

Established in the market with passion, professionalism and innovative spirit



numroto[®]
Total solution for tool grinding

Developing and manufacturing special tools according to specific customer requirements is the specialty of WAWO, a company based in Oberriet (Switzerland). Founded in 1987 purely as a resharpening company, from the turn of the millennium the focus was on the manufacture of special solid carbide tools and resharpening was concentrated on the company's own products. The great potential and increasing complexity of these tools were quickly recognized; with NUM and the NUMROTO software, a reliable partner was found to turn even the most demanding tools into reality. The fact that both companies are only half an hour away from each other is further supported by a WAWO company motto: "short, clear communication" is the trump card.

The collaboration between WAWO and NUM began just over a decade ago. Today, WAWO uses NUMROTO software exclusively on several machines from various well-known manufacturers to manufacture tools of all kinds. The focus is clearly on the special solid carbide tools mentioned at the beginning, which are typically manufactured in small batches and used for milling, drilling, turning, reaming, thread cutting, etc. For individual customers, however, large batch orders are also fulfilled, in a 24/7 operation.

WAWO is therefore divided into two divisions. The customers of WAWO Werkzeuge GmbH, where the special solid carbide tools are manufactured, mainly come from the tool and machine construction sectors, the automotive industry, and the medical and vacuum technology sectors. However, special tools from Oberriet are also used in the watch industry. In the European automotive sector, many parts for steering, belt tensioning (as well as other safety components), powertrain and brakes are machined with tools from WAWO. One especially prestigious product line is impact tools, which WAWO grinds for producing gearboxes used in motor racing. In medicine, the tools are used in the manufacture of screws and plates as well as implants for joint replacement.

WAWO Produktion GmbH supplies customers who require medium to large batches of special tools and use them, for example, in the production of high-end furniture, car interiors and fashion articles. These are also manufactured exclusively on machines with NUM controls and NUMROTO software.

The extraordinarily high order rate of the offers created by WAWO is very impressive. A major reason for this high value is the way in which NUMROTO has been fully integrated into the quotation system. According to Adrian Thurnherr, Managing Director of WAWO Werkzeuge GmbH,

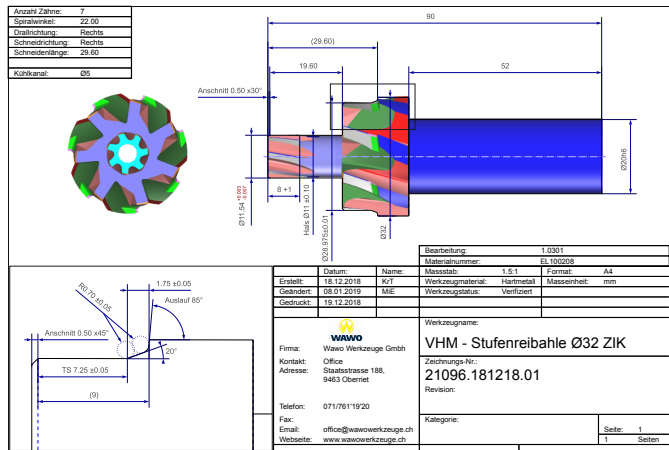
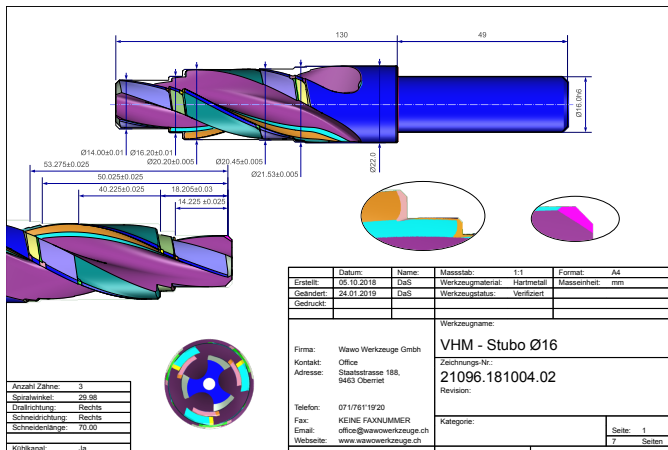
the deadlines for quotations and implementation are becoming ever shorter. In order to accommodate this trend, WAWO creates a finished NUMROTO program and a complete tool drawing with NUMROTO Draw during the quotation phase. After an enquiry, a customer receives a fully documented quotation with an exact calculation of the price. What initially sounds like additional work saves a lot of time in subsequent production. When the customer gives their "OK", WAWO can start production immediately. Adrian Thurnherr: "Efficiency can be increased optimally for both sides through clear communication in advance. NUMROTO Draw helps us to check feasibility right from the quotation phase and to identify potential problems at an early stage. This ensures that there are no unpleasant surprises later and the customer gets exactly what they need – including adherence to delivery dates."

