

Masters of the Micron: Gloor and NUMROTO Setting the Pace for High Precision



Precision that drives industries – from the finest gear teeth in the watch industry to highly complex tools for medical technology. Gloor Präzisionswerkzeuge AG has been one of the technological leaders in the machining industry for decades. Where micron-precise profiles determine efficiency, quality, and safety, Gloor produces tools that only a select few manufacturers worldwide are capable of delivering at this level.

Founded in 1959 by Friedrich Gloor, Gloor Präzisionswerkzeuge AG has been a leading manufacturer of solid carbide special tools for more than six decades. Based in Grenchen, Switzerland, the company stands for maximum precision, innovative strength, and consistent specialization. Certified management systems for quality, environmental management, and occupational health and safety underscore its high standards for quality and sustainability and provide a reliable foundation for long-term customer relationships.

With an export share of 58 %, Gloor supplies customers in Switzerland, Germany, and the United States. The company develops and manufactures exclusively customer-specific tools – from form cutters and threading tools to complex gear-cutting tools.

Martin Pfeuti, Head of Sales/Marketing and co-owner, emphasizes that comprehensive consulting and close customer support have always been among the company's key strengths. Products are sold directly to customers without intermediaries.

The combination of deep expertise and many years of experience enables Gloor to develop solutions precisely tailored to each application.

With a team of around 50 employees and an international customer base, Gloor serves demanding industries such as gear manufacturing and medical technology, as well as the key and watch industries, turning technology, and mechanical and equipment engineering. The tools are often manufactured with micron-level precision, ensuring fundamental process reliability and repeatability. "Our goal is to develop tools that are better than their predecessors with every generation. This allows us to significantly reduce our customers' process and unit costs," explains Managing Director Daniel Flury.

At the end of 2024, Gloor moved into a modern new facility in Grenchen, which became fully operational at the beginning of 2025. The new production environment offers optimal conditions for manufacturing highly complex tools with shaped and profiled grinding wheels. Gloor uses patented processes for this work, including methods for producing finely toothed profiles with up to 200 teeth.

Software Expertise Meets Grinding Expertise

Close collaboration with NUMROTO forms the digital backbone of production. Since the first machine equipped with

NUMROTO was installed in 2018, the machine fleet has been continuously expanded. Today, Gloor relies on state-of-the-art CNC grinding machines from Strausak, TTB, and Vollmer – all programmed uniformly with NUMROTO.

For Gloor, NUMROTO has a decisive impact on productivity and precision. Collision control, process-integrated measurement, and 2D and 3D simulation are indispensable, ensuring maximum process reliability – especially for complex profiles and tight tolerances in the micron range.

"For us, NUMROTO is the most precise and user-friendly software on the market. New employees require surprisingly little training before they can work productively," emphasizes Martin Pfeuti.

Complex tools that once required significantly more manual programming can now be prepared, simulated, and manufactured more efficiently – and with the highest precision – thanks to NUMROTO, even when working with demanding materials such as titanium or stainless steel. Patrick Erb, Deputy Head of the CNC Manufacturing Department, describes the difference clearly: "Today, thanks to NUMROTO, we can simulate every tiny detail in the micron range."



From left to right: Daniel Flury, Managing Director and co-owner of Gloor Präzisionswerkzeuge AG, Patrick Erb, Deputy Head of CNC Manufacturing at Gloor Präzisionswerkzeuge AG, Martin Pfeuti, Head of Sales/Marketing and co-owner of Gloor Präzisionswerkzeuge AG, and Gustav Heer, Application Engineer at NUMROTO

The high-resolution simulation method, a feature of the 3D special functions, makes it possible to detect and correct even the smallest program inaccuracies in advance, ensuring that even the first tool falls within the specified tolerance. Given the long service life of the tools, this capability is particularly valuable.

This digital transparency greatly increases process reliability and enables demanding geometries to be implemented more quickly and consistently.

Some of Gloor's tools are ground using specially profiled grinding wheels – a technology that requires the highest precision. Profile tolerances in the range of ± 1 micron are standard. 2D simulation based on precisely defined grinding wheels, exact profile definition, and automatic collision avoidance are indispensable for Gloor. "The software's performance is particularly evident in gear-cutting and threading tools with a large number of cutting edges," Erb adds.

Automation of the machine fleet also enables unattended production overnight and on weekends while maintaining consistent accuracy – another advantage of the clearly structured NUMROTO operating concept. "The fact that a large proportion of our machines run

on NUMROTO and are programmed according to the same operating principle creates enormous efficiency. This reduces complexity and increases our team's flexibility," adds Flury.

