

High-end CNC pursuing high machining performance

FANUC

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



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FANUC Series 30i/31i/32i-MODEL B Plus

More powerful and easier to use

- Further improved productivity and high-quality machining with High-speed CPU
- Improved basic performance (required functions are included as standard)
 - Customizable functions for characteristic screens and operation
 - Advancing the IoT adaptability with Multi-function Ethernet
 - Extended memory capacity for storing large sized program
- Improved visibility and operability with renewal design of screen
- Equipped with FANUC's latest CNC and servo technologies
- Easy robots connection and control

Machining Performance

- Significantly improved CNC basic performance
 - ▶ Adopt high-speed CPU
- Improved productivity through reduced cycle times
 - ▶ Fast Cycle-time Technology
- Achieves high-quality machining
 - ▶ Fine Surface Technology
- 5-axis machine tool with improved usability
 - ▶ 5-axis Integrated Technology

Optimal CNC based on the application

Multi-axis and multi-path CNC

- FANUC Series 30i-MODEL B Plus**
 - Max. number of paths : 15 paths
 - Max. total number of controlled axes : 96 axes (72 feed axes, 24 spindles)
 - Max. number of simultaneous controlled axes : 24 axes

CNC with support for simultaneous 5-axis control

- FANUC Series 31i-MODEL B5 Plus**
 - Max. number of paths : 6 paths
 - Max. total number of controlled axes : 34 axes (26 feed axes, 8 spindles)
 - Max. number of simultaneous controlled axes : 5 axes

Core CNC

- FANUC Series 31i-MODEL B Plus**
 - Max. number of paths : 6 paths
 - Max. total number of controlled axes : 34 axes (26 feed axes, 8 spindles)
 - Max. number of simultaneous controlled axes : 4 axes

Standard CNC

- FANUC Series 32i-MODEL B Plus**
 - Max. number of paths : 2 paths
 - Max. total number of controlled axes : 26 axes (18 feed axes(including Loader control system), 8 spindles)
 - Max. number of simultaneous controlled axes : 4 axes

Maximizing Uptime

- Prevent sudden machine downtime with preventive maintenance
 - ▶ Extensive failure prediction functions
- Reduce recovery time by easily pinpointing faulty parts
 - ▶ Diagnosis/maintenance functions

Ease of Use

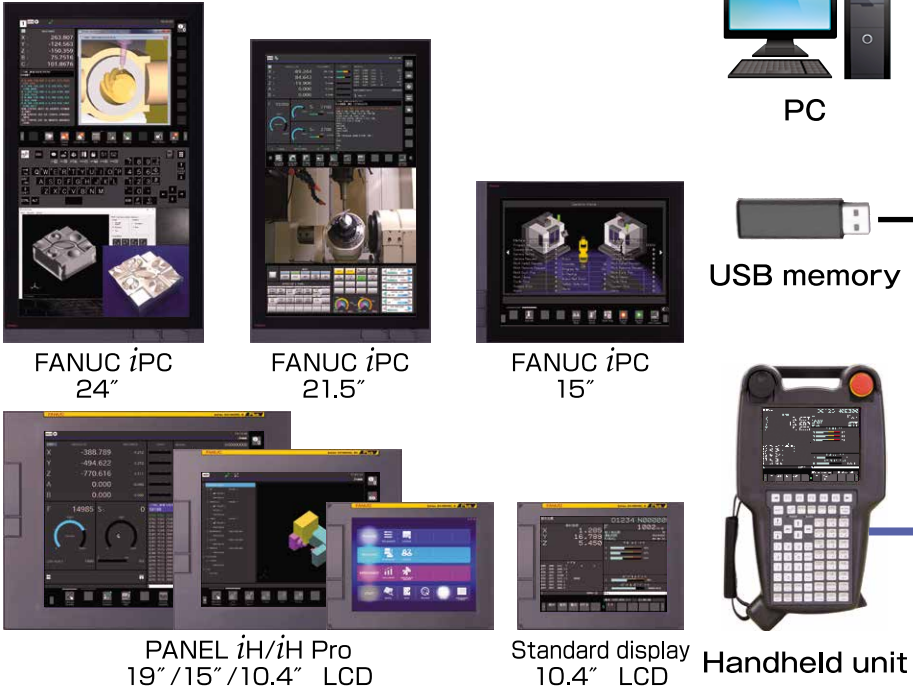
- Consistent support at shop floor
 - ▶ **FANUC iHMI**
- Original screen for ease of use
 - ▶ Comes standard with customizable functions
- IoT integration
 - ▶ Extensive compatibility with field networks



System Configuration

CNC Control Unit (LCD mounted type/stand-alone type)

The display lineup supports a wide range of machines, from compact to large, including the FANUC *i*PC and PANEL *i*H with *i*HMI support, a 10.4" LCD unit, and more.



Handheld Unit

Equipped with an emergency stop button and a manual pulse generator, this handy unit line-up achieves safe manual operation of machine tools.



I/O Unit

Wide range of I/O units compatible with various installation locations and I/O devices.

Optimized for operator's panels with its thin and space-saving design

Standard operator's panel with key input duplication

Handles the output/input of safety signals

Compatible with original operator's panels

Safety Machine operator's panel

I/O module for operator's panel supporting safety function

I/O module for operator's panel

Optimized for control cabinets with high scalability and extensive modules such as the multi-point output/input type and the analog/digital output/input module

Small size I/O unit with improved expandability, workability and maintainability

Excellent cost performance with multi-point output/input

Compact and with reduced wiring

Effective for thermal displacement compensation with multi-point temperature sensor input

FANUC Slice I/O

I/O unit for power cabinet

I/O unit for connector panel

Temperature sensor input unit

Optimized for reduced wiring by enabling distributed setup

Can be positioned near sensors scattered inside and outside the machine cabinet

IP67 type

I/O Unit-MODEL B

Ethernet

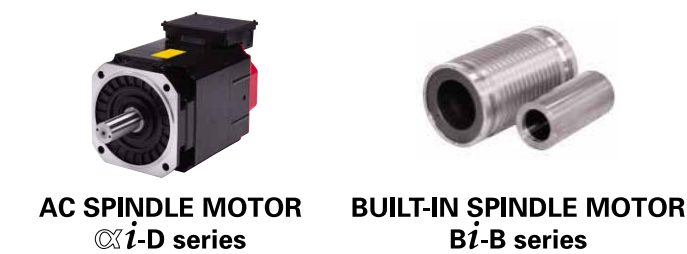
Servo Motor

Line-up to meet the various needs of machine tools and contribute to the performance improvement of feed axes



Spindle Motor

Line-up to meet the various needs of machine tools and contribute to the performance improvement of spindles



