flexium$^+$

CNC–SYSTEM

num
CNC HighEnd Applications

NUM Solutions and Systems
Established worldwide

Your solution partner for sophisticated processes in machine automation

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

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.

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.

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.

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.

ENGINEERING			SOFTWARE	HARDWARE		SERVICES		RETROFIT
Analysis	Project Development	Project Management	CNC	User Interface	Servodrives	Motors	Training & Support	Upgrades & Repairs	Modernisation, value maintenance

NUM Solutions and Systems – intelligent and creative

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.

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 ground-breaking complete solutions for demanding applications.

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.

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

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

numspecial
NUMspecial – creative solutions for your specific requirements

Flexium+ CNC system
Flexium and more...

Flexium+ builds on the success of NUM's Flexium system to advance CNC to a new level. It combines all the power, flexibility and user-friendliness NUM's products are renowned for, with additional state of the art functionality and a completely new hardware and software platform.

Flexium+	Flexium+ 6	Flexium+ 8	Flexium+ 68
Axes + Spindles per NCK	4 + 1	5	32
Spindles per NCK	1	1	32
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			

The new platform

The outstanding success of Flexium with over 10,000 applications completed in a short space of time paved the way for development of Flexium+. We took the best components, kept those elements behind the success of our previous CNCs, such as scalability, flexibility, unique CNC functions, standardized interfaces and PLC programming, then renovated and improved the complete system. Flexium+ has new and enhanced features, new panels, a new HMI, an enhanced servo bus, enhanced drives and simplified connectivity – all within a completely new safety-related architecture. There are three configuration levels – Flexium+ 6, Flexium+ 8 and Flexium+ 68 – to provide optimum cost/performance ratios.

Architecture

Its compact dimensions are the result of a design aimed at limiting energy requirements of the Flexium+ system. Latest generation processors powering intelligent and evolutionary hardware ensure return on investment and long system life, in line with NUM's philosophy.

Increased CNC functionality offers improved flexibility, scalability and accuracy. In particular, we have extended the concept of axis or spindle to allow control of up to 32 spindles per NCK unit (NCK for NC Kernel) and make spindle/axis commutation even easier. We have also improved internal computing resolution, increased 'servobus' speed, and much more. The freedom to link several NCKs together in a global configuration has of course been maintained, enabling, for example, control of large transfer systems with more than 200 interpolating axes.

The system controls the NUMDrive X digital drives via up to three RJ45 ports, allowing for distributed drive sets on the machine. In addition to the digital interface, two interfaces are provided for analog control. The PLC complies with the IEC 61131-1 standard and communicates via efficient standardized interfaces. The single development environment provides different access levels for machine integration, setup and maintenance.

The human-machine interface is provided via PC panels, including a revolutionary 19" unit and companion machine panel, all running modern fully redesigned HMI software. There is a choice of machine panels and portable units, and the renowned Flexium 3D simulation package rounds out the portfolio.

NUM EtherCAT Terminals
NUM Safe PLC & Safe Terminals

flexium+
CNC System
FSoE (Fail Safe over EtherCAT)

NCK Network
Multi-NCK architecture

Axes and
Spindle Motors

Operating Panel PC

NUM
Servobus

EtherCAT

CANopen

RTEthernet

NCK 1

Safe Axes

HBA-X

CANopen Axes

NCK 2

Machine Panel

Ethernet
TCP/IP

NCK n

nPad
Portable Handheld Panel

Host

Interpolated Axes
Up to 32 axes per NCK and more
than 200 per CNC System

Flexium+
Safety, Flexibility and Productivity

A distinguishing feature of Flexium+ is its new NUMSafe safety architecture.

In short (more details on page 12), a safe PLC is tightly integrated in the overall system architecture and communicates with safe inputs and outputs, as well as with NUMDrive X units where the motion monitoring functions are executed. A single programming environment is provided for both 'safety related' and 'non safety related' logic.

NUMDrive X, featuring the new SAMX functional safety board, is a key component of this solution. It maintains all of the superb and well known characteristics of NUMDrive C – such as performance, scalability, modularity and reliability – and advances them even further.

Among other new features, we have doubled the drive's computing power, increased its resolution and bandwidth, and expanded its I/O capabilities.

Unified firmware for both mono- and bi-axis drives simplifies version management.

