



numroto® flash

Issue 27, May 2024

**GRINDING
HUB**

May 14–17, 2024

IMTS2024
AAHT

September 9–14, 2024

DMP

November 26–29, 2024

IMTEX 2025

January 23–29, 2025

**Grinding
Technology
Center**

March 5–7, 2025

Exhibitions 2024/25 NUMROTO is there

NUM will be showcasing NUMROTO at various trade shows around the world this year. We'll be unveiling the latest NUMROTO innovations and will be available for engaging discussions. Join us at the mentioned trade shows. Our team is excited to meet you.

You can locate our halls and booth numbers on our website num.com before the expo begins.

Additionally, many machine manufacturers will be present with machines equipped with NUM CNC systems and NUMROTO.

NUMROTO X – Next Generation

In the process of further development, the tried-and-true NUMROTO technology is now showcased as NUMROTO X on a modern platform. This isn't just a modernized version of NUMROTOplus; the development team has put in extensive effort to implement innovative ideas and create a future-proof product. The initial release of this ongoing development effort is now visible, featuring compelling new features such as the powerful Profile Editor X and the real-time 3D view. NUMROTO X sets new standards for optimizing grinding processes. We're excited to unveil NUMROTO X at GrindingHub. This launch establishes a solid foundation for consistently delivering our proven NUMROTO technology to our valued customers.

Last year, we also concentrated on thoroughly analyzing and optimizing the entire process chain to ensure an exceptional overall solution. We maximized the utilization of our NUMROTO Technology Center, equipped with state-of-the-art grinding and measuring machines, as well as a digital

microscope. Our focus remains on the precision of ground tools and meeting customer demands.

In our customer report, we introduce ALESA AG from Switzerland, a company with an impressive track record in manufacturing cutting tools since 1934. Operating as a family business, ALESA prioritizes the highest quality, precision, and innovative solutions. The utilization of NUMROTO software, known for its precision, is pivotal in producing top-tier tools. ALESA not only serves as a tool supplier but also as a problem solver and process consultant for end customers worldwide. Explore the diverse range of products, the integration of innovative technologies, and the strategic partnership between ALESA and NUMROTO, which redefine efficiency and quality in tool manufacturing.

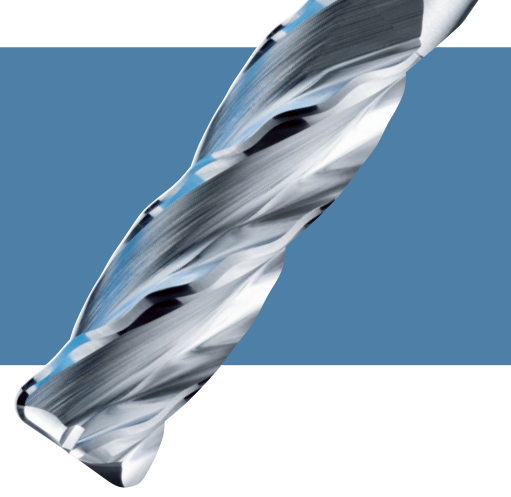
Best regards,

Andreas Hartig
CSO West

Adrian Kiener
CSO Asia

NUM 
CNC HighEnd Applications

NUMROTO Sets the Course for the Future

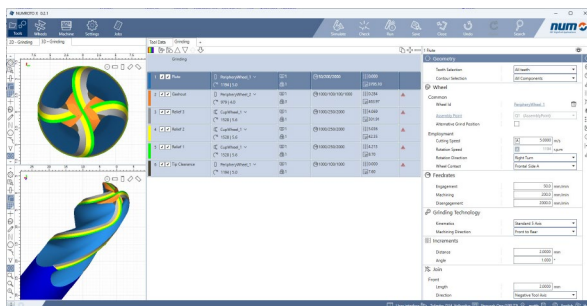


With NUMROTO X, NUMROTO is getting a new product line that will provide our customers with the usual high standards of NUMROTO technology in the long term. The new software has been rewritten from scratch, with particular attention paid to modern technologies and flexible expandability. This allows not only the implementation of demanding requirements for tool grinding, but also prompt adaptations to changing market needs.

Like NUMROTO*plus*, NUMROTO X is also designed as a desktop application and will also be available on the workstation PC as an application on the grinding machine. Proven concepts such as the multi-user database, 3D simulation and collision check as well as product documentation with NUMROTO-Draw will also be retained with NUMROTO X.

