102-NF-18200

FFCAM 2018.2

Description of New Functions

MAKINO

Preface

This manual describes the functions added to FFCAM 2018.2 and how to use them.

Created on

September 2018

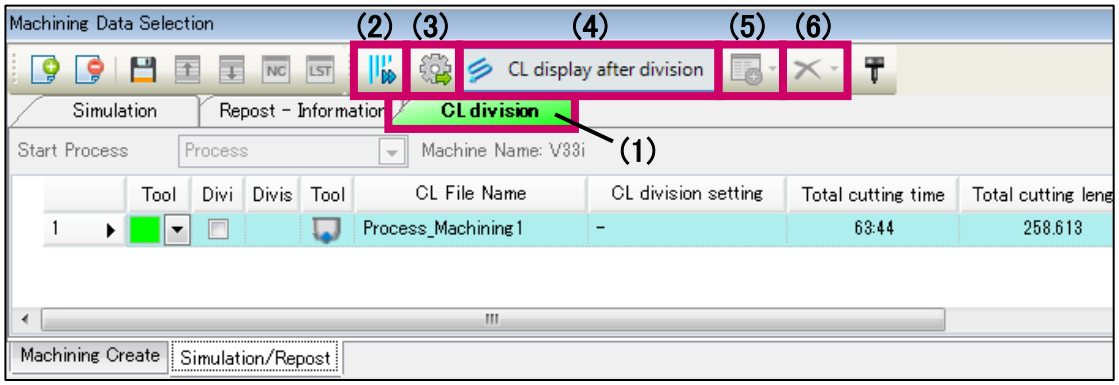
List of Added Functions in FFCAM 2018.2

1. CL Division Function

During machining that takes a long time (cutting length), damage to the tool and deterioration of the machined surfaces occur if tool service life is exceeded during machining.

In FFCAM2018.2, you can divide the tool path based on cutting time or cutting length so that machining can be continued beyond the service life of the tool.

■ Setting screen ([CL division] tab/toolbar)



(1) CL division [CL division] tab

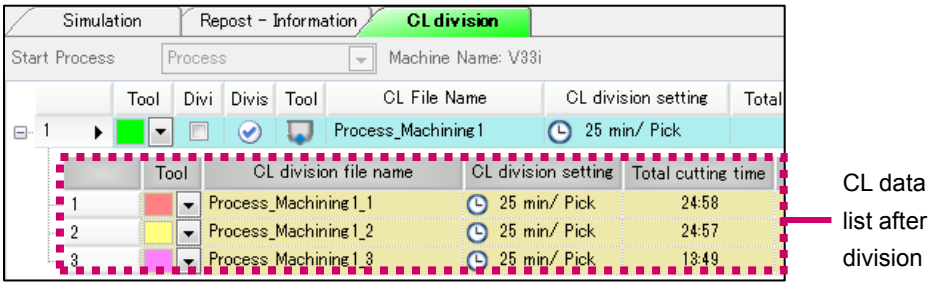
Switches to CL division mode.

(2) CL division

Executes division of CL data according to the contents set in [CL division setting].
The name of the CL data after division is given below.

<file name of original division data_1, file name of original division data_2…>

Also, the file name is expanded in such a way that the list of CL data after division is dependent on the child hierarchy of the original CL data list that is divided.



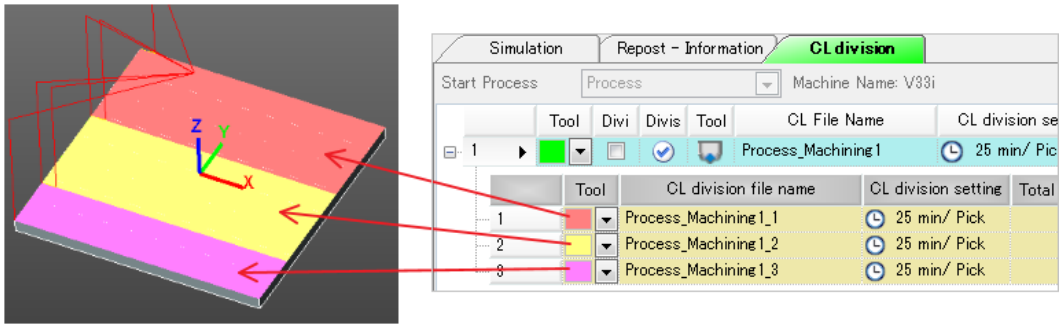
(3) CL division setting

Set the CL division method in [CL division setting] window.

※ For details, see the item of "Setting screen ([CL division setting] window)" below.

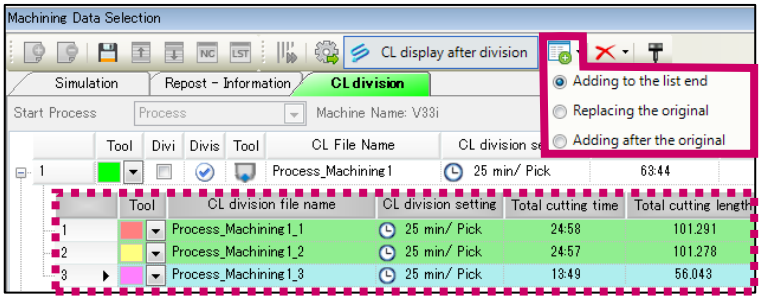
(4) CL display after division

Draws the CL data after division on the graphics window while the button is pressed. Unlike regular CL drawing, each divided CL (file unit) is displayed in different colors. The color set in the CL list is applied.

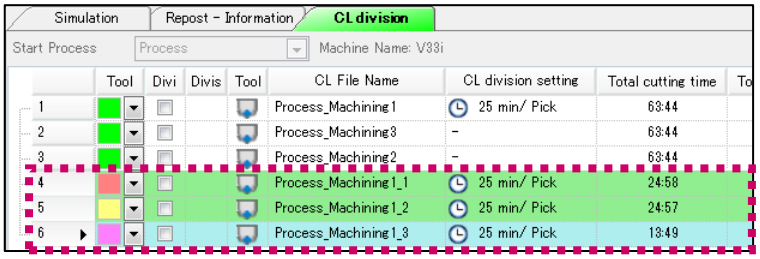


(5) Registration of division result to the list

Registers CL data after division in the child hierarchy of the CL list to the parent hierarchy of the CL list.
The CL data registered in the parent hierarchy is also registered in CL lists of [Simulation] and [Repost] tabs enabling execution of simulation and repost. (Data cannot be registered while simulation or repost is in progress.)



After registration, CL data after division moves from the child hierarchy of the CL list to the same parent hierarchy as the original CL data it was divided from.



