MITSUBISHI ELECTRIC
Changes for the Better

M830VW適用於超高速模具，五面加工

M830VW is for high-speed die & mold and 5-face machining

刀具尖端點控制功能

三菱電機數值控制器 M800V/M80V系列

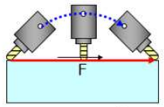
您是否在編譯傾斜程式覺得不容易？

我想使用刀尖跟隨功能。

- 使加工程式的指令位置、成為控制隨工件旋轉的座標系（工作台座標系）上的刀具尖端點功能(TPC)。
- 該功能適用於①刀具傾斜型式、②工作台傾斜型式、③混合型式３種型式的機械。

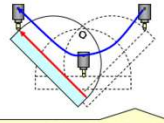
功能示意圖

【刀具傾斜】



控制刀具尖端點路徑成為直線

【工作台傾斜】



控制刀具尖端點位置在工作台座標系中

在4+1軸，3+2軸上都可使用
在ISO／反ISO都可使用

三次元手動進給功能

三菱電機數值控制器 M800V/M80V系列

您是否在傾斜狀態下使用手輪時感到操作不便？

我想在傾斜面狀態下用手輪3D座標移動。

- 三次元手動進給功能允許選擇要加工的虛擬座標系、並通過手動進給(JOG、增量、手輪)在該座標系中移動軸向

功能示意圖

【刀具傾斜 A-C軸】

【工作台傾斜 A-C軸】

在4+1軸，3+2軸上都可使用
在ISO／反ISO都可使用

3D刀具徑補正

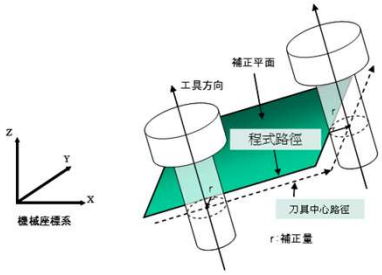
三菱電機數值控制器 M800V/M80V系列

您在處理過程中遇到困難嗎？

我想在傾斜面狀態下進行刀具徑補正。

- 帶有兩個旋轉軸的5軸加工機上的刀具徑補正功能、是考慮到旋轉軸的移動引起的工件方向和刀具傾斜變化的機能。
- 通過程式指令來計算刀具在工件上的運動軌跡、然後對其垂直於刀具方向的平面（補償平面）上計算補償向量、從而對刀具徑進行3次元的補償。

功能示意圖



在4+1軸，3+2軸上都可使用
在ISO／反ISO都可使用

刀具軸方向刀具長度補正功能

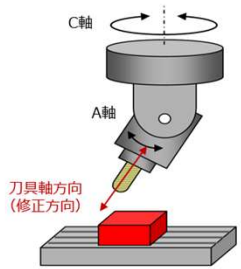
三菱電機數值控制器 M800V/M80V系列

您是否在傾斜角度下有過補正的煩惱？

我想提高刀具長度調整的可操作性和加工精度。

- 刀具軸方向的刀具長度補正功能允許旋轉軸旋轉，刀具軸方向不是Z軸方向。
  即使在刀具軸方向也能進行刀長補償，能提高加工精度。

功能示意圖



對於A軸-C軸配置

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Tool center point control function

Mitsubishi Electric CNC M800V/M80V Series

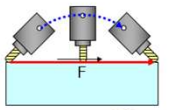
Do you have any problems with processing?

I want to use TCP function.

- Tool center point control function improves machining accuracy
  By adding two axes, "rotation" and "tilt," continuous 3D curved surface processing and
  Undercut processing is possible, and high accuracy enables precision machining of molds.

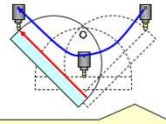
Configuration Diagram

【Tool Inclined】



Control the tool point path to form a straight line.

【Workpiece Inclined】



Control the tool point position in the workpiece coordinate system.

It can be used on both 4+1 axes and 3+2 axes.
It is compatible with both ISO and reverse ISO

3D manual feed function

Mitsubishi Electric CNC M800V/M80V Series

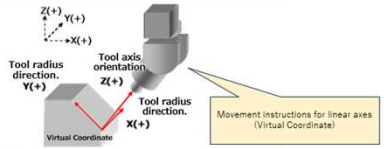
Do you have any problems with processing?

I want to use the handwheel to move in the inclined plane state.

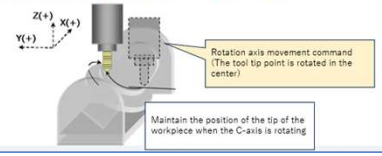
- The 3D manual feed function allows you to select the virtual coordinate system to be processed and move the axes within that coordinate system through manual feed (JOG, incremental, handwheel).

Configuration Diagram

【Head-Head A-C Axis】



【Table-Table A-C Axis】



It can be used on both 4+1 axes and 3+2 axes.
It is compatible with both ISO and reverse ISO

3D tool radius compensation function

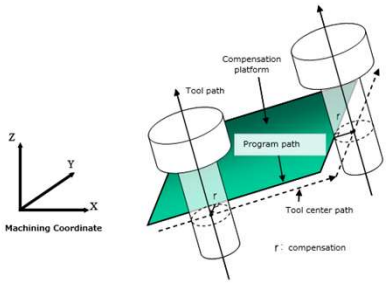
Mitsubishi Electric CNC M800V/M80V Series

Do you have any problems with processing?

