

Achieving the competitive edge by short response times, innovative and advanced developments as well as highly precise production



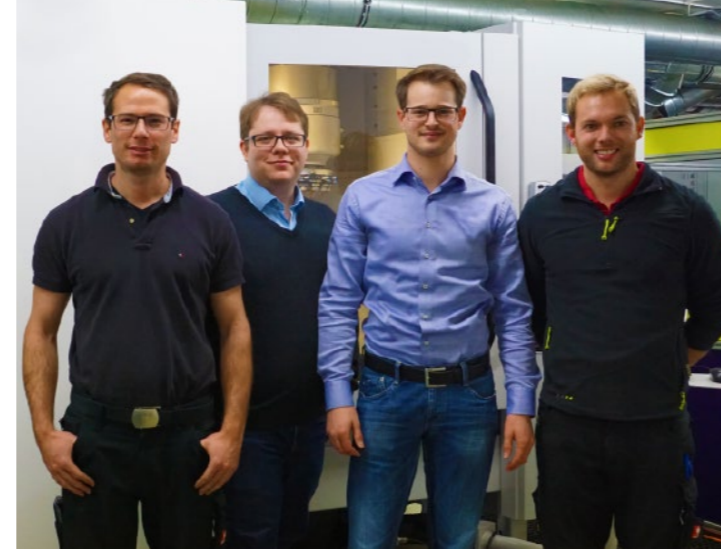
Hofmann & Vratny is one of the leading manufacturers of solid carbide tools, with its production headquarters in Assling near Munich, and another facility, the re-sharpening center, in Nuremberg. The company can look back on a successful 40-year corporate history characterized by continuous growth. With NUMROTO, NUM has played a significant role in the development and production of milling tools and drills at Hofmann & Vratny for around 22 years. Nowadays, it is impossible to imagine a production company that does not use milling as a production method. For machining workpieces quickly and precisely, Hofmann & Vratny relies on modern CNC machining centers, the majority of which are equipped with NUMROTO. At present, about 1.6 million tools are produced each year.

The core product range offered by Hofmann & Vratny primarily includes solid carbide milling tools. In the 1980s, the company was one of the first to launch these tools on the market. Today, the manufactured products include micro-tools for the medical and semiconductor industries, and high precision milling tools for mechanical engineering, aerospace technology and, last but not least, the automotive industry. "With the help of very close and long-term cooperation with partner companies such as NUM AG, carbide suppliers and coating companies, as well as by quick response times covering everything from

inquiries for a new application to the delivery of the appropriate tool, Hofmann & Vratny has managed to position itself in the premium tool grinding segment", says Marius Heinemann-Grüder, CEO at Hofmann & Vratny.

Hofmann & Vratny produces tools for the aerospace and automotive industry, as well as for the medical sector. At present, great emphasis is placed on the development of new CFRP tools (carbon-fiber-reinforced plastic), since this material is being increasingly widely used in production, especially in automotive construction. However, even tooling materials such as aluminum, titanium and sandwich materials for the aerospace industry are also enjoying an increasing demand. Even tools for machining tempered steel hardened to up to 75 HRC (Rockwell hardness) are no problem at all for Hofmann & Vratny.

In order to manufacture such special tools, you need motivated employees in addition to a good working environment. "The goal is that every employee looks forward to coming to work in the morning", says Robert Wendl, the Production Manager at Hofmann & Vratny. In order to achieve this goal, the company makes large investments regularly. The new production hall with a heat recovery system and a UPS system has been commissioned recently in Assling. This enables a considerable part of the energy that is consumed for production to be recovered and thus saved. This helps to further reduce production costs in this fiercely competitive market. Hofmann & Vratny also invests regularly in the latest generation of CNC machines. On specific request, these are fitted with a NUM controller and NUMROTO software. "The advantage of NUMROTO is



Left: from left to right, Stefan Maier, Production Manager Microtools, Andreas Vratny Managing Director, Marius Heinemann - Grüder, CEO and Robert Wendl, Production Manager at Hofmann & Vratny.

Right: The new GFRP, CFRP and graphite end mill sets new standards for milling of GFRP materials. The cutter was developed by Hofmann & Vratny itself.