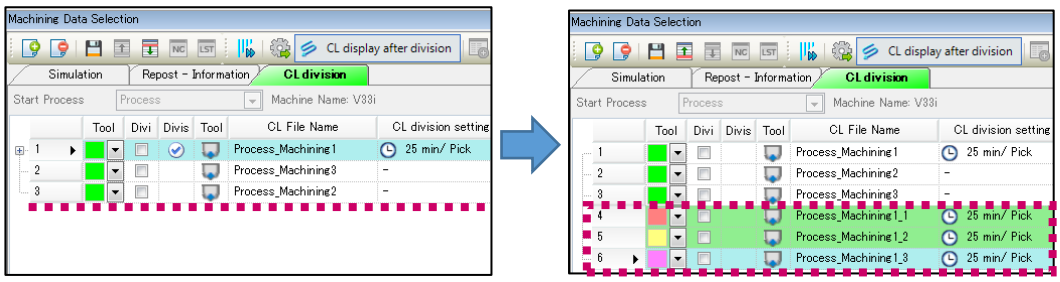
This is also reflected in the CL lists on the [Simulation] and [Repost] tabs.

Registration mode of [Registration of division result to the list]

Using ▼ at the right of the [Registration of division result to the list] button, select the method to register the CL data after division to the parent hierarchy of the CL list.

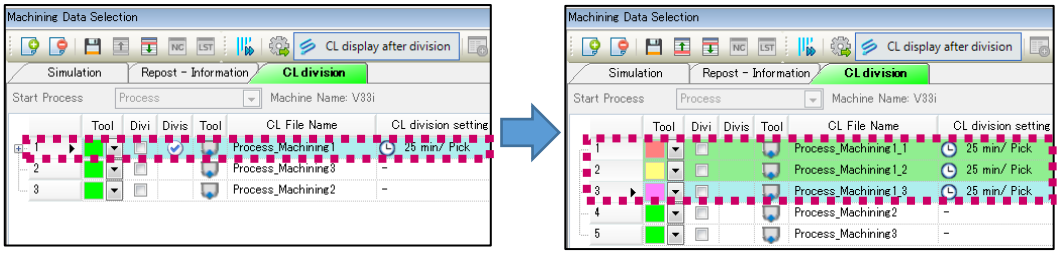
- **Adding to the list end**

  Adds the CL data after division to the end of the CL list (parent hierarchy).



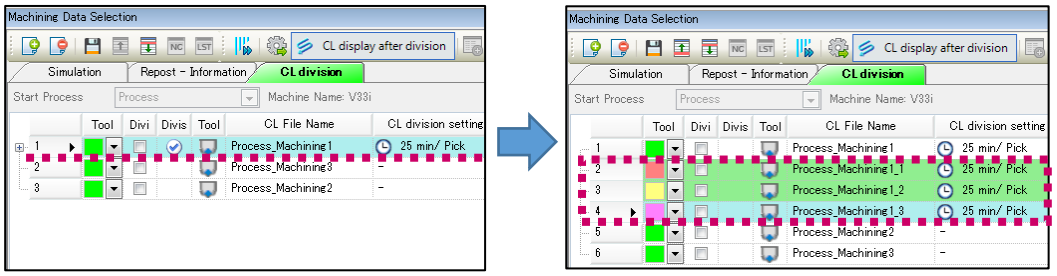
- **Replacing the original**

  Deletes the original CL data and replaces it with the CL data after division.



- **Adding after the original**

  Inserts the CL data after division into the next line of the original CL data.



(6)  Deletion of division result

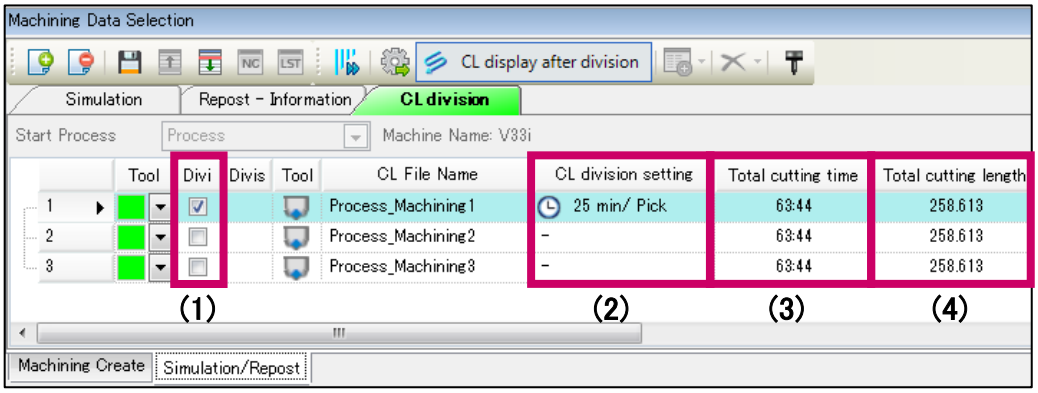
Deletes the selected CL data of division result from the list.
Further, you can select [Deletion of division result (including output files)] using ▼ at the right of the button.

Deletion of division result (including output files)

Deletes the file (*.cldata or *.xpst) created after division along with the CL data of the division result.

The CL data moved to the parent hierarchy after execution of [Registration of division result to the list] cannot be deleted with this function.

■ Setting screen (CL List)



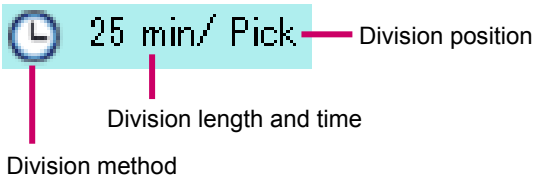
(1) Division reservation

The CL data with check mark is subject to division.

(2) CL division setting

Displays the set CL division method.

"-" is displayed for CL data for which division method is not set.



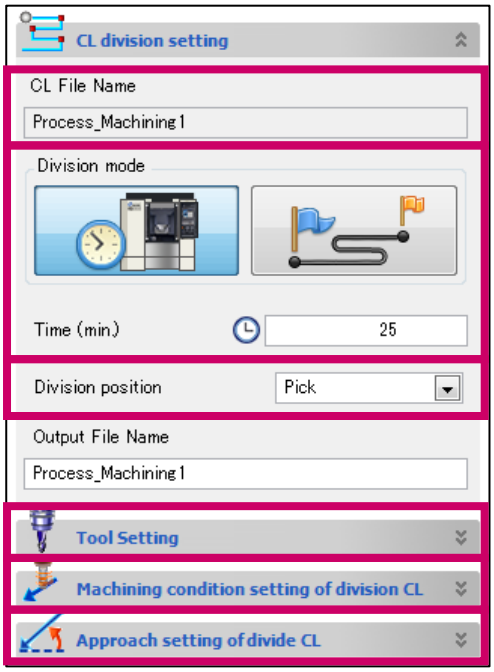
(3) Total cutting time

Displays the cutting time of CL data (including rapid traverse).

(4) Total cutting length

Displays the cutting length of CL data (including rapid traverse).

■ Setting screen ([CL division setting] window)



(1) CL File Name

Displays the name of the CL file being set.

(2) Division mode

Selects the CL division method using the [Time] or [Length] buttons.
Depending on the selected mode, an input field for setting the value of [Time (min)] or [Length (m)] is displayed. The total cutting time (seconds are rounded up) or total cutting length of the CL data is already entered as the initial value.

Time

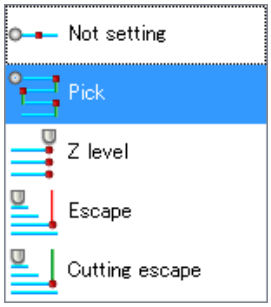
Executes CL division with cutting time.
Set the cutting time to be divided in the input field.

