FFCAM 2021

Description of New Functions



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Preface

This manual describes the functions added to MAKINO FFCAM 2021 and how to use them.

Created on

March 2021

List of Functions Added to FFCAM 2021

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Addition of Tool Drawings and Coordinate Value Display Function

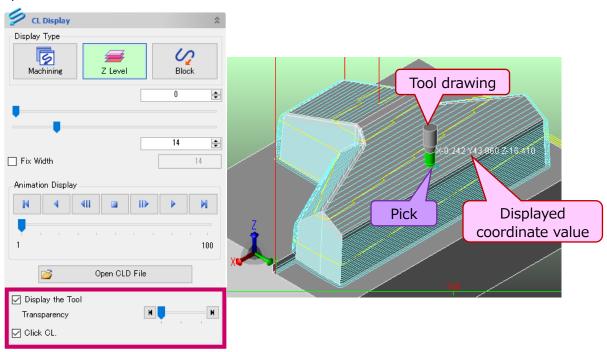
In FFCAM 2021, the tool position can now be checked in CL Display.

A function to draw the tool at the position on the CL path picked by clicking the mouse has been added in CL Display. A function to display the coordinate values of the point where you rolled over the mouse cursor on the CL path has been added.

Operation Screen

CL Display

Add a check to [Display the Tool] and [Click CL] in [CL Display]. When you click on the CL path on the screen, the tool geometry is displayed at the point.



(1) Display the Tool

Specify whether to display the tool geometry on the CL path.

Transparency

Specify whether to display the tool geometry on the CL path.

(2) Click CL

also displayed.

When you pick on the CL path, the tool geometry is displayed at the picked point. The coordinate values of the point where you rolled over the mouse cursor on the CL path is

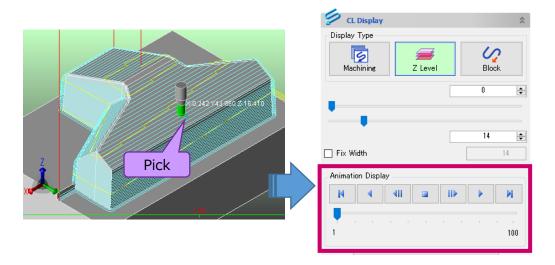
[Click CL]

- · If [Display the Tool] is not selected, only the coordinate values are displayed.
- The value of the picked point is updated in the [CL display adjustment slider bar].

 Screen example:



- · You can execute [Animation Display] from the picked point.
 - * Only when Tool Display is set to ON

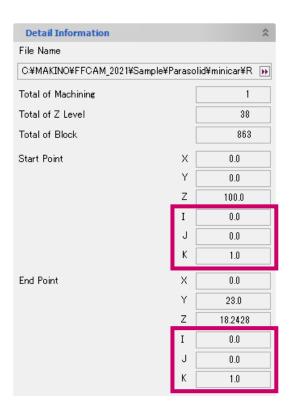


■ Note

For CL data that includes 5-Axis Simultaneous Machining, the tool is displayed at the end point of the CL block.

■ Other New Functions for [CL Display]

The start point and end point of I, J and K values of the CL data are now displayed in [Detail Information].



2. Multiple Color Selection Filter Added to the Element Selection Screen

In FFCAM 2021, filtering by multiple colors can now be executed in the element selection screen.

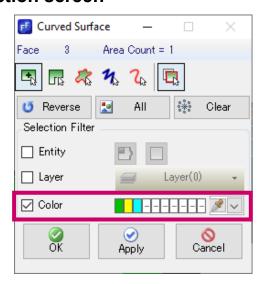
In previous FFCAM versions, filtering could be executed by selecting only a single color, but with this new function, filtering can be executed by selecting multiple colors.

Setting screen

The [Color] filter in the element selection screen is now in the form of a palette of multiple selection colors.

All colors specified in the selected color palette can be used for filtering at the same time and selected at once.

Element selection screen



(1) Color

To filter elements for selection by colors, add a check.

(2) Selected color palette

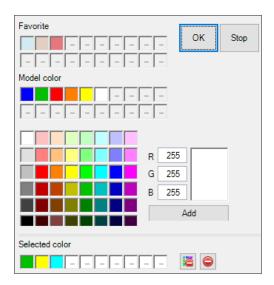
Displays the colors specified for filtering. When filtering is executed, all the colors specified here are used for filtering at the same time.

(3) M Obtain model display color

Click on the model displayed in the graphics screen to get the display color. The obtained color becomes the specified color in the [Selected color palette].

