KOMET GROUP

numroto®
Total solution for tool grinding

Exceptional flexibility marks NUMROTO out

JEL® has relied on NUMROTO software for about 20 years, making it one of the company's oldest partners. Since being integrated into the KOMET GROUP, the benefits of the flexible and simple, standardised NUMROTO application have also become apparent to the entire KOMET GROUP. Bit by bit, the application has been introduced and successfully used across the whole group.

From left to right: Walter Grob, Sales Manager for NUMROTO, Kurt Pohle, Head of the KOMET GROUP Complete Machining department in Stuttgart, Mr Joachim Dünwald, Production Manager for KOMET GROUP in Stuttgart and Mr Jörg Federer, NUMROTO Application Manager.

A leading manufacturer of precision tools, the KOMET GROUP is represented around the world by 15 subsidiaries, 40 service and sales centres and 10 production sites. The company was founded in 1918 and has operated under the name of KOMET® since 1924. With the takeover of DIHART AG in 1996 and JEL® GmbH in 1999, KOMET® has strongly expanded its product portfolio in the area of thread and ream technology. The company uses a large number of machines equipped with NUMROTO and is set to obtain even more machines this year. A major part of their operation involves producing solid carbide tools in small to medium-sized series. Their machinery includes products from UWS, SAACKE, DECKEL, EWAG, TTB and STRAUSAK. All the machines are connected in a network and are attached to a central multi-user database. NUMROTO has become a tried and tested standard for the KOMET GROUP. With innovative tool concepts and all-round solutions, the KOMET GROUP is a global technological leader. Reducing production costs, economic efficiency and reproducible drilling quality are the core aims of the tool solutions and concepts, in both the standard and specialised areas. Customer satisfaction is a top priority, along with the possibility of being at the forefront of innovation in the tool sector.

The KOMET GROUP relies on NUMROTO because this software runs on various machine types. Once an employee is familiar with NUMROTO, he or she can work with any machine. This results in greater flexibility in production. The NUMROTO software itself also offers flexibility, which is one of the reasons why the KOMET GROUP uses it. "NUMROTO is incredible flexible", says Joachim Dünwald, Production Manager at the KOMET GROUP in Stuttgart. "There is a solution for virtually everything." Another major benefit is that the software is constantly being updated. "NUMROTO is alive – you just have to briefly download the update to the machine and you're up-to-date", adds Mr Dünwald. This is true of all the NUMROTO machines in use at KOMET® in Stuttgart; including those that are about to turn 20 years old. Another plus point is the 3D simulation: "The NUMROTO 3D simulation is always good for showing employees how the process works, but also for identifying errors", says Mr Kurt Pohle, Head of the Complete Machining department at the KOMET GROUP in Stuttgart. The KOMET GROUP also uses the "in-process measurement" application (see article over the page). This enables very precise grinding by compensating for the wheel wear and thermal effects in the machine itself. In addition, the control measurements make the production process verifiable and secure. This function is becoming increasingly popular, enabling very reliable production.

THE KOMET GROUP insists on consistent quality in production, repairs and delivery, all around the world. This goal is achieved by KOMET SERVICE®. This service covers professional regrinding, individual recoating, ultra-precise retooling and, where needed, a compact tool range, including solid carbide tools and simple VHM special tools. The KOMET GROUP relies increasingly on external partner companies that are licensed by KOMET® to regrind or even produce KOMET® products. This is mainly to cover peak production times and to be able to guarantee waiting periods. The KOMET GROUP prefers to cooperate with partners that use NUMROTO machines themselves, in order to implement the idea of the "extended workbench". Thanks to the compatibility of the programming systems, the companies can exchange tool data and offer the high quality that the KOMET GROUP guarantees.

KOMET GROUP Deep-hole drill with special profile at the tip

Deep-hole drill with special profile at the tip
This solid carbide drill is designed to bore deep holes. At the same time, it creates a precisely defined profile at the base of the drill hole. This type of tool is generally used to make holes in which components with a special form are to be installed form-locking. For example, sealing rings, springs, mechanical safety mechanisms or sensors. The drill's two cutting edges can be designed symmetrically or asymmetrically, in order to create sharp-edged corners, for example.