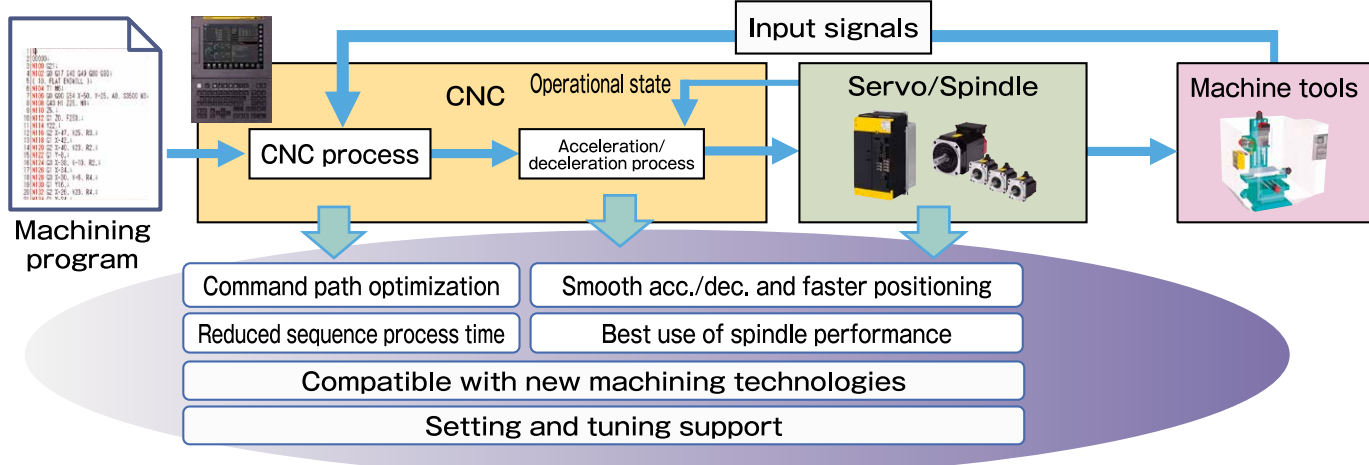
Servo Amplifier

Line-up to be flexibly available for a variety of machine tools and contribute to the downsizing of cabinets



Fast Cycle-time Technology

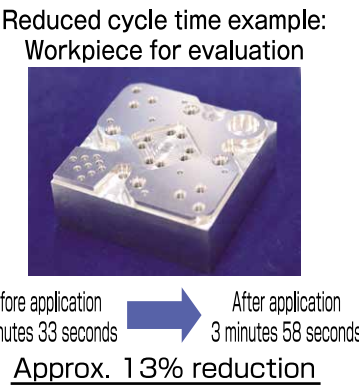
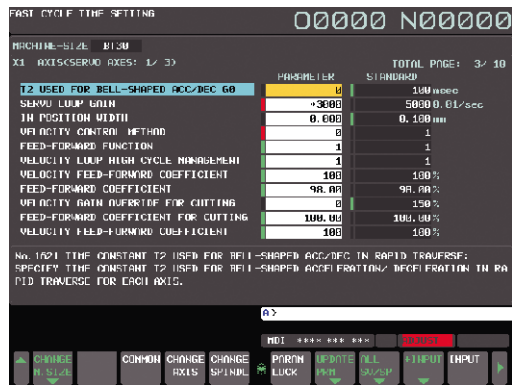
Fast Cycle Time Technology refers to CNC and servo technologies that achieve reduced cycle times. It reduces cycle times of machining programs through methods such as accelerating and decelerating depending on the operational state, making the best use of spindle performance, and reducing the sequence processing time for external signals.



Fast Cycle-time setting

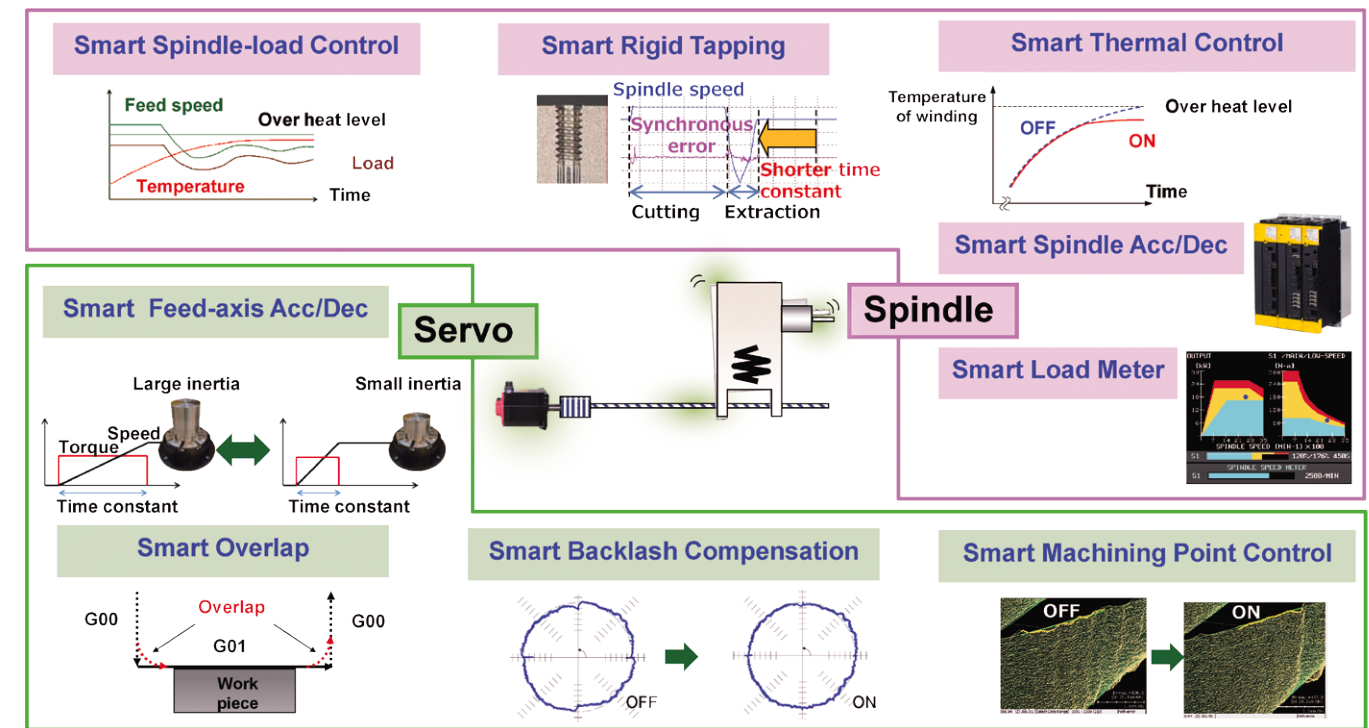
Easily reduce cycle times

The Fast Cycle-time setting compares the currently set parameter setting to the FANUC default setting, allowing you to easily use the setting that most effectively reduces cycle time.



