



## Series 30i/31i/32i- MODEL B

Precise, fast and reliable



FANUC America Corporation  
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888-FANUC-US (888-326-8287)



# Series 30i/31i/32i-MODEL B-

## The right choice for all high performance machines

The Series 30i/31i/32i-MODEL B CNCs have been developed for the next generation of high performance machine tools. Their enhanced functionality and superior performance extends the potential of machine capabilities into the future. The product line spans from standard CNC applications up to the most complex machine tools and non-traditional applications. FANUC controls have a world-class reputation for performance, precision, reliability and user-friendly operation, making them popular with the most demanding managers and operators alike. With more than 3 million controls already installed around the globe, FANUC is the world's leading CNC manufacturer. By choosing a machine tool with a FANUC CNC it will be available for production more often, process more parts and use less energy.



<p><b>Available on the world's best-in-class machine tools</b></p>	<p>Available on the world's leading performance machine tools including 5-axis machining centers, multi-axis lathes, mill-turn machines, transfer machines, gear cutting machines, precision grinders, woodworking machines and state-of-the-art, non-traditional applications.</p>
<p><b>Ultimate resolution and precision for quality machining</b></p>	<p>The CNC and drive system executes at a nanometer resolution all the way down to the 16-million count encoders for the maximum precision and the smoothest contoured surface finish quality.</p>
<p><b>High-speed machining for quality and reduced cycle times</b></p>	<p>Advanced software algorithms analyze part geometries and machine capabilities and adjust trajectories and feedrates to provide the smoothest tool paths for the highest processing speed at the specified precision.</p>
<p><b>Simple operation for maximum productivity</b></p>	<p>Operators with previous FANUC experience can use their existing skills as they learn new techniques, and existing part programs will run smoothly with minimum modifications.</p>
<p><b>Connectivity for today's high-tech manufacturing</b></p>	<p>Ethernet connectivity for high-speed part program transfers of large part programs and data collection is standard.</p>
<p><b>High reliability, easy maintenance and world-class service and support</b></p>	<p>Reliable hardware with clear diagnostics provides a stable platform for maximum machine availability. Additionally, factory-trained field service engineers provide free lifetime over-the-phone technical support and local on-site service increasing machine uptime.</p>
<p><b>Powerful simulation tools</b></p>	<p>Simulation of CNC operation, part programming and maintenance screens for effective training of operators, part programmers, maintenance engineers and technicians in a safe environment.</p>
<p><b>State-of-the-art hardware</b></p>	<p>Ultra-high-speed processors provide fast interpolation times with up to 1000-block look-ahead, up to 10 paths and 40 axes and up to 24 axes simultaneously. Up to 5 independent, 9.1 nanosecond-per-step PMC ladders execute simultaneously, supporting up to 4096 digital inputs and outputs.</p>
<p><b>Customer specific solutions</b></p>	<p>Unique solutions may be realized using powerful programming languages, user interface development tools, real-time macros and PC functionality. Series 30i/31i/32i-MODEL B CNCs may connect with Windows compatible PCs, or rugged, diskless Windows CE.NET operator interfaces.</p>



Designed to  
handle complex  
applications  
with ease





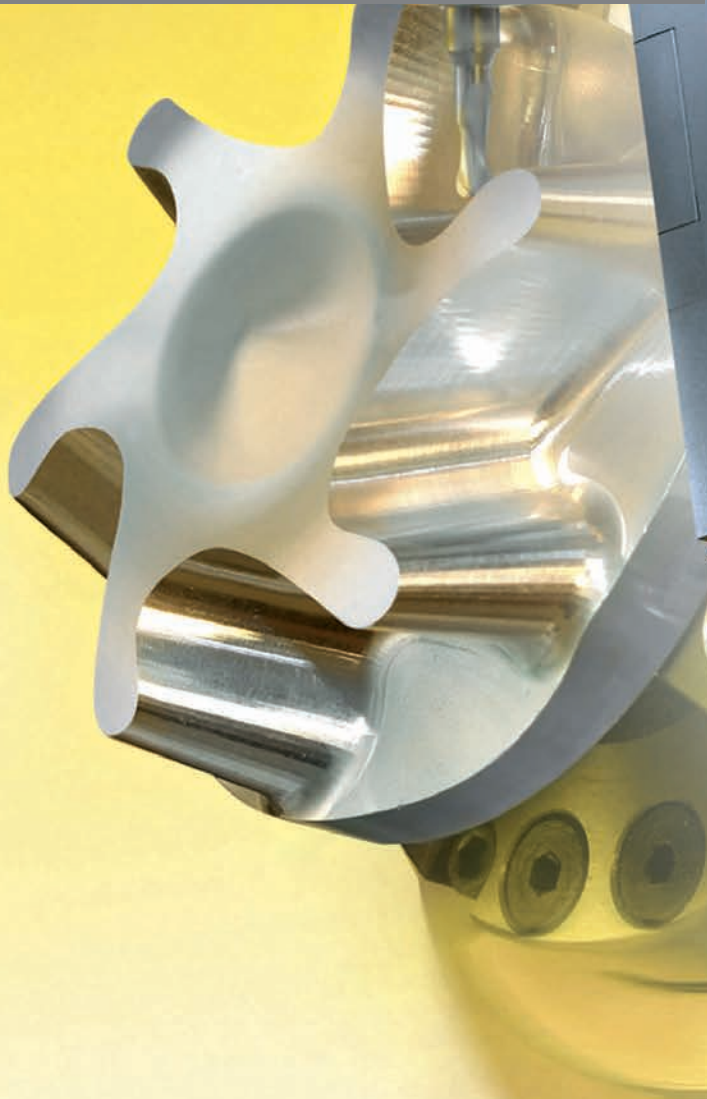
## The first choice for the most demanding applications

The Series 30*i*/31*i*/32*i*-MODEL B is designed for today's most complex, high-performance machines with a large number of axes, multiple part program paths and high-speed auxiliary machine functions. The Series 30*i*-MODEL B supports up to 32 servo axes, 24 simultaneous interpolated axes, 8 spindles and 5 independent PMC machine ladders. The Series 30*i*/31*i*/32*i*-MODEL B CNC is ideal for your next machine, whether it is a simple lathe or mill, or the most complex part profile, multi-axis application.

- 5-axis machining with Series 30*i*-MODEL B and Series 31*i*-MODEL B5, for precision parts that faithfully match the original CAD drawing, with faster cycle times, improved surfaces finishes and simplified part programming, setup and operation.
- Mill-turn and 5/6-sided machining, combining turning and milling in a single part program to reduce setup and cycle time and improve quality.
- Linear and rotary transfer machining for the shortest cycle times for high volume manufacturing with the convenience and simplicity of a single CNC interface for multiple spindles and stations.
- Precision grinding, with the performance and accuracy for cylindrical, surface and profile grinding.
- Gear cutting, synchronizing multiple axes and spindles and providing highly customized operator interfaces for high quality cylindrical and bevel gear machines.
- Woodworking machining of large nested part programs at ultra-high speed while maintaining accuracy for flat-bed and 5-axis routers.
- New processes and technologies that require high performance motion control in applications such as composite tape laying, riveting, water jet, laser, friction stir welding and EDM.



