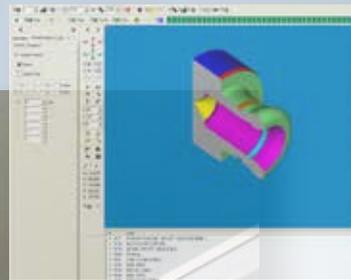


flexium

CNC-SYSTEM



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 machine tool 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 collaborate throughout 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 optimizing 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 areas. As a proven engineering company, 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 with the best hardware, software and engineering expertise, so that you can fully exploit the advantages of CNC technology.

ENGINEERING

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 of production processes.

HARDWARE

Our wide range of compatible products includes CNC controllers, servo and spindle drives, and motors.

NUM supports you and your projects to achieve the best results for your company and your infrastructure. The goal of our cooperation, however, always remains the same: collaborating to create the best-possible solution for your project.



Project Coordination

Efficient consultation for optimised application solutions
This model is ideal for companies that have their own development teams and automation specialists. As an external partner, we can make available our entire expertise in the field of CNC automation and provide in-depth consulting services.



Project Cooperation

Combining knowledge – harvesting synergy
Your team of developers joins forces with our specialists. Together, we clearly delineate responsibilities in automating your machine. This type of collaboration has proved itself to be extremely efficient in past projects.



Complete Solutions

Delegating responsibilities – monitoring results
Acting as a general contractor, we take charge of the overall project and assume responsibility for the full implementation. Starting with the product requirement specifications, including development and commissioning and finally, providing support, training and service.

NUM Solutions and Systems – intelligent and creative

We have developed countless customer- and application-specific solutions for diverse industries – devising practical solutions for professional needs. With this in mind, our engineers create groundbreaking complete solutions for demanding applications.

All of our solutions are based on a wide range of our own perfectly integrated products, such as CNC, servodrives and motors. Partnerships with our customers are maintained in the evaluation, project and installation phases by means of training courses, support and service centres, and continue after commissioning. We make a point of advising our customers with specific know-how from our experts.



numroto.

NUMROTO – the most successful trendsetter in tool grinding for years

numtransfer.

NUMtransfer – cost-effective and versatile for all batches, for in-line and rotary transfer and multi-spindle machines

numhsc.

NUMhsc – excellent high speed and quality on 5 or more axes machines

numwood.

NUMwood – long tradition with powerful complete solutions in woodworking

numgear.

NUMgear – intelligent complete solutions for new or used gear manufacturing machines

numspecial.

NUMspecial – creative solutions for your specific requirements

numcut.

NUMcut – a complete solution with a ready-integrated tool head for sophisticated cutting machinery applications

Flexium CNC-System

Technology and Performance

Optimizing production processes to maximize performance and efficiency requires high-end motion control products. The Flexium CNC system was developed with powerful, modern and widely recognized technologies to accomplish the most challenging tasks.

Flexium CNC is a key element of NUM's high-end applications systems. Its compact dimensions are the result of a design aimed at limiting energy requirements. Latest generation industrial processors with large number crunching capabilities powering intelligent and evolutionary hardware ensure return on investment and a long system life, in accordance with NUM's philosophy.

The PLC, programmed according to IEC 61131-3, as well as the powerful and user friendly development environment provides efficient tools for development, commissioning and servicing of your machines.

Flexium uses standardized interfaces such as Ethernet – real-time Ethernet when required – EtherCAT and CANopen for I/Os, as well as the dedicated and efficient DISC NT bus for connection to the servo drives. The CNC units (NCK for NC Kernel) can be linked together in a global configuration, whereby, for example, large transfer systems with more than 200 interpolating axes can be easily implemented. Integrating machine control panels, inputs and outputs, hand wheels, positioning axes and more is easy, thanks to the versatility of the field bus interfaces.

The Flexium HMI is based on the popular NUMpass user interface. Combining user friendliness with power, it is compatible with existing Axiom Power and Num Power systems to ensure an easy transition, as well as simplifying training and servicing.