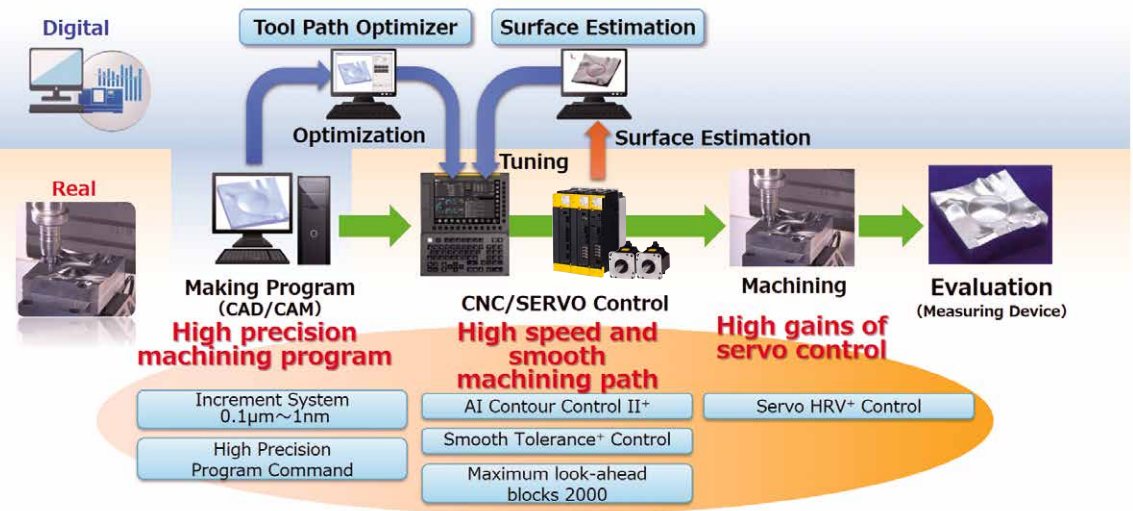
Smart Servo Control

Smart Servo Control is a group of functions to optimize control in real time according to the change of machine conditions such as load and temperature. These functions contribute to high-speed, high-precision and high-quality machining as the control technology supporting Fast Cycle-time Technology and Fine Surface Technology.



Fine Surface Technology

Fine Surface Technology is a collective term for CNC and servo technologies that achieve fine surface machining. This technology allows for the interpolation of high precision machining program output from CAD/CAM, high-speed execution of small segment programs, the generation of a smooth tool path and accurate command follow-up. These tasks more efficiently by taking digital technology.



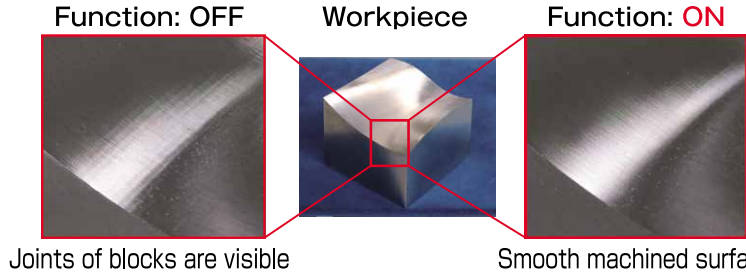
Fine Surface settings

Standard setting values are provided based on machining conditions (roughing, semi-finishing, or finishing), and slide bars can be intuitively used to set and adjust high-speed, high-precision machining parameters based on the machine. Machining under optimal conditions can be achieved by selecting machining processes during the machining itself using a machining program or screen operations. Settings for each machining condition can be saved for up to 10 patterns.



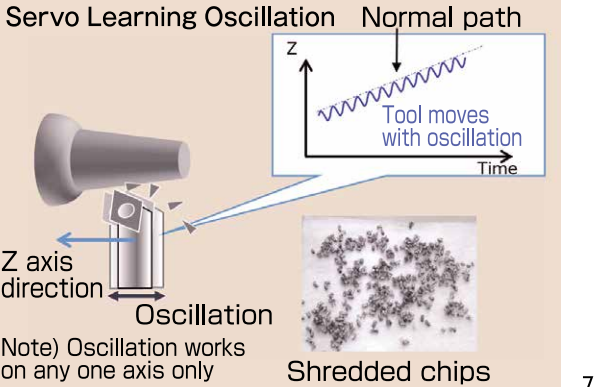
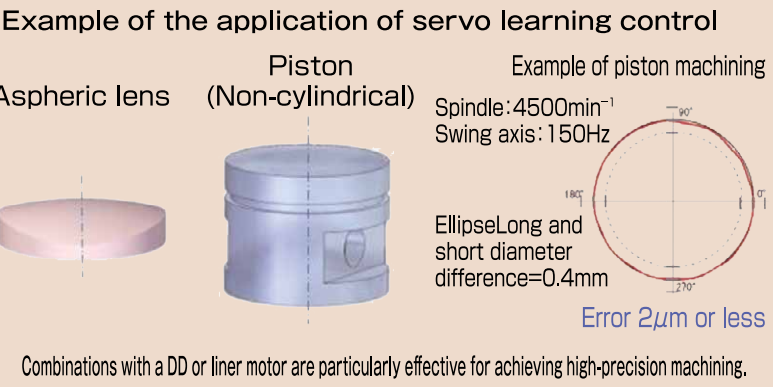
Smooth Tolerance+ Control

Smoothing continuous small blocks to realize fine surface machining. The machining path specified in continuous small blocks, like the one for mold machining, is smoothed out within the specified allowance error tolerance. The smooth machining path reduces mechanical shock and improves the quality of the machined surface.



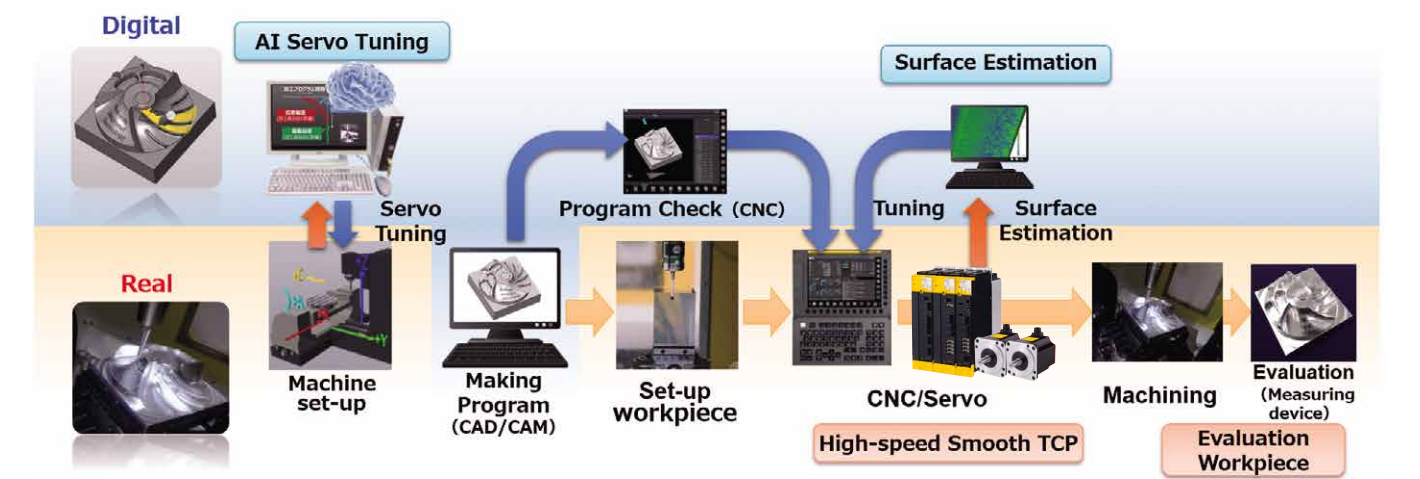
Servo Learning Control/ Servo Learning Oscillation

Servo learning control enables high-speed, high-precision machining of workpieces that require repeatable cutting commands, such as aspherical workpieces, gears, and so on. Servo learning oscillation that applies servo learning control also accurately tracks oscillation commands with a high frequency, thereby achieving dependable chip shredding.