I want to perform tool radius compensation on an inclined surface.

- The tool radius compensation function on a 5-axis machining center with two rotary axes takes into account the changes in the workpiece orientation and tool point caused by the movement of the rotary axes.
- Through program instructions, the tool's motion path on the workpiece is calculated. Then, the compensation vector is calculated on the plane perpendicular to the tool direction (compensation plane), enabling 3D tool radius compensation.

Configuration Diagram



Tool length compensation along the tool axis function

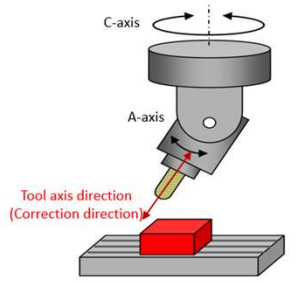
Mitsubishi Electric CNC M800V/M80V Series

Do you have any problems with processing?

I want to improve ease of tool length adjustment and machining accuracy.

- The tool length compensation function in the tool axis direction allows for rotation of the rotary axis, even when the tool axis is not aligned with the Z-axis. This feature enables precise tool length compensation along the tool axis direction, enhancing machining accuracy.

Configuration Diagram



In case of A-axis-C-axis configuration

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Changes for the Better

M830VS適用模具加工及門型機種

M830VS suitable for mold machining and gantry-type machine models.

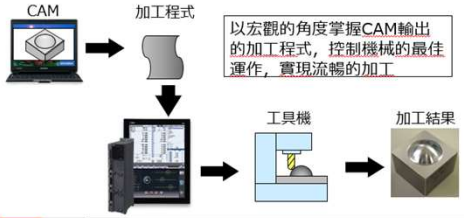
SSS控制

三菱電機數值控制器 M800V/M80V系列

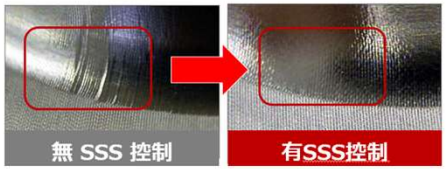
您在加工過程中遇到困難嗎？

我想提高加工精度

- 透過SSS控制(Super Smooth Surface)
  無論 CAM 生成的加工程式內容如何，
  都能穩定實現高品質加工



SSS控制示意圖



同期控制

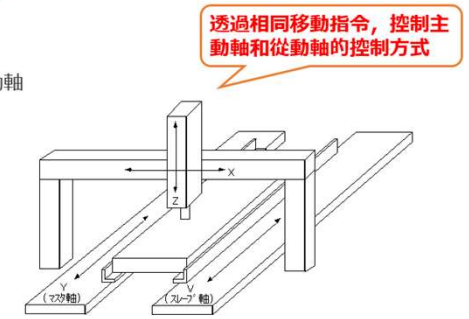
三菱電機數值控制器 M800V/M80V系列

如何實現主從動軸的同步控制？

將主動軸的移動指令傳送給從動軸

- 可用於由2個伺服馬達驅動1軸的大型工具機等
- M800V系列全系統合計可配置多達8組主動軸及從動軸
- M80V系列最多可配置3組 (M8系列同樣規格)

同期控制示意圖



弦函數補間2

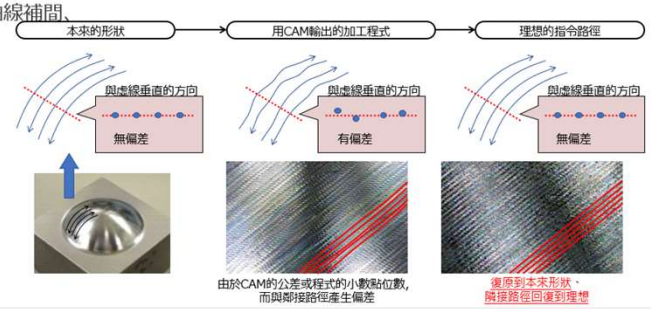
三菱電機數值控制器 M800V/M80V系列

如何消除加工的路徑偏差，提升表面加工品質？

透過弦函數補間2平滑曲線與高品質加工

- 許容誤差(公差量)內平滑的曲線補間、
  提升加工面的品質
- 利用鄰接路徑的偏差抑制，
  可進行高品質的模具加工

弦函數補間2示意圖



特殊刀具頭交換

三菱電機數值控制器 M800V/M80V系列

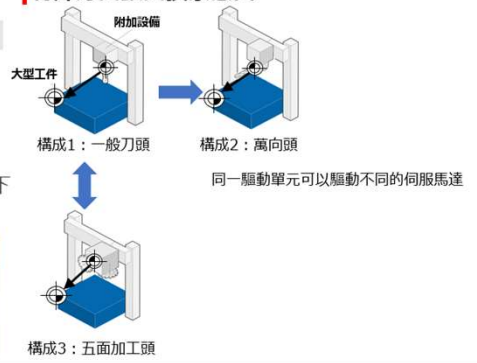
如何提升刀具頭交換的靈活性與生產效率？

特殊刀具頭交換功能，提升生產效率

- 內藏伺服馬達的刀具頭可以動態切換
  依加工流程自動更換刀具主軸頭，
  進而提高生產效率
- 透過預先設定主軸端位置的差異，
  可以在不改變每個刀具頭的工件座標原點的情況下
  執行程式指令

	SV1	SV2	SV3	SV4	SV5
一般刀頭	X	Y	Z	軸取出	
萬向頭	X	Y	Z	C	A
五面加工頭	X	Y	Z	C	B

特殊刀具頭交換示意圖



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M830VS suitable for mold machining and gantry-type machine models.

