



num

Complete solution for Gear Hobbing

- Simple, dedicated operation
- New installations and Retrofit
- High-quality and efficiency

www.num.com

num [®]
CNC HighEnd Applications

NUM Solutions and Systems Established worldwide

Your solution partner for sophisticated processes in machine automation



Brilliant automated solutions don't just happen: they are based on brilliant ideas! This is why we do not just focus on optimising software and hardware but also build on the innovative abilities and creativity of our specialists.

All outstanding solutions in machine automation share something in common: they are the result of diligence, exceptional technology and a high degree of creativity!

And this is exactly how NUM has earned its reputation in the tool and machine industry. We develop the most sophisticated, custom-made CNC automated solutions that guarantee both machine manufacturers as well as the users of the machines the highest added value. Your productivity wish is our command.

Our strengths as a recognised CNC specialist begin where those of our rivals end: with expertise in creating applications for CNC-controlled production machines. All of the solutions we create reflect the many interdisciplinary skills we have acquired in decades of research and development, all of which benefit you – the customer, the user and partner – and enhance your competitive edge within the industry.

As companies work to distinguish themselves in the market using innovative high tech solutions to offer the highest added value to their clients, specialists emerge in diverse specialty areas. As a proven power engineer, our strength lies in the fact that we employ experts with interdisciplinary experience from the most diverse technical fields. As a customer, you have the security of knowing there is a partner on your side that is defining the cutting edge of CNC development. Our goal is to provide you the hardware, software and brainware, allowing you to fully exploit the advantages of CNC technology.

BRAINWARE

Our innovative engineering team with its interdisciplinary know-how is at your service.

SOFTWARE

We focus on the requirements of machine operators for optimum programming and controlling the production processes.

HARDWARE

Wide range of products for CNC controllers, feed and spindle drives.

Accompaniment and support during the entire product life cycle

When you select a system and a solution from NUM, you are making a long-term investment. As your partner, we take part through the entire process: from the conception of the idea to its execution, from on-site customer service to retrofitting years later, giving new life to quality used machines.



NUMgear® – Perfection in Gear Hobbing

NUM complete solutions: intelligent and creative

NUM has developed countless customer and application-specific solutions for diverse industries – practical solutions for professional needs. With this in mind, our engineers created ground-breaking complete solutions for a great variety of applications such as gear hobbing.

NUMgear is the most comprehensive solution for gear hobbing on the market and was specifically developed for its requirements. In addition to the new installations, Retrofits play a major role in the gear hobbing machines. NUMgear strengths lie not just in its technical high-performance but particularly in its flexibility and adaptability, even for unusual machines.

NUMgear complete solution

The innovative complete solution for gear hobbing stands out alongside its high flexibility and adaptability due to the especially clear and use-friendly user interface. Combined with NUM CNC for the application and the servodrives and motors, NUMgear achieves some impressive results.

The advanced software provides easy to use functions, such as the integrated fully-electronic drive, the automatic alignment of the spindle and tool and a variety of its own milling cycles and special functions for gear hobbing.

Continuous system development and an experienced on-site customer service team ensure long-term value conservation. NUMgear quality is rounded off by training according to customer needs and remote diagnosis methods.

numtransfer.

numhsc.

numwood.

numroto.

numspecial.

numgear.

NUMgear – first choice for gear hobbing

NUMgear was developed to provide solutions that are especially tailored to the customer, the application and the machine. The combination of high quality and efficiency is a major part of the overall concept.

At NUMgear, flexible, cutting-edge technology that is easy to use is blended with comprehensive specialist know-how and application expertise. Each NUMgear solution based on hardware developed in-house at various performance stages can be added to by a range of software functions especially developed for the application. By adapting and optimising the hardware and software to the specific application, our specialists were able to get unparalleled results.

NUMgear can be integrated in the company network based on Windows XP. Central storage and administration of part programs and extended back-up functions can be made quickly and easily.

The machine operation was developed for use in sophisticated applications and is clearly structured. Even the most complex gearing can be easily programmed and the logical user structure makes working on the machine far easier.