Focus on Tomorrow's Innovations

Gloor has a clear goal of further digitizing precision manufacturing and providing customers worldwide with even more efficient, durable, and dimensionally stable tools. The close partnership with NUMROTO remains a central building block for future innovations.

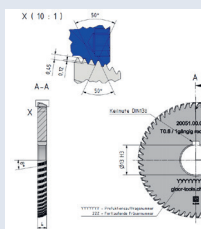
Pfeuti summarizes the company's outlook: "We want to continue offering our customers the best solution – technically, economically, and in terms of quality." Flury adds, "We are growing, but we remain true to our values: precision, reliability, and collaborative partnership."

Close collaboration with NUMROTO will continue to play a key role in the future – as the foundation for innovation, precision, and sustainable success.

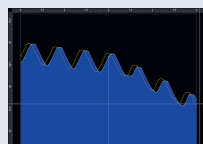
High-Precision Thread Milling Cutter for Producing the Head Thread of a Bone Screw

The conical head thread of a bone screw can be produced very efficiently and virtually burr-free using thread milling cutters (polygon milling). To enable this, the profile of each individual cutting edge must be calculated and designed separately. Time savings compared to conventional thread milling (using indexable inserts) can reach up to 75%.

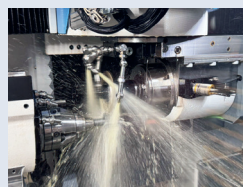
At the same time, service life is significantly increased because wear is distributed across 60 or more cutting edges. This meets the high requirements for surface quality, process reliability, and reproducibility.



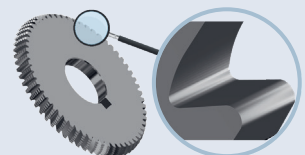
Detailed drawing of the end mill



Detailed view of the 2D simulation in NUMROTO
The specially calculated profile varies for each tooth and is also offset in the longitudinal axis of the tool



Machine



3D-Simulation in NUMROTO
High-precision thread milling cutter with detailed area of the high-precision 3D simulation. Tool diameter: 50 mm → Simulation accuracy 1 micron

**GRINDING
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May 5-8, 2026

IMTS2026
AAMT

September 14-19, 2026

DMP

November 4-7, 2026



April 2027

**GRINDING
HUB**
Americas

May 18-20, 2027

Exhibitions 2026/27 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.

When Microns Set the Standard

Precision is no accident. It is the result of experience, an innovative spirit, and the consistent interaction between people, machines, and software. In an industry where microns determine quality, efficiency, and safety, these factors are what make the difference.

In this issue of NUMROTOflash, we focus on high precision at its most consistent level. The success story of Gloor Präzisionswerkzeuge AG demonstrates how decades of grinding expertise combined with modern software technology can create measurable added value for customers worldwide. Wherever complex profiles, tight tolerances, and maximum process reliability are required, NUMROTO delivers the digital transparency that makes precision predictable and repeatable.

At the same time, this edition highlights that technological excellence today is inseparably linked to efficiency and flexibility. New features such as feed-optimized machining based on actual removal volumes and modular

licensing models show how productivity can be increased without compromising quality or safety.

NUMROTO stands not only for powerful software but also for true partnership and collaborative engagement. Together with users such as Gloor, solutions are developed that meet the growing demands of modern tool manufacturing and help pave the way for future innovations.

We invite you to explore this issue in greater depth – into the world of high precision, digital process reliability, and technologies that are already setting tomorrow's standards today.

We hope you enjoy reading it.

Best regards,

Andreas Hartig
CSO West

Adrian Kiener
CSO Asia

Flexible Licensing for Maximum Efficiency – NUMROTO X Packages



NUMROTO X offers a package-based licensing model that allows users to tailor functionality and investment costs to the specific application of a machine. This modular structure ensures a high degree of transparency and scalability.

The infrastructure package as a foundation

All licensing is based on an infrastructure package, which serves as the required foundation. It provides a single sequence for tool machining steps and supports wheel packages of up to three wheels. Depending on the complexity of the requirements, three levels are available:

- **Basic infrastructure package:** Ideal for simple manufacturing processes. It offers a fixed sequence for machining steps and allows wheel packages with up to three wheels to be configured. A production order consists of a workpiece program that can be manufactured in any quantity.
- **Advanced infrastructure package:** This package is designed for optimized manufacturing processes. It allows two sequences for specific applications and supports the management of up to 10 different workpiece programs per order. In addition, continuous corrective measurements and a universal profile editor are included.
- **Professional infrastructure package:** Designed for complex and high-performance processes, this level offers maximum flexibility. It supports any number of sequences, an unlimited number of workpiece programs per order, and a powerful formula editor for mathematical parameter dependencies. There are also no restrictions on the number of wheels per package.

