numhsc®

Complete solutions for 5-Axis Machining and HSC

- High-Speed Cutting
- High-Level Precision
- High Contour Precision & Quality

www.num.com

num®
CNC HighEnd Applications

NUM Solutions and Systems Established worldwide

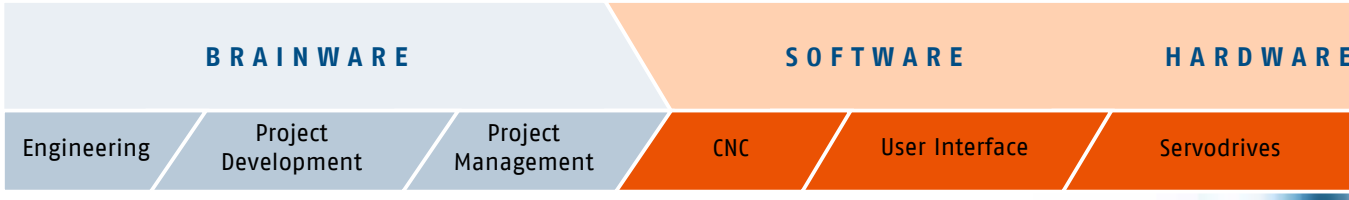
All outstanding solutions in machine automation share something in common: they are the result of diligence, exceptional technology and a high degree of creativity!

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.

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.



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.

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.

NUMhsc® – Perfection in surface quality and speed

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 demanding applications, such as high-speed cutting and 5-axis machining.

NUMhsc was developed for particularly demanding applications in all respects. Systems with five or more axes can be implemented, such as for high-speed cutting and all its combinations. Many years of hard and continuous use in the automobile and aircraft industries have shown that NUM solutions are tried and tested and guarantee quality and efficiency.

numhsc®

numgear®

numwood

numroto

numspecial

NUMhsc complete solution

NUMhsc stands out for its numerous high-tech solutions and continuous development. The advanced software with intelligent algorithms and efficient CNC provide impressive results when used in combination with the NUM servodrives and motors.

Functions, such as inclined plane, RTCP, splines, high contour precision, NUMLiss and polynom contribute in a major way to achieving exceptional quality for high-speed cutting, even for the most complex workpieces.

numhsc®

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

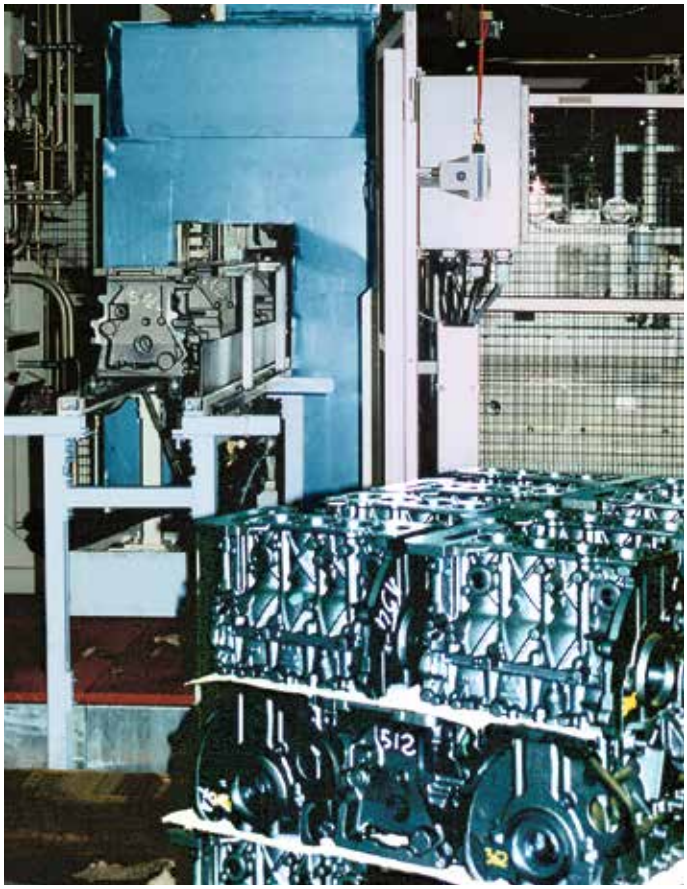
NUMhsc – first choice for HSC and 5-axis machining

Exceptional performance for exceptional requirements – this is why NUMhsc was developed. Successful companies in high-tech sectors have relied on HSC complete solutions by NUM for many years

At NUMhsc, state-of-the-art technology for the whole system is blended with comprehensive specialist know-how and application expertise. Each NUMhsc solution based on powerful hardware developed in-house, can be added to by a range of software functions especially developed for the application. Machine manufacturers are supported by our specialists in the definition and fine-tuning exactly to their requirements in order to achieve maximum precision and speed. Adapting and optimising the hardware and software to the specific application provided unparalleled results.