Last but not least, thanks to an innovative communication protocol that accommodates encoder power and data on just two wires, we have managed to completely eliminate dedicated encoder cables. Motors and drives can now be linked with a single cable, simplifying installation and saving considerable time and money.
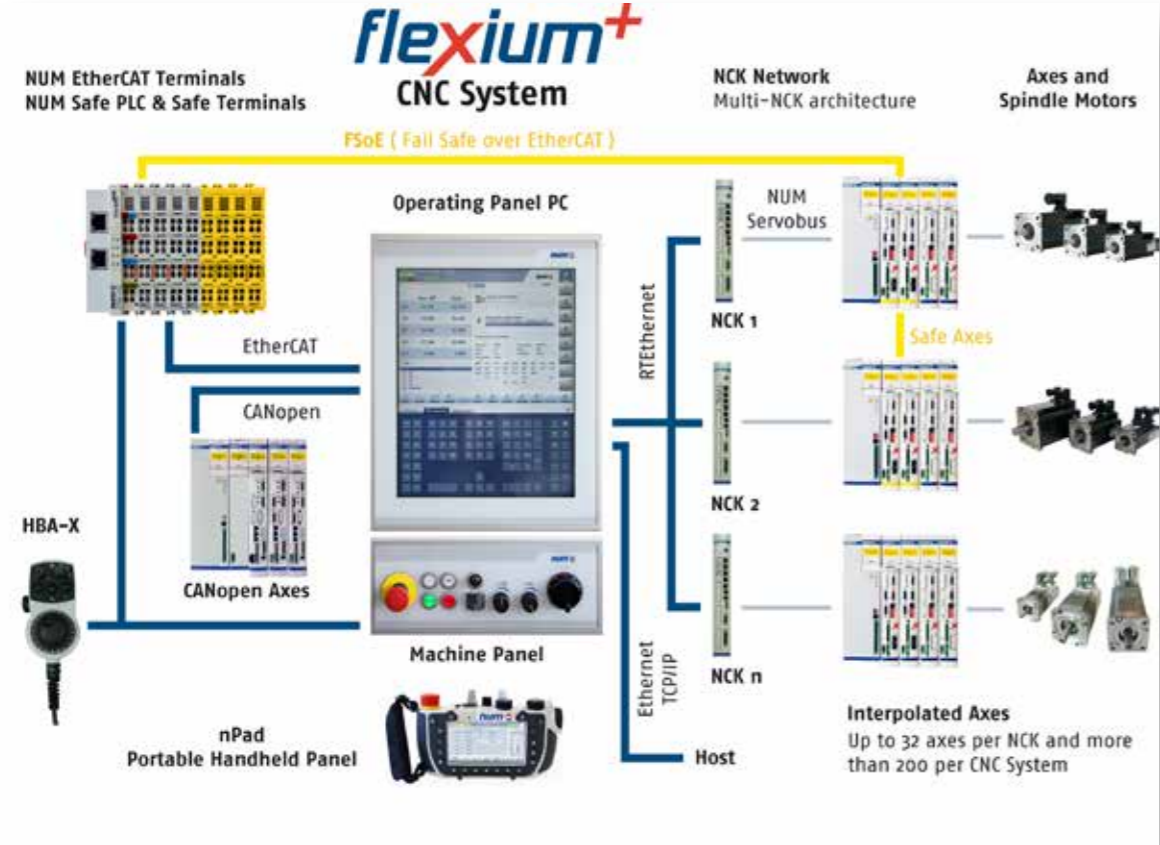
Flexium+ CNC system
Flexium and more...

Flexium+
...more about Safety, Flexibility and Productivity

With Flexium+, safety now also means simplified programming, simplified wiring, simplified setup, plus new functions. Let's take a more detailed look at the different components of the Flexium+ system.

Flexium+ NCK : The CNC unit

Flexium+ NCK is the heart of the system. In a compact design compatible in size with the NUMDrive X components, it packs a powerful engine, up to 40 MB of user memory, connectivity for up to 32 digital axes or spindles, and the PLC link – all delivered via standard RJ45 ports. Additional Ethernet and clock synchronization ports for multi NCK operation, two analog axis ports and two probing inputs, as well as 16/16 digital I/O ports for direct part program access, four analog inputs and two analog outputs complete the line up. Efficient hardware is only one side of the solution; the reengineered Flexium+ firmware also provides new and innovative features.

Flexibility

This recognized attribute of NUM products has now been pushed even further. With Flexium+ the consideration of axes or spindles have been totally revised, so it might be necessary to find a new name. Any of the 32 connected devices

can alternatively be an axis or a spindle. This makes spindle/C axis commutation even easier, but more importantly it opens the door to new possibilities – sophisticated transfer machines being one amongst many.

As a direct consequence, a single Flexium+ CNC is able to control up to 32 spindles. Among the four spindles of each channel, one will be the master on which all advanced functions (CSS, Threading, etc) will be performed, the other three being declared as auxiliaries. They are controllable in speed, direction and indexing. Of course at a given time, any spindle can be master or auxiliary. And exchanging spindles or axes between channels is just an M code away.