Dedicated operation for gear hobbing

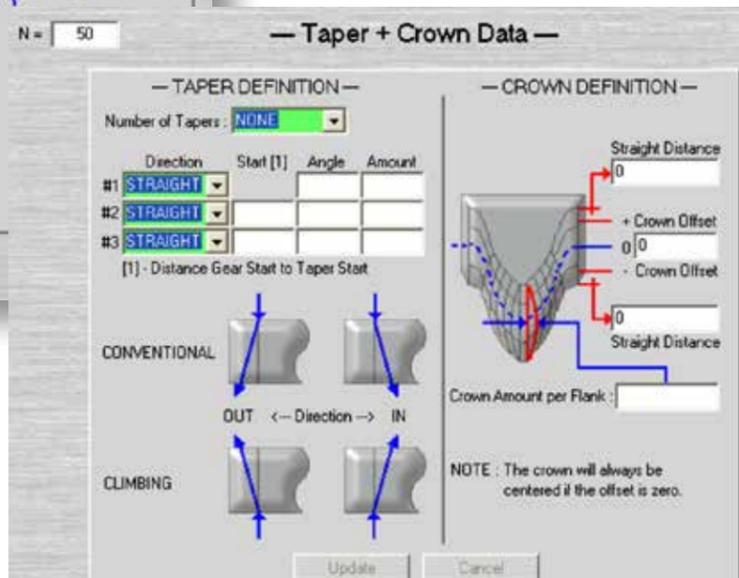
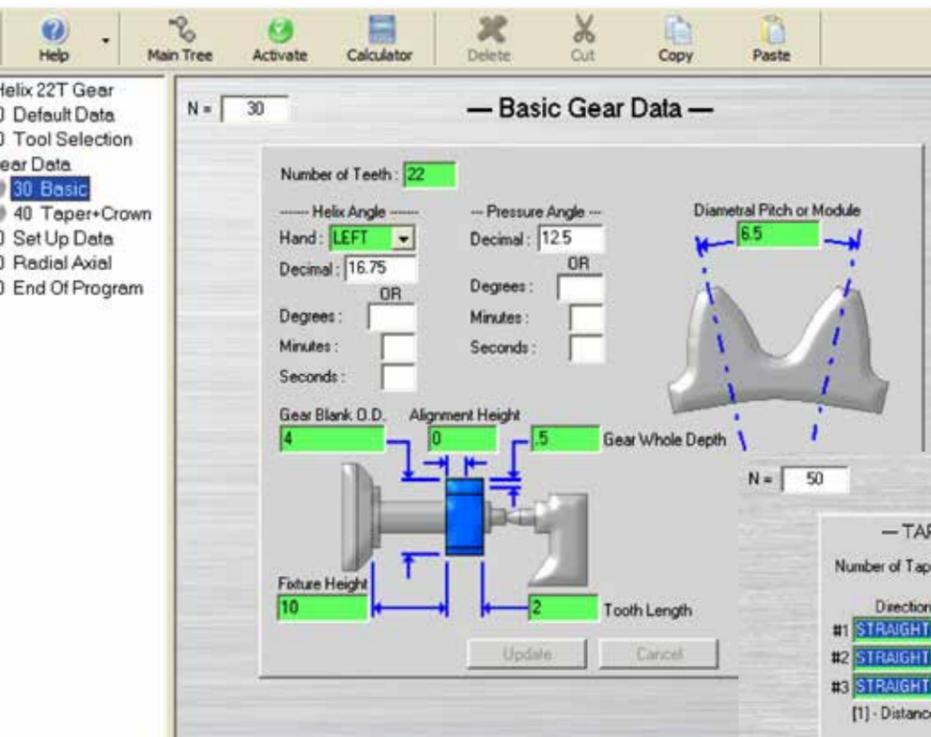
The specifically-developed user concept for programmer and operator applications and requirements is impressive with its graphical display and the appropriate programmer tools.

Logical and flexible user concept

The easy and clear operation of NUMgear supports programmers and operators in all sectors. Efficient tools