(4) Filter Color Settings

The filter color setting screen is displayed in the drop-down list. In this screen, set the color to be specified in the [Selected color palette].



Favorite

This is the color palette used to display the colors that are frequently used when setting the model.

The color you pick in this palette is registered in [Selected color].

* The colors of [Favorite] are set from the [Selection Filter] of [Optional Settings]. For details, refer to the "Optional Settings screen" below.

Model color

All the colors used in the displayed model elements are displayed.

The picked color is registered in [Selected color].

Color palette

Pick or set the color to be registered in [Selected color].

If you pick a color from the color palette, the picked color is registered in [Selected color].

The value of the picked color is also updated in the R, G and B fields.

Add

If you change the values in the R, G and B fields and click the [Add] button, the color that is set is registered in the [Selected color].

Selected color

The colors to be set in the [Selected color palette] are registered from each item above.

Use [Delete] and [Delete all] buttons to delete the color/s.

Delete

Deletes the selected color.

Delete all

Deletes all colors.

OK

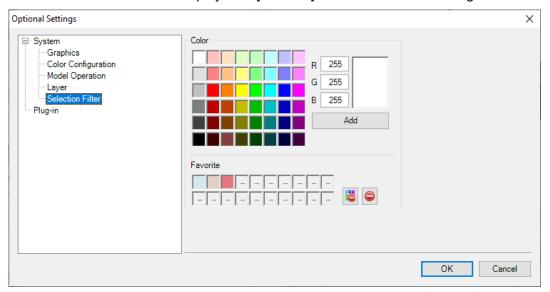
Sets the colors registered in [Selected color] to the [Selected color palette], and closes the setting screen.

Stop

Cancels the registration in [Selected color]. The registration is discarded and the setting screen is closed.

Optional Settings screen

The setting item of [Selection Filter] has been added to the Optional Settings screen. You can set the color to be displayed in [Favorite] of each filter color setting screen.



(1) Color

Pick or set the color to be registered in [Favorite].

If you pick a color from the palette, the picked color is registered in [Favorite].

The value of the picked color is also updated in the R, G and B fields.

Add

If you change the values in the R, G and B fields and click the [Add] button, the color that is set is registered in [Favorite].

(2) Favorite

The colors to be set in [Favorite] are registered from the item above. Use [Delete] and [Delete all] buttons to delete the color/s.

Delete

Deletes the selected color.

Delete all

Deletes all colors.

3. Addition of Function for Color Coded Display of Angular Deviation of the Model in the Measurement Screen

A function for the color coded display of angular deviation of the model geometry has been added to [Measurement].

Previously, in FFCAM, you could pick a point in the model geometry to check the angle at that position. However, it was difficult to check the angle at each point for complex geometries, etc.

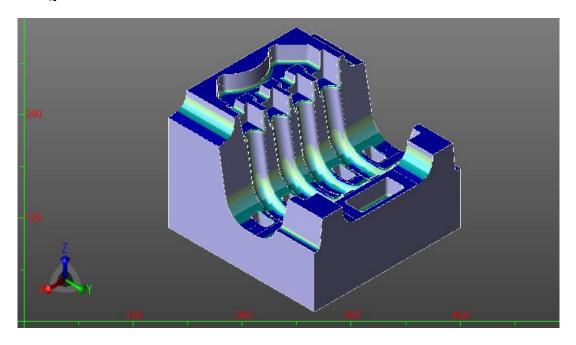
In FFCAM 2021, a function is now provided for the color coded display of the angular deviation of a specified face or the entire model geometry. You can understand the angular deviation of the entire geometry at once, and use it as a reference for selecting the tool setting.

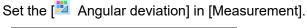
Setting screen

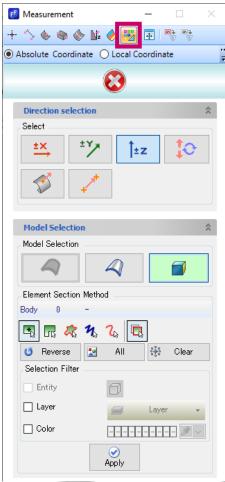
Specify the coordinate axis or the normal direction to the face of the model geometry as the reference vector.

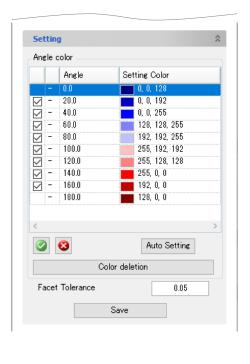
When measurement is executed, angular deviation between the reference vector and model geometry is displayed by color coding on the model.

