

DECO MAGAZINE

21

2/02

M A Y

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Rough work
and
finishing

Echange standard:
des avantages
pour tous...

Ein
Automobilzulieferer
mit Weltruf

Più piccolo,
più profondo e di
migliore qualità

Kostnader för
svarvning
av smådetaljer





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Since the start of the DECO revolution...



Mike Cox
Applications Manager
TORNOS Technologies UK Ltd

...some six years ago, TORNOS has constantly improved its products and services to maintain a competitive edge. We have seen many new developments created as part of initial enquiries from customers that have materialised into standard options available to order.

One of the most difficult problems encountered when utilising high production machines is swarf control. With increasing component complexity and difficult materials high production efficiencies have become impractical to achieve. Modern cutting tool technology can provide most of the solutions but there is always the obscure or "hard nut to crack". Recently we have had great success with the utilisation of High Pressure systems. This is usually associated with very specific applications such as gun drilling or high-speed milling but at TORNOS we have adopted the system in a much more general manner. By introducing a high-pressure coolant in and around the general cutting area we have seen a dramatic improvement in the control of swarf. We have provided customers with Multi output systems capable of delivering pressures in excess of 150-bar wherever the component creates the usual nightmare of swarf build up. An added benefit when introducing such a system is improved tool life and surface finish quality that has also given the customer more justification for implementation.

As part of our continuous commitment to our customers we have entered into a partnership with ISCAR Tools UK. The result of a request from Iscar has led to the installation of a DECO 13bi at their showroom in Birmingham. This machine has formed the basis for a series of seminars run by Iscar highlighting their new product line specific to small turned parts. It has given us the chance to present TORNOS products to a wider audience as well as offering our customers the total engineering solution.

More recently TORNOS have improved and updated its existing products. The introduction of the new DECO 20a and 26a has come as a result of direct input and feedback made by our existing customers. We believe that by doing this we can deliver exactly what the customer wants. The capability of these machines has also been enhanced by the introduction of power driven tooling facilities from the front platen giving increased production facility and faster production. In addition to our revised machines we have also launched an all new bar loader, the SBF. Initially

this will accompany both DECO 20a and 26a machines but we will adopt the SBF across the DECO range, replacing current SSF210, 226 and 532 models. Again it shows the commitment TORNOS has to constant development and improvement.

So that our customers can make best use from their investment TTUK have introduced a scheme called "TORNOS Services". This has been devised to make customers more aware of what we can offer in terms of direct assistance in areas such as set ups, program training, tooling advise, maintenance or any facet of the after sales. We like to think that we are as much a product as the machines we sell and should be utilised to gain maximum advantage from our experience.

After taking up my recent position at TTUK as Applications manager a main objective for me is to improve on our existing training packages. Similar to how TORNOS look to develop their machine tools so should we look to improve and make best use of our own skills when considering customers needs. I firmly believe we already have in place, an excellent team capable of implementing such needs and I look forwards to the challenge ahead.

Rough work and finishing

Machining a part with a large depth of cut sometimes causes problems. In some cases, machining in "rough/finishing" mode is necessary.

This application can be achieved with the DECO 7a, 10a, 13a, 20a and 26a machines.

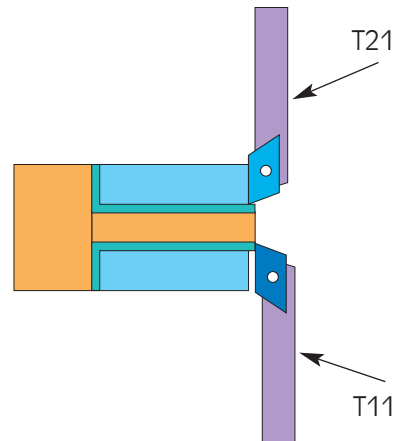
For the two examples quoted, the bar diameter and turning diameters are as follows:

Bar diameter:	10 mm
Roughwork turning diameter:	7 mm
Finishing turning diameter:	6 mm

Two different examples will be illustrated below.

First example:

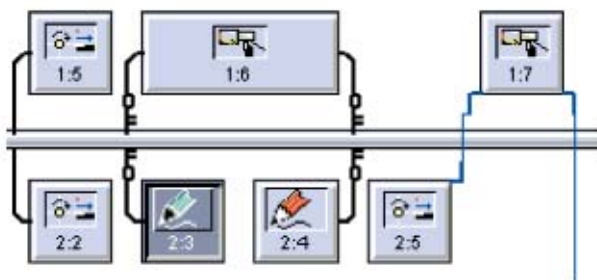
In this particular example, the tools do not have the same Z geometry. In fact, the roughing tool (T21) precedes the finishing tool (T11).



Feature:

The finishing cutter must be mechanically offset in the tool holder during pre-setting in relation to the roughing cutter. This is 0.2 mm in our example.

T11	T21
X = 0	X = 0
Y = 4	Y = -4
Z = -20.2	Z = -20
R = 0	R = 0
Q = 0	Q = 0



Program:

Locking axes X1 and X2 in mirror function:

Operation 1.5: Indexing the finishing tool to X and positioning the bar to Z.

G1 G100 Z1=0.5 T11

G1 G100 X1=6

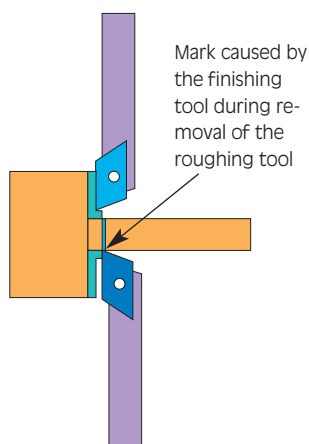
Operation 2.2: Indexing the roughing tool to X (excess thickness for X)

G1 G100 X2=7 T21

Operation 1.6: Turning

Operation 2.5: Removal of roughing tool from X

Operation 1.7: End of turning with finishing tool



Conclusion:

This first example causes some stresses, which in some cases, may entail the application of a tip (as shown in example two).

a) The above example poses quite a considerable drawback. In fact, once the rough cutter has completed its work, the Z movement has to be suspended to allow the tool to leave the material. During this time, the finishing cutter "rubs" against the material, thereby producing a mark on that particular spot (see figure below). If the Z movement is not to be interrupted, then it is essential to re-touch up the surface with the finishing cutter. This could result in a small defect at the intersection between the length and diameter.