But WAWO offers even more: the small, committed team in the St. Gallen Rhine Valley has a lot of know-how and also dares to tackle very challenging projects. Often the customer only specifies one end product. WAWO analyses this in terms of geometry, material and machining technology, among other things. The required tool is then designed and precisely documented with a keen eye for geometry details such as chip grooves or protective chamfers. The development and production of special tools is thus carried out completely in-house as a service for the end customer.

According to Adrian Thurnherr, the reasons for the exclusive use of NUMROTO are the flexibility of the system and the extensive functions. "NUMROTO offers companies a broad basis for letting their own creativity run wild. We are faced with new tasks every day; NUMROTO is an optimal tool for this and has never confronted us with unsolvable problems within the geometric possibilities." Daniel Schilling, Application Engineer at WAWO Werkzeuge GmbH, adds: "I like the logical, comprehensible structure. NUMROTO is a reliable tool that makes everything possible. If someone knows NUMROTO exactly, they can make any tool. Once you know and appreciate NUMROTO, you want to stay with it."



Typical special solid carbide tools from WAWO.



Comprehensive tool documentation with NUMROTO Draw, as already created in the quotation phase.

WAWO goes into every detail with NUMROTO. While, for example, chip grooves on sintered inserts are well known, WAWO went one step further in 2018 and developed, among other things, ground chip grooves on form inserts, turning steels and step drills, which until then were little known. This is another example of WAWO's innovation and creativity, supported by NUMROTO.

The development of a special logistics box for the transport and storage of tools also shows that WAWO goes to work with a lot of passion. These are thus not only protected from damage, but can also be optimally stored. "Tools are a high-quality commodity", Adrian Thurnherr adds. A further, creative solution was found for the use and handling of the products, leading to detail and process optimization, which is important in everyday life.



From right to left: Mr. Adrian Thurnherr, Managing Director of WAWO Werkzeuge GmbH, Mr. Daniel Schilling, Application Technician at WAWO Werkzeuge GmbH, Mr. Jörg Federer, Head of NUMROTO Application Technology at NUM AG.



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NUMROTO® flash

Issue 22, March 2019

Optimized user interfaces and clearer programming

One year ago, we presented the major new version 4.0 of NUMROTO software, which is enjoying great popularity. Of course, development must never stagnate, which is why our specialists have since made further optimizations. The results have been incorporated into Release 4.1.0a and are very diverse. Some of the most exciting developments, such as input dialogs with a vertical navigation structure, which increase clarity and simplify and accelerate work processes, are highlighted in this brochure.

This time we visited WAWO Werkzeuge GmbH in Oberriet (Switzerland) for our 'Customer Special'. This company manufactures special solid carbide tools to meet specific criteria – including customers' challenging requirements and even, on occasion, WAWO's own manufacturing requirements! With a keen eye for detail, creative solutions find their way into WAWO products. NUMROTO is used from the beginning (feasibility check and preparation of quotation) to the end (production).

"Short, clear communication" is not only a WAWO corporate motto, but is also its most important trump card. This motto is also a perfect match for the way NUM works and the way we respond to the wishes of NUMROTO machine manufacturers and users. To develop and im-

prove the user-friendliness, flexibility and efficiency of the NUMROTO software from year to year, short communication channels with you are essential.

It is very important to us to be able to meet you at trade fairs – in order to present you with news and exchange ideas with you. We look forward to welcoming you at our stand at Grinding Technology in Japan in March, or later in the year at EMO in Hanover in September.

If you do not have the opportunity to visit us at one of these two trade fairs, you will find details of our participation at other 2019 trade fairs on our website at www.num.com. We also use the website to regularly inform you about all news from NUM.

We wish you exciting reading with this brochure.