Length

Executes CL division with the cutting length.
Set the cutting length to be divided in the input field.

(3) Division position

Select a tool motion that is subject to CL division from the drop-down menu.
The CL division is performed at the final motion position within the set time or length of the selected tool motion.



Not setting
Performs CL division at the set time or length, regardless of the tool motion.

Pick
Performs CL division at the pick motion position.

Z level
Performs CL division at the timing when the Z level of contour motion changes.
For machining that does not include contour motion, such as projection machining and surface machining, CL division is not performed.

Escape
Performs CL division at the escape motion position.
For machining that does not include escape motions during machining, CL division is not performed.

Cutting escape
Performs CL division at the cutting escape motion position.
For CL data that does not include cutting escape motions, CL division is not performed.

(4) Tool Setting

Displays or edits the tool information.

When CL data before CL division is selected
Displays the tool information. Editing is disabled.

When CL data after CL division is selected
The tool information can be edited.

(5) Machining condition setting of division CL

Displays or edits the machining condition.

When CL data before CL division is selected
Displays the machining condition. Editing is disabled.

When CL data after CL division is selected
The machining condition can be edited.

(6) Approach setting of divide CL

Adds an approach to the position divided by CL division.

When CL data before CL division is selected

The approach method can be set.

When CL data after CL division is selected

Displays the defined approach information. Editing is disabled.

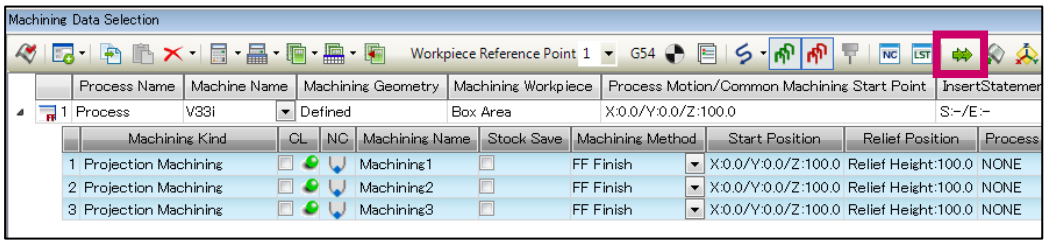
■ Operating Methods

This section covers operation examples from execution of CL division to creation of NC with CL data after division.

● CL division

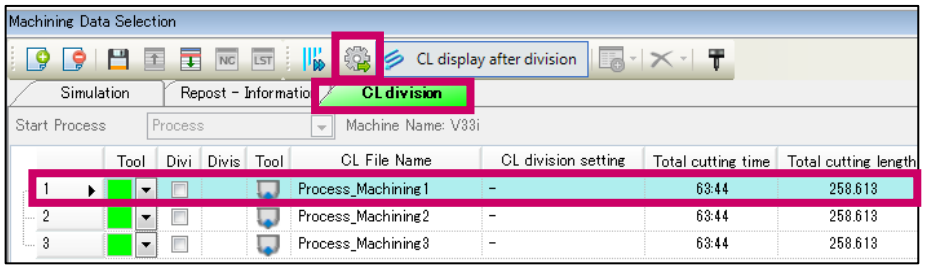
Operation Procedure:

1. Add the calculated CL data to the CL list.



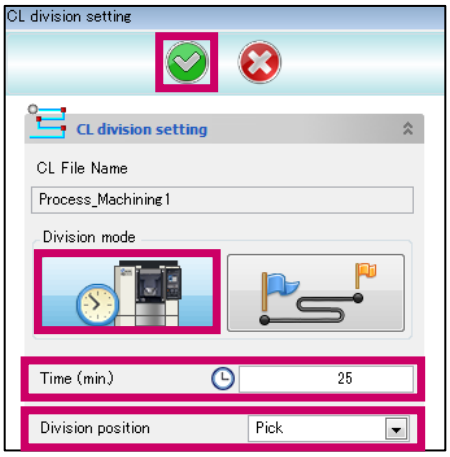
2. Open the [CL division] tab on the [Simulation/Repost] screen.

3. Select the machining for CL division, and click the [CL division setting] button.

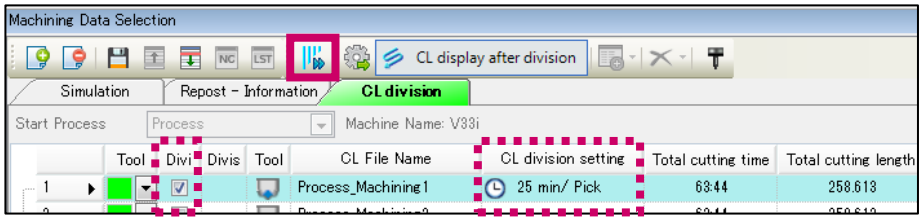


The [CL division setting] window opens.

4. Click the [Time] button under the division mode.
5. Set the [Time (min)] to "25".
6. Set the [Division position] to "Pick".
7. Click the check button to close the screen.

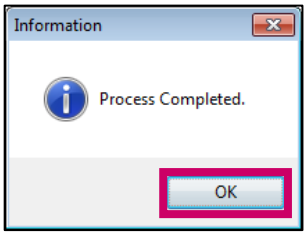


8. Check the following two points on the CL list.
   (1) The check box of [Division reservation] is selected.
   (2) The set value is displayed under the [CL division setting].
9. Click the [CL division] button to execute CL division.

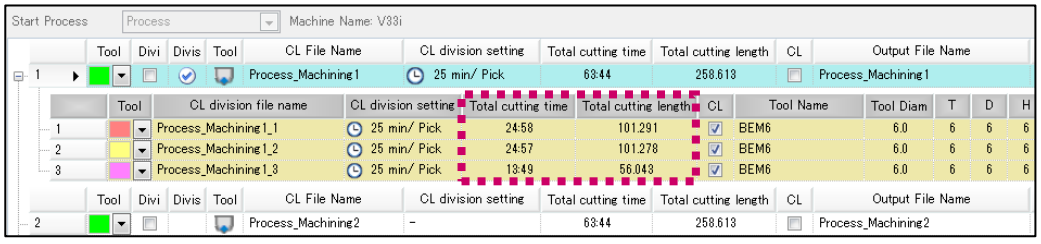


When division processing is completed, the [Information] message is displayed.

10. Click "OK".



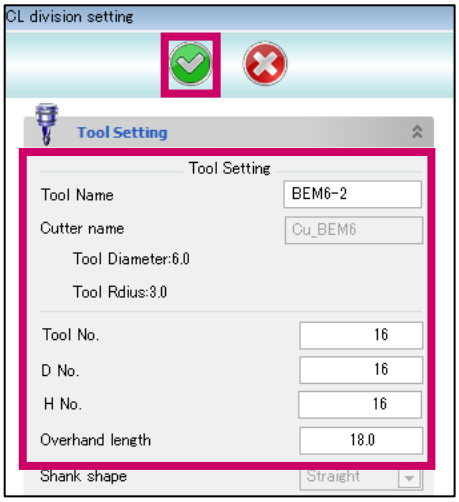
11. Check the numeric value of the divided CL data.
    The cutting time or cutting length should be less than or equal to the value you set.