5-axis Integrated Technology

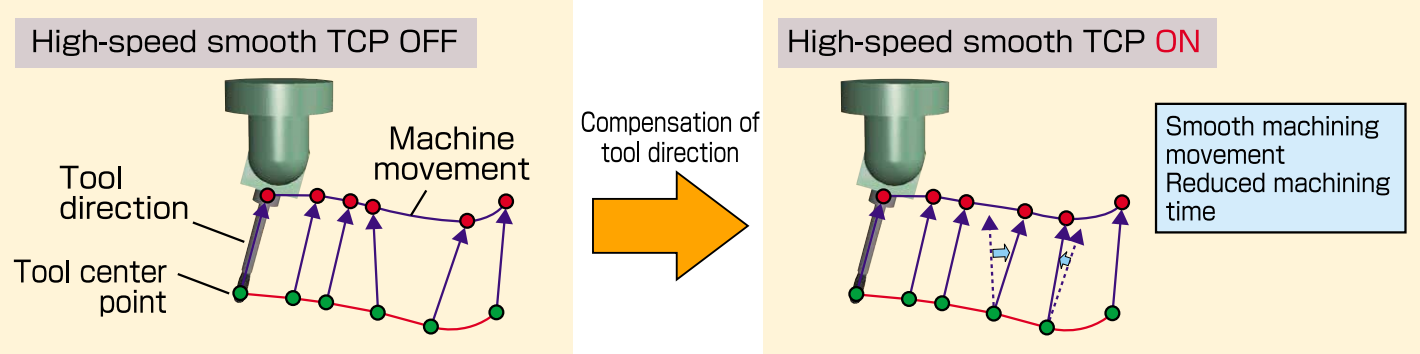
5-axis Integrated technology is used to achieve 5-axis machining that is even easier to use and higher in quality. High-quality 5-axis machining is achieved through strong support for all 5-axis machining processes, from machine setup to program creation and machining evaluation. In addition to die cutting, machining that is high-speed, high-precision, and smooth is also achieved when it comes to part machining, which demands speed.



High-speed Smooth TCP that Achieves Smooth High-speed and High-quality 5-axis Machining 30i-B/31i-B5 Plus Only

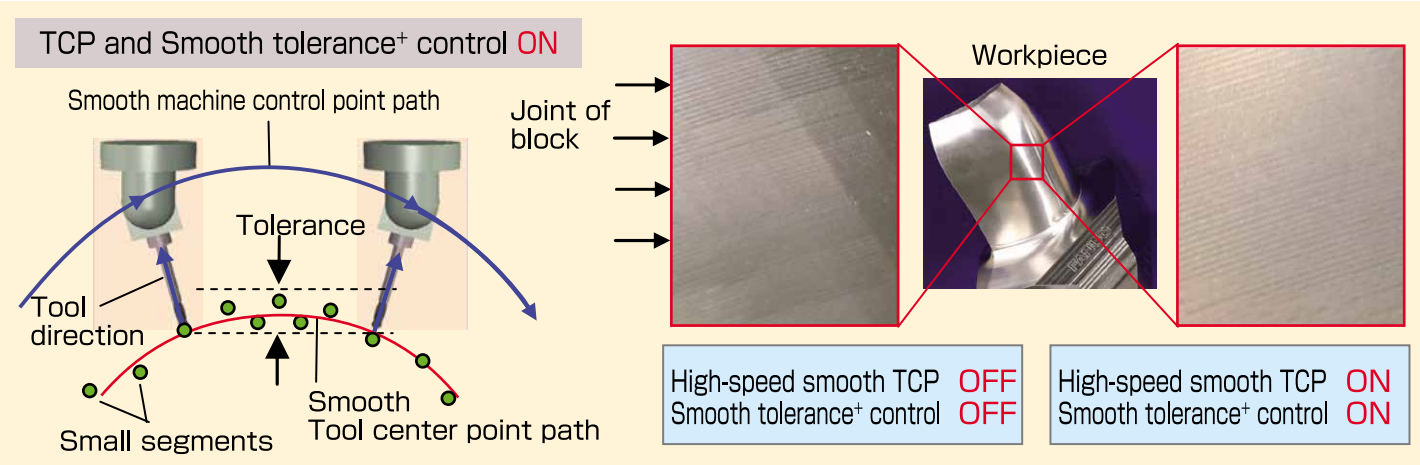
High-speed and smooth simultaneous 5-axis machining

High-speed smooth TCP makes the machining movement smooth by compensating tool direction to decrease the unevenness, and improves the quality of the machined surface and reduce machining time.



High-precision simultaneous 5-axis machining using Smooth tolerance+ control

By combining high-speed smooth TCP and smooth tolerance+ control, the quality of the cutting surface is improved greatly by smoothing the tool center point path even if machining programs consists of unnecessarily small segments.



FANUC iHMI

FANUC iHMI supports all jobs at shop floor consistently, exceeding a limit of conventional CNC operation. For the flow of "planning," "machining," and "improvement." process, various functions such as tool data registration, machining time prediction, programming, and post-machining inspection has been provided. Any of them can be easily operated by intuitive operability. In addition, at the center of each function is the home screen, which can be displayed from any screen with a dedicated key, so there is a sense of security that you can return at any time.

CNC operation

The CNC operation screen has been consolidated into three screens, "programming", "setup", and "machining", which reduces screen switching operations and greatly improves operability. In CNC operation screen, machining programs can be easily recognized and easily created, such as color-coded display for each command and comment input function for tool information.

- G-code Guidance enables easy programming with machining selection and input screen even if complex command. It reduces program creation time and errors.
- Machining program preview detect a programming errors before machining. It Reduces working time and costs.
- The help, troubleshooting, and other functions are available to solve problems at a time if you have difficulty.

Tool manager

- Tool data of each application of FANUC iHMI can be centrally managed and all the tool data can be referred here.
- By reading the catalog data provided by tool makers, such as mold model number, dimensions, and machining conditions of the tool, the time to enter the tool data can be reduced.

Maintenance manager

- Prevent check leak of maintenance parts by collective management of maintenance parts for machines and for CNC, amp, and motor.
- Prevent errors by working maintenance with checking the maintenance manual.

SERVO VIEWER

- SERVO VIEWER offers the waveform display of the machine operation such as position of feed axes and torque of spindle.
- PMC signals and sequence numbers can be observed simultaneously.
- Useful for reducing cycle time and improving cutting condition, without any additional equipment.

Manual viewer

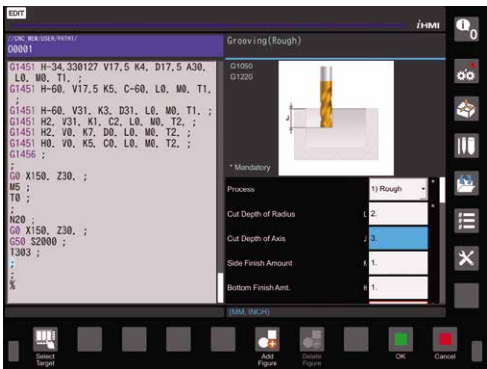
- Not only CNC manuals, but also machine manuals and work procedure manuals can be registered.
- You can check it in front of the machine without having to look for a paper manual or return to your office computer.



