responsiveness and engineering support from the TORNOS team in Switzerland".

In conclusion, Mr. Choo said, "The DECO 2000 has opened up new avenues to Spindex to serve our existing and new customers with parts of greater sophistication and higher precision. It has further consolidated and strengthened our position as an integrated solution-provider of machined-components in this region. We are also very excited about leveraging on the DECO 2000 technology to enter the biomedical industry".

SPINDEX

First ever

Who had never dreamt…

…of having an effective "two-way" thermal stabilisation solution to either heat or cool cutting oils as required?

This has become reality with the DECO 13a and DECO 20a!

Special customer feature

CSW 200
stabiliser for the DECO 20a

Special customer feature

CSW 200
stabiliser for the DECO 13a

Application

This thermal stabilisation system guarantees optimum machining conditions, whatever the level and variations in ambient temperature.

The system, comprising a cooling and heating system, can be fully parameterised, thereby ensuring that the oil remains at a constant temperature. The precision and repetition of machining operations are considerably improved.

Comment

This device can be added at any time, since it does not involve any major changes to the machines.

Safety is optimum – there is no contact between the heater unit and oil. The stabiliser consists of two sections, namely a copper/aluminium (or stainless steel, as an option) exchanger that is plunged into the sprinkling tank and a compact group made up of a water tank, accommodating the heating and cooling systems.

A temperature probe is plunged into the oil tank and connected to a digital, neutral thermostat.

Compatibility

DECO 13a and DECO 20a/26a

Technical characteristics

◆ Cooling power	2235 W
◆ Heating power	3370 W
◆ Temperature stability	+/- 1°
◆ Noise level	50 DbA
◆ Dimensions (length x height x depth)	435 mm x 570 x 525

Measurements

Test on the DECO 20a

- ◆ Following a 3-month testing period, the stabiliser worked perfectly, maintaining exemplary temperature stability.
- ◆ For the precision test, the following results were obtained after 2 days:
- ◆ DIM 21.60 mean: 21.6036 Type deviation 0.00171
- ◆ DIM 19.075 mean: 19.0753 Type deviation 0.00201

The machine maintained a tolerance of +/- 0.002 mm throughout the entire day of production!

This unit, which guarantees stability and precision, has not yet been allocated an option number in the Tornos catalogue, but is already available.

DECO productivity

in quite an unusual form

Producing parts 3 metres long on the DECO ?
Yes – it can be done !

The DECO machines are highly flexible tools – as is demonstrated yet again when it is used to produce a 3-metre long part.

To find out more details about this unusual operation, DECO Magazine went to see Mr. Christian Gauchon, Manager of ROULEAUX PACK.

The French company, ROULEAUX PACK, that specialises in handling rollers, has been producing the axes for bulk products on the DECO 26 since 2001, where these did not exceed a length of 600 mm. Then, in order to extend its automatic production capacity, the company adopted the DECO solution to machine axes of greater lengths (from 600 mm to 3000 mm).

In close co-operation with TORNOS and RAVNI, a company based in St-Etienne, France, it came up with a special loading device.

The DECO 20a is supplied with billets cut to a length slightly longer than the final dimension. The part is conveyed by the bar feeder across the main headstock whereupon it undergoes automatic machining on the lathes fitted with plattens 1 and 2 over a length of 68 mm. The lathe, therefore, supplies the system with the means of transferring the part to the counter spindle. The second side of the part is then machined using the installed "mirror" tools, which also are on plattens 1 and 2. Once the part has undergone machining, the bar feeder ejects the part before inserting the next.

In order to replace several machines, which would involve reworking, the company turned to the DECO solution. For ROULEAUX PACK, DECO is synonymous with fast setting up times by way of program parameterisation and the use of standard tools and is also synonymous with considerable increases in productivity.

Production time for some parts dropped from 9 minutes to 3 with the DECO solution. What is more, this new system means that Rouleaux Pack can free the operator, who can now proceed with operations in hidden time, such as for example assembling the bearings on the axes.

With its location at Boën, ROULEAUX PACK has a workforce of 70 employees and three DECO machines located in a somewhat "traditional" workshop.