Image after measurement execution









(1) Absolute Coordinate/Local Coordinate

Select the coordinate system used for selecting the reference vector direction from either [Absolute Coordinate] or [Local Coordinate].

(2) Direction selection

Select

[X axis, Y axis and Z axis] button

Sets the reference vectors in the direction of X, Y and Z axes of the specified coordinate system.

[Reverse Direction] button

Changes the direction of the reference vector set by the [X-axis, Y-axis and Z-axis] buttons to the reverse direction.

[Surface Normal Direction] button

Sets the reference vector to the normal direction of the surface specified by the mouse.

[Two Points] Button

Sets the reference vector to the direction of the vector connecting the two points specified by the mouse.

(3) Model Selection

Select the model geometry to measure the angular deviation.

[Apply] button

Executes the measurement of the angular deviation.

The selected model geometry is displayed by color coding according to the angular deviation.

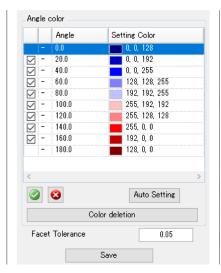
(4) Setting

Sets the display color corresponding to angular deviation.

Angle color

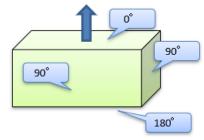
The color can be set for each angle to be detected.

* The color setting method is the same as [Corner R] in [Measurement] and [Rest Model Color Setting] in [Simulation]. For detailed setting methods, refer to "Chapter 9 Simulator" in the "FFCAM Training Manual B".



Relationship between the reference vector specified in [Direction selection] and the angle to be detected

Example: Detection angle when +Z direction is specified



Checkbox setting buttons

Selects all checkboxes.

: Clears all checkboxes.

Auto Setting

Automatically adjusts the setting values for angle and setting color of angle color. (Adjustments are executed for items that are unchecked.)

Color deletion

Deletes the color displayed on the model geometry after measurement.

Facet Tolerance

Sets the display accuracy of angular deviation.

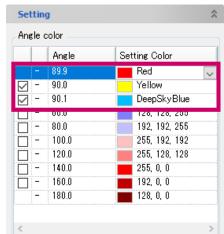
The smaller the value, the more accurate is the display of deviation.

Save

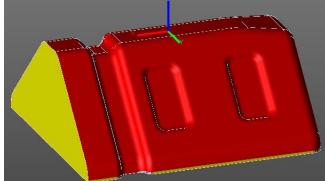
Saves the settings.

Setting example

When detecting vertical walls and under parts with the reference vector as +Z axis



With the setting shown on the left, the angular deviation with respect to the +Z axis is displayed in red for less than 90 degrees and in yellow for 90 degrees.



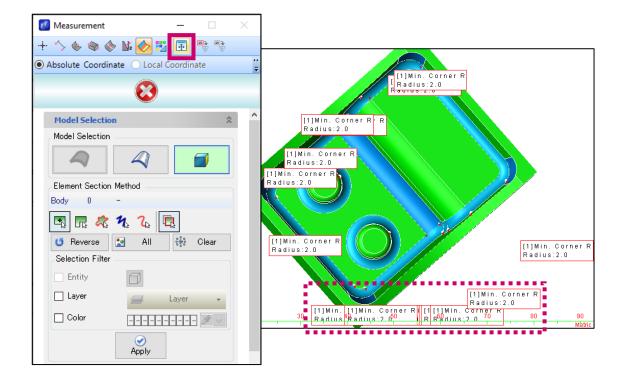
4. Addition of [Fit of the measurement result] Function button to the Measurement Screen

The [Fit of the measurement result] button has been added to the [Measurement] screen. The [Fit of the measurement result] function, which used to be operated from the FFCAM menu or toolbar, can now be operated from the [Measurement] screen as well. In FFCAM 2021, you can now execute the [Fit of the measurement result] function more quickly.

Setting screen

The [Fit of the measurement result] button has been provided in the [Measurement] screen as well.

After measurement, clicking the [Fit of the measurement result] button moves the measurement result display balloons that are displayed outside the graphics screen into the screen.

