

# The Complete Reference Guide

## *RhinoCAM 2026*

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# Profile-NEST

MecSoft Corporation  
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## Welcome



# Profile-NEST Module 2026

[Prefer Printed Documentation? Check Here!](#)

[What's New](#) | [Quick Start Play List](#)

The [RhinoCAM Profile-NEST](#) module offers sheet nesting capability with 2-1/2 Axis Profiling toolpaths. Toolpaths can be nested individually or in groups with control over sheet size, layout and thickness, with all of the cut material simulation capabilities of the MILL module. Nesting parameters include grain control, auto-tagging, orientation, nesting reports and more, all running inside [Rhino](#).

For purposes of brevity, [RhinoCAM-Profile-NEST](#) will be referred to as [Profile-NEST](#) in all subsequent references. Also, [Rhino](#) refers to both [Rhinceros 7](#) or [Rhino 8](#).

[Profile-NEST](#) also comes with numerous post-processors to output the programmed G-code to some of the most popular machines in the market. This online help system provides comprehensive help topics as well as context sensitive ToolTips to help you become a productive user of [RhinoCAM](#).

## 1.1 Overview

The [RhinoCAM-Profile-NEST](#) module provides sheet nesting capability with 2-1/2 axis profile toolpaths. Toolpaths can be nested individually or in groups, with control over sheet size, layout and thickness with all the cut material simulation capabilities of the MILL module. Nesting parameters include grain control, automatic marking, orientation, nesting reports, and more, all running within the MILL module. [Rhino](#).

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## 1.2 Understanding

Here is some additional information that will help you understand how [Profile-NEST](#) works:

- [Profile-NEST](#) allows you to nest [2 Axis Profiling](#) toolpath operations onto one or more nested sheets. You can have multiple nest setups within the same [Machining Job](#). Each are listed in the order they are processed in the [Machining Job](#).

- The **Machining Job** can have one or more **Setups** called  **Operations to Nest**. If you expand a **Setup** in the **Machining Job** you will see that it has a set of **Nesting Parameters** assigned to it. You can adjust these parameters individually for each **Setup**. When you **Regenerate** a **Setup** the toolpath operations contained within it are updated and its associated nested sheets are also updated. Regenerating a toolpath operation will also update its associated nested sheets.
- When **Nested Sheets** are generated they are listed under the **Setup** they are associated with.

## 1.3 Work flow

**Profile-NEST** offers a quick and easy work flow for nesting **2 Axis Profiling** toolpaths. Working left to right from the Nest tab, here are the basic steps:

1. Define your **Machine** and **Post Processor**.
2. Define your **Sheet** parameters.
3. Set your **Nesting Parameters**.
4. Create your **2 Axis Profiling** operations.
5. Generate your Operations to update your **Nested Sheets**.
6. Review your **Nested Sheets**.
7. Generate your **Nesting Report** if needed.
8. **Simulate** and **Post Process**.

## 1.4 Post-Processing

Once the machining operations have been created and verified, they can be post processed to create **G-code** files. These **G-code** files can then be sent to the controller of the machine tool to drive the actual machine tool.

## Quick Start



# Profile-NEST Module 2026

[Prefer Printed Documentation? Check Here!](#)

[What's New](#) | [Quick Start Play List](#)

Quick Start Guides for each RhinoCAM module are available in both PDF and Video format. Refer to the following information to access these guides:



### What's New!

[What's New in RhinoCAM 2026](#)



### The Complete Quick Start Video Play List

[Here is a link to the complete 2026 Video Play List](#)



### How to Access the Quick Start Guide Documents

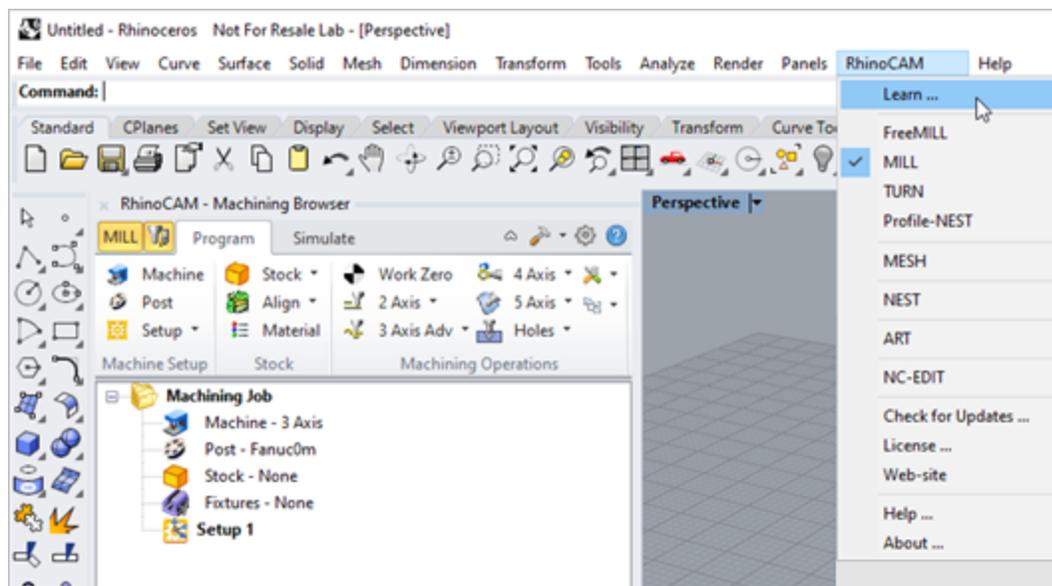
To help you quickly get started in working with each module, select one of the Help buttons located on the [RhinoCAM Learning Resources](#) dialog.

You will find:

- Quick Start Guides
- What's New documents
- Online Help links

The [Quick Start Guides](#) will help you step through an example tutorial which will illustrate how to use the module. To access the [Learning Resources](#) dialog:

