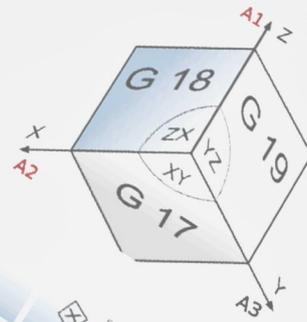


nummill

TOTAL SOLUTION FOR MILLING MACHINES



NUM Solutions and Systems

Established Worldwide

Outstanding solutions in machine automation have one thing in common: They are always the product of outstanding performance, exceptional technologies and a high degree of creativity!

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Established Worldwide
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Programming Solution for
Milling Machining
- 09 Flexium+ CNC System
Flexibility, Productivity & Safety
- 10 NUM Motors
Perfect for all Applications
- 11 NUM Services
Worldwide at your Service



And NUM has earned its exceptional reputation in the machinery and tools industry exactly with that. We develop customized automation solutions that ensure a high degree of added value both to the machine manufacturer and the user. With our expertise that we have developed over decades, we put our motto "NUM automation solutions provide machine builders with a competitive advantage" into practice. NUM had already developed the first CNC controller in 1961, i.e. 10 years before CNC- or NC control systems found a wide acceptance among users. With the launch in 1964, NUM was one of the first CNC providers in the world. Since then, we have maintained our position as a technology leader in this segment and are eager to expand it further. Today's systems, with their flexibility and our expertise, enable us to automate the most varied machinery. Our long, successful track record supports this finding in an impressive manner. We will continue to develop the readiness and flexibility of our systems in this direction and make the necessary investments in R&D as well as in our staff.

As an international company headquartered in Switzerland, we have sales, application development and service locations all over the world (see back cover) from which we operate worldwide. Our research and development departments are located in Switzerland, Italy and France. Our main production facility is located in Italy.

It is our clearly defined vision that we keep the development and manufacture of the core products in the CNC system, including the drives and motors, under our control. This enables us to adjust the important flexibility and readiness of the systems to new market requirements even in the short-term.

The ready and flexible NUM automation systems combined with our locally available engineering expertise and the machine manufacturer as a competent partner, results in a uniquely flexible and powerful team.

Customized Projects

NUM supports you with your projects in the same way as it is ideal for your business and infrastructure. The goal of our cooperation, however, always remains the same: To find the most efficient solution for your project together with you.



Project facilitation PRODESIGN

Efficient consulting for optimal application solutions

This model is ideal for companies with their own development teams and automation specialists. As an external partner, we provide our entire know-how in the field of CNC automation and take on an advisory role.

Project cooperation CODESIGN

Merging knowledge - potentiating results

Your development team will be combined with our team of specialists. Together we will realize the automation of your machine with clearly defined responsibilities. This form of cooperation has proven to be extremely efficient in many projects.

Total solutions ALLDESIGN

Delegating responsibility - controlling result

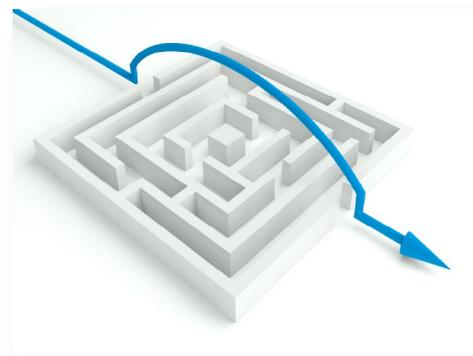
We assume the entire project management in the sense of a general contractor and are fully responsible for the successful implementation. Starting with the development of the requirements specification, over the development and commissioning, up to support and service.

NUM Solutions and Systems

Intelligent and Creative

We have developed countless customer- and application-specific solutions for different industries and thus mapped out practical solutions for professional requirements. Based on this, our engineers have created groundbreaking total solutions for demanding applications.