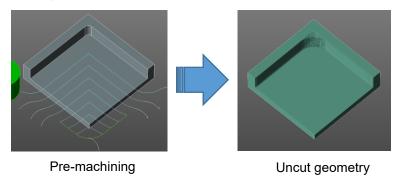


<Flat Face Machining> Improved Tool **Path Outputs During Stock Machining**

In previous versions of FFCAM, stock machining of flat faces was only supported for updating the uncut geometry. Therefore, the tool path was also output for the flat surfaces. In FFCAM 2021, in addition to updating the uncut geometry, the difference between the machining shape and uncut geometry is also identified, so that tool path is now output only for uncut parts.

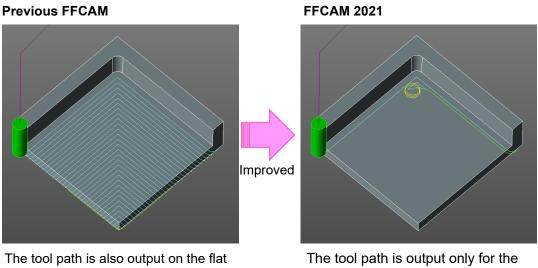
Explanation screen

The following is an example of loading the uncut geometry by flat face machining and outputting the tool path.



Flat Face Machining

Load the above uncut geometry and compare the output tool path



surface.

difference between the machining geometry and the uncut geometry.

■ Note

Stock machining during flat face machining cannot be used at the same time as the following functions.

- · When Offset Work is specified
- Tilt infeed out of area suppressed + Round Insert Interference is not checked
 - [Tilt infeed out of area] is not checked + Tool is other than Round Insert FM
 - [Tilt infeed out of area] is not checked + Tool is Round Insert FM + [Avoid cutting by the bottom of Round Insert cutter] is not checked
- · Path Infeed + Infeed offset width is not specified
 - Path Approach Motion Type of Infeed is other than "Omit" + Infeed Start "Approach position"

Addition of Automatic Acquisition Function for "Cylinder" in Set of Machining Workpiece

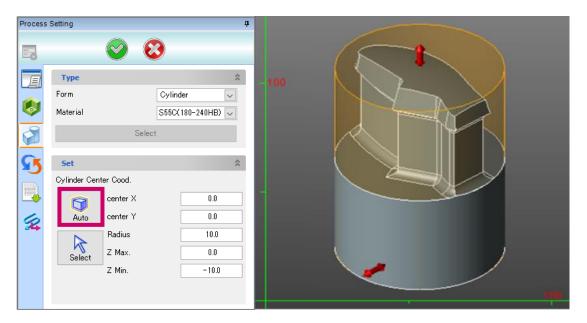
A Function to obtain the geometry automatically has been added to "Cylinder" in [Set of Machining Workpiece].

Like the auto acquisition function in [Box area], the cylindrical geometry can be automatically acquired and defined.

Setting screen

Select the model geometry under "Cylinder" in [Set of Machining Workpiece] and click on the [Auto] button.

The values of the center (X, Y), Radius and Z (Max., Min.) of the cylinder that encloses the geometry are automatically acquired, and a translucent cylinder (see the figure below) indicating the acquired range is displayed.



7. Improved Tab Display in the Process Setting and Machining Parameter Setting Screens

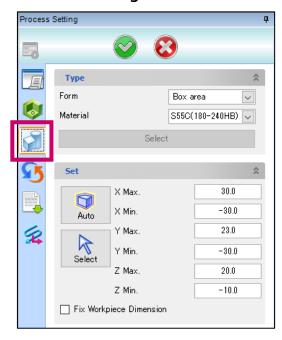
The icons of the tab in the [Process Setting] and [Machining Parameter Setting] screens have been improved so that they are highlighted when selected.

It is now easier to recognize the selected tab in [Process Setting] and [Machining Parameter Setting] screens.

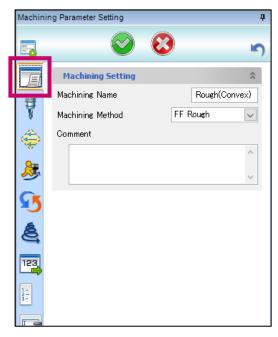
■ Explanation screen

The icon of the selected tab is highlighted with an orange border.

Process Setting



Machining Parameter Setting



8. <Cutter Setting> Changed the Min Value of [Maximum cutting angle of inclination] for Round Insert FM

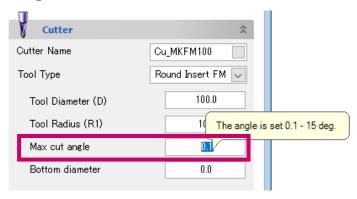
In the previous versions of FFCAM, the minimum value of [Maximum cutting angle of inclination] for the Round Insert FM in the Cutter Setting was "1.0" degree.