NUMhsc can be easily integrated in the company network based on Windows XP. Other possible functions are central storage and administration of part programs and convenient extended, back-up.

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



NUMhsc – high-performance as a principle

NUMhsc – team work in all areas

The 5-axis and high-speed cutting demand maximum performance from all components. The technical base is extremely rigid and has a good shock absorption system which is tailored for this application. High quality, dynamic and speed requirements demand a solid construction and the appropriate clamping.

The demands on the rigid and cooled spindle are also extremely high. This is manufactured and balanced precisely and is housed in a dynamic motor which enables a very wide range of applications. The brackets and tools manufactured especially for HSC reflect the demands on the machine.

NUMhsc is the ideal complement for this type of machine designed to this degree of perfection. All elements are designed for HSC such as the CNC, servodrive and motors combined with the dedicated software, intelligent algorithms and interpolations. NUM emphasises the importance of creating an impressive overall system instead of just excelling in one single field. We symbolise perfection in surface quality, speed and efficiency, even for difficult procedures:

Our success can be seen in the workpiece.

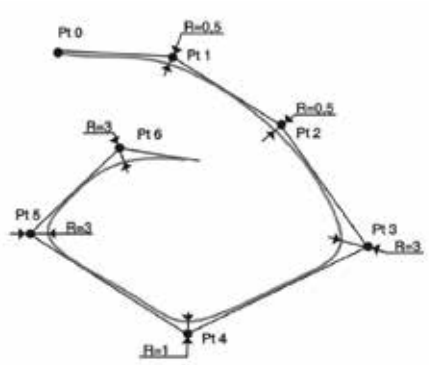
The fine adjustment of all the elements on the machine and the first and second grade precision interpolation in the servo motors ensure the best possible machining. The simple operation of NUM CNC systems ensures that this performance can really be achieved. On the following pages, we present you with some functions which exemplify NUMhsc perfection.

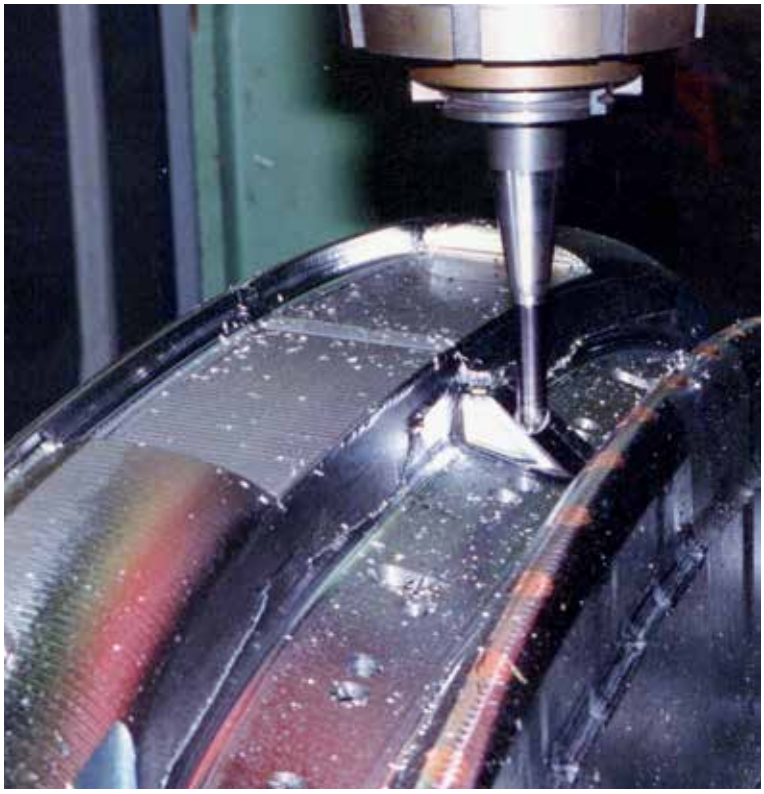
Intelligence for exceptional precision and surface quality

NUMhsc can be easily integrated into the company network and therefore the production system. CAD/CAM data can be imported directly into the system and is then processed by exclusively developed algorithms for the production and precisely interpolated in the servo-drives. In this way, NUMhsc is able to achieve a surface quality which meets the very highest requirements.