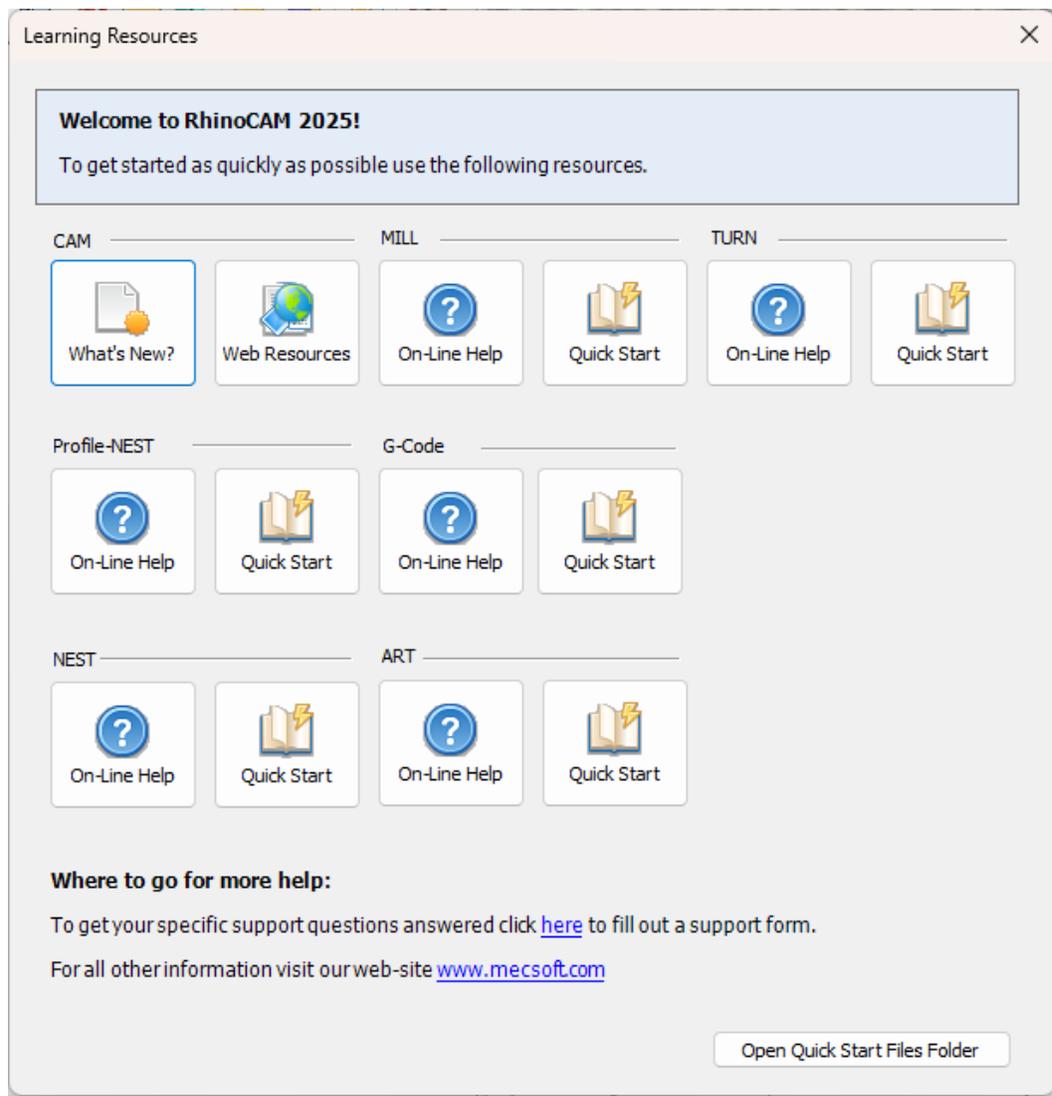
1. From the [Rhino Main Menu](#), drop down the Main menu and select [Learn ...](#)



To access the Learning Resources dialog in RhinoCAM

2. Select a document from the [Learning Resources](#) dialog to get started using the module of your choice.

 You can also select the [Open Quick Start Files Folder](#) button located at the bottom of the dialog to open the [Quick Start](#) folder where the source files (start and completed versions) are located.



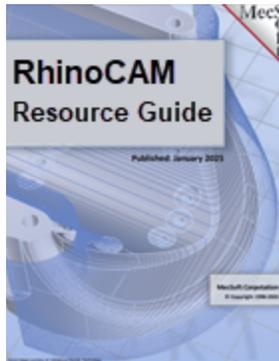
Learning Resources Dialog

## Resource Guide

Download this PDF Guide for a list of the available [RhinoCAM Resources](#).



### 2025 RhinoCAM Resource Guide



### The 2026 RhinoCAM Resource Guide!

*18 Pages*

Lists PDF downloads and Online resources including [Quick Start Guides](#), [Reference Guides](#), [Exercise Guides](#), [Tutorials](#) and [More](#).

[Prefer Printed Documentation? Check Here!](#)

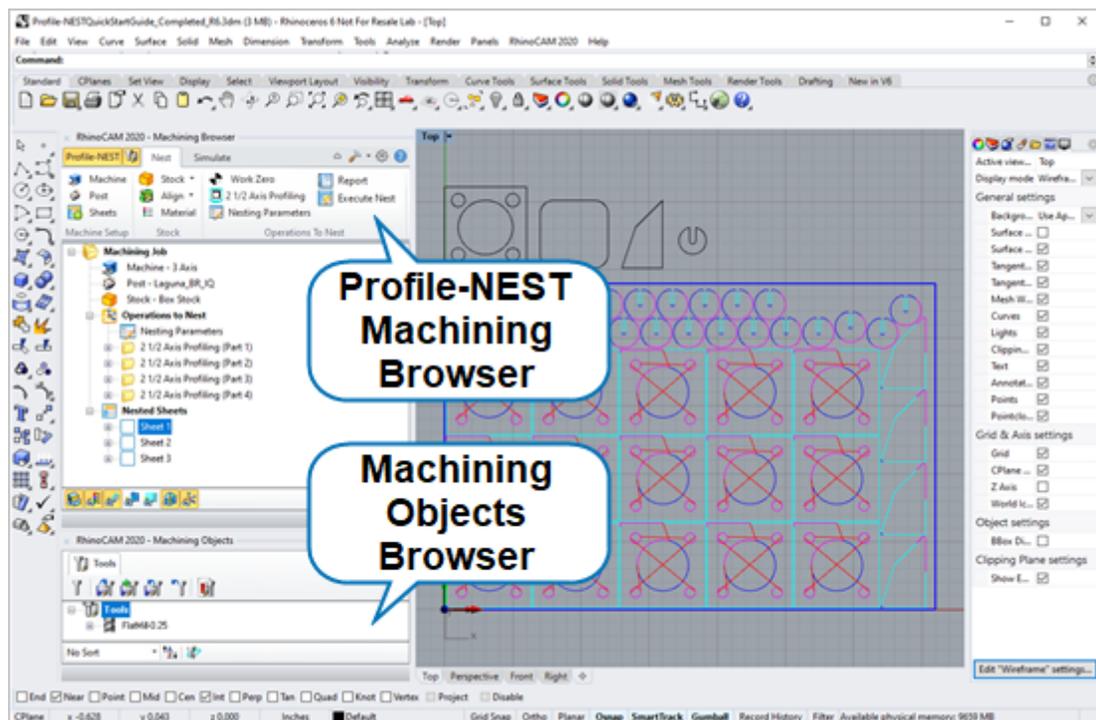
[What's New](#) | [Quick Start Play List](#)

## User Interface

The **RhinoCAM Profile-NEST** module adheres to the **Windows** standard for user interface design and integrated into the **Rhino** screen seamlessly.

