

# NUM

# information

JOURNAL FOR CNC-TOTAL SOLUTIONS

No 52 - September 2011



1961 - 2011



years of CNC

**02** 50 years of NUM - Words from our CSO

**04** Stonelec special machines / NUM Event Calendar

**06** R&D - Product news - more flexibility / higher performance

**08** STM - Water jet cutting, one for all - with help from NUM

**10** 64 axes built by CML, 64 axes controlled by NUM

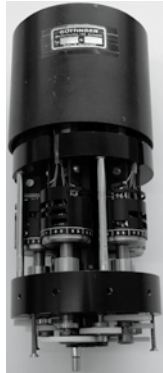
**12** SINICO a qualified partner for NUM

**14** Dassault - Maintaining a big advantage...

**16** Exceptional flexibility marks NUMROTO out

**18** Gear production accelerated by CNC refurbishment of gear shaper

**20** NUM Service - «One Step Ahead»



1961 - 2011  
**50**  
 years of CNC

## Innovative people create technology, not the other way around

Dear readers,

Last time I had the pleasure of writing the editorial for NUMinfo was just before EMO 2007 and it has been a very turbulent 4 years since then. In 2007 we had just become an independent company and there was some uncertainty in the market and at some of our customers, as to where NUM was heading and whether we would remain the trusted partner we had been for many years. The launch of the new innovative Flexium system at EMO 2007 convinced most people that NUM was very much alive and that, although we had a very long history to look back on, our biggest successes lay in the future.



After the very positive business development in 2007 & 2008, we also got hit by the very steep recession,

you hear of companies in our business segment which look at diversifying and refocusing on new areas

**„Innovative people create technology, not the other way around.“**

*(Jan Koch, Exec. VP / CSO NUM Group)*

which took hold of the machine tool market in 2009. Although the survivability of our company was never in question, we were very happy to see a fast return to more normal conditions in the 2nd half of 2010, and I am happy to say that 2011 looks to be an even better year than 2008.

and business opportunities, but our current and future customers can be certain that NUM will stay in our area, and that our entire company is focused on living up to our mission statement: "NUM CNC solutions provide Machine Builders with a competitive advantage".

In 2011 we celebrate 50 years in the CNC area, or more correctly in the NC / CNC area. We are all proud to look back at our history and if you look at the pictures at the top, you can see, and maybe recognize, some of the products that helped shape our history. But the real history of NUM lies in its people and their commitment to the company, its projects and being there for our customers when needed. From time to time

Another compelling competitive advantage of NUM is the size of our company. Granted we are not the biggest player in this business, but we are big enough to have all core elements under our own control. So all components in a CNC system which are vital to the overall performance of the system, are developed, manufactured and produced by NUM. This gives us the ability to make adaptations to the system,





which often are needed by our OEM customers to gain an advantage, offer higher value and provide a unique solution. Last year we were faced with the challenge to realise a very large turning machine with a power consumption in excess of 1 MW, for machining parts with a start weight of more than 300 Tons. This is beyond the capabilities of our standard drives range, so to realise this machine we had to make adaptations to our biggest drive series, and collaborate with the OEM to select the optimal main spindle motors. Here the flexibility of our company

proved the key factor in getting the right technicians on the customer and NUM sides together fast, and with solution oriented thinking on both sides we were able to make the necessary software and hardware changes, which enabled this project to be completed within a very short timeframe.

As mentioned before, EMO 2007 marked the year we presented our new Flexium CNC system, and we started the roll out in 2008. Before the end of this year we will reach a 5 digit number of Flexium equipped machi-

nes installed world wide, making the Flexium our most successful product launch based on quantity in our 50 years of history. Since the launch we have been improving the Flexium products continuously with new features and functions, but as this is a constantly moving target, we will keep an ear open to our customers and end-users to make sure we fulfil the market needs. At the same time we are doing our utmost to make sure we also have the right solutions in the pipeline for what will be needed in a 3-5 years timeframe.

We are all proud to be part of our company and we get great pleasure and satisfaction in doing our part in making our OEM customers more successful. We all understand that only through getting this part right, will we provide the OEMs with the right solutions and arguments to convince the end-users and only then can we reach our targets; rest assured we will never be so proud that we forget to listen.

We look forward to a dialogue with current and future customers in the years to come.

Jan Vestbjerg Koch  
Exec. VP / CSO NUM Group

## Impressum

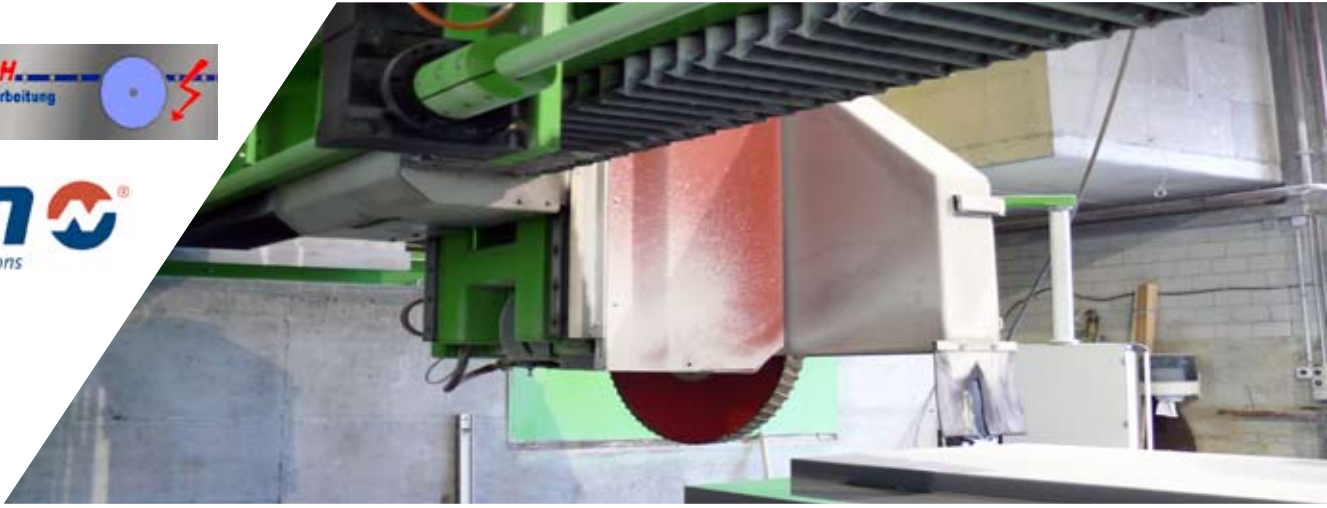
<b>Publisher</b>	NUM AG Battenhusstrasse 16 CH-9053 Teufen Phone +41 71 335 04 11 Fax +41 71 333 35 87 sales.ch@num.com www.num.com	<b>Editor &amp; Layout</b>	Marco Martinaglia
------------------	--	----------------------------	-------------------

NUM information is published approximately twice a year in English, German, French, Italian and Chinese.