Flexium

For highest Productivity

Perfection according to customers' wishes

The Flexium system is fully scalable and can easily be adapted to customers' needs. Available in three configurations – Flexium 6, Flexium 8 and Flexium 68 – each with specific functions and application packages, the system can be tailored to suit every application. In combination with drives and motors from NUM's extensive range, it forms a perfect system for controlling a machine with the highest possible performance and accuracy.

There is a wide range of application-specific functions. These are available individually, in dedicated packages for milling, grinding, gear cutting, etc, or as

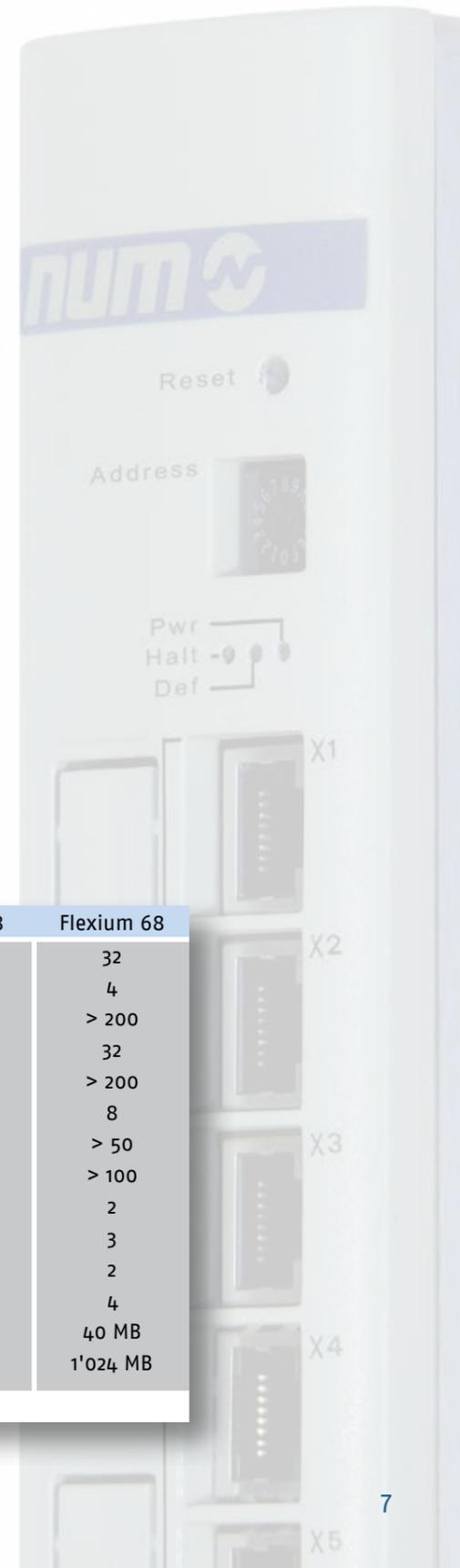
a complete solution such as NUMtransfer. The functions include rapid and precise servo drive algorithms, which in conjunction with sophisticated acceleration management techniques aim at increasing productivity with optimal quality.

For very specific requirements like particular coordinate conversion, Flexium offers the machine manufacturer secure and real time access to the system interpolator's data; integration of CAD/CAM systems is also facilitated.

We look forward to showing you possibilities that will surprise you.

Flexium	Flexium 6	Flexium 8	Flexium 68
Axes + Spindles per NCK	4 + 1	5	32
Spindles per NCK	1	1	4
Axes + Spindles per system	N/A*	N/A*	> 200
Interpolated Axes per NCK	4	4	32
Interpolated Axes per system	N/A*	N/A*	> 200
Channels per NCK	1	2	8
Channels per system	N/A*	N/A*	> 50
CANopen axes/spindles per system	> 100	> 100	> 100
CANopen interfaces	1	1	2
Servobus digital ports per NCK (DISC NT)	3	3	3
Measurement Inputs per NCK	2	2	2
Handwheels per NCK	2	2	4
CNC Program Memory per NCK	40 MB	40 MB	40 MB
PLC Program Memory	1'024 MB	1'024 MB	1'024 MB

*N/A = not available because of only 1 NCK possible



Flexium CNC-System

Easy-to-Use, Cutting-Edge Technology

Flexium – versatile and comprehensive

Intuitive high performance tools that simplify programming set the Flexium system apart from its rivals.