Flexium+ provides up to eight channels, each able to handle up to nine axes, a main spindle and three auxiliary spindles. Each channel runs its own part program at its own speed, but can be synchronized whenever necessary. Thanks to the advanced programming function, this structure offers numerous possibilities, including the ability to pass one or more axes from one channel to another on the fly. Moreover, the different channels can function totally independently. This is almost like having several NCKs.

Programming

To control these new functions the part program structure has been enhanced, taking advantage of the 40 MB available.

Block numbering has been extended, and enhanced search capabilities added. A direct editing facility, in conjunction with backtrack and resume functions, aids any necessary interaction on long machining operations.

Emergency retract, invoked manually or automatically, is an important feature to protect people, material and machine, should anything go wrong.

Flexium 3D helps secure safe machine operation by creating a 3D view of the final part while checking for interferences, collisions and other incidents. Further details are given later in this brochure.

Speed and accuracy

There is no longer any need to compromise between extended travel and high resolution, or between high traverse rates and highest possible accuracy. New algorithms have been implemented to extend performance in all areas. Detailed technical information is contained in the catalog.

Axes control

Enhanced acceleration algorithms with increased resolution allow the 'jerk' value to be fine tuned for optimal block transitions, while limiting mechanical stress.

The Flexium+ software development package Flexium Tools, has a powerful toolset, which includes dedicated tools for optimizing and checking servo response. Operating closely with the digital drives, they provide monitoring of the drives' internal values, oscilloscopes to check responses, a Ballbar function, and Contour accuracy checking to verify machine reaction at specific stages of operation.
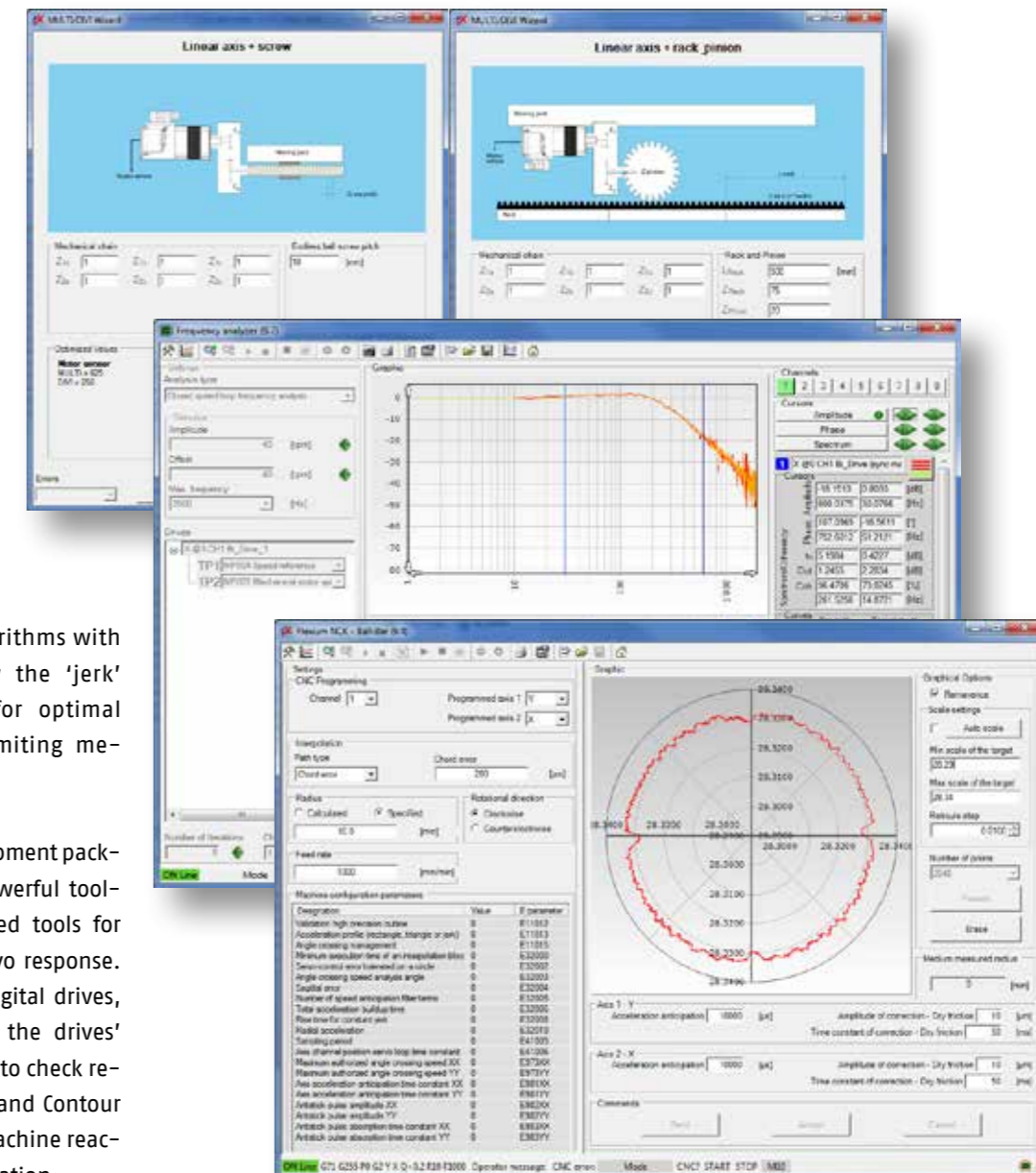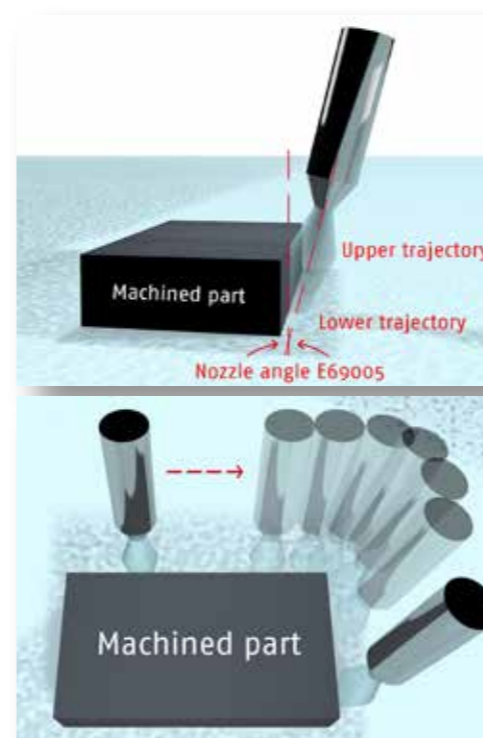
Machining packages