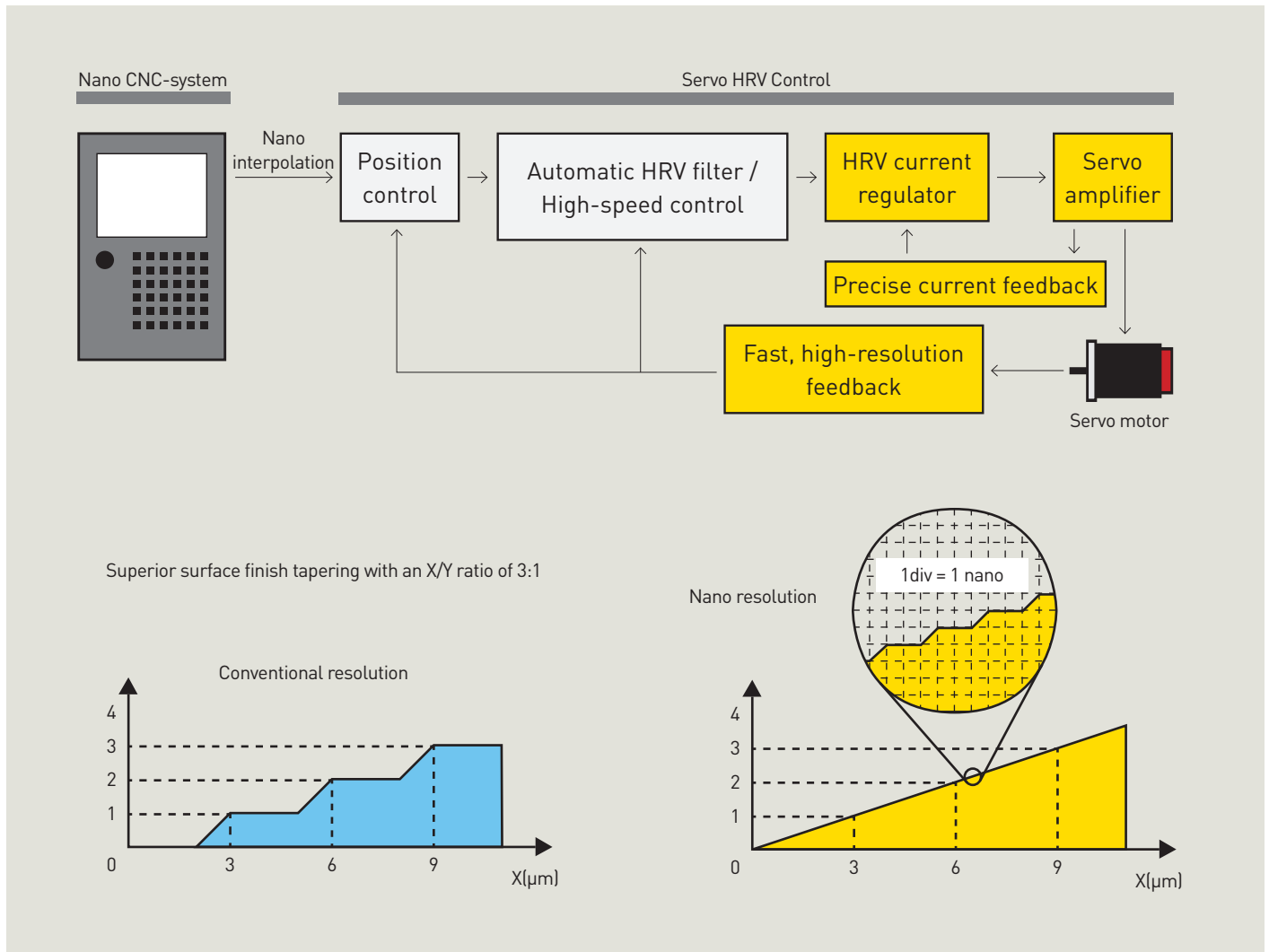
The ultimate precision



## Nanometer precision

The Series 30i/31i/32i-MODEL B achieves the highest precision possible, with nanometer resolution standard throughout the entire motion system - from the CNCs internal calculations and stored values, through to the interpolator, on to the servo and spindle drive systems and back through the 16-million count-per-revolution position feedback devices.

FANUC's unique system-wide nanometer resolution precision provides a superior surface finish quality whether you are machining simple prismatic parts or the most complex NURBS curves using advanced spline interpolation. This minimizes the need for secondary operations in many cases, reducing both the total part cycle time and part cost, delivering additional value to your customers.



## Machine accuracy compensations

The best built machine tools can be made better with the suite of accuracy compensation functions available in the Series 30i/31i/32i-MODEL B. Mechanical wear, environmental conditions or the shear size of the machine may be corrected with compensation technology. From the basic backlash and stored pitch error compensations to the more specialized functions, FANUC can provide the technology and services to improve finished part accuracy.

- Smooth backlash compensation
- Bi-directional and interpolated pitch error compensation
- Inclination and straightness compensations
- Thermal growth compensations
- 3D volumetric compensation



# Optimized speed



## Reduced cycle times means more parts out the door

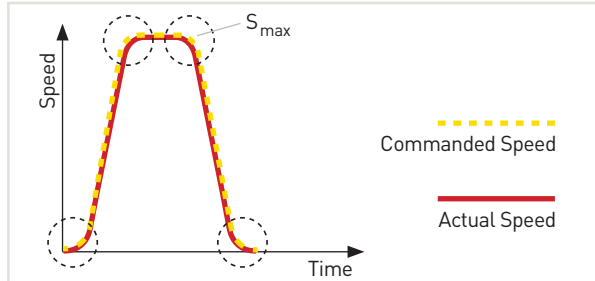
Having already integrated high-speed CNC and drive system hardware with servo and spindle motors that feature ultra smooth rotation, accurate current detection and high resolution feedback devices - any further reduction in cycle times requires minimizing machine shock and vibration so that part program feedrates can be optimized. The Series 30i/31i/32i-MODEL B feature a suite of advanced motion control software functions to reduce cycle times while enhancing part accuracy and extending machine life.



## Bell-shaped acc/dec

Bell shaped acc/dec minimizes machine shock and reduces the time it takes to accelerate and decelerate and can be applied to rapid, contouring and tapping motions.

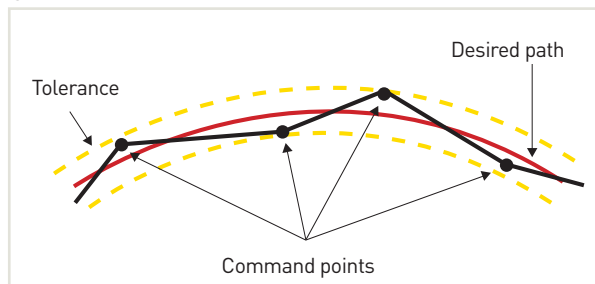
### Bell Shaped Acceleration and Deceleration



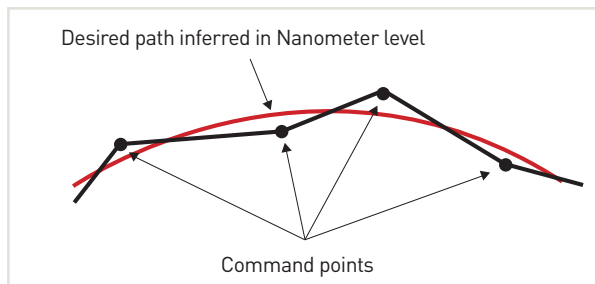
## Nano smoothing

Nano smoothing converts CAM-generated line segments into NURBS curves for faster execution and a superior surface finish - with only small modification to the CAM system or existing part programs to activate the feature.

### CAM



### CNC



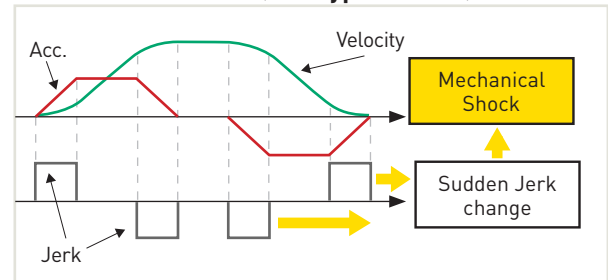
## HRV

Auto-following HRV servo and spindle drive filters dynamically suppresses mechanical resonance even when the frequency changes.

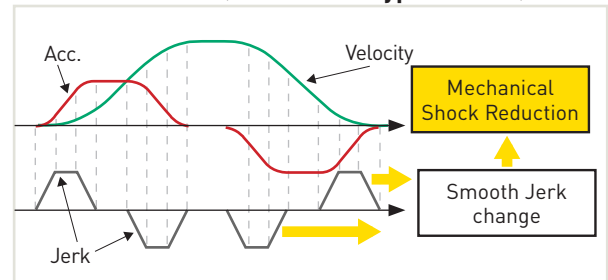
## Jerk control

In part program sections in which acceleration changes significantly, such as where the cutting path changes from a straight line to curve, machine vibration or shock may occur. Speed control and a change of acceleration suppress vibration and machine shock and their associated machining errors.

### Without Jerk Control (Bell type acc/dec)



### With Jerk Control (Smooth bell type acc/dec)



## AI Contour Control

AI Contour Control looks ahead in the part program to eliminate the acc/dec and servo delays that limit feedrates when cutting short line segments or contours, and effectively eliminates machining trajectory error in corners and small radii.

The Continuous Rapid Traverse mode enhancement eliminates pauses at transitions between or from rapid traverse moves in AI Contour Control mode, reducing the cycle time of parts with many positioning moves by up to 10%. In Continuous Rapid Traverse mode (G05.9), axes are not decelerated to a stop between G00 blocks or in transitions between G00 and G01. Continuous Machine Coordinate System Positioning (G53.7) speeds up common operations such as moving to the tool change position. A radius can be automatically inserted at the intersecting corners of positioning moves to minimize machine shock and increase the speed of direction changes.



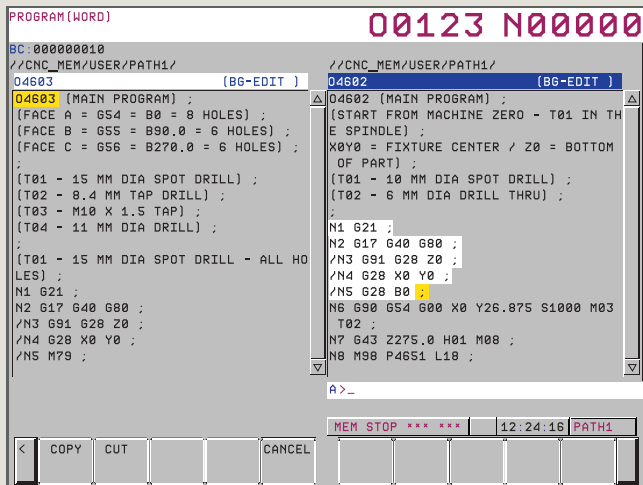
Simple and  
user-friendly  
operation

## User-friendly operation and programming

Operational and programming consistency are critical to maximize the productivity of new equipment. Operators that already have experience with FANUC controls will be comfortable with the Series 30i/31i/32i-MODEL B in no time at all, without the need for expensive retraining. CNC enhancements can be adopted over time, either by learning on the CNC or by using FANUC's realistic and efficient NCGuide CNC simulator.