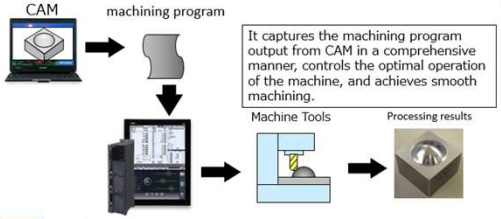
SSS Control

Mitsubishi Electric CNC M800V/M80V Series

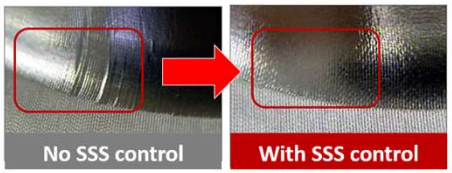
Do you have any problems with processing?

We want to improve processing accuracy.

- SSS control function (Super Smooth Surface)
  Regardless of the content of the CAM-created machining program,Achieves stable, high-quality processing.



Improved machining quality with SSS control function



Spline2

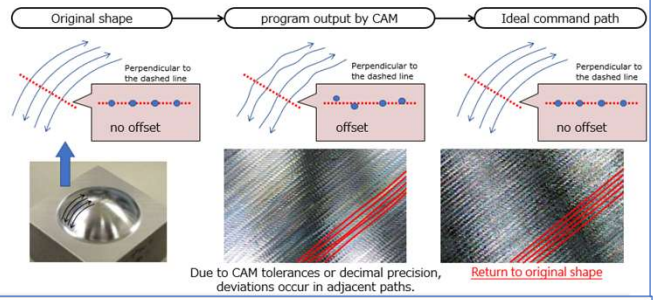
Mitsubishi Electric CNC M800V/M80V Series

How to eliminate path deviations and improve surface quality?

Achieve smooth curves and high-quality machining through SPLINE2.

- By smoothing the curve interpolation within the allowable tolerance, the quality of the machined surface is improved.
- By suppressing deviations in adjacent paths, high-quality mold machining can be achieved.

SPLINE2 Diagram



Synchronous Control

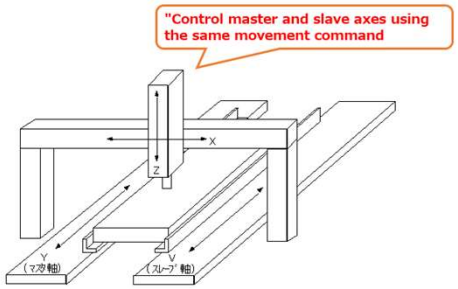
Mitsubishi Electric CNC M800V/M80V Series

How to synchronize master and slave axes?

Send master axis movement commands to the slave axis.

- For large machine tools with two servo motors per axis.
- M800V series: up to 8 master-slave pairs.
- M80V series: up to 3 sets (same for M8 series).

Synchronous Control Diagram



Special Tool Head Exchange

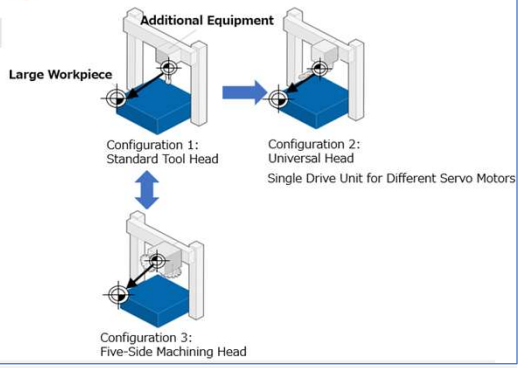
Mitsubishi Electric CNC M800V/M80V Series

How to boost the flexibility and efficiency of tool head changes?

Special Tool Head Exchange Function, Enhancing Production Efficiency.

- Tool heads with built-in servo motors can be dynamically switched, automatically changing the tool spindle head according to the machining process, thereby improving production efficiency.
- By pre-setting spindle end position differences, program commands can be executed without changing each tool head's workpiece coordinate origin.

Special Tool Head Exchange Diagram



	SV1	SV2	SV3	SV4	SV5
Standard Tool Head	X	Y	Z	Axis Extraction	
Universal Head	X	Y	Z	C	A
Five-Side Machining Head	X	Y	Z	C	B