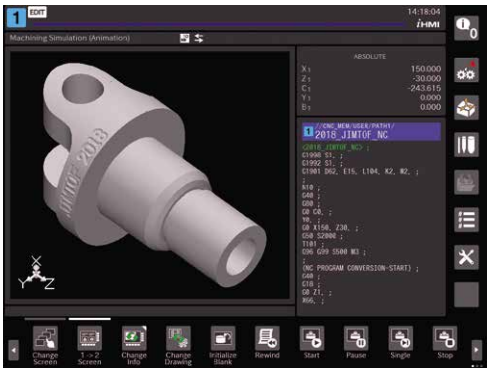
HOME screen



CNC operation screen



G-code Guidance



Machining program preview

Many Customizable Functions Ease of Use

Customizable functions are available, which allow machine tool builders to customize their own machine tools

Customizing Operation Screens

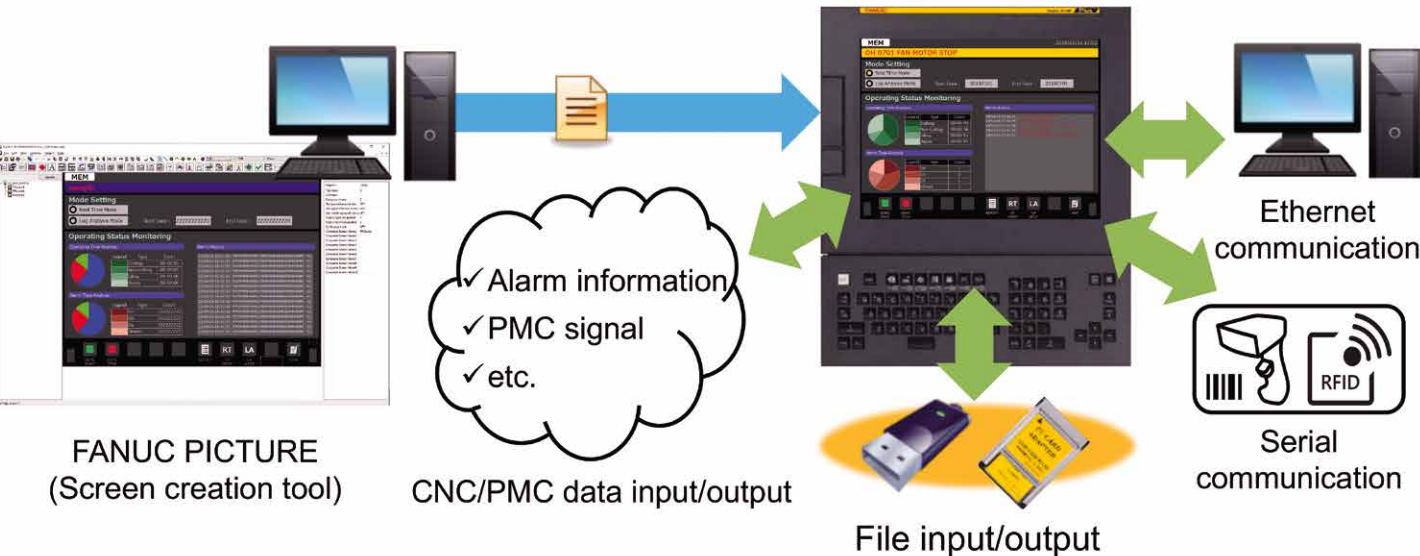
FANUC PICTURE

This tool enables you to create a machine operation screen simply by pasting screen components such as buttons and lamps on the PC.

- The screen creation tool is FANUC's proprietary easy-to-use user interface that is optimized for creating screens for CNCs.
- Screens that are created can be displayed and operated on various CNC models.
- Complicated controls such as network communication and file control can be easily implemented by using general-purpose scripts.

In addition, in PANEL *iH/iH Pro*, it is possible to create screens that leverage the performance of display devices.

- You can display the font for each language of any desired size.
- You can display buttons, lamps, and high precision images in full color.



C Language Executor

Machine tool builders can create their own operation screens, which enables unique CNC display and operation.

- C language is used for programming.
- Multi window display enables creation of pop-up menus.
- Operation screens using the touch panel can be created.
- In addition to standard ANSI functions, many functions are available for CNCs and PMCs.
- High-level tasks to which high execution priority is assigned can monitor signal and position information.

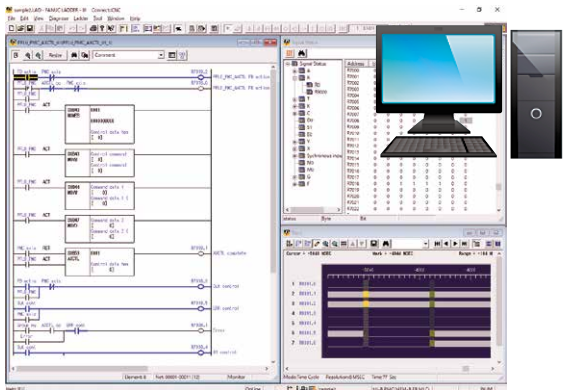


Implementing Original Sequence Control Based on PMC

FANUC LADDER-III

For machine customization, a machine tool builder's own sequence control can be incorporated into the built-in PMC. A PMC sequence program can be created on a personal computer by using FANUC LADDER-III, a very easy-to-use programming tool with many useful functions.

- A program can be created with ladder and function block.
- A program can be coded using signal names instead of signal addresses.
- Online monitoring and editing can be performed by connecting a personal computer with the CNC via Ethernet.
- Including PMC Function Library which enables you to integrate functions such as PMC axis control easily.

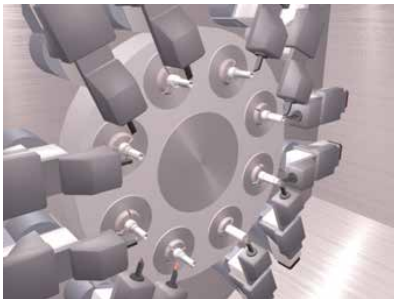


Flexible Support of Various Mechanical Configurations Ease of Use

Expanded Multi-axis and Multi-path Functions

Multiple functions for multi-axis and multi-path control

- A single CNC can achieve complex control of a multi-path lathe with many turrets, compound machine tool with a milling head, or automatic lathe requiring many axes and command systems.
- This CNC provide many functions required for multi-path control, such as synchronous/composite control, superimposed control, flexible axis assignment, waiting function, and interference check.
- A combination of high-speed, high precision control technology that FANUC has cultivated for years and multi-axis multi-path control technology further promotes improvements in precision and efficiency of lathes and automatic lathes.



Rotary index machine

Excellent Operability Ease of Use

Large Capacity Program Memory

You can use large capacity program memory that can store large sized program. Programs stored in program memory can be operated by memory operation. Also, edit can be done.

Extended Program Memory (CF card)

Using CF card installed in memory card slot of display unit as program memory.

- Maximum capacity is about 4GB.
- Recommended if you use standard display unit.
- Having excellent cost performance.
- Total number of programs and folders that you can register has expanded to 1000.

Extended Program Memory (PC)

Using HDD/SSD of PC like PANEL *iH/iH Pro* as program memory.

- Maximum capacity is 40GB.
- Recommended if you use display unit with PC function like PANEL *iH/iH Pro*.
- Having excellent cost performance.
- High speed GOTO jump and high speed search can be done.

Easy Robots Connection and Control Ease of Use

Integration of Robots to Machine Tools

This function allows you to easily connect a FANUC robot to a machine tool. Machine users with no experience using robots will be able to use robots easily.

Robot G-CODE

Robots can be operated with the feel of a machine tool.