Existing part programs will run smoothly on the new control with little or no modification. Machine setup is simplified with features like the Workpiece Setting Error screen, adjusting the part program to the orientation of the part on the machine table with easy to measure an X/Y/Z and roll-pitch-yaw values. Each operator can select their preferred language quickly from any of the 18 supported, enhancing their comfort level and operational effectiveness.

## Powerful G-code editor



Program and operational consistency is a cornerstone of FANUC's commitment to interoperability. The traditional CNC word editor mode is fully supported and enhanced, whereas the flexible character editing mode may satisfy the needs of a new generation of operators that are used to PC-editors. Character editing mode also makes it easier to quickly modify complex word structures such as Custom Macro, mathematical statements and part program comments.

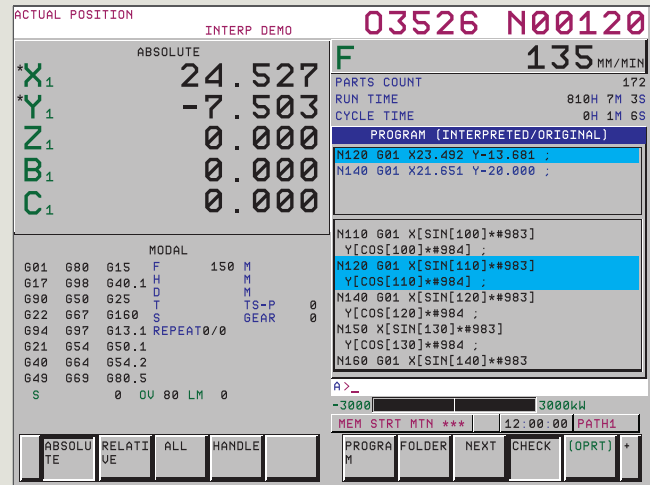
The background editor allows multiple programs to be displayed side-by-side on the screen and provides the same powerful cut-and-paste and search-and-replace operations as the foreground editor. Background editing mode also allows one part program to be downloaded and modified while another part program is executing in the foreground.

Multi-path part programs can also be displayed side-by-side, with special functions to locate the synchronizing M-codes, while scrolling through part programs in the editor.

## Enhanced folders

Part program folders can be used to organize part programs and macros by categories such as libraries, customers and jobs. The familiar folder tree-view is similar to that used on PCs, making it easy to visualize the structure. Copy, move and input/output operations can be performed on a program or a complete folder. The folder system separates user and machine tool builder part programs and macros for simplicity and to avoid accidental modification or deletion.

## Custom Macro



Custom Macro extends the standard programming language to include the features of an easy-to-use, yet powerful computer programming language. Using Custom Macros you can make programming more generic for families of parts and interfacing with external devices such as trigger probes and memory cards.

- Variables for passing parameter values to macros and for saving intermediate calculations within a macro, sharing values between macros and program paths, saving values when the power is turned off and reading and writing a variety of CNC data items
- Standard math operations and functions for trigonometry, logical bitwise operations and data format conversions
- Flow control for branching with conditional if-then expressions and powerful do-while-end loops
- Variety of formats for call macros and subprograms, including the creation of custom G-codes and M-codes

## Multiple part program view

The enhanced part program display provides more insight to the part program calling structure and simplifies verification and debugging. It displays the active part program/subprogram blocks in detail with interpreted values replacing items such as macro variable statements. If a subprogram is active, it also displays the name(s) of the calling parent program(s). A second window displays the original part program with the macro variable statements.



## Fast shop-floor programming

User-friendly MANUAL GUIDE *i* shop-floor programming software simplifies and enhances the productivity of the machine operator. This innovative part programming operation environment allows a job to be completed in the shortest time possible, from the manufacturing drawing right through to the finished part. MANUAL GUIDE *i* supports turning, milling and compound machining applications.

## Integrated programming and operation

A single integrated screen provides for routine machining operations including part program creation and editing, animated simulation-based program verification, production machining, MDI operation and manual operations.

## Simple part program generation

Simple menu-driven conversational programming screens guide the operator through a series of frequently used machining operations. These high-level cycles eliminate the tedium and error-prone process of generating the same multiple blocks of G-code for common machining operations.

## Realistic 3D solid model simulation

Machining programs can be checked effectively using a solid model animated simulation for all operations. It realistically shows the material surface being removed with a specific type of tool tip as if the real workpiece is being machined.

## Advanced set-up guidance

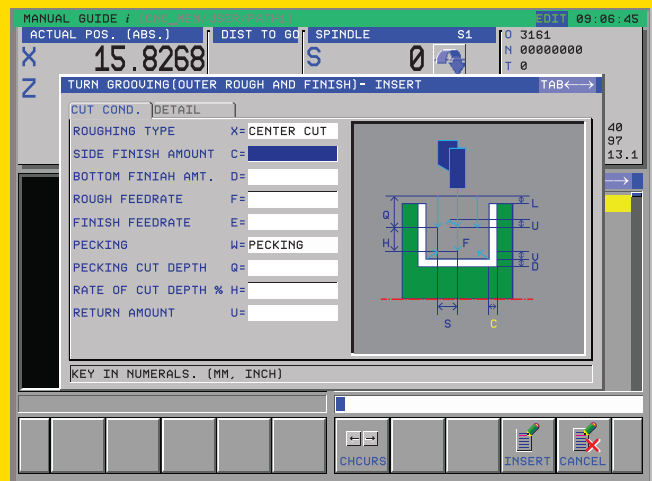
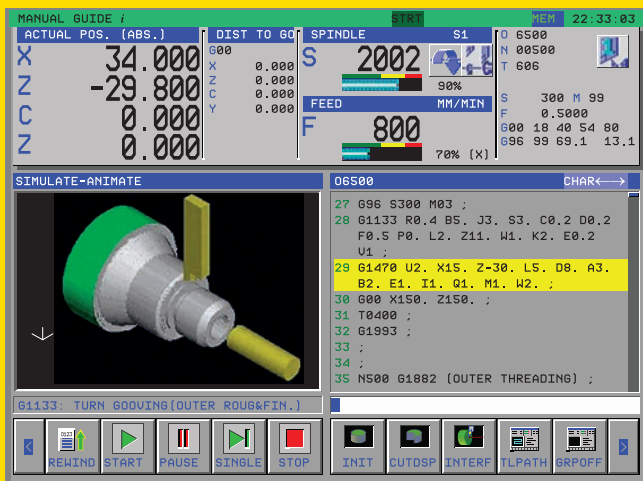
Machine setup is simplified using MANUAL GUIDE *i* set-up guidance functions. All measurements are supported, from tool and work coordinate offsets through to the measurement of the finished workpiece.

## Offline programming

MANUAL GUIDE *i* is supported by NCGuide and NCGuidePro, FANUC's CNC software running on a PC. Programs can be created on the PC and then transferred to the machine after verification. Programs can be exported to standard G-code so they can run on a wide range of FANUC CNCs.

## Affinity with CAD/CAM systems

Standard machining programs created using CAD/CAM or other offline programming systems can be visualized and verified using the 3D solid model simulation by simply adding the block that defines the material blank size.



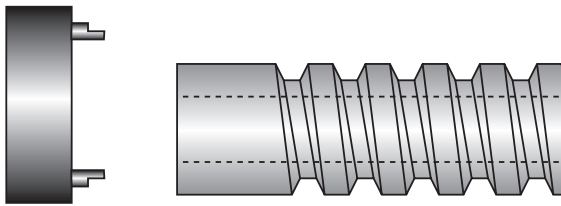
## Arbitrary speed threading

Spindle speed override can be activated during threading to allow the operator to adjust the spindle speed to avoid chatter, the CNC maintains feed axis synchronization to assure thread definition. M-code activation ensures existing part programs work as expected.

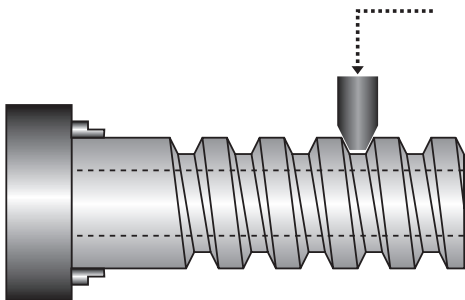
Previously machined threads can be repaired by manually placing the tool into the machined thread with the spindle stopped and registering the position with the CNC. After retracting the tool, the thread can be re-machined easily. Arbitrary speed threading is especially useful for threading large diameter or long length work-pieces as used in the oil and gas industries.

Remachining a thread is a simple 3-step process:

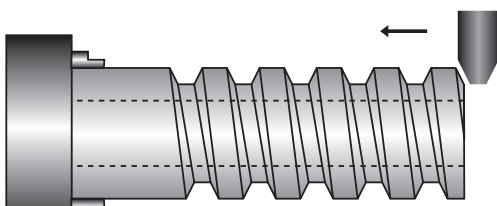
1. Load machined part into the machine.



2. Manually place tool in thread with spindle stopped.



3. Retract tool and run threading part program.



## Large part program management

The Series 30i/31i/32i-MODEL B provides up to 8MB of nonvolatile internal memory for part program storage. Slots are provided for an additional 2GB of part program storage using economic ATA or Compact Flash memory cards. The Fast Data Server can also be installed in the CNC, providing up to 4GB of flash memory.

Part programs stored in external memory cards or in the Fast Data Server can be edited and executed just like internal memory, providing practically unlimited capacity.