How did the transition to the DECO go?

Mr. Gauchon provided the following details:

"We changed over to the DECO solution in several stages. The first was the acquisition of a DECO 26

lathe, which came with a program for the part being machined, designed by TORNOS. This meant that we could start production immediately. One of our employees was sent to attend a DECO training course. He completed the practical side and then passed on what he learnt to his colleagues. We noted that with their growing experience, it didn't take long to be fully in control of the machine and its software. We then launched new parts quite independently.

We finally acquired a "DECO culture" which prompted us to envisage machining very long parts on this type of machine.

Then, following numerous design meetings with the various departments of TORNOS, we hit upon the idea of production. We were able to define the kinematics of the loading and unloading systems by finding a solution for each stage likely to hamper this development. We then brought in the RAVNI company to assist in our research and the latter was able to convert this kinematics concept to a mechanical one.

At present, we are just perfecting our first "long part" machine. The second machine is currently being executed to be ready for machining in June. We anticipate putting a third machine into operation in two years time, to produce the bulk of our bearing axis run on the DECO.

Our idea of using the DECO 20a machines for long parts will mean that we can achieve numerous economies of scale, since we will only be using one numeric control technology (reduced training costs, programs, spares, tooling and maintenance). What is more, the use of mirror tools will provide us with the facility to fit 16 different tools, thereby reducing the vast number of setting-up times by the mere use of the "flashcard" program, which involves no tool change. This is a versatile and fairly quick solution for an affordable investment – a compromise that is becoming more and more rare!"

This "success story" shows the extreme versatility of the DECO and that any company anxious to maximise the potential of the machine, can achieve surprising results.

There was close co-operation between ROULEAUX PACK, TORNOS and RAVNI to achieve this aim.

- Client: ROULEAUX PACK / France
- Machine: TORNOS DECO / Switzerland
- Software: TORNOS TB-DECO / Switzerland
- Loading/unloading system: RAVNI / France

TORNOS Rue Industrielle 111 - CH-2740 Moutier

ROULEAUX pack L'Argentière – Boîte postale 17 – F-42130 BOEN

RAVNI TECHNOLOGIES Z.I de Grüner – 42230 Roche La Molière – France

An extensive product range

In order to meet the most varied of requirements, ROULEAUX PACK has a vast range of products in terms of sealing, operating mode, loading or withstanding impact or temperature fluctuations. Additional parameters, such as anti-static or drive parameters, further increase the potential to adapt to requirements.

As part of the range, we can mention, in particular:

- plastic rollers
- gravity rollers
- tapered rollers
- precision rollers
- heavy and super-heavy rollers
- mining rollers for corrosive environments
- controlled rollers

etc…

From problem, through product concept to the finished tool

Paul HORN GmbH, which was founded by Paul Horn in 1969 and is based in Tübingen, currently employs more than 550 people worldwide.

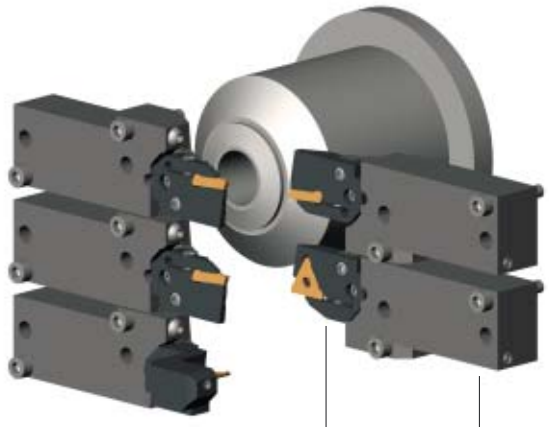
Grooving and cropping small parts accurately on a lathe are only possible if the cutting tool and workpiece are firmly and securely clamped in the machine tool.

The DECO series from TORNOS offers the right machines for this and Paul HORN GmbH has set itself the task of developing the corresponding tools that are adapted to the DECO series.

A tool development that is tailor-made to a type of machine is not an everyday requirement. This situation demands honest and frank co-operation between machine and tool manufacturers. Extremely good co-operation right from the start between the parent company of TORNOS in Moutier and Paul HORN GmbH Tübingen in conjunction with the Swiss agent, DIHAWAG in Biel, provided the guarantee for a rapid and successful tool solution.