© Copyright by NUM AG  
Reuse allowed with reference only, specimen copy welcome.

© Coverpicture: NUM / Level East

# 50 years NUM



## Special equipment for machining stone, ceramic and concrete built to "Swiss Label" quality standards

**Stonelec GmbH was founded in 1997. Its goal is to serve the domestic and international stone-machining industry with practice-oriented and efficient solutions and services. Like NUM, Stonelec provides its customers with competent advice, fast order fulfilment and comprehensive technical support – all from a single source.**

Stonelec began by trading stone machining equipment and by representing the renowned Italian machine manufacturer Marmo Meccanica SpA. In addition, Stonelec took over the service operations for sold machines and assumed responsibility for modifying machines to customers' requirements. Stonelec also handles the repair and maintenance of all types of stone-machining equipment on the market. Later the company decided also to focus on machine design and manufacturing and based on close cooperation with customers the user-friendly,



*Flexium operator panel*

*Stone saw with a 3 tonne sandstone block*



multifunctional SK6 machine was designed in 2001. Alongside the standard layout as a table/column combination, this series can be delivered in a wall-running layout or in a version with a moveable table. In 2007, Stonelec presented the first bridge saw, which is manufactured completely at the company's factory in Altendorf, based on design documents from the machine manufacturer Wenzler AG. All Stonelec machines are designed and manufactured entirely in Switzerland. Their robust and precise construction doesn't just impress the domestic customer base, but also customers across the world. Stonelec develops and manufactures special equipment for machining stone, ce-



ramic and concrete, which is built to the 'Swiss Label' quality standard. The 'Kallisto' bridge saw has also come about through close cooperation with NUM. Special attention was paid to ensure that this machine can be mounted on existing foundations. As well as two-layer paint coating, many components also receive a galvanised spray-coating. Another special feature is the large blade diameter range of 500–1,700 mm. This machine is mainly used for renovating projects primarily in sandstone, but other types of stone can also be machined. Complex structures can also be created using a CAD/CAM system. Below are some technical specifications of the machine.



Complete machined arcade arches

#### Working area:

- X axis (transverse) 3,800 mm on ball bearing guide rails
- Y axis (bridge) 4,200 mm on guide wheels
- Z axis (vertical) 1,200 mm on ball bearing guide rails with ball bearing screws
- C axis (rotating table) continuously rotatable, 1,500 x 3,000 mm, max. load 15 t
- Motor power for blade drive 30 kW
- Maximum blade diameter 1,700 mm
- Total weight of machine approx. 8 t

Grinding and drilling machines are important in the machining of sanitary ware. Together with NUM, Stonelec is pursuing a leading role in this market segment. Stonelec uses its strengths

in terms of flexibility, company size and location to devote a large amount of attention to its customers. These strengths include:

- Delivering customer-specific solutions
- Machine and tool design from the single source
- Quick reaction times in service and support
- Company-own design and machine construction
- Central location in Europe (Switzerland)

The cooperation between Stonelec and NUM works very well; there is a natural synergy between the Swiss

machine manufacturer and the Swiss controller manufacturer, with the following advantages:

- NUM has a global company network, which supports Stonelec's servicing
- NUM and Stonelec work on optimal technical solutions together
- Applications are supported without a great amount of bureaucracy

In this combination, which is positive for both companies, several more interesting projects and individual solutions can be taken on and realised.

## NUM Event Calendar



#### EMO Hannover

From 19th – 24th September 2011 in Hannover, Germany



#### GrindTec

From 14th – 17th March 2012 in Augsburg, Germany



#### Industrie Paris

From 26th – 30th March 2012 in Paris, France

# Events



## R&D Product news – more flexibility / higher performance

This article presents two new NUM products for the Flexium system with regard to more flexibility (Portable Handwheel) and higher PC performance initiated with multi-core processor technology for the same price.



### Portable handwheel panel HBA-Xd

#### Product overview

A new portable handwheel panel HBA-Xd connected over CAN by means of a 24 VDC counter module is offered to Flexium customers. To separate the new portable handwheel panel from the existing one, different names have been chosen, HBA-Xd (24VDC handwheel signals) and HBA-Xc (RS-422 handwheel signals).



Figure 1: Handwheel panel HBA-Xd

The portable handwheels (HBA-Xc and HBA-Xd) have been developed for easy, machine oriented control of the kinematics in manual mode. On the machine there may be multiple connections, where the portable handwheel can be connected. By so-called 'hot plugging', insertion and removal of the portable handwheel is possible on a running machine. The pulses of this particular 24 VDC handwheel in the HBA-Xd are transferred via CAN to the PLC. A PLC application has to pass the values on NCK for execution.

#### Product key points

The portable handwheel HBA-Xd provides the same operating functions as HBA-Xc:

- Axis selection
- Manual mode and speed selection
- Forward/backward movements and speed override
- 3 step acknowledge button (dead-man's button)
- Connection to the system via CAN
- Hot-plugging
- Dead-man's button connected to safety circle

**HBA-Xd components**

The portable handwheel HBA-Xd consists of following components:

- Portable handwheel panel in the same form and pattern as HBA-Xc with 5m cable length (see figure 1)
- CAN Counter module (Type XN-1CNT-24VDC) and connection body (Type XN-S4T-SBBS)
- Digital Inputs for PLC signals
- One or more connectors for hot-plugging

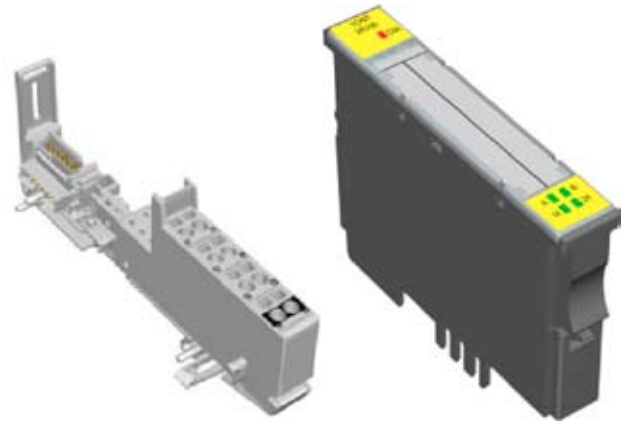


Figure 2: CAN connection body and counter module

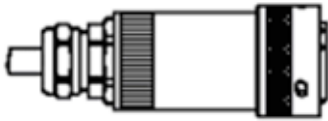


Figure 3: Plug connector 23 pins

**Performance Upgrade to Multi-Core processor technology**



NUM is proud to present new processor board technology for FS152i P1/P2 panels, which allow the use of multi-core processors (Dual Core, Quad Core, etc.). The new FS152i offers a considerable performance increase by using a Dual Core processor – and this is without increasing the price. Depending on the demand, a Quad Core processor version of the FS152i can also be considered.