## USB port

A USB port is also conveniently located at the operator display to provide practically unlimited storage for part programs, tool data and parameters using a wide range of commercially available USB flash drives. Files can be easily moved between office, computers and the machine tool - quickly loading part programs into internal CNC memory for execution.



# Connecting manufacturing and business

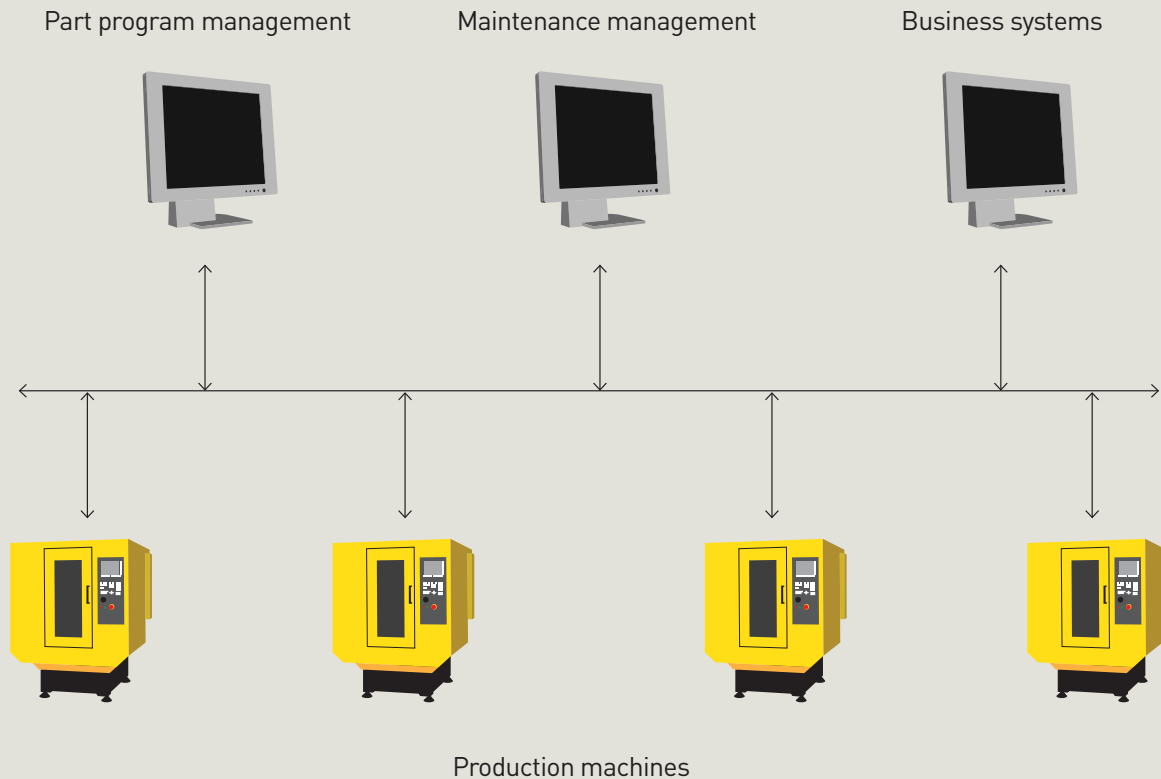
Today's ultra-competitive business environment demands flexibility and speed from every aspect of the company. Large part programs generated by CAD/CAM systems for increasingly complex part profiles are challenging the traditional CNC serial communications interface. Business speed and customer satisfaction relies on instant access to information that is only possible by connecting manufacturing to business systems, securely and reliably. The Series 30i/31i/32i-MODEL B meets the challenge with a standard high-speed Ethernet interface for file transfer and data collection.

## High-speed file transfers

The Series 30i/31i/32i-MODEL B supports the industry standard File Transfer Protocol (FTP) for high-speed transfers of part programs, parameters, tool data and other files. CNC screens guide the operator to download or upload files to any FTP server directory on a network. The Fast Data Server incorporates an FTP server so that the CNC can become a standard storage device on a network, providing the standard drag and drop file transfers from a remote computer.

## Powerful data collection

The FOCAS2 interface provides robust, documented access to practically unlimited CNCs, machine and process data. Using Drivers and Libraries, applications can be developed quickly to provide information such as current status, part counts for each part program, active error messages and tool offset values. Read and write routines are provided to a wide range of CNC and PMC data elements - allowing powerful systems integration.





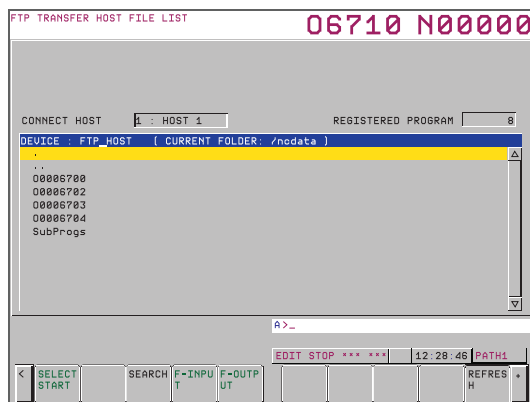
## High-speed Ethernet

The standard 100-MBit Ethernet interface integrates the CNC into a network for high-speed part program transfers and the collection of process related data. It also supports remote troubleshooting from the maintenance department or a machine tool builder anywhere around the world. Because the Ethernet port does not use a public operating system, it is practically “hacker-free” and virus immune.

The Fast Ethernet option board provides a dedicated CPU to support multiple connections and is suitable for DNC operation and remote operation using CNC Screen Display function.

## Fast Data Server

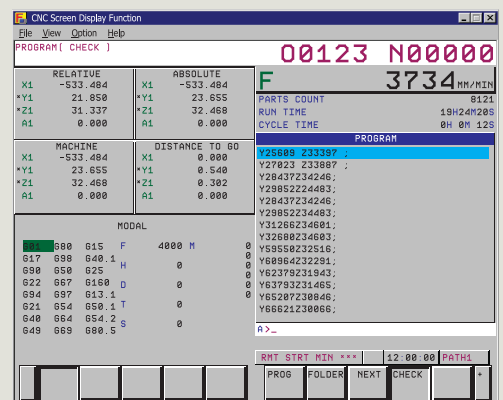
The Fast Data Server adds the benefits of 4GB of flash memory and a powerful FTP server to the Fast Ethernet option. The flash memory can be configured as storage or as a high-speed buffer for very large programs. The FTP server allows a robust and easy connection to a PC allowing simple drag-and-drop operations to the Fast Data Server part program storage memory from an office environment. Part programs in the Fast Data Server memory can be edited and executed just like the primary internal part program storage.



## Remote CNC monitoring

CNC Screen Display and Basic Operating Package 2 allow users to display CNC screen data remotely over an Ethernet network.

CNC Screen Display provides familiar FANUC CNC screens on the user’s PC screen. All CNC screens are supported including any custom screens created with FANUC PICTURE, C-Executor and Macro Executor. The dual display feature is required to allow the operator to continue using the standard CNC screen independent of remote screen selections.





## Maintenance friendly

Batteries and fans are modularized for quick and easy replacement without tools. An available rechargeable backup unit eliminates the need to maintain the batteries. A comprehensive package of maintenance tools is integrated into the CNC to help keep your machine running and making parts. A snapshot of any CNC screen can be captured to a memory card to be used in troubleshooting. Troubleshooting Guidance screens lead maintenance technicians easily through recommended procedures to identify the root cause of problems. Factory-trained field service engineers are always available to provide you with free over-the-phone technical support and local on-site service whenever you need it.

## Alarm and operation history

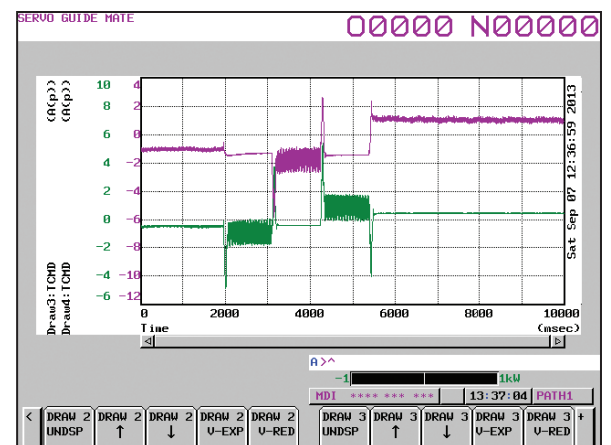
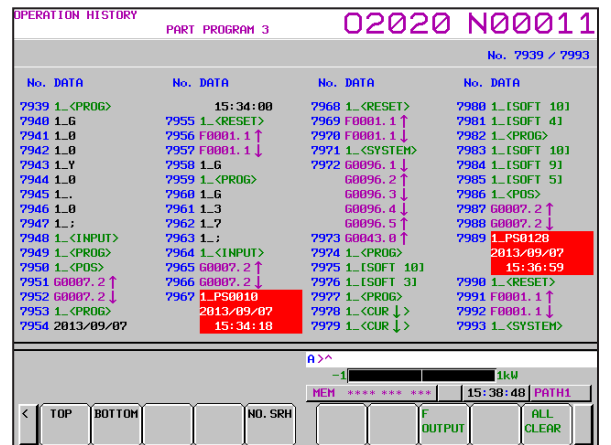
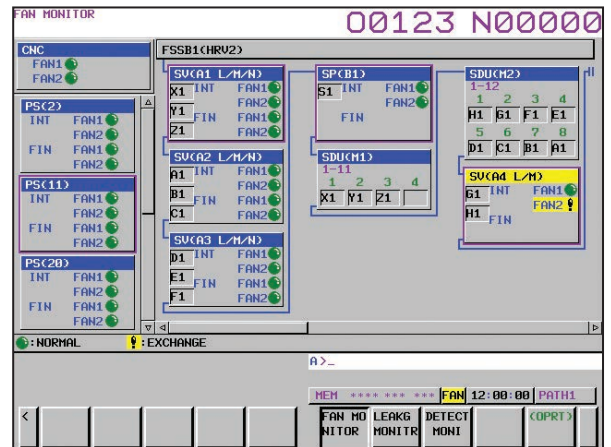
To assist in troubleshooting, a history of CNC keys pressed, PMC signals and alarms are recorded automatically and can be displayed. When an alarm occurs, additional data such as modal information and axis position data may also be recorded and displayed.

