NUMROTO at core of Unimerco's seamless global tool manufacturing operation

from left to right: Walter Grob, NUMROTO Head of Sales, Gerd Hotz, SAACKE Director Marketing & Sales, Jorgen Bylov, UNIMERCO Group Production Director, Carsten Thomsen, UNIMERCO CNC Grinding Specialist, Finn Hassing, UNIMERCO Group IT Manager and Ib MUNK Nissen, UNIMERCO Technology Development
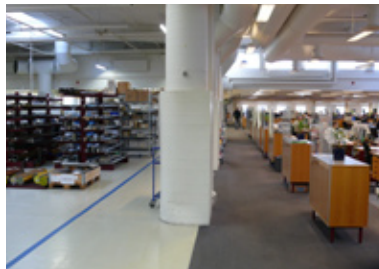
Unimerco has earned one of the most interesting reputations worldwide for creating special-purpose tools. Its development services are heavily relied on by many of its end users to work with them to design better metalworking production solutions, and the company often produces custom cutting tools at extremely short notice. Underpinning Unimerco's special tooling services, with 12 facilities worldwide, is a very close relationship with its tool grinding machinery builder Saccke, and standardization on the tool grinding software package NUMROTO – the company's key resource when developing and prototyping new special tooling.

This theme of uniform excellence runs deep within the company's culture. Every Unimerco facility looks very similar, not just from the outside but also from the internal building layout. All employees, no matter whether they are manager, engineer, or machinist on the production line, works in the same unified space – there is no separation between office and manufacturing areas. Everyone is treated equally in these open-plan environments, with the CEO having the same workspace as the secretary, the designer, the engineer or the appren-

tice. And the company is also majority owned by its employees. This culture has enormous benefits in terms of communication efficiency and team spirit, and Unimerco has an enviable reputation for retaining highly skilled staff. Another unusual feature of the company culture is a small "hotel" area on major Unimerco sites with some 10–20 rooms and living spaces. This makes it very easy for the company to transfer employees for training and knowledge exchange, and to host major meetings for tool development, machine handovers, and training with both its clients and suppliers such as NUM and Saacke.

Tool development

Unimerco has been in the tool supply business for over 40 years, and moved into the creation of special-purpose tools some 20 years ago, following the acquisition of its own CNC grinding machines for reconditioning tools. Customization of tool designs to improve cycle time and eliminate process stages was the natural next step, and the company has steadily developed its know-how in this sector. This is

aided by its unique corporate culture which means that many employees stay with the company for very long periods – allowing enormous experience to be brought to bear on any production requirement.

Once accepted, the final tool specification is stored on a master server at Unimerco's Danish headquarters, allowing it to be accessed over the company's intranet by any subsidiary. Each of Unimerco's manufacturing locations in the Americas and Europe (and soon Asia) uses identical Saacke grinding machines, controlled by the identical NUMROTO package used in the design – with the exception of local-language differences in the HMI. This means that Unimerco is able to faithfully reproduce every tiny aspect of the tooling design exactly as first conceived – wherever and whenever either new parts or regrinding is required.

Unimerco's focus on custom tooling typically involves the solving of complex problems, and this in turn has led the company to develop very close relationships with the grinding machine builder Saacke and the grinding software supplier NUM. Numerous major developments to the CNC technology inside Saacke's grinding centers can trace their beginnings to requests for new levels of machining performance from Unimerco. Examples include the very first automatic Tool changer on a tool grinder or the unique network

architecture. Likewise, Unimerco relies on a sophisticated tool design and machine control software, and standardized on NUMROTO in 1994. The package's comprehensive three-dimensional modeling, simulation and optimization environment plays a crucial role in Unimerco's ability to turn new designs around rapidly. If Unimerco has encountered a similar problem before (and the sheer length of its experience over 20 years means that this is usually the case) then a template design typically exists in its model library. This means that many special-purpose tool designs can be imported, modified, simulated and optimized all within the space of an hour or so. NUMROTO's rich virtual prototyping facilities includes both workpiece simulation and collision monitoring for the Saacke grinding machines, helping Unimerco to build plenty of time into the development cycle for trials and customer evaluations.