1961 – 2011 50 years of CNC

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EMO Hannover 19-24·9·2011

NUM at the EMO Hall 25, Booth C 25

NUMROTO at the EMO 2011

NUM, together with NUMROTO, will be exhibiting at EMO in Hanover in September 2011. We will be showing you the latest NUMROTO innovations and will be available for constructive conversations. Visit us from the 19th to the 24th of September 2011 in Hanover: our team is looking forward to greeting you. You will find NUMROTO in Hall 25, Stand C 25.

And of course, there will also be many grinding machine manufacturers showing machines that use NUM CNC systems and NUMROTO. These are:

Exhibitor:	Hall:	Booth:
UWS	6	E 20
Saacke	6	F 57
Ewag	11	D 32
Michael Deckel	6	E 02
TTB	6	F 57
Hawema	6	F 12
Paragon	11	E 73

Stand out from the crowd with unique solutions

Over the last 25 years, we have helped our NUMROTO partners bring unique solutions onto the market at the right time. In close cooperation with our end user and partners' specialists, NUMROTO has become an exceptionally universal and productive solution for tool grinding. In NUMROTO, we are putting into practice our belief that unique solutions can help you stand out from the crowd. This flash presentation introduces a new customer-oriented NUMROTO function: "in-process measurement". The module was originally developed for the cylindrical grinding machine. However, we continued to develop the function so that you can now also use it on tool grinding machines while they are running. The measuring sensor senses the actual ground geometry and then repeats the grinding operation with suitable corrections until the dimension is within the selectable tolerance range. This enables you to compensate for systematic errors, such as the machine's heating cycle, wear on the grinding wheel, grinding pressure, etc. On the following pages, you can find out more about "in-process measurement" and how we implement it with our partners and customers.

NUM will again be taking part at the EMO in Hanover this year. At our stand no. C 25 in Hall 25, we will be presenting our entire product range and, in particular, our range of services. NUMROTO will, of course, be on board. Our NUMROTO employees and myself look forward to welcoming you to the stand. There, we can discuss an individual project solution for you and also celebrate "50 years of NUM CNC" together.

Peter von Rüti, CEO NUM Group

1961 – 2011 50 years of CNC

numroto
Total solution for tool grinding

"In-process measurement" permits very precise grinding

Over the last 25 years, NUMROTO has developed into a very universal solution for tool grinding. This success is based on our long-standing and very intensive cooperation with the grinding specialists of our end users and the machine manufacturers. Over the years, more and more new functions were added, making the software a real trendsetter in tool grinding. "In-process measurement" that was developed around 8 years ago represented a major step forward, and has been greatly expanded in the last few years. With many of our end users, this option is in every-day use and numerous processes are inconceivable without it. The measuring and compensation strategies have been continuously optimised, so that today micrometer-precision grinding of tool geometries is possible even of large series

Many tool grinders use the tool measuring probe "only" before the actual grinding: Either to measure the clamping position of the tool blank or, for tools to be resharpened, to determine the existing geometry (e.g. outside diameter, core diameter, spiraling of the cutter(s), flute space geometry, run-out, etc.). The same measuring probe can, however, also be used during grinding. This led to the creation of the expression "in-process measurement". Originally in-process measurement was developed for cylindrical grinding machines and is still used even today for cylindrical grinding. The tool measuring probe senses the actual cylindrically ground geometry and then repeats the grinding operation with appropriate offsets until the dimensions are within the selected tolerance range. This enables systematic errors, such as the machine's heating cycle, wear of the grinding wheel, grinding pressure and switching thresholds of the probe to be compensated. This principle can be equally well used on a tool grinding machine, and in many cases enables the cylindrical grinding on an external machine to be eliminated. In the meantime, in-process measurement functions have been greatly expanded and extended to many other operations in the tool grinding process. Figure 1 shows this clearly: All machining processes activated in column "P" can use in-process measurement, if necessary.