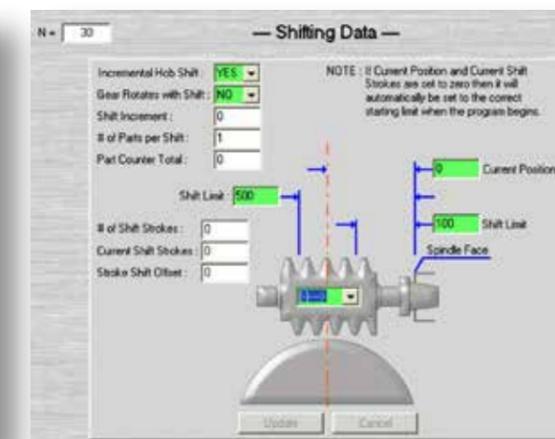
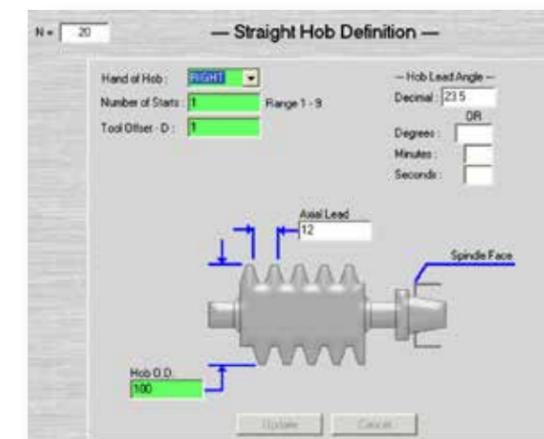
and clear graphical displays speed up the programmers work and make it far easier. Instead of having to program using confusing codes, real values in practical, graphical forms can be transferred. All essential gear forms and functions can be programmed easily and fast in this way. While the gears are being manufactured, the operator is able to keep an overview of the production procedure at all times.

This dedicated human-machine interface is the key to customer-specific and application-specific machine



control. In addition to the standard configurations of NUMgear, the user interface can be freely adapted to the professional requirements of the user. NUM has developed a variety of control panels for a range of requirements with or without the integrated industry PC. This allows you to fully exploit the machine's strong points, logically

model the applications and, consequently, increase the efficiency of the machining processes.



Precision and efficiency

NUMgear can be easily integrated into the company network and therefore the production system. The user concept and the tools simplify the programming significantly and NUMgear achieves a precision and efficiency which meet the highest requirements.

Fully-electronic gearbox

The built-in fully-electronic gearbox is one of the central elements of NUMgear. All master axes, such as milling axis and Y & Z axes and the slave axis (C axis) are fully synchronised. The 5-axis configuration with tool axis controls the system perfectly. Stored G code cycles simplify the programming significantly.

Drive alignment

An integrated, automatic alignment is available for the milling spindle and connected grinding disc with a previously machined workpiece. These functions can be accessed on stored G code cycles.

Precision and efficiency

Milling cycles: Standard blocks

The implemented standard block of gear cycles covers the largest part of regular gears. All geometries and process figures are entered in defined fields and production can begin without delay.

Milling cycles: Programming tools

The heart and main user interface of NUMgear is the milling cycle programming tool. You can see how easy NUMgear operation is just by the clear and well-laid out display of all the relevant data. The PC based user concept is particularly user-friendly and guides the operator through the procedure with step-by-step instructions. The milling cycle is automatically generated and stored and can also be started immediately. The terms of the input fields can be individually adapted and an integrated online help function with a large amount of information supports the operator in many sectors. A link to CAD or other data is also possible.

Axial milling

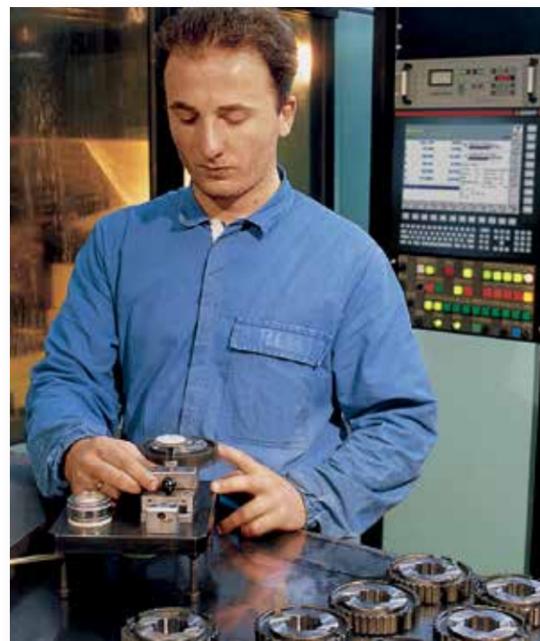
Normal axial milling functions, such as convex, offset and bevelled, are also possible, as well as special tapered diagonal milling, individual turns and radial grooves. Stop times can be set and the workpiece can be automatically aligned with the gear master or the previous gear.

Radial milling

Worm gear cycles with or without tangential feedrate can be set with this function. Individual turning and stop times are also available, such as the automatic alignment with the gear master or the previous gear.