In FFCAM 2021, the minimum value of the [Maximum cutting angle of inclination] for the Round Insert FM has been changed to "0.1" degree to meet the specifications of the tool manufacturer.

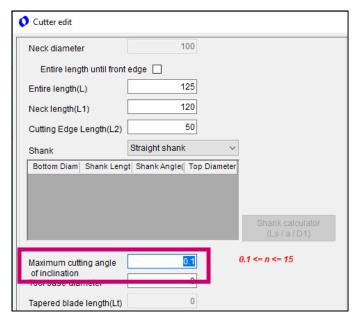
Setting screen

The minimum value of [Maximum cutting angle of inclination] for the Round Insert FM can be set from "0.1" degree.

Cutter setting



Cutter edit (when Round Insert FM is set)



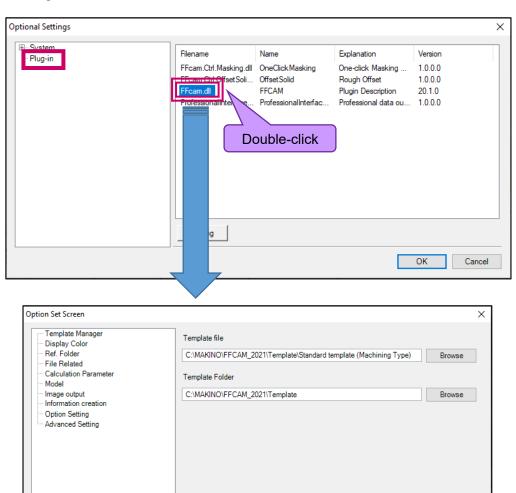
Improved the Procedure for Opening Option Set Screen

Until now, to open the [Option Set Screen] in [Optional Settings], you had to select the file name "FFcam.dll" in [Plug-in] and click on the [Setting] button.

In FFCAM 2021, the [Option Set Screen] can now be opened by double-clicking the file name "FFcam.dll".

Operation Screen

In [Optional Settings] -> [Plug-in], double-click the file name "FFcam.dll" to open the [Option Set Screen].



OK Cancel

10. Improved Output Function in Sheet Name

Supported items for the Sheet name output function set in the [Option Set Screen] have been added.

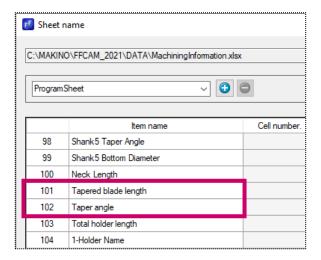
In addition, restrictions and their automatic confirmation function have been added to the Sheet name output function.

The details are described below.

Setting screen

The following items have been added in [Sheet name].

- · Tapered blade length
- · Taper angle



Limitations and Automatic Confirmation Items of Sheet Name Output Function

- Automatically confirms if Excel is installed on the working PC It is confirmed at the following timing.
 - When a file is referred in [Sheet name]
 - When [Information Create (Output the one file)] in [Machining Data Selection] is executed

If Excel is not installed, an error message is displayed and the Sheet name is not output.

2. Automatic confirmation of the number of characters in the sheet name

The number of characters in the sheet name in [Sheet name] is now limited to 31 single-byte characters.

If you enter a name using 32 characters or more, a message is displayed asking you to reduce the number of characters.

If a sheet name of 32 characters or more has been set in an existing file, the name after 32 characters is deleted. (continues output process of the Sheet name.)

3. Automatic confirmation of the number of characters in the output file path when creating the Sheet name

The number of characters in the output file path of Sheet name is now limited to 218 characters.

If the number of characters exceeds 218 characters, an error message is displayed and the Sheet name is not output.

11. Addition of [Open a Designated Folder] Function Button to the Simulation/Repost Screen

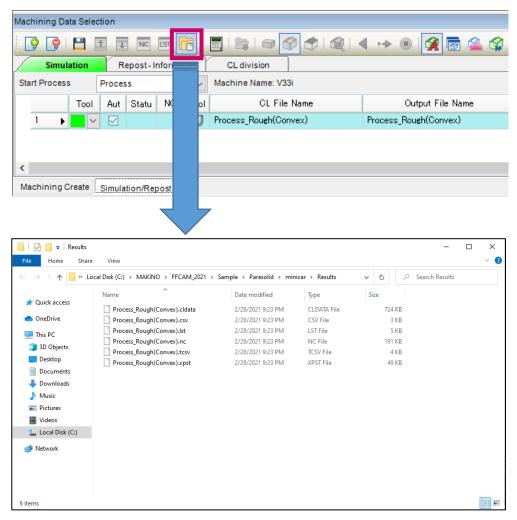
The [Open a designated folder] button has been added in the [Simulation/Repost] screen.