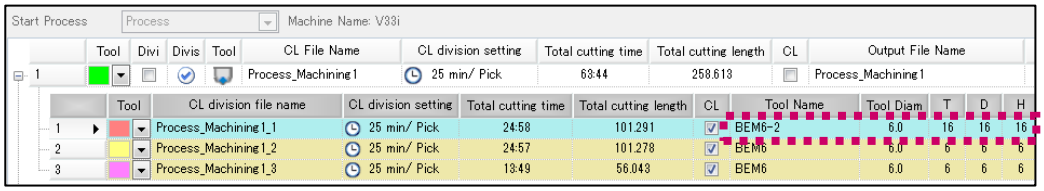
● Editing Divided CL Data

Operation Procedure:

1. Select the divided CL data, and click the [CL division setting] button.
   The [CL division setting] window opens.
2. Edit the [Tool Setting] as required.
3. Click the check button to close the screen.



4. Confirm that the tool information is changed.



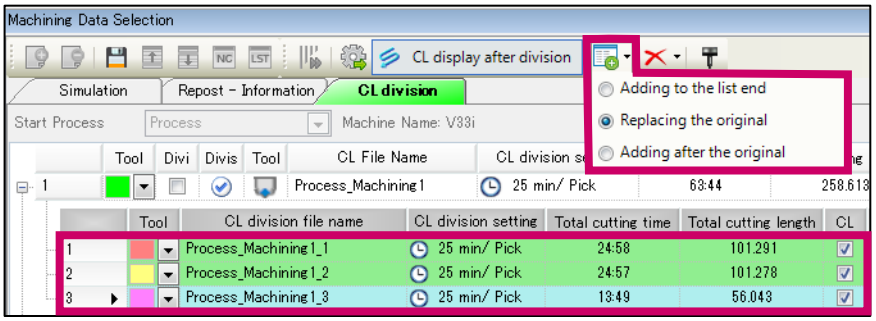
5. Repeat procedures *1.* to *4.* for other CL data to set them as well.

● Creation of NC with the Divided CL Data

Creating NC data with the divided CL data.

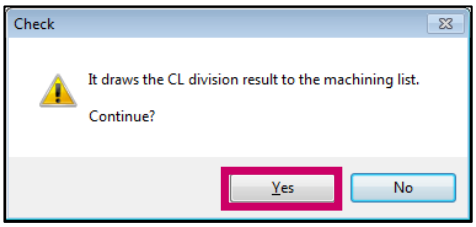
Operation Procedure:

1. Select the divided CL data, and click ▼ on the right side of the [Registration of division result to the list] button.
2. Select the [Replacing the original].
3. Click the [Registration of division result to the list] button.

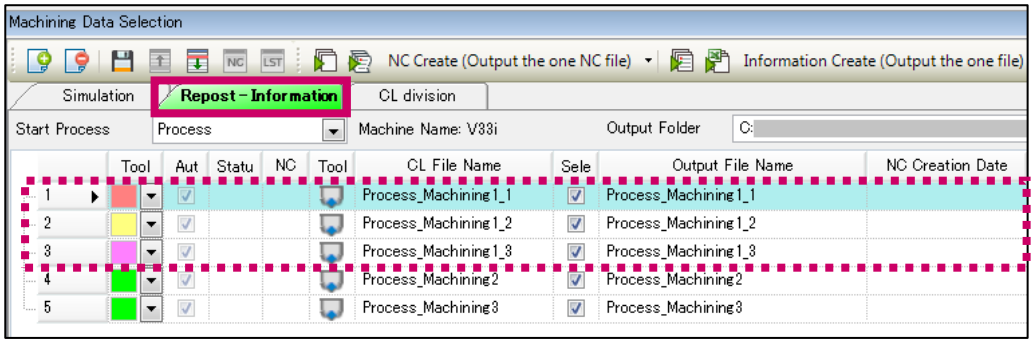


A [Check] message is displayed.

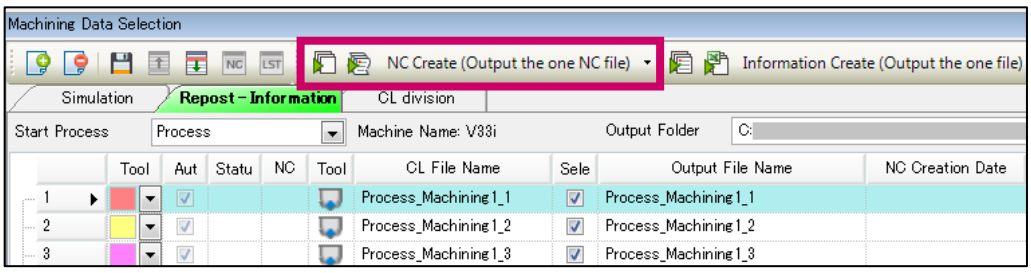
4. Click "Yes".



5. Open the [Repost - Information] tab.
   Confirm that the divided CL data is displayed.



6. Output the NC.



■ Note

CL data which is created with the batch path calculation cannot be divided.

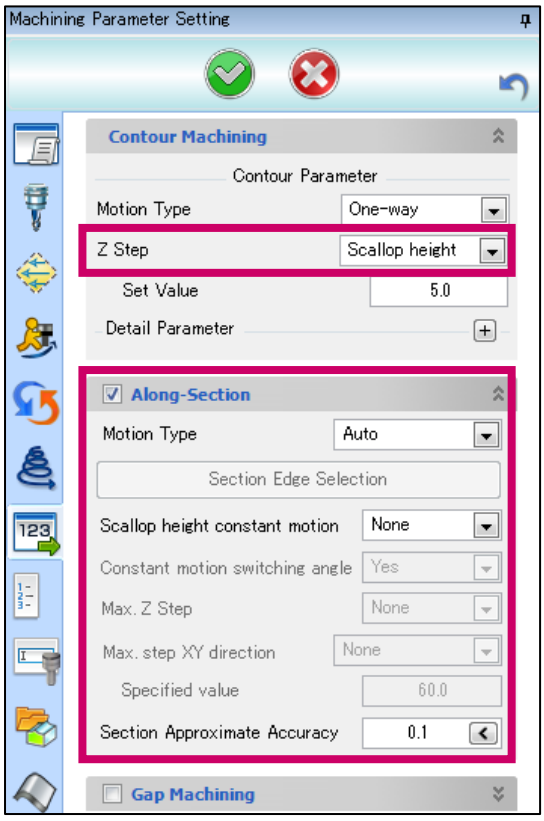
2. Removal of Restrictions on Lens Barrel Tool

The following two parameters can now be set for the lens barrel tool added to FFCAM 2018.