MITSUBISHI ELECTRIC
Changes for the Better

M80V適用於多軸多系統，複雜工件加工最佳利器

Apply for multi-axis multi-system turning center with M80V

振動切削控制

三菱電機數值控制器 M800V/M80V系列

您在加工過程中遇到纏屑的問題嗎？

切削時鐵屑堵塞內槽中，刀具易損壞。且耗時清除鐵屑。

- 振動切削功能有助於提高生產率
  自動分離鐵屑可以防止堵塞，且無需停工清除。
  為提高生產率做出貢獻

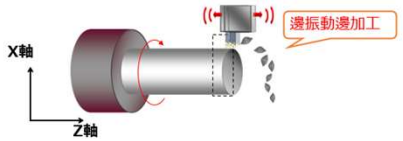
集屑箱容易充滿鐵屑，增加清除難度。

- 縮短清屑時間，有助於提高生產力

是否難以設定斷屑的條件。

- 可以在螢幕上直接輸入參數及條件來分配振動週數並在加工前做檢查

振動切削功能設定/操作畫面



顫振抑制控制

三菱電機數值控制器 M800V/M80V系列

您在加工過程中遇到振動問題嗎？

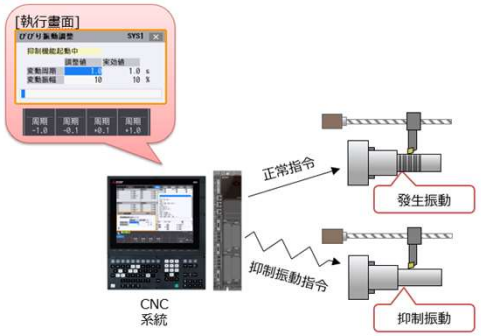
想要抑制振動並提高加工精度

- 透過抑制振動功能以提高加工精度
  透過改變主軸速度可以抑制正常車削指令時所發生的振動。

要設定抑制振動很困難

- 從專用畫面可以輕鬆設定波動條件
  在專用調整畫面上輸入波動週期和波動幅度，可以輕鬆設定波動條件。

抑制振動操作圖



極座標補間 軸指定指令(位址E)追加

三菱電機數值控制器 M800V/M80V系列

您在兩個C軸中切換極座標補間有問題嗎？

快速、平穩地切換可縮短加工週期

- 極座標插補指令（G12.1）時，可以使用位址 E 指定旋轉軸。
- 切換旋轉軸時，與參數設定（G10 L70）相比，縮短循環時間。

舊規格

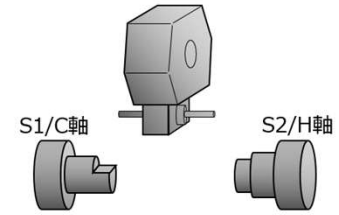
```
(正面主軸(S1/C軸)
G10 L70
P1516 <C>
G11
G12.1
  :
G13.1
  :
(背面主軸(S2/H軸)
G10 L70
P1516 <H>
G11
G12.1
  :
G13.1
```

新規格

```
(正面主軸(S1/C軸)
G12.1
  :
G13.1
  :
(背面主軸(S2/H軸)
G12.1 E=H
  :
G13.1
```

※#1516 mill_ax=C

極座標補間操作示意圖



控制軸重疊

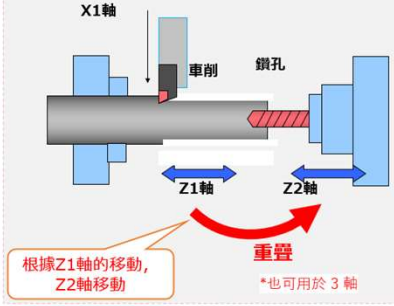
三菱電機數值控制器 M800V/M80V系列

車削與鑽孔是否可同時進行？

想透過同時執行多個加工流程來縮短週期時間。

- 控制軸重疊功能將目標軸重疊在參考軸上，
  實現同步重疊加工，縮短週期時間
  同時加工一個工件多個部分，以縮短循環時間。
  基準重疊軸，可以重疊於另一個軸。

控制軸重疊示意圖（2軸範例）



Automating the World

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Apply for multi-axis multi-system turning center with M80V

Vibration Cutting Control

Mitsubishi Electric CNC M800V/M80V Series

Do you have any problems with processing?

Chips get clogged during internal groove processing, damaging the tool. It takes time to remove the chips.

- Vibration cutting function contributes to improved productivity
  By dividing the chips, clogging is prevented and chip removal is no longer necessary.
  Contributes to improved operating rates.

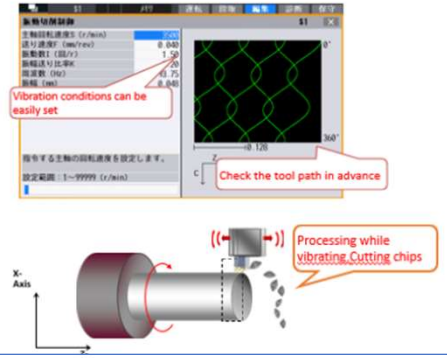
The container quickly fills up with chips, making replacement difficult.

- Extending the time between container changes contributes to improved productivity

It is difficult to set vibration cutting that can break up the chips.

- Is it possible to break chips using the conditions entered on the screen? Can be checked before processing

Vibration cutting function setting screen and function operation image



Chatter Suppression

Mitsubishi Electric CNC M800V/M80V Series

Do you have any problems with processing?

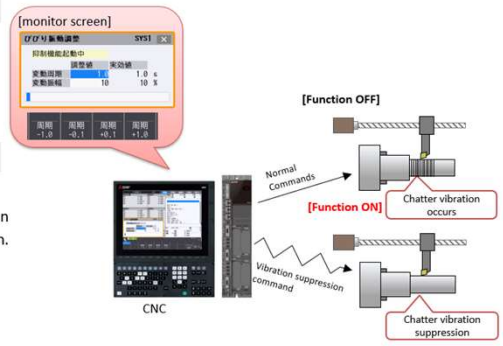
I want to suppress chatter vibration and reduce machining defects

- Reduces machining defects with chatter vibration suppression function
  Chatter vibrations that occur with normal turning commands can be suppressed by varying the spindle speed.