The [Open a designated folder] function in [Machining Create] screen can now be used in the [Simulation/Repost] screen.

You can also open the destination folder of the working file with a single click in the [Simulation/Repost] screen.

Setting screen

Clicking the [Open a designated folder] button in the [Simulation/Repost] screen opens the destination folder for the file currently being worked on.

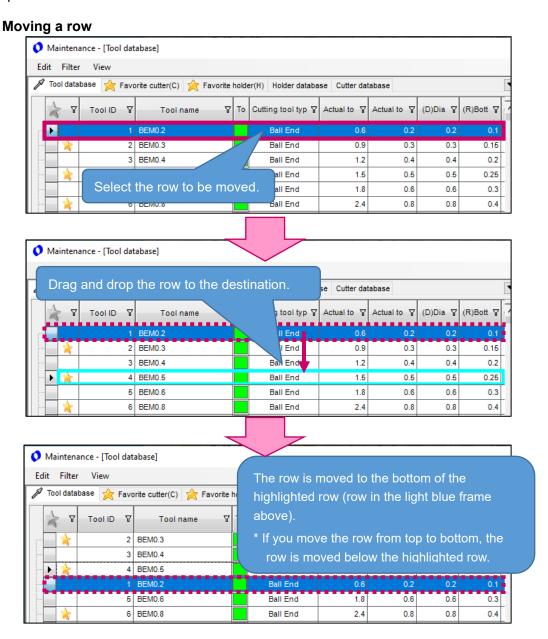


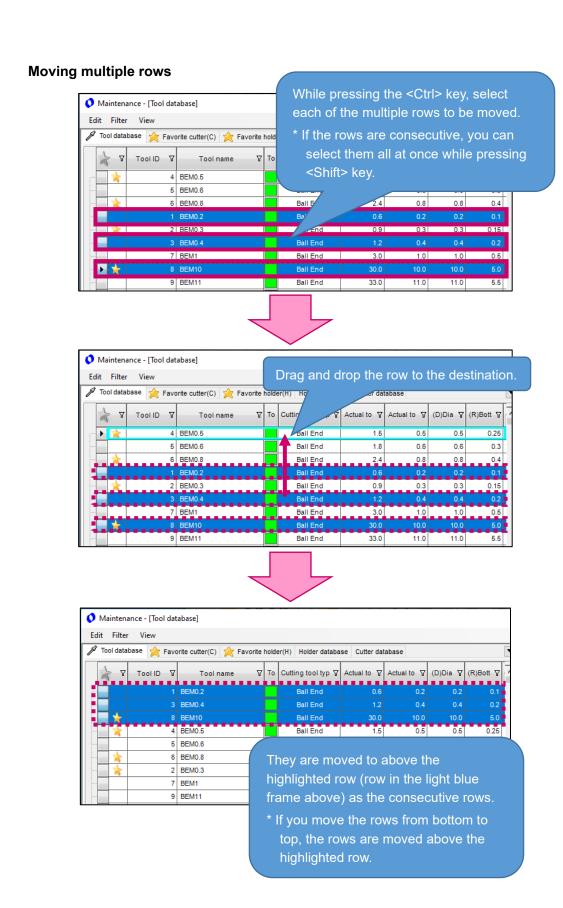
12. Addition of a Function to Change the Order of the List Rows in the Maintenance - Tool Database Screen

The order of the list rows in the Maintenance - [Tool database] screen can now be changed as required.

■ Operation Screen

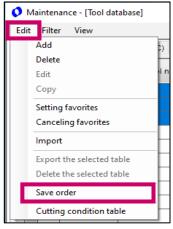
How to change the order of the list rows in the Maintenance - [Tool database] screen is explained below.

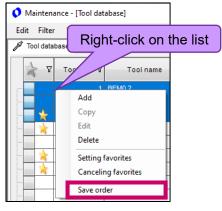




Saving the Sort Order

To save the order of the rows, select the [Edit] menu or [Save order] of the right-click menu.