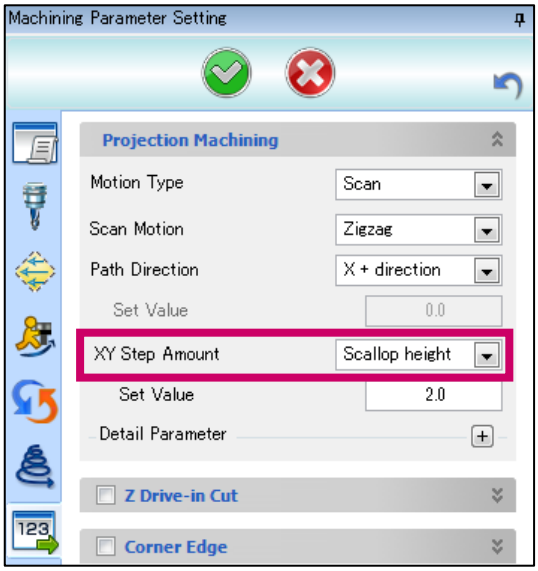
- Specification of step height by scallop height
- Along-section machining

■ Setting Screen

● Contour Machining



● Projection Machining



3. Addition of Parameters for Specifying Along-Section

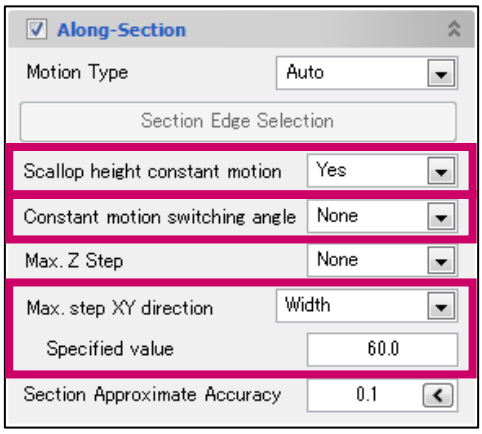
A "Scallop height constant motion" function has been added.

In conventional along-section machining, a tool path of uniform width was output for a specified cross-sectional shape. This prevented the generation of many uncut portions on flat parts.

In the "Scallop height constant motion" function, a tool path with constant scallop height after machining is output. This enables machining the side surfaces reducing the gap between tool paths to only the required extent while preventing uncut portions on the flat parts.

■ Setting Screen

Parameters added to [Along-Section]



(1) Scallop height constant motion

Outputs a contour tool path with step width where the scallop height is constant.

None

Outputs a tool path keeping a constant distance from the cross-section. (existing function)

Yes

Outputs a contour tool path where the scallop height is constant.

(2) Constant motion switching angle

A function to switch between scallop constant motion and along-section motion depending on the inclination angle.

None

Scallop height is constant in all areas.

Yes
Makes the scallop height constant in the area where the inclination angle is more than 45°.
For the portion where the inclination angle is less than 45°, performs contour motion with uniform steps on the cross-section.

(3) Max. step XY direction

Prevents the steps in the X and Y directions from becoming larger than [Max. step XY direction]. (Step in the XY direction ≦Max. step XY direction)
This function is effective for gentle slopes when flat end mill or bullnose end mill is used.

None
The [Max. step XY direction] is not specified.

Width
The step is specified along the width (mm).
Enter a value in the [Specified value] field.

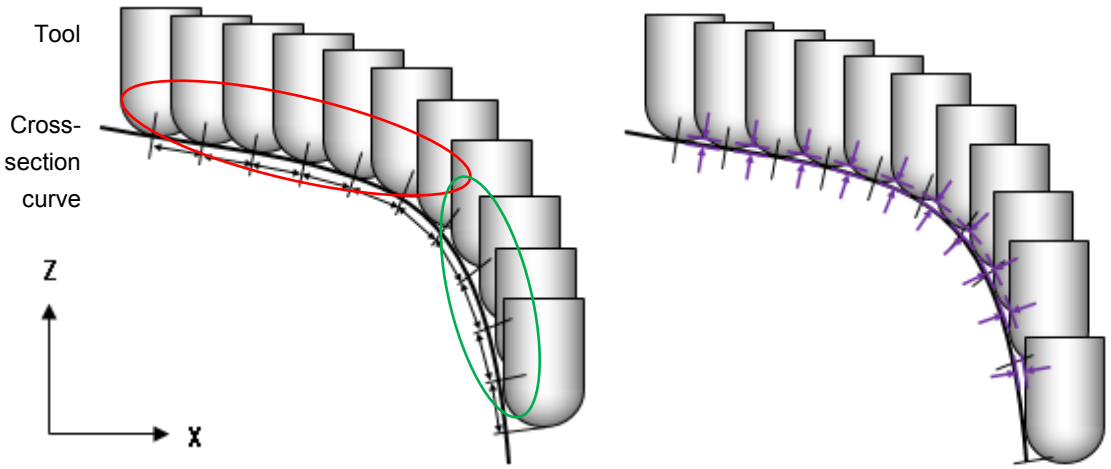
Tool ratio
The step is specified in percentage (%) with respect to the tool diameter.
Enter a value in the [Specified value] field.

■ Explanation matter

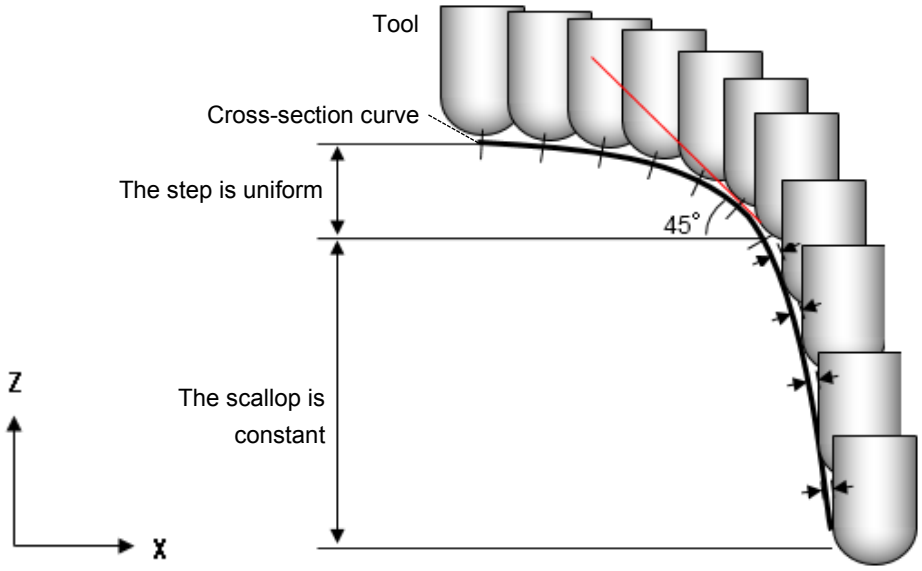
(1) Difference between "Conventional along-section" and "Scallop height constant motion"

- Conventional along-section
  The spacing between tool paths on the cross-section is constant.
  In the figure below, the scallop height on the machined surface is different for the areas indicated by red and green circles.

- Scallop height constant motion
  The scallop height is constant on the cross-section.
  The spacing between tool paths are non-uniform according to the inclination angle of the cross-section.



