

Celebrating 50 Years of Excellence in Cutting Tool Manufacture



US cutting tool manufacturer Tool Alliance celebrates 50 years of highly successful business in March 2022. During this time, the company has grown steadily and in the process has built an enviable reputation for the quality and durability of its solid carbide and indexable carbide cutting tools.

Tool Alliance makes extensive use of CNC grinding machines from various manufacturers, but has chosen to standardize the machines' control systems on NUM's Flexium CNC platform and NUMROTO software, primarily for reasons of performance and production efficiency. Tool Alliance is one of the largest licensees of NUMROTO in the United States.

Founded in 1972 and still privately held, Tool Alliance operates a number of company-owned factories – its principal manufacturing facilities are located in Huntington Beach, California, and in Fort Myers, Florida. The company's cutting tool products and services include such renowned brand names as Ultra-Tool®, RoundTool Laboratories®, Tungsten ToolWorks®, Routco® and Mil-Tec®. All five brands are sold worldwide, and are supported by shared research, design, engineering, manufacturing, marketing and sales facilities.

The owner and President of Tool Alliance, Dave Povich, is no stranger to the cutting tool industry. A past-President of the United States Cutting Tool Institute (USCTI), he has worked for the company since 1987. According to Povich, "NUM is our CNC technology partner, which creates a win-win situation for both companies. We benefit from having a direct technical input to NUMROTO software development, while NUM gains valuable feedback on the design and production of the very latest cutting tools."

Tool Alliance's innovative Ultra-Tool Series 365 high performance end mills are a case in point. Designed specifically for the machining of exotic materials, these solid carbide



Tool Alliance has chosen to standardize the control systems of all its CNC grinding machines on NUM's Flexium CNC platform and NUMROTO software

tools feature a patented variable-helix geometry combined with a proprietary edge preparation/PVD coating combination that allows for world-class dynamic milling of tool paths, including most slotting cut applications. The tools are produced on high performance 5-axis CNC grinding machines using NUMROTO, employing monitored tool run-out, real-time deviation compensation and the latest diamond abrasive technology utilizing advanced wheel truing equipment.

Mark Wortsman, Tool Alliance's Technical Director, says that collaborating with NUM has multiple advantages. "The NUMROTO team is very supportive and always amenable to suggestions, which makes life a lot easier for us, as well as our customers. For example, we recently suggested adding categories for collets, and some new features for wheel probing and automatic 3D collision checking; these have all been implemented in the latest version of NUMROTO software."

"We consider the 3D-simulation capabilities of NUMROTO to be the most accurate in the tool grinding world; they help us to optimize tool programming by preventing any grinding errors that might otherwise be caused by imperfect wheel measurement or incorrect machine alignment."

Wortsman also points out that NUM's software helps simplify shop floor management. "Over the years we have built an extensive library of tools that we have produced with NUMROTO. The NUMROTO team has done a superb job of incorporating the library in a centralized industry-standard SQL database which can be accessed by any of our machines or programming stations. The database can store tens of thousands of tool programs which can be accessed by several hundred users – at the same time if needed."



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Tool Alliance's innovative Ultra-Tool Series 365 solid carbide end mills feature a patented variable-helix geometry and are produced on high performance 5-axis CNC grinding machines using NUMROTO software

able, we can bring all our machines, regardless of make or model, up to the same software revision level."

Many of Tool Alliance's CNC grinding machines are equipped with automatic loading systems to facilitate overnight production – in fact, some run for two days in a row without interruption and without the need for any manual compensation. To keep the tool dimensions within tolerance, the company relies on the NUMROTO software's 'measurement in process' feature, which automatically measures tools after grinding and applies appropriate compensation.

A number of projects undertaken by Tool Alliance have warranted installing early generation CNC machines and then retrofitting them with NUM's latest motors, drives and CNC systems. According to Steven Schilling, General Manager of NUM Corporation, "Again, we were able to help. Our CNC team in Chicago provided local support, and we were able to improve the performance of the machines' spindles and axes. It has been, and continues to be, a pleasure to be a partner to the success of Tool Alliance."