UNIMERCO outil à rainurer les canaux   N= 1990t/min Fn= 0,06 mm/rev.

Tools to boost productivity in hydraulics parts

One of numerous industrial application areas that Unimerco is heavily engaged in is special tooling for machining hydraulic valve bodies. It's a sector that is characterised by a need for ever more complex solutions, and many machining contractors have found that close relationships with the tool developer holds the key to meeting these demands. Unimerco has developed a range of tool concepts for this market which can be easily and quickly customized for individual applications. One example is its land grooving tool, which can machine all the lands in a spool bore in a single operation. Some machinists working in this market can use a cutter with inserts, and would typically have to machine the valve body in several operations with different tools, and maybe from both sides. With up to as perhaps 15 lands in a bore, the time and cost savings of optimized all-in-one solutions can be enormous.

Complete tooling package for the machining of a cast iron valve body

Unimerco has equally advanced solutions for other common valve body machining tasks such as holes for compensators, oil, shock valves, etc. Unique know-how embodied in its designs means that its tooling solutions also ensure that bores are created "ring free" – and do not require subsequent finishing operations after the initial machining stage.

A typical example of an efficient Unimerco all-in-one solution – a land grooving tool and the before and after results of a machined workpiece

NUMROTO at the GrindTec 2010 in Augsburg

In March 2010, NUM will be taking part in the GrindTec for the sixth time in succession. As always, we will be presenting the latest NUMROTO innovations and looking forward to fruitful discussions.

Come and see us between 17 and 20 March 2010 in Augsburg. Our team is looking forward to meeting you. You will find **NUMROTO in Hall 7, Stand 739.**

Of course, there will also be a large number of grinding machine manufacturers with machines on site which are equipped with NUM CNCs and NUMROTO. These are namely:

Exhibitor:	Hall:	Booth:
UWS	5	517
Saacke	1	102
Ewag	7	735
Michael Deckel	7	737
TTB	1	102
Hawema	7	746
Pizzi	5	515

NUMROTO at the GrindTec:
Hall 7, Stand 739

www.num.com

www.numroto.com

CNC HighEnd Applications

numroto® flash 13

Optimum production with fewer resources

In the last Flash editorial I wrote about change being the only constant factor in our business. Change and the altered economic circumstances affect all of us in the tool grinding sector. We urgently need to continue optimising processes, investments and capacities. We have to prepare for a period of recovery in which we may have to achieve more, but with less capacity. Personnel capacity has never been overabundant, particularly when it comes to specialists. This situation will not improve in a period of recovery: in fact, quite the opposite is true.

Many companies are using this time of crisis to better position themselves on the market (with innovations, new products and new offerings). We are all working intensively – each of us in our own fields – to increase productivity. By the time a tool, for instance a profile cutter, is used on a customer's machine, many different partners have been involved in its production: this might be in the production itself, or prior to that in the design of the tool, in the definition of the tool coating or in the construction and automation of the machine.

Between all these partners there are interfaces of varying intensity. The interfaces here range from relatively simple to extremely complex. Naturally, the complex interfaces require more expenditure and capacity. Poorly functioning interfaces cost a lot of time, capacity and ultimately money. I believe that we must take a closer look at particularly complex interfaces with a view to identifying potential room for improvement. Trade fairs such as the GrindTec are a wonderful platform for finding out about the latest trends and opportunities, and for coming up with ideas on how to optimise interfaces. The fewer and more simple the interfaces, the more efficiently we can operate. The user-friendliness of a machine very much depends on the quality of the man-machine interface. One of the items we will be presenting to visitors at the GrindTec will be a new kind of 3D simulation. This simulation now includes the relevant moving parts of the machine, such as the support, which means that potential conflicts can be resolved during the simulation phase.

NUM looks forward to welcoming you at Stand 739 in Hall 7 at the GrindTec from 17 to 20 March 2010 in Augsburg.

Peter von Rüti, CEO NUM Group

NUMROTO at the GrindTec 2010

NUMROTO Hall 7, Stand 739

Visit us on our Stand between the 17th and 20th of March 2010 in Augsburg, Germany. Our team is looking forward to meet you.

