Cut with Confidence Transform the Workflow

FANUC Smart Digital Twin[®]



Cut with Confidence Transform the Workflow

By knowing...

Machine Motion

Accurate machine simulation is realized by Servo Model which is reflecting mechanical characteristics. It leads to reducing the setup time on site.

Cycle Time

Precise cycle time can be estimated. It leads to efficient optimization of process configuration.

Machined Surface Quality

Surface quality significantly close to real machining can be validated in advance. It leads to minimizing waste and loss due to actual trial cutting.

FANLO Smart Digital Twin[®] Innov ate machining, by trying in digital

before actual cutting

FANUC Smart Digital Twin[®] is Servo Model generated based on It performs high-speed and high-pre

CNC Reflection Stud

Accurate machine simulati

a collective name of computer software that realizes Digital Twin of FANUC CNC. FANUC's accumulated CNC technologies realizes the same level of validation as real machining digitally. cision digital validation to minimize actual trial cutting, which realizes a smarter production workspace.



Smart Digital Twin Manager Integrated Environment for more convenient use of each application



CNC GUIDE 2

High-speed and high-precision CNC simulator that integrates Servo Model reflecting mechanical characteristics Reproduce

Tool Path Optimiz er Supporting improvement of surf ace quality by optimizing program com mand

ÍO

on



Surface Estimation Precisely reproducing surface quality close to real machining

> Digital Improve

Real

CNC GUIDE 2

Integrates Servo Model reflecting mechanical characteristics and realizes high-speed and high-precision CNC simulation

Validating CNC functions on a computer without occupying a machine

CNC GUIDE 2 is a software tool that validates CNC functions on a computer and is essential to realizing the Digital Twin of FANUC CNC. It precisely reproduces CNC motions such as acceleration/deceleration and smoothing function and performs accurate simulations of tool path and cycle time at a minimum of 5% of the time required for real machining. In addition, it integrates Servo Model reflecting mechanical characteristics and can reproduce almost the same level of machined results as real machining with high precision.



Servo Model

reflects mechanical characteristics of each By using this Servo Model, a simulation that

is near to real machined result can be realized.

Work efficiency improved through cooperation with various software

By working with machining support tools, it can accurately simulate a machined surface and machine motions. By working with development support tools, it can efficiently perform development/debugging of screens and ladder programs.



CNC Reflection Studio

Realizes accurate machine simulation

Safe and high-speed interference check

This software tool can check machine motions when a machining program is executed on a computer. Because it does not use a real machine, it has the following advantages:

- · Prevents damage to the machine due to incorrect machining program or tool setting
- Maximizes uptime because a real machine is not occupied for validation
- Reduces electric power consumption for machine operation and trial cutting for real machining, which contributes to saving energy

Pre-check for an accurate machining program

Cooperation with CNC GUIDE 2

It is possible to execute a machining program on CNC GUIDE 2 and then use the execution data to operate a machine model. This enables accurate reproduction of motions by actual CNC control.

Accurate G code analysis

It is possible to analyze any G code program in the same way as actual CNC.

- · Complicated G code commands
- (Example: Tilted Working Plane Indexing, Cycle commands)
- Machine manufacturer's macro programs



Cooperation with CNC GUIDE 2



Interference check is possible before machining

Simulation using accurate coordinate values

Based on CNC parameters, CNC GUIDE 2 calculates accurate coordinate values by taking acceleration/deceleration and smoothing into account.

It is possible to reproduce precise machine motions based on the coordinate values calculated by CNC GUIDE 2.

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Surface Estimation

Precisely reproduces the machined surface quality of a real machined surface by CNC commands

Machined surface quality check before actual machining minimizes waste associated with trial cutting

This software tool estimates a machined surface at high precision on a computer by using the position data of each axis, which is obtained by operating a machining program on CNC GUIDE 2 without operating a machine. It can also use the position data of each axis that is obtained by dry-running a machine.



Because it can check not only the shape of machined result but also machining surfac quality, machining problems such as stripes generated on a machined surface can be grasped in advance.