It is difficult to set up the vibration suppression

- Easily set variable conditions from a dedicated adjustment screen
  The fluctuation conditions can be easily set by entering the fluctuation period and fluctuation amplitude on the dedicated adjustment screen.

Operational image of chatter vibration suppression function



Milling Interpolation(Address E) Append

Mitsubishi Electric CNC M800V/M80V Series

Do you have any problems with processing?

I want to reduce cycle time and increase productivity?

- When using the Milling interpolation command (G12.1), the E address can be used to specify the rotation axis
- Compared to parameter settings (G10 L70), switching the rotation axis reduces the cycle time.

before

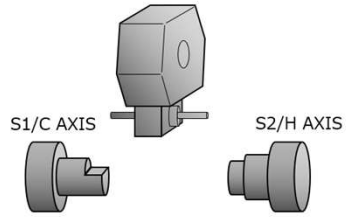
```
(Front spindle(S1/C AXIS)
G10 L70
P1516 <C>
G11
G12.1
 :
G13.1
 :
(Rear spindle(S2/H AXIS)
G10 L70
P1516 <H>
G11
G12.1
 :
G13.1
```

after

```
(Front spindle(S1/C AXIS)
G12.1
 :
G13.1
 :
(Rear spindle(S2/H AXIS)
G12.1 E=H
 :
G13.1
```

※#1516 mill_ax=C

Milling interpolation operation diagram.



Control axis superimposition

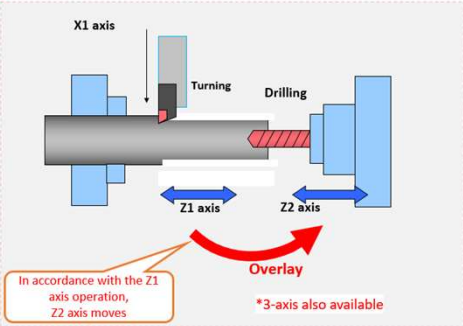
Mitsubishi Electric CNC M800V/M80V Series

Do you have any problems with processing?

I want to improve cycle time by performing multiple processes simultaneously

- Control axis superimposition function reduces cycle time
  Simultaneous machining of multiple parts of one workpiece reduces cycle time.
  Using the superimposed controlled axis as a reference, another axis can be superimposed and controlled.

Control axis superimposition function operation image (2 axes)

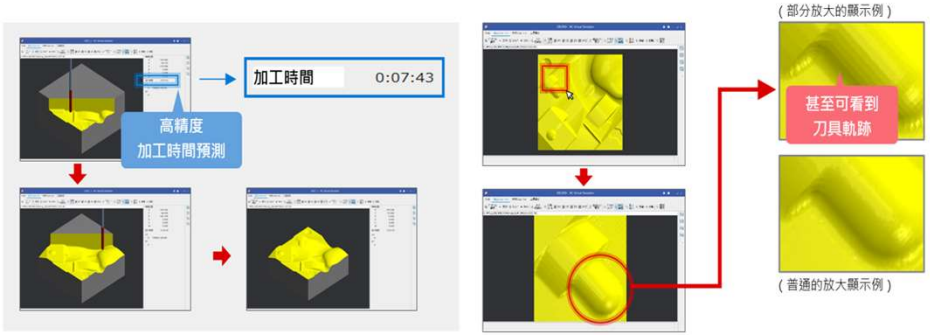


MITSUBISHI ELECTRIC
Changes for the Better

NC加工模擬軟體
Mitsubishi Software “NC Virtual Simulator”