All of our solutions are based on a wide range of perfectly matched proprietary products such as CNC, drive amplifiers and motors. The partnership with our customers in the evaluation, project and installation phase is further maintained by our training, support and other services even after commissioning. We attach importance to ensuring that our customers are served by our professionals with specific knowledge.



numroto

NUMROTO – successful trendsetter in high-precision tool grinding for many years

numspecial

NUMspecial – creative and practical solutions for your specific applications

numcut

NUMcut – a complete solution for advanced cutting machines

numgear

NUMgear – intelligent total solutions for new machines or as a retrofit in the field of gear machining

numtransfer

NUMtransfer – economical and flexible for all lot sizes for transfer, rotary transfer and multi-spindle machines

numhsc

NUMhsc – excellent quality at the highest speeds on machines with 5 or more axes

numgrind

NUMgrind – grinding and dressing cycles, with intuitive shop floor entry screens and 3D visual validation

nummill

NUMmill – flexible solution with a graphical interface for extensive milling cycles, including full 3D simulation

numwood

NUMwood – long tradition with powerful complete solutions in woodworking

numretrofit

NUMretrofit – rational extension of the service life of your machine by years

NUMmill – Shop Floor Programming Solution for Milling Machines

NUMmill is a complete off-the-shelf solution for milling machines. The HMI (Human Machine Interface) is designed to support programming in front of the machine and the programmer can even write or modify part programs while the machine is in a production cycle.

NUMmill HMI

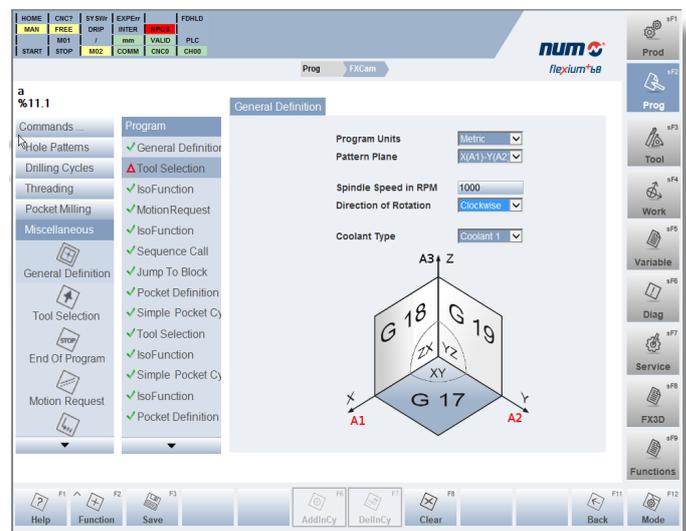
Flexium+ Systems with NUMmill HMI increase the programming performance and reduce programming time. Writing a part program is simple and fast and knowledge of the ISO code is not required. In fact, NUMmill is an interactive conversation language with animated images that guides the programmer step by step.

On the left side is the “command tree” with all available functions (general definitions, tool selection, cycles, etc.). The user interface can work with mouse, keyboard and touch screen.

The middle frame shows the “Program sequence”. The selected commands are inserted into it. When a command block complete and error-free, it is indicated by a green or red flag next to each command.

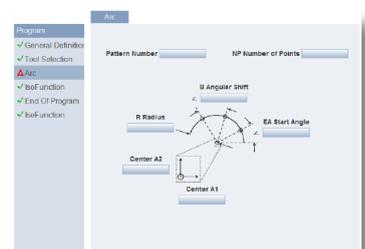
Available as a fully scalable control system, it is suitable for a wide range of precision milling applications in markets as diverse as metal milling, woodworking, plastic, and high precision machining.

NUMmill offers an extensive suite of canned cycles, ranging from simple center drilling, boring and threading through to pocket cycles and complex profile milling cycles supported by graphical interactive help. Milling operations can be performed on circular, oblong, rectangular and square pockets.

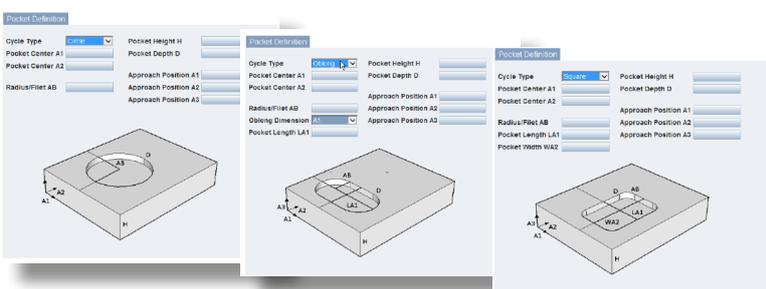


Hole patterns can be programmed in a variety of geometries, including Arc, Cover Patter, Drilling with Rotary Axis, Grid, Pitch Circle, Row, and Single Points.

NUMmill also offers Center Drill or Chamfer, Peck, Chip, Counter Bore, Tap, Ream-Feed Out, Bore-Dwell/Feed Out, Bore-Stop/Rapid Out, Thread Chase, and Taper Threading.