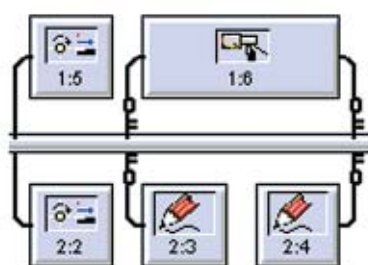
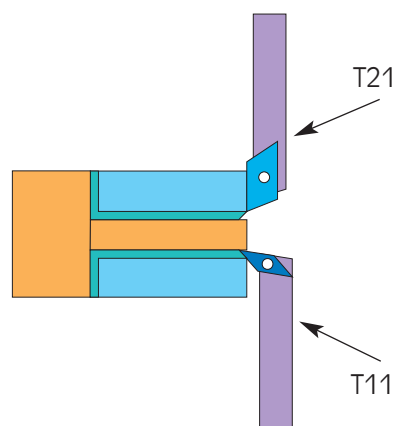
b) This means of programming means that the insert radius functions G41 and G42 cannot be used in the finishing contour (operation 1:6). In fact, as the end of the contour was executed during operation 1:7 after removal of the roughing tool, the function G41 or G42 must be cancelled at the end of operation 1:5.

Second example:

With this tip, the problem highlighted above does not exist. This time, it is the finishing cutter (T11) which precedes the roughing tool (T21). All the finishing cutter does is remove a small layer whilst acting like a pitting cutter. Like in the previous example, the roughing cutter removes most of the material.

Feature:

The roughing cutter must be mechanically offset from its tool-holder during pre-setting, in relation to the finishing cutter. 0.4 mm in our example.



T11	T21
X = 0	X = 0
Y = 4	Y = -4
Z = -20	Z = -20.4
R = 0	R = 0
Q = 0	Q = 0

Program:

Locking axes X1 and X2 in mirror function:

Operation 1.5: Indexing the finishing tool to X and positioning the bar to Z.

G1 G100 Z1=0.5 T11

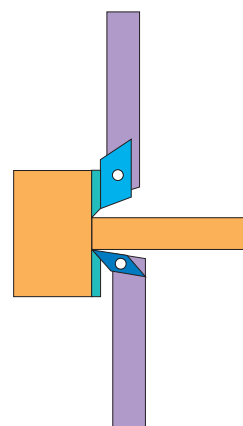
G1 G100 X1=6

Operation 2.2: Indexing the roughing tool to X (excess thickness to X)

G1 G100 X2=7 T21

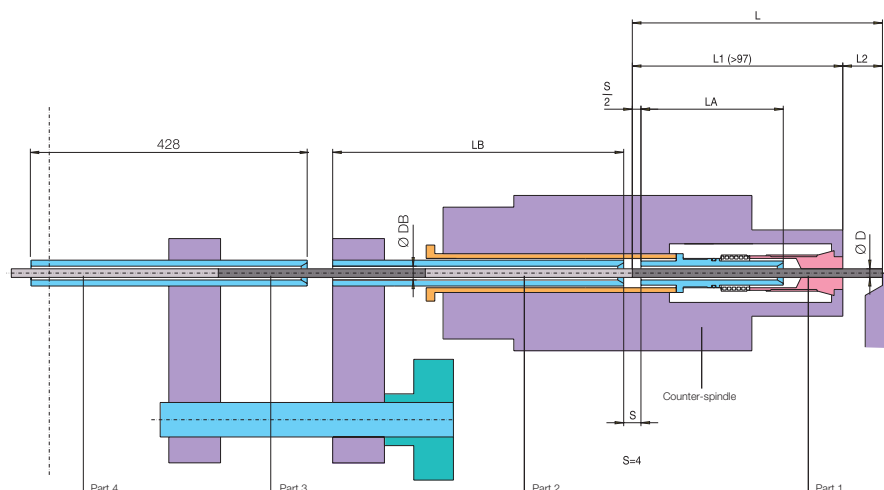
Operation 1.6: Complete turning with tool expulsion.

There is no need to stop at the end of turning since it is the finishing tool that precedes the roughing tool in Z (see figure below).



In this edition, there are two devices that are not part of the standard options currently offered by the company...

A device dedicated to simple and long parts



DECO 13 bi, a lathe dedicated to the machining of simple parts, has now been upgraded to include an option to evacuate these long parts through the counter-spindle, without the addition of an ejector.

Customer specification

Ejection of parts in succession

Application

This simple device must be adapted for each start-up operation (preparation of guide tubes) but represents a very simple alternative

over long part devices already in use, for all those customers wishing to try out long parts at little cost.

The parts merely push one against the other through the counter spindle. A set of fixed and revolving tubes ensures guidance and the parts are recovered along an inclined plane on the left side of the machine.

Comment

The tubes must be finely adapted to the length of the part being machined. The length must be set every time the machine undergoes a new set-up.

Compatibility

DECO 13 bi



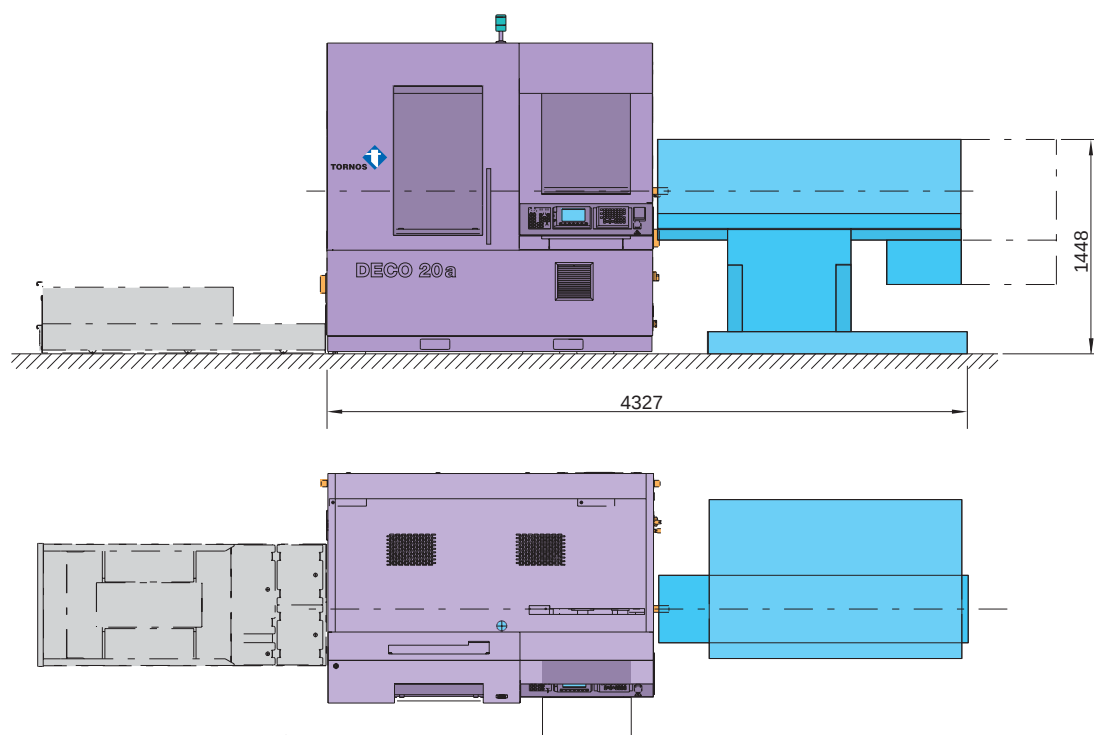
Technical characteristics

Diameter of parts being machined	Min. 3	Max. 9,5 mm
Length of parts being machined	Min. 100	Max. 300 mm
Length of part in the counter-spindle	Min. 97 mm	
Guide tubes for parts with a diameter of	3,0 à 4,5	3 tubes dia. intérieur 5 mm
	4,5 à 6,5	3 tubes dia. intérieur 7 mm
	6,5 à 9,5	3 tubes dia. intérieur 10 mm

Types of parts being machined

All types of parts that can be guided without problem through the guide tubes.