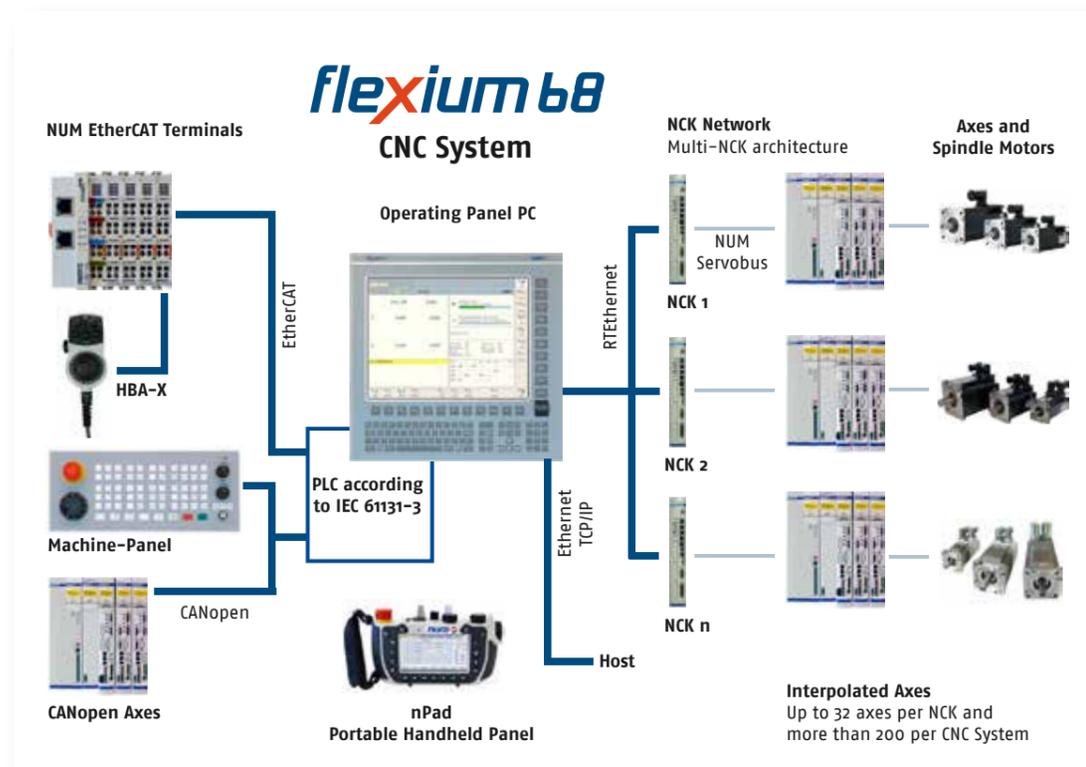
The PLC of the Flexium system is programmed in accordance with IEC 61131-3; its logical and user friendly programming environment provides powerful tools for development, startup and servicing. Num Power and Axiom Power PLC programs can be translated into the new programming language using a special tool. An integration tool provides functions to optimize drive actuation, and axis parameters can be determined analytically. A software development kit

(SDK) aids quick and simple development of customer- and application-specific user interfaces – and the purchase of the needed SDK includes a training course conducted by NUM specialists.

NUM PLC Terminal and Gateways

The newly developed Flexium inputs/ outputs offer many variations and are available in two versions, which can be combined with one another. The ECO

versions come with an impressively high channel density (16 channels on 12.5 mm) and a particularly attractive price, while the standard modules come with mechanical encryption, multicore connection technology and more. The open NUM I/O system can be configured to match application and customer needs precisely, and facilitates cost optimization.