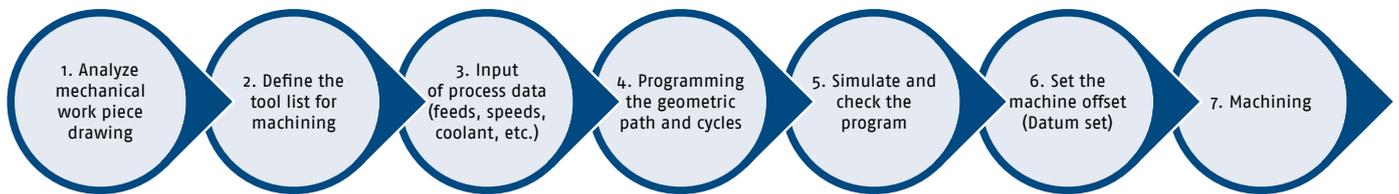
The machine operator can test and verify the part programs created by NUMmill with Flexium 3D. Toolpath simulation is helpful to avoid programming errors. Flexium 3D Collision Monitoring helps prevent machine damage.



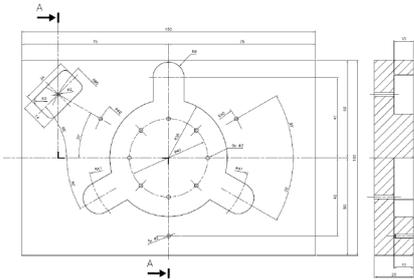
NUMmill – Shop Floor Programming Solution for Milling Machining

Programming example

The typical flow of shop floor programming:



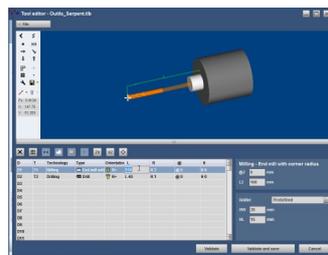
1. Analyze the mechanical work piece drawing



In the mechanical drawing the user identifies the required tools and determines the program origin, OP:
 Milling tool (trochoidal) for pocket machining ($R = 3 \text{ mm}$)
 Drilling tool for the 2 mm holes ($R = 1 \text{ mm}$)
 Datum set OP in the center of piece

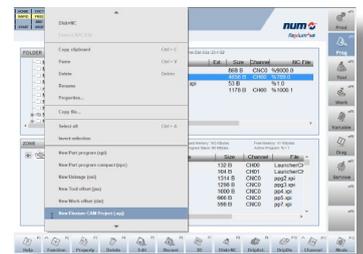
2. Define the tool list for machining

Enter the tool geometry in the operating HMI Tool page or define it in the graphical tool editor of Flexium 3D



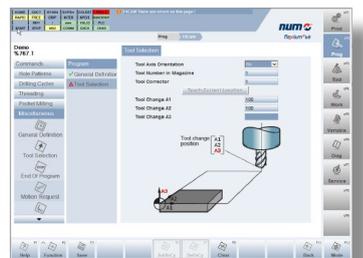
3. Input of process data (feeds, speeds, coolant, etc.)

In programming context the user creates the new program by selecting "New Flexium CAM Project (.xproj)". The user creates a new NUMmill program with the desired settings. A blank project opens and the system waits for the first command entry. The NUMmill HMI displays commands, grouped into specific submenus by operation type. A status icon is displayed next to the program step indicating errors/incomplete input or that data entry is complete. The first step to create a new program is to add the "General Definition" command from the "Miscellaneous" menu.



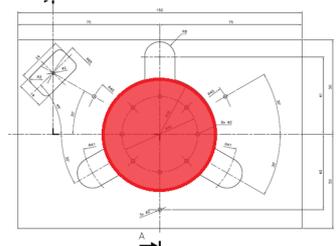
Next the user selects the first Tool for machining by the command "Tool Selection".

All the commands in NUMmill HMI are self-explanatory for a quick and intuitive programming.

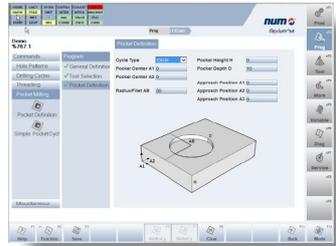


4. Programming the geometric path and cycles

We are ready to insert the first machining procedure: the circular pocket in the center.