The exceptional versatility of DECO products need no longer be proved. Apart from a good number of options, TORNOS also offers some additional applications – the billet loader, for example.



Client specification

Billet loader

Application

The main feasibility criteria lie in the dimensions of the rough billets and in the capacity of the machine to execute the necessary machining and extraction operations.

Comment

TORNOS undertakes to examine each case and suggest the best solution corresponding to your requirements. Each adaptation of this type must be examined in our R&D offices.

Compatibility

DECO 13a & DECO 20a

Type of loader

Quick Load by LNS

World class supplier



Along with many other industries the automotive sector is always striving to present its customers with new designs in order to win business. The companies that supply the turned parts to these car manufacturers are continually searching for new ways to keep their competitive edge and thus retain contracts. Cutting component costs while retaining and improving component quality can be crucial to contract success, but if you design your own product then you must be producing something special.

H. R. (Ray) Adcock started life as a subcontractor around 40 years ago. The Company products were precision turned parts, particularly spindle components and shafts, many of which went into the automotive industry. Having worked in the company for most of his life Ray's son, Neil, and his company partner, Martin Haigh, bought out other company shareholders and all efforts were refocused on developing new processes. Mr Adcock adds, "we began to specialise in making parts for the automobile seating market, such as head restraints and seat adjuster mechanisms, and, as our volumes and expertise developed we saw the op-

portunity to design and develop our own product range."

HR Adcock is now the sole supplier of manual seat adjuster assemblies for the Ford Focus in both Europe and America.

The company also has a patent on their process Rollaweld™, a lighting fast method of attaching flanges and cranks to any cylindrical spindle or shaft. Unfortunately for TORNOS this reduces the requirement for turning, but as it reduces the product costs it does improve the prospects for supplying shaft parts throughout the industry. The area could be a large growth area as Adcock now marketing the Rollaweld as a licensable process in a wider range of applications.



Currently there are around 50 staff. The new building comprises of offices, shop floor and general flow process assembly line in order to maintain the high precision components. Special machining busi-

World class supplier



ness still accounts for around 25 % of the company's turnover where the use of precision machine tools comprises 4 TORNOS DECO 20 mm machine all with long parts support. TORNOS have had a long relationship with the Shephshed based company, and the decision to purchase four DECO 20 mm machines in the 8-axis configuration has significantly transformed production. The company still uses a Traub Fixed head lathe and various specialized cam autos. "We considered several other makes of machine prior to deciding on the DECO's, but they proved to be the best for the job, giving us the quality, precision and productivity we sought," Neil explains. On the TB-DECO, "We have also found the TB-DECO Windows based software to be extremely user friendly and practical in meeting our programming needs. As our volumes grow we are intending to invest in additional DECO machines."

H. R. Adcock are dedicated in their approach to employee training and further development.

They received the top Award for People Efficiency and also for the best SME from the Manufacturing Excellence Awards run by the Institution of Mechanical Engineers. Winners in other categories included BAe, Jaguar and Renishaw. The Teaching Company scheme (TCS), which is aimed at



promoting the expertise of graduates within local companies. Neil Adcock states, "The fact that the first TCS graduate is now part of our team is a clear indication of our belief in the TCS scheme, and our partnership with the (Loughborough) University. Our future is in the high technology field that means we need a very high skill level."

As an automotive supplier, HR Adcock can be considered as "world class", Neil states, "it is my understanding that within the automotive industry, any company having a parts per million defect figure of consistently less than 24 is considered to be "world class". We currently have a running total of only 1.7 parts in 2.2 million delivered." The company has become

an Investor in People, and is working towards the environmental standard ISO 14001 and health and safety systems OHSAS 18001. Recently HR Adcock have joined the world's elite by certification of the quality standard ISO/TS 16949 for both Part 1 and Part 2. To date some 500 companies have been certified to this standard, but only a small number have achieved both parts. Said David Davidson, Adcocks recently appointed Marketing and Technology Director, "we must continue to improve both our product line and our means of production. This means using lean manufacturing techniques and working with machine tool partners who also continually improve."

Standard exchange:

benefits for everyone...

Since January 2002, the TORNOS DECO after-sales department implemented a new policy for managing standard parts subject to wear – namely the standard exchange system (without this entailing new customer contracts).

This service is dedicated to DECO machines.

Operation

The principle underlying the standard exchange will enable all users of the DECO to benefit from quality, renovated and warranted parts, irrespective of the condition of the used part. For example, this is the end of unpleasant surprises, such as having to replace a subspindle that can no longer be repaired for the price for a new one.

The mode of operation is very straightforward – the customer can work to three configurations.