High contour precision

A whole package of specific software developments serves to create high-precision contours. The Look Ahead function enables material removal quickly and as evenly as possible, processes the command in advance and acts accordingly. The Jerk Control prevents chatter marks and also enables a much higher speed and significantly improves the surface quality. The contouring error compensation reduces geometry errors for edges on two sections to the previously defined and permitted dimension. The Advanced Resonance Suppression (ARS) in the servodrives compensates the active instabilities in the machine and vastly suppresses resonance. Other filters and functions are available which include enabling the rigidity of the drive to be adjusted to a higher level. All these functions improve the quality of curves or edges and assure that instructions are executed as precisely as possible.

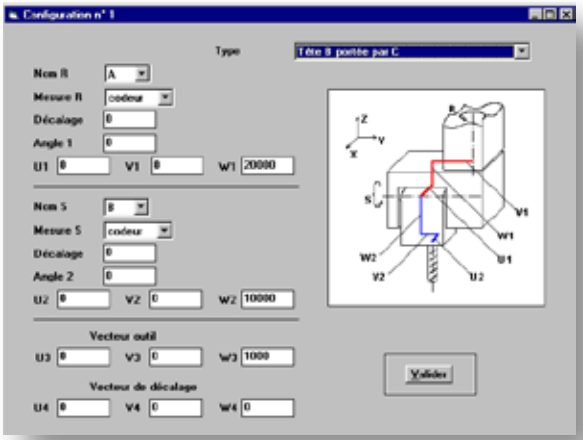


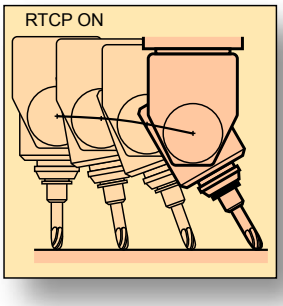


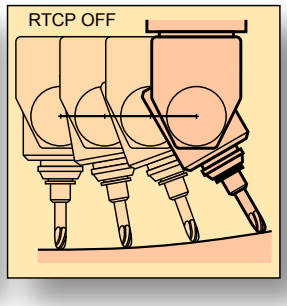
Intelligent algorithms for the highest quality

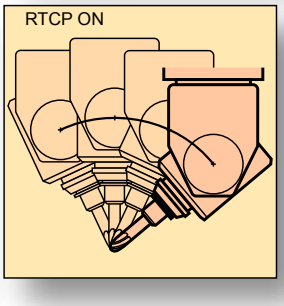
RTCP

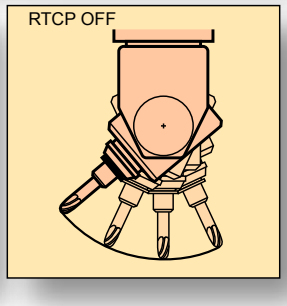
The RTCP (Rotating around Tool Center Point) function was originally launched onto the market by NUM and is an essential part of CNC machining. RTCP is able to keep the tool tip continuously in the workpiece. The post-processor calculates the position of the rotating axes and the CNC does the geometric transformation in real time so that optimal cutting conditions are maintained at all times. This reduces the machining time, the surface quality is better and the tool is subject to less strain.