The number of specific machining packages or functions is being expanded. Currently, packages are available for operations such as Turning, Milling, Grinding (OD or surface), Gear Hobbing and Shaping. NUM is now introducing new cutting functions, starting with 'tilted nozzle management' that automatically compensates for the conical shape of the cutting beam (see figure).

And much more

Other components of Flexium+ are described later in this brochure. However,

there is insufficient space to list all the benefits this unique system could bring you. Please don't hesitate to contact us – we will be happy to demonstrate our product in more detail so that you can understand why NUM is your ideal partner for high-end CNC applications.

A unique development environment

The complete Flexium+ system is configured via Flexium Tools. All CNC, servodrive, I/O, PLC (IEC 61131) and relevant safety logic setup and programming tasks are performed using a centralized toolset.

Flexium FS192i Touch-sensitive operating Panel
...re-experiencing NUM

19-inch Touch Panel

With the latest 19-inch capacitive touch screen system, NUM has set a new standard for operating panels in the machine tool industry. A compact and scalable panel PC with Intel's i5 allows entry to multi-processor technology under OS Windows 7.

NUM's new FS192i operating panel provides a durable, modern front end for machine control. It has an IP65 degree of protection at the front, and IP20 at the rear. High-quality 4 mm hardened glass protects the front, without introducing any disturbing reflections. A narrow brushed aluminum frame with rounded edges provides complete side protection for the glass and multi-touch sensor. All necessary printing on the protective glass complies with NUM corporate design and color standards, and is executed with durable ceramic inks, using screen printing technology. The FS192i presents a modern face to the world. NUM has completely revised its Flexium HMI panel software, in line with its design guidelines, to ac- commodate dual touch gestures such as 'Drag & Drop', 'Wipe', 'Zoom' and 'Ro- tate'. Of course, touch gestures are only interpreted at the panel software level, so the system is still capable of handling faster or more direct forms of input. All HMI context levels have been adjusted to the new design for improved usability and operator convenience.

MP05 Glass Operating Panel
To accompany the new FS192i touch pan- el, NUM has launched the MP05 machine operation panel. This uses the same 4 mm hardened safety glass as the FS192i and has the same IP65 protection level at the front. The glass is scratch resist- ant and screen printed on the reverse – again, using durable ceramic inks and to NUM's corporate design and color stand- ards. Four-sided glass protection is af- forded by the brushed aluminum frame with rounded edges. A solid aluminum back plate ensures correct stiffness.

FS192i Virtual keyboard
FS192i Virtual machine panel
As an option, a complete virtual machine operating panel with softkeys is avail- able. Implemented with the same NUM design guidelines as the keyboard, this virtual machine panel eliminates need for an MP04 machine panel, reducing cost considerably. Due to its 19-inch screen and sensor protection frame, the new Flexium FS192i operating panel has dif- ferent dimensions to NUM's earlier FS152 family. However, machine builders will discover that the new panel is an easy mechanical fit in cabinets. Users will re- experience the power of NUM products.