During the development of NUMROTO X, various innovative development priorities were implemented. The focus was on the optimized production of complex standard milling cutters. NUMROTO X not only offers an extended number of configurable geometry elements, but also provides completely new options for production and process planning. Grinding operations and probing cycles as well as dressing and calibration processes can be organized in sequences. With the option of executing sequences from within other sequences, these can be combined as required, allowing complex production processes to be configured and still clearly displayed.

These innovations are complemented by an integrated job manager, which has been redesigned from scratch. This provides the user at the machine, as well as in work preparation, with new possibilities in production planning. Job lists can be changed and expanded "on the fly", allowing uninterrupted production operations.



Instead of nested dialogs, the interface relies on scrollable areas that clearly display the numerous parameters. User input is immediately evaluated and converted into machining paths, which enables rapid visualization of the workpiece. This makes it possible to observe the effects of parameter changes in real time. The innovative visualization calculates a pixel-precise image for each zoom level, making every detail visible, no matter how small.

The kinematics module was implemented with a completely new approach to calculate the machine movements. It offers interesting possibilities, including support for interpolating 6-axis movements. New strategies have been implemented for the transfer movement between two grinding operations, which are not only more efficient, but also control the axes more optimally.

When creating a new workpiece, the user is supported by an extensive default value system. The default values can be configured as required by the user and adapted to the requirements of the tool range to be produced.

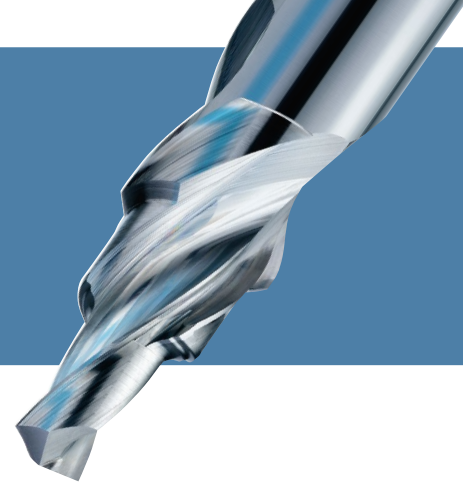
The guiding principle of "faster and more precise" is implemented by the NUMROTO development team with great ambition. In addition to the above-mentioned optimizations, which allow faster and more efficient programming and production of the tools, new algorithms have been implemented which deliver even more precise results.

For example, the flute calculation can maintain the programmed tool core exactly, even if the cutting angle of the grinding wheel is large, regardless of whether it is calculated automatically or defined manually. For the reliefs, the user can choose whether the relief angle should be maintained at the cutting edge or over the programmed relief angle width, analogous to the measuring depth when calculating the flute.

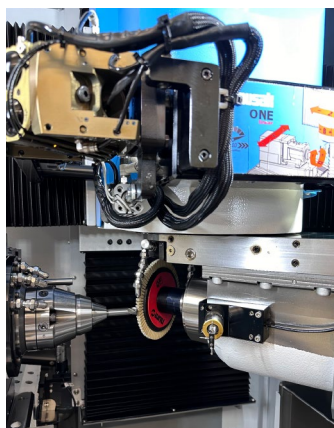
NUMROTO X will be officially launched at GrindingHub 2024 and will be available in its first version with the range of functions for manufacturing complex standard milling cutters. To ensure a smooth market launch, the new software will initially be used by selected customers in consultation with the machine manufacturers. After this initial trial phase, it will then be gradually introduced into the production facilities, opening a new chapter in the NUMROTO success story.

Even if NUMROTO X does not initially reach the functional scope of NUMROTO*plus*, the new software package boasts many new functions and innovative solutions. It is important to us to continue supplying our customers with the proven and high-quality NUMROTO technology in the future, which is why NUMROTO*plus* and NUMROTO X will be available in parallel for several years.