Sébastien Perroud,
Managing Director



Exhibitions 2019 NUMROTO is there

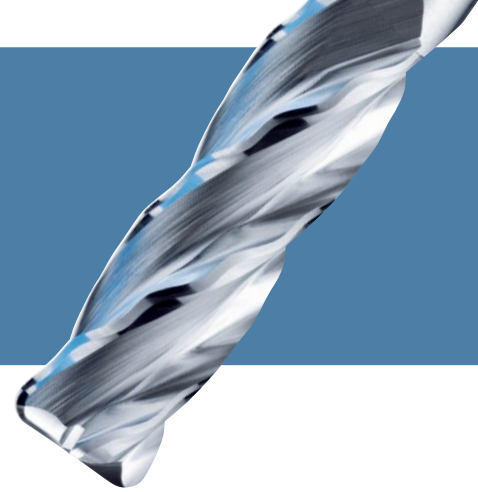
With NUMROTO, NUM will once again take part in various trade fairs around the world this year. We will present the latest NUMROTO innovations and are ready for constructive discussions. Visit us at the above-mentioned trade fairs. Our team is looking forward to meeting you.

Go to our website www.num.com to find our respective stand numbers before the start of the trade fairs.

And of course, there will also be many machine manufacturers on site with machines that are equipped with NUM CNC systems and NUMROTO.



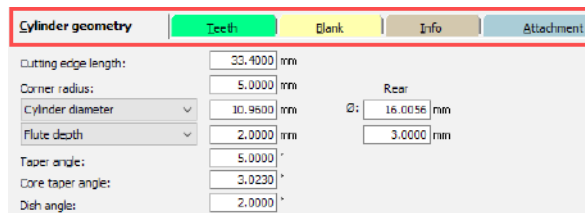
Optimized User Interface



Optimized user interface enables faster and clearer programming

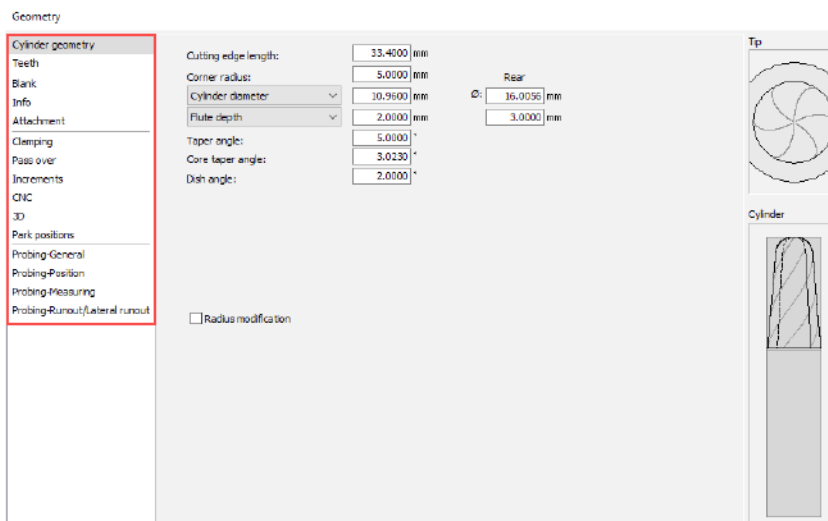
Input dialogs with vertical navigation structure

Up to NUMROTO version 4.0, subdialogs were called via tabs, arranged horizontally at the top of the dialog.



Geometry dialog with horizontal tabs

This very common solution becomes confusing in dialogs with many tabs. Furthermore, it is not possible to switch directly to other main dialogs. To make this clearer and faster, NUMROTO 4.1 uses navigation with vertical tabs. As you can see below, this navigation includes not only the current subdialogs, but also the other main dialogs. For example, you can now switch directly from a subdialog of the tool geometry to a subdialog for probing or clamping with a single mouse click. Previously, several mouse clicks were necessary for this.



Geometry dialog with vertical tabs

All dialogs, including those for the grinding operations, are now always the same size, and their position on the screen does not change (no more "jumping"). This makes navigation more consistent and user-friendly. The preview graphics now appear on the right-hand side of the dialog.

Cylinder/Flute-X

- Flute
- Core
- Flute washout
- Wheel
- Feedrates
- Reduction
- Cycles/Infeed
- AC
- Increments
- General
- Change positions
- Grinding position
- Cooling Valves
- Division/Helix
- ISO disengagement program
- ISO program

Geometry

- Cylinder geometry
- Teeth
- Blank
- Info
- Attachment
- Clamping
- Pass over
- Increments
- CNC
- 3D
- Perk positions

Shortcuts

Navigation within an operation

Navigation within an operation is also more convenient. With just one mouse click, you can switch from the flute dialog to the grinding position or cooling valve dialog, for example. This direct switch to all main dialogs is also possible from 2D and/or 3D simulation. Those who are used to working with shortcuts can continue to do so: the keyboard shortcuts appear in an easily readable font after pressing the Alt key.