Together, the FS192i and MP05 form the most modern panel and operating system NUM has ever created. The combination provides OEMs with a powerful competi- tive advantage.

Flexium 3D Simulation

Fast 3D simulation with high accuracy – Flexium 3D graphical simulation software is for part pro- grams written in ISO-Code (DIN 66025 with NUM dialect) for different applications like milling, drill- ing and/or turning, as well as water jet and plasma cutting, etc.

Office version
Flexium 3D can be used as a standalone program in production planning, without a CNC, to verify and optimize manually written or CAM generated part programs with direct source reference.

Machine version
Here, Flexium 3D forms an additional part of the Flexium HMI and is connected to the CNC. Flexium 3D can be used as pre- simulation program A (even during part processing program B) or to provide si- multaneous online simulation during part processing.

During part program simulation you can visualize the path of the TCP (tool center point), simulate material removal from the work piece, and check for collisions between machine components, part and tool.

Turning
3-5 axes simulation of part programs. In- cludes simulation of grooving, thread cut- ting and tapping movements and cycles.

Milling/drilling
3 axes simulation of part programs. In- cludes simulation of standard milling and drilling cycles (4 to 5 axes simultaneous processing with RTCP and inclined plane are planned).
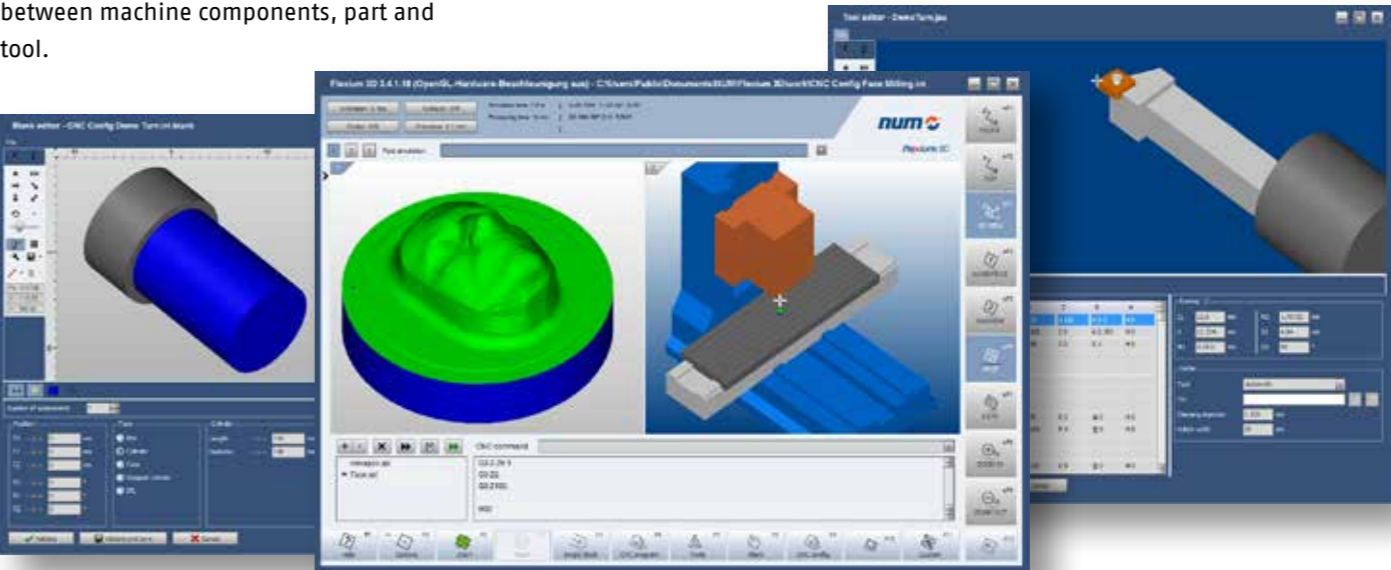
Cutting
2D/3D visualization of cutting contour. Configurable moving zoom window of TCP environment to illustrate local contour when comparing huge work pieces.
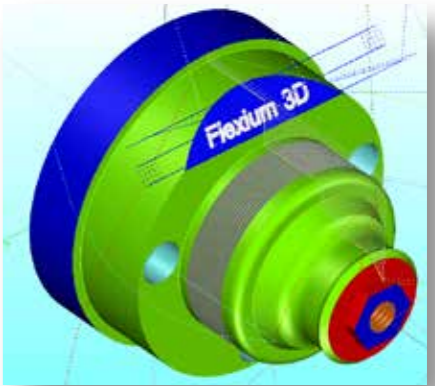
Flexium 3D simulation main features
Workpiece and Machine views
Tool Editor
Blank Editor
Machine Editor
Wired path display
Material removal
Collision detection