(2) When output by specifying "Yes" for [Constant motion switching angle]



■ Note

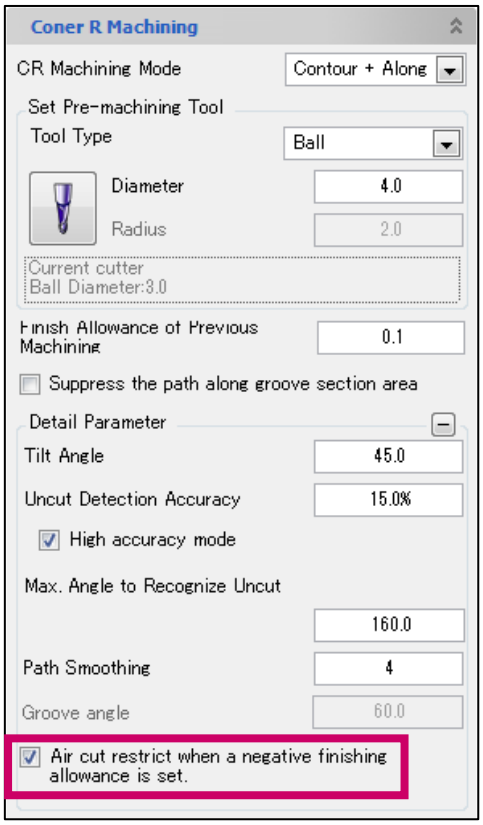
(1) When [Scallop height constant motion] is "Yes", you cannot use "Averaging" of Contour Machining.

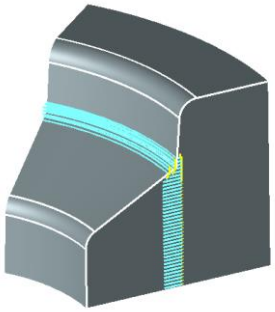
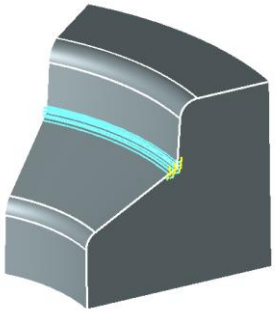
(2) If [Contour Face Cut Machining] is checked, the following functions are not available.
- Scallop height constant motion
- Constant motion switching angle
- Max. step XY direction

4. Improvement of Air Cut Path in CR Machining

When a negative finishing allowance is set for contour machining such as fillets etc., tool paths may be created in portions where it is not required.
As a function to prevent this motion, the "Air cut restrict when a negative finishing allowance is set" parameter is added.

■ Setting Screen



●Outputs with Check OFF (conventional)	●Outputs with Check ON
	

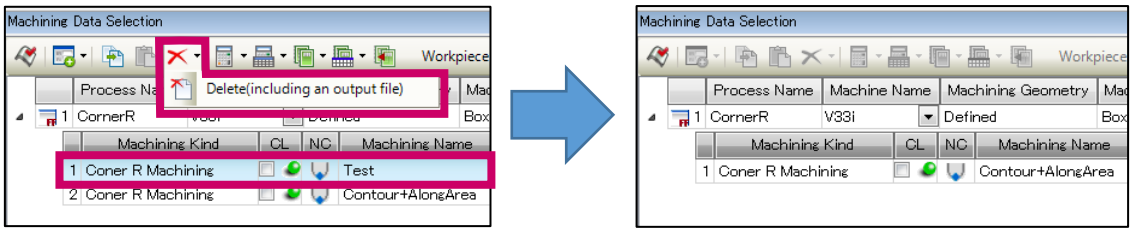
5. Deletion of Output File While Deleting Process/Machining

When deleting processes or machining on the [Machining Data Selection] screen, files created after calculation can now be deleted together.

As files that are not required is not saved in the calculation result output destination folder, file management becomes easier.

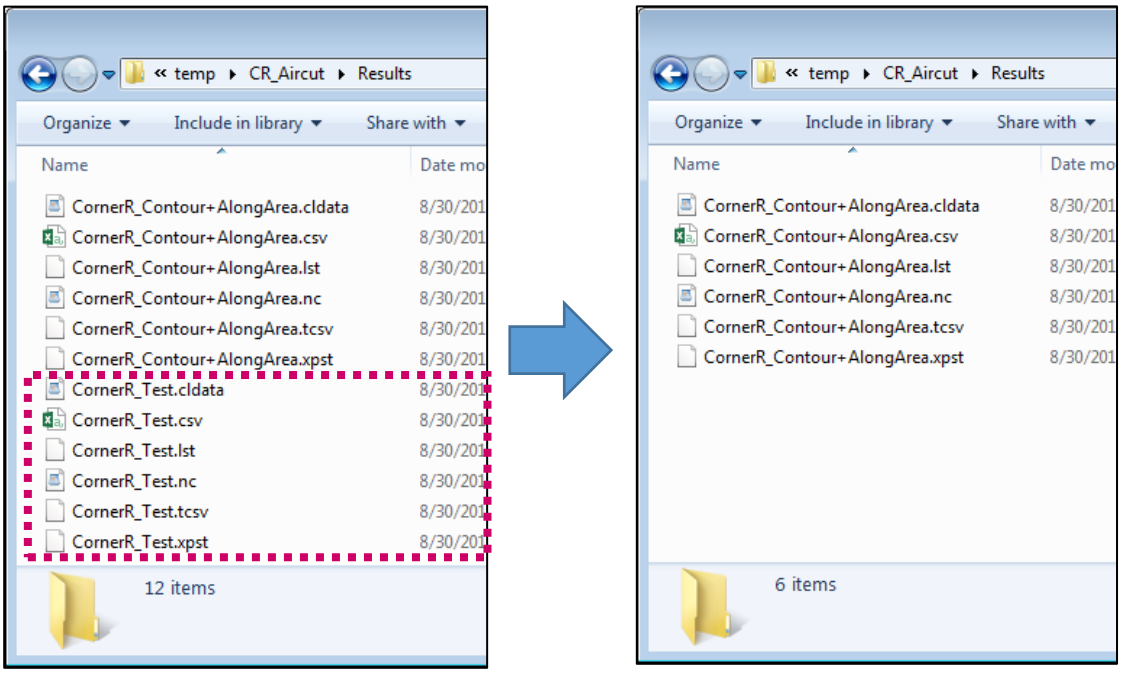
●Operations in the [Machining Data Selection] screen

Select machining data, and click the [Delete (including an output file)].
The selected machining data is deleted.



●Output destination folder

The files output by the deleted machining data are deleted.