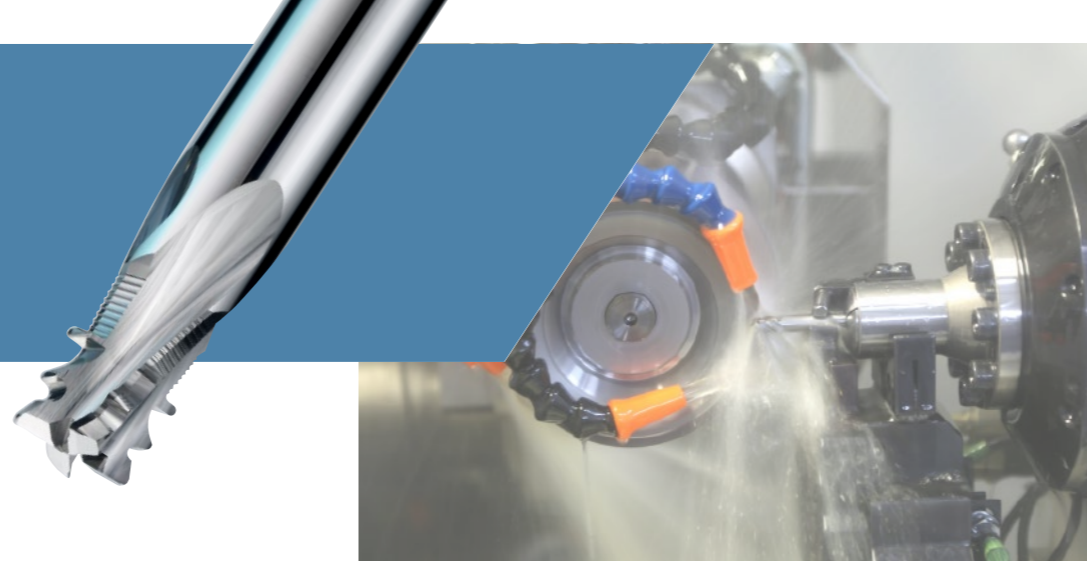
that it is easy to operate and can be deployed universally, and yet offers a large number of options for designing and manufacturing new and special tools" says Robert Wendl. "Even if something does not work out at the first attempt, an alternative solution is sought immediately by making a personal telephone call to NUM AG. Partnership based cooperation ensures that the problem is resolved promptly, in the minimum", adds Wendl. At NUM AG they rely on good, intensive partnership with the customer and on the user-friendliness of the applications. As a result, a new employee engaged by a customer using NUMROTO can be trained quickly, and then deployed at various machines. For standard, special and micro tools, the suitable machine can be procured, and still, all machines use the same programming system of NUMROTO. With the help of perfectly coordinated development and production processes, Hofmann & Vratny is in a position today of achieving production figures of 1.6 million tools per year, and producing a range of 7,000 different solid carbide tools for machining.

An example of the innovative and development strength of Hofmann & Vratny is the high-performance milling tool illustrated here. This diamond-coated milling tool is used within the automotive industry for machining CFRP and GFRP (glass-fiber-reinforced plastic) materials. Thanks to the special shape and the cooling ducts, the fibers are first pressed in one direction and then in the other, which causes them to tear without leav-

ing residues and without fraying. As a result of the neat edge produced in this first work step, the next step of edge finishing is normally superfluous, which saves cost and time. This is a very significant factor under present day circumstances.

#### GFRP, CFRP and graphite end mills

By cutting in opposite directions, delamination of the top and bottom edge is prevented. Thanks to the simultaneous effect of the tensile and sliding forces on the cutter and the special arrangement of the cooling ducts, you achieve excellent results. In order to increase the service life, the tool is provided with the latest generation of diamond coating.



Issue No 19, March 2016  
A publication of NUM AG  
CH-9053 Teufen

[www.num.com](http://www.num.com)  
[www.numroto.com](http://www.numroto.com)



16th - 19th March 2016,  
Augsburg, Germany



11th - 15th April 2016,  
Shanghai, China



12th - 17th September 2016,  
Chicago, USA

## 2016 trade shows with NUMROTO

NUM will be showcasing NUMROTO at various trade fairs around the world this year. We will be presenting the latest NUMROTO innovations and will be available for constructive discussions. Come and visit us at the trade fairs listed above. Our team is looking forward to meeting you. Our hall and stand numbers will be listed on our website ([www.num.com](http://www.num.com)) before the beginning of every trade fair.

