



num*transfer*

**CNC COMPLETE SOLUTION
FOR TRANSFER,
ROTARY-TRANSFER AND
MULTISPINDLE MACHINES**

www.num.com

num 
CNC HighEnd Applications

NUM Solutions and Systems

Established Worldwide

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

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Worldwide at your Service



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

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

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

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

Customized Projects

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



Project facilitation PRODESIGN

Efficient consulting for optimal application solutions

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

Project cooperation CODESIGN

Merging knowledge – potentiating results

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

Total solutions ALLDESIGN

Delegating responsibility – controlling result

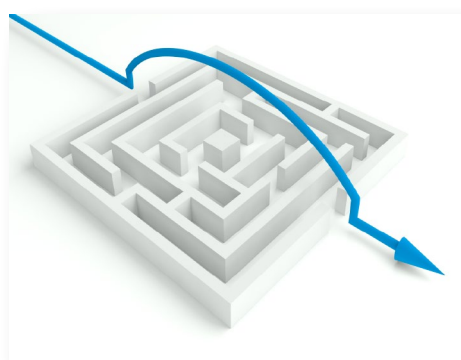
We assume the entire project management in the sense of a general contractor and are fully responsible for the successful implementation. Starting with the development of the requirements specification, over the development and commissioning, up to support and service.

NUM Solutions and Systems

Intelligent and Creative

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

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



numroto

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

numspecial

NUMspecial – creative and practical solutions for your specific applications

numcut

NUMcut – a complete solution for advanced cutting machines

numgear

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

numtransfer

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

numhsc

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

numgrind

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

nummill

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

numwood

NUMwood – long tradition with powerful complete solutions in woodworking

numretrofit

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

NUMtransfer – for Transfer, Rotary-Transfer and Multi-Spindle Machines

NUMtransfer on NUM's current Flexium+ control system is one of the world's leading industrial solutions for transfer, rotary transfer and multi-spindle machines. NUMtransfer is fully integrated in the controller.

Operating the transfer machines profitably

In mass production, transfer, rotary transfer and multi-spindle machines must be optimized to the parts to be manufactured in order to work in a time-efficient manner. The increasing demand for smaller batches, a greater variety and faster response times places increasingly greater requirements on the setup, conversion and handling of these machines. The profitable use of these machines therefore requires flexibility and efficient, intuitive operation that is transparent to the user.

Practice-oriented CNC total solution

NUM has been supplying CNC systems that are used successfully around the world for many years. Based on the wealth of experience it has gained, the CNCs have been developed and optimally adapted to the demands of the transfer, rotary transfer and multi-spindle machines.

Securing investments

Further development of NUMtransfer to meet the requirements of users secures the investments made by machine manufacturers and machine users.

They can be expanded as desired and adapted to the machine and users' needs (also see page 9)

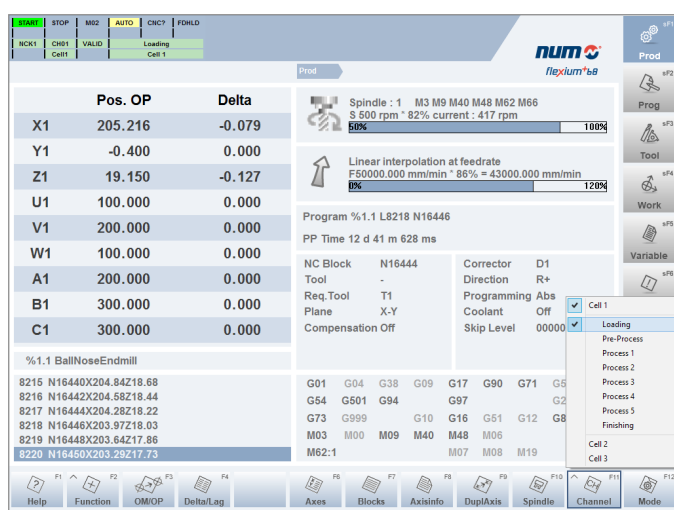
- More than 40 stations
- More than 200 interpolated CNC axes
- Multi-NCK operation for controlling any number of axes/stations
- Assignment and switchover of a C axis to various axis channels even across NCK boundaries
- Integration of continuous rotating tables
- Only one PLC to control the complete machine (independent of the number of CNC kernels)
- Only one PLC is needed to control the complete machine (independent of the number of CNC kernels)
- Overall safety functions