Uniform machining sequence

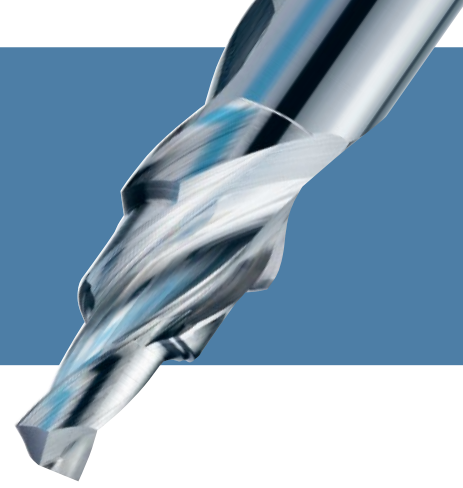
As of version 4.1, there is no need to switch between the different views for the sequence of operations. The operations for the 3D simulation can be activated in a separate column (1).

The [F7] key is now assigned to the 3D simulation (2) and is always visible. Consequently, the 3D simulation or the production [F10] can be started with a mouse click (without switching).

A new "revolution speed column" (3) has been added by popular request. This column shows the RPM and the cutting speed of the grinding wheel.

Optimized User Interface

Release Notes 4.1.0a



The keys in column (4) can be used to directly select another (or a new) grinding wheel.

After a short period of getting used to the new layout, you will quickly see its advantages. It makes it possible to work more efficiently and is therefore a benefit for NUMROTO users.

The screenshot shows the NUMROTO software interface with a machining sequence table. The table has columns for Operation, Wheel, Rotation speed, Feedrate, Collision, Removal, Path error, and Flags. Red circles with numbers 1, 2, 3, and 4 highlight specific UI elements: 1 points to the '3D' column, 2 points to the '3d sim' button, 3 points to the 'Rotation speed' column, and 4 points to the 'Wheel' column.

	O	P	3D	C	Operation	Wheel	Rotation speed	Feedrate	Collision	Removal	Path error	Flags
1					Schaft/Shank (Independent p...	1A1_NUT-Schrupp (1)	5346 / 28.00	10.0 / 500		5016.2	0.000	
2					Konus/Taper (Independent pr...	1A1_NUT-Schrupp (1)	5346 / 28.00	20.0 / 500		4639.1	0.000	U
3					Supplementary flute	Ref_Nut_0	6031 / 30.00	100.0		3716.9	0.049	
4					Flute-X	Ref_Nut_0	6031 / 30.00	50.0		4385.5	0.080	U
5					Tip clearance	Ref_Nut_0	4423 / 22.00	100.0		472.15	0.000	
6					Tip gash out X	Ref_Ausspitz	5787 / 30.00	50.0		232.50	0.071	
7					Body clearance	Ref_Nut_0	4423 / 22.00	100.0		214.44	0.049	
8					Relief 2	Ref_Topf	6685 / 35.00	15.0		488.51	0.094	
9					Relief 1	Topf	6684 / 35.00	15.0		216.27	0.109	U
10					Inspection measurement - Dia...					0.00	0.000	
11					Dressing wheel (A)	1A1_NUT-Schrupp (1)	5346 / 28.00			0.00	0.000	

Machining sequence

Release Notes 4.1.0a

General

- The calculated grinding time and the tool weight can be stored under Info.

Name:	--STUFENBOHRER--	
Drawing number:		
Revision:		
State:	Released	
Category:	-DEMO	
Grinding time:	4m45s	edit...
Weight:	89.50g	edit...

- New option for output of grinding status and workpiece information for industry 4.0 applications.
- Collets can now also be assigned to several machines, so that these can then only be selected on these machines.
- A separate lead can now be specified for the cooling hole. This is then taken into account in the 3D simulation.
- In the settings, the corresponding time requirement can now be defined for measuring in process. This is then taken into account in the time calculation.
- A correction of the grinding time can now be defined for each machining step.
- The polygon overlay can now also be programmed as a table, either per cam or for a complete revolution.

Milling cutters

- In the case of the manual tip reliefs, tooth groups can now also be used.
- In the case of Flute-X, a radius-shaped flute wash-out can now be programmed at the end of the flute.
- In the case of the gash-out-X operation on a ball nose end-mill, the gash-out angle can be defined for each tooth group.
- The widening of the gash-out-X has been extended to include a rotation along the contact line.