Figure 4: FS152i Panel

**Comparison result**

In comparison with the previous FS152i P1 there is a performance increase of:

- ~40 % faster at operating HMI
- ~30% faster upload/download of part programs
- Twice as fast at online help
- Parser speed 10 times faster
- True 3D simulation: approx. 3 times faster at path display and material removal

In comparison with the previous FS152i P2 there is a performance increase of:

- ~50 % faster at operating HMI
- ~30% at upload/download
- ~30% faster at online-help
- Parser speed 30 % faster
- True 3D simulation: approx. 2 times faster at path display and material removal

**Summary facts**

Fact   Unit	Actual FS152i P1	New FS152i P1	Actual FS152i P2	Future FS152i P2
Operating System	Windows XP embedded	Windows embedded POSReady	Windows XP	Windows XP
CPU	Celeron M 0.8 GHz	Atom D510 Dual Core 1.66 GHz	Pentium M 1.8 GHz	i5 M520 Dual Core 2.4 GHz
RAM	1 GB	1 GB	1 GB	>=2 GB
Storage medium	2 GB CF	8 GB SSD	>=40 GB HD	>=80 GB HD
Ethernet / CAN	3 / 2	3 / 2	3 / 2	3 / 2

Figure 5: With the new version of FS152i you will get much more power for the same price.

Flexibility





## STM, one for all – with help from NUM

**As a leading supplier and specialist for water jet cutting systems, STM offers a complete service, primarily for companies working in the processing of steel, aluminium, non-ferrous metals, stone, glass, plastic or sealing materials. STM is able to further extend its leading role, with NUM as its competent and solution-oriented partner for CNC control. Based in Bischofshofen, Austria, STM has been developing leading-edge product solutions for more than 20 years.**

STM water jet cutting systems bring many advantages as tools for cutting unique forms in almost all materials. Simple programming and control of the water jet, via a highly intuitive MS Windows interface, is standard for STM water jet cutters. The water jet can cut almost all materials with a thickness of 100 mm and greater. STM manufactures CNC controlled systems in all sizes and for almost any application

*Working at the machine bridge*



possible. During design and construction, a great amount of attention is paid to the system's transportability, ease of use and ease of maintenance, as well as its functionality and cost effectiveness: regardless of the model, all structural parts and screws are made from corrosion-resistant stainless steel or aluminium. The system is extremely manageable and compact, thanks to its flat underbody, smooth side walls using concealed linear guides without bellows, and a high-pressure pipe entrained in the axis. The systems offer a choice of four bridge widths, each available in a range of different lengths, and are divided into three product series: 'EcoCut', 'Standard' and 'Premium'. The product series correspond to the most common user profiles in terms of the different technical features they offer. The modular construction of the system guarantees that customers can target their investments in the functions they need at the time, without having to plan far in advance. This makes STM's systems attractive not just from a technical aspect, but from a cost aspect too.

The fully digitalised drive also contributes to the systems' cost-effectiveness, with brushless AC servomotors and multi-axis CNC control from NUM,



*Assembly of the CNC Z-axis*

which can process very large amounts of data, even in reload mode. The software for this runs under MS Windows and can be installed and run on standard PCs as often as desired without incurring extra costs. Drawings can be made directly in the cutting program, where the cutting pressure and quantity of abrasives can also be specified very easily. The NUM FS152i P2 operating unit is integrated into a separate control panel, ensuring maximum user comfort, control flexibility and safety. STM only uses top quality high-pressure pumps in its water jet cutting systems. If desired, the system can cut at pressures as high as 6000 bar, with a power requirement of 11 – 75 kW and a flow rate of 1 – 10 litres per minute.





*STM 3D water jet cutting system in a high-gantry construction with NUM FS152i control panel*

**NUM technical specifications:**

- Flexium 68 with 7 axes
- FS152i P2, individual keyboard, MP04
- 5-axis interpolation, RTCP (Rotating Tool Centre Point)
- Gantry axes
- Customer-specific application in terms of running and height scanning
- CoDeSys-based, customer-specific HMI
- Digital drive technology with NUMDrive C

*Calibrating the axes during machine assembly*



There are many different configuration options, depending on the individual requirements. These include automatic height scanning with collision protection, low-pressure monitoring in the abrasive metering system and the option to operate several cutting heads simultaneously. STM presents the whole spectrum of relevant options to a potential customer as part of an individual requirements analysis.

Through continuous advice, training and an extensive replacement parts and maintenance service, STM makes sure that its customers' manufacturing processes remain as profitable as possible for as long as possible. The customer support from STM ranges from technical advice, business planning and sample calculations, to project planning for complete systems, test procedures, shipping and sales training.

Alongside technology for the future and quality as standard, STM puts a particular focus on innovative, complete service. This way, the company can ensure that its customers' individual production processes can continually be adapted to suit their current requirements.

**Quality**



## 64 axes built by CML 64 axes controlled by NUM

**"Technological innovation tailored to your needs."** Since 1993 this has been the philosophy of CML, which goes hand in hand with the philosophy of NUM, "NUM CNC solutions provide Machine Builders with a competitive advantage". Since that time, CML has been designing, manufacturing and installing machines for the woodworking industry for the production of windows, doors, panels and flooring. The systems they are developing are technologically advanced and employ integrated IT and robotics elements. Every customer request is met with a detailed response in terms of solutions, optimization, productivity, safety and reliability

*Mr. Diego Ramacci CEO of CML Group and  
Mr. Marco Battistotti Director - NTC Italy*



CML creates leading-edge modular units that are designed to meet the most diverse manufacturing needs, with very high accuracy even in the most complex production tasks. By using NUM's Flexium control system, CML is able to handle multiple working phases, switching from one type of process to the next, even without operator supervision. The space required for the desired production output is kept to an absolute minimum. As production output increases over time, CML can integrate the basic modules to upgrade the system.