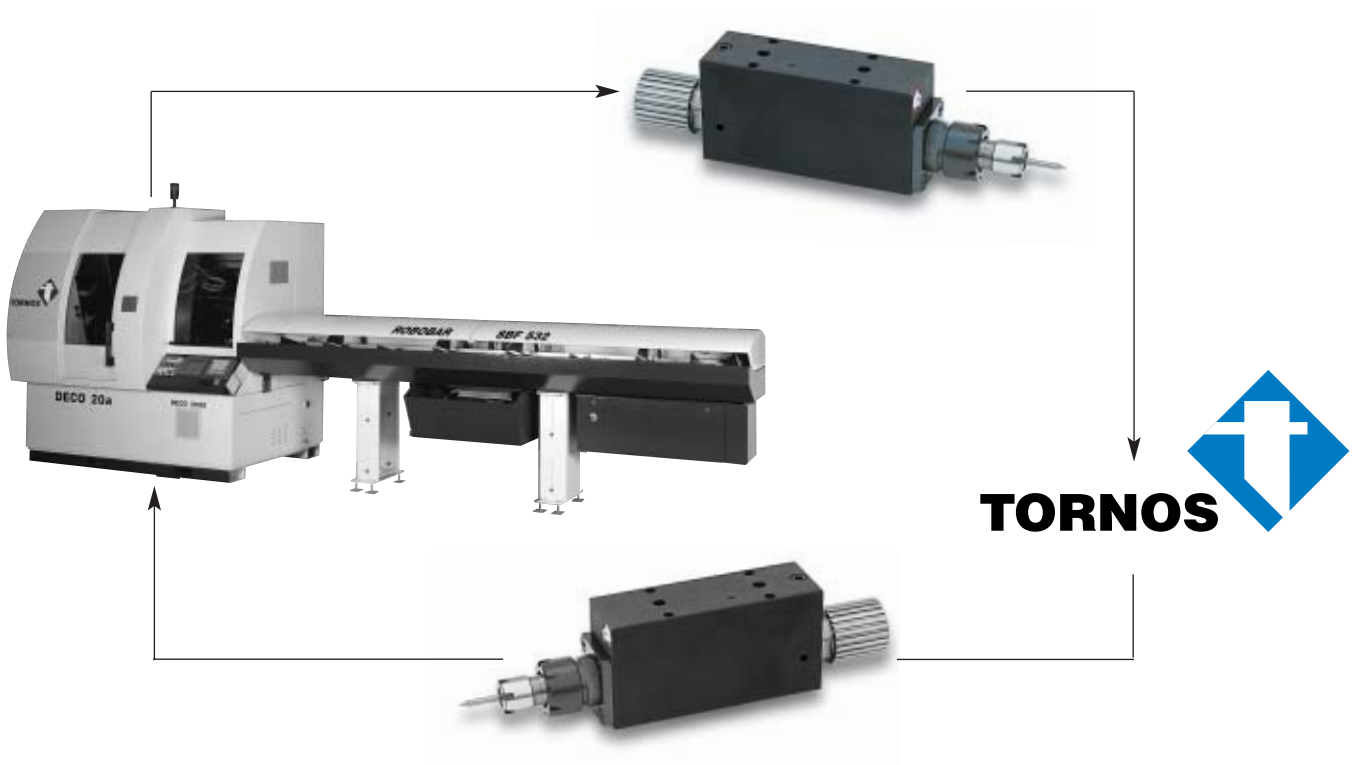
A) The client wants to change a worn part (see boxed list next page) but does not want to relinquish it until he has the re-

placement. In such cases, there are two alternatives:

A1) The client has a buffer stock of a part at the new price and the standard exchange takes place at the exchange price (between 40 % and 70 % of the price of the new part), or

A2) the client orders a standard spare, has it invoiced at the new price and receives a discount on receipt of the worn part.

B) (The most common example), the client returns his worn part and has a reworked and guaranteed part sent at the standard exchange price.



Reaction speed

All parts earmarked for the standard exchange system are held in store in Moutier and many of them are held by our subsidiaries and agents. In the case of a shortfall with an agent, the part can normally be dispatched to any country in Europe within less than 24 hours and within less than 48 hours to the USA.

For the large fleets of machines, TORNOS recommends that clients should hold a stock of "single parts" so that they can overcome any problems associated with differences in rhythm or time scale.

The benefits

Apart from always having perfectly reworked, operational and warranted parts, this system allows our clients to dispose of parts at the best price.

Another benefit is the facility of updating certain machine components with this system. For example, on the DECO 20a & 26a, all the revolving guide bushes (option 0240) supplied since the 2nd half of 1999 are different models that are more tight and stronger. Their use can be a plus point when it comes to working with emulsion or machining very strong materials.

There is, of course, no optional limit of operation with this new version. This merely duplicates the attraction of the standard exchange system offered by creating real added value!

Another example coming within this category is the drill (option 1600) for the DECO 20a & 26a. Since the beginning of the year 2000, all machines have been fitted with models that are more tight and strong for the same reasons as those for the spindles mentioned above.

Financial considerations

As far as our clients are concerned, a significant financial factor can be added to the above benefits. In the case of a simple repair on a tail stock, the parts and labour come to approximately 30% of the price of a new part (which is rarely sufficient), whilst for the standard exchange this can be as much as 50%. Where the tailstock has to undergo major repairs or even replacement, the costs could rise to 100% of the new price. With the standard exchange systems, there will be no more such unpleasant surprises, as the costs are always the same.

As can be seen, many arguments speak in favour of this technique and it also allows the company to pass on its know-how to the clients.

The parts are supplied with all the information and tips for fitting these and they undergo daily testing by TORNOS engineers.

A global concept that reaches out...

This logic of "know-how included in the package" can also be found with respect to single supplies needed to maintain machine fleets in perfect working order. For example, a belt without play supplied by TORNOS was designed and tested to interact perfectly with the DECO machines – would the same apply to a "single commercially available belt"? The head of customer sales recommends that one should not try and save on the very small amounts and run the risk of major breakdowns – he always recommends that customers should be aware of potential risks...

Those parts involved in this standard exchange system:

Type of part	% of new price
◆ tailstocks	50 %
◆ guide bushes	50 %
◆ standard drills	60 %
◆ recirculating ball screw module	40 %
◆ pumps	40 %
◆ motors	70 %
◆ The majority of Fanuc components	70 %
◆ frequency converter	70 %

Various projects are on the point of being implemented at customer service level. We shall keep you posted in subsequent editions of the DECO Magazine.

A solution which is being improved upon...

The solution proposed by TORNOS for the fixed headstock with the DECO 42f is starting to take shape and is tending towards greater flexibility of choice for the users.



When the DECO 42f was launched in September 2001, TORNOS presented the machine as an integral solution comprising various ancillary devices, so as to ensure the most universal operation possible.

The various peripherals that are essential for fault-free operation have been incorporated at the design stage of the machine. This global vision of satisfying requirements, coupled with a real desire to supply the complete solution, is a guarantee that the production output of the DECO 42f will be maximised.

These elements were thought through with a concept of practicality and efficiency in mind. For example, the generously sized tank containing the cutting liquid is located away from the machine so as to minimise thermal problems and simplify handling. The universal type conveyor was designed to operate harmoniously with all types of chips. The incorporated filtration system reinforces the versatility of the DECO 42f.

The pre-setter is another tool contributing to the power and availability of the DECO 42f, - the time lost with tool changes and setting

is reduced to a minimum (please refer to DECO Magazine 20 for further details on HSK C32 tools).

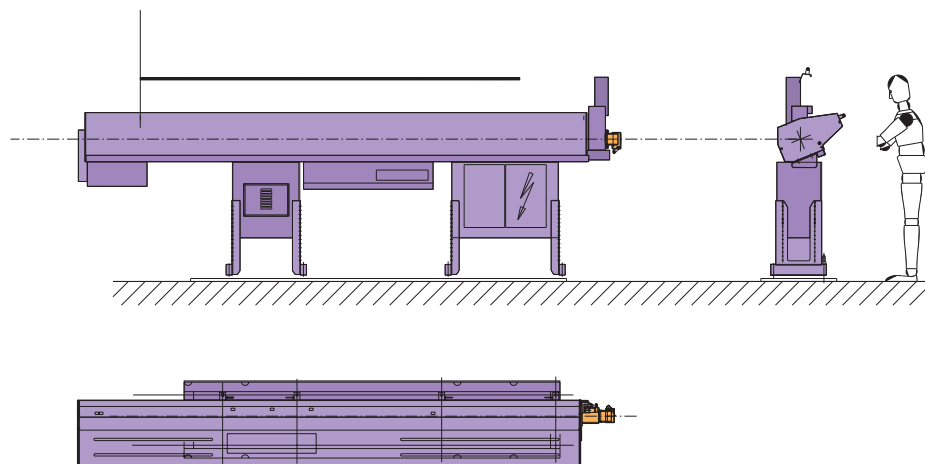
Nowadays, TORNOS is even going further along this route, since the company is now offering the facility of opting for an additional bar feeder based on different selection criteria - e.g. size, bar length, origin (manufacturer) and customer preferences.