Freely adaptable user interface

The Flexium human-machine interface is the key to customer and application-specific machine control.

Further to the standard configurations, the user interface can be freely adapted to the professional requirements of the user. The software's modular structure and dedicated tools also enable special real-time functions to be easily implemented and adapted. This allows the machine's strengths to be fully exploited, with applications presented in a logically usable way, resulting in a considerable increase in efficiency of machining processes.

The user interface can be easily programmed using standard tools such as HTML and Java Script (Visual Basic, Delphi, Visual C and C++ are also supported). The context-based division of the operating mode allows the type of information displayed to be adapted to each group of users: programmers, setup technicians, operators, servicing personnel and more.



Tangible benefits: Flexium panel

NUM presents new processor board technology for FS152i P1/ P2 panels, which allow the use of multi core processors. This considerable performance gain with Multi Core processors is available with constant pricing.

Flexium FS152i control panels mark consistent further development of the successful FS151 family. With a modern appearance, their intrinsic value is immediately apparent. Depending on the application, two technically distinct power levels can be selected.

Equipped with Windows Embedded, flash memory cards and a specific motherboard, the first variant has no moving parts such as a hard disc or fan. The second variant features a full version of Windows and a hard disc, for

use when higher performance and more storage space are required. Both variants provide full network and Internet capability as standard.

22 large function keys are grouped around the 15" flat screen, and a version with an expanded QWERTY keyboard is also available. The USB interface on the front facilitates quick and easy data exchange with the integrated industry

PC. An ideal extension to all models is NUM's MPO4 machine operating panel.

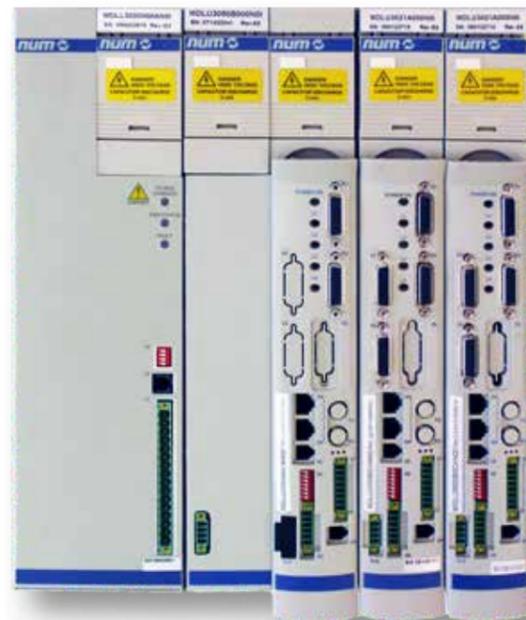
Flexium FS152i control panels are mechanically similar to the FS151 family and have the same hole pattern. They are extremely well suited to the implementation and use of sophisticated modern systems and form an ideal partnership with the Flexium NCK.

NUM Drive

Compact Precision and Dynamics

The NUMDrive C servodrives with their modern design are the ideal counterpart to the powerful Flexium CNC. Modular in design, compact in their dimensions and with a low power consumption, they correspond ideally to the needs of modern systems.

One distinguishing feature of NUMDrive C servodrives is their high power density. Packing an enormous amount of computing and drive power within a very small space, they have one of the highest power/space ratios available. System advantages include low power consumption and low heat radiation, which simplifies layout design and installation. Highly modular in design, the servodrives offer a wide range of control and power options, facilitating implementation of systems optimized for performance at the lowest possible cost. For maximum contour precision, speed and cost-effectiveness,



NUMDrive C servodrives can be tailored to exactly match particular machine and application requirements.