### **MILL Module Displayed**

A screen shot of the **RhinoCAM Profile-NEST** module running inside of **Rhino** is shown below:



The Profile-NEST module running inside of Rhino

### **The RhinoCAM MILL Interface**

There are 3 main interface objects created when **MILL** module is loaded.

1. **RhinoCAM** menu bar entry under **Rhino** menu bar
2. **Machining Browser (Mops)** window
3. **Machining Objects (Mobs) Browser** window

## 4.1 The Main Menu

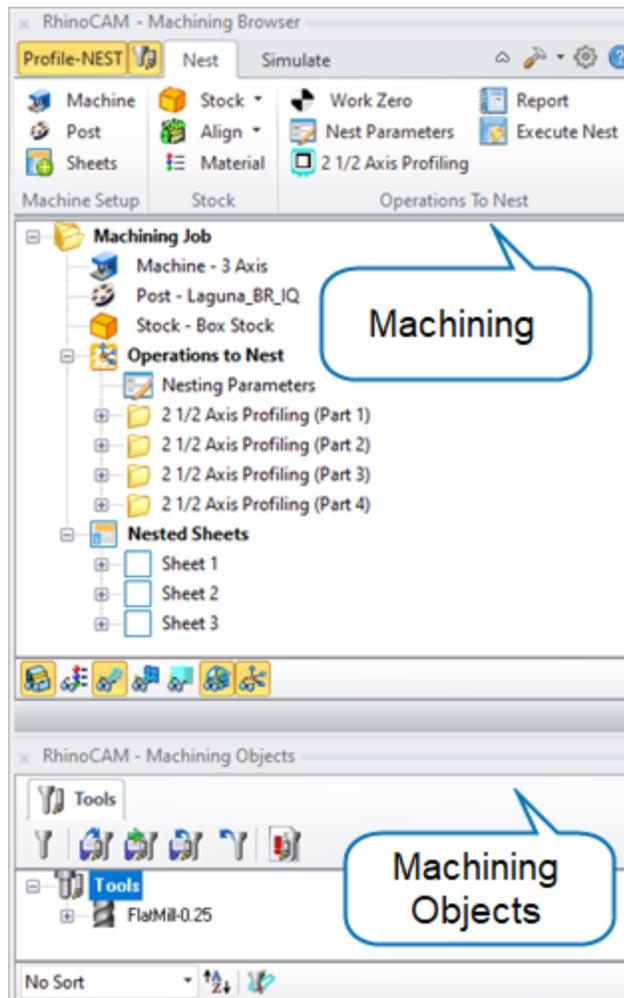
When **RhinoCAM** is loaded it will add a menu bar item, titled **RhinoCAM** to the main **Rhino** menu bar. Selecting this menu bar item will display a drop down menu as shown below.

## 4.2 Profile-NEST Browsers

The [Profile-NEST Browser](#) is a dock-able window that allows management of various entities or objects that can be created in the [RhinoCAM Profile-NEST](#) module. There are 2 browsers in [RhinoCAM](#) – the [Machining Operations Browser \(Mops\)](#) and the [Machining Objects Browser \(Mobs\)](#).

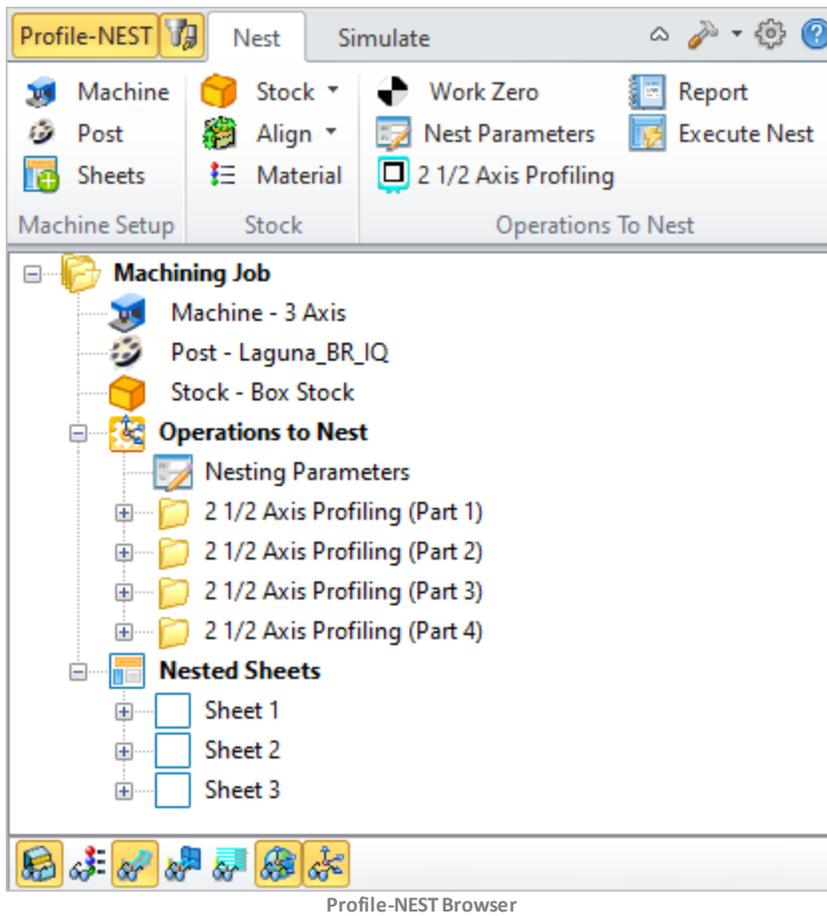


### Profile-Nest Browsers



## 4.3 Machining Browser

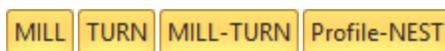
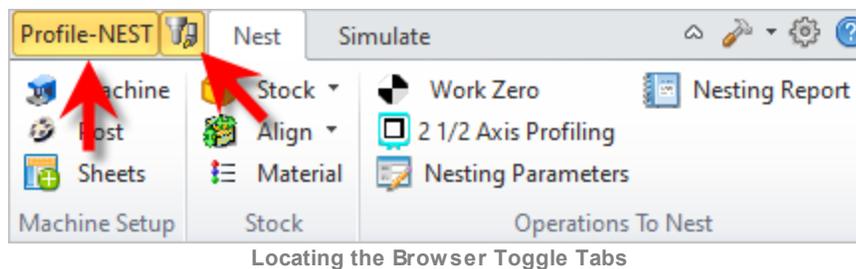
The [Profile-NEST Operations Browser](#) has two main modes of operation represented by tabs at the top of the window. These are [Nest](#) and [Simulate](#). Each tabbed view also incorporates a ribbon toolbar at the top and a toolbar at the bottom. These toolbars group all of the functions associated with the type of object in the tab.