## Built-in backup (manual or automatic)

The CNC guarantees minimum downtime due to lost machine tool builder and user files because important data can be backed up regularly into flash memory. Time can be saved when experimenting with settings for process improvements or troubleshooting by saving a snapshot of all the existing user files and settings before modifications are made. In addition, up to three independent automatic backups can be scheduled by parameter setting.

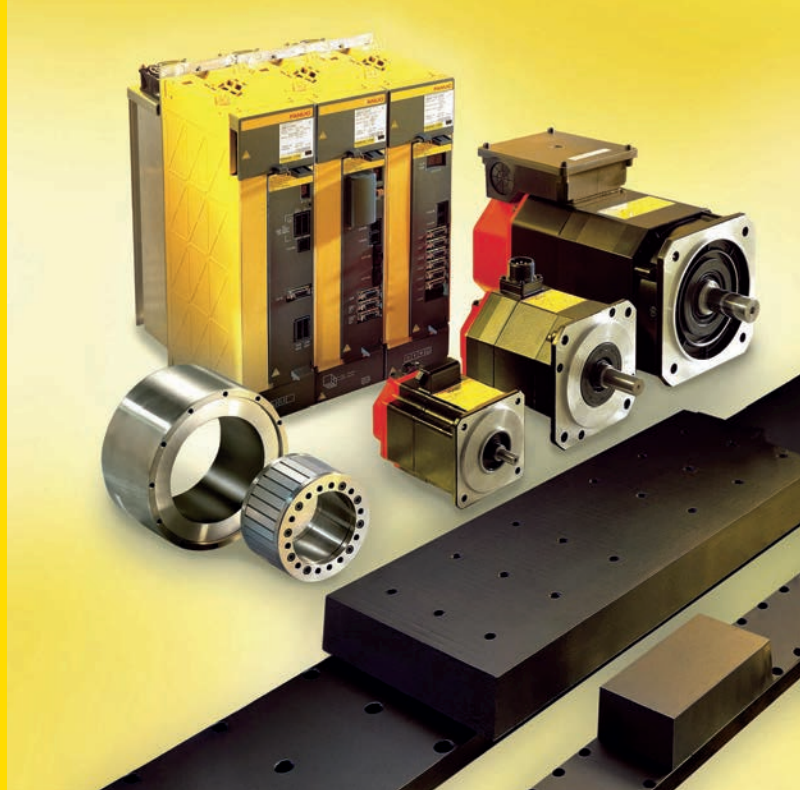
## Automatic servo and spindle tuning

Recommended servo and spindle servo tuning parameters can be determined quickly and automatically by simply pressing a softkey on a screen built into the CNC, eliminating the need for costly specialized resources. Servo Guide Mate is a built-in function that provides graphical interpretations of servo and spindle servo system performance that can be used to optimize the machine. The graphical data can be saved for later comparison during machine maintenance.





# A totally integrated CNC system



## Fully digital system

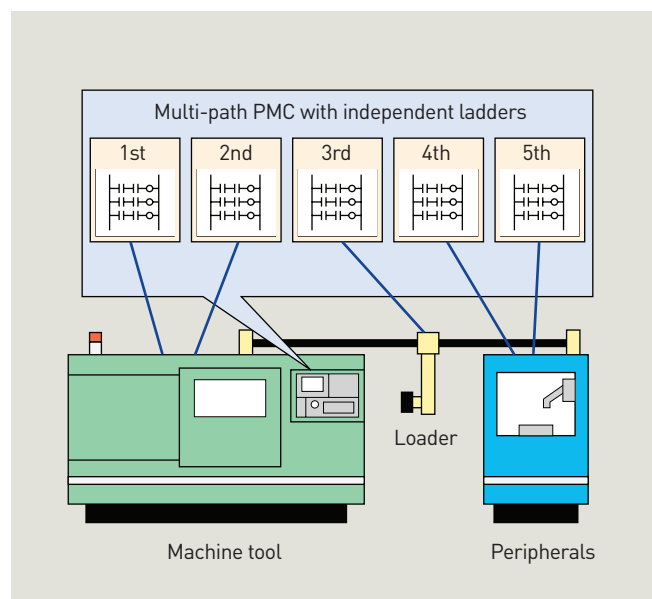
Thanks to the limited number of components and their high-speed inter-connection technologies, the design of the electrical enclosure is simplified, and allows for a reduction in wiring. An enhanced fiber optic connection between the control and the servo and spindle drives provides guaranteed noise immune data exchange at distances up to 300 feet. A similar fiber optic connection is utilized between the control and the display, if they are separated. I/O Link *i* provides a fast serial interface between the PMC and I/O, supporting up to 4,096 devices. Digital technology throughout ensures that any data transfer can be performed at high-speed and error-free.

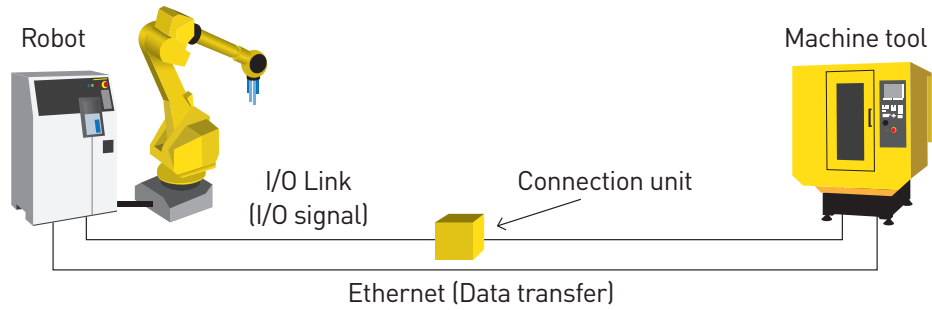
## Integrated PMC/PLC

An integrated, ultra-fast PMC processor controls and monitors the rapid and smooth operation of all machine auxiliary devices. The PMC sequence control offers execution speeds of 9.1 nanoseconds per step for ladder logic programs, and up to five ladders can be executed at the same time. For example, one PMC ladder could manage the basic machine functions, the second could be dedicated to optional equipment such as material handling and the third could be reserved for end-user or machine integrator customization of peripheral devices. External PLCs for peripheral control becomes unnecessary, reducing system costs.

## Drive systems

For optimum machine tool performance, FANUC offers a totally integrated range of drives and motors. Simple maintenance, high-quality, compact design and exceptional performance are key factors inherent in their design. High efficiency drive components, power source regeneration and cycle time reduction features combine to reduce energy usage by as much as 30% to 50%.





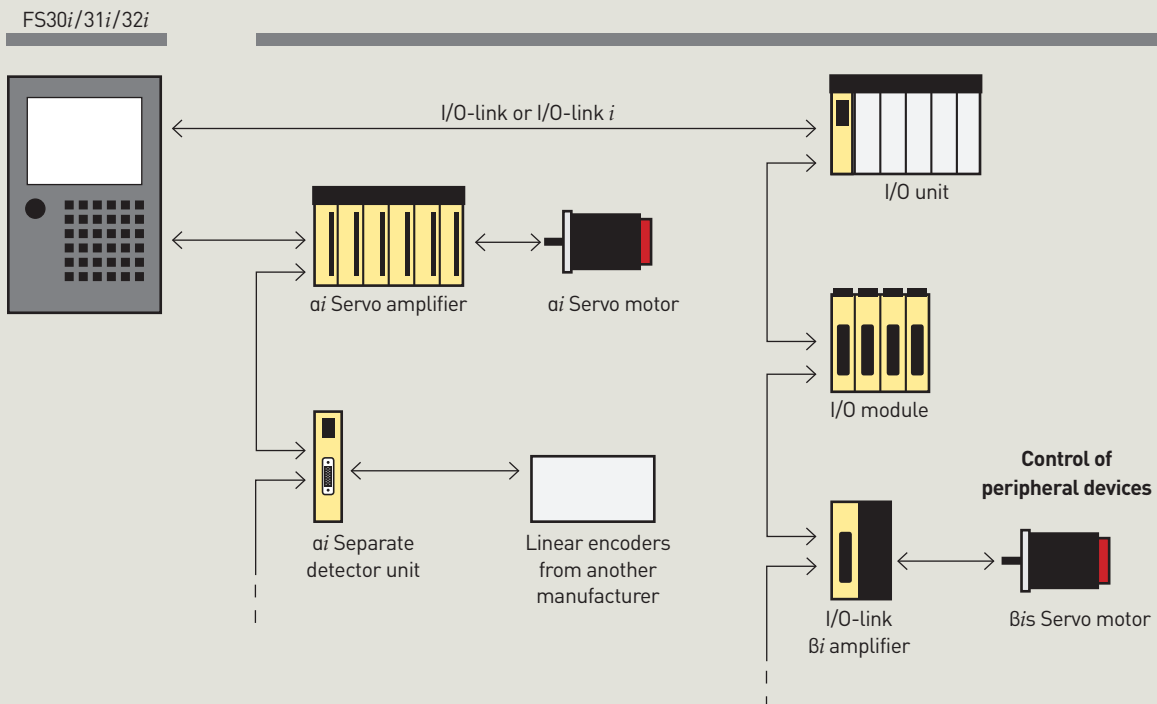
## Robot interface

A standard interface between a FANUC robot and a machine tool significantly reduces both integration time and cost. Intuitive wizards simplify the application of the I/O interface, grippers, programs and positions. FANUC robots and