Solution for DECO 7/10a

Solution for DECO 13a



Solution for DECO 20/26a

Type RHC105 clamp holder

Interface optimisation

The avoidance of or reduction in interfaces between the cutting edge of a tool and the NC axis of the machine tool was one of the principal objectives when designing the tools.

Tools were developed for the single spindle lathes DECO 2000 series with bar capacities 7/10 mm, 13 mm and 20/26 mm.

The latest design aids, such as 3-D CAD of the high-end class, in conjunction with strength calculations based on the finite element method and decades of experience in the development and production of carbide tools provide the optimum conditions for the design of such tools. As a result, Paul HORN GmbH was in a position to produce the future prototypes within a few weeks.

At the Head office of TORNOS in Moutier we were then able to fit the computer-designed tools to the corresponding machine.

By fitting directly to the appropriate type of machine, it was possible to check for collision points and edges with the machine in dynamic operation.

Tool solutions

Monobloc clamp holders have been specially developed for the DECO 7/10 machine of the DECO 2000 series. Type 312, three-edged indexable inserts with cutting widths of 0.5 mm to 1.5 mm and maximum cutting depths of 8 mm, can be used on this machine for machining external diameters.

Monobloc holders for the DECO 7/10 are also available as standard for machining internal diameters. The type RHC105 clamp holders can be used with standard tool tips, type 105, from a boring diameter of 0.5 mm upwards. A coolant hose connection for these clamp holders guarantees an optimum supply of coolant through the tool tip directly onto the cutting edge.

For machine types DECO 13 and DECO 20/26 special basic holders have been developed. A patented and stable interface permits the use of cassettes for machining internal and external diameters.

The cassette solution enables the use of the type 312, three-edged indexable inserts with a cutting width of w = 0.5 mm upwards and a maximum cutting depth of 9 mm. Cassettes for the type S224 indexable insert make it possible to use two-edged indexable inserts with a cutting width of w = 2 mm to 3.7 mm and countless geometrical variants.

From problem, through product concept to the finished tool

Cassettes with the same interface also enable internal cutting and machining of holes with a diameter of 0.5 mm upwards. These cassettes also have a coolant hose connection.

Type M275 polygonal milling cutter

Type 381 polygonal milling cutter

For the polygonal milling option of, for example, 2/4/6 edged key faces, Horn supplies type M275 or 381 standard milling tools for all machine types of the DECO 2000 series.

To sum up

Optimum communication and synergy between HORN, DIHAWAG and TORNOS has meant that market introduction could begin in a very short time. A tool program that is rounded off in every respect and constantly growing, is the result of intensive co-operation.

Matthias Oettle

Design – New developments
Paul Horn GmbH

Hartmetall-Werkzeugfabrik
Paul Horn GmbH
Postfach 1720
D-72007 Tübingen
Tel.: 07071-7004-0
Fax: 07071-72893
E-mail: info@phorn.de
Internet: www.phorn.de

Permanent showroom

The spring exhibition held by Tornos was one of the many opportunities to discover the MULTIDECO 20/8b.

You couldn't make it? Don't worry, because after this event, which took place from the end of April to the beginning of May in Moutier, the first ever MULTIDECO 20/8b in the world will be displayed in the training centre until September.

In pleasant surroundings, the customer will be given the opportunity to discover this new "high performance" machining solution in greater detail.

Operating according to the DECO concept and based on proven solutions on previous models, the new MULTIDECO 20/8b will provide the answer to all multi-spindle machining requirements, from simple to complex parts.

New perfected characteristics

The new FANUC 16iTB numeric control, which can control up to 32 axes simultaneously, combined with 6 cross slides and spindle / counter-spindle stops, allows design offices and manufacturers from several areas of activity, to execute parts of exemplary complexity at high rates of productivity.

The car industry was not disappointed following its keen interest in this particular type of activity.

The two C axes at the spindles, coupled with one at the counter-spindle, increase machining potential even further.