A basic characteristic of the Flexium control system is its flexibility, which is particularly important for transfer machines. An important part of this is the distributed "intelligence", i.e. the control consists of several computer units. This makes it possible to configure very large systems without any loss of performance, since with every component added, computing power is also added. A Flexium NCK can easily control up to 32 axes/spindles and execute up to 8 CNC programs in parallel. If more axes/spindles are required or if more CNC programs are to be executed, a Flexium NCK can easily be configured for this purpose. With some controllers, the PLC is on the same unit as the CNC, which makes it necessary to synchronize PLC programs on large systems. Not so with Flexium+. The integrated PLC runs on a separate computer. This makes it possible to develop a PLC program that dynamically adapts to the number of axes and axis channels and NCKs. Two performance levels are available as the computer unit for the PLC. Various industrial PCs are available for displaying the graphical user interface. If a CAM system is to be installed on the machine, which makes high demands on the computing power, an office PC can be used for the Flexium HMI and the CAM.

Machine and process-oriented operating concept

Due to the parametrization, transfer machines from simple to highly complex are easily understood by the operator and are depicted just as they are operated. The names of the stations can be freely assigned and thereby clearly and quickly identified. For very large machines, the stations can be combined into "cells", which can likewise be assigned any name.

NUMtransfer – for Transfer, Rotary– Transfer and Multi-Spindle Machines



Regardless of the number of NCKs in the system, all information is displayed on a single HMI. Every station and every cell can be directly selected in any operating mode of the CNC system. The operator selects the corresponding function and does not have to bother about which axis channel and which CNC executes these functions. This provides an improved overview, increases operating speed and reduces inputting errors.

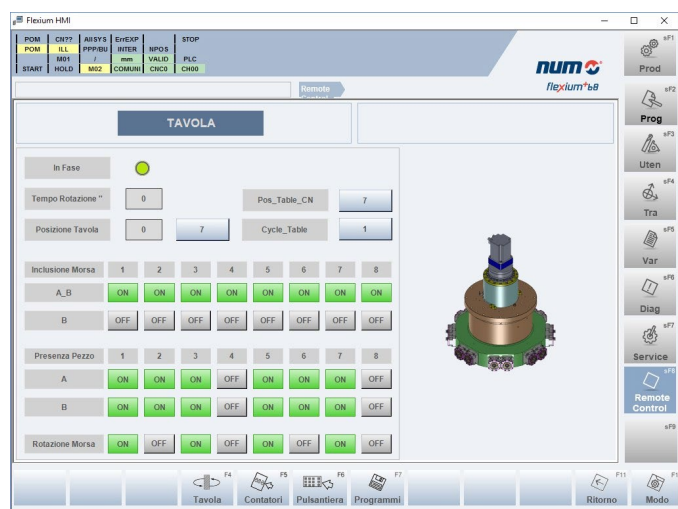
Comprehensive and precise error messages facilitate troubleshooting and reduce machine downtime. The messages are entered in a log file, regardless of which NCK they originate from.

The tool management integrated in the control system also covers the requirements of transfer machine applications. The tools can be assigned to an axis channel. The tools per channel are displayed on a special page.

Most machines get by with one display. For various reasons, however, additional display devices may be necessary. This is easily possible. The additional devices are simply connected via Ethernet.

A portable display device, the nPad, which is also available in a wireless version, can be used for setup. A user interface specially tailored to the machine can be easily created in a PLC program using PLC visualization.

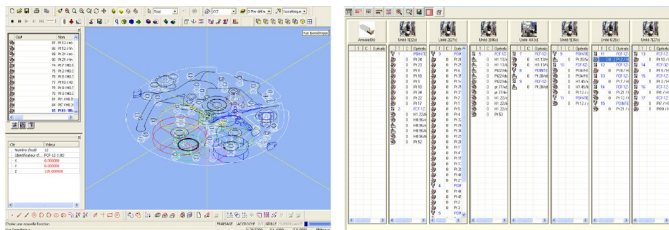
Of course, the Flexium HMI's user interface can also be replaced or extended. This allows machine manufacturers to highlight specialties of their transfer machines.