- Utilize robots as part of machine tools with CNC programs (G code commands)
- By using familiar machine tool handles, robots can be positioned and taught easily from CNC screen

Robot ON-SITE

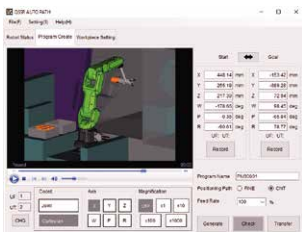
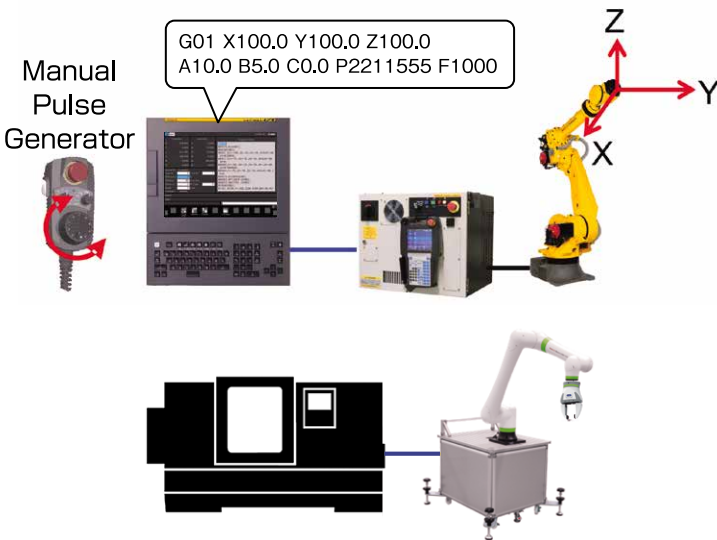
Robots can be installed on existing machines without changing machine tool system modification.

- Easy connection of CNC and robot via Ethernet cable without additional hardware
- Robot operation by using macro variables without ladder change

Robot Auto Path Generation

This function makes it possible to automatically generate a robot path that does not interfere with PC tools.

- Automatically generate path that does not interfere with the machine tool just by specifying the start point and end point
- The generated path can be confirmed by simulation, reducing man-hours for teaching robot.

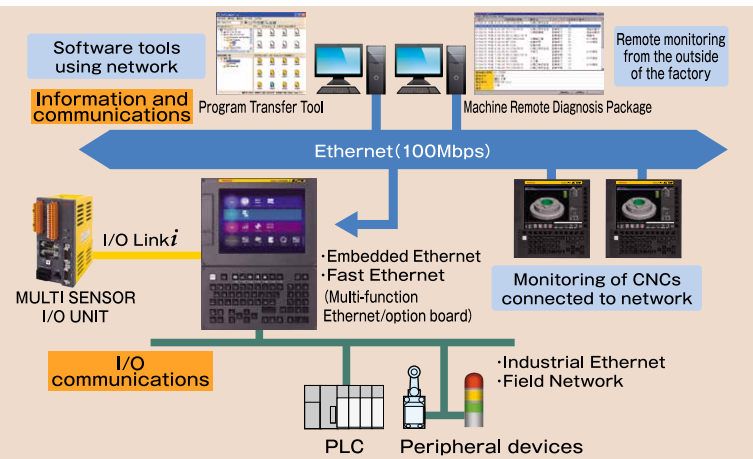


Network Support Functions Ease of Use

Advancing the IoT adaptability of CNC machine tools with extensive network functions

Ethernet / Industrial Ethernet / Field Network

Multi-function Ethernet is included as standard in addition to embedded Ethernet. Moreover, information communication functions such as NC program transfer and remote diagnosis are supported as standard, as is control I/O communication. Multi-function Ethernet enables high-speed communication using a dedicated processor, and can be used for various types of industrial Ethernet communication. Various types of field networks are also supported as options. Industrial Ethernet and field networks enable connection with various peripheral devices, that includes the control of peripheral devices such as waterproof I/O devices and the collection of sensor information. It is also possible to read information from collision sensors, temperature sensors, etc., through an I/O Linkⁱ-connected multi-sensor I/O unit.



Supported Industrial Ethernet/Field Networks

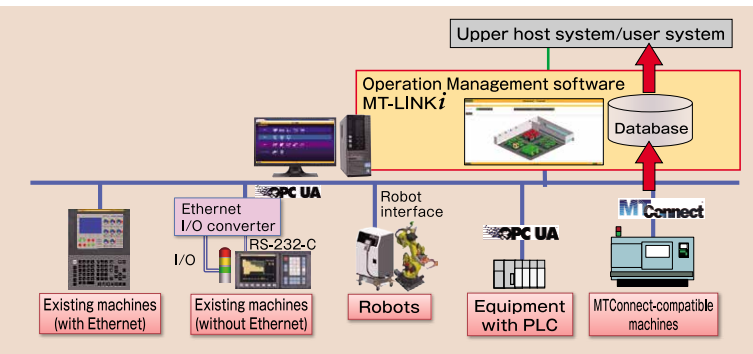
- FL-net
- EtherNet/IP (master/slave)
- PROFINET (master/slave)
- Modbus/TCP (slave)
- EtherCAT (master)
- CC-Link IE Field (slave)
- DeviceNet (master/slave)
- PROFIBUS-DP (master/slave)
- CC-Link (slave)

FANUC MT-LINKⁱ (Operation Management software)

MT-LINKⁱ

MT-LINKⁱ is a software product that can collect, manage, and help visualize various information of machines connected via Ethernet. It helps visualize the machines in factories, and contributes to minimizing downtime.

- It can collect device information not only from machine tools equipped with FANUC CNCs, but also from FANUC robot controllers, OPC-compatible PLCs, and MTConnect-compatible machine tools.
- Information of existing devices that do not have Ethernet I/F can also be collected by using an Ethernet I/O converter.
- Many standard screens that display various pieces of information such as the operational states and operational results of machines are available.



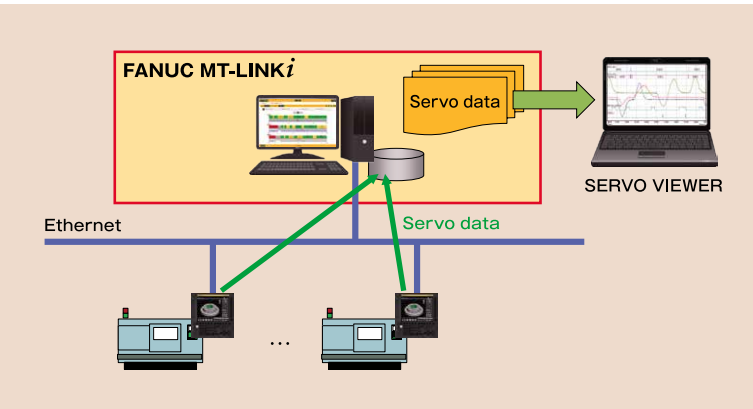
Standard screen example)



Visualization of machine operation

A combination of MT-LINKⁱ and SERVO VIEWER makes servo data and various status signals to be collected, achieving the visualization of detailed machine operations.

- High-speed sampling (1ms) servo data is efficiently collected from multiple machine tools.
- Various schedule and trigger functions enable efficient analysis by collecting only required data at the right timing.