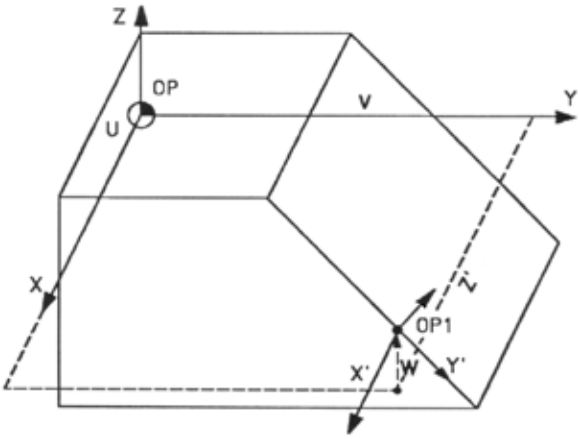






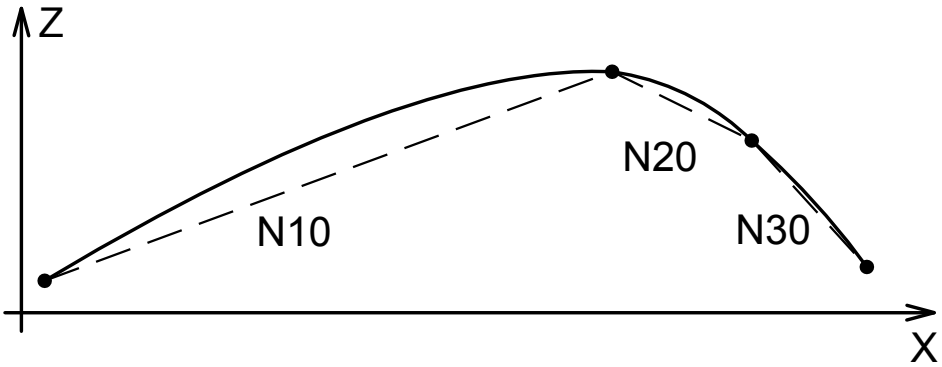
Inclined plane

Programming complex forms is greatly simplified and shortened, using the inclined plane function. In addition to the six levels already in the XYZ coordinate system, a inclined plane can be created at any rotation angle. The workpiece contour can now be programmed as in a normal level and the programmer is spared the complicated spatial thought processes altogether. If the program is interrupted during production, the "Inclined plane" function remains active and the user can, for example, manoeuvre it out of the drill hole manually if the tool is broken.



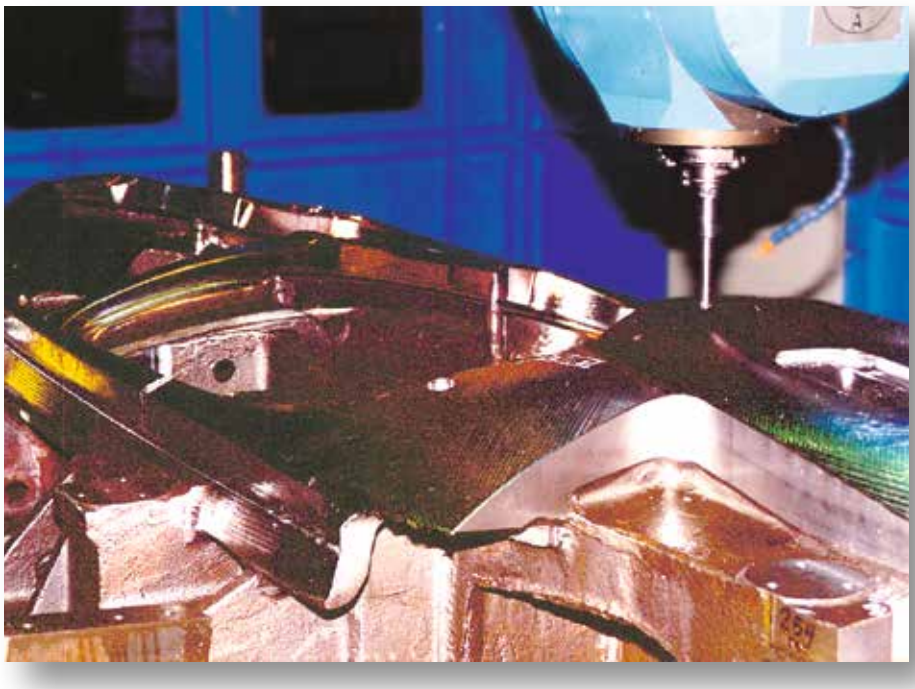
Polynom interpolation

The polynomial interpolation calculates polynomials up to 5 degrees in real time. Facets are then suppressed which result in a far better surface quality. The speed of complicated tracks can be better controlled, which has a positive impact on surface quality and tool life.