Cutting Edge Rounding Directly in the Tool Grinding Machine



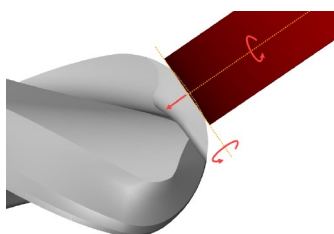
Today, the cutting edges of ground tools are often deburred and rounded by drag finishing or with a simple brushing process in the grinding machine. It's widely recognized that this rounding of cutting edges can significantly extend the service life of tools. In recent years, various research institutes and specialized companies have acquired precise quantitative knowledge regarding the relationship between the geometry of cutting edges and tool longevity. Multiple studies have demonstrated that cutting edges with defined rounding by brushing exhibit markedly longer tool life compared to conventionally rounded cutting edges.



Brush in the tool grinding machine

the brush could be positioned relative to the contact point on the cutting edge and oriented with technologically sensible variables such as plunge depth, displacement angle, and cutting angle. This results in uniform positioning for all cutting edge points, ensuring that the rounding of the cutting edge is consistent along the cylinder and the full radius. The brush movement is then executed along the full-radius cutting edge in up to 5-axis interpolation.

In contrast to drag finishing or simplified brushing, the cutting edges can be rounded in a defined manner in the direction of the rake face or in the direction of the relief angle. The ratio of the rounding radius in the direction of the rake face to the rounding radius in the direction of the relief angle is known as the K-factor. If the rounding radius dominates in the direction of the rake face, the K-factor is > 1 .



Positioning the brush on the full radius end mill D12

Given the promising nature of this technology involving the use of diamond fiber brushes for rounding cutting edges, tests were conducted on the tool grinding machine at the NUMROTO Technology Center in Teufen. Dynamic Finishing (brushes) and Keyence (optical measurement technology) participated in these tests. The primary focus was on precisely brushing the cutting edges, in contrast to alternative methods such as round-grinding the workpiece or using a robot for brushing.

For the tests, end mill and form cutter machining operations were adapted so that

Using high-quality brushes is crucial for consistent brushing results. For our tests, we used brushes from Dynamic Finishing, with which we achieved

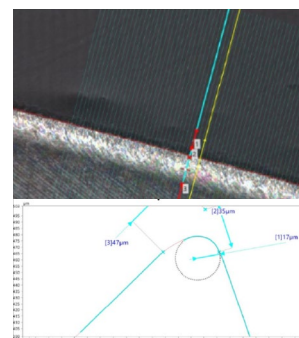
very good results. To accurately assess the brushing process results and optimize the process if necessary, it is essential to analyze and measure the rounded cutting edge in detail. The Keyence measuring microscope is ideal for this purpose. It is recommended to use the objective lens with a magnification of 100 to 1000X.

Operations for brushing will be successively integrated into NUMROTO. Initially in the milling cutter package and then operations for form cutters and drills are also planned. Thorough training is a prerequisite for successful use.

We are convinced that the rounding of cutting edges is becoming increasingly important. Therefore, we plan to integrate this into NUMROTO X at an early stage.

In addition to rounding the cutting edges, we also use the Keyence microscope to analyze the ground surface and for general process optimization, particularly to optimize the drives.

We would be happy to discuss the topic of "cutting edge rounding" with you in more detail during the GrindingHub in Stuttgart. We are looking forward to an extensive exchange with you.



*Rounded cutting edge
K-factor > 1 (Keyence digital microscope magnification 700, brush Dynamic Finishing No. 12 (Da 150 mm / Di 120 mm / B 7 mm / filament 0.4 mm with diamond grit 600)*



Measurement of the cutting edge on the full radius cutter at 45°

More details on brushing and the measuring microscope can be obtained directly from our partners:

www.dynamic-finishing.com
thomas.gyarmati@dynamic-finishing.com

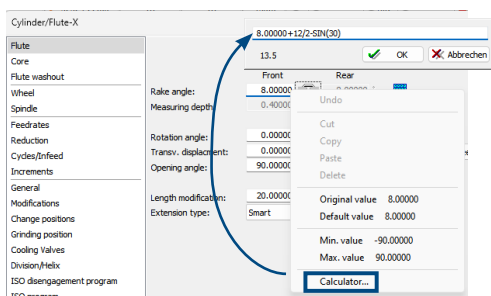
www.keyence.eu
m.schneider@keyence.eu

Release Notes 5.1.0 Compared to 5.0.0

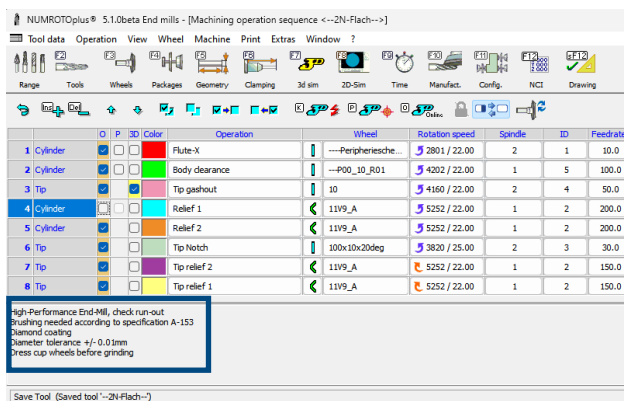


General

- A calculator can now be opened via the context menu (right mouse button) of each parameter, which can calculate simple and complex formulas.



- The tool comment can now optionally always be displayed below the machining sequence. This must be activated in the program options.



- Two additional pieces of information can now be stored on the info page of a tool:
Measuring program ID number and order number.
- Sort order of the tool and wheel list:
The last selected sort order is now retained even after restarting NUMROTO.
- New checkbox per wheel "Brush (non-cutting)":
A grinding wheel defined in this way does not remove any material when simulating in the 3D simulation. Nevertheless, the position of the wheels (brush) can be checked visually.
- Copy/paste several operations simultaneously:
Within the same module, it is now possible to copy any number of operations simultaneously and paste them to another tool.
- Probe run-out error as a processing step:
It is now also possible to determine the run-out error between machining steps (e.g. after grinding the flute).
- The filter has been extended with "last used" and "last changed" dates.

End Mill

- For ball nose end mills with gash out X with helix on radius "helix angle linearly increasing", the helix in the ball center can now be reduced by up to 100 %. This allows the curvature of the cutting edge to be influenced.
Article CH-50052480, Special grinding functions, is required for this function.
- S chisel edge: New longitudinal correction (height correction) in the center:
Due to wheel wear (wheel corner radius), a "hole" can occur in the center of the S chisel edge. This can now be compensated with the "longitudinal correction in the center".

Drill

- The calculation of the manual flute is up to 4 times faster.

Form Cutter

- New option for calculating the form relief: "Calculate relief direction according to current reference diameter, shift to cutting edge and take torsion into account". This variant makes sense if the profile is to be ground to the center (or close to the center) for a tool with a side distance (straight helix or shear angle).
With the new variant, the wheel position is not rotated the longer the more (as the wheel approaches the center), but the desired relief angle relative to the cutting circle diameter is still maintained.

Probing

- Calibration data can now be saved in a file on the PC and retrieved again.
- Only the coolant hole position can now be probed during the rotation probing processing step.

NCI

- The last 10 cycle times are now saved and can be called up using the drop-down menu.

Dressing wheels/sticking

- More options can be specified for how the CNC correction amount is to be taken into account before dressing.
- The execution of a dressing process can now be made dependent on the status of an E parameter.

3D Simulation

- The blank limits for a box blank can now also be specified with the mouse.

You can also find more information about new features on our website.

www.numroto.com

We would be happy to present the NUMROTO version 5.1.0 live to you at one of the upcoming trade fairs. In addition, as usual, we offer training courses at your premises or at our company and explain the innovations in detail to your employees.

ALESA AG: Swiss Precision in Circular Saw Systems and Special Tools



ALESA AG, with its headquarters in Seengen (CH), Aargau, employs around 65 highly motivated and experienced employees and can look back on an impressive tradition in the manufacture of cutting tools that began back in 1934. The family business is now independently managed by the 4th generation. The company's pride lies in its consistent focus on the highest quality and precision. ALESA has set itself the goal of supplying both the Swiss market and the world market with first-class tools, which are mainly manufactured or resharpened using NUMROTO software. The company is known by end customers as a "problem solver" and consultant who can optimize processes and maximize tool life. This combination of tradition, quality and innovative thinking makes ALESA a reliable partner for sophisticated cutting tool solutions.

Precise variety

ALESA presents an impressive product portfolio: Circular saw systems and special disk milling cutters which dominate a whopping 40 % of the product range and are manufactured at their production facility in Switzerland. The range also includes 40 % milling heads with indexable inserts, which enables precise milling with a high volume of chip removal. In order to meet the wide range of requirements, a wide range of special tools are available, which make up 20 % of the portfolio. Of course, ALESA AG also offers a comprehensive resharpening service for its tools.