Collision-free thanks to sophisticated machine modelling

The NUMROTO programming system, which has been on the market for over 20 years now, is used in over 2,500 tool grinding machines worldwide. Tool manufacturers and grinders choose this software because it allows them to cover an extensive palette of tools, and they are also able to develop the grinding program independently for the tool grinding machine, and test it for collision safety. Thanks to increasingly high-performance PCs, the entire tool grinding machine as well as the actual grinding process can be simulated right down to the smallest detail. Today, the majority of all NUMROTO machines are equipped with 3D simulation. We have featured several reports about it in the past editions of our newsletter.

Modern tool grinding machines feature an even more compact design thanks to 3D-CAD technology. The space in the machine interior must be utilised optimally for the large variety of tool geometries to be ground at all. This is made more difficult by the fact that individual machine components are only used for certain tools or processes, and can be a hindrance during other procedures. The programming system must therefore always choose the calculated grinding paths, remaining free from collisions, despite these impediments. Prerequisite for this is a very precise, realistically represented machine model. Version 3.5.1 of NUMROTO is equipped with very comprehensive machine modelling which ensures that the machine model on the PC behaves exactly like the real machine

The basis machine model for a tool grinding machine can be seen in figure 1. Models like these are to-
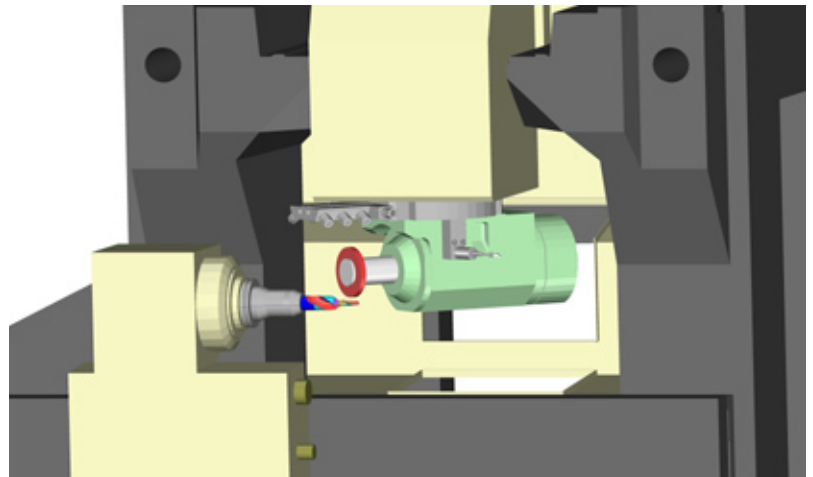