Spline and NURBS interpolation

The interpolation of splines and NURBS (not uniform rational B splines) in CNC supports up to 6 axes and 5 degree polynomials. The RTCP function can continue to be used if required. The improved surface quality and smooth track specifications often go together with smaller workpiece programs, where the CNC has less to handle.

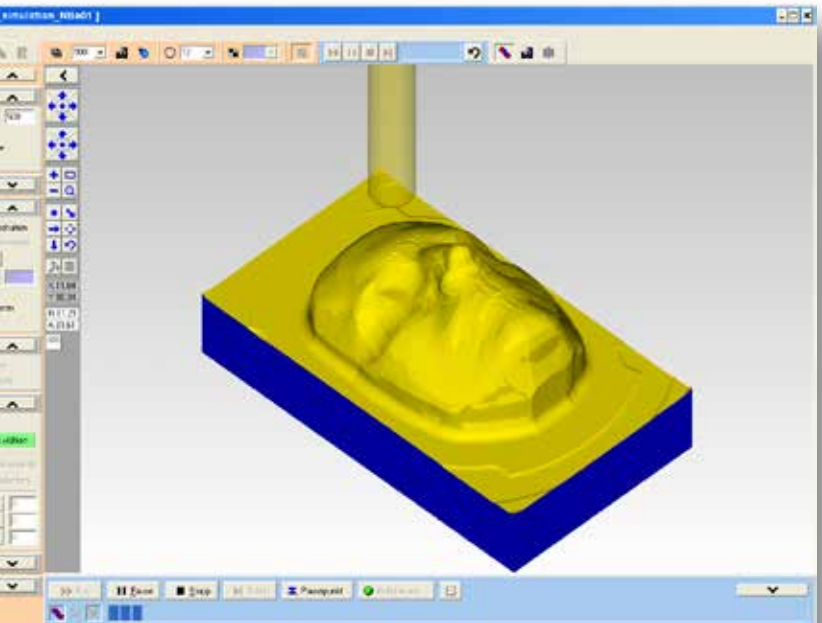


Smoothing: NUMLiss
3D simulation

High-level smoothing: NUMLiss

NUMLiss uses the polynomial interpolation from NUM and creates one continuous movement in real time from the individual, small instructions in the post-processor. Geometric errors, the number and size of facets are all reduced and precision and surface quality can be greatly increased. Reducing the braking procedures on the radius edges and the reduced amounts of data serve to accelerate the machining. NUMLiss can also calculate in real time, just as was used in the production preparation.

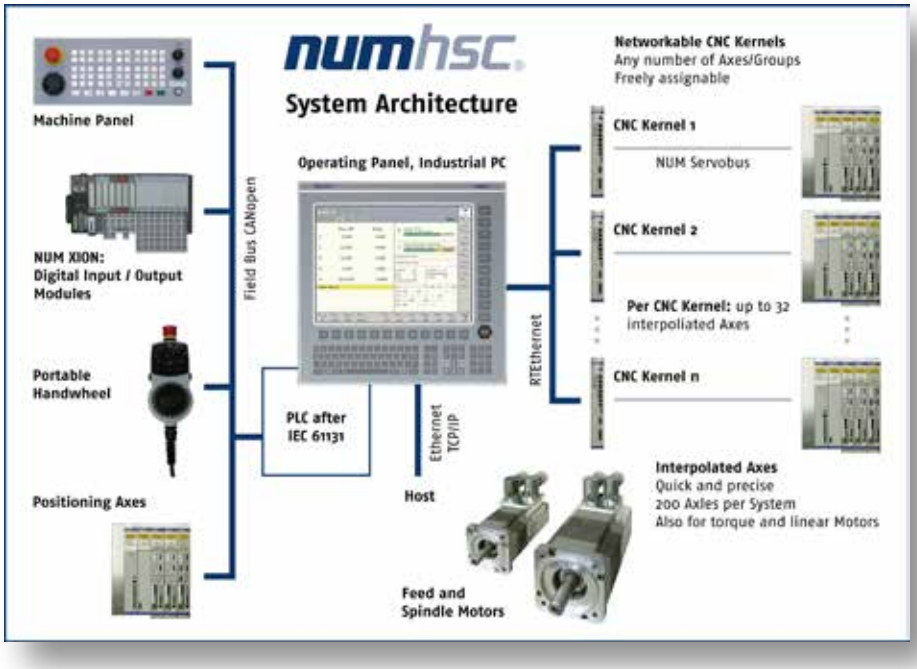
3D simulation and 3D collision monitoring