NUMSafe
...re-experiencing NUM

The safety architecture

Flexium+ integrates comprehensive solutions for the functional safety management of each machine type.
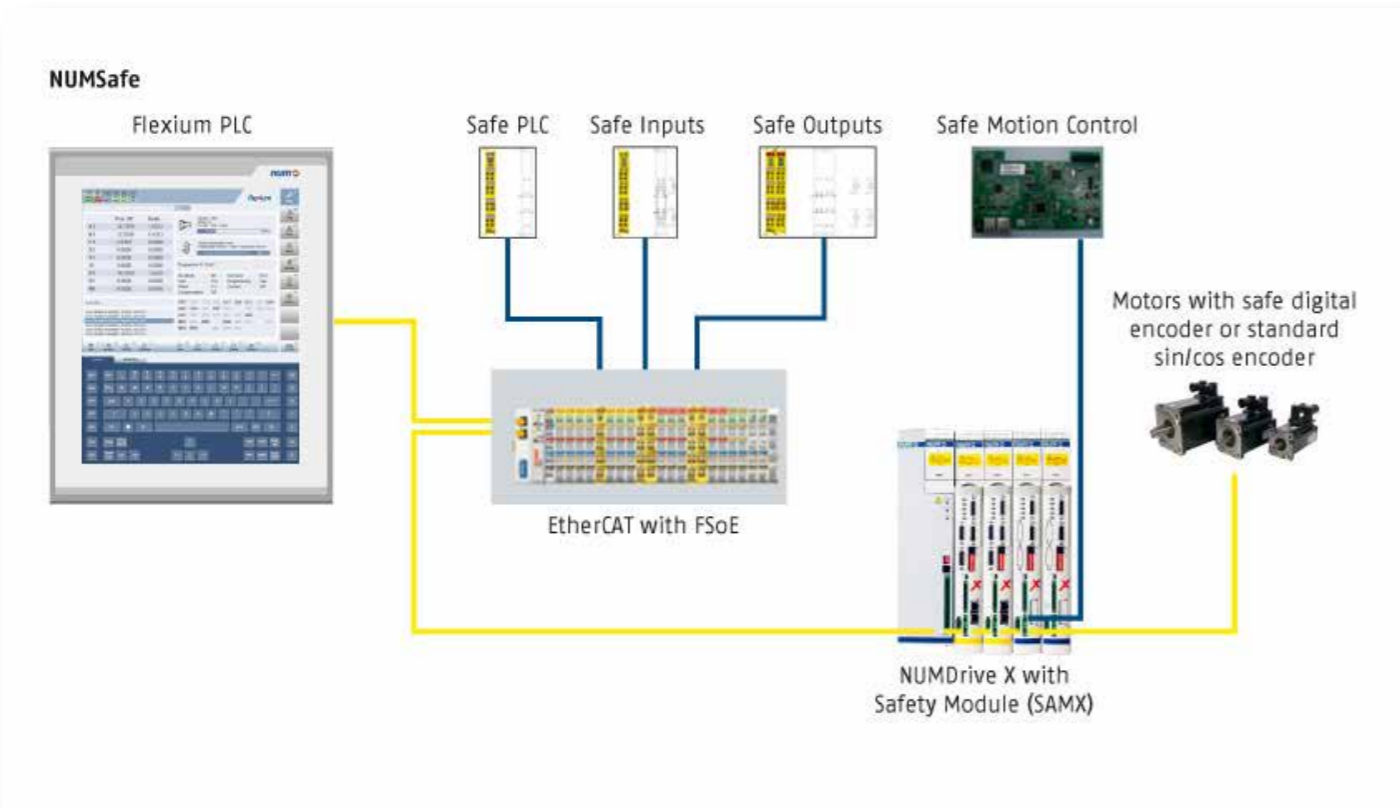
NUMSafe provides hardware and software solutions for implementing standard automation and safety technology in the Flexium+ system. Offering a wide range of benefits in terms of scalability, flexibility and reduced wiring needs, NUMSafe also provides a common programming environment for all system devices.

Architectures with mixed standard and safety related signals and components

are possible; the NUMSafe PLC (CTMP6900), the NUMSafe Input (CTMS1904) and the NUMSafe Output (CTMS2904) can be positioned inside a standard terminal line up, that by means of a NUM EtherCAT gateway communicate with the automation PLC, other EtherCAT gateways, servodrives and safety related components. The safety related motion functions are realized inside NUMDrive X by means of the NUM-SAMX board.

All safety related information is transmitted over the standard EtherCAT connection, with data reliability ensured by use of a Fail Safe over EtherCAT protocol (FSoE); wiring is reduced to a minimum, while flexibility and scalability are maximized.

NUMSafe is compliant with EN 13849-1 and EN61800-5-2 up to PL e and SIL 3 respectively.