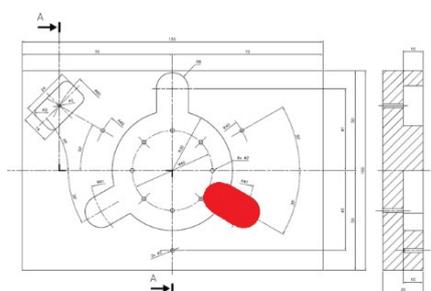


In the "Pocket Milling" menu the command "Pocket definition" offers the possibility to select three types of pockets (Circle, Oblong and Square). The user enters the correct data according to geometric and process requirements. After the pocket definition the next command can be selected: "Simple Pocket Cycle".

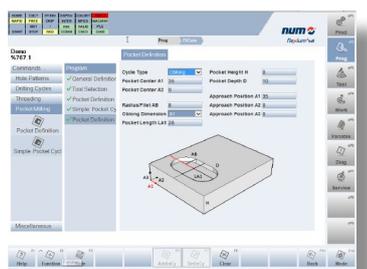


- A selection box offers the possibility to choose the desired machining sequence:
- Axial or/and Lateral
 - Roughing or/and finishing etc.

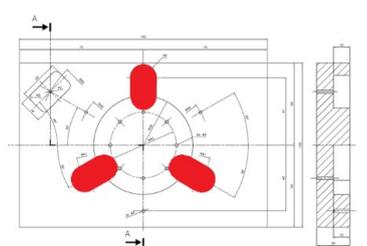
The next machining segment is an Oblong Pocket.



Like in the prior operation, the pocket geometry is first defined, followed by the "Simple Pocket cycle" to enter the process data



Inserting an "ISO Function" command allows for shifting or rotating the pocket's position.



The next machining sequence is drilling. A tool change is required before drilling.

The Hole Patterns menu includes several possibilities: Arc pattern, Cover, Grid, Drilling with rotary axes, Pitch circle etc.



NUMmill – Shop Floor Programming Solution for Milling Machining

Once the hole pattern is defined, the drilling cycle type is added. The “Drilling Cycles” menu offers several kinds of cycles and the user simply chooses the right one for machining need. Following the same sequence, the user can add more “Hole patterns”.



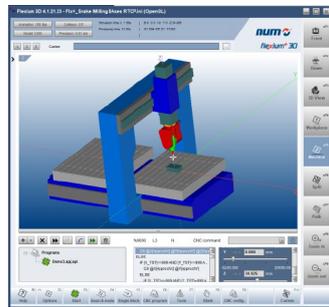
The last operation is to machine the square pocket. The end user can select “Square” and set the data in “Pocket Definition”

5. Simulate and check the program

Whether in the office or on the shop floor, the simulation and optimization can be done with the help of Flexium 3D.

Start simulation:

- Start Flexium 3D and load the program saved
- Start simulation, check the result, monitor for any collisions and optimize the program if necessary



6. Set the machine offset (Datum set)

Define the machine datum set for machining is necessary for the starting working process, we can use two ways:

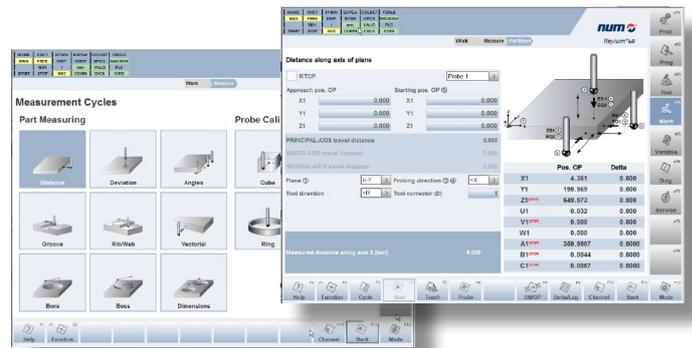
1. Manual mode
2. Automatic mode by Touchprobe

Manual mode datum setting

There is a specific page in HMI, aided with quick softkeys, to support the user in this setup process.

Automatic mode datum setting (Touch probe)

NUM Flexium+ supports the user with several touch probe cycles.



7. Machining



Summary

The NUMmill software has an exceptionally easy-to-understand graphical user interface that radically simplifies machine operation via interactive, dialog-supported operator guidance.

The operator is requested to define the program sequence and to fill in the corresponding data fields of the human-machine interface (HMI). The machine control program is then created fully automatically and stored in an executable form.