Additional information highlight

By using digital technologies, it highlights the status such as tool speed during machining, tool acceleration, and path errors, in colors on the machined surface.

This function leads to identification of the cause of a problem in the machined surface quality.





Path error highlight

Tool speed highlight



esult Picture

Tool acceleration highlight

Measuring surface roughness of the machined surface

By calculating a surface roughness based on the results of Surface Estimation, the machined surface can be evaluated quantitatively.





Arithmetic average height (Sa)	3.616 [um]
Max. height (Sz)	25.833 [um]

tting Improving the mad

Compensating the tool path with minute line segment

Tool Path Optimizer

This software tool compensates the tool path in a machining program on a computer by using a target shape (CAD data).

- Create a program (CAD/CAM)
- It uses machining program and CAD data to generate a machining program that has been optimized for FANUC CNC.
- The optimization is possible regardless of the type of CAM that generates a machining program, which can realize a high machined surface quality.

Supporting simultaneous 5-axis machining programs

- Even for free curve machining with simultaneous 5-axis, it can compensate the command points in the tool direction.
- It can compensate the machining programs for tool center point control (Type 1 and 2).

Smart Digital Twin Manager

Comprehensively supports improving machining process work by Digital Twin

This software tool improves machining processes on a computer by using the software of FANUC Smart Digital Twin[®].

Providing functions required for machining process improvement

By simple operations, it can execute simulations in combination with the software of FANUC Smart Digital Twin[®]. It can also facilitate comparison and improvement.

Batch management of digital data

It manages digital data used for improving machining process in a batch.

Supporting digital machining process improvement

By using the software of FANUC Smart Digital Twin®, it supports optimal machining condition identification and application to the workspace.





Height map display

3D shape (*)

Supports improvement of machined surface quality on a machined surface

Improving the machined surface quality by compensating the tool path in a machining program



Machining program optimization







Specification list

We have five types of software for realizing Digital Twin of FANUC CNC.

- CNC GUIDE 2 (High-precision CNC simulation)
- CNC Reflection Studio (Machine simulation)
- Surface Estimation (Machined surface quality check)
- Tool Path Optimizer (Machined surface quality improvement)
- Smart Digital Twin Manager (Integrated Environment of Digital Twin)

Product name		Drawing No.
	1 user	A08B-9010-J840#ZZ99
	3 users (network license)	A08B-9010-J734#ZZ99
CNC GUIDE 2	10 users (network license)	A08B-9010-J841#ZZ99
	20 users (network license)	A08B-9010-J842#ZZ99
	Site license (network license)	A08B-9010-J843#ZZ99
Surface Estimation	1 user	A08B-9010-J941#ZZ99
	Essential 1 user	A08B-9010-J820#ZZ99
CNC Beflection Studio	Complex Milling Extension 1 user	A08B-9010-J821#ZZ99
	Machine Simulator Extension 1 user	A08B-9010-J822#ZZ99
	Milling Professional Package 1 user	A08B-9010-J823#ZZ99
Tool Path Optimizer	1 user	A08B-9010-J816#ZZ99
Smart Digital Twin Manager	1 user	A08B-9010-J872#ZZ99

*We also provide trial versions (trial licenses) for each software that allow users to try it for 60 days free of charge.

Operating environment

OS	Windows (for Intel) 10 64bit(22H2)
	Windows (for Intel) 11 64bit
Package	.NET Framework 4.7.2
CPU	Intel [®] Core [™] i5-4400E 2.7 GHz or higher
Memory	8 GB or higher
Hard disk capacity	(Total) 21 GB or higher
Display resolution	1920 x 1080 FHD or higher
Graphic	Intel® HD Graphics 4600

License

- The licenses are provided as software licenses (USB dongles are not provided).
- An internet environment is required for obtaining software and installing the license.
- · You can install the license even to an offline computer if you have a computer connected to the internet
- The installed license can be moved when, for example, replacing computers. However, we do not recommend frequent movement.
- We cannot reissue a license that has been lost due to the customer's fault.

FANUC CORPORATION

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