NUMSafe

Flexium PLC — Safe PLC — Safe Inputs — Safe Outputs — Safe Motion Control

Motors with safe digital encoder or standard sin/cos encoder

EtherCAT with FSoE

NUMDrive X with Safety Module (SAMX)

A unique programming environment

The complete Flexium+ system is configured via Flexium Tools. All CNC, servodrives, I/O and PLC (IEC 61131) setup and programming tasks are performed using a centralized toolset. Safety relevant logic is also programmed using Flexium Tools; the safety related components are visualized in the device tree.

The safety application is easily constructed using function blocks such as E-Stop, Operation Mode, AND, OR, etc. Programming the safe PLC is then simply a matter of linking inputs and outputs to these blocks, which can be chained in order to create complex functions.

The safety application is then downloaded to the safe PLC via EtherCAT.
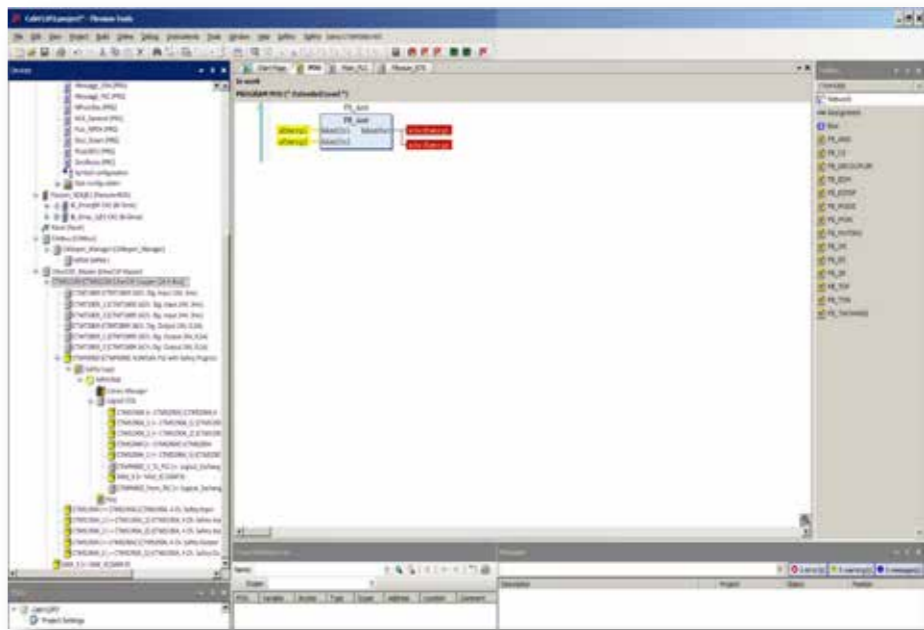
Safe motion functions

The safe PLC contains the programmed logic of the safety application, while the safe motion monitoring functions are handled by the NUM-SAMX board built into NUMDrive X servodrives.

The available monitoring functions, according to EN 61800-5-2, are: Safe Torque Off (STO), Safe Operating Stop (SOS), Safe Stop 1 (SS1), Safe Stop 2 (SS2), Safely-Limited Speed (SLS), Safely-Limited Position (SLP in preparation).

The safe motion functions can either be realized using synchronous motors, to which standard sin/cos encoders are connected, or, in the case of SHX/SPX (single cable motors), with safety encoders.

STO

SOS

SS1/2

SLS

SLP
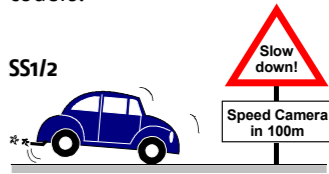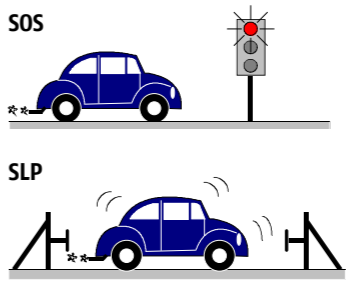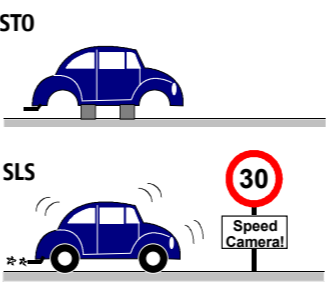
NUMDrive X
compact and scalable

NUM's latest drive – NUMDrive X – is the result of more than 20 years' experience in developing full-digital drive systems. This compact and modular drive is fully scalable – different performance versions are available to suit any type of machine tool application.

A high degree of integration and efficiency has allowed us to achieve an extremely compact design that makes NUMDrive X one of the smallest high-end drives on the market. Its small installation depth and scalable width (a multiple of 50 mm) simplify cabinet layout.