NUMmill is supplied as a complete turn-key package but it can also be extended with additional cycles and functions.

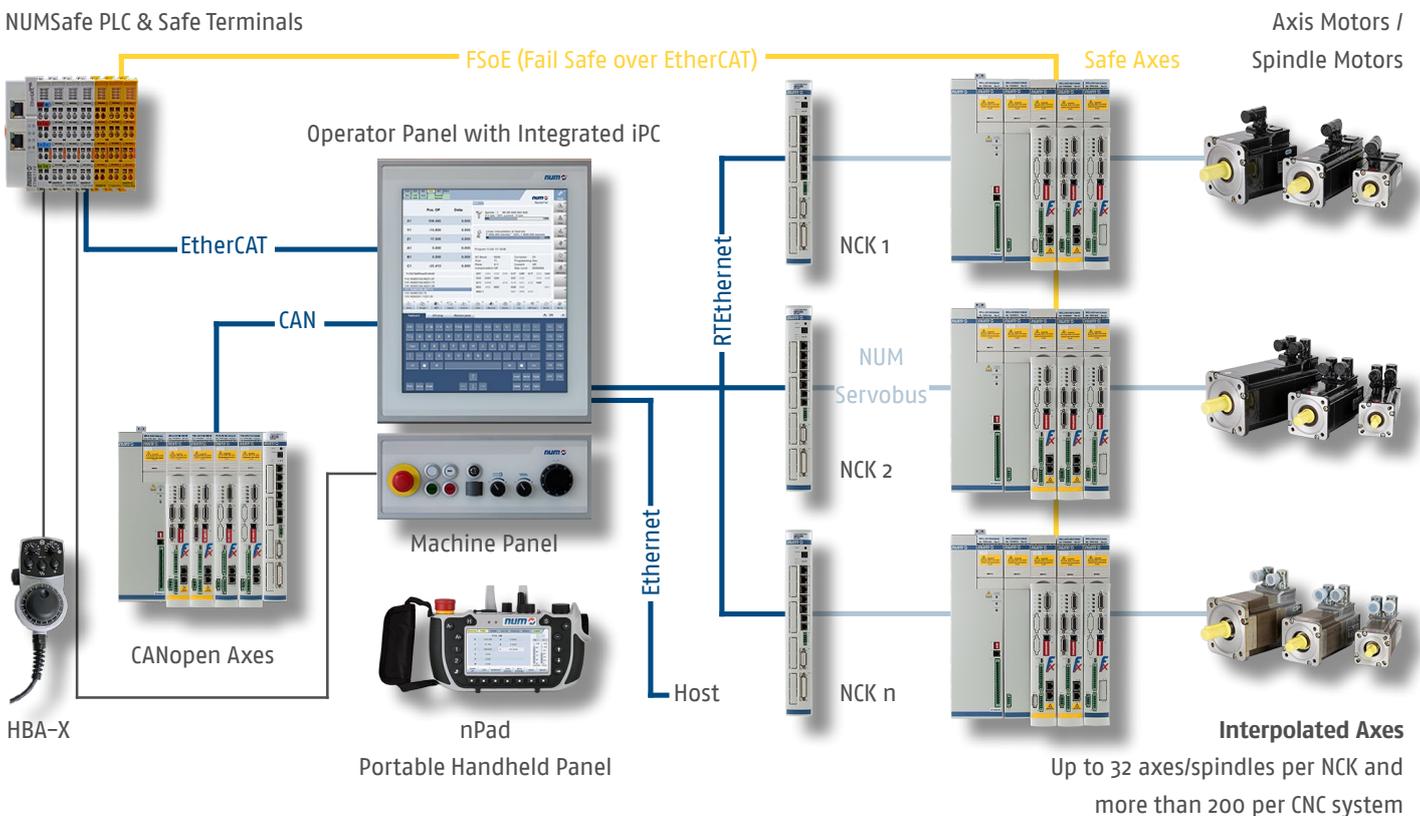
Flexium+ CNC-System

Flexibility, Productivity and Safety

Flexium+ Extreme Scalability



NUM EtherCAT Terminals
NUMSafe PLC & Safe Terminals



The control system is characterized by an extremely high scalability. It allows the perfect adaptation to the respective application solution. Thus, in a simple way, systems from 1 to over 200 CNC axes can be realized. The Flexium+ system has a secure PLC in addition to the normal PLC, which communicates via FSoE (Fail Safe over EtherCAT) with the secure inputs and outputs as well as with the NUMDrive X drive control systems. The system covers all necessary safety functions in a simple manner. The programming of the safety logic is carried out with the same software tool as the rest of the PLC. This same tool is also used for the entire system parameterization and commissioning of the machine.