From 2002 onwards, the DECO 42f will be available with bar feeders from three well known manufacturers, who are specialists in their field - namely, FMB, IEMCA and LNS. For further details, please consult your normal contact at TORNOS.

A major change

Following many thorough tests and based on the comments of several professionals, the machine has undergone some changes, thereby making it possible, with the first machine supplied, to machine parts up to a length of 180 mm (as against 100 mm announced a few months ago!).





Have you not yet had the opportunity of discovering the DECO 42f?

Please do not hesitate to see the machine at one of the many events, where it will be exhibited during the second half of 2002.

METAV	Düsseldorf (Germany)	04.06.-08.06.2002
AMB	Stuttgart (Germany)	10.09.-14.09.2002
BIMU	Milan (Italy)	03.10.-08.10.2002
Prodex	Basle (Switzerland)	05.11.-09.11.2002

YOUR ONE-STOP-SHOP FOR TORNOS SLIDING HEAD AND MULTISPINDLE TOOLING

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- Manigley
- MicroTurn
- Neukomm
- Precitool
- Schaublin
- Schwanog
- Valtec
- Zeus Knurling

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Interchangeable insert form tooling ideal for multispindle applications.
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Form and Cut Knurling and Marking tools.

And also Bar feed collets and accessories to suit all makes of bar feed. Machine spares for traditional cam machines.

Tooling Support around the world...tech@floydautomatic.co.uk. No matter where you are, we can offer you assistance on tooling for Tornos machines, either directly or through our network of business contacts.



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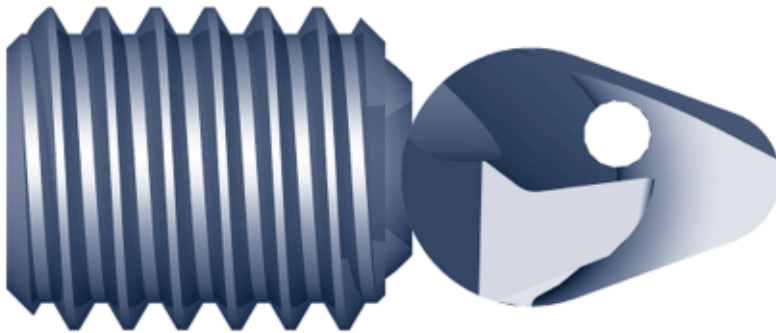
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Due to component miniaturisation particularly in the car industry, optimum chip evacuation is a parameter demanding more and more attention. This is due, in the first instance, to the quality of the substrate prior to application of the micrometric coating.

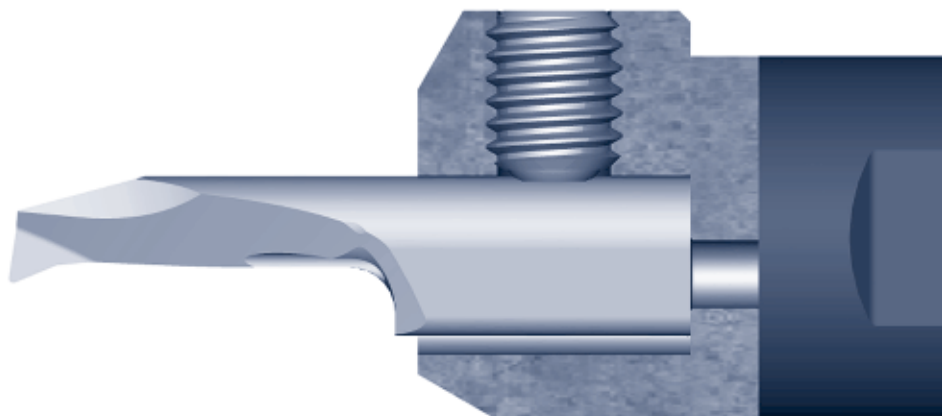
From selecting a micro-geometry to an adapted CBN, the development work to be executed for machining the grooves in hard materials, is still quite considerable.

Smaller, deeper and of improved quality



Clamping rod in a drop shape for maximum stability

When these words are used in the context of material removal, they involve the user and hence, the tool designers. Boring applications frequently entail the choice of specialist solutions. In many cases, chip evacuation takes precedence over cutting speeds. Without doubt, this problem is quite simple to overcome but can the time needed to achieve the surface quality by grinding be substituted by a finish boring operation? It is at this point that numerous special solutions, designed on the basis of current manufacturing processes, come to the fore, beyond all standard solutions. For large-scale series, special micro-geometry settings must be worked out before determining the series production cutting parameters. The Wipperfloethen geometry was accordingly readapted so that grinding could be substituted by the finish-turning operation. Sharing the know-how amongst all those parties involved is essential for such applications.



Efficient and compact clamping of the tool

As a general rule, the car industry and sub-contractors define their requirements in terms of machine construction and hence, the need to develop special tooling.

For some years now in the car sector, the requirements have tended towards parts miniaturisation, especially for the safety components (for example, power assisted steering and ABS systems).

For such applications, the basic criterion for the tooling is to offer optimum repetitiveness. The operator is perfectly well aware that a continuous tolerance of 0.01 mm is difficult to achieve.

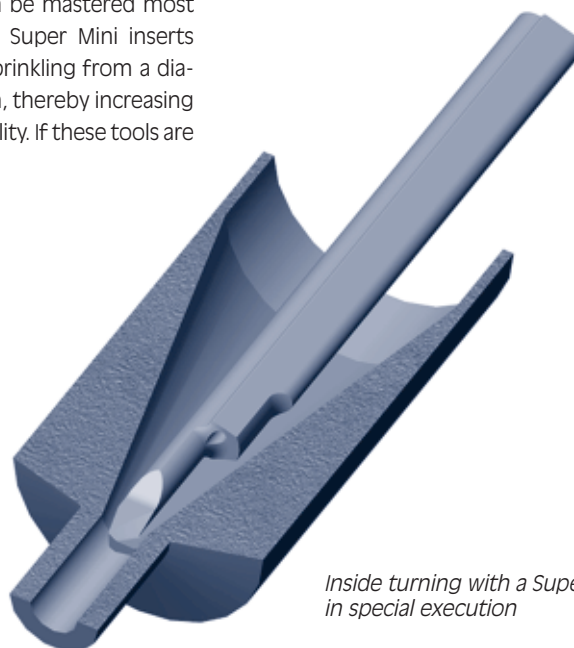
Before directing the processes towards a reduction in cost (i.e. by dispensing with the grinding work), the design of the tools should, at the outset, alleviate the stresses of working with hard materials.