There will, of course, also be a number of tool grinding machine manufacturers at the trade fairs whose products are equipped with NUM CNC systems and NUMROTO.



numroto® flash

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## High flexibility, the hallmark of NUMROTO

Only the best compete at the top! Therefore, NUM supports the industry competition "Tool Grinder of the Year 2016" which will be held at the GrindTec trade show. In this competition, participants have a limited time to make a complex tool on a Vollmer tool grinding machine. The machine is fitted with a NUM Flexium\* control system and NUMROTO software.

With this, Hofmann & Vratny were successful in effectively manufacturing a new tool, which is used in the automotive industry for the processing of GFRP materials. This new tool saves costs and production time for the tool user.

Cooperative partnership with machinery manufacturers and users is a hallmark of NUM. We are firmly convinced that with this approach we can give you the decisive competitive advantage in this highly competitive market.

I hope you enjoy reading this NUMROTO Flash and we also look forward to seeing you at the 2016 GrindTec in Augsburg and welcoming you to our stand 7070 in Hall 7.

Peter von Rüti, CEO NUM Group



## Gash-out-X

Full radius or corner radius milling are primarily used for machining near the radius. The cutting geometry along the radius ultimately determines whether or not a tool is efficient and economical. The cutting face is ground in this area with the gash-out. The gash-out used so far by NUMROTO has been well proven. NUMROTO end mills can often be identified visually, by the very neat transition from the front flute to the cylinder flute. With the gash-out-X, additional and supplementary gash-out options are provided to the user. While the rake surface so far has always been ground with the corner radius of the grinding wheel, the gash-out-X also supports flat grinding of the rake surface with the flange side of the grinding wheel. As a result of this, the cut is ground very precisely along the desired radius, and at the same time, the programmed rake angle is maintained exactly. This applies for tools with both low and high twisting. The course of the core geometry in the front face area can be programmed. The grinding wheel then follows this path when grinding.

### Grinding a straight rake surface

The gash-out-X grinds the red surface. This consists of an arch-shaped grind along the cut (1) and an adjacent widening (2). Since the grinding wheel touches the cut on the flange side, the result is a straight rake surface. In the process, the wheel corner radius has practically no impact on the rake angle. The rake angle thus, also remains constant as the wheel grinds. In contrast to this, the gash-out so far always ground an elliptical rake surface with the corner radius of the grinding wheel, which had a great impact on the rake angle.

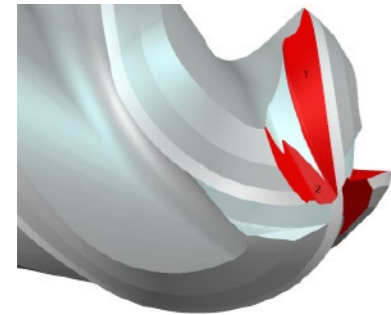


Photo 1: Full radius end mill with gash-out-X

As can be clearly seen in Photo 1, the rake surface and the front-sided widening are ground in one stroke. Depending on the shape of the grinding wheel used, the back area can be angular, especially if a 12V9 wheel (45° wheel) is used. This area can be backed with one or more parallel cuts with a second gash-out-X and a suitable grinding wheel, e.g. a slightly flattened 12V9 wheel.

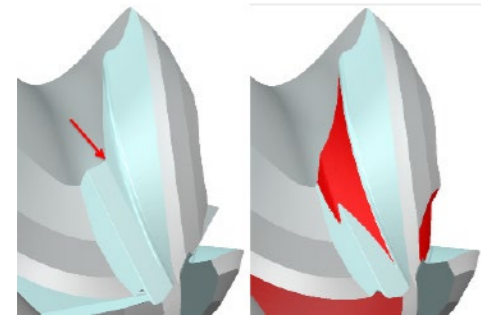


Photo 2: Flute area of the left gash-out: Edge, right: with backing (2 cuts)

Thanks to this concept, the user can grind the front-sided chip space of tools over a large diameter area with one set of wheels. First the flute area is backed and then the chip surface is ground. Since only a little material is removed during machining of the rake surface, it can also be ground with a fine-grain wheel, which results in an excellent surface quality.