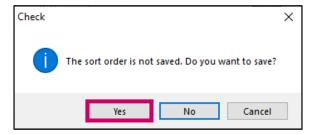


[Edit] menu

Right-click menu

If the order is not saved, a dialog box is displayed to confirm save, when you close the screen or move to another screen.

To save the order, select "Yes" in the [Check] dialog.



■ Supplementary Note

- The order of the list rows changed by sorting the items can also be saved with the same method.
- The above order function is not available in the [Cutting Condition Database] screen or the [Tool database] screen that is started from [Process Setting].

13. Addition of Project Data Collection Tool

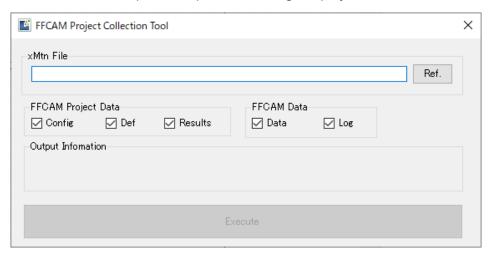
A tool to collect the project data set of FFCAM has been added.

You can quickly collect project data when there is a problem with the data and it needs to be verified, or when you want to backup the project related data in the middle of work.

■ Operation Screen

Launch the tool from the Windows [Start] menu -> Application List -> [FFCAM 2021] -> [Project Collection Tool].

From the [FFCAM Project Collection Tool] that has been launched, select the target xMtn file and type of data to be collected. Click on [Execute] to execute the collection. When the collection is complete, a zip file containing the project data is created.



(1) xMtn File

The path of the selected xMtn file is displayed.

Use the [Ref.] button to select the xMtn file for data collection.

Or, drag and drop the xMtn file into the [FFCAM Project Collection Tool] screen.

(2) FFCAM Project Data

Select the project folder where the data is to be collected.

- Config
- Def
- Results

(3) FFCAM Data

Select the data folder where the data is to be collected.

- Data
- Log

(4) Output Information

The name of the collection zip file and file path to save the file are displayed after the collection process is successfully completed.

The displayed file path can be opened from the link.

(5) Execute

Executes the collection process.

If the process is successful, a collection zip file is created in the same directory as the xMtn file.

The destination folder automatically opens and the collection Zip file is highlighted.

Supplementary Note

The collection zip file name is as follows. yyyyMMdd.HHmmss *********.zip

- yyyyMMdd.HHmmss: Date and time when you click on the [Execute] button
- ********: xMtn file name

Restrictions

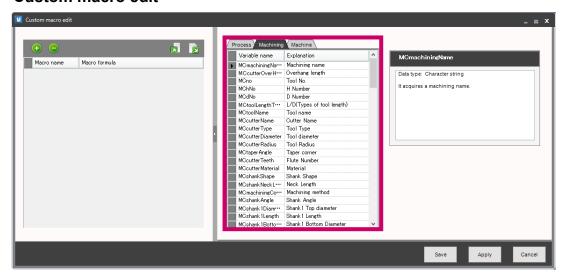
- You cannot specify files other than the xMtn file.
- If the file path to the xMtn file is more than 200 characters, an error message is displayed and the collection process is not executed.
- If the same version of FFCAM as the specified xMtn file is not installed on the PC, a dialog is displayed. In the dialog, select whether to continue the collection process.
- If the data folder to be collected does not exist, a warning message is displayed. The collection process is continued, and only folders that exist are collected.
- If the creation of the collection zip file is not completed successfully, a warning message is displayed.
 - However, the collection zip folder is created, the destination location is opened, and the collection zip file name and file path are displayed even in [Output Information].

14. Addition of Macro Definition to Machining Parameter Macro

New macro definitions have been added to the machining parameter macros. Refer to the following for the added macro definitions.

List of added macro definitions

Custom macro edit

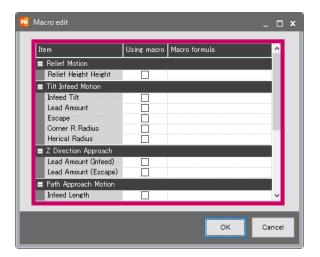


| Screen | Item | | | Remarks |
|--------|-----------|----------------------|---------------|--------------------------|
| name | Tab name | Variable name | Explanation | Explanation statements |
| Custom | Process | MCcommonEscapeHeight | Common | Data type: Real number |
| macro | | | Relief height | type |
| edit | | | | Gets the common relief |
| | | | | height. |
| | | MCprocessIndex | Process | Data type: Integer type |
| | | | number | Gets the process number. |
| | Machining | MCtaperAngle | Taper angle | Data type: Real number |
| | | | | type |
| | | | | Gets the taper angle. |
| | | Mcshank1Diameter | Shank 1 | Data type: Real number |
| | | | upper | type |
| | | | diameter | Gets the shank 1 upper |
| | | | | diameter. |
| | | Mcshank1Length | Shank 1 | Data type: Real number |
| | | | length | type |
| | | | | Gets the shank 1 length. |