The NUMDrive X drive solution is the result of more than 20 years of experience in the development of fully digital drive systems. It is available in different versions with different performance data. The wide range of drive amplifiers is available in single and dual axis versions and also in different performance levels (processing power). This allows a technical and financially optimum adaptation to every application. These modules are designed for rated currents of a few up to 200 amps. Another strength of the drive amplifier is its compactness and high energy efficiency.

NUM Motors

Perfect for all Applications

Excellent volume/performance ratio and great dynamics, so that our motors can satisfy almost all applications.

NUM has more than 50 years of experience developing servo and spindle motors. We pioneered the development and production of AC brushless servo motors, as well as synchronous spindle motors with flux weakening.

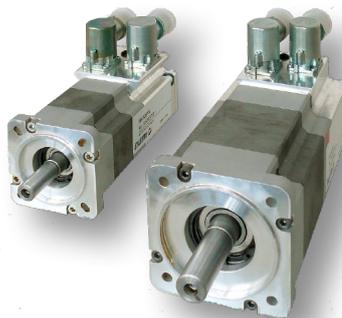
The comprehensive **servo-motor** series of NUM offer an excellent volume/output ratio, as well as first-class dynamic properties optimized for the machine tool industry. They, with perfect concentric run-out, satisfy even at very low speeds. The so-called "single cable" motors offer the advantage that the complete measuring system cable is eliminated. This simplifies the wiring of the machine significantly and thus saves money.

The **asynchronous motors** of the AMS series offer excellent quiet running at low speed, quick and accurate positioning and are ideally suited as a C-axis and for spindle indexing.

The TMX series **torque motors** have an extremely low cogging torque as well as a very high S_1 torque density. They are ideal for applications that require very smooth and precise motion, especially at low speeds. Typical applications are direct drive rotary tables or workhead axes of machine tools. The TMX motors are complemented by an extensive range of torque motors from our partner company Schaeffler Industrial Drives (IDAM), who's customers include many well-known European machine builders.

Key data of the motor series:

- Servo-motors from 0.318 to 160 Nm (IP65, IP67)
- Rated speeds of the servo-motors up to 8000 rpm
- Spindle motors up to 55 kW
- Special kit motors
- Liquid-cooled spindle motors
- Liquid-cooled servo motors
- Asynchronous and synchronous motor spindles (motor spindle)
- "Single cable" motors
- Custom motors



SCHAEFFLER

NUM Services

Worldwide at your Service

The decision for NUM is also the decision for a customer service that will support you long after the initial investment as on the first day – even after 20 years and on-site. Our specialists can ensure an extended life for your good (but old) machinery with NUM retrofits.

Worldwide support by experts

For professional analysis and trainings, a perfect infrastructure is available to our experts in all centers of excellence. So that we can assist you quickly and efficiently around the world, we also rely on the advantages of the most modern communication technologies, e.g. for remote maintenance via Internet. Of course, we will be happy to offer advice on site in your company.



Comprehensive training offer

We orient our training to your individual needs – whether its operator training, maintenance, repair and service training, PLC programming, or adjustment of servo drives.

NUM provides a training offer matched to the customer needs:

- CNC operation
- CNC programming
- PLC programming
- Commissioning and servicing
- Preparation of custom surfaces
- Customized customer training

Technically always up to date

Our team of specialists will actively inform you on the latest hardware- and software developments and provide you with useful technical information.

Repair- and spare parts service

If an error unexpectedly occurs in your CNC system in spite of proper maintenance, you can trust that this will be fixed by dedicated service employees of our global network.



Customer service

For you and your markets, we have a worldwide service organization. The International customer service provides telephone consultation, deployment on site, even for many years old installations. With a retrofit from NUM, the operating time of an excellent machine can be extended by many years.

Our customer service is available and responsive to help even with cutting edge products and custom developments. We carry local inventory and have your materials and components in stock ready to meet your requirements for quality and delivery times.

Complete CNC Solutions Worldwide



NUM systems and solutions are used worldwide.

Our global network of sales and service locations guarantees professional service from the beginning of a project to its execution and for the complete life cycle of the machine.

NUM has service centers around the world. Visit our website for the current list of locations.

www.num.com



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