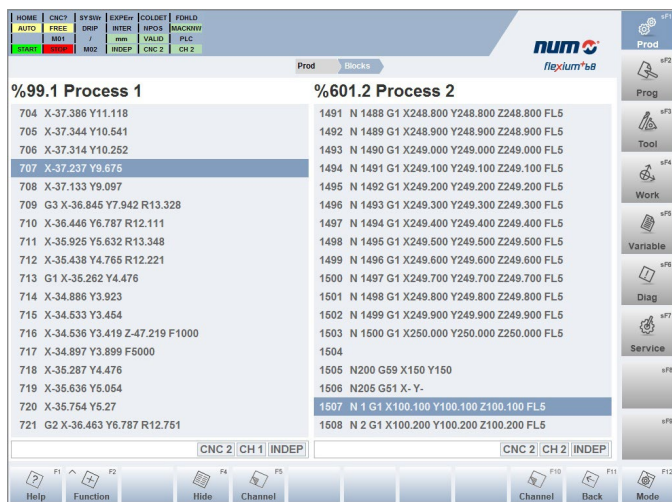
Special functions for the commissioning of transfer machines

Setting up the part programs

A challenge is to optimize the various part programs so that the entire production time is as short as possible. Specialized CAM systems can be inserted for this purpose:



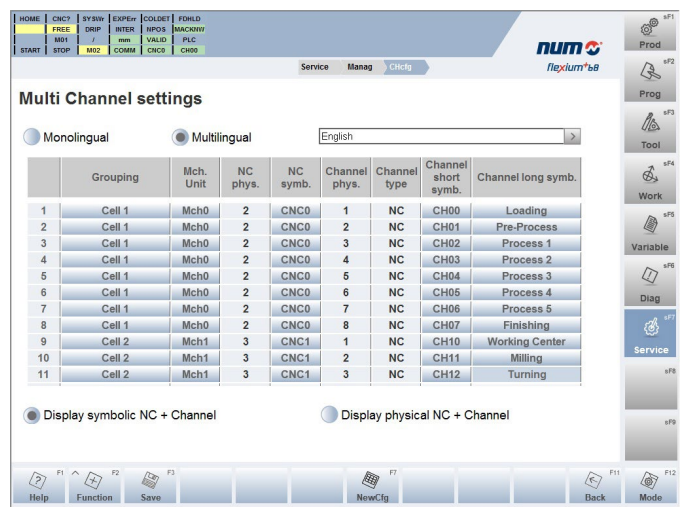
The Flexium HMI has the ability to display CNC block views simultaneously. The channels to be displayed in parallel are freely selectable. This option helps to program the part programs.



To increase the intelligibility of part programs the axis names can be indexed, e.g. X1, Y1, Z1, ... for channel 1, X2, Y2, Z2, ... for channel 2 a.s.o. On the one hand, the indexed axis names can be displayed in the user interface. On the other hand, they can also be used in the part programs.

User interface that can be configured as desired

Besides the standard configuration options, the user interface can be adapted with the Flexium HMI to meet the needs of special requirements. The names for the axes and the channels are defined in the 'Service' (sF7) context. Here is an example for the assignment of the channel names to an NCK and the channel number:



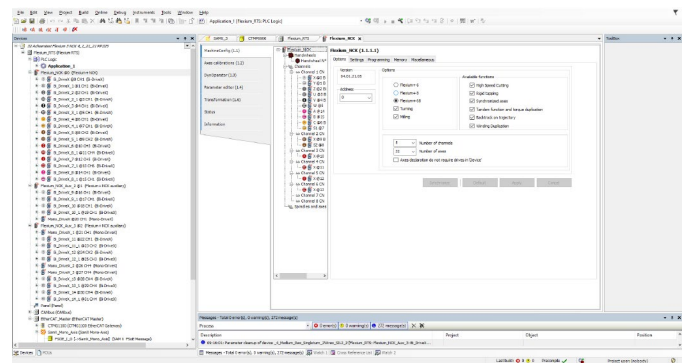
NUMtransfer – for Transfer, Rotary– Transfer and Multi-Spindle Machines

Tools and functions that support the commissioning of a transfer machine

A transfer machine is a machine that automatically transports a workpiece from one machining station to the next. In this way a conveyor belt type production is achieved. There are different types of transfer machines, with and without CNC controls. Those with CNC can also be divided: several CNC machines connected by a conveyor belt or a machine with many machining stations. With the second type, the stations can be arranged in a linear or circular manner. The "circular" ones are called rotary transfer machines and are based on a rotary table, which is indexed at each cycle (upon completion of a part machining operation). On the one hand, only the workpieces can be passed on. On the other hand, if motors are mounted on the rotary table, the corresponding axes are passed on from one axis channel to the next. Between the axis amplifiers and the motors, many lines are required for the power and signals. If the associated axis amplifiers remained stationary, this would be almost impossible to handle via slip rings. It therefore makes sense to mount the axis amplifiers on the rotary table as well. This way, only the total power and the communication data for the CNC drives have to be transmitted.