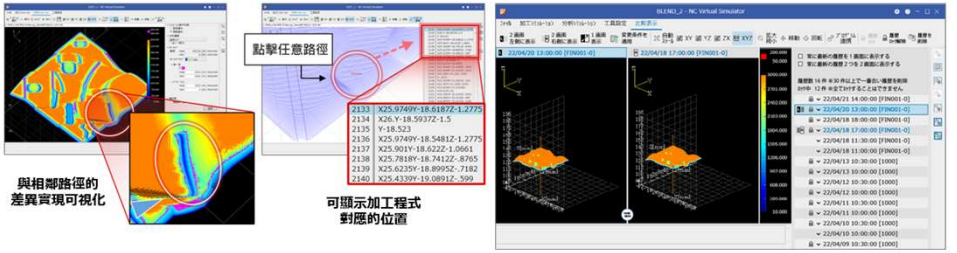
加工模擬工件模擬切削
三菱電機數值控制器 M800V/M80V系列

利用與工具機相同的加工條件、真實再現平滑、加減速、伺服響應延遲的CNC動作的高精度模擬。有助於減少測試加工和減少不良品的消耗等。



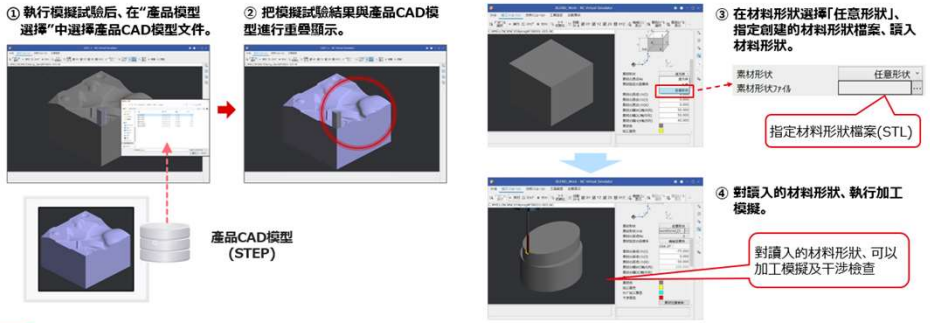
分析模擬比較
三菱電機數值控制器 M800V/M80V系列

- 以微小線段長為單位、根據變化量用彩色圖顯示位置、速度、加速度等。另通過選擇任意路徑、可實現與加工程式之間的聯動。
- 利用該功能、可把試驗結果保存為歷史記錄、並與過去的結果進行比較。可確認到加工結果是如何隨NC參數等加工條件的差異而變化的。



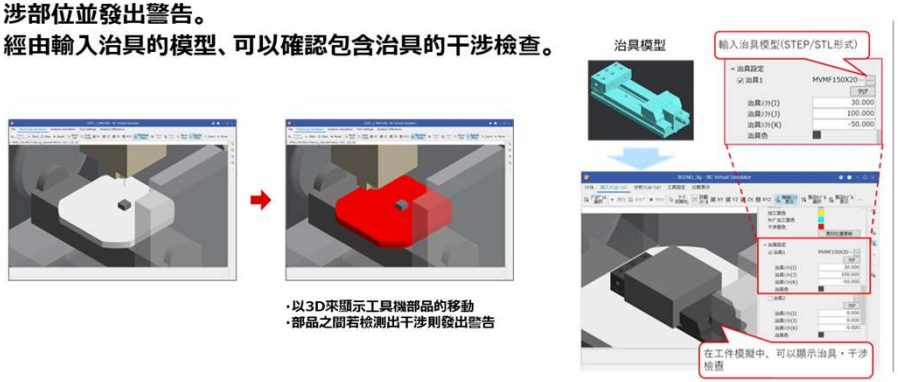
加工模擬CAD模型登錄
三菱電機數值控制器 M800V/M80V系列

- 通過讀取CAD模型（STEP）、與切削模擬試驗重疊顯示、用於加工工程遺漏檢查等。
- 輸入使用CAD工具作成的任意材料的形狀進行加工模擬、例如鍛件/鑄件等。



加工模擬機械、治具模型登錄
三菱電機數值控制器 M800V/M80V系列

- 利用3D工具機模型、可確認自動運轉中的機械干涉。例如出現干涉、可通過顏色顯示干涉部位並發出警告。
- 經由輸入治具的模型、可以確認包含治具的干涉檢查。



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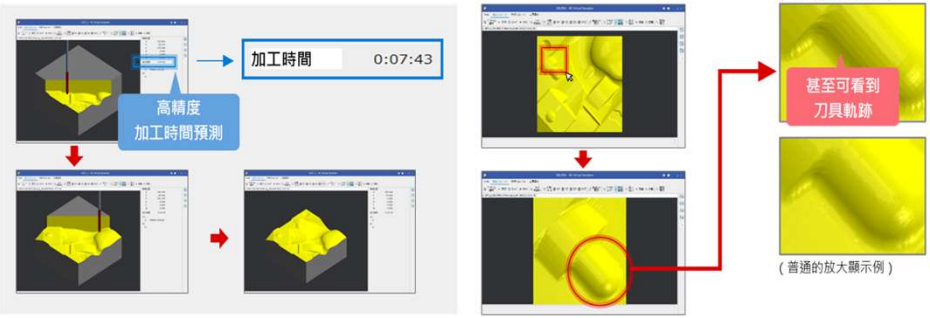
NC加工模擬軟體
Mitsubishi Software “NC Virtual Simulator”

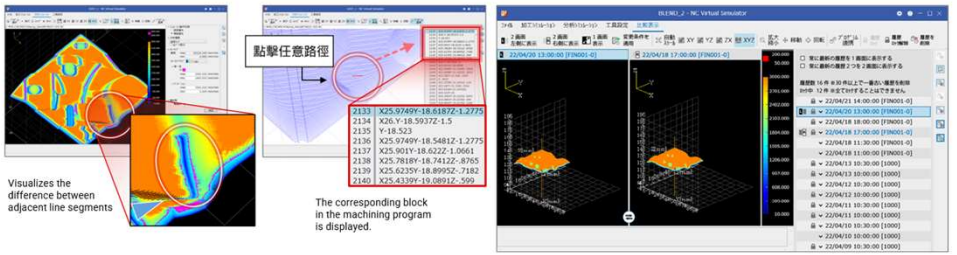
Work simulation cutting
Mitsubishi Electric CNC M800V/M80V Series

Work simulation estimates the machining time and depicts the surface contour accurately using the digital position data that simulates smoothing, acceleration/deceleration, and servo response delay.