A wide range of power modules, available in Mono-Axis and Bi-Axes versions and with continuous current ratings from a few amperes up to 200 Arms, enables each application to be technically optimized at the lowest cost.

NUMDrive X offers a choice of two performance levels: High-Performance (HP) drives and Standard-Performance (SP) drives. The HP versions are designed for sophisticated and complex applications in precision machine tools. Featuring high internal resolution, a short sampling time and specially developed algorithms, they offer outstanding regulation performance and very wide current, speed and position loop bandwidths, as well as a number of built-in application-specific functions. High-Performance versions can interoperate with a huge variety of encoder and motor types, enabling OEMs to optimize their machines without compromise.

The diferent versions are intended for systems and precision machine tools of medium complexity, and are especially suitable for cost-sensitive applications.

As described previously, NUMDrive X provides safe functions by means of two options: a basic board for implementing the Safe Torque Off function (NUM-STO), and a powerful board (NUM-SAMX) which provides a huge number of safe motion monitoring functions.

NUMDrive X is a modular drive system optimized for multi-axis applications. Use of a common power supply unit means that only one mains connection, one line filter and one braking resistor are required per system, reducing cabling and overall costs. The system's modularity also facilitates energy exchange between different axes via the DC bus, offers the possibility of using stored energy for retraction purposes, and – in the case of regenerative power supplies – allows energy to be re-injected into the mains to reduce machine operating costs.

Significantly reduced wiring effort

Power + Data + SIL3 Speed & Position = Only 2 wires
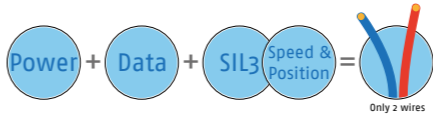
Every machine builder has experienced the complexity of encoder wiring and knows that it takes time and effort to install and debug satisfactorily. NUMDrive X introduces a revolutionary innovation to overcome these issues. The drive handles a full digital encoder interface which uses a two-wire communication protocol. The two wires are integrated in the power cable, so there is only one cable connecting the drive to the motor. Furthermore, the two-wire connection handles the encoder supply voltage, as well as high resolution position, redundant position (for safe applications), motor thermal sensor and diagnostic data.

Encoder wiring now becomes a very simple task. Elimination of the encoder cable means that there is no longer any need to crimp and solder a large number of wires – the power cable merely contains two additional shielded wires, which are connected by screw terminals on the drive side. Aside from reduced installation time and cost, other advantages include reduced cabling costs, smaller cable carriers, lower moving masses, better reliability and electromagnetic immunity, and higher resolution control.

NUMDrive X Mono-Axis	Rated Current (S1) Arms	Maximum Current Arms	Overall Dimensions (W x H x D) mm
MDLUX014A...	8.9	10	50 x 355 x 206
MDLUX021A...	13	15	50 x 355 x 206
MDLUX034A...	13	24	50 x 355 x 206
MDLUX050A...	28	35	100 x 355 x 206
MDLUX075A...	34	53	100 x 355 x 206
MDLUX130A...	60	92	200 x 355 x 206
MDLUX200A...	100	141	200 x 355 x 206
MDLUX400A...	200	282	300 x 355 x 206
NUMDrive X Bi-Axes	**Rated Current (S1) Arms**	**Maximum Current Arms**	**Overall Dimensions (W x H x D) mm**
MDLUX014B...	6.3 + 6.3	10 + 10	50 x 355 x 206
MDLUX021B...	6.3 + 6.3	15 + 15	50 x 355 x 206
MDLUX050B...	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/volume 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/BPX 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.

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.

New brushless axis motors

SHX Motors / SPX Motors

To perfectly match the new NUMDrive X, two new motor families have been marketed: SHX and SPX. Their characteristics are respectively similar to th well known BHX and BPX servo motors but the connection is realized with a "single cable solution" as more detailed explained in the previous pages.

Motor range	Main characteristics	Typical applications	Continuous torque	Frame sizes	Available options
BHX / SHX	Very compact, high inertia, IP64	Feeding axes for 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 / SPX	Extremely compact, high peak torque, smooth operations, high inertia, IP67	Feeding axes for 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, smooth operations, medium inertia, up to IP67	Feeding axes for 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, smooth operations, very high inertia, up to IP67	Feeding axes for 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, high inertia, IP65	Feeding axes for large machine tools	From 85 Nm up to 160 Nm	260mm	Holding brake, keyed shaft, medium and high resolution single and multi turn encoder

bpx

bhx

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 insufficient 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$^+$

USA

Mexico

Great Britain
Germany
France
Spain

Finland
Sweden
Denmark
Austria
Switzerland (Headquarter)
Italy
Turkey
Algeria

India

China
Taiwan

Brazil

South Africa

Australia

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