The new slide fairing and hinged control do not significantly affect the parts being manufactured. However, to execute highly complex parts at high rates of productivity, why not avail yourself of the best ergonomy and practical application? In order to meet market requirements, the new design of the machine incorporates our applications experience with more than 300 MultiDECO machines.

Permanent showroom

Like the MULTIDECO 32/6i, the spindle cooling system is also used here. This new feature represents a major technological step forward. Because of the well-designed circulation of the cutting fluids, the spindle temperature is aligned to ambient temperature, thereby offering an even greater guarantee of precision and repetition.

These developments provide greater machining potential with more precision and complexity and are clearly based on the DECO concept, i.e. programming in hidden time, tool pre-adjustment, program transfer by e-mail and so on.

The strong features of the MULTIDECO 20/8b are also available for achieving very straightforward parts at very high rates of productivity, since this machine is also available in a [2x4] version.

Technical characteristic

MULTIDECO 20/8b	
Spindle speed	6000 rpm
Spindle motor power	15 kW
Tapping, drilling motor power	2.2 kW
Number of axes	23
Spindle and C-axis stops	yes
Spindle cooling	yes
Infeed slide (X1)	1
Cross slides (X, Z position 2 to 7)	6
Cutting slide (X8)	1
Counter-operation slide (X9)	1
End units (Z21-Z27)	7
Counter spindle (Z28)	1
Counter-spindle and C-axis stop	yes
Counter-spindle motor speed	8000 rpm
Numerical control	PNC Deco
Barrel lock	Hirth gear teeth
Number of axes running simultaneously	All

MULTIDECO 20/8b [2x4]	
Spindle speed	6000 rpm
Spindle motor power	15 kW
Tapping, drilling motor power	2.2 kW
Number of axes	22
Spindle and C-axis stop	yes
Spindle cooling	yes
Infeed slide (X1, X5)	2
Cross slides (X, Z in pos. 2, 3, 6, 7)	4
Cutting slide (X4, X8)	2
Counter-operation slide (X4', X9)	2
End units (Z21, Z22, Z23, Z25, Z26, Z27)	6
Counter-spindle (Z24, Z28)	2
Counter-spindle and C-axis stop	yes
Counter-spindle motor speed	8000 rpm
Numerical control	PNC Deco
Barrel lock	Hirth gear teeth
Number of axes running simultaneously	All

The [2x4] version
Two machines in one

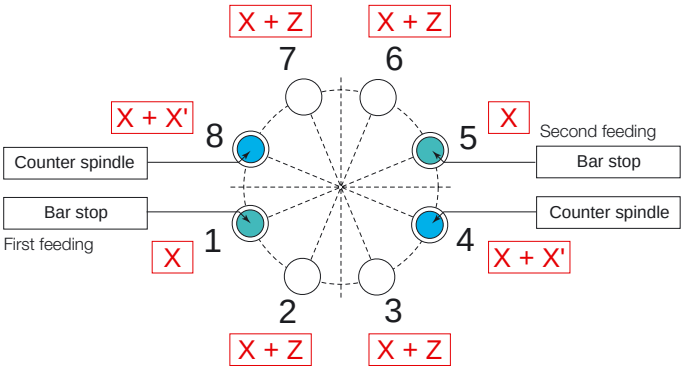
As a simplification, the machine comprises two multispindle machines fitted with four spindles.

The first position [pos. 1] includes the bar feeder, a hobbing slide and an independent end unit.

The second and third position [positions 2 and 3] are fitted with cross slides and independent end units.

The fourth position [pos. 4] includes a cutting slide and counter-operation slide with two tools and one counter-spindle.

Positions 5, 6, 7 and 8 are strictly identical.



Flexibility

Nowadays, the market seems to be in a permanent state of change. One of the many benefits of the MULTIDECO 20/8b is that customers can change a MULTIDECO 20/8 "two parts per cycle" [2x4] into one authentic 8 spindle version, simply by modifying a few parameters. This concept means that complex parts can be executed with the following configuration: 4 cross slides, 4 single slides, 6 independent end units, 1 cutting slide, 1 reworking spindle and 1 counter-operation slide.