Soldering CBN inserts is not dependent upon high technology but know-how is absolutely essential when it comes to preparing the cutting edges. There is no formula or fundamental theory on the design and manufacture of such tools. Many different processes have been developed at the manufacturers, but these are generally improved upon jointly with the final user. It is only the development

channelled in this direction, which will optimise the application, thereby considerably reducing the cost of a CBN insert compared with a carbide insert.

The Super Mini tools of the HORN Company have been specifically designed for precision work. The base in a water drop shape (i.e. ovoidal), holds the insert in an incomparable position thereby clearly reducing the phenomena of vibration. From this position, chip evacuation can be mastered most efficiently. The Super Mini inserts have central sprinkling from a diameter of 1 mm, thereby increasing their functionality. If these tools are

capable of machining the latest materials, the soldered inserts will make it possible to work the most complex alloys. Close co-operation between the user and supplier will lead to the development of optimum solutions for these specific applications.



Inside turning with a Super-Mini tool in special execution



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Paul Horn GmbH**

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Unter dem Holz 33 – 35
D-72072 Tübingen
Telefon (0 70 71) 70 04-37 –Telefax (0 70 71) 70 04-58

DECO 20a:

On the road to discover an universal product...

At DECO-Magazine it is not our custom just to mention something once, so we would now like to come back to a product that is already well-known.



Because the DECO 20a lathe was designed with this global approach in mind, the question that had to be answered by the engineers was whether it was really feasible to de-

The most varied of requirements...

Amongst the vast range on offer by TORNOS, the DECO 20a recently underwent an upgrade through the incorporation of a drive facility on the front platen, a new overall design and a technical development of the combination/ counter-spindle slide, thereby making this a universal tool.

When investing several hundred thousand Euros in production, the client is primarily searching for a reliable tool that is perfectly adapted to the work, but which is also an 'open' product that can be used to match the vast number of different customer requirements.

In the design of the DECO 20a (as is also the case with all the other DECO machines), the engineers at Moutier concentrated on this overall vision of satisfying ever changing customer requirements.

The result: an imposing, reliable lathe, the size of which gives an indication of its strength and excep-

tional capacities. It is more than a mere lathe with its vast potential of adding different options – it also accommodates tools that can be perfectly interchanged with the various items comprising the machining area. A drill, for example, can be deployed for the platen or combination unit or for counter operations without any restriction whatsoever.

Consequently, the high production output of the DECO is perfectly supported by maximum simplicity and versatility of use.

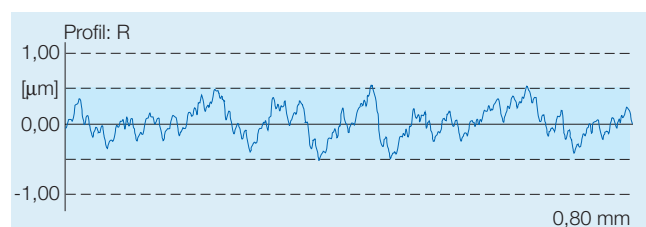
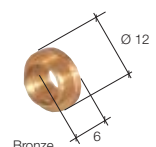
As the tool-holders are pre-set in masked time – as is also the case with programming – machine downtimes are reduced to a minimum.

sign a machine that could keep all it promises to meet the most varied of requirements.

Let us now look in detail at some points which are the outcome of an analysis conducted with our customers to help us have a better understanding of the actual scope of application of the DECO 20a!

High precision

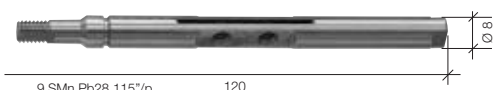
Moving masses is not obviously compatible with extreme precision (look at the DECO 10a, for example) but nonetheless, precision machining, surface states and compliance with dimensional tolerances are still paramount – see this for yourself!



Ra 0,17 µm

Maximum productivity

Apart from its design and kinematic properties, the DECO 20a is perfectly adapted to achieve very high production capacities and we shall now illustrate two examples of parts machined at extremely high speeds.



Removing vast amounts of material

Does your client need a type that has to undergo a special machining process for a specific part? You are not so concerned about extremely

high precision but have to "evacuate the chips". No problem. The same DECO 20a can easily cope with the toughest of treatments. Picture "b"

M16 X 1,5
Edge rolling

a

Stainless
steel 316 L

High
pressure
drilling
Ø 13,5
depth
prof. 155

280

Ø 18

Ø 4

b

Ø 20

Stainless steel 420

shows a part executed with the DECO 20a with a 4-mm radius pass and rough-finish turning carried out simultaneously. As for part "a", this comprises edge rolling an M16 thread and internal drilling to a depth of 155 mm and an internal diameter of 13.5. These two parts perfectly illustrate the exceptional stability of the machine.

Highly specialist parts

You client has decided to go in for locksmith work and execute parts that are quite incompatible with small parts turning. No problem. The DECO 20a will allow you to respond to such requirements. Its vast array of tooling and equipment allows it to match up to the most extreme constraints without further ado.

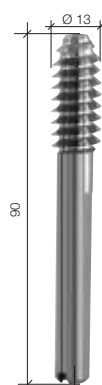
The locksmith parts presented here were produced at a rate of roughly 3 parts per minute on the DECO 20a.



Medical know-how

TORNOS is the leader in the medical and dental sector, enjoying many years' experience in thread whirling, high-pressure drilling and machining of re-melted stainless steels or titanium. The DECO 20a incorporates a vast array of know-how thereby allowing you to approach such highly demanding market sectors.

The bone and hip screws shown below are really beautiful illustrations.



High pressure drilling Ø 3

Stainless steel 316L
and Titanium



Stainless steel 316L
and Titanium

Every increasing universality

The above examples are but only a few of the most varied types of parts executed daily on the DECO 20a. What is more, the programming and DECO design enable users to proceed with part changes, going from one extreme to another, without problem and without having to invest in numerous machines or specific tooling.

With technology tending towards overcoming ever higher, if not opposing constraints in all spheres of activity, the DECO 20a has succeeded in establishing itself as a universal tool that can perfectly overcome these constraints.

Often, a so-called universal product is but a compromise between some mean characteristics corresponding to the requirements of specific fields of activity. This is not the case with the DECO 20a! The lathe really proposes solutions that fully comply with these various requirements.

Nowadays, the DECO 20a machines are used in all spheres of activity and to meet the requirements listed above.