Tool packages allow specialization







The tool packages build on the infrastructure package, providing the specific functionality required to create and perform operations on different tool types. Version 1.0 focuses on the milling cutter package, with additional tool types such as drills and indexable inserts to follow gradually.

Similar to the infrastructure packages, the milling cutter package is also divided into three levels:

- **Basic end mill package:** Enables the production of simple end mills with cylindrical or tapered bodies. It covers standard geometries such as ball noses or flat ends, as well as corner radii and chamfers.
- **Advanced milling cutter package:** Expands the scope to include more sophisticated end mills. Convex or concave circular segments in the tool body, as well as lens or circular-segment faces, can also be defined. Groove geometries and helix angles can be specified individually for each tooth.
- **Professional milling cutter package:** Offers a solution for highly complex end mills. The integration of a profile editor allows shell, corner, and face elements to be defined with complete flexibility, with the cutting edge always following the profile precisely. All geometry elements – such as face cutting edges, helix angles, or core dimensions – can be parameterized individually for each tooth.

Conclusion and Combination

A key advantage of the NUMROTO X model is its flexibility. Infrastructure and tool packages of different types can be combined to create a customized software environment. For example, a user can benefit from enhanced production capabilities with the Advanced infrastructure package while only needing the Basic milling cutter package for standard tools.

		Milling Cutter Packages			
					
		numroto^x	Milling Cutter Basic	Milling Cutter Advanced	Milling Cutter Professional
Infrastructure Packages		Infrastructure Basic	<ul style="list-style-type: none"> • Simple end mills • in open-loop monoproduction 	<ul style="list-style-type: none"> • Demanding end mills in linear • in open-loop monoproduction 	<ul style="list-style-type: none"> • Complex end mills & form cutters • in open-loop monoproduction
		Infrastructure Advanced	<ul style="list-style-type: none"> • Simple end mills • in up to 10 variants in closed-loop series production 	<ul style="list-style-type: none"> • Demanding end mills • in up to 10 variants in closed-loop series production 	<ul style="list-style-type: none"> • Complex end mills & form cutters • in up to 10 variants in closed-loop series production
		Infrastructure Professional	<ul style="list-style-type: none"> • Simple end mills • in unlimited variants in closed-loop series production 	<ul style="list-style-type: none"> • Demanding end mills • in unlimited variants in closed-loop series production 	<ul style="list-style-type: none"> • Complex end mills & form cutters • in unlimited variants in closed-loop series production

Mix and match infrastructure and tool packages to create a custom solution

Explore the full range of functions here:



Production Control System Integration

NUMROTO^{plus} – Feed optimization



Production Automation with a Higher-Level Manufacturing Control System

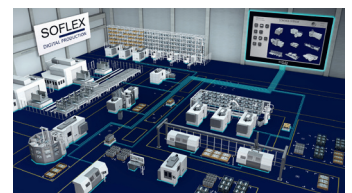
NUM AG is consistently driving automation forward and specifically aligning NUMROTO for use in highly automated production environments.

This strategic collaboration is being developed in close partnership with Saacke, Ulmer Werkzeugschleiftechnik, and Vollmer and combines the partners' respective technological expertise.

SOFLEX The implementation of the SOFLEX production control system interface makes it possible to seamlessly integrate NUMROTO tool grinding machines into higher-level process control systems. This enables machines to be controlled remotely from a central location, automatically loaded with blanks, and efficiently unloaded once the tools have been machined.

This expansion forms the foundation for continuous, automated manufacturing processes, increases productivity, and opens new potential for flexible, networked tool production.

The solution is currently under development and will be presented for the first time at GrindingHub Stuttgart 2026. The planned market launch is scheduled for the second half of 2026 and underscores the continued focus on future-oriented, networked, and highly automated production processes.



Digital production

NUMROTO^{plus} – Feed optimization based on the 3D removal rate QW'

Time is money – even when grinding tools

Every second counts, especially in series production of tools. Unnecessary grinding time has a direct impact on productivity and cost-effectiveness.

NUMROTO already offers numerous options for optimizing machining time. Almost every distance and every feed rate can be programmed individually to make processes as efficient as possible.

NUMROTO is now expanding these options with a new, intelligent function:

Automatic feed optimization based on the removal volume

Machining feeds can now be automatically optimized based on the actual removal volume. The removal volume calculated in the 3D simulation serves as the basis for this process.

This feed optimization offers particular advantages when the removal volume varies during machining, which is very often the case in practice, for example with:

- Flute cutting
- Tools with multiple spirals
- Conical tools
- Step drills

Even when grinding gash-outs, ball nose clearance operations and especially pockets for PCD inserts, the removal volume per unit of time is rarely constant. In such cases, the grinding time can be specifically reduced by means of an automatically variable feed rate.