Tool Alliance makes extensive use of CNC grinding machines at its manufacturing facilities

"It is much easier to backup a single centralized database file instead of having to backup files from the computers on each machine – we perform automated backups several times a day, just to ensure productivity continuity in the event of a machine breakdown. Software updates are also handled very efficiently. As soon as a key NUMROTO update is available, we can bring all our machines, regardless of make or model, up to the same software revision level."



Photo shows (left to right): Mark Wortsman, Technical Director of Tool Alliance / Dave Povich, owner and President of Tool Alliance / Patrick Schmid, NUMROTO Project Manager / Steven Schilling, General Manager of NUM Corporation

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numroto® flash

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Time for New Things

We are in a celebratory mood! Thanks to an enthusiastic and dedicated NUMROTO team, we can look back proudly on 35 years of successful NUMROTO developments. From the first 2D simulations of NUMROTO-DOS, the first publication of NUMROTO flash magazine, the launch of NUMROTOplus®, our participation at the early GrindTec trade fairs, the introduction of NUMROTO 3D simulation, and the presentation of NR-Draw – up to the 700th installed NUMROTO software on more than 100 machine types at more than 1000 end customers in more than 50 countries. We also owe this success to our partners and end customers, to whom, at this point, we would like to express our sincere thanks.

able to make some great, high-quality contacts, collaborate with existing customers and to present our NUMROTO innovations.

In contrast to the already very successful spring trade fairs in Asia, we will not be exhibiting at GrindTec, instead we will be participating as an exhibitor at the GrindingHub trade fair, which will be held for the first time from May 17 to 20 in Stuttgart. At the "new hub of international grinding technology" many manufacturers will be present with tool grinding machines equipped with NUM CNC systems and NUMROTO. At GrindingHub we will also be highlighting the new functions of NUMROTO version 5.0.0.

In the last two years, we have made a concentrated effort to implement many features and enhancements to NUMROTO, which are now included in the current version 4.3.0. Take a look at our release notes and let us introduce you to version 4.3.0 at one of the upcoming trade fairs.

We hope to be able to welcome you in person at one of our trade fairs soon and in the meantime wish you an exciting read.

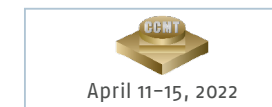
Best regards,

Andreas Hartig Managing Director
Peter von Rüti CEO NUM Group



Are you also looking forward to face to face contacts again? Online meetings and remote trainings were and are central and helpful in times of pandemic and travel restrictions, but we are very happy to work with you again in-person.

For NUM, the trade show kick-off was back in October 2021, with EMO in Milan. Despite travel restrictions, we were



Exhibitions 2022 NUMROTO is there

NUM will be exhibiting NUMROTO at various trade fairs around the world this year. We will be presenting NUMROTO innovations and be available for interesting discussions. Visit us at the above-mentioned trade fairs. Our team is looking forward to meeting you.

On our website num.com you will find our halls and stand numbers even before the fair starts.

Of course, many machine manufacturers will also be at these trade fairs, showing machines equipped with NUM CNC systems and NUMROTO.



Perfecting full radius or corner radius cutters

Increasingly, customers grind the cutting edges on a full radius cutter with a noticeable side distance. As a result, such tools are very stable in the center and wear less. In order for the outer shape of this full radius cutter to be very accurate, every point of the cutting edge – especially the chisel edge – must lie exactly on the spherical radius. To ensure that the chisel edge runs steadily, NUMROTO now offers the option of grinding the chisel edge in an S-shape.