### 4.3.1 Toggle Browser Tabs

Tabs are available on the [Machining Browser](#) that allow you to toggle the display of both the [Machining Browser](#) and the [Machining Objects Browser](#).

#### Browser Toggle Tabs



Selecting this tab toggles between each module browser that you are currently licensed to operate. Select the button to toggle to the [Profile-NEST Browser](#).

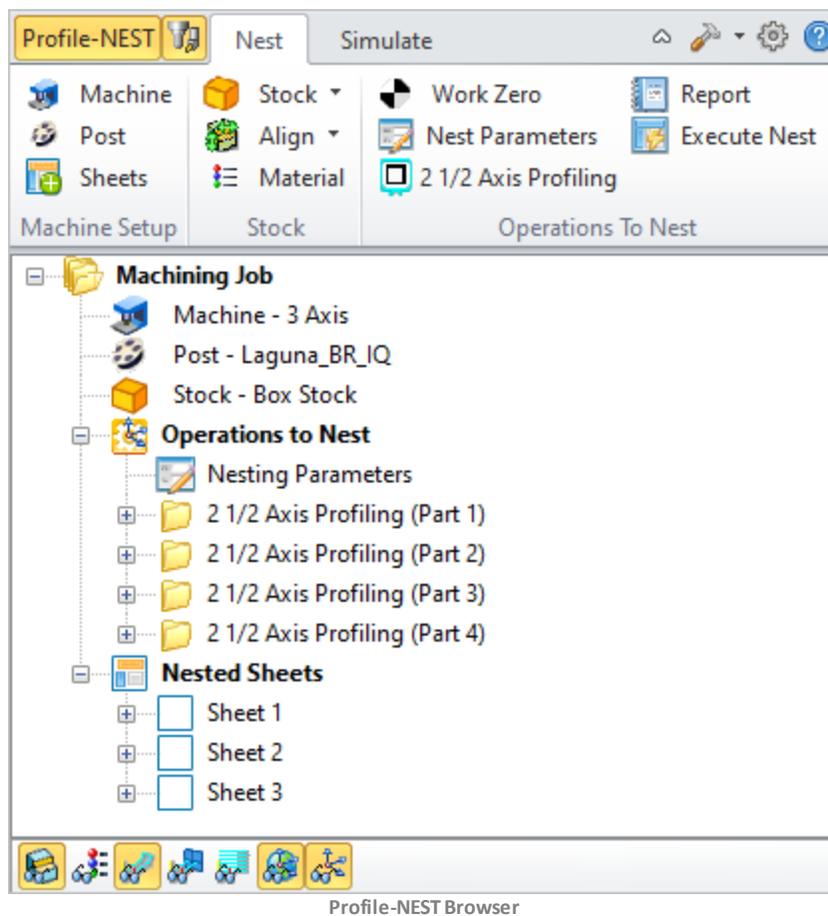


Select this tab to toggle the display of the [Machining Objects Browser](#).

### 4.3.2 Nest Tab

Selecting the [Profile-NEST](#) tab in the [Machining Browser](#) provides access to [Machine](#), [Stock](#) and [Operations to Nest](#) commands. These commands are listed in the ribbon bar when the [Nest](#) tab is selected.

#### The Machining Operations (Mops) Browser, Nest Tab

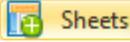


Profile-NEST Browser

#### Machine Setup Pane

This section allows you to define the [Machine Tool](#), [Post Processor](#) and the [Nested Sheets](#).

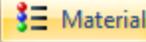
 <b>Machine</b>	<b>Machine Tool Setup:</b> Sets the <a href="#">Machine</a> for 2½ axis, 3 axis, 4 axis and 5 axis operations.
--	--

 Post	<b>Set Post-Processor Options:</b> Allows you to set the <b>Current Post Processor</b> , posted file naming conventions, posted file extension, program to display the posted file.
 Sheets	Add <b>Sheets</b> by defining sheet size parameters or geometry.



### Stock Pane

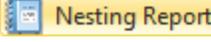
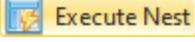
This section allows you to define the **Machine Tool**, **Post Processor** and the Nested **Sheets**.

 Stock	<b>Create Stock Model:</b> Allows you to create <b>Stock</b> geometry. User can also delete a <b>Stock</b> geometry by selecting <b>Delete Stock</b> .
 Align	<b>Align:</b> Allows you to <b>Align</b> stock model to part and locate <b>WCS</b> with respect to <b>Part</b> or <b>Stock</b> . This function is especially useful when the part model and the stock model are created without regard to their respective positional locations.
 Material	<b>Define Stock Material:</b> Allows you to select a material from the material list.



### Operations to Nest

This section allows you to create machining operations. The **Profile-NEST** module allows you to create multiple **2 Axis Profile** machining operations in a part file. This is a powerful feature that allows you to create an entire sequence of machining operations that is required in the nested sheet.

 Work Zero	Add a <b>Work Zero</b> to set the current work coordinate location for machining.
 Nesting Parameters	Set <b>Nesting Parameters</b> for the current <b>Profiling Nesting Machining Job</b> .
 2 1/2 Axis Profiling	Add a <b>2 Axis Profile</b> toolpath operation to the Machining Job.
 Nesting Report	Generate a <b>Nesting Report</b> of the current <b>Machining Job</b> .
 Execute Nest	<b>Execute</b> the nest with current parameters.