Innovative technologies and quality

ALESA has been successfully using NUMROTO software to manufacture its tools since 2009. The commissioning of the first HAWEMAT machine with NUMROTO was a significant milestone in the company's technological development. Since then, ALESA's shop floor has grown considerably, preferably with machines equipped with NUMROTO. The use of this software enables precise and efficient production of tools that meet the highest quality standards.

ALESA optimizes its manufacturing processes through the comprehensive use of the NUMROTO infrastructure. The possibilities of 3D simulation, dressing, in-process measurement and the NR-Control job manager are particularly worth mentioning. The company's own expertise is also incorporated, particularly in the form of free programming, which is combined with the standard NUMROTO operations and tested as a whole in the 3D simulation. The complete program is then sent to the grinding machine, where everything is ground in a single clamping operation. Mr. Florian Legoll, Application Engineer ALESA, emphasizes: "The 3D simulation makes it possible to

precisely predict the production time of a tool too, which makes it much easier to prepare quotations."

Precise star interfaces and innovative circular saw systems

The circular saw systems in the Nutex family enable precise sawing and slotting on CNC centers without the need for end face clamping elements. This ensures that the circular saws and disk cutters are free on the face side, enabling work pieces to be cut precisely and flatly. The new, patented Nutex Star clamping system complements this. This pioneering, star-shaped star interface enables even greater cutting depths with even greater precision. This clamping system is also ground on NUMROTO machines at ALESA. Daniel Buchmann, Operations Manager at ALESA, emphasizes: "The ability to use NUMROTO on different machine types makes it much easier to train employees. Operators can be deployed on different machines without any problems. Changing a tool series from one machine to another is particularly quick and uncomplicated, even if the machines have different handling systems, such as chain loaders, robots or pallets."



From left to right: Florian Legoll, Application Engineer ALESA, Daniel Buchmann, Plant Manager ALESA, Markus Steiner, Head of Grinding Department ALESA and Jörg Federer, Application Manager NUMROTO



ALESA's strategy for tool manufacturing and resharpener

A major advantage of NUMROTO is that the same programs that are developed for tool production can be used in the resharpener centers without any changes.

Increasing demand for circular saws made of ceramic

"Currently, 80 % of ALESA's tools are made from carbide. The remaining 20 % of our tools are made of high-speed steel (HSS) in order to meet the diverse requirements of our customers," says Mr. Daniel Buchmann. There is a strong increase in demand from the medical sector for circular saws made of ceramic. In contrast to carbide and high-speed steel (HSS), ceramic does not contain any heavy metals that can be potentially harmful to the human body. ALESA took up this challenge and can now offer optimum solutions for this emerging industry. It is once again setting new standards in tool manufacturing and reaffirming its position as a reliable partner for high-quality and industry-specific solutions.

Synergy ALESA and NUMROTO

Mr. Markus Steiner, Head of the Grinding Department at ALESA, emphasizes: "NUMROTO is an absolute must for the procurement of a new tool grinding machine." The clear statement emphasizes the essential role of the NUMROTO platform for ALESA's demanding standards in tool manufacturing. The consistent use of NUMROTO not only reflects technological excellence, but also contributes significantly to the efficiency and precision of the production process.

Circular saw blades for efficient cutting

ALESA's general expertise in the range of circular saw blades is self-evident. Today, these saws are mainly made of carbide and are used for end products that are particularly difficult to machine or high-alloy end products. In addition to the cylindrical tools, various other forms, such as V-shaped circular saw blades, are also available. Thanks to the individual shaping of the saw blade teeth, they offer a flexible solution for various applications. Thanks to the small diameter of the star interface, the outer diameter of the circular saw blade is reduced while the cutting depth remains the same. As a result, the grinding time and material consumption of such circular saw blades can be significantly reduced.

Special form cutters for the automotive industry

One outstanding example is the special form milling cutter, whose complex form is logarithmically relief-ground and which ensures an important safety function in vehicles in the automotive industry. The high demands of the automotive industry have been fully met with this tool. Tool life was maximized, thanks in part to an ideal rake and relief geometry.

Corner radius cutters for the oil industry

Other interesting tools have been developed for the oil production industry. One such customized special milling cutter with corner radius and special chip breakers, also manufactured with NUMROTO, ensures maximum performance in this demanding environment.