FANUC CNCs can be connected with minimum wiring using Ethernet or I/O Link. Robot operation and monitoring can be performed through CNC screens without entering the safety zone of the robot.

## Open communication at the machine level

As well as FANUC's own integrated I/O structure, alternative fieldbus systems (Ethernet/IP scanner or adapter, DeviceNet, Profibus-DP, AS-i, I/O Link II, FL-net, Modbus/TCP or CC-Link) may be connected.

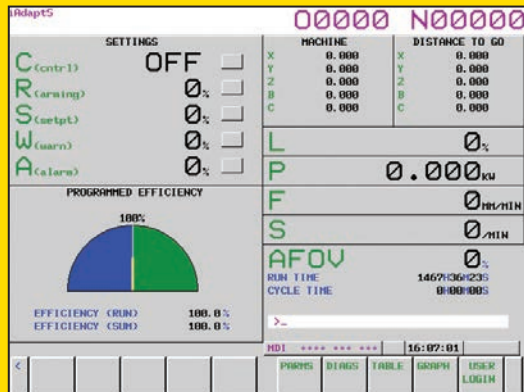


# Flexible application

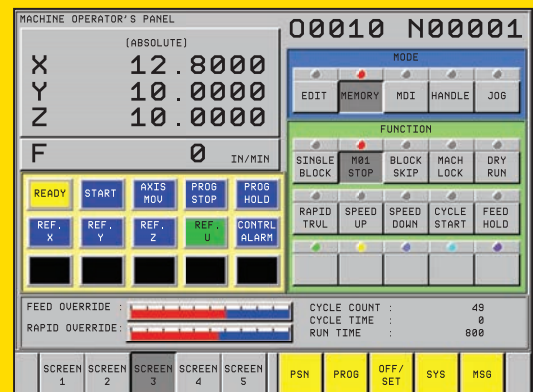
## Customer-specific adaptation

The Series 30i/31i/32i-MODEL B has powerful tools for customization, providing machine tool builders the flexibility to configure the control interface to meet their requirements and to add proprietary functionality.

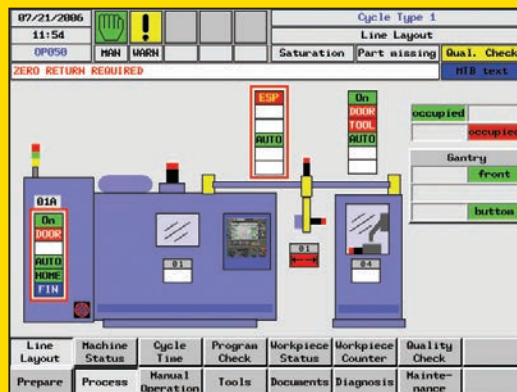
Complex features and screens and can be created using the C-Language-Executer to complement the standard factory screens. FANUC PICTURE simplifies custom screen development through the use of predefined icons for display components and operator selection buttons. Applications can be developed that can also interface with the machine ladder logic program. Macros using M and G codes can also be created, providing users cycles that can be executed at the push of a button. The Automotive HMI provides reliable, high-performance hardware, a rugged touch-screen and standardized screen templates so that a common operator interface look-and-feel can be delivered regardless of application or manufacturer. FANUC PICTURE and Windows PC-based solutions are available.



C-Executer

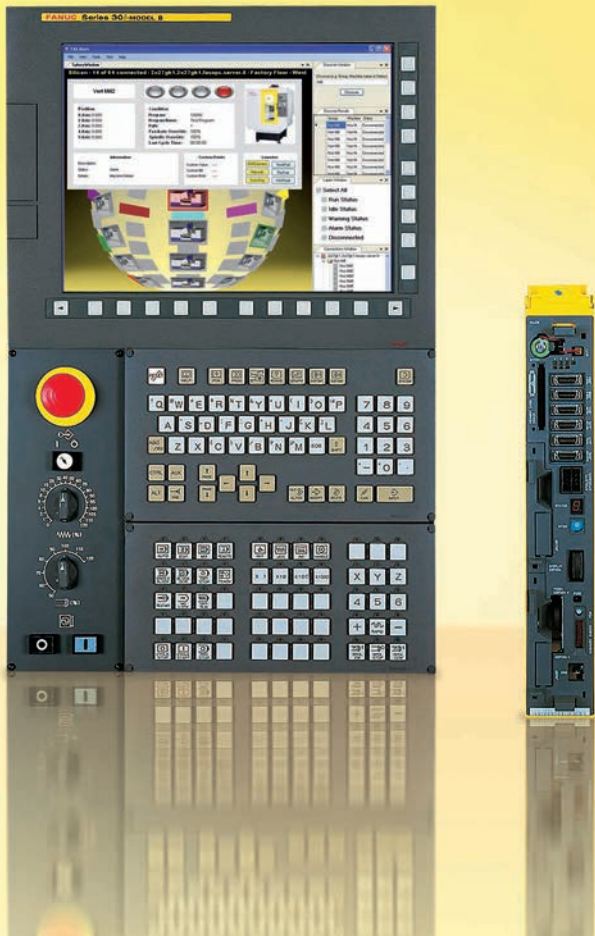


FANUC PICTURE



Automotive HMI





## Open CNC

At FANUC, the designation 'Open CNC' refers to the combination of a CNC and a PC via a high-speed fiber optic interface, which allows transfer of large amounts of data.

**The Series 30i /31i /32i-MODEL B have two 'open' versions:**

- Windows® Embedded Standard 2009 for compatibility to Windows® XP Professional 32-bit applications
- Windows® Embedded Standard 7 for compatibility to Windows® 7 Professional 64-bit applications

Both models support the FOCAS2 protocol for the high-speed exchange of data between the CNC and the PC.

FANUC's Open architecture enables the integration of 3rd party applications. Open permits the development of a wide variety of applications such as custom graphical user interfaces (GUIs) for specialized applications and the exchange of large volumes of data via networks.

## iPendant

The FANUC *iPendant* is a factory hardened, portable display and operation panel that can be highly customized.

It has multiple applications:

- Complement the primary display on large machines to allow the operator and workstation to get close to the workpiece
- Used as the primary display when the application has simple, temporary or portable display requirements

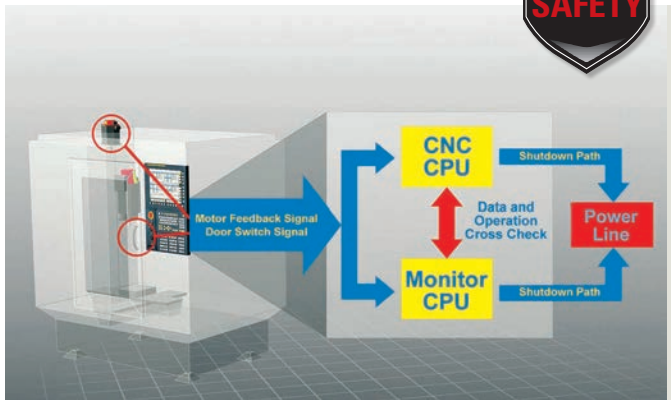
The FANUC *iPendant* supports all the standard Series 30i-B screens for operation, programming and maintenance. A touch panel interface is available. Customizing of machine operation keys is available with the use of the transparent key sheet.

Keyboard function can be switched between MDI (manual data input) mode for data entry and editing, or machine operation mode which enables the keys to be used for manual axis motion, operation of miscellaneous functions and automatic machine operation. Use of machine operation mode is executed by the machine's PMC interface for functionality and safety by the machine tool builder. *iPendant* also can be equipped with a small MPG (manual pulse generator) device for manual axis operation by Handle Mode. A USB port for file I/O is located on the rear of the unit.

The *iPendant* interfaces to the CNC through a built-in or detachable connection unit. A built-in unit is used for permanent operation, while a detachable unit allows the *iPendant* to be easily removed for portability or security.



# Integrated safety



## Safety I/O unit

The safety I/O unit is a single module interface that provides redundant inputs and output safety signals when Dual Check Safety is used, requiring only a single I/O Link *i* channel.