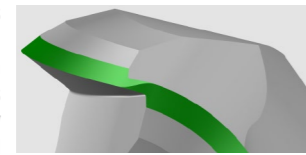


Figure 1 Centre of the full radius cutter with an S-shaped chisel edge

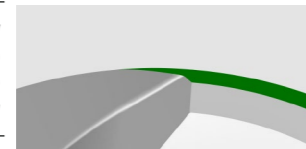


Figure 2 Radius of the chisel edge

An additional combo box enables programming:

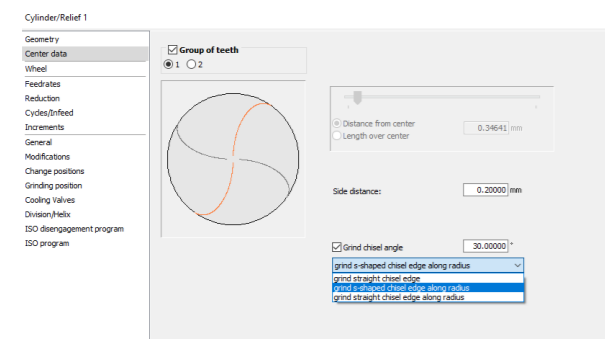


Figure 3 Dialogue chisel edge angle

In addition to the previous "straight chisel edge", the S-shaped chisel edge presented above or a straight chisel edge, which also lies on the sphere radius, can now be selected. This is interesting for applications where a cross gash out is required in the centre.

The above pictures clearly show that the 3D simulation of NUMROTO has been decisively expanded and optimized. Analyses in the sub-micron range are also possible. This allows the accuracy of the paths calculated by the programming system to be continuously checked, which is a prerequisite for high accuracy of the work piece geometry.



Figure 4 Simulation of an S-shaped chisel edge

The proven relief operations have been expanded with new processes. Now reliefs can be ground with a vertically oriented grinding wheel, which has advantages in terms of cutting technology (the entire wheel rim is engaged). A peripheral wheel can thus remove the material in the centre without damaging neighbouring teeth. In addition, there are beautiful run-outs of the relief on the shaft side. This method requires only minimal movements during grinding, which means that a good surface can be achieved.



Figure 5 Simulation of a cross-gash out

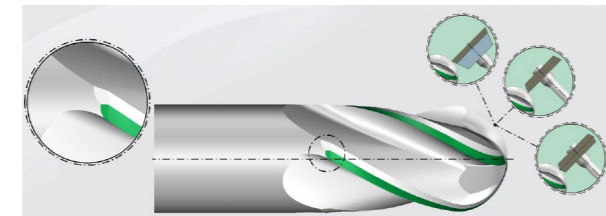


Figure 6 Grinding perpendicular to the surface

Pointed or cup wheels can also be used. Grinding of the reliefs with the face of the grinding wheel is possible as before with the 11V9 (cup wheel). A selection of cup wheel shapes is now offered so that 11V5 wheels can also be used. With this, it is possible to machine very economically with the entire rim, whereby the grinding wheel achieves a long service life. In addition, this method also offers more freedom of movement in the centre of a ball nose cutter.

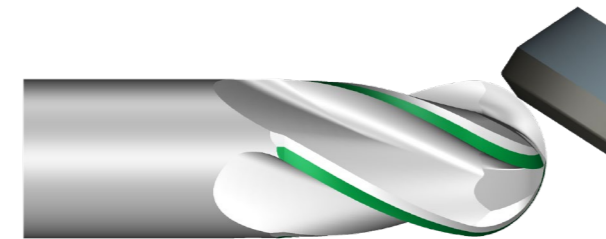


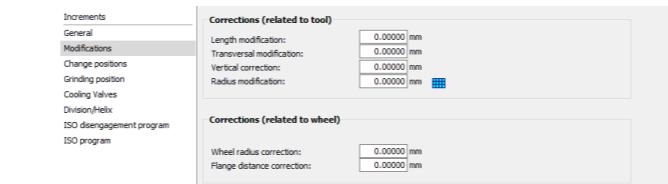
Figure 7 Grinding with the entire rim on an 11V5 grinding wheel along the spherical relief

These new options have been available since version 4.2.1 and 4.3.0 respectively. We would be happy to show you these in detail at a future trade fair or during a training session.