Additional options and functions

The options allow incremental or synchronous adjustment – the gear moves with the adjustment. The machine control functions can contain automatic height and pressure adjustment of the tailstock, automatic clamping/unclamping of the workpiece and cooling control. The “cluster drive milling” provides an unlimited number of sequences and all machine cycle combinations.



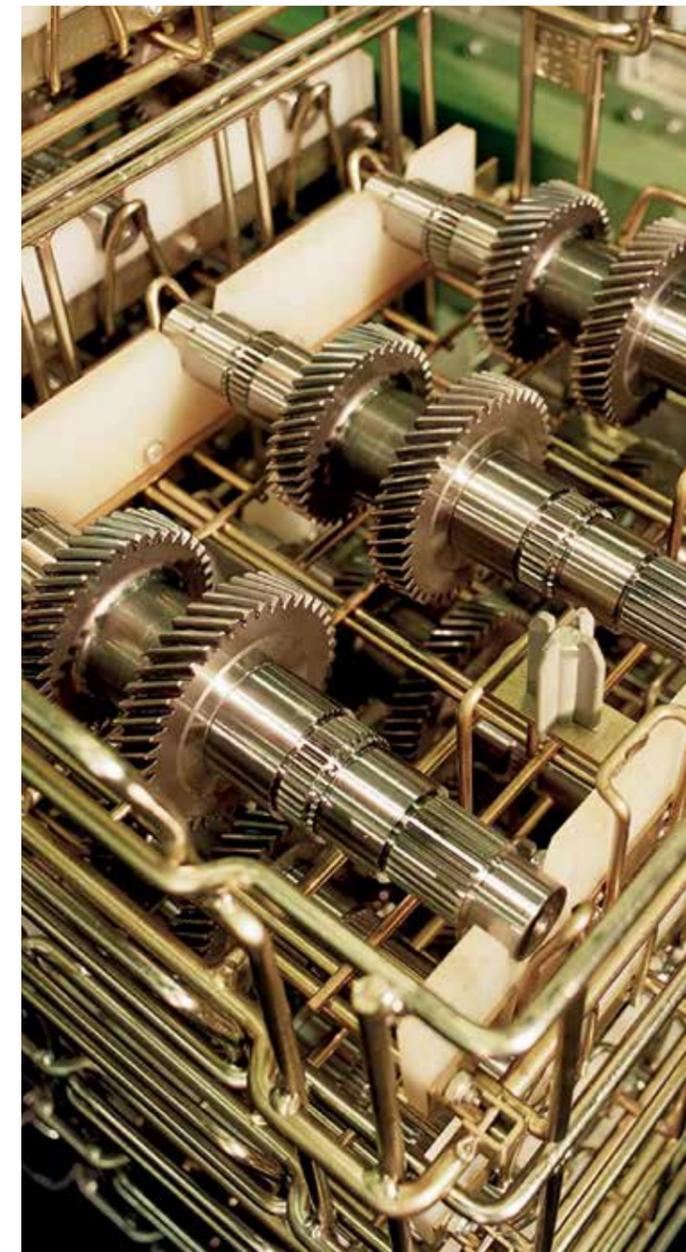
NUMgear – for new and current machines

Modern control and drive technology by NUMgear is developed for new and existing machines alike. That is why NUMgear is also an excellent solution for a Retrofit.

An essential feature of NUMgear complete solution is the user-friendly, simple and fast machine operation. The user concept is very visual and supports the programmer and user considerably in their work. Workpieces can be programmed and manufactured fast and precisely even without knowing the ISO codes.

The CNC systems are selected and configured exactly according to customer and application requirements. The CNCs are available in two powerful digital versions and one especially suitable for the analogue Retrofit version. Dedicated programs and tools expand the application range and CNC performance for gear hobbing.

The intelligent digital servodrive forms a unit with the CNC and performs the precision interpolation. The large selection of different NUM motors offers the perfect extension. You can achieve unparalleled perfection in precision, quality and efficiency from our specialists, combined with finely tuned CNC with intelligent algorithms and interpolations.



Retrofit CNC Systems

flexium

Retrofit – extra service life for the machine

When old machines show signs of aging it is mostly in the failing reliability and electronics faults. Compared to new machines, it is often the flexibility of the program and the CNC system that leave a lot to be desired. It is also the inadequate computer and servodrive power.

The mechanical features of the old machines are often superior to the new ones and make an investment in a Retrofit an extremely attractive option. NUMgear can extend the service life which makes it interesting from an economical point of view:

- Investing in a Retrofit pays off in a very short period of time.
- The Retrofit machine is up and running again in only a few weeks.