A 2x4 machine modifed to a 1x8 machine does have some limitations compared with a standard machine.

A high-performance concept

Production rates these days are of utmost importance – production rates of parts per minute are just not good enough. With its MULTIDECO concept, TORNOS not only provides excellent productivity but also flexibility, precision, tool simplicity (tools with inserts) and a programming system that can quickly respond to market demands.

The rate of machine availability is reinforced by many peripherals guaranteeing fail-safe operation (e.g. bar feeder, chip conveyor, cooler etc.).

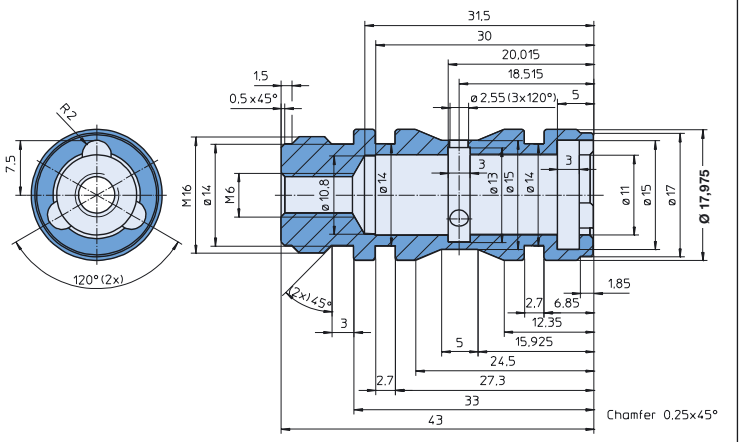
This new solution enhances machining flexibility and potential; 8 spindles, 6 cross slides, 2 spindle C-axes and stopping in the counter-spindle position are the salient points providing the essential versatility and power required by the modern industrial sector.

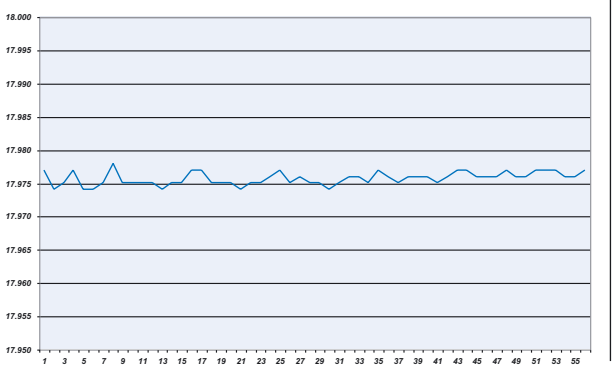
The new spindle cooling system provides excellent machining stability and guarantees high precision and repetition.

With this latest MULTIDECO, TORNOS is now providing a complete range of multi-spindle lathes capable of providing any solution up to 20-mm diameter with six and eight-spindle machines and 32 mm with six spindle machines. Never before has power and technological know-how been so readily available as now.

20/8b

SPC control, let the figures speak for themselves!





Condition of test:
Warming-up time: 60 min.
Productivity 5 parts/min.
Material: AC INOX 303 Ø 20
Sampling: 56 parts in a row

To find out more about the salient features of the TORNOS multispindle solutions and how these can match your requirements, please do not hesitate to contact your normal Tornos dealer, who will be pleased to organise a date to allow you to discover more.

This occasion will provide you with the possibility of discovering TB-DECO and the machines not to mention the technological solutions adapted to those areas of interest to you, such as are currently applied to the car industry, medical sector, fittings and so on.

The experts in the company will be delighted to respond to your requirements.