Powerful PMC Ease of Use

High-Speed, Large Capacity, and Multi-path PMC

High-Speed and Large Capacity

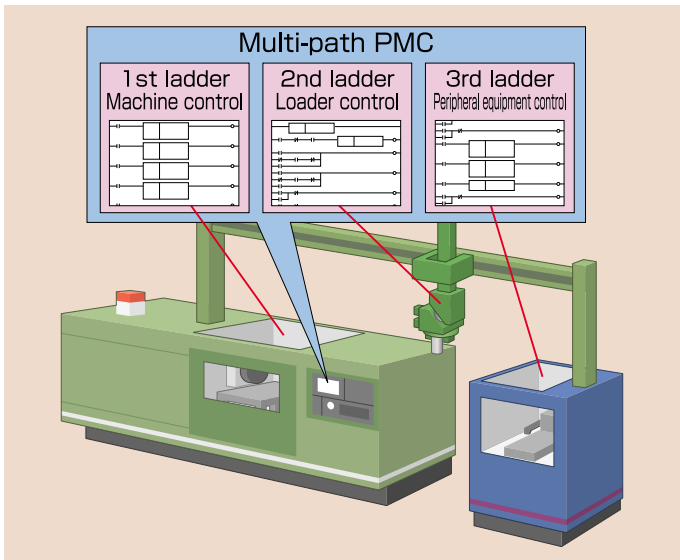
The internal PMC functions can also process large-scale sequence control at a high speed through the use of a powerful dedicated processor and the latest custom LSI.

- Program capacity Max. 300,000 steps (Total of all PMC paths)
- Internal relay (R) Max. 60,000 bytes
- Data table (D) Max. 60,000 bytes
- PMC paths Max. 5 paths (Max. 40 ladder programs)

Multi-path PMC

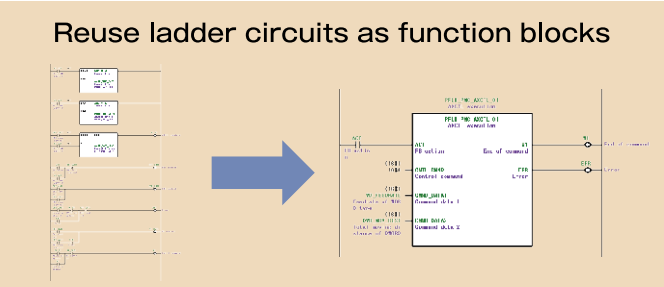
One PMC can execute up to five independent ladder programs, including loader control and peripheral equipment control.

- Ladder programs can easily be developed according to each user's machine configuration.
- Cost reductions are achieved by eliminating external PLCs or other devices for peripheral equipment control.



Function Block function

- This function enables repeated ladder circuit patterns to be arranged in function blocks and easily reused.
- The PMC function libraries attached to FANUC LADDER-III include functions ready for immediate embedding such as PMC axis and peripheral equipment control, and can be freely customized.



A full range of libraries are included in FANUC LADDER-III

- PMC axis control
- Operator's panel
- Spindle functions
- I/O devices
- CNC functions
- Others

Safety Functions Ease of Use

Improvement of the Safety of Machine Tool and Machining Line

Dual Check Safety Function

This is a safety function integrated into the CNC that conforms to ISO 13849-1 PL d. Multiple processors perform dual monitoring of the actual positions, speed, and safety-related I/O of servo motors and spindle motors, securing a high level of safety by providing duplicated paths for cutting off power.

Network safety function

By combining this function with the Dual Check Safety function, safety functionality of the machining line is achieved.

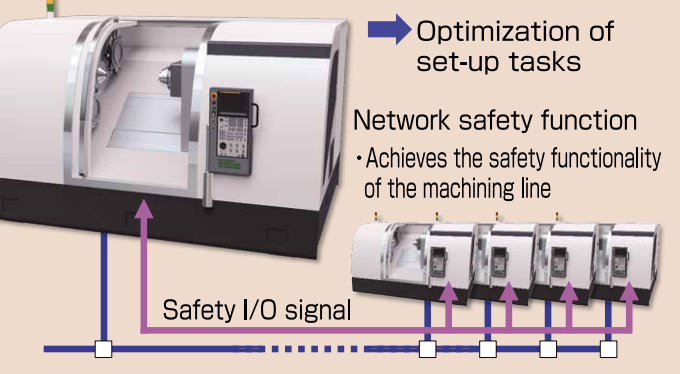
- Safety function by FL-net
- EtherNet/IP Adapter Safety function
- PROFINET IO Device Safety function
- PROFINET IO Controller Safety function

Safe Torque Off (STO) function

This is a safety function integrated in servo amplifiers that conforms to IEC 61800-5-2. Motor power can be safely cut off by the duplicated cut-off path within the amplifier.

Dual Check Safety Function

• The machine can be operated safely while the protective door is open



Easy Maintenance

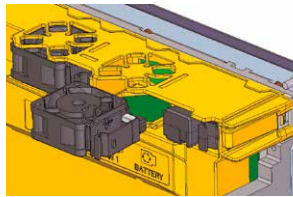
Maximizing
Uptime

Functions for minimizing downtime

Contribution to Preventive Maintenance

Cooling Fan Warning Function

By monitoring a decrease in the rotational speed of each cooling fan motor of the CNC and the servo amplifier, signs of fan abnormalities can be detected.
This function enables preventive maintenance.
Fans are stored in a cartridge and can be replaced quite easily, so maintainability is enhanced.



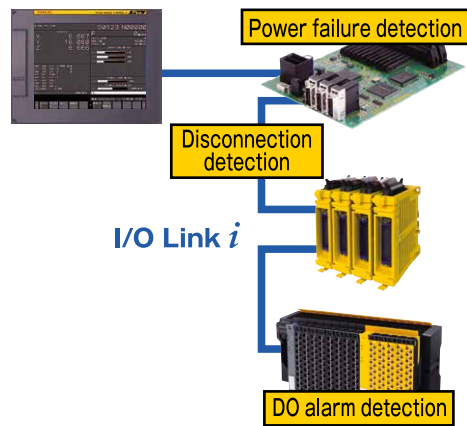
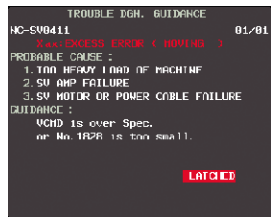
Failure Part Detection

Trouble Diagnosis Function

Various failure detection functions provided to the I/O Link *i* and FSSB can detect interruptions in the power supply to the I/O modules or servo amplifier and identify disconnection locations of the communication cable.
In addition to that, I/O Link *i* can detect the ground fault of each DO.

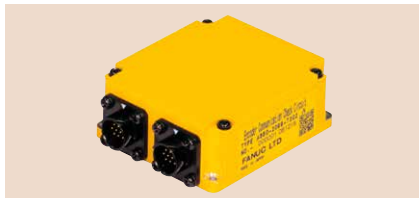
The trouble diagnosis function enables you to see diagnosis information helpful in determining the status when an alarm occurs on the CNC screen.

- Trouble diagnosis guidance screen
- Trouble diagnosis monitor screen
- Trouble diagnosis graph screen



Encoder Communication Check Circuit

This check circuit enables a quick recovery from encoder communication alarm by identifying which part such as encoder, feedback cable or servo amplifier has failed.