Fig. 1: Basis machine model

day found in standard programming systems for tool grinding. However, there are often many more machine components in the machine itself, for example supports, tailstocks, mobile steadyrests, special chucks for sintered castings or inserts, dressing unit(s), reconditioning station(s) and HF spindle(s). Figure 2 shows a typical machine with the corresponding equipment. The fixed-mounted machine components, such as the dressing unit or the HF spindle (yellow) in figure 2, are selected from the NUMROTO machine component list once and then remain visible in the machine model until they are deselected. For mechanically moveable components such as supports, the movement is programmed for the corresponding element. Variable machine components can remain in a rest position during one machining step, and appear in a working position in the next machining step. In a simpler example, these are the components which are positioned using an electric, hydraulic or pneumatic actuating unit. A component like this is animated in accordance with the assigned CNC command. The most complex to model are the axis-controlled machine components, for example mobile steadyrests, which are coupled in or decoupled in defined positions.
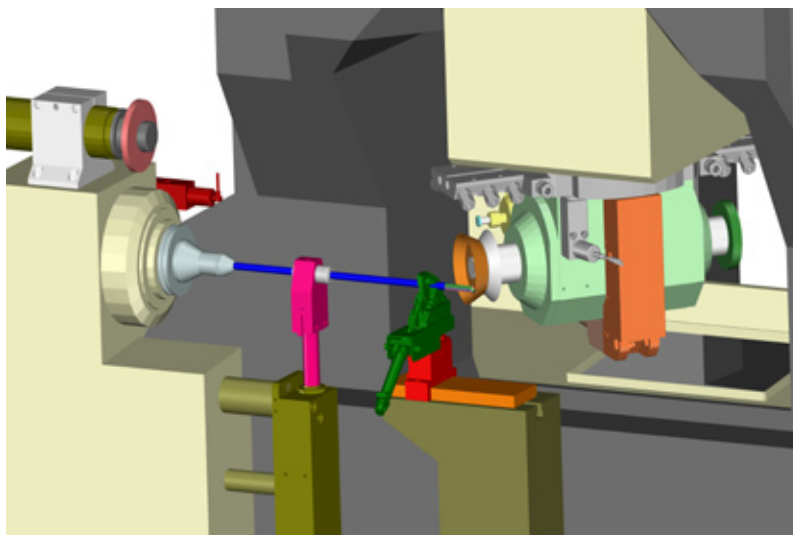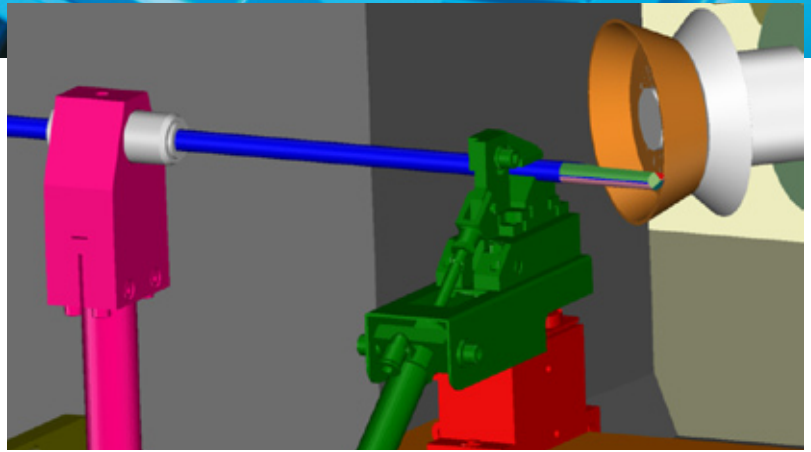

Fig. 2: Basis machine model plus machine components

Fig. 3: Add-on parts

Additional add-on parts can be allocated to every machine component. Figure 3 shows, for example, a half-shell with holding down clamp (green) which is assembled on the moveable support, as well as a bushing (light grey) in the mobile steadyrest. Add-on parts can be installed in a variety of sizes. If the machine is retooled for a different application, the newly-installed add-on parts are then selected in NUMROTO, which can be done with a

Fig. 4: Database for the machine components

single click of the mouse. The machine components and add-on parts are stored in the NUMROTO database and are therefore also subject to the usual data backup. There are no limitations on the range of elements, so even very complex machine details can be depicted extremely realistically. Thanks to the highly-realistic machine model on the programming console, exhaustive collision safety tests can be performed for every newly-generated tool program before it is applied using the tool grinding machine. The collision test is conducted in high resolution, which allows collisions between even very small parts to be detected.

Summary

Modern tool grinding machines are engineered very compactly. Optional machine components increase the risk of collision in the confined space within the machine. Only with an exact machine model, reliably tuned to the machine equipment, can collision-free production be guaranteed. The new version 3.5.1 of NUMROTO provides optimal machine modelling and collision testing. Existing NUMROTO systems can – as usual – be upgraded to the newest version.
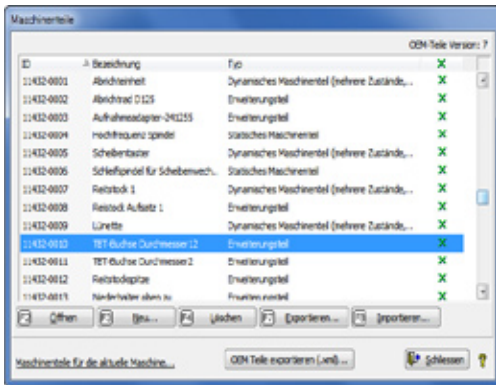
NUM Group at the EMO 2009 in Milano

The NUM Group, as well as many other international manufacturers who offer NUMROTO on their machines, exhibited their products from 5 to 10 October 2009 at the EMO in Milan.