## Integrated safety

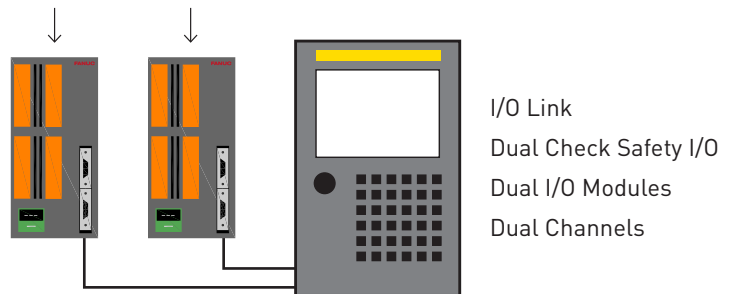
Many machine tools today must comply with safety category Performance Level D (EN/ISO 13849-1). With Dual Check Safety, the Series 30i/31i/32i-MODEL B support an integrated safety function that complies with European safety standards over a single cable.

Using built-in redundancy, a special processor for monitoring safety-related parameters guarantees the safety of the system by following the actual position and speed of the servomotors, spindle motors and the I/O interfaces. One advantage of this software solution is that less space is required in the electrical cabinet as the mechanical components required by traditional solutions are no longer needed.

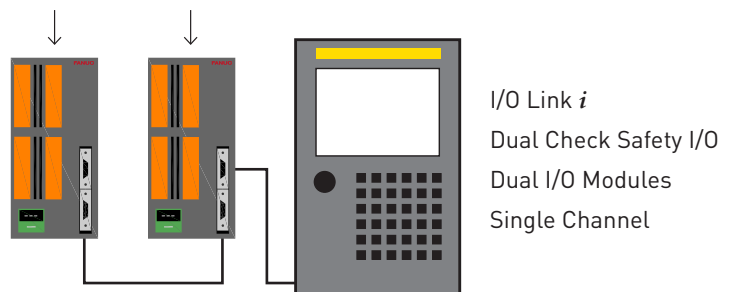
### Dual Check Safety, basic functions:

- Safety brake monitoring
- Safe spindle speed (4 ranges)
- Safe servo axis speed (4 ranges, velocity & positioning)
- Safe machine axis position (4 ranges)
- Safe stop
- Safe I/O's
- Safety I/O signal history function
- Safety spindle speed limit override function
- Test mode function for acceptance test

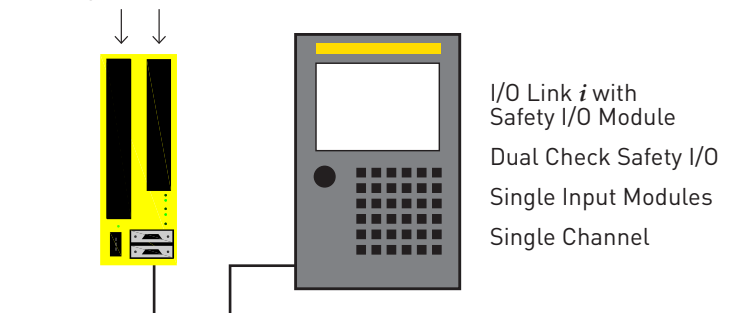
### Safety I/O



### Safety I/O

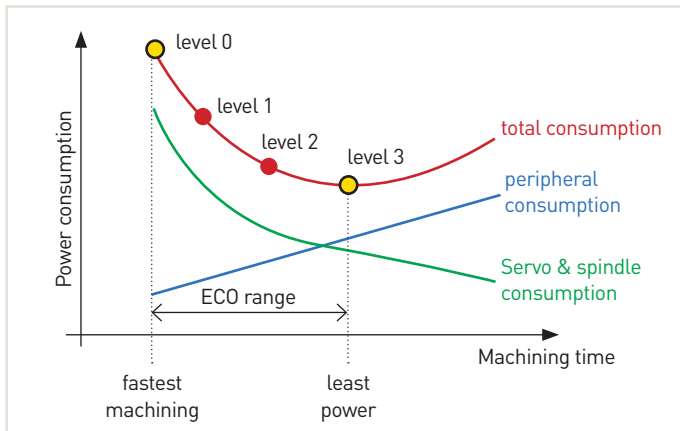


### Safety I/O unit

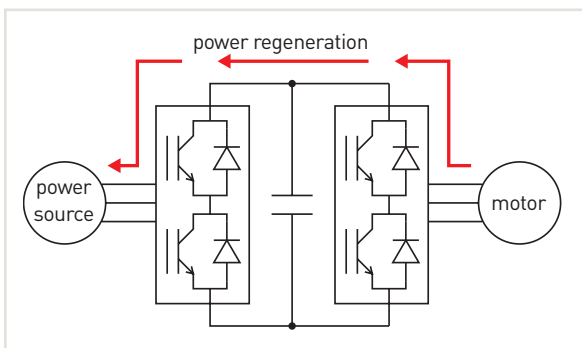


## Energy saving

Studies have shown that approximately 20% of a machine running costs can be attributed to electrical energy consumption, primarily for hydraulic and pneumatic pumps, and the servo and spindle drive systems.



The servo motors in a motion system are continuously accelerating and decelerating as they change speed and direction. FANUC's state-of-the-art AC drive systems use high-speed, high-efficiency switching circuits to direct the energy back into the main electrical supply when an axis is decelerating, reducing the net energy used.



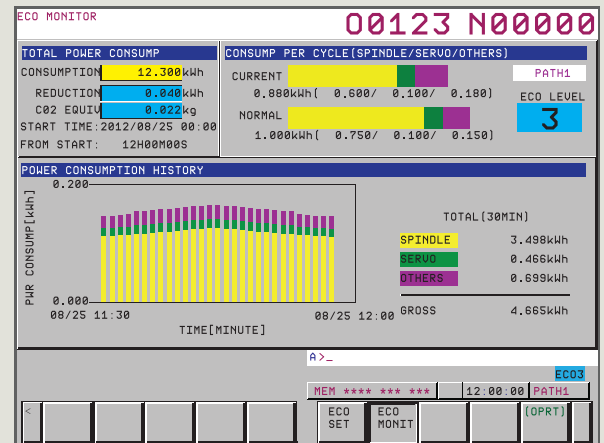
FANUC's energy saving level selecting function allows the user to optimize the balance between the fastest (normal) machining speed and the lowest energy consumption. When the ECO level is set above level 0, the torque of the spindle drive is limited during acceleration to reduce energy usage.

The CNCs PMC interface can also be used to turn off power hungry peripheral when the machine is not in cycle. The energy usage of peripheral devices can be monitored by entering their average power consumption and controlling PMC addresses.

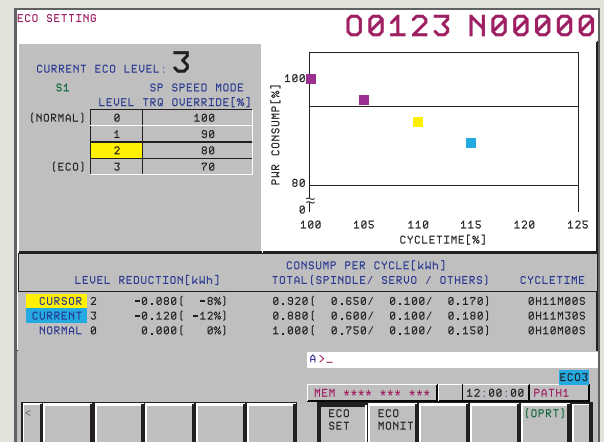
## Energy monitoring and optimization

The CNC monitors and displays the real-time energy usage and savings allowing part programs to be optimized for maximum efficiency. The data can also be collected via Ethernet and saved for analysis.

The ECO monitoring screen displays a comprehensive analysis of power consumption and the benefits achieved with eco machining.



The ECO setting screen provides visualization of energy consumption to enable the selection of the best eco-machining setting.





# NCGuide – Effective learning environment

NCGuide is an authentic simulation of a FANUC CNC that runs on a PC, providing a realistic operation and part programming environment at a fraction of the cost of using a production machine tool. This translates into lower training costs, as comprehension and retention is enhanced as students perform repetitive hands-on exercises in an ergonomically friendly environment - away from the noise of the factory floor. Operators, programmers, and maintenance engineers can all practice common procedures and develop optimized processes without risks to people, tooling or machines.

## Operational training

NCGuide is ideal for operational training. All standard CNC operational screens can be selected and all standard procedures can be practiced. Custom screens provided by the machine tool builder are supported.

You can create and edit part programs, search for words and safe start blocks, upload and download part programs, and test for syntax and tool path geometry errors. Workpiece, tool geometry and tool wear offsets can all be edited and their effects visualized to enhance understanding. Users can expand their knowledge by learning the features available with newer controls - even before they are installed.

For the most realistic and effective learning environment, each user can quickly setup configuration to emulate a particular machine's CNC.

## Part programming training

NCGuide supports both conventional G-code part programming with tool path simulation, and the easy-to-use, yet powerful MANUAL GUIDE *i* conversational part programming with 3D tool path and part geometry visualization.

You can create and edit machining center, lathe and compound machining part programs, generate cycle time estimates, and create and test Custom Macro subroutines. You can use tool path simulation to visually verify a part program, to see the effect of workpiece and tool offsets, and to observe the effects of canned cycles and advanced interpolation modes.