As well as the perfect simulation of the complete tool, the software can also be used for measuring geometric features, creating cross-sections of the tool and analysing the volume of removal for each machining process. The 3D collision monitoring can check the complete machining process for collisions on command, fully-automatically or parallel to the CNC file transfer. It contains the tool and spindle mandrel as well as an attached auxiliary device and can also be used with a loader. The collision check only takes a few seconds when used with normal workpieces.

NUM CNC Systems:
The modern heart of NUMhsc

Depending on the application, two different digital CNCs are available with different performance levels to complete the NUMhsc 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 Flexium has compact dimensions, reduced power input, efficient, modern processors with high computing speeds and an intelligent layout for further extensions. The reload mode and the very large memory ensure continuous operation for comprehensive programs. The Flexium NCK can produce simple and complex systems according to customer requirements. Axium Power is the CNC system has been proven thousands of times in special applications with HSC solutions, such as in the automobile and aircraft industries. You require specific brochures for these products.



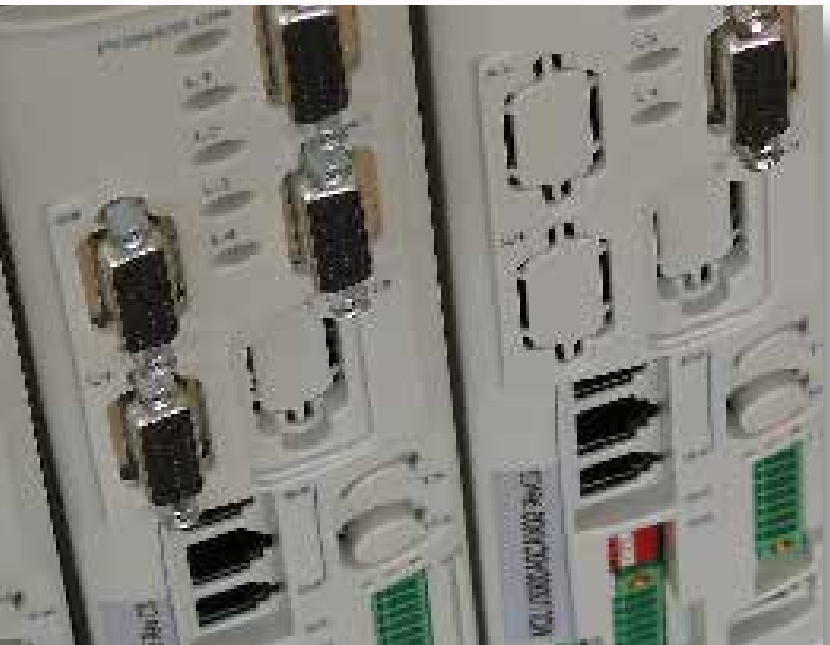
NUM Drive and NUM Motors

Ideal partners for NUMhsc

The modern design of the NUMDrive C servodrive combined with the newly-developed BHX motor are ideally suited to the implementation of a NUMhsc complete solution.

NUMDrive C servo motor: 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 programs are precisely interpolated in the NUMDrive C and the position control loop is closed with 5 kHz, achieving exceptional precision and speed at the mechanical interface of the machine. Spindles with an r.p.m. above 50,000 can also be controlled. The NUMDrive C servodrives are exactly adjusted to the particular machine and application to produce the highest precision contour, speed 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 servo-drive 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 particularly for NUMhsc. The position 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. Conventional NUM servodrives can also be integrated in a NUMhsc complete solution and CANopen positioning drives are also available for Flexium NCK.

NUM motors and BHX series: Perfect adjustment

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 NUMhsc. 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 case.

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 the three stages: replacing the control, additional replacement of the servodrives and spindle motors or a combination of these with a mechanical overhaul. The "new" machine produces modern power and productivity figures and sparkles with reliability. A Retrofit is both quickly executed and due to its short payback period, an economically sound option. NUM Customer Service will proudly continue 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

NUMhsc 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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