### Display Toggle Toolbar

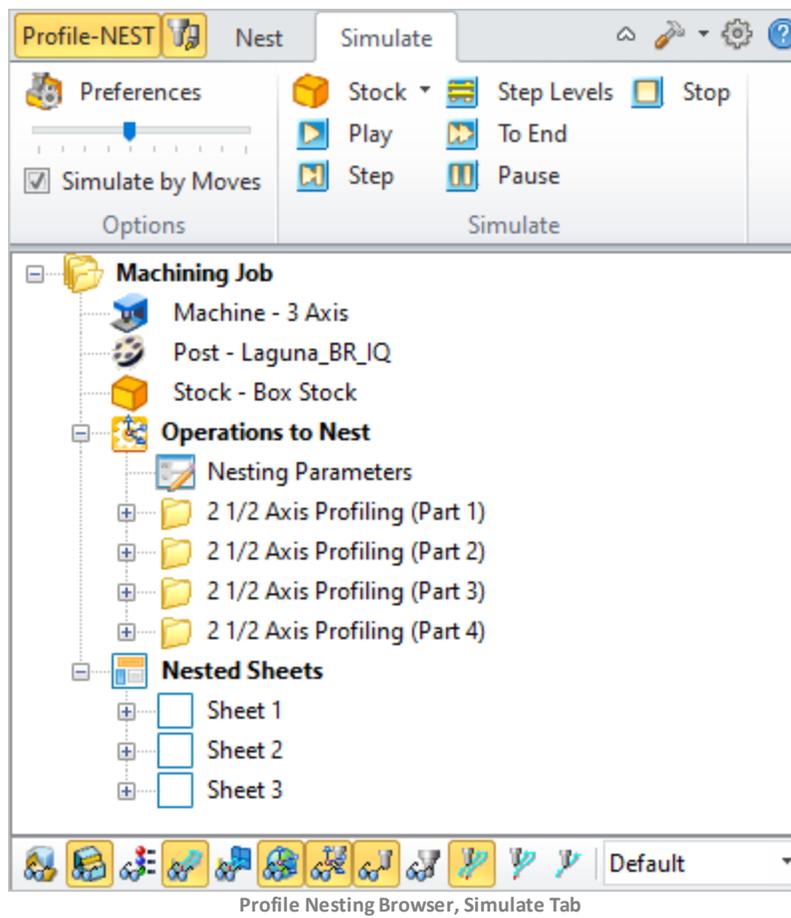
This toolbar is located at the base of the [Machining Browser](#) and has the following controls:

	<b>Stock Model Visibility:</b> Turn on/off stock model
	<b>Material Texture Visibility:</b> Turn on/off material texture visibility
	<b>Toolpath Visibility:</b> Turn on/off toolpath display
	<b>Hidden Toolpath Visibility:</b> Turn the hidden portions of toolpaths on/off.
	<b>Display Toolpath Levels:</b> Displays tool path by Z levels
	<b>World CSYS Visibility:</b> Turns on/off of <a href="#">World Coordinate System</a> display.
	<b>Machine CSYS Visibility:</b> Turns on/off of <a href="#">Machine Coordinate System</a> display.

### 4.3.3 Simulate Tab

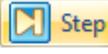
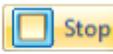
Select the [Simulate](#) tab to run cut material simulations and toolpath animations. This tab also provides controls to vary the simulation speed, set the simulation preferences and toggle the display state of various simulation components.

 [Profile Nesting Browser, Simulate Tab](#)



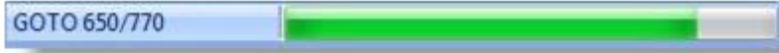
### Simulate Tab Functions

The following controls are available on the [Simulate](#) tab:

 Stock ▾	<b>Create Stock Model:</b> Allows you to create <b>Stock</b> geometry. You can also delete a <b>Stock</b> geometry by selecting <b>Delete Stock</b> .
 Play	<b>Perform Toolpath Simulation or Animation:</b> Allows you to perform cut material simulation with tool animation.
 Step	<b>Simulate Next Toolpath Block:</b> Simulation is performed in steps as defined by the display interval in the simulation preferences.
 Step Levels	<b>Simulate Next Toolpath Z Levels:</b> Simulation is performed in separate Z levels.
 To End	<b>Simulate to End:</b> Simulation is performed without updating the display until the end of the toolpath.
 Pause	<b>Pause Toolpath Simulation:</b> <b>Pause/Stop</b> the simulation.
 Stop	<b>Stop Toolpath Simulation:</b> <b>Exits Simulation Mode.</b> Pause simulation before exiting simulation mode.
	<b>Simulation Speed:</b> Varies simulation speed
 Preferences	<b>Set Simulation Preferences:</b> Provides access to simulation preferences.
<input checked="" type="checkbox"/> Simulate by Moves	<b>Simulate by Moves:</b> Switches from <b>Simulate by Distance</b> to <b>Simulate by Motions</b> .

### Simulate Toolbar Functions

The following toolbar controls are available on the **Simulate** tab:

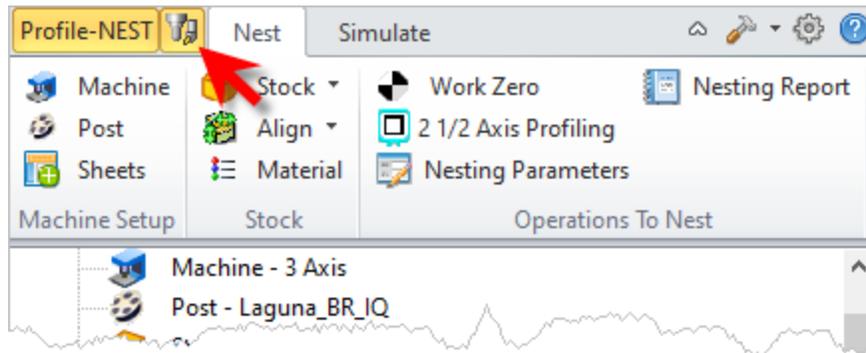
	<b>Part Model Visibility:</b> Turn on/off part model display during simulation.
	<b>Stock Model Visibility:</b> Turn on/off stock model
	<b>Material Texture Visibility:</b> Turn on/off material texture visibility
	<b>Toolpath Visibility:</b> Turn on/off toolpath display
	<b>Hidden Toolpath Visibility:</b> Turn the hidden portions of toolpaths on/off.
	<b>World CSYS Visibility:</b> Turns on/off of World Coordinate System display.
	<b>Machine CSYS Visibility:</b> Turns on/off of Machine Coordinate System display.
	<b>Tool Visibility:</b> Turn on/off tool display during simulation.
	<b>Holder Visibility:</b> Turn on/off tool holder display during simulation
	<b>Follow Toolpath Display:</b> The toolpath is displayed as it follows the behind the movement of the tool (i.e., you will only see the toolpath after the tool passes.
	<b>Trace Toolpath Display:</b> The toolpath is not displayed as it follows the behind the movement of the tool (i.e., you will only see the toolpath before the tool passes.
	<b>Segment Toolpath Display:</b> The toolpath is only displayed for the segment that the tool is currently on.
	<b>Simulation Display State:</b> Use this to select the display state for the simulation. Select from <b>Default</b> , <b>Tool</b> , <b>Mop</b> or <b>Texture</b> . See <b>Machining Operation Properties</b> for setting unique simulation colors for each Mop ( <b>Machining Operation</b> ) in your <b>Machining Job</b> .
 <p>The status bar displays the progress of the operation currently being simulated and number of <b>Goto</b> motions.</p>	