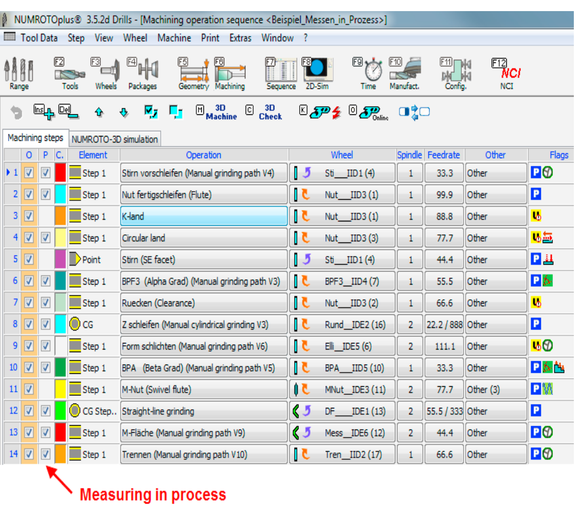

Figure 1 Machining steps with in-process measurement

At first sight in-process measurement may appear to be trivial. In reality, however, a great deal of know-how has been invested in the evaluation of the sensed deviations and in the strategy for their compensation. The following criteria have to be observed:

- On no account must there be any over-compensation, otherwise the part will become scrap.
- The sensing method must be selected such that high precision is assured. Machine heating or deflections of the probe must not influence the measurement result.
- In order that time is not unnecessarily spent on measuring, measurements should only be performed as often as required. For many machining operations it is sufficient to carry out random sample measurements, in each case after a number of produced tools.
- No time should be wasted either on unnecessary correction passes. Correction passes should only be necessary during a short grinding-in phase until the course of the compensation values is known. The compensation values for the following tools can then be estimated fairly accurately, so that its dimensions are normally within the tolerance band from the outset.

In many cases today, tool systems are offered which consist of replaceable carbide tips and a holder. With this inexpensive system, the carbide inserts are either screwed in or clamped. In order that after assembly, the tool system is at least as precise as a solid carbide tool, the holders and carbide tips have to be manufactured with higher precision than a solid carbide tool. Furthermore, the surfaces provided for the clamping have to be ground with micrometer precision.

Figure 2 KenTip™ drilling head (Kennametal works photo)

In-process measurement has been successfully employed for many years, for example, by Kennametal. For the KenTip™, a large number of critical dimensions are continuously monitored by in-process measurement and automatically corrected, if necessary. This allows the manufacturer to achieve a very high and constant quality and minimise scrap.

The following machining operations can be ground today using in-process measurement:

- Cylindrically ground outside diameters
- Manually programmed surfaces on the outside diameter
- Core diameters
- Position of surfaces (distances between or thicknesses of surfaces, exact longitudinal position of surfaces)
- Position of linear cutting operations
- K-lands

In addition to the in-process measurement, "control measurements" are also offered. These serve for checking geometric parameters after grinding. No correction is provided for. The following can be measured, for example:

- Differences in cutting height of drill main cutting edges
- Diameter run-out
- Pitch deviations

The data collected during in-process measurement or during the control measurements can be printed out or processed electronically for documentation of a production lot or for quality assurance.