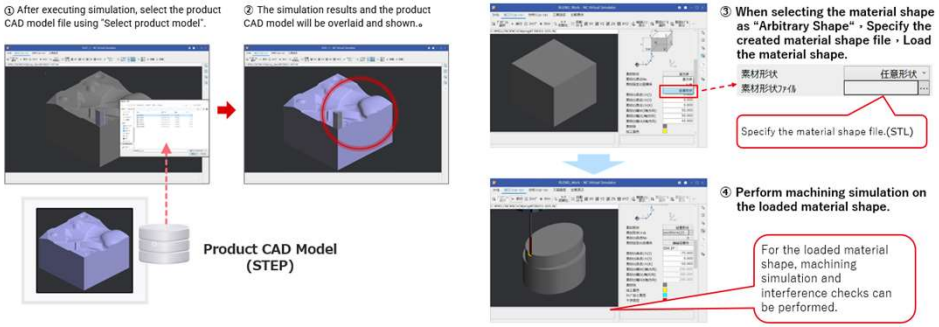
Analysis simulation
Mitsubishi Electric CNC M800V/M80V Series

- **The change in position, speed, acceleration rate, and other data is displayed at the level of a micro segment in a color map.In addition, by selecting a line segment in the contour, the corresponding block in the machining program can be displayed.**
- **Simulation results are retained as history and used in simulation result comparison. You can see how the machining result changes depending on the machining conditions such as NC parameters.**



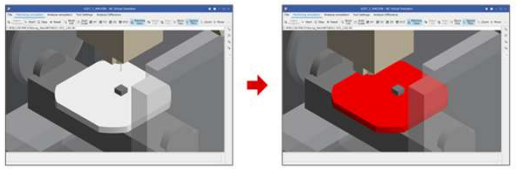
Work simulation CAD Model File
Mitsubishi Electric CNC M800V/M80V Series

- **You can check for omitted machining processes, etc. by reading in the product CAD model (STEP) and showing it overlaid with the cutting simulation.**
- **Input the shape of any material created using CAD tools for machining simulation, such as forgings or castings.**

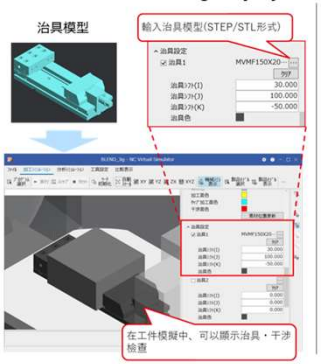


Work simulation Machine check Interference
Mitsubishi Electric CNC M800V/M80V Series

- **You can check for machine interference during automatic operation using 3D machine models.If interference occurs, the parts that interfere are shown in interference color as warning display.**
- **By inputting the fixture model, interference checks including the fixture can be performed.**



- The movement of machine parts is shown in 3D.
- If interference between parts is detected,a warning display takes effect.



台灣三菱電機客製化畫面開發
Mitsubishi CNC developed Customized Screens

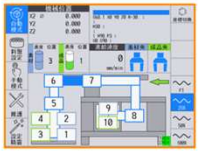
Gantry專用畫面
三菱電機數值控制器 M800V/M80V系列

◆ 車床畫面

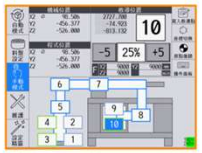
操作畫面：

■ 主畫面

■ 自動模式

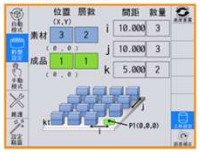


■ 手動模式



■ 維　護

■ 料盤設定

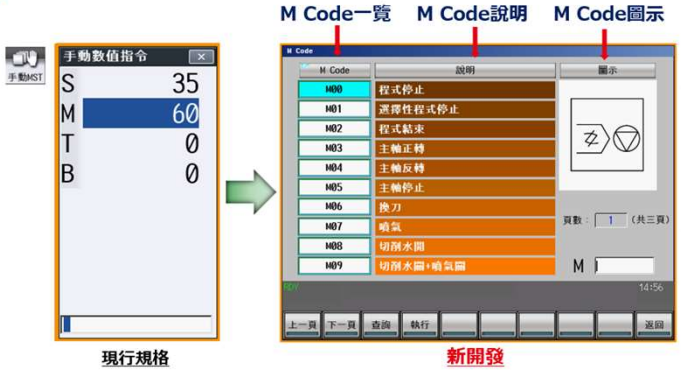


■ 設定精靈

註1：僅支援全觸控顯示器。
註2：僅支援10.4吋規格。

MST Code 強化
三菱電機數值控制器 M800V/M80V系列

圖示版畫面:



現行規格　　新開發

- ✓ 內建M Code說明及圖示
- ✓ 畫面**觸控操作**取代傳統輸入M指令方式
- ✓ 點選M code指令**直接執行**
- ✓ M Code查詢功能，**快速查詢**不熟悉指令
- ✓ 可省去M碼一覽表貼附在機床鈑金的成本。

消費電力
三菱電機數值控制器 M800V/M80V系列

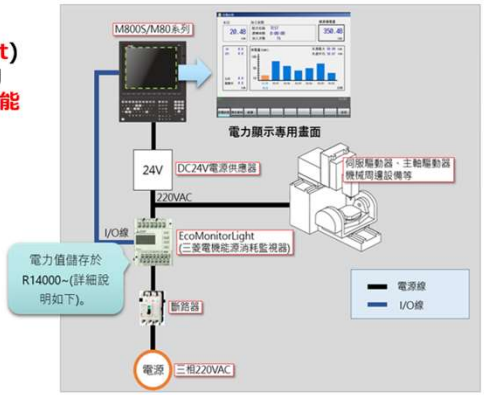
機能說明：

本機能透過三菱電機外部電錶(EcoMonitorLight)進行總電力的取得,並配合NC機能消費電力計算的功能,取得機台相關消費電力資訊,以協助客戶端節能減碳功能的開發。