Optimal modularity

The modularity of NUMDrive C servodrives facilitates perfect system adaptation, even when complying with stringent cost control requirements. The common power and auxiliary power supply units allow efficient distribution and use of system energy to reduce overall power consumption. Mostly, only one filter and one braking resistor are required per system, which helps lower total costs. A servodrive comprises a power module and a control unit. A high degree of parts commonality reduces inventory and simplifies warehousing.

Diverse and flexible

A wide range of power modules and scalable control units, available in Mono-Axis or Bi-Axes versions, enables the technically optimal solution to be implemented at the lowest cost. Two performance levels are available. The High-Performance HP control units are designed for use with sophisticated and complex applications in precision machine tools. The position control loop is closed with 5 kHz, whereby exceptional accuracy and speed at the mechanical interface of the machine (motor axis, Linear motor) can be achieved.

NUMDrive C servodrives accept almost all measuring systems and can control a broad range of motors (servo, torque, linear and asynchronous) from NUM or other manufacturers. This ensures that an optimal solution can be selected from the technical and economical point of view. The Basic-Performance BP control unit are suited to systems and precision machine tools of medium complexity as well as to cost effective solutions.

The servodrives' small installation depth and scalable width (a multiple of 50 mm) simplify cabinet layout. For the Mono-Axis NUMDrive C, the safety module (SAM), which offers integrated safety functions according to EN 61800-5-2 up to SIL 3 is available as an option.

NUM's CANopen positioning drives allow low-cost integration of positioning axes into the system via the CANopen interface.

These have the same form factor as NUMDrive C servodrives, simplifying installation.

Other servodrives

The NUMDrive C range is being continually extended. Furthermore, conventional NUM servodrives can also be integrated into a Flexium system, which can be useful, for example, when extending an existing machine series. You can obtain detailed information from NUM.

NUMDrive C servodrives consist of a power module and a control unit and are completed by the appropriate power supply unit.

NUMDrive C Mono-Axis	Rated Current (S1) Arms	Maximum Current Arms	Overall Dimensions (W x H x D) mm
MDLU3014A...	8.9	10	50 x 355 x 206
MDLU3021A...	13	15	50 x 355 x 206
MDLU3034A...	13	24	50 x 355 x 206
MDLU3050A...	28	35	100 x 355 x 206
MDLU3075A...	34	53	100 x 355 x 206
MDLU3130A...	60	92	200 x 355 x 206
MDLU3200A...	100	141	200 x 355 x 206
MDLU3400A...	200	282	300 x 355 x 206
NUMDrive C Bi-Axes	Rated Current (S1) Arms	Maximum Current Arms	Overall Dimensions (W x H x D) mm
MDLU3014B...	6.3 + 6.3	10 + 10	50 x 355 x 206
MDLU3021B...	6.3 + 6.3	15 + 15	50 x 355 x 206
MDLU3050B...	20 + 20	35 + 35	100 x 355 x 206
Power Supply	Rated Power (S1) kW	Peak Power kW	Overall Dimensions (W x H x D) mm
MDLL3015N00A...	15	50	100 x 355 x 206
MDLL3030N00A...	30	50	100 x 355 x 206
MDLL3025N00R...	25	50	200 x 355 x 206
MDLL3050N00R...	50	97	200 x 355 x 206
MDLL3025N00H...	25	50	200 x 355 x 206
MDLL3050N00H...	50	97	200 x 355 x 206
MDLL3120N00H...	120	190	300 x 355 x 206

A... = Passive power supply
R... = Regenerative power supply
H... = Regulated DC Bus power supply

NUM Motors

Perfect for all Applications

NUM produces a comprehensive series of motors, all of which offer excellent performance/price ratios and superb dynamic characteristics, and are suitable for virtually all applications. In combination with NUMDrive servodrives, these motors provide excellent stability even at very low rotational speeds, and can be easily integrated into machines.