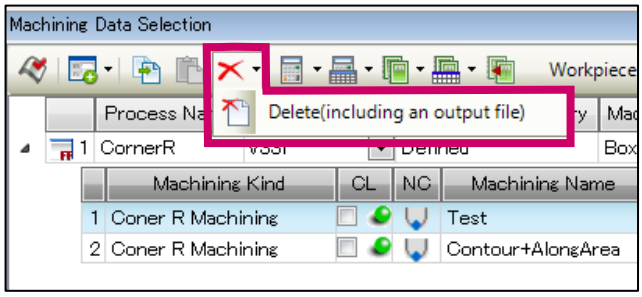


■ Operation Screen

You can operate using the following two methods:

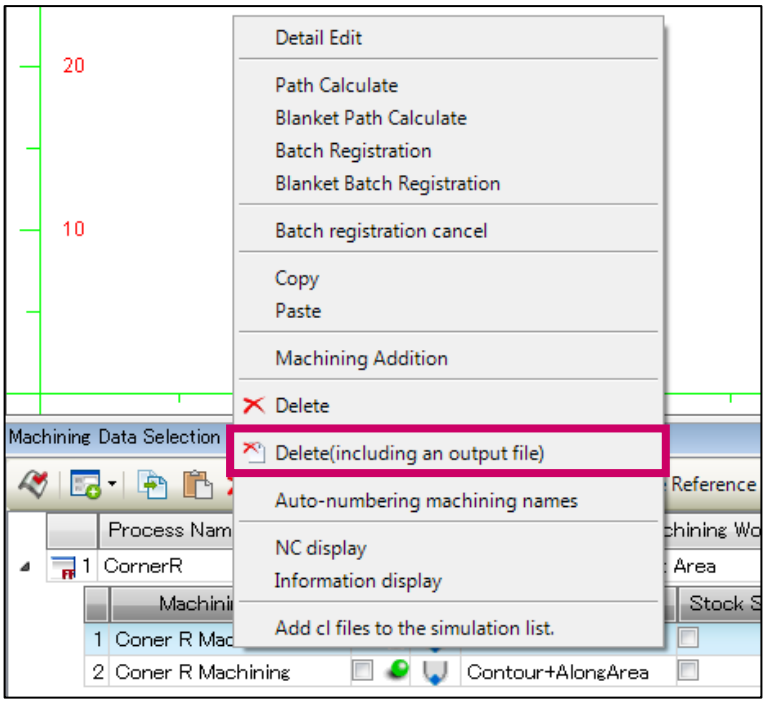
● Toolbar on [Machining Data Selection] screen

After selecting machining data (or process data), click ▼ at the right of the [Delete] button, and select [Delete (including an output file)] from the menu that is displayed.



● Right click menu on [Machining Data Selection] screen

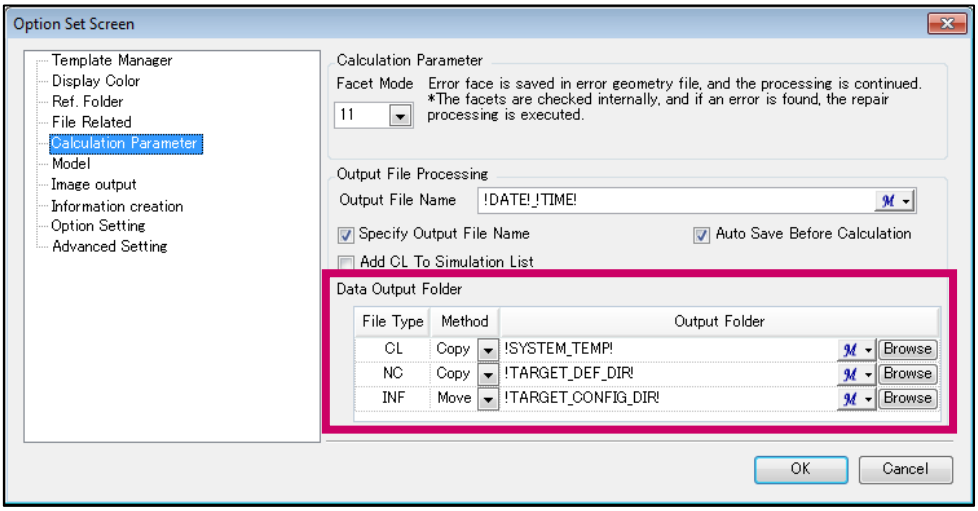
Right click on the machining data (or process data) to be deleted, and select [Delete (including an output file)] from the menu that is displayed.



■ Explanation matter

The output files that are deleted by the [Delete (including an output file)] function are the files in the following folders.

1. Results folder
2. Folder set by the [Calculation Parameter] in Option Set Screen



However, files are not deleted in the following cases.

- When the file name has been changed.
- When files are written out by appending date and time to the output file names, the file calculated last is deleted, but previous files are not deleted.

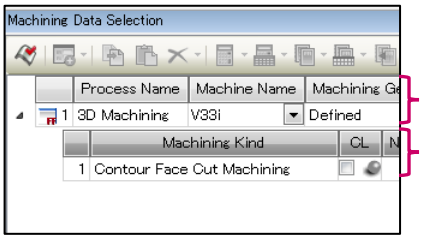
  Ex.) When the output file name is in the form of "date_time_machining name"

  20180801_0920_machining1.xxx
  20180801_0940_machining1.xxx
  } These files are not deleted as they are not the latest files.
  20180801_1530_machining1.xxx ←The file calculated last is deleted.

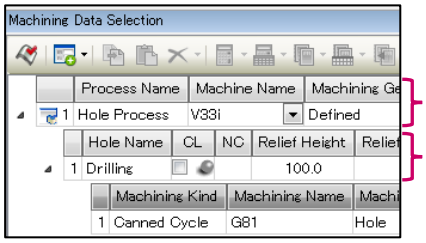
■ Note

- When "Process" is selected: Deletes all files related to machining included in the process.
- When "Machining" is selected: Deletes the selected machining file.
- When "Hole Process" is selected: Deletes all hole process files included in the hole process.
- When "Hole Information" is selected: Deletes the hole process file(s) included in the selected hole information.

● 3D



● Drilling

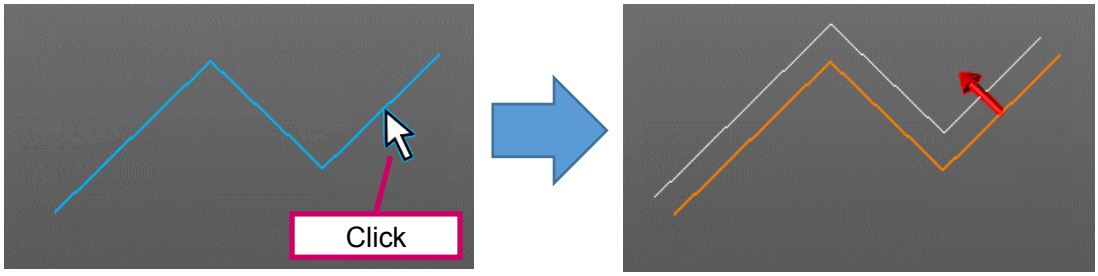


6. Specification of Offset Curve Direction

With the Offset Curve function, you can now specify the direction before executing offset.

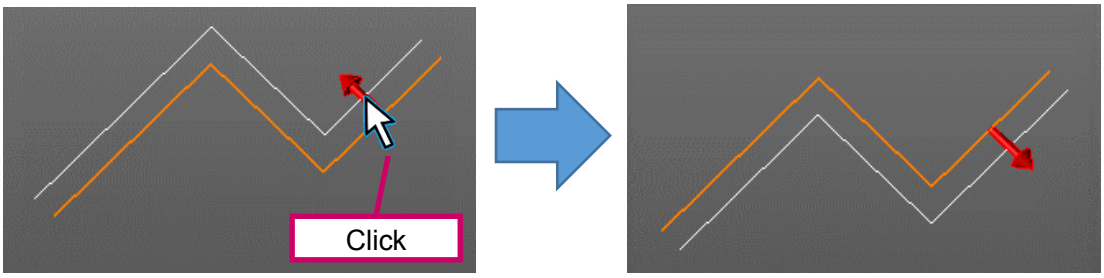
(1) Preview of the offset result

When you click on the curve to offset, an arrow indicating the offset direction is displayed along with the preview of the offset curve.