資料可視化

碳排計算

節能



負荷監視
三菱電機數值控制器 M800V/M80V系列

機能說明:

- ✓ 菜單鍵及畫面按鈕皆可切換**訓練模式**及**監視模式**(不同顏色顯示)
- ✓ 選擇監視No.後、如需再選擇接續10筆的資料、僅需直覺化點選 數值即可
- ✓ 依抓到的系統軸數顯示並用顏色表示目前進行監視的軸向
- ✓ 第一次訓練模式後,即可參照標準值進行微調警告及異警數值
- ✓ 在監視狀態下，當發生警告或異常時，相關軸的警告或異常輸入框將以黃色或紅色底色顯示，以提示使用者注意。
- ✓ 可透過(▲ 及 ▼)上下微調數值增加操作上的便利性

MITSUBISHI ELECTRIC
Changes for the Better

台灣三菱電機客製化畫面開發
Mitsubishi CNC developed Customized Screens

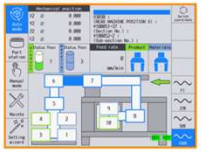
The exclusive Screens on Gantry System
Mitsubishi Electric CNC M800V/M80V Series

◆ Lathe

Features:

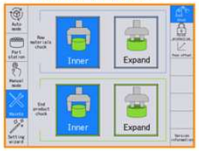
■ Main Screen

■ Auto Mode



■ Manual Mode

■ Maintenance



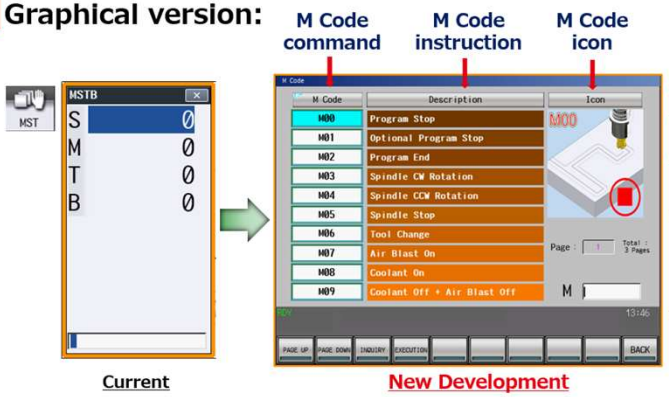
■ Part station settings

■ Setting wizard

Note 1 : Touch panel operation only.
Note 2 : 10.4-type display only.

M Code Screen Enhancement
Mitsubishi Electric CNC M800V/M80V Series

Graphical version:



Current

New Development

- ✓ Graphical display
- ✓ Intuitive touch operation
- ✓ Replace original input mode
- ✓ M Code query function, quickly look up unfamiliar commands
- ✓ Reduce Hardware and maintenance costs

Electricity Consumption Description
Mitsubishi Electric CNC M800V/M80V Series

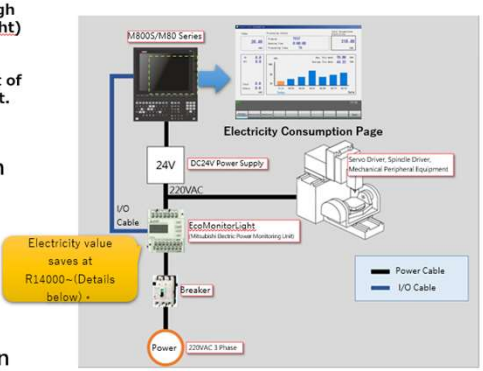
Features:

This function acquires total electricity consumption through Mitsubishi Electric's external power meter (EcoMonitorLight) and, together with the NC function's power consumption calculation feature, obtains relevant power consumption information for the machines to assist in the development of energy-saving and carbon reduction features for the client.

Data Visualization

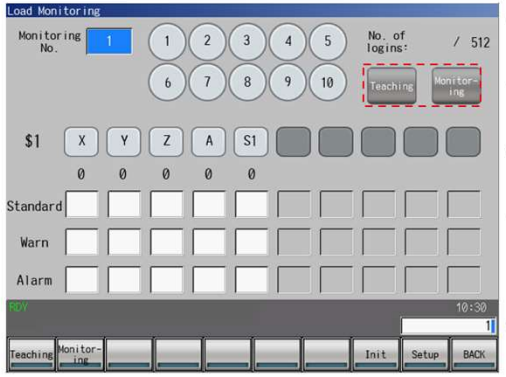
Carbon Emission Calculation

Energy conservation



Load Monitoring
Mitsubishi Electric CNC M800V/M80V Series

Features:



- ✓ Menu keys and screen buttons are switchable by Training mode and monitoring mode (displayed in different colors).
- ✓ After selecting the monitoring number, if you need to select the next 10 data entries, simply intuitively click ◯ on the values.
- ✓ Display the number of system axes detected and use colors to indicate the currently monitored axis.
- ✓ In monitoring mode, when a warning or abnormality occurs, the warning or abnormal input box for the relevant axis will be displayed with a yellow or red background to alert the user.
- ✓ The values can be fine-tuned up and down through (^) and (v) to increase operational convenience.