| MCshank1BottomDiameter | Shank 1 | Data type: Real number |
|------------------------|----------|--------------------------|
| | bottom | type |
| | diameter | Gets the shank 1 bottom |
| | | diameter. |
| Mcshank2Angle | Shank 2 | Data type: Real number |
| | angle | type |
| | | Gets the shank 2 angle. |
| Mcshank2Diameter | Shank 2 | Data type: Real number |
| | upper | type |
| | diameter | Gets the shank 2 upper |
| | | diameter. |
| MCshank2Length | Shank 2 | Data type: Real number |
| | length | type |
| | | Gets the shank 2 length. |
| MCshank2BottomDiameter | Shank 2 | Data type: Real number |
| | bottom | type |
| | diameter | Gets the shank 2 bottom |
| | | diameter. |
| Mcshank3Angle | Shank 3 | Data type: Real number |
| | angle | type |
| | | Gets the shank 3 angle. |
| Mcshank3Diameter | Shank 3 | Data type: Real number |
| | upper | type |
| | diameter | Gets the shank 3 upper |
| | | diameter. |
| MCshank3Length | Shank 3 | Data type: Real number |
| | length | type |
| | | Gets the shank 3 length. |
| MCshank3BottomDiameter | Shank 3 | Data type: Real number |
| | bottom | type |
| | diameter | Gets the shank 3 bottom |
| | | diameter. |
| Mcshank4Angle | Shank 4 | Data type: Real number |
| | angle | type |
| | | Gets the shank 4 angle. |
| Mcshank4Diameter | Shank 4 | Data type: Real number |
| | upper | type |
| | diameter | Gets the shank 4 upper |
| | | diameter. |
| MCshank4Length | Shank 4 | Data type: Real number |
| | length | type |
| 140 1 140 11 51 | | Gets the shank 4 length. |
| MCshank4BottomDiameter | Shank 4 | Data type: Real number |
| | bottom | type |
| | diameter | Gets the shank 4 bottom |
| | | diameter. |

| Mcshank5Angle | Shank 5 angle | Data type: Real number type |
|--|----------------------------------|--|
| Mcshank5Diameter | Shank 5 upper | Gets the shank 5 angle. Data type: Real number type |
| | diameter | Gets the shank 5 upper diameter. |
| MCshank5Length | Shank 5 length | Data type: Real number type Gets the shank 5 length. |
| MCshank5BottomDiameter | Shank 5 bottom diameter | Data type: Real number type Gets the shank 5 bottom diameter. |
| MCshankStepCount | Number of shank steps | Data type: Integer type Gets the number of shank steps. |
| MCescapeHeight | Relief height | Data type: Real number type Gets the relief height. |
| MCmachiningXYclear * Improvement of existing | XY Direction/Side | Data type: Real number |
| * Improvement of existing definitions MCmachiningZclear | Direction/Side Clearance | type Gets the following values. [Side Clearance] of the finishing allowance for Flat Face Machining and Flat Edge Machining The value of [XY Direction] for other machining is set to a number greater than or equal to "((Tool diameter/2) - Tool radius (R1)) x (-1)". Data type: Real number |
| * Improvement of existing definitions | Direction/Flat Surface Clearance | type Gets the following values. [Flat Surface Clearance] of the finishing allowance for Flat Edge Machining The value of [Z Direction] for other machining is set to an unrestricted number. |

Macro edit



| Screen | Item | | | |
|-----------|--------------------------------|--------------------|-------------------------|--|
| name | Tab name | | Parameter name | |
| Process | Process Start/End Point/Relief | Common Start Point | Relief Height | |
| Setting | Setting | Setting | | |
| Machining | Relief/Approach/Infeed Setting | Relief Motion | Relief Height - Height | |
| Parameter | Finish Allowance/Accuracy | Finish Allowance | XY Direction | |
| Setting | Setting | | * Excluding Flat Face | |
| | | | Machining and Flat Edge | |
| | | | Machining | |
| | | | Z Direction | |
| | | | * Excluding Flat Edge | |
| | | | Machining | |