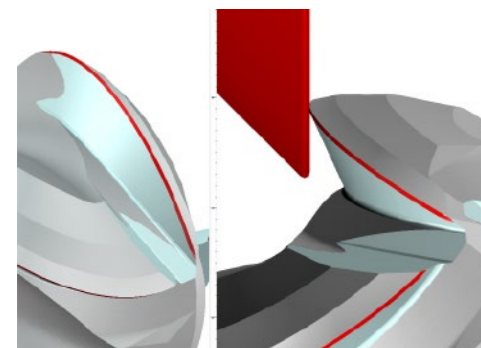


Photo 3: K-land

Sometimes customers want to grind a K-land on the cut. This is the case, for example, with end mills used to machine hardened material. The gash-out-X is also used for this.

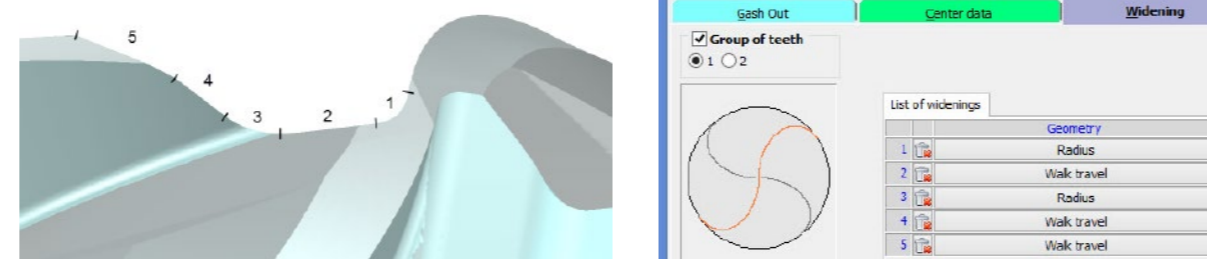
### Grinding a round rake surface

A straight rake surface is not optimal for machining in all applications. Hence, the gash-out-X also offers the option of grinding an elliptical rake surface. This grind is comparable with the previous gash out. However, the gash-out-X offers even greater flexibility when designing the core geometry, which can follow either a core radius or a core corner radius.

### Widening in the center

At the end of the rake surface in the center, the gash-out wheel usually moves away laterally and thus widens the flute area. With the gash-out available previously, the user only had a limited choice of widening segments. One new feature is that this selection is unlimited. The widening segments can be defined in a list and they can be freely combined from straight, radial or untwisting movements. Thus, for example, even edges in the back area can also be rounded off.

Photo 4: Widening with 5 segments



## Flute-X with more flexibility at the flute inlet

The calculation with the flute-X has been optimized based on the most recent mathematical findings. This makes the calculation faster and more robust. The core geometry, if necessary, may feature a variable design from the front to the shaft. This also applies to the area of the front-sided flute inlet. Here the core can be reduced continuously, as a result of which the flute cross-section is enlarged and chip transport is optimized. This means that you can dispense with the backing of the front and angular transitions are also avoided.

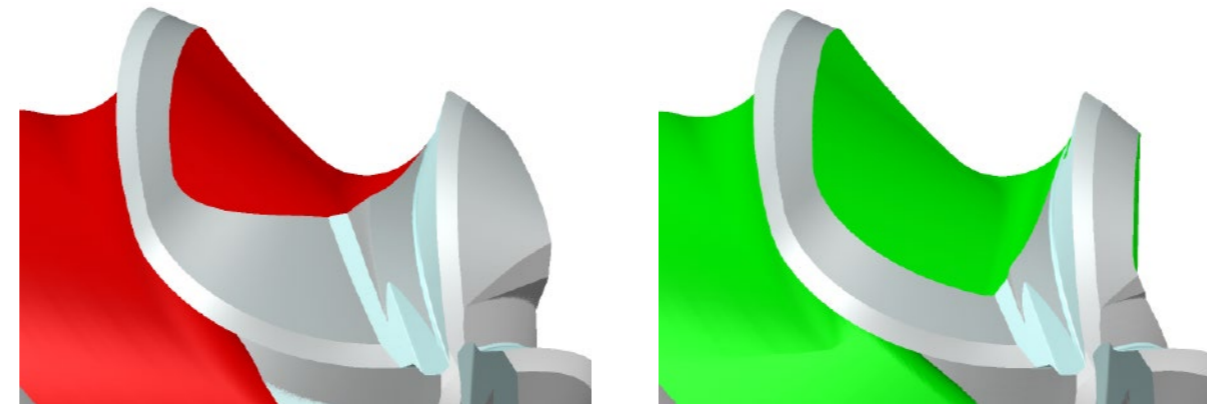


Photo 5: Left: constant core diameter, Right: core diameter pulled to the front

Of course, the flute outlet can also be rounded on the shaft side, if necessary, and the core diameter in this area can be programmed as specified by the customer.