Our open and inviting stand attracted a great deal of interest in NUM products, particularly NUMROTO. Visitors from all over the world wanted to find out more about NUM and its NUMROTO product, and therefore not only came to our stand, but also to those of our partners who manufacture and sell machines with NUMROTO. Here is a small selection of pictures of our stand and those of our partners.
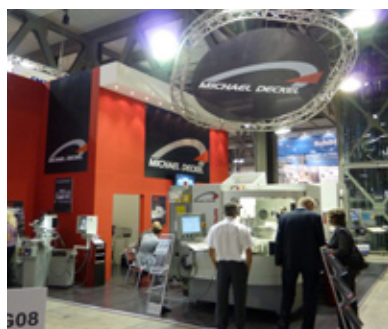
Masterpieces are a team effort

Have you ever looked back at the past and been surprised by the changes which have taken place in recent years? It happens to us from time to time, and we always wonder how it was possible to make products based solely on skilled handicraft – simply fantastic! These days find that geniuses are still around, working in various fields, but the resources that are available to them are now just a "little bit" different. We notice this most of all when we see how our customers' staff use our high-capacity CAD software to develop tools which would not have been at all possible just a few years ago – genuine mas-

Walter Grob

Martin Grob

terpieces! Deciding who the master is – the software developer or the expert user – is faineant. No-one can do it on their own – these innovations are ultimately the sum total of many different brilliant ideas – and you are bound to encounter some of them at the GrindTec.

That's why we think that the GrindTec is really worth visiting – We look forward to seeing you there!

Walter Grob & Martin Grob
Sales team NUMROTO

Release Notes

The most important innovations between 3.0.1 and 3.5.1

NUMROTO general

Gash out – Grind along gash out angle
At the operation "end mill gash out" within the modules drills and form cutters it is now also possible to grind along the gash out angle when doing the gash out.

New operation – Round clearance grinding
There is a new operation which can be used in different NUMROTO modules as long as the helix is straight. The name of this operation is "Round clearance grinding". This allows to grind the clearance in a new style.

Extended grinding program splitting
The grinding program can now be split in a way which generates one CNC program for each operation. Like this less CNC memory is used which has the advantage that the CNC program is transferred faster from the PC to the CNC. Also these smaller CNC programs will enhance the overall performance of the CNC.

Custom file name for export and import
When exporting or importing data from NUMROTO, the filename can now be chosen by the user.

Search for tooth position before measuring the clamping length
If needed the tooth position can now be probed before probing the clamping length of the tool.

NUMROTO 3D

Collision check of active grinding wheel
The collision check will now detect collisions between the active grinding wheel and the blank whenever the active grinding wheel is making a move which is not part of the actual grinding.

Automatic check of wheel removal rate
When doing the collision check the total removal rate of the grinding wheel can now be monitored at the same time.

New administration of 3D machine parts
Within NUMROTO it is now possible to add 3D components or move them in all three linear axis. This allows to administrate additional machine parts like dressing units, probes, supports and so on quite easily and directly from NUMROTO.

Using a 3D model as a temporary blank
When exporting a calculated 3D model it is now also possible to generate 2D and 3D DXF files. When generating a 2D DXF

file it is possible to select the view angle of the tool.

End mills

Setting of disengagement distance
For most operations the disengagement distance can now be programmed manually if needed. This allows to limit disengagement distances which are too big or to make disengagement distances, which are a little bit too tight, a bit longer.

Feedrate reduction for cylindrical reliefs
In the end mill package it is now also possible to use the feedrate reduction at the rear end (as for flutes).

Step drills

Selection of grinding direction at the break point
The grinding direction for break point reliefs can now be switched.

Form cutters

Multiple clamping system transformation tables per tool
Now it is possible to program more than one clamping system transformation table per tool. Afterwards for each grinding operation a different clamping system transformation can be selected if needed.