## 4.4 Machining Objects Browser

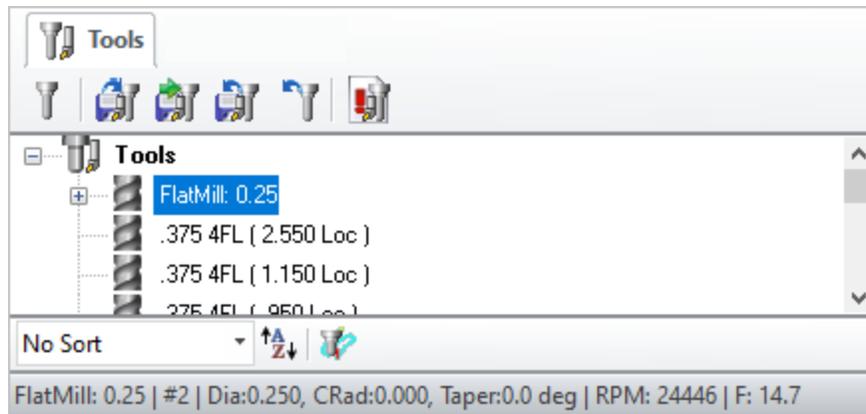
The **Machining Objects Browser** has two tabs located at the top to work with Tools and Knowledge Bases. Each tabbed view also incorporates a toolbar at the top. The toolbars on each tab group all of the functions associated with the type of object in the tab.

The **Machining Objects Browser** can be toggled on and off by selecting the toggle button located at the top left corner of the **Machining Browser**. This toggle button is shown below.

### The Machining Objects (Mobs) Browser



Locating the Machining Objects Browser toggle tab



The Machining Objects (MOBs) Browser

The status bar displays the currently selected tool, spindle speed and cut feedrate.

BallMill1 | #1 | Dia:0.5, CRad:0.25, Taper:0 deg | RPM: 24446 | F: 15

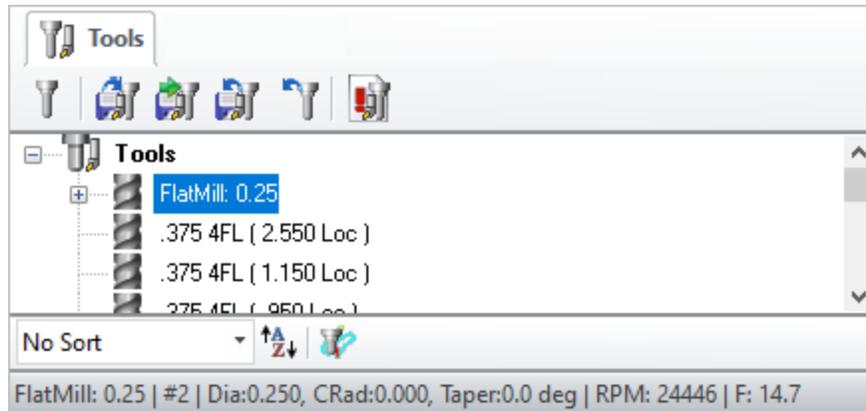
### Machining Objects Browser Tabs

	<b>Tools tab:</b> Allows you to create, edit, tools and tool libraries.
---	---

### 4.4.1 Tools Tab

Selecting the **Tools** tab under the **Machining Objects Browser** brings up the tool manager. It lists all of the tools currently defined as well as the tools that are in use in machining operations. You can edit a tool by double clicking the tool button in the browser. A tool can be deleted by selecting the tool from the Tools browser, right click cut or use the delete key from the keyboard.

#### The Machining Objects (MObs) Browser, Tools Tab



The Machining Objects (MObs) Browser, Tools Tab

RhinoCAM supports 2 types of tool library file formats **\*.vkb** and **\*.csv** (**\*.vkb** is recommended).

#### Tools Tab Functions

 **Create/Edit Tools:** This button brings up the tool dialog that enables the creation and saving of tools. All milling, drilling and user defined tools can be created here. Refer to [Tool](#) section for a detailed description on creating tools and defining tool parameters.

 **Load Tool Library:** The load tool library button enables the loading of a previously saved tool library. Refer to the following section for additional information - [Load Tool Library](#)

 **Select Tools from Library:** The select tool library button enables you to select tools from a previously saved tool library. Refer to the following section for additional information - [Select Tools from Library](#)

 **Save Tool Library:** This button enables the created tools to be saved in a tool library file. The file can be saved in the desired directory and read in when required. Refer to the following section for additional information - [Save Tool Library](#)

 **Unload Tool Library:** This button will unload the current [Tool Library](#).

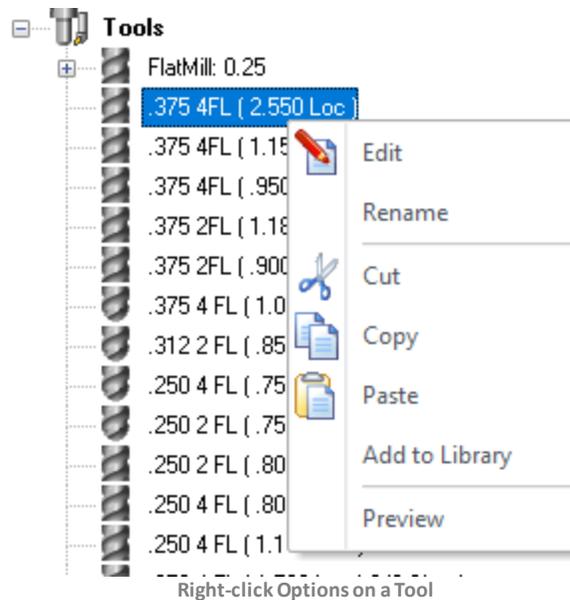


**List Tools:** The button brings up all the tool properties associated with the tools currently recorded in the current MILL session. Refer to the following section for additional information - [List Tools](#)



### Right-click Options on Tools

You can right-click on a [Tool](#) listed in the [Mobs Browser](#) to perform various functions. These are listed below:



#### Edit

Displays the [Create/Edit Tool](#) dialog allowing you to edit the [Tool](#) parameters.

#### Rename

Allows you to [Rename](#) the selected tool.



#### Cut / Copy / Paste

These options allow you to [Cut](#) or [Copy](#) the selected [Tool](#) to the [Windows Clipboard](#) and then [Paste](#) it back to the Tools list to create a new tool using the previous tool as a template.

#### Add to Library

This allows you to [Add](#) the selected [Tool](#) to an exiting [Tool Library \\*.csv](#) data file.

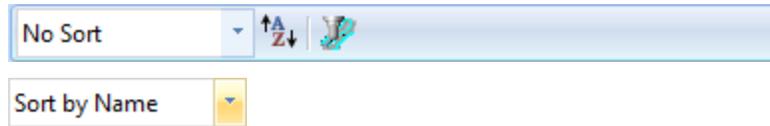
#### Preview

This will display a [Preview](#) of the selected [Tool](#) in the [Graphics Window](#) similar to how the [Tool](#) displays during [Simulation](#). The [Tool](#) will display at the origin of the [MCS](#) for the current operation.