The advantages of NUM's Flexium control approach convinced CML to start collaborating with the company. The modular structure of the NCK system, knock down the limit of 8 groups of working managed by only one PLC automation of the flexibility of the PLC CoDeSys to interface outside the machine via Ethernet, were strong points for CML. Other points that contributed strongly to the use of Flexium include the use of the popular CANopen field bus, and



*Laser device for different code printing (DATA-MATRIX, BAR CODE, TEXT CODE, etc.)*

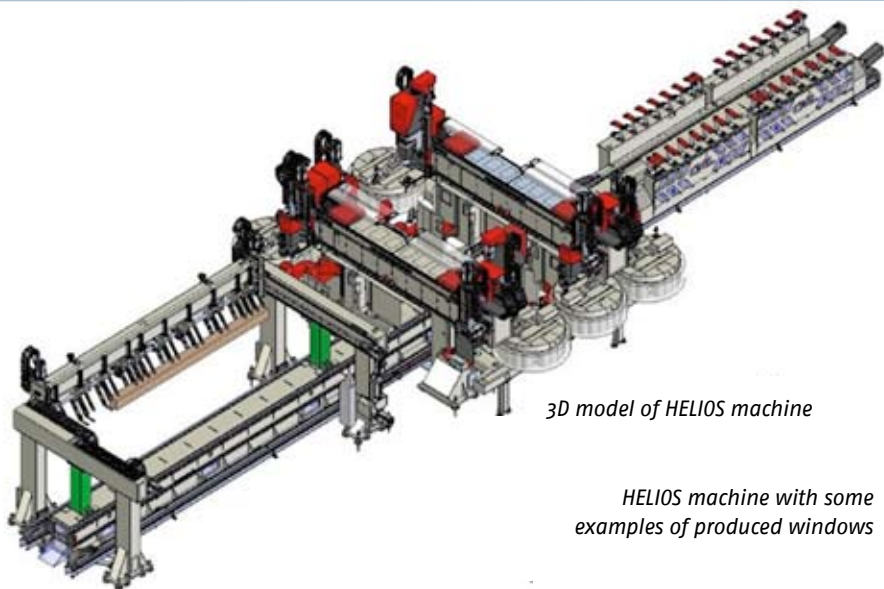


*Example of DATA-MATRIX code on window element*

the regenerative power supply that reduces the system's energy consumption. And last but not least, the superb industrialisation of the electrical cabinet, which is about 40% smaller than comparable systems, with the use of the Modular/Biaxes solution, cemented the company's decision to adopt Flexium.

Due to a high daily production target, the working process is programmed in advance by customised





3D model of HELIOS machine

HELIOS machine with some examples of produced windows



CML touch-screen panel

HELIOS line during FAT

software, which communicates with the Flexium control system. Consequently, a considerable number of programs are used every day by the machine. There are several I/O modules distributed throughout the machine, which communicate with other third party components. The target of this machine is to output 1 work-piece every 30 seconds over a 10 hour production schedule, which amounts to 1,200 work-pieces every day. As part of the production process each work-piece receives a data matrix production code, burned in by a laser matrix burner; this forms an integrated part of the workflow, controlled by Flexium. The data matrix code is used for tracking

each work-piece during subsequent manufacturing processes, and is also used quality control purposes.



CML provides a comprehensive product support service, from initial testing through to installation of the system in the plant. Full training is provided to customers on management of the system and production program interface, as well as on operation and process control procedures. All CML installations are monitored via a remote support service to ensure maximum production continuity. Furthermore, as well as a worldwide service organisation (see article page 20/21), NUM also operates an international customer department which guarantees uncomplicated application support. On-site services such as system integration, product development, software updates, rRetrofits, etc., are offered worldwide.

The start of this collaboration between CML and NUM means that two strong and individually competitive partners have established a way to increase their customer service level, worldwide.

64 axes CNC





## SINICO a qualified partner for NUM

Living the same philosophy as NUM, SINICO is a qualified partner, helping customers achieve unbeatable competitiveness for almost the last 50 years. SINICO specializes in the design and manufacture of automatic rotary transfer double end machines with integrated cut to length and bar-feeder functions, suitable for producing medium/large metal parts (steel, stainless steel, copper, brass, aluminium, titanium, Inconel etc.) from tubes, bars, coils, forgings and blanks. With a single clamping, the SINICO machine can perform virtually all forms of operations including: cutting, facing, chamfering, boring, centring, turning, drilling, threading, tapping, milling and grooving, as well as shaping operations such as flaring, tapering, rolling, pressing, marking and knurling.

*View of the rotating table*



*Examples of parts produced with Sinico machines*



SINICO's headquarters and production facility are based in Montebello Vicentino in Italy's Northeast. The modern and functional company premises take up a total area of 23'100 sq m, with indoor floor space accounting for 9,050. SINICO nowadays (2011) employs a staff of 50 and its owner follows a strict policy based on research, innovation and investment, channelling efforts into the pursuit of new solutions and ideas for a dynamic, constantly expanding market. SINICO was founded in 1962 by Mr. Egidio Sinico together with his partners Mr. Iginio Camerra and Mr. Bortolo Groppo. The company developed its first prototype of a manual centring machine for parts made from bars. This was to be the starting point for the production of cut-off/centring machines (TC models, 1966). The company evolved steadily and specialized in the design and construction of automatic rotary transfer cut-off and end-finishing machines to become one of the leading companies in this sector, currently exporting most of its production.

The SINICO machines' flexibility and modularity mean their field of use is quite extensive. In terms of the number of machines delivered, the biggest sectors are the automotive, bicycle and motorbike industries, manufacturing of hydraulic components, electric motors and power transmissions, industrial chains, earth moving machinery and contract machining.

This flexibility is also the most important advantage of the Flexium control from NUM, which is used on the SINICO machines. A special customized HMI was developed which focused on ease of use and getting the operators familiarized with the process fast. Also, the HMI supports the operator in connection with changing from one production phase to the next, reducing the set up time and increasing overall productivity.

The new Flexium based TOP 2000r1 (Flexium will soon also be used on other machine families) offers the ultimate in flexibility for a machine of this size;





a flexible, high-performance control unit is the key for successful production and fast changeover from one production phase to the next. With the collaboration of SINICO and NUM, a competitive and future orientated machine has been realized, targeting the world market in their production and assembly lines.