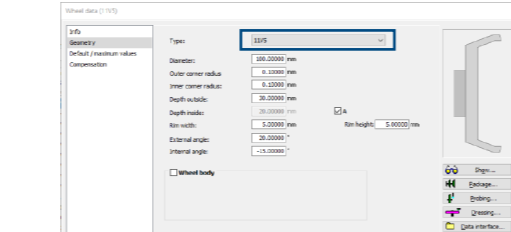
Excerpt of the most important changes of version 4.3.0 compared to 4.2.1

General

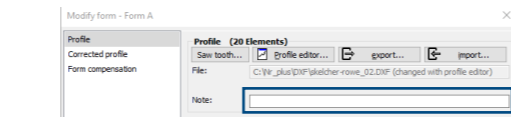
- There is now a uniform "Corrections" dialog that can be programmed individually for all machining operations. This enables a consistent separation between nominal geometry and corrections (transversal and vertical correction from version 5.0.0).



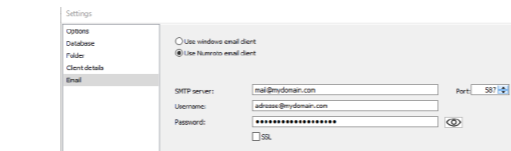
- Cup wheel type 11V5 is also available for end mill reliefs (CH-50052480 special grinding functions are required).



- Copies of wheel packages, including all associated wheels, can now be created easily.
- Profiles can now be provided with comments.



- There is now a 2D preview in the list of collets (except for STL collets).
- NUMROTO now has its own e-mail client.

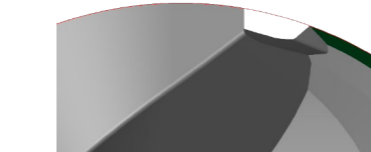


- There are now various time optimizations in the path calculation and the creation of the CNC file, reducing non-productive time.

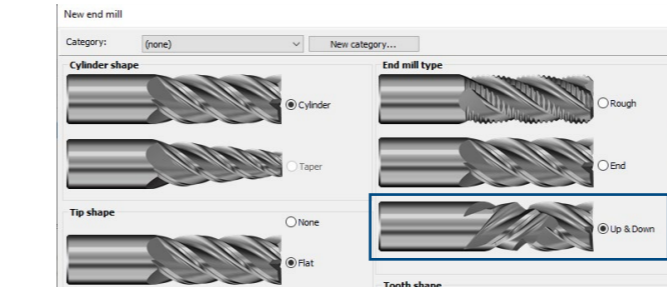
- Many new functions have been added to the external calculations. Since these primarily affect people who deal with their own path calculations, we offer tailored training courses for a detailed explanation.

End mill

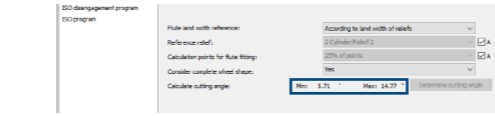
- On end mills with spherical end faces, all cutting edges lie exactly on the spherical radius. This applies in particular to the chisel edge, which can now be ground in an S-shape or straight (CH-50052480 special grinding functions are required). More information on this can be found in the separate article on page 4.
- The relief of the spherical end face, which is ground over the center, can optionally also be ground on the 'length over center' along the radius (CH-50052480 special grinding functions are required).



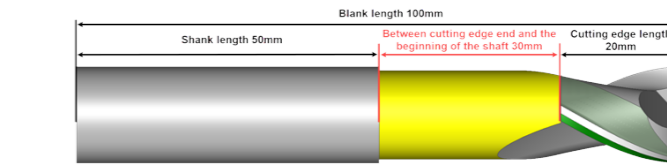
- Up & Down cutters can be programmed in a greatly simplified way as the new cutter type "Up & Down" (option CH-50052352 is required from version 5.0.0).