### Tools Toolbar Functions

The following [Tool Sorting](#) rules (when set) will apply to both the [Tools](#) tab of the [Machining Objects Browser](#) and the [Create/Select Tools](#) dialog.



**Sorting Selector:** This allows you to sort the tool list. You can select [No Sort](#) or sort by [Name](#), [Number](#), [Type](#) and [Diameter](#).



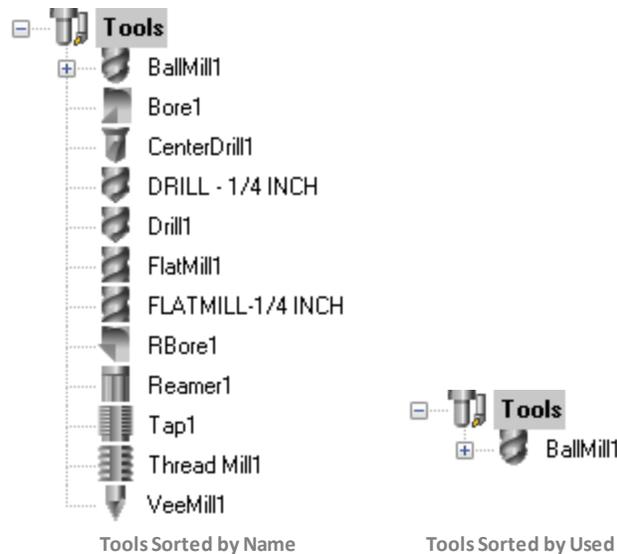
**Sort in Ascending/Descending Order:** This icon acts like a toggle to switch between Ascending and Descending sort order.



**List on the Tool used in Machining Operations:** Toggle this icon to list ONLY the tools currently assigned to an operation. **Note:** You must [Generate](#) an operation for the assigned tool to be listed.



If you do not see any of your tools listed, check to make sure this icon is toggled OFF. If no operations are using tools yet and this icon is ON, then no tools will be listed!



The status bar displays the currently selected tool, tool tip radius & angle, spindle speed and cut feedrate.

Flat Mill-0.5 | #1 | Dia:0.5, CRad:0, Taper:0 deg | RPM: 3055 | F: 61

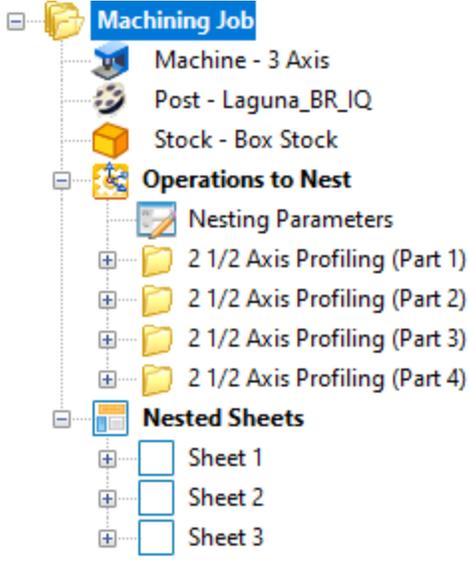
Status Bar, Tools Tab, Machining Objects Browser

## 4.5 Right-Click Commands

You can perform a variety of commands by right-clicking on items within the [Machining Browser](#) and [Machining Job](#). The tables below lists each of the available commands.

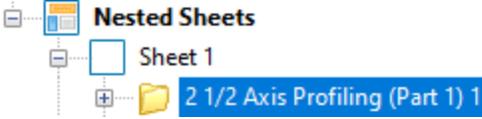


[from the Machining Operations \(MOPs\) Browser](#)

RhinoCAM Right-Click Commands - MILL Module	
Action Item	Right-Click Commands
Machining Browser  <p> <b>Machining Job</b>              Machine - 3 Axis              Post - Laguna_BR_IQ              Stock - Box Stock  <b>Operations to Nest</b>              Nesting Parameters              2 1/2 Axis Profiling (Part 1)              2 1/2 Axis Profiling (Part 2)              2 1/2 Axis Profiling (Part 3)              2 1/2 Axis Profiling (Part 4)  <b>Nested Sheets</b>              Sheet 1              Sheet 2              Sheet 3           </p>	Regenerate All <a href="#">Post All</a> <a href="#">Simulate All</a> <a href="#">Information</a> <a href="#">Shop Documentation</a> Delete All
 <b>Machine - 3 Axis</b>	<a href="#">Machine Tool Setup Dialog</a>
 <b>Post - AbilitySystems</b>	<a href="#">Set Post Options Dialog</a>
 <b>Stock - Box Stock</b>	<a href="#">Box Stock Dialog</a> <a href="#">Part Box Stock Dialog</a> <a href="#">Delete Stock</a> <a href="#">Remove Simulations</a>
 <b>Operations to Nest</b>	Regenerate <a href="#">Post</a> <a href="#">Simulate</a> <a href="#">Information</a> <a href="#">Shop Documentation</a> <a href="#">Rename</a> <a href="#">Suppress</a>

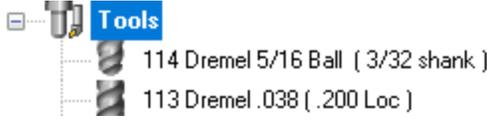
	Cut
	<a href="#">Copy</a>
	<a href="#">Paste</a>
	<a href="#">New Setup</a>
	<a href="#">Align</a>
 <b>Nesting Parameters</b>	<a href="#">Nesting Parameters</a>
 <b>2 1/2 Axis Profiling (Part 1)</b>	Regenerate
	<a href="#">Post</a>
	<a href="#">Simulate</a>
	<a href="#">Simulate Until</a>
	<a href="#">Simulate to End</a>
	<a href="#">Information</a>
	Edit
	<a href="#">Rename</a>
	<a href="#">Suppress</a>
	Cut
	<a href="#">Copy</a>
	<a href="#">Paste</a>
	<a href="#">Clone</a>
	<a href="#">Save As Defaults</a>
	<a href="#">Properties</a>
 <b>Nested Sheets</b>	Execute Nest ( <a href="#">Nesting Parameters</a> )
	Regenerate
	<a href="#">Post</a>
	<a href="#">Simulate</a>