Focus on quality and tool protection

However, effective optimization should not simply involve increasing

the feed rate across the board. Excessive feed rates can impair grinding quality or lead to increased wheel wear.

For this reason, NUMROTO provides various strategies that allow feed optimization to be individually adapted to each machining operation.

The new function can be controlled using the following parameters, among others:

- Maximum desired QW'
- Maximum permissible removal rate in mm³/s
- Maximum feed factor during wheel engagement
- Maximum feed rate during grinding without removal (outside the blank)

In addition, NUMROTO offers a fine-tuning function in which the feed is reduced shortly before the first grinding contact and then gently increased as soon as the wheel is engaged. This may be particularly necessary when using grinding pins.

For optimal functionality, it is essential to define the blank used as accurately as possible. NUMROTO provides various blank definitions for this purpose.

Input dialog with all available parameters

NUMROTObus – Feed optimization

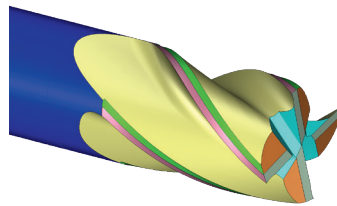
Practical Examples



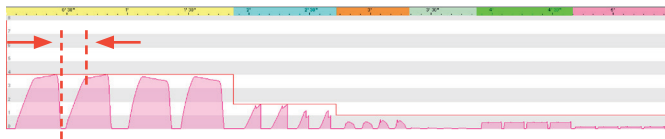
Practical examples

End Mill with Multiple Spirals

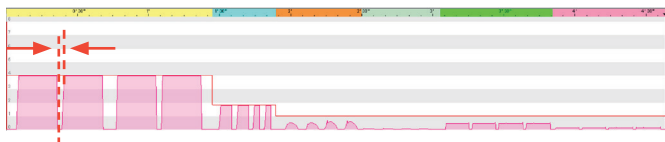
The following evaluation shows the wheel load (QW') with constant feed (without feed optimization). During flute machining (yellow) and gash-out (cyan), the wheel's maximum possible QW' is reached only briefly, as the removal volume varies.



In this example, the greatest optimization potential lies in the area of engagement (red arrow).



After activating feed optimization, the maximum QW' is achieved and maintained throughout the entire machining process.



Feed optimization can generally be used for all machining operations in NUMROTO – for example, for reliefs on the OD or the tip. In this example, it was deliberately activated only for fluting and gashing, as this is where the time savings are most significant.

Result

Grinding time without optimization: 5 min. 40 sec.
Grinding time with optimization: 4 min. 52 sec.
Time saved: 14%

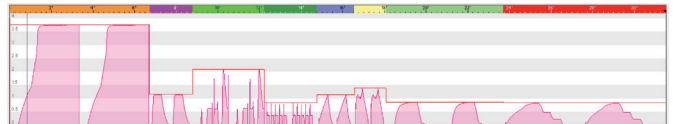
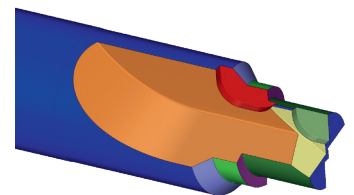
Release Notes NUMROTObus
Further information about new features in version 5.2.1 can be found on our website.

www.numroto.com

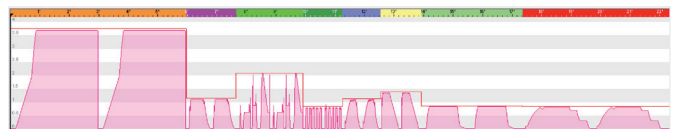


Stepped tool with pockets

Feed optimization was applied to all operations for this tool, but intentionally to a limited degree. The maximum feed factor was set to 1.5 to ensure optimal surface quality.



Despite this conservative setting, the grinding time was significantly reduced.



In this example as well, the feed had already been programmed so that the wheel load approached the maximum permissible QW'. Feed optimization therefore primarily takes effect in the engagement area, where the feed can be increased by up to a factor of 1.5.

Result

Grinding time without optimization: 31 min. 51 sec.
Grinding time with optimization: 22 min. 41 sec.
Time saved: 29%

In practice, feed rates are often programmed more conservatively than technically necessary. In such cases, feed optimization is effective throughout the entire machining process, resulting in even greater time-saving potential.

Note

For technical reasons, feed optimization cannot be used for cyclical grinding operations or for regrinding.

Availability

The "Feed optimization via 3D removal rate" function is available as a new option in NUMROTObus version 5.2.1 and higher.

If you are interested, please contact your machine manufacturer.