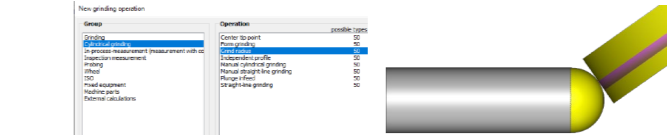
- With the flute-X, the cutting angle can be calculated automatically. Depending on the flute space, the cutting angle can change considerably along the flute. The maximum and minimum calculated cutting angle is therefore now displayed as information.



- Cylindrical Grinding Grooving: There is a new checkbox to automatically limit the range to "between the end of the cutting edge and the beginning of the shank" to grind a neck groove.



- "Radius grinding" is a new cylindrical grinding operation on the ball and corner radius cutter.

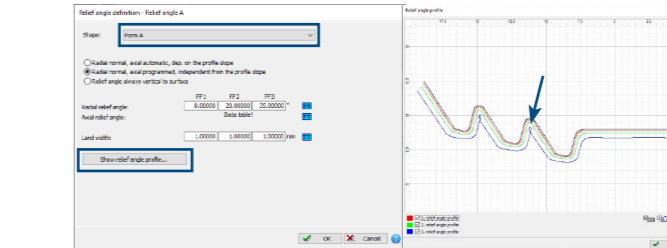


Drill

- The search distances for the K-land probing can now be set in greater detail.

Form cutter

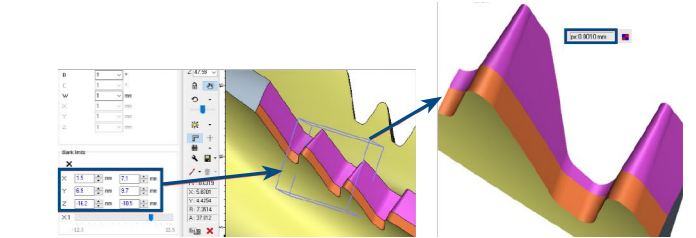
- The profile of the relief angles can be graphically displayed, based on the selected relief angle and land widths. This makes it possible to immediately check whether the cutting edge is free at every point.



- For the form reliefs, it is now also possible to link the Feedrates, Cycles/Infeed and Increments. There is a new 'All' button in the references which activates all links.
- If a form relief is machined cyclically and "Front and rear infeed" is active, a separate feed rate can be defined for the infeed.
- Form relief: It is now possible to compensate for the diameter during the measuring process via "Recalculate using stock amount". This enables simultaneous multi-axis oscillation.

3D Simulation

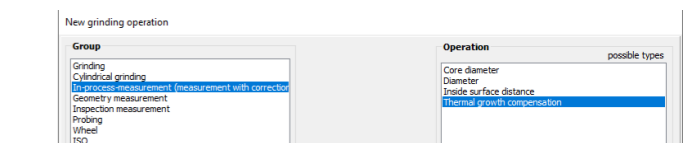
- It is now possible to reduce the blank to a defined cuboid to enable highly accurate simulation of small details.



- With CPUs with 6 or more cores, the simulation becomes even faster.

Probing

- New function for "thermal growth compensation in process" (option CH-50052351).



- K-land: Additional probing method "With cooling channel needle vertical".
- The function "Determine tooth center position", which is already available for the rotation probing of shaper cutters, is now also available for the form cutter module.

Dressing / sticking grinding wheels

- Redesign of the results page of wheel dressing and wheel sticking.

You can also find more information about the new features of version 4.3.0 on our website.

www.numroto.com

We will be presenting NUMROTO version 5.0.0 at GrindingHub 2022. This version will contain further interesting innovations, which we will be pleased to demonstrate if you visit our stand.

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