Depending on requirements, NUM offers specific solutions which can improve performance and production figures in three stages and can hardly take second place to a modern machine.

New controls

Replacing the CNC control is sufficient, provided the machine, servodrive and spindle motor are in good condition. The simple operations and high computing power of the analogue NUM Power CNC boost the performance of the machine. Programming complex procedures is far easier and the system has sufficient power reserves for all essential production processes.

New controls and drives

Provided the machine is in good condition, replacing the CNC controls, servodrive and motors will improve the performance significantly. Equipped with modern digital NUMgear drive technology, the machine does not come second to a new product. Our specialists finely

tune the elements to one another and on the machine to combine perfection in precision and efficiency even for demanding procedures. The simple operation of NUM CNC systems ensures that this performance can really be achieved.

New controls and drives, mechanical overhaul

In addition to the new CNC control and drive technology, the machine is overhauled in all relevant mechanical areas. This type of modernisation cannot be compared to new machines and has significantly lower investments costs and delivery times.

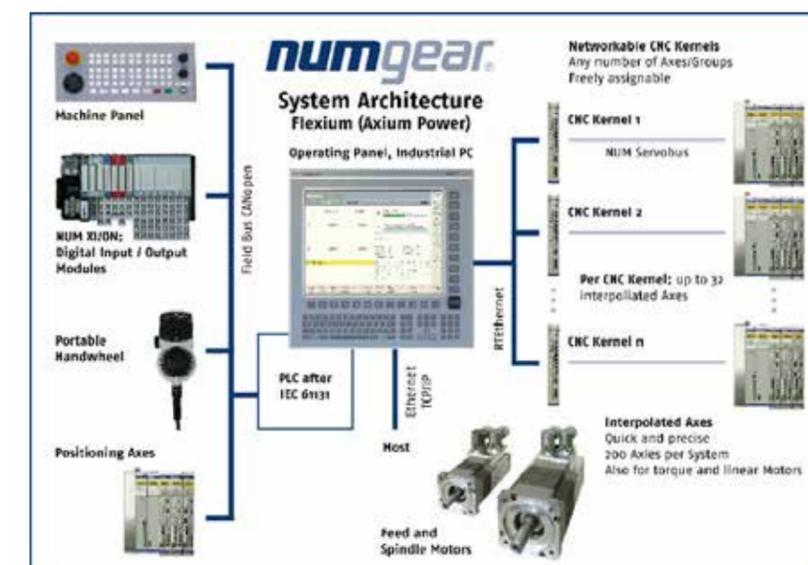
NUM Customer Service will be glad to service this upgraded machine for decades to come.

NUM CNC Systems: The modern heart of NUMgear

Depending on the application, three different CNCs are available with different performance levels to complete the NUMgear complete solution. The Flexium NCK stands out with its exceptional high performance and flexibility and is a key element of NUM solutions and systems. This CNC has compact dimensions, reduced power input, efficient, modern processors with high computing speeds and an intelligent layout for further extensions. The Flexium NCK can produce simple and complex systems which are cost-effective and can meet customer requirements.



Axiom Power is the digital CNC system which has been proven thousands of times in special applications and with numerous NUMgear solutions. Num Power is the analogue CNC system which has been successful in applications for decades and which also reliably



controls existing analogue servodrives. You require specific brochures for these products.

NUM Drive and NUM Motors

Ideal partners for NUMgear

The modern design of the servodrive and the motors, which are perfectly adjusted to the machine, are ideally suited to the implementation of a NUMgear complete solution.

Servodrives: Intelligent precision and performance

One distinguishing feature of the NUMDrive C is its high power density. The servodrives offer an enormous amount of computing and drive power within a very small space and thus have one of the highest power/space ratios available. The wide range of power modules and scalable control units, available in single-axis or dual-axis versions, enables the implementation of the technically best and most economical solution.

The CNC program blocks are precisely interpolated again in the NUMDrive C. The servodrives are adjusted to each machine and application exactly to achieve the highest quality and efficiency.

Optimal modular

The modularity of the NUMDrive C enables perfect adjustment to the system with stringent cost control at the same time. The common power and auxiliary power supply units enable the distribution and use of the system energy, which reduces the power consumption. A servodrive consists of the power module and a control unit.

Diverse and flexible

The diverse range of power modules and scalable control units, each designed with a single axis or dual axes, allow the realisation of the best possible technology solution with the lowest costs.