*right: Control panel with fully customized HMI*

*below: View of the NUM drive-C rack*



it can be widely customized to perform a whole array of operations. It offers the choice of having all axes fully CNC controlled or if needed, a combination with hydraulic axes for high thrust loads with less demands for speed and accuracy. SINICO transfer machines are highly versatile and after the cut to length operation a vast array of different double end machining operations can be performed. The machine accommodates  $\varnothing 8\text{mm}$  to  $\varnothing 120\text{mm}$  tubes and square material from  $8 \times 8\text{mm}$  to  $80 \times 80\text{mm}$ . Raw material is provided up to 6.5 meters in length and the built-in cut to length station shortens this to the required length before it is transferred to the following station for the double end processes. If the raw material is already the correct length, or if no cut to length operation is required, the machine can just be used as a double or single machine. The combination of a strong and reliable machine with

#### Model Top 2000 with 4 workstations:

- Flexium 68 with: 9 axes and 5 spindles, 8 channels, 2 hand weels
- FS152i P2, touch screen, customized keyboard, MP04 with hand weel
- n° 5 Spindle Motors           AMS100GB           9 KW
- n° 6 Brushless Motors       BPX1263R           12,6 Nm
- n° 1 Brushless Motor        BPH1903N          36 Nm
- n° 2 Brushless Motor        BPX0952N          5 Nm
- n° 6 Drives NUMdrive C 130A
- n° 3 Drives NUMdrive C bi-axes 50A
- n° 1 Drive NUMdrive C 14A
- n° 1 120KW regenerative and regulated power supply
- Flexium PLC application has been made in cooperation with NUM Application Engineers using CoDeSys language
- Customized Flexium HMI made by Sinico using standard Visual Basic language with NUM libraries

*From left to right: Mr. Christian Cisco, Production Manager Sinico, Mr. Danilo Baraldo, General Manager Sinico, Mr. Marco Battistotti, NTC Manager, NUM Italy and Alessandro Casalini, Sales Engineer, NUM Italy*



Performance

**DASSAULT**  
**FALCON**

**NUM**  
CNC HighEnd Applications



## Maintaining a big advantage...

One thing has become apparent over the last few years: if Europe wants to be able to defy the competition of emerging countries, new innovations have to be brought out constantly, the latest technology must always be used and productivity must be continually increased. This is especially true of the aircraft industry, where our Asian competitors are very keen on catching up quickly. The French aircraft manufacturer DASSAULT has taken this on board and is mastering the use of special forming technology for the wings of its planes, especially the FALCON aircraft, which continues to be a notable success.

*View of the operator side of the machine*



Until recently, this forming work step was carried out with conventional – even manual – methods and a lot of know-how. Increasing the productivity, whilst at the same time guaranteeing precision, repeatability and traceability, could not be done without automating the process. SERMATI (society for planning and realising assembly lines and special machines) was therefore commissioned to automate the pressing plant. SERMATI turned to NUM to integrate the Flexium system (CNC, drives, motors), design the process control and produce the specific HMIs.

The technical process is of course confidential, but an outline of the customer requirements that needed to be fulfilled is given here. First, imagine a machine that is large enough to fit an entire wing inside. This machine comprises six units driven by 18 motors, each of which develops a torque of more than 120 Nm. Each unit consists of two or four axes that can be moved completely independently, partially or entirely in sync. Each unit

*View of the conveyor side of the machine*

carries out a very special function. The synchronisation between the units must be extremely precise and as simple as possible to achieve. The machine also communicates with a conveyor system, which positions the necessary tool and the workpiece to be machined when needed, transporting the latter to the next machining station after the work step has been completed. The conveyor system communicates closely with other systems, in order to ensure that the workpieces can be transported quickly and without a hitch.

The machining itself is generally programmed using a teach-in box. Numerous parameters, such as movement, pressure, temperature, time, etc., need to be checked constantly, in order to avoid anything happening that could pose a risk to the operator, equipment or the workpiece. The system monitors and records all relevant data, regardless of whether the programme being executed is standard or based on teach-in. It goes without saying that full operational safety must be ensured and both programming and operation must be simple and user-friendly. To



this end, a human-machine interface was developed to fit the requirements of the operators and the maintenance staff. These requirements, which the engineers at NUM faced, were diverse. They included a high number of axes to control, a great many inputs and outputs, and the need for a reliable, safe and user-friendly solution.

The servo drives, which are connected to the control via DIC-NT, are of particular importance in this system. After the axes have been initialised, they are assigned to the different CNC channels based on the NC program and synchronised on the fly, depending on the requirements. Each axis can be a master, slave or completely independent. The integrated safety function, SAM, ensures that the movement is safe in all situations. The digital bus also allows a wide range of information to be fed back, which is used for both process control and tracking.

It was feared that programming six units, sometimes working independently, would quickly cause a real headache. To avoid this, all axis

movement is controlled from a single workpiece programme. This uses functions such as symbolic programming, automatically generated tables and dynamic operators.