Of course, the axis must still be passed on from one axis channel to the next in the control software. However, this is a standard Flexium function. But what if the machine has more than 8 stations? This has also been considered. A special control function allows the transfer of axes to other NCKs!

The definition of the control system and its commissioning is carried out by means of the Flexium Tools software. The corresponding project contains all information on all devices involved, as well as the PLC programs and the definition of the safety functions.



Summary

- User-friendly and efficient setup of even the most complex machines
- Workpiece data is assigned automatically to the stations
- Any combination of machining procedures (lathing, drilling, cutting, grinding, measuring etc.)
- Machine-oriented display of the stations and cells
 - Stations can have any name
 - Stations can be combined into cells that have any name
- Parallel display of two freely selectable CNC block views
- Indexed axis names of the different channels
- Configuration-independent performance of the CNC system

NUM Motors

Perfect for all Applications

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

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

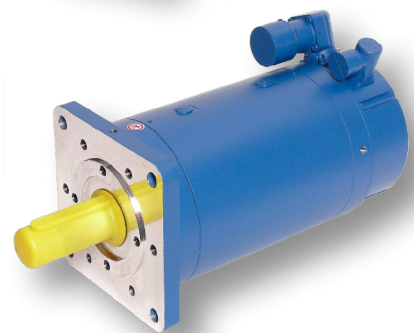
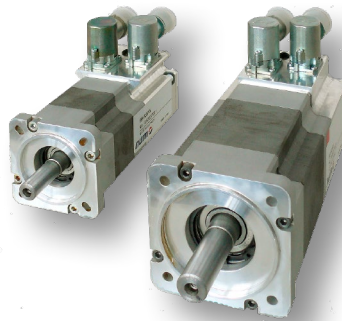
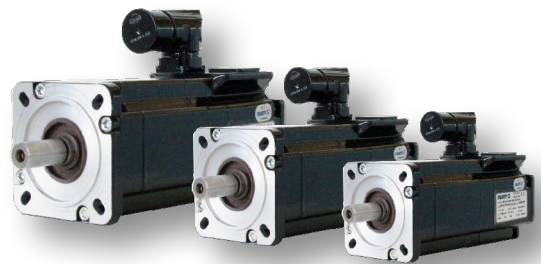
The comprehensive **servo-motor** series of NUM offer an excellent volume/output ratio, as well as first-class dynamic properties optimized for the machine tool industry. They, with perfect concentric run-out, satisfy even at very low speeds. The so-called "single cable" motors offer the advantage that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

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

The TMX series **torque motors** have an extremely low cogging torque as well as a very high S₁ torque density. They are ideal for applications that require very smooth and precise motion, especially at low speeds. Typical applications are direct drive rotary tables or workhead axes of machine tools. The TMX motors are complemented by an extensive range of torque motors from our partner company Schaeffler Industrial Drives (IDAM), who's customers include many well-known European machine builders.

Key data of the motor series:

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



SCHAEFFLER

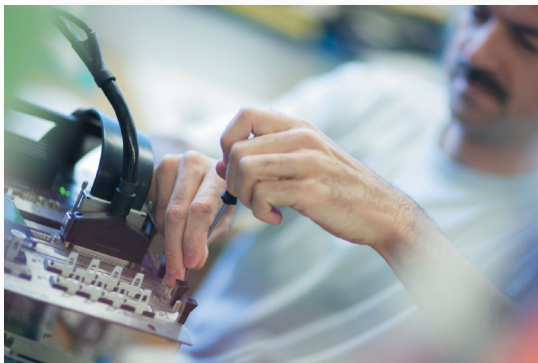
NUM Services

Worldwide at your Service

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

Worldwide support by experts

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



Comprehensive training offer

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

NUM provides a training offer matched to the customer needs:

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

Technically always up to date

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

Repair- and spare parts service

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



Customer service

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

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

Complete CNC Solutions Worldwide



NUM systems and solutions are used worldwide.

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

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

www.num.com



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