The "in-process measurement" option can be retrofitted on existing NUMROTO systems.

```
Next tool: Stufenbohrer_D16-D12        20.06.2011 15:12:19
15:12:19 Prepare tool loading: 1
15:12:19 Tool loaded
15:12:23 Create tool grinding program (1)
15:12:24 Start tool grinding
15:12:24 Tool grinding finished
15:12:24 Probing the tool (1)
15:12:41 Measuring results: 11.9800; Compensation: 0.09
15:12:41 Measured value is too small
15:12:41 Create tool grinding program (2)
15:12:41 Start tool grinding
15:12:42 Tool grinding finished
15:12:42 Probing the tool (2)
15:12:53 Measuring results: 3.6200; Compensation: -0.06
15:12:53 Machining step (2) is being repeated
15:12:53 Create tool grinding program (2)
15:12:54 Start tool grinding
15:12:54 Tool grinding finished
15:12:54 Probing the tool (2)
15:13:02 Measuring results: 3.6000; Compensation: -0.06
15:13:02 Measuring result within tolerance
15:13:02 ISO finalize sequence
15:13:02 Start tool grinding
15:13:03 Tool grinding finished

Next tool: Stufenbohrer_D16-D12        20.06.2011 15:13:03
15:13:03 Prepare tool loading: 2
15:13:04 Tool loaded
15:13:09 Create tool grinding program (1)
15:13:09 Start tool grinding
15:13:10 Tool grinding finished
15:13:10 Probing the tool (1)
15:13:17 Measuring results: 12.0000; Compensation: 0.09
15:13:17 Measuring result within tolerance
15:13:17 Create tool grinding program (2)
15:13:17 Start tool grinding
15:13:18 Tool grinding finished
15:13:18 Probing the tool (2)
15:13:21 Measuring results: 3.6000; Compensation: -0.06
15:13:21 Measuring result within tolerance
15:13:22 ISO finalize sequence
15:13:22 Start tool grinding
```

Figure 3 Logging data

NUM Group at CIMT 2011

The NUM Group, as well as many other international manufacturers who offer NUMROTO on their machines, exhibited their products from 11 to 16 April 2011 at the CIMT in Beijing, China.

In the last two years, all NUMROTO machine producers have managed to considerably increase their machine sales in China. The market share for NUMROTO machines in China is expanding continuously and we are constantly working at offering the best possible service to our satisfied customers. The interest in NUM products, especially NUMROTO, is very strong – as was the interest shown by visitors to partners of ours who produce and offer machines with NUMROTO. Here is a small selection of pictures of those partners.

Release Notes

The most important innovations between 3.5.1 and 3.5.2

All relevant enhancements and improvements can be found at: www.numroto.com > Customer Area

NUMROTO general

Windows XP and Windows 7
Since version 3.5.1 of NUMROTOplus only Windows-XP and Windows-7 are supported.

Manual profile grinding path
The new manual profile grinding path enables grinding along a profile with a grinding pin, for example. This is often used for grinding insert seats. This new operation is part of the new "special grinding functions" option.

Comparison measurement for the temporary removal of the tool from the machine
If the tool is temporarily unclamped for the purposes of external measurement and is afterwards clamped in place again and aligned again with the probe, the new comparison measurement enables highly accurate positioning for the correction grinding process.

XML data interface
The data exchange with the machine or other systems can now optionally be performed using XML.

Finding the start tooth with uneven pitch
For tools with uneven pitch, the programmed pitch can now be compared with the effective pitch of the tool so that the grinding process uses the correct tooth as the first tooth.

NUMROTO 3D

Direct STL display after simulation
Immediately after the simulation, if desired, a temporary STL model can be calculated and displayed in a matter of seconds. This considerably improves the display quality. This function is optional.

Determining the centre of gravity
The 3D simulation can now display the centre of gravity of the simulated part. This enables the user to find any possible unbalance on the tool. This function is optional.

Save STL blanks within NUMROTO
It is now possible to save STL blanks directly with the tool program in the NUMROTO database. STL blanks with up to 2 MB per tool are supported.

Cutters

Radial relief with cup wheel
A cup wheel can now be used for grinding a radial relief. The cup wheel is correctly positioned automatically.

Tap-thread calculation
The calculation of the tap pitch within the cutter profile operation has been perfected.

Drills and step drills

Automatic alignment of flutes with wheel profiles
If a flute is used for a wheel profile, the wheel profile can now be automatically aligned to the cutting edge if desired. This calculation is optionally available.

Milling cutters

Correction profile
For each profile which is used in a tool an additional correction profile can now be defined. Afterwards the user can decide himself which profile should be used for the calculation and therefore for the grinding process.