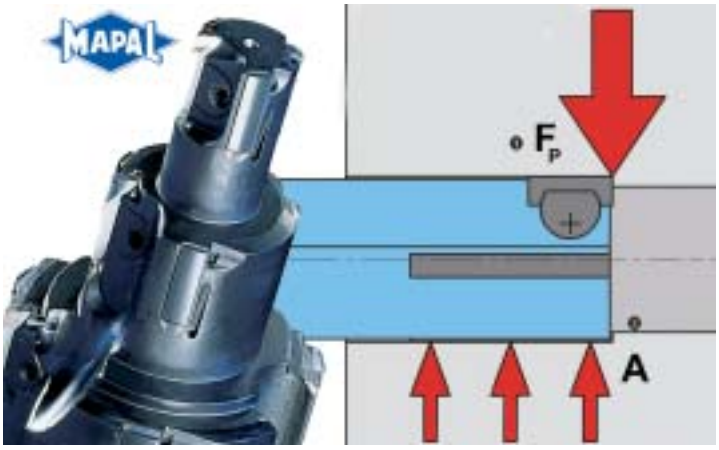
Machining competence from one casting

If castings are to be machined economically and with fine precision, then this can now only be done by combining the skills of tool and machining fluid manufacturers.

The Bucher Hydraulics works in Frutigen is one of four production sites and it concentrates on the development and production of a wide range of hydraulic valves. With precision dimensional stability as the set standard, piece-time and tool life are of special interest to Bucher Hydraulics. It was here that MOTOREX and MAPAL Schweiz AG, together, were able to lend a hand and exploit the available synergies.

More and more spheroidal graphite iron

Spheroidal graphite iron belongs to the iron-carbon group of alloys. Compared with steel, the carbon content is up to 4%. The characteristics of the material depend on the form, distribution and size of the graphite and the basic metallic structure (ferrite and pearlite 1:100). In the case of the ductile casting, the graphite is spheroidal in shape. The special structure of spheroidal graphite iron gives it excellent mechanical properties. Machining it in a way that is economically attractive has, however, to be learnt.



The tried and tested MAPAL principle stands for maximum precision:
Cutting tool (1) = cutting edge and (2) = work guides
A = support Fp = passive force

Characteristics of spheroidal graphite iron EN-GJS-400-15

Material description to DIN EN 1563	EN-GJS-400-15 (previousely GGG40)
Tensile strength R_m N/mm²	400 - 550
Tensile yield strength $R_{p0,2}$ N/mm²	250 - 350
Fracture strain A_5 %	27 -15
Brinell hardness HB 30	135 - 185

The MAPAL stepped, fine-boring tool

The MAPAL stepped, fine-boring tool for machining the part shown (dia. first step: 31.8mm/30°, dia. second step: 30mmH6 and dia. third step: 18mmH6) with high-precision, adjustable and replaceable throw-away inserts with 2 cutting edges corresponds to the latest generation of cutting tools for machining EN-GJS-400-15. The unmistakable MAPAL principle of one cutting edge and three work guides make for absolutely precise machining results. This arrangement was achieved in this machining for all three steps. This makes the circular quality, in particular, significantly better than with traditional multi-cutter friction tools. With the chosen starting cut at the throw-away inserts, surface qualities of N6 can be achieved without problem.

Use of the high-quality MOTOREX TWIN 300 cutting oil considerably prolongs the life of the work guides. This is due to the ultra-thin lubrication film between the work guides incorporated in the main body of the tool and the borehole wall, which effectively prevents wear.

Longer tool life

Compared to the machining of aluminium, where cutting speeds of several thousand rpm are possible, the machining speed for castings is limited by the nature of the material. It was precisely in this, that the challenge to MOTOREX and MAPAL lay: using the optimum tool and a machining fluid that is tuned to the application, the cutting speeds and tool lives were noticeably improved.

By using the chlorine-free, high-performance cutting oil, MOTOREX SWISSCUT TWIN 300, the experts placed the main emphasis on high cutting values, while achieving above-average surface qualities and maintaining long tool life. A special high-pressure additive assisted the complex chemical processes in the critical temperature ranges, thereby making the desired result possible.

This example once again shows that through new combinations there is still considerable performance potential hidden in the many different machining processes.

We would be pleased to supply further details on: www.motorex.com and www.mapal.ch

Valuable synergies can only be unlocked by close co-operation between tool, machine and lubricant manufacturers.

MOTOREX AG
Lubrication Technology
Postfach
CH-4901 Langenthal
Phone 062 919 74 74

MAPAL Schweiz AG
Precision Tools
Industriestrasse 30
CH-4542 Luterbach
Phone 032 682 70 80