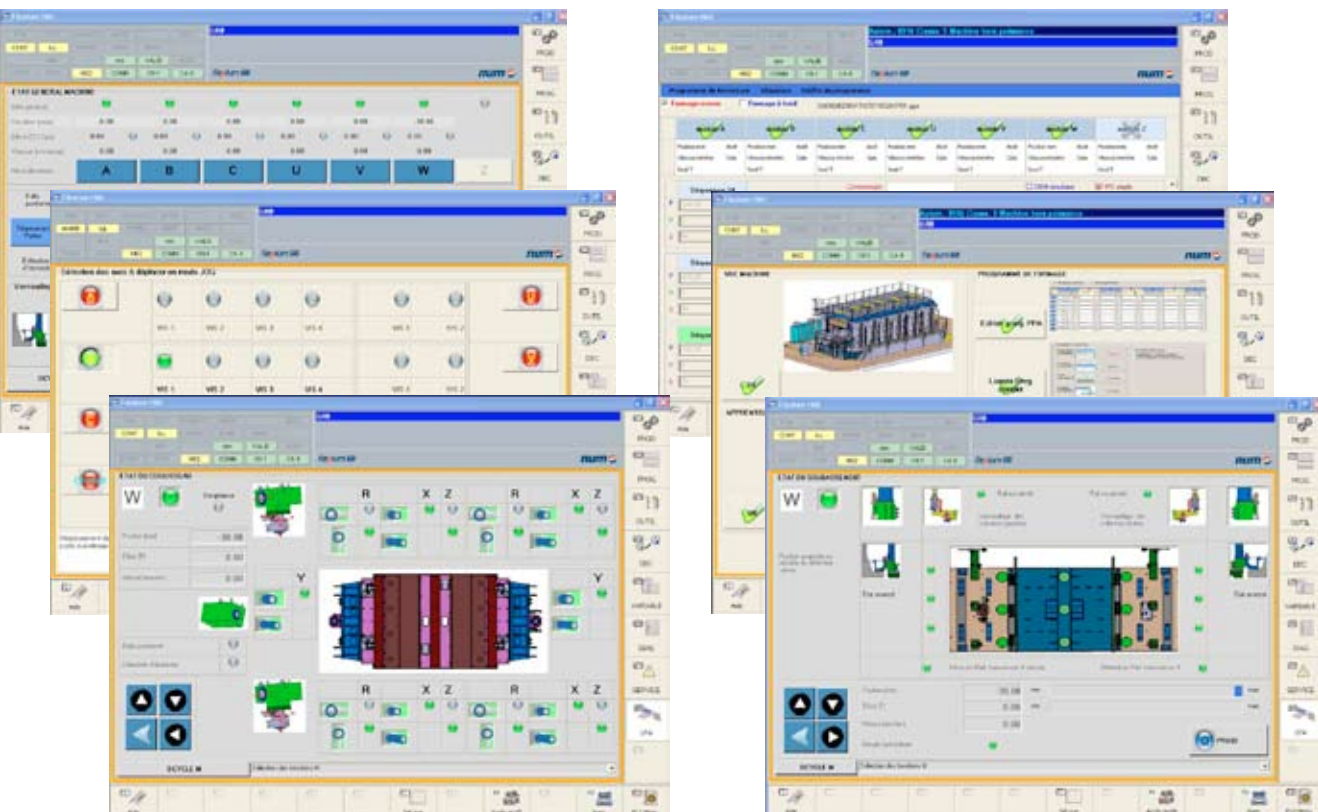
A large number of SPS units are connected to the Flexium system via fieldbus. The range extends from simple sensors to intelligent instruments, spread out over the whole machine. As well as the actual machine control, the SPS units also constantly monitor the functions of the attached modules. In case a fault occurs (such as a wire breaking), individual emergency withdrawal positions have been defined, further increasing the safety of the system. A special graphical HMI was developed to fulfil the requirement of simple operation. The HMI is based on the FXServer and is written in a high-level language. The contextual HMI ensures the machine can be controlled and the diagnosis and programming can be carried out via the teach-in box. The machine is currently in the commissioning phase at DASSAULT Aviation in Seclin and according to Jean-François ROUX, head of industrial resources:



The control desk

"The high level of engagement by NUM, together with their willingness to listen and fulfil the customer's needs, has made the development of this innovative process in accordance with the main specifications possible. The choice of NUM and the Flexium CNC system for this special process has proved beyond doubt to have been the right one. The great strength of the Flexium CNC system is demonstrated by the precise control of 18 synchronous channels, and the user-friendly graphical human-machine interface."

Numerous HMI pages necessary for the control of the machine



Leadership



## Exceptional flexibility marks NUMROTO out

**JEL® has relied on NUMROTO software for about 20 years, making it one of the company's oldest partners. Since being integrated into the KOMET GROUP, the benefits of the flexible and simple, standardised NUMROTO application have also become apparent to the entire KOMET GROUP. Bit by bit, the application has been introduced and successfully used across the whole group.**

A leading manufacturer of precision tools, the KOMET GROUP is represented around the world by 15 subsidiaries, 40 service and sales centres and 10 production sites. The company was founded in 1918 and has operated under the name of KOMET® since 1924. With the takeover of DIHART AG in 1996 and JEL® GmbH in 1999, KOMET® has strongly expanded its product portfolio in the area of thread and friction technology. The company uses a large number of machines equipped with NUMROTO and is set to obtain even more machines this year. A major part of their operation involves producing solid carbide tools in small to medium-sized series. Their machinery includes products from UWS, SAACKE, DECKEL, EWAG, TTB and STRAUSAK. All the ma-

chines are connected in a network and are attached to a central multi-user database. NUMROTO has become a tried and tested standard for the KOMET GROUP.

With innovative tool concepts and all-round solutions, the KOMET GROUP is a global technological leader. Reducing production costs, economic efficiency and reproducible drilling quality are the core aims of the tool solutions and concepts, in both the standard and specialised areas. Customer satisfaction is a top priority, along with the possibility of being at the forefront of innovation in the tool sector.

The KOMET GROUP relies on NUMROTO because this software runs on

various machine types. Once an employee is familiar with NUMROTO, he or she can work with any machine. This results in greater flexibility in production. The NUMROTO software itself also offers flexibility, which is one of the reasons why the KOMET GROUP uses it. "NUMROTO is incredible flexible", says Joachim Dünwald, Production Manager at the KOMET GROUP in Stuttgart. "There is a solution for virtually everything." Another major benefit is that the software is constantly being updated. "NUMROTO is alive – you just have to briefly download the update to the machine and you're up-to-date", adds Mr Dünwald. This is true of all the NUMROTO machines in use at KOMET® in Stuttgart; including those that are about to turn 20 years old.





From left to right: Walter Grob, Sales Manager for NUMROTO, Kurt Pohle, Head of the KOMET GROUP Complete Machining department in Stuttgart, Mr Joachim Dünwald, Production Manager for KOMET GROUP in Stuttgart and Mr Jörg Federer, NUMROTO Application Manager.



*KOMET GROUP Deep-hole drill with special profile at the tip*

Another plus point is the 3D simulation: "The NUMROTO 3D simulation is always good for showing employees how the process works, but also for identifying errors", says Mr Kurt Pohle, Head of the Complete Machining department at the KOMET GROUP in Stuttgart. The KOMET GROUP also uses the "in-process measurement" application (see article over the page). This enables very precise grinding by compensating for the wheel wear and thermal effects in the machine itself. In addition, the control measurements make the production process verifiable and secure. This function is becoming increasingly popular, enabling very reliable production.

THE KOMET GROUP insists on consistent quality in production, repairs and delivery, all around the world. This goal is achieved by KOMET SERVICE®. This service covers professional regrinding, individual recoating, ultra-precise retooling and, where needed, a compact tool range, including solid carbide tools and simple VHM special tools. The KOMET GROUP relies increasingly on external part-

ner companies that are licensed by KOMET® to regrind or even produce KOMET® products. This is mainly to cover peak production times and to be able to guarantee waiting periods. The KOMET GROUP prefers to cooperate with partners that use NUMROTO machines themselves, in order to implement the idea of the "extended workbench". Thanks to the compatibility of the programming systems, the companies can exchange tool data and offer the high quality that the KOMET GROUP guarantees.