Brushless axis motors

NUM axis motors offer an excellent volume/performance ratio and provide very smooth running even at low speeds. The motors of the BHX series complete the range, and in addition to an advantageous price/performance ratio are characterised by a mass moment of inertia that is optimized for the machine industry. All NUM axis motors feature very compact designs; their overall length has been reduced to an absolute minimum, and most are available with or without a brake. The flange dimensions are oriented

to those usual in the market, opening up possible new fields of application. The spectrum of all motor types extends from 0.5 Nm to 160 Nm constant torque.

Spindle motors

The asynchronous motors of the AMS series offer excellent smoothness of running at low rotational speeds, quick and accurate positioning, and are extremely well suited as a C axis and to spindle indexing. The spectrum ranges from 2.2 kW to 55 kW.

Motorspindle®

The active parts of the motor are integrated directly in the spindle, which ensures increased rigidity of the machine and greater quietness of running. On request NUM is pleased to develop special motor spindles.



bpX
bhX

Overview

In addition to the standard products described below, NUM builds customized motors to suit customers' specific requirements. Please contact NUM for information about special and built-in motors.



Servomotor range	Main characteristics	Typical applications	Continuous torque range	Available frame sizes	Available options
BHX	Very compact design, high inertia, IP64.	Designed for feeding axes of cost effective machine tools.	From 1.2 Nm up to 20 Nm	75mm, 95mm, 126 mm and 155mm	Holding brake, keyed shaft, medium and high resolution single and multi turn encoder.
BPX	Extremely compact design, high peak torques, smooth operations, high inertia, IP67.	Designed for feeding axes of high-end machine tools, grinding machines, robotics and special machines.	From 0.5 Nm up to 23 Nm	55mm, 75mm, 95mm, 126 mm and 155mm	Holding brake, keyed shaft, medium and high resolution single and multi turn encoder.
BPH	Compact design, smooth operations, medium inertia, up to IP67.	Designed for feeding axes of high-end machine tools, grinding machines, robotics and special machines.	From 1.3 Nm up to 100 Nm	75mm, 95mm, 115 mm, 142mm and 190mm	Holding brake, keyed shaft, medium and high resolution single and multi turn encoder.
BPG	Compact design, smooth operations, very high inertia, up to IP67.	Designed for feeding axes of high end machine tools, grinding machines, robotics and special machines.	From 1.3 Nm up to 56 Nm	75mm, 95mm, 115 mm, 142mm and 190mm	Keyed shaft, medium and high resolution single and multi turn encoder.
BHL	Very compact design, high inertia, IP65	Designed for feeding axes of large machine tools.	From 85 Nm up to 160 Nm	260mm	Holding brake, keyed shaft, medium and high resolution single and multi turn encoder.

Maintenance of value

Decades of support from NUM

When you choose NUM you are also choosing customer service that will continue to serve you long after your initial investment, we still provide service on some systems that are 20 years old. Our specialists can help you 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. NUM's logistics structure is optimized to reduce response times and accelerate project completion. As part of our service to customers, we offer new solutions for old 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 machines start to age, even the best are likely to suffer repeated electronics failure, or reduced flexibility

and power. As a consequence, they are often left unused, even though mechanically they may well be superior to newer models.

With a Retrofit from NUM, the machine's operational life can be extended significantly. Depending on the machine and the customer's performance and productivity requirements, it can be improved in three stages by replacing its control, additionally replacing its servodrives and spindle motors, or performing a combination of these complete with a mechanical overhaul. The 'new' machine will have much improved power, productivity and reliability. A Retrofit is executed quickly and has a short pay-back period, making it an economically sound proposition. NUM Customer Service will then continue to service the machine for decades to come.



NUM Services

Professional global support

NUM is committed to transferring its knowledge to its customers on a regular basis. CNC knowledge and special production expertise, as well as drive and application techniques, are all subjects of 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 team of specialists actively informs you about the latest hardware and software developments, and provides useful engineering information.

Repair and spare parts service

In the rare event that a failure occurs in your CNC system despite proper maintenance, you can count on it being corrected by personnel from our 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.

flexium



NUM AG
CNC HighEnd Applications

www.num.com



NUM [®]
CNC HighEnd Applications