(2) Reversing the offset direction

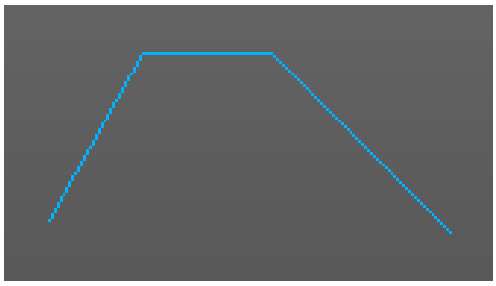
When you click on the arrow marker, the offset direction is reversed.

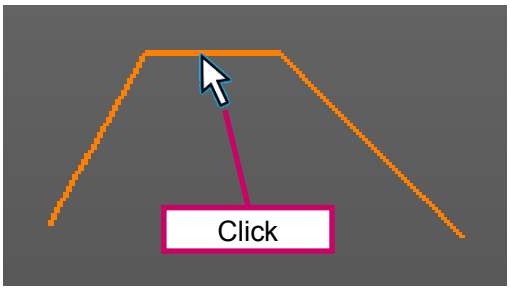
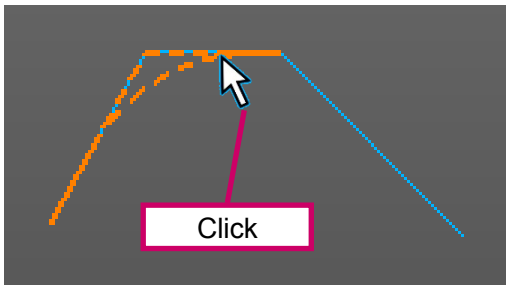


7. Improvement of Curve Fillet

Fillets can now be defined for curves and rectangles created together.

Ex.) Curves created together



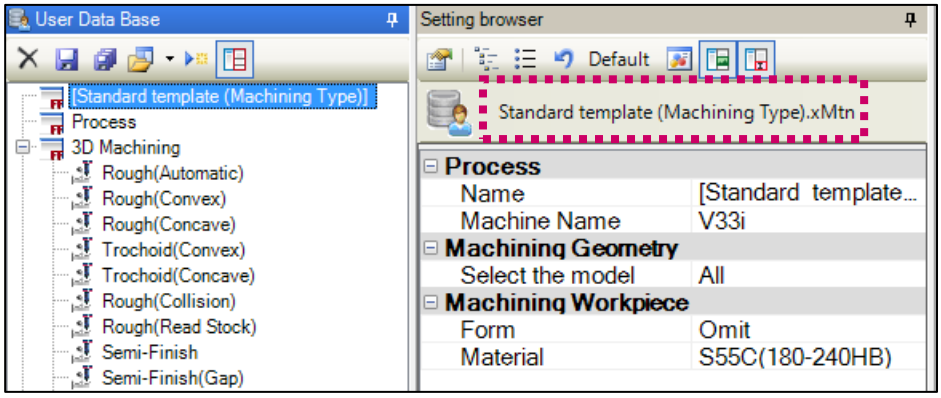
● **FFCAM 2018.1**	● **FFCAM 2018.2**
All the curves will be selected when you click on a curve and fillets cannot be created.	You can select individual curves even when curves are created together, and fillets can be created.
	
Note: You can create fillets after dividing the curves.	

8. Display of Template Name on Title Bar in Setting Browser

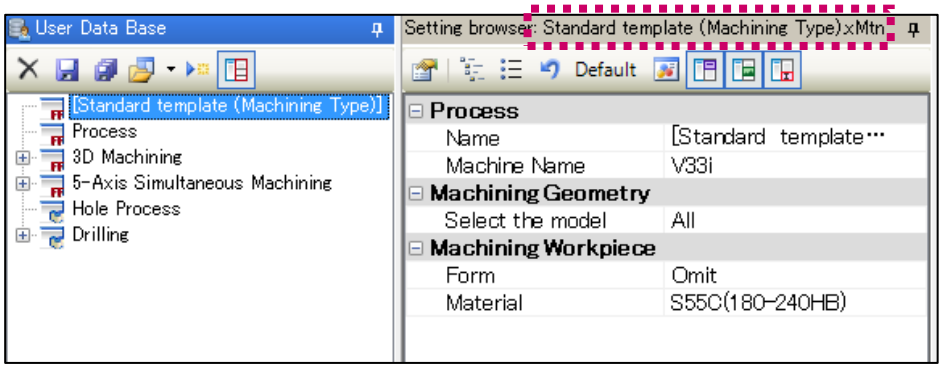
The template name displayed in [Setting browser] is now displayed in the title bar.
Since the template name display is compact, the [Setting browser] screen can be used widely.

■ Setting Screen

● FFCAM 2018.1



● FFCAM 2018.2



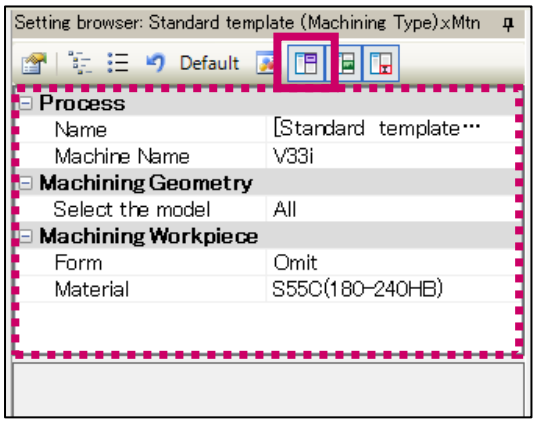
9. Display Function for Parameter List in Setting Browser

You can now toggle between display and hide for the parameter list of the [Setting browser].

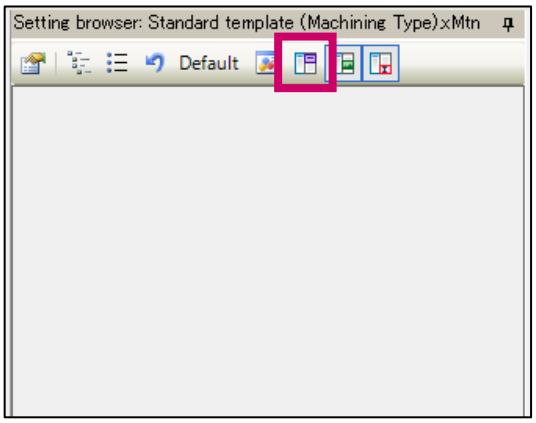
■ Setting Screen

Use the button on the toolbar to toggle between display and hide.

- **Display**



- **Hide**



10. Deletion of Image in Setting Browser

You can now delete images registered in the [Setting browser].

■ Setting Screen

Right click on the image display area, and select [Deletion of image] from the menu that is displayed.