**Deep-hole drill with special profile at the tip**

This solid carbide drill is designed to bore deep holes. At the same time, it creates a precisely defined profile at the base of the drill hole. This type of tool is generally used to make holes in which components with a special form are to be installed form-locking. For example, sealing rings, springs, mechanical safety mechanisms or sensors. The drill's two cutting edges can be designed symmetrically or asymmetrically, in order to create sharp-edged corners, for example.

Precision





## Wind turbine gear production accelerated by CNC refurbishment of gear shaper

Advanced gear shaping software and motion control hardware from NUM has been used to bring an old manually-controlled gear shaper machine up to modern day control standards. The five-axis Stanko machine is now controlled by a NUM Axiom Power CNC system, using electronic gearbox techniques to synchronise the rotary cutter, gear blank and stroking axes. It also incorporates an innovative programmable replacement for the stroking axis, which reduces product changeover time from hours to minutes – significantly improving productivity.



*„Before“ – starting the rebuild*



The gear shaper was bought by DePe Gear Company, which specialises in the design, manufacture and refurbishment of gears and gearboxes for a diverse range of industrial and commercial applications, including the steel processing, rail, mining, quarrying and aeronautical industries. The company operates a considerable number of gear cutting, shaping and grinding machines at its Stoke-on-Trent manufacturing facility and is no stranger to NUM – 3 of its current gear cutting machines are equipped with NUM Axiom CNC systems and NUMgear software. In this particular case, DePe Gear Company purchased the Russian-built Stanko gear shaper initially for manufacturing large internal gears for the wind turbine industry, and subsequently commissioned machine tool engineering company Euro CNC to carry out the necessary refurbishment work.

*„After“ – fully rebuilt and in production*

Euro CNC specialises in retrofitting, rebuilding and upgrading machines. This often involves equipping manual machines with partial or full CNC systems, and the company consequently maintains a close working relationship with NUM, providing it with access to the latest CNC technology, control software, digital drives and motors. In recent years, Euro CNC has built up considerable knowledge of machine tools for gear production, and nowadays handles a wide variety of gear hobbing and shaping machines.

Euro CNC quickly ascertained that although the machine was fully mechanically serviceable, it would benefit from being equipped with new motors and drives, including high performance digital units for all axes, together with a CNC system for operational flexibility and a customised



HMI to replace outmoded mechanical switchgear.

Traditionally, gear shaping machines employ a complex cam-driven 'nodding' axis arrangement to move the cutting tool up and down the gear blank as it is cut, the stroke of which needs to be synchronised to the rotation of the tool and the blank. This approach suffers from numerous disadvantages: it can involve up to three axes of movement, each subject to error, and is extremely difficult and time-consuming to set up, which does not sit well with the fast and flexible changeover requirements of modern manufacturing. Euro CNC consequently decided to develop an entirely new form of stroking axis, based on a fully programmable linear actuator. The end position, length and speed of the stroke can be freely changed under software control.

In addition to the stroking axis, the gear shaper has three rotary axes – to rotate the cutting tool and the gear blank, and to retract the cutting tool on the up stroke – together with a linear positioner based on a motor and ballscrew, which drives the gear blank to the cutting tool. All of these axes are controlled by NUMDrive C servo drives and NUM brushless motors.

Euro CNC chose to use a NUM Axium power CNC system to control all five machine axes, networked to a NUM industrial PC and a large touch-sensitive screen. The software includes NUM's powerful NUMgear package, but in this instance it is used mainly to provide the electronic gearbox functions for synchronising the cutting tool rotation, gear blank rotation and linear stroking axes. The HMI for the gear shaper machine is primarily created by a special version of NUM's PC ProCam software, which was jointly developed by Euro CNC and NUM's USA facility specifically for this type of application. The software combines a highly intuitive graphical user interface using common gear shaping terminology with a 'conversational' style of programming, enabling operators who are not familiar with CNC-based machines to become proficient very quickly.

The refurbished Stanko gear shaper was recently installed at DePe Gear Company's Stoke-on Trent facilities, and aside from a few minor initial issues has performed flawlessly.



*Applications Engineering facilities enable NUM (UK) to provide first class customer support, including the use of a 4 axis "training machine"*

Nigel Parker, Technical Director of DePe Gear Company, points out that, "We are using the gear shaper for a variety of internally cut gears, including spur gears for wind turbine generator gearboxes and a variety of splined gears. Although it is too early to provide quantified data, we are definitely seeing a reduction in setup and operating times. Like our other CNC machines, the most significant benefit comes from the sheer versatility of this all-digital approach, which enables us to switch freely from manufacturing one type of gear to another under software control. Machine operators no longer need to laboriously count the number of teeth being cut, but simply push the appropriate button on the menu, which helps maximise throughput."

According to Tim Clarke, Director of Euro CNC, "We have worked with NUM for about five years now, and have found their CNC products to be extremely re-

liable. We also benefit from excellent technical support from their UK facility, and have recently experienced a similar level of backing from NUM USA. So far, we have installed PC ProCam on some 25 machines – mostly gear hobbers rather than gear shapers – and have been delighted with the positive feedback from customers."

Steve Moore, NUM (UK) Ltd Managing director says, "We have been in this industry since 1987, and during this time we have seen many changes in the machine tool industry. We pride ourselves on giving a professional level of service at all times, both to OEM/Rebuilders and end users, we support the whole range of products from the vintage 7xx series controls upto the latest Flexium CNC. Our engineering staff have a combined machine tool experience of over 100 years.

*Steve Moore,  
Managing director NUM (UK) Ltd*



**Reliable**



## NUM Services – „One Step Ahead“

Consultation and support during the entire product life cycle, internationally and across cultural and national borders. When you decide for a system and a solution from NUM, you are making a long-term investment. We consider ourselves to be your partner: from the idea to its realisation and through to on-site customer service. We are there for you worldwide – and also want to be there for you even before a problem arises. That is why our new motto is: “One step ahead”

In order to be able to be this step ahead,  
the NUM service concept is built on 5 pillars:

- Training & support
- Maintenance and audits as proactive consultation
- Repairs & upgrades
- Globe-spanning product-specific proactive replacement programmes
- Modernisation & maintenance of value



### Training & support

NUM is committed to transferring its know-how on a regular basis. In training courses, our specialists share their comprehensive CNC knowledge with you, as well as their special product expertise and drive and application techniques. Our extensive range of training courses is oriented towards your individual requirements, be these operator training, maintenance, repair and service training, or programming training in SPS, CNC, HMI, etc.