Drill

- New: "Wheel radius" or "Wheel axis" can now also be used for the infeed direction of a DXF forming step relief.
- Improved surface quality in the flute wash-out.

Form cutters

- Punch-like tools can now be ground with 2 axes as an option.

The screenshot shows the 'Form relief 1 - Geometry data' dialog box. It has tabs for 'Technology', 'Range', and 'Dimension/engagement'. Under 'Technology', there are options for 'Positioning and guiding prec.' with sub-options for grinding with definition of rotation angle, grinding with definition of axial angle, grinding with cutting edge relative to form, grinding with definition of rotation and axial angle, and grinding in helix direction. The 'Grinding procedure' dropdown is set to 'Peripheral grinding'. A checkbox 'Use only 2 axis' is checked and highlighted with a red box.

Release Notes 4.1.0a

All significant extensions and improvements can be found at: www.numroto.com

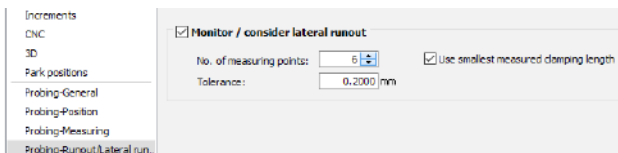


NR-Draw

- Rectangular and circular shapes drawn by the user can now also be cropped.
- The position of the drawing header for new drawings can now be specified in the settings.
- Optionally, an empty page can be inserted automatically from the beginning of a new drawing.
- NR-Draw can now also be used for Burrs.
- When printing, it is now possible to select in more detail which pages should be printed.
- For the tolerances, you can choose between the display type: "Upper and lower" or "Symmetrical".
- Dimensions can be hidden individually via Ctrl + double-click.
- If the minimum number of decimal places is set to 0, only decimal places are displayed if there are actually decimal places.
- It is now possible to insert user-defined images into user-defined tables.
- A watermark can now be inserted into the drawing to prevent unauthorized copying.

Probing

- The clamping length can now be measured several times, with the blank rotated in between. This allows the smallest measured clamping length to be used for grinding.



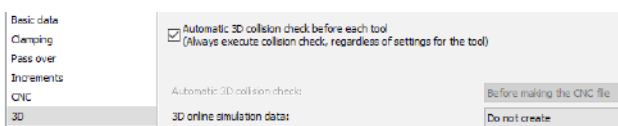
- New measuring function "Monitoring axial run-out" when probing the clamping length.

NR-Control

- In addition to the remaining grinding time, the calculated absolute end time for the current job list is now also displayed.
- When inserting a production step as a copy of a template tool, you can redefine how many copies are to be created and inserted.

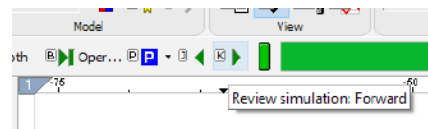
3D Simulation

- It is now possible to use a switch in the settings to specify that all tools should always be checked for 3D collisions, regardless of what is effectively entered in the workpiece.

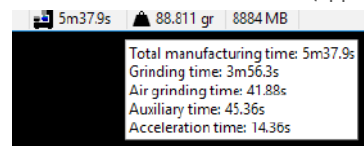


- Special display mode for the workpiece with a metallic shine.

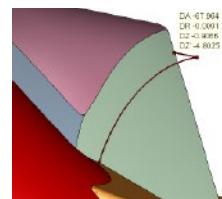
- A new review mode enables subsequent simulation in real time (forwards or backwards) from a selectable point in the grinding process.



- When calculating the grinding time, the acceleration time of the axes is now taken into account (approximate value).



- New measuring line to determine the clearance in longitudinal direction.



- The display of the measurement results is easier to read because a transparent background is used.
- Instead of the inverse time, the programmed feed rate can now be displayed.
- Improved calculation of the QW' value.

NCI

- The input line for MDI commands has been moved to the left area so that it is also visible when a function key table is displayed.
- The calculated grinding time is now also displayed when the NCI restarts (if a grinding program is already being processed).

Dressing wheels

- Axial plunging during wheel sticking instead of radial plunging.
- New management of the dressing units. Dressing units can now also be exported and imported.
- If the dressing process of a wheel is divided into several areas, the cycles can now be executed alternately per area one after the other. So first cycle 1 of all ranges, then cycle 2 of all ranges, then cycle 3 of all ranges, etc.
- X-Dressing: New dressing method for pointed and radius wheels where the grinding wheel axis is always perpendicular to the dressing roll axis. Training may be required for the application.