The high-performance NUMDrive C HP control units were developed for use with sophisticated and complex

applications in precision machine tools and specifically for NUMgear. The bearing control loop is closed with 5 kHz, achieving exceptional precision and speed at the mechanical interface of the machine (motor axis, linear motor). NUMDrive C accepts almost all measuring systems and can control a broad range of motors (servo, torque, linear, asynchronous motors) from NUM or other manufacturers. The BP control units are suited to systems and precision machine tools of medium complexity as well as to cost-effective solutions.

For the single-axis NUMDrive C, the safety module (SAM), which offers integrated safety functions according

to EN954-1 CAT-3, in future CAT-1, or IEC61508 SIL 2, is available as an option.

Additional servodrives

The NUMDrive C range is being continually extended. The conventional NUM servodrive, which is also integrated into a NUMgear complete solution and NUM Power, also has analogue servodrives.

NUM Motors: Perfectly adapted

Brushless axis motors

The NUM axis motors provide excellent volume / performance ratio and are impressive with perfect concentricity even for low speeds. The new motors in the BHX line extend the range and are especially suitable for using with NUMgear. They stand out with the advantageous price/efficiency ratio due to a mass moment of inertia and friction which is perfectly adapted to meet machining industry needs. Machining is controlled by the NUMDrive C servodrives and precisely implemented

to reach excellent performance rates in combination with intelligent CNC algorithms. Surface quality, speed and efficiency can be ideally combined.

Spindle motors

AMS asynchronous motors offer excellent running smoothness at lower speeds, fast and precise positioning and are suitable for C axis and spindle indexing functions. The range reaches from 2.2 kW to 36 kW.

Motorspindle®

The active components of the motor are directly integrated into the spindle, ensuring high machine rigidity and increased running smoothness.

NUM develops and produces customised and integrated motors and can also meet customer requirements.



Maintenance of value

NUM – Decades of support

When you choose NUM, you are also choosing customer service which will continue to serve you just like new long after you have made your initial investment – even after 20 years, we still serve on-site. Our specialists can extend the life of your quality older machines with NUM Retrofits.

Good, quick customer service ensures that waiting time is kept to an absolute minimum. Thanks to its new logistics structure, NUM is constantly working to reduce response times. NUM offers new solutions for older systems. Our specialists use their knowledge and skills to restore even older systems as quickly as possible – new or old we are on the job.

New life with Retrofit

When excellent machines start to age, they often experience electronics failure and reduced flexibility

and power. Older machines are often left unused, although mechanically they are often superior to newer models.

With a Retrofit from NUM, the machine's operating time can be extended and depending on the requirements, machine and customer requirements for performance and productivity, it can be improved in three stages: NUMgear is the best example, as the "new" machine produces modern power and productivity figures and glows with reliability. A Retrofit is both quickly executed and due to its short payback period, an economically sound option. NUM Customer Service will be glad to service this machine for decades to come.



NUM Services

At your service – globally

NUM is committed to transferring its knowledge on a regular basis. CNC knowledge, special production expertise as well as drive and application techniques are the subjects of the training programs taught by our specialists.

Global support from professionals

A perfect infrastructure is available to our experts in all competence centers for conducting professional analyses and training seminars. In order to support you around the globe in the most efficient way possible, we employ the latest communication equipment, for example, for remote maintenance via Internet. We can, of course, also advise you on-site, directly on your company premises.

Comprehensive training programs

Our training programs are adapted to the needs of our customers. They can include operator, maintenance, repair and service training and even PLC programming or modification of servomotors and drives.

NUM offers a range of custom training programs, tailored to the needs of the customer:

- CNC operation
- CNC programming
- PLC programming
- Commissioning and maintenance
- Creation of custom interfaces
- Made-to-measure customer training

Always technically up-to-date

Our development team actively provides you with information about the latest hardware and software developments including useful brainware.

Repair and spare parts service

Should, in a rare case despite proper maintenance, a failure occurs in your CNC system, you can count on it being corrected by a global network of committed service professionals.

Customer service

Our worldwide service organisation is available for you and your markets. Our international customer service department ensures smooth commissioning and system integration, as well as providing telephone support, on-site service (also for older systems), product development, and software updates.

The department keeps up with latest product developments and maintains a large stock of material and components so that it can always meet your requirements and delivery expectations.



CNC Complete Solutions Worldwide

NUMgear 01/08 en
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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.

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