### Repairs & upgrades – NUM Decades of support

Good, quick customer service ensures that standstill times are kept to an absolute minimum. Thanks

to its new logistics structure and its 32 international service points, NUM is constantly working to reduce response times. Our specialists use their knowledge and skills to restore even older systems as quickly as possible – new or old, we are on the job. .

NUM boasts a global, high-performance network of service points and branch offices. The tried-and-tested 3-level concept is structured as follows:

**NTC:** NUM Technology Center – Competence centre with its own spare parts store.

**Agent:** Independent NUM partner





company with a local spare part store. Support and regular training by our specialists.

**Contact:** Local contact person for our customers who speaks the respective national language.

#### Spare parts supply

Thanks to our national representatives and partners, spare parts can be supplied in the quickest way possible. Local warehousing by every NTC allows the duration of spare part delivery to be minimised. The local spare parts store is replenished by the large central warehouse, from which all NTCs and agents are served. We can produce and dispatch axis motors within 2 working days. NUM also offers a trade-off program for most spare parts with cost savings of up to 40% when a part which can be repaired is sent back. Customers gain even more security with a service contract. This guarantees the availability of parts

in the NUM branches for the CNC systems the user has installed.

#### Remote diagnosis and maintenance

Our service engineers can make a remote diagnosis online via the HMI (NUMpass or NUMROTO) – simpler problems can be rectified directly, or bridged provisionally. This means you have no call-out costs. Even in the event of a more serious incident, time can be saved, as the maintenance personnel can begin to take the necessary measures even before the NUM technician arrives on site. In addition, any necessary spare parts can be immediately supplied or ordered.

#### Technical service hotline

Our hotline is staffed by well-trained engineers who can answer technical questions competently. The preliminary diagnosis made on the telephone determines the further procedure for the service staff and whether a service engineer will be deployed to the site. The technical service hotline can be reached every day during normal working hours, and this, thanks to our global service network, in most important time zones all over the world.

#### Minimising standstill times through data backup

When valuable information such as commissioning data, PLC programs or CNC machining programs can be lost, recovering/replacing lost data can take longer and be more costly



than the repair of the hardware. That is why our technical team offers special advice with regard to data backup.

#### Easy Backup

Easy Backup is the quick and easy backup & recovery solution that is installed on our PC-based systems (FS151i and FS152i). With this software, images of individual files or the whole system can be generated on the Easy Backup USB stick, directly and without any complicated installation. Should Windows suddenly no longer be able to run, a data carrier image is always readily available for this emergency.

#### Backup agent

This optional backup software, which is integrated into NUMpass, allows you to configure which items should be backed up. The backup is performed manually or fully automatically, depending on the setting. erfolgt je nach Einstellung manuell oder vollautomatisch.

# NUM Service





#### **Software updates and extensions**

The ongoing development of the CNC system software and new hardware components for our control family enhances the practical potential and capabilities of CNC. The developments made in the NUM technology centres include user benefits such as new functions in programming and in the operating environment. Thanks to years of experience in practice, new tools emerge which support the machine manufacturer and the user when solving problems.

#### **Audits as proactive consultation**

A further form of customer service is represented by the audits that NUM can perform. To provide customers with the greatest possible security, the NUM products are carefully checked by our NUM technicians. The completeness of the spare parts store is also checked, and attention is called to any parts missing. Know-how is significant for every company. NUM therefore develops individual training plans, based on the latest level of knowledge, together with the customer. These are then implemented in accordance with the customer's specifications. The customer is therefore optimally prepared should a glitch occur, and can be ensured that the machine is being operated correctly.



#### **Service contracts**

The NUM service contracts are aimed at end users, machine manufacturers and distributors. First and foremost, the service contract covers the labour and travel costs for potential repairs at the user's premises during the guarantee period; further main points are:

- Detailed telephone support
- Preferential support
- On-site support
- Increased availability of spare parts
- Staff deployment

#### **Modernisation & maintenance of value**

Older machines tend to suffer from failure of the electronics, and their reliability decreases from year to

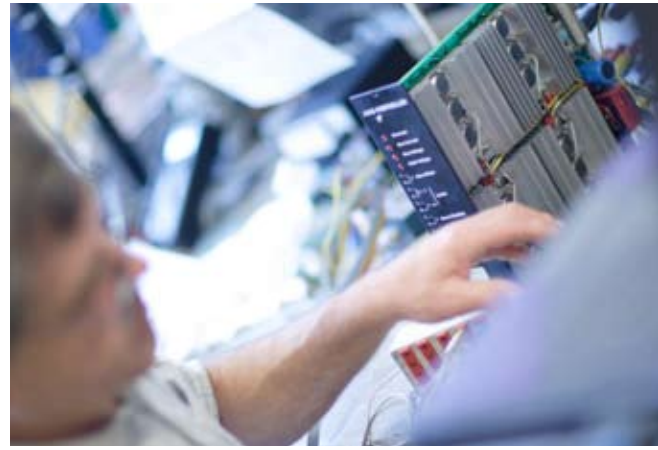
year. Compared with new machines, the flexibility of the program and the CNC system also often leave a lot to be desired. This is compounded by the no-longer-adequate computer and servodrive power.

#### **Refurbishment – the globe-spanning proactive replacement and general overhaul programme for our OEMs**

We offer a scheduled replacement and integrated refurbishment / general overhaul programme for the customised product. We therefore service proactively and optimise the products around the globe for our OEM for his whole machine park worldwide. In a package this offers benefits with respect to planning and costs.







### **Retrofit – the extended service life of the machine**

If the machine's mechanics are still flawless or the machine is one of a kind, which cannot be replaced by more recent methods, then a retrofit is an attractive solution. NUM is able to extend the service life of the NUM products in these machines, which is particularly interesting from an economic perspective:

- Investing in a retrofit of the NUM products pays off in a very short period of time.
- The retrofit machine is up and running again in only a few weeks.
- Our specialists finely tune the elements to one another and to the machine in order to combine perfection in precision and cost-effectiveness even for demanding processes. The simple operation of the NUM CNC system ensures that this performance is really achieved.
- The NUM customer service is also guaranteed for retrofit machines for years to come.
- NUM customers can rely on optimum service for their control unit even after 20 years. Our NUM customer service works on this daily, as satisfied customers are the best business card our company can provide.
- The international NUM service team can fall back on 30 years of experience.
- The international NUM service team has an average of 10 years' experience .

1961 – 2011  
**50**  
 years of CNC

**NUM Service**

# CNC Complete 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](http://www.num.com)

1961 - 2011  
**50**  
years of CNC

**NUM**   
CNC HighEnd Applications