MANUAL GUIDE *i* conversational part programs can be developed on the simulator and then converted to conventional G-code to run on any FANUC CNC.



# 10 unbeatable arguments for controls from FANUC:

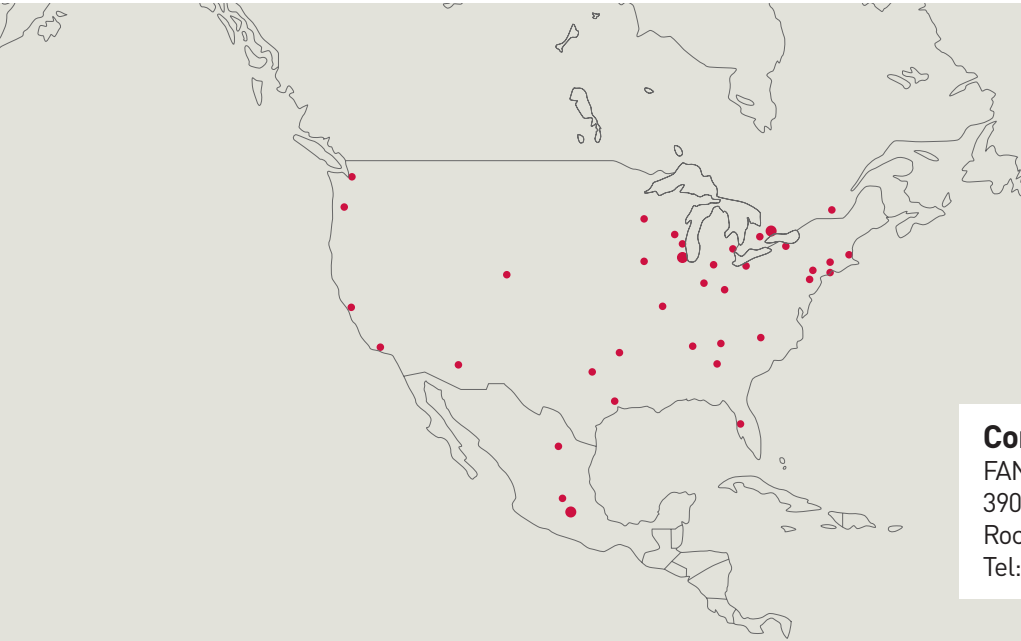
1. Maximize machine uptime and minimize TCO with FANUC's world class reliability, delivering MTBF rates in excess of 34 years.
2. Lifetime maintenance - we support your FANUC product for its entire production life.
3. Increase competitive edge with state-of-the-art technologies to increase quality, efficiency, reliability and to reduce cycle times.
4. Minimize training and support costs with continuity of operation and upward compatibility to run existing programs on new CNCs.
5. Reduce delivery times with quick and easy at-the-machine programming.
6. World-class factory-trained service, training as well as free lifetime technical support provide decades of trouble-free operation and the lowest MTTR.
7. Boost efficiency with Ethernet enabled data and remote diagnostics.
8. Minimize downtime by separating CNC and PC technologies.
9. Rely on a world class partner for simple through complex machine tools.
10. Simplify integration with FANUC robots by using the standard interface.



	30i-B	31i-B/31i-B5	32i-B
Maximum number of controlled axes	40	26	16
Maximum number of servo-axes	32	20	10
Maximum number of controlled spindle axes	8	6	6
Maximum number of simultaneously interpolated axes	24	4 [5 for 31i-B5]	4
Maximum number of controlled paths	10	4	2
Power Mate CNC Manager for additional axes on I/O LINK	•	•	•
Maximum internal part program memory length	8 MB	8 MB	2 MB
Maximum resolution 0.0001 mm, 0.0001 degrees, 0.00001 inches	•	•	•
Maximum resolution 0.00001 mm, 0.00001 degrees, 0.000001 inches	•	•	•
Maximum resolution 0.000001 mm, 0.000001 degrees, 0.0000001 inches	•	•	•
Maximum look-ahead	1000 blocks	1000 blocks	200 block
Maximum tool offsets	2000	2000	400
Maximum workpiece coordinate offsets	300	300	48
PMC system	•	•	•
Nanoseconds per step		9.1	
Maximum PMC paths (simultaneous program processing)		5	
Maximum number of steps		300,000 for 5 paths	
Maximum number of I/O points	4096/4096	3072/3072	3072/3072
I/O modules for operating field installation	•	•	•
Autonomous field bus I/O modules	•	•	•
PMC axis control	•	•	•
Number of available extension plug-in card slots (version with LCD)		0, 1 or 2	
Number of available extension plug-in card slots (stand-alone version)		2 or 4	
Open CNC-System	•	•	•
Integrated safety 'Dual Check Safety'	•	•	•
Data communication		RS232, DNC1, DNC2, Ethernet, PROFIBUS-DP, DeviceNet, I/O Link II, FL-net, AS-i	
PCMCIA slot accessible from front side		ATA Flash storage card, CompactFlash™ storage card, Ethernet card, modem card	
USB memory slot for Flash drive	•	•	•
<b>Standard display</b>			
TFT-LCD colour display for ONG-type keyboard		8.4 inch or 10.4 inch	
TFT-LCD colour display for QWERTY-type keyboard		10.4 inch or 15 inch	
PCMCIA accessible from front side		1	
<b>CNC display with Windows®</b>			
Processor		Intel® Celeron™/Core™ 2 Duo	
Memory		up to 4GB	
Storage capacity		Minimum 500GB HDD or up to a 64GB SSD	
Operating system		Windows Embedded OS supplied by FANUC (Windows 7 Professional supported)	
SATA ports		3 Total (1 for SSD card and 2 for general device)	
TFT-LCD Color Display		10.4 inch (800x600) or 15 inch (1024 x 768) or 19 inch (1280 x 1024)	
Keyboard		PC QWERTY or Standard MDI	
PCMCIA port accessible from front side		1	
USB ports		5 total - 1 front, 4 rear	
Serial ports		2	
PCI slots		2 (PCI v2.3, 32Bit)	
Ethernet port (10BASE-T/100BASE-T/1000BASE-T)		1	
<b>CNC display with Windows® CE.Net or Windows® Embedded CE</b>			
Processor		HITACHI	
Memory		128MB or 256MB	
File storage		CompactFlash™ card	
TFT-LC colour display for QWERTY-type keyboard		10.4 inch (640 x 480) or 12 inch (800 x 600) or 15 inch (1024 x 768)	
Ports		PCMCIA (1), USB (2), Ethernet (1-100BASE-TX)	
<b>CNC Macro Executor</b>	•	•	•
<b>CNC customer macro</b>	•	•	•
<b>CNC C-language Executor</b>	•	•	•



	30i-B	31i-B/31i-B5	32i-B
Touchscreen	•	•	•
Handy machine operator panel	•	•	•
iPendant	•	•	•
Dialogue programming MANUAL GUIDE <i>i</i>	•	•	•
<b>Display</b>			
Graphic display	•	•	•
Multi-path display	•	•	•
Status/program/parameter	•	•	•
PMC monitoring and editing	•	•	•
Servo and spindle device	•	•	•
Alarm/operating archive	•	•	•
Remote diagnosis	•	•	•
Dynamic multi-language display	•	•	•
Customer-specific configuration	•	•	•
<b>Milling functions</b>	•	•	•
<b>Turning functions</b>	•	•	•
<b>Combination machining function</b>	•	•	•
<b>Electronic gear unit/generating milling cutter functions</b>	•	•	•
<b>Grinding functions</b>	•	•	•
<b>Tool functions</b>	•	•	•
<b>Measuring functions</b>	•	•	•
<b>Operating prompting for machine set-up functions</b>	•	•	•
<b>Accuracy compensation functions</b>	•	•	•
<b>Linear interpolation/circular interpolation</b>	•	•	•
<b>Exponential interpolation</b>	•	•	•
<b>Helix interpolation</b>	•	•	•
<b>Involute interpolation</b>	•	•	•
<b>Cylindrical interpolation</b>	•	•	•
<b>Polar coordinate interpolation</b>	•	•	•
<b>Interpolation with imaginary axis</b>	•	•	•
<b>Taper/helical interpolation</b>	•	•	•
<b>Nano interpolation</b>	•	•	•
<b>NURBS interpolation</b>	•	•	•
<b>5-axes machining functions</b>	•	•	•
<b>3D circular interpolation</b>	•	•	•
<b>Nano smoothing</b>	•	•	•
<b>Extended Look-Ahead control system</b>	•	•	•
AI continuous-path control, type I (look-ahead)	40 blocks	40 blocks	40 blocks
AI continuous-path control, type II (look-ahead)	200 blocks	200 blocks	200 blocks
Look-ahead extension for AI continuous-path control, type II	600 or 1000 blocks	600 or 1000 blocks	
Anti-jerk control	•	•	•
Rigid Tapping	•	•	•
Axis Synchronisation	•	•	•
Tandem control	•	•	•
Extended tandem control functions	•	•	•
Torque control	•	•	•
High Precision Oscillation Function	•	•	•
Learning Control Functions	•	•	•
Built-In 3D Interference Check	•	•	•
Groove Cutting by Circle Movement	•	•	•
Wrong Operation Prevention	•	•	•
Reverse Motion for Restart	•	•	•
Extended acceleration/delay control functions	•	•	•



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