Are you now asking whether the DECO 20a is capable of executing your most demanding parts to your complete satisfaction?

Coupled with a rate of productivity providing you with maximum profitability?

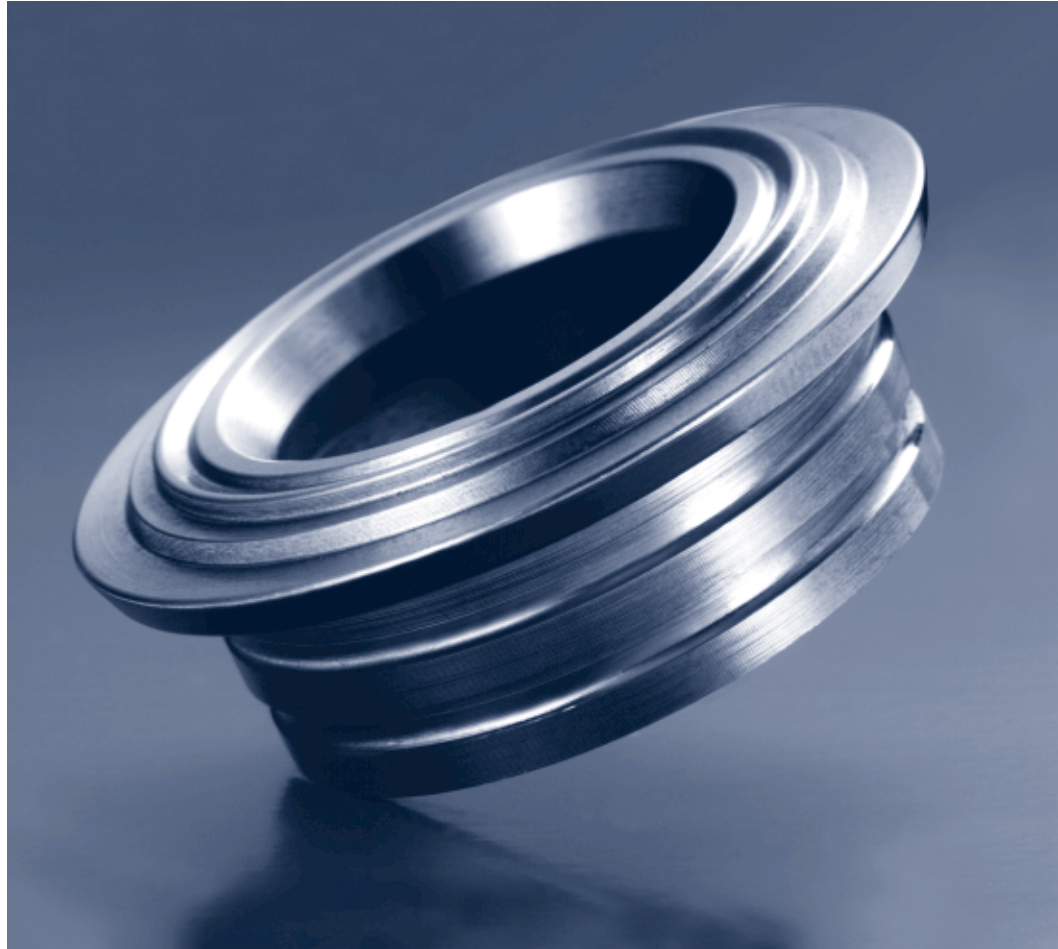
Please do not hesitate to consult our specialists (at the address below) or your normal TORNOS contact. They will be pleased to offer you advice and demonstrate what the DECO 20a can do for you!

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MOTOREX-Focus:

Automatic multispindle lathes brought up to speed

Where there are extremely large numbers of parts and complex, multi-stage machining processes, tool change times are a very important consideration. In this case, CNC-controlled, automatic multispindle lathes produce significantly more than their single-spindle counterparts. Where materials that are difficult to cut are also being machined, cutting oil has great influence on the efficiency demanded, quite apart from the correct choice of tools and tool changing system. We used MOTOREX SWISSCUT ORTHO 400 to test the series production of a lock ring made from heat-treated steel.



Demanding workpiece

The type 42 Cr Mo 4 V heat-treated steel lock ring for the car industry has a strength of more than 1000 N/mm² and is produced during the test by machining approx. 80 % of the original raw material with a total of 13 different tools. The tolerances specified by the customer, such as the diameter measurements of 20 µm and the length measurements of 0.05 mm, are rated as extremely ambitious.

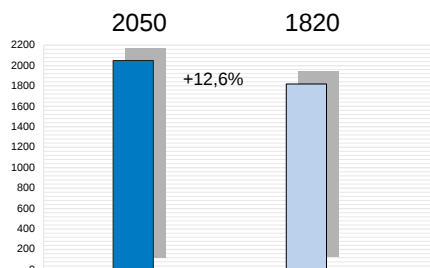
For the comparative test, five representative operations were chosen:

- A) roughing
- B) solid drilling
- C) internal roughing
- D) punching
- E) cropping.

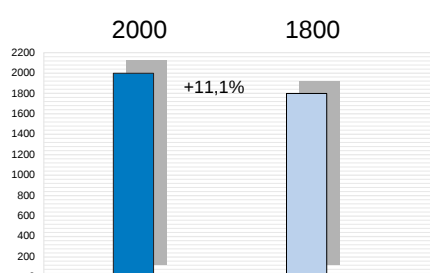
A conventional, high-performance cutting oil and MOTOREX SWISSCUT ORTHO 400 were used.

Absolute figures:	Parts produced up to tool change
Percentage values:	Performance optimization
Bar diameter Ø:	41 mm
Material:	Heat-treated 42 Cr Mo 4 V steel
Source:	MOTOREX AG, Langenthal, Mr. D. Schmid

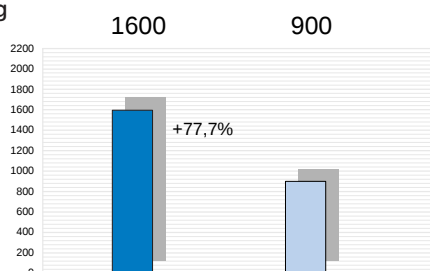
A) Roughing



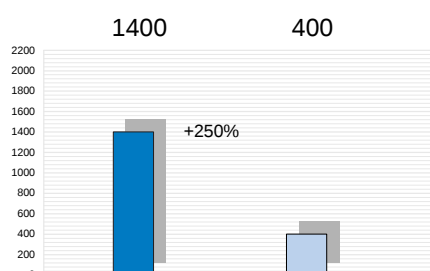
B) Solid drilling



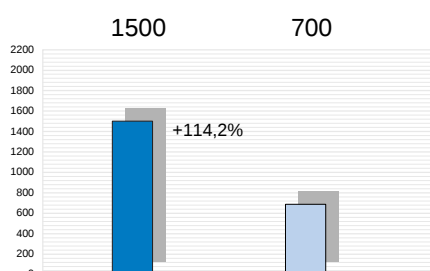
C) Internal roughing



D) Punching



E) Cropping



- A) SWISSCUT ORTHO 400
- B) High performance cutting oil

Astonishing results

The astonishing results indicate permanent optimization potential even for automatic multispindle lathes. The basic prerequisites are the three success factors: machine, tools and cutting oil, which will only facilitate the desired increase in performance if they are optimally matched. MOTOREX SWISSCUT ORTHO 400 enabled the feed rates and cutting speeds to be optimized and perfect chip-breaking to be achieved. SWISSCUT ORTHO cutting oils are based on an innovative formula comprising low-aromatic, solvent-refined base oils, a large number of special additives and fully synthetic components. They are distinguished by their outstanding cooling, washing and lubricating power plus enormous wear reserves in an extremely wide temperature range. The result is also significantly longer tool life.