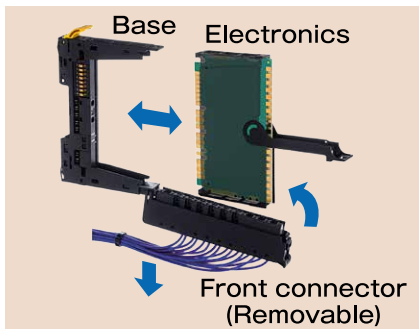
Reduction of Recovery Time

FANUC Slice I/O

Exchangeable of electronics housing without removing wires due to 3-Pieces Structure; "Front connector", "Electronics" and "Base".

In addition to that, following functions can easy detect failure module.

- LED indication for each signal state and unit status
- Enable voltage check of each I/O terminal
- Display nickname of each module on the front of module

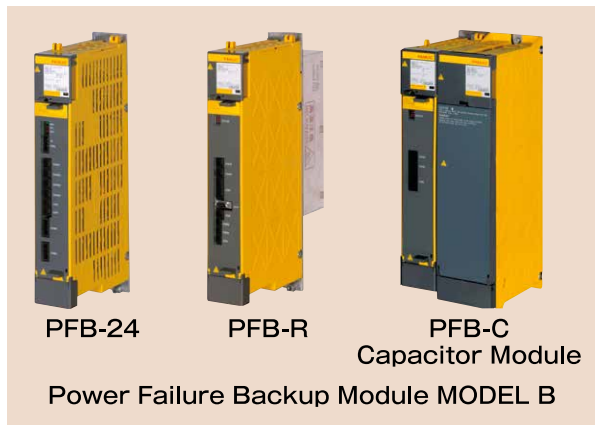


Prevent Machine Damage at Power Failure

Machine Protection at Power Failure

Damage of machines and workpieces at power failure is prevented where a power supply is unstable or in a lightning-prone areas.

- Gravity-axis drop prevention
The holding brake of gravity axis are quickly activated by detecting power failure in the circuit incorporated into the amplifier.
- Stop distance reduction ^{*1)}
Feed axes are quickly stopped to avoid a crash in high-speed machine tools.
- Retraction ^{*2)}
The tool is retracted from the workpiece while keeping synchronization in gear cutting machines and others.



14 ^{*1), *2)} "Power Failure Backup Module (Hardware)" or "Power Failure Backup Function (Software)" shall be applied.

Digital Twin for FANUC CNC

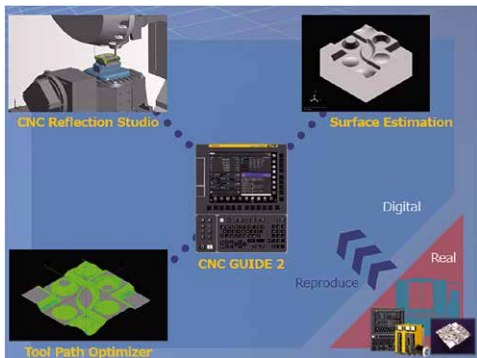
Supporting productivity improvement for machine tool builders and machine users

Supports efficiency for machine tool design, processing and maintenance

FANUC Smart Digital Twin®

Consolidated FANUC CNC technology and Digital technology improves productivity. Part of operation that was available only on machine in the past can be done on PC.

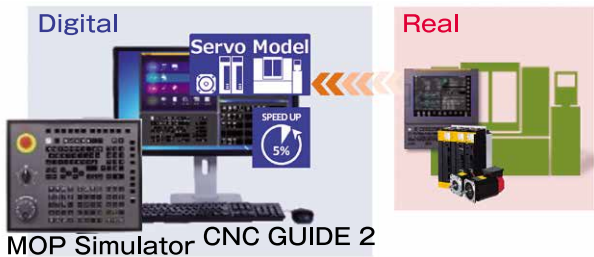
- Improvement of machine utilization rate by not occupying the machine
- Shorten working time by high-speed simulation
- Contribution to energy saving by reducing work-pieces and tools for test cutting



FANUC CNC GUIDE 2

This is a core technology of digital twin for FANUC CNC and a software tool that enables verification of CNC functions on PC.

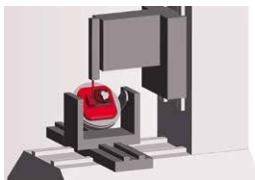
- Realization of more realistic simulation by using Servo Model which reflects characteristics of controlled axes and the maximum 20 times faster simulation than actual machining
- Simulation of the machine motion and the machined surface working with CNC Reflection Studio and Surface Estimation
- By connecting the MOP simulator that integrates the MDI and the operation panel, it is possible to train CNC operation with the same operation feeling as an actual machine tool



FANUC CNC Reflection Studio

It is a software tool that visualizes machine movement according to machining program execution.

- Safe and high-speed machine collision check can be done in digital space
- G-code analysis/interpolation processing are equivalent to actual CNC by cooperation with CNC GUIDE 2

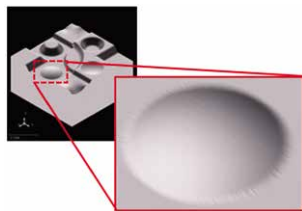


Collision check of machine

FANUC SERVO VIEWER Surface Estimation

It is a software tool that estimates machining surface accurately using position data of CNC GUIDE 2 machining program execution or dry running of actual machine

- Surface quality issue like streaks can be checked digitally before actual cutting
- Trouble shooting becomes easier by understanding relation between surface and machining program or used tools

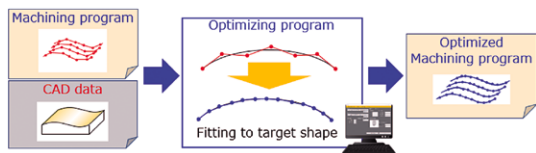


Surface quality evaluation

FANUC Tool Path Optimizer

It is a software tool that compensates the tool path using the machining shape (CAD data).

- Machining program is optimized for FANUC CNC regardless of type of CAM software that generated the machining program
- The quality of the machined surface is improved by reducing scratches and steps on the machined surface caused by the tool path



Machining program optimization

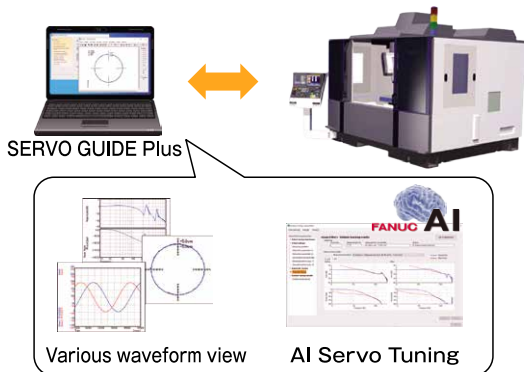
Support of Efficient Servo Tuning for High-Speed and High-Precision Machining

FANUC SERVO GUIDE Plus

Integrated tuning tool for Servo and Spindle

SERVO GUIDE Plus helps to improve machining performance through the various waveform analysis and the optimization of servo/spindle parameters according to machine characteristics.

- All in one package for servo tuning including data measurement, parameter management and test program preparation
- Various views of waveform helps easy analysis of machine condition
- AI Servo Tuning is an auto-tuning algorithm with artificial intelligence. It can optimize parameters easily and in a short time.
- 3-D View Function (option) visualizes the tool path and path error and helps trouble shooting of 5-axis machining



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Maximizing Uptime



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Service**



**Lifetime
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