	<a href="#">Information</a>
	<a href="#">Shop Documentation</a>
	<a href="#">Rename</a>
	<a href="#">Suppress</a>
	Cut
	<a href="#">Copy</a>
	<a href="#">Paste</a>
	<a href="#">New Setup</a>
	<a href="#">Align</a>
	Regenerate
	<a href="#">Post</a>
	<a href="#">Simulate</a>
	<a href="#">Simulate Until</a>
	<a href="#">Simulate to End</a>
	<a href="#">Information</a>
	Edit
	<a href="#">Rename</a>
	<a href="#">Suppress</a>
	Cut
	<a href="#">Copy</a>
	<a href="#">Paste</a>
	<a href="#">Clone</a>
	<a href="#">Save As Defaults</a>
	<a href="#">Properties</a>

	Regenerate
	<a href="#">Post</a>
	<a href="#">Simulate</a>
	<a href="#">Simulate Until</a>
	<a href="#">Simulate to End</a>
	<a href="#">Information</a>
	Edit
	<a href="#">Rename</a>
	<a href="#">Suppress</a>
	Cut
	<a href="#">Copy</a>
	<a href="#">Paste</a>
	<a href="#">Clone</a>
	<a href="#">Save As Defaults</a>
	<a href="#">Properties</a>



from the Tools tab of the Machining Objects (MOBs) Browser

RhinoCAM Right-Click Commands - MILL Module	
Action Item	Right-Click Commands
Machining Objects Browser / Tools Tab	Cut
	Paste
	<a href="#">Tool List</a>
	<a href="#">Create Edit Tool</a>

	Rename
	Cut
	Copy
	Paste
	<a href="#">Add to Library</a>
	<a href="#">Preview</a>

## 4.6 Docking Browsers

Both [Machining Operations Browser](#) and the [Machining Objects Browser](#) windows are dock-able windows. This means these windows can be docked in any position in [Rhino](#). This section describes the procedure to be used to dock both of these windows such that they are stacked vertically.



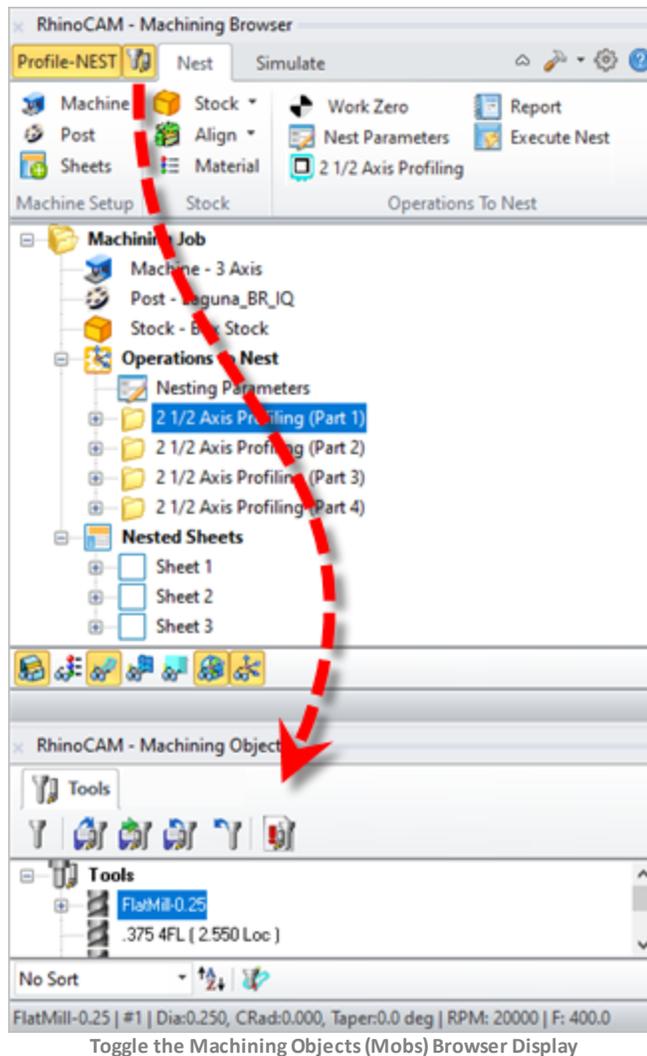
### Step 1: Launch the MILL Browser

From the [Rhino](#) main menu, select the [RhinoCAM](#) menu and then pick [MILL](#). This displays the machining operations browser and by default is docked to the left half of the application window next to the view bar.



### Step 2: Display the Tools, Machining Objects Browser

Select the [Tools Machining Objects](#) button located on the [Machining Operations Browser](#) just to the left of the [Program](#) tab. This displays the [Machining Objects Browser](#) next to the operations browser.



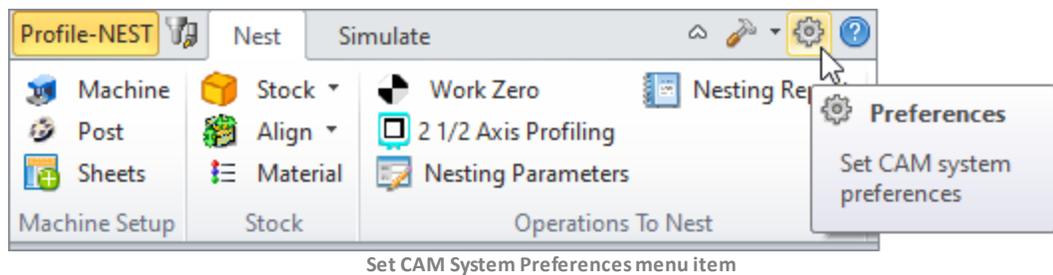
### Step 3: Drag & Drop the Browser

Selecting the title bar and holding the left mouse button down and dragging the browser window allows you to dock the browser to desired location. You can dock a browser inside of another browser or have them docked side by side.

## 4.7 CAM Preferences

-  You can set various [CAM Preferences](#) that will be saved even after you exit the program. Select the [Preferences](#) icon from the [Machining Browser](#). When you install a new [RhinoCAM](#) update you are choose to import your [CAM Preferences](#) from one version to the next.

### The CAM Preferences Icon (in the MILL Module)



**The available Preferences include:**

### Geometry

Includes color preferences for [Regions](#) and [Surfaces](#). [Show the dialog.](#)

### Stock

These include stock colors, stock edge display and stock transparency. [Show the dialog.](#)

### Cutting Tools

Includes [Tool](#) colors, [Tool](#) display states and the default [Tool Library](#) preferences. [Show the dialog.](#)

### Feeds & Speeds

Includes [Feeds & Speed](#) preferences such as default values and other options. [Show the dialog.](#)

### Machining

Includes [Arc Output](#), [Drill Cycle Output](#), [Toolpath Resolution](#) and the default machining [Knowledge Base](#) preferences. [Show the dialog.](#)

### Output Control

Includes preferences that control how g-code is posted. [Show the Dialog.](#)

### Toolpath

Includes [Toolpath Colors](#) and [