If you would like to ask the specialists from MOTOREX a question about machining materials that are difficult to cut on an automatic multi-spindle lathe, then contact:

MOTOREX AG - LANGENTHAL
Customer Services
keyword "Multispindle machines"
PO Box, CH-4901 Langenthal
or send an e-mail to:
motorex@motorex.com

Mastering

tooling costs for small parts turning

Tooling costs are an important factor in the cost price of small parts turning. Other costs, such as down-times or starting up machines, are also influenced by the technicality and quality of the tools. We shall now review the essential qualities that determine tool profitability and examine the technical solutions adopted.



1. Tool strength

This is, undisputedly, the main factor that influences the useful life of the cutting edge of a cutter. For a tool with removable insert, the system of fixing the insert to the tool holder and the quality of the latter determine its overall strength.

These qualities also determine the longevity of tool performance (no wear and deformation of the insert casing on the tool holder)

The solution adopted by APPLITEC in its type 700 tool range is particularly efficient in this respect:

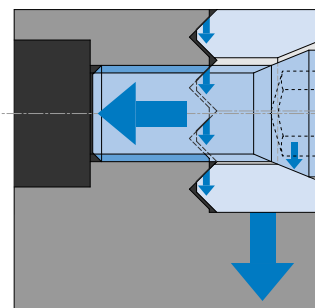
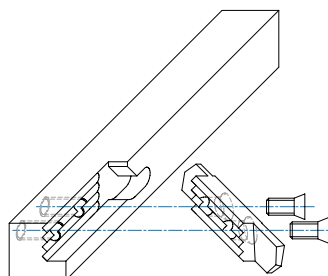
With this offset tooth clamping system, the clamping force of the

screws applies a very strong force to the basic support of the insert. The 45° angle created by the supporting faces of the teeth in relation to the bottom supporting face, locks the insert into the tool holder. The insert thereby contributes towards the strength of the tool holder, thereby preventing any deformation of the insert casing.

Case hardening prevents wear to the tool holder, thereby providing excellent anti-vibrating properties.

The clamping system is patented by the APPLITEC company.

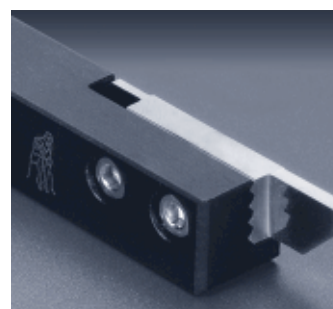
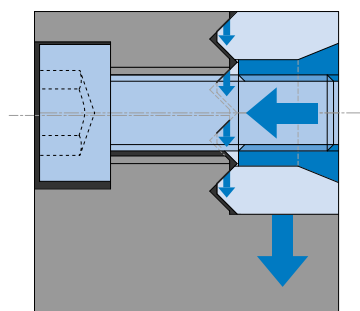
Power Tools by Applitec



2. Tool changing whilst mastering machine down-times

At tool level there are several factors that essentially influence the speed of insert replacement:

- ◆ the precision of repositioning the insert onto the tool holder (in 3 axes)
- ◆ insert accessibility (whether the tool holder needs to be removed from the machine or not)
- ◆ the quality of the tool holder (straightness and squareness) where it has to be removed from the machine.



For the majority of its type 700 tools, APPLITEC offers the facility of clamping from the side opposite the insert for one and the same tool holder. Two small threaded inserts are added to the inserts. (type B clamping).

Repositioning the type 700 inserts is less than $\pm 0.01\text{mm}$ in the three axes. They are also perfectly symmetrical.

The tool holders are ground on all four surfaces, which are perfectly square.

The influence of the above parameters on machine down times is obviously down to the tool clamping technique onto the machine, the pre-setting facilities and the organisation of tool procurement within the company.

3. Mastering machine start-up time

Although machine down times are widely influenced by parameters practised by each company, tool quality also plays a major part according to the above criteria.

However, the essential qualities needed for starting up the machines with respect to tooling, are based on the following :

- ◆ scope of the offer proposed by the manufacturer (i.e. different types of inserts, their geometries or quality)
- ◆ the availability of these products on the market.

APPLITEC offers more than 560 insert references, available in different PVD cladding qualities of the latest generation. The majority of these tools are available from APPLITEC stocks or from its authorised dealers around the world.

Mastering

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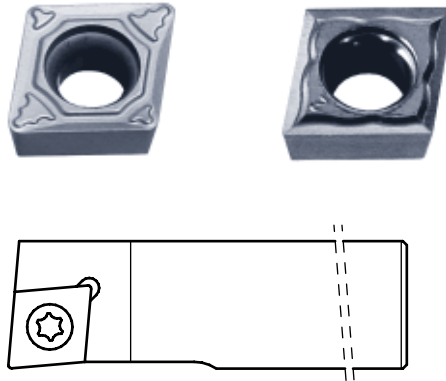
4. Cost of the tool

This is certainly the least significant parameter with regard to the actual cost of using a tool. However, in the current gloomy economic climate, it is obvious that each company is looking for solutions to limit its tooling expenditure. The concept of a client-supplier partnership is now becoming particularly important.

Certain types of tools, for example, lend themselves very well to regrinding. This applies to the type 700 APPLITEC tools. Available in large quantities for long production runs, APPLITEC is also pleased to offer a regrinding service for these inserts. In such cases, the re-ground inserts are returned with performance values as good as new.

It is clear that not all machining operations require the most sophisticated of tooling. ISO inserts, for example, are also quite suitable for certain turning operations.

APPLITEC offers a new range of ISO tools, the insert sizes of which and the tool holders are perfectly adapted to small parts turning...at highly competitive prices!



Conclusion

One can only reasonably define the cost of tooling in relation to tool performance.

Large-scale production cost savings can be achieved by using high-performance tools that meet the technical quality criteria indicated above.

Close co-operation between the client, distributor and manufacturer also represents a pledge of performance and efficiency.

Source:
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