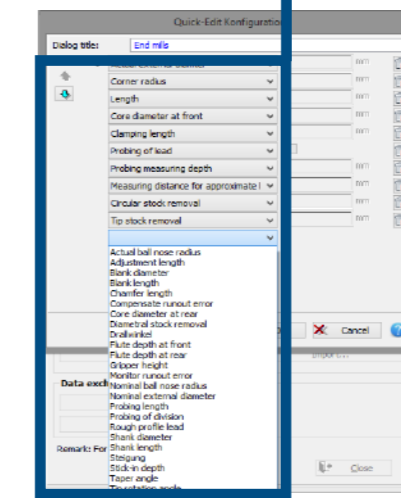
The gash-out-X and the flute-X give the user – as usual with NUMROTO – plenty of flexibility when implementing customized geometries and grinding concepts. They thus form an important basis for future machine tool developments. It would be our pleasure to present these and other innovations at our GrindTec stand.

All relevant enhancements and improvements can be found at: [www.numroto.com](http://www.numroto.com) > Customer Area

### General

#### Quickedit pages

For the milling tools and drills it is now possible for you to compile pages on your own, on which certain tool parameters can be summarized and displayed. These so-called Quickedit pages are primarily helpful for re-sharpening standard tools.



#### Minimum block cycle time

A new feature is that you can predefine the minimum block cycle time for each CNC in the machine data. With the default value it is now ensured, especially with older controllers, that there is still sufficient time remaining for communication between the PC and CNC even when generating very high precision tool paths with many points.

#### External path calculation

The external path calculation (integration of customer-specific algorithms for the calculation of special grinding paths) can now be used as an option. In any case, an introduction by NUM AG Switzerland is beneficial for the efficient use of this function.

#### Memory optimization

If a large number of tools are saved

in a database, displaying the tool list requires relatively more RAM. This has now been optimized in such a way that up to 500,000 tools can be displayed in a tool list depending on the amount of PC memory installed.

#### Sticking wheels

If the machine has a station for sticking wheels, this operation can now also be controlled via NUMROTO. From the operational perspective, the alignment of the sticking stone must be integrated for each machine type in NUMROTO. This must take place in cooperation with the machine manufacturer.

#### Displaying the programmed feedrate

A new feature is that you can now display the effectively programmed surface feedrate optionally in NCI.

#### Separate database for templates

The template tools can now be saved in a separate database. In the process, the template database may either be a local or a multi-user database. In addition to this, there are new options for automatically generating a new tool based on a template tool and an XML file.

#### End mill

##### Gash-out-X

New gash-out for point thinning for ball nose end-mills, which generates a straight rake angle. Completely precise adherence to the rake angle, even when using a high helix angle. In addition there are also new versions of the round ball gash-out and further options for the widening in the center. Details: Refer to the specialist article.

##### Flute-X, optimized calculation

The calculation for the flute-X has been optimized based on the most recent mathematical findings. This makes it faster and more robust. In particular, the front-sided flute inlet can be programmed very flexibly, which results in

technological benefits. Details: Refer to the specialist article.

#### NR Control

Optimized loading times for long job lists Job lists with several different tools are now loaded faster by several times when a saved job list is opened.

#### Creating new tools starting from NR Control

New tools can now be created directly from NR Control in conjunction with a template tool, and thus, added immediately to the job list.

#### Protected parameters

Some parameters in the end mill module can now be protected against modifications. Only an administrator can unlock these parameters.

#### NUMROTO-3D

Measuring lines lock onto angle values Measuring lines now lock at certain angle values (0°, 15°, 30°, 45°...) so that it is easier to draw a measuring line at a certain angle. This function was also integrated in the NUMROTO-Draw and 2D simulation in NUMROTO.

#### Use of the cursor buttons for review

As a new feature, a simulated grinding program can always be browsed with the help of cursor keys in individual steps forward or backward (Review). As such, even short movements can be analyzed very effectively.

#### NUMROTO-Draw

##### Export as DXF

The drawing can now be exported in DXF format. However, images (Bitmaps) cannot be exported. Also dimensions can only be exported as many individual objects and will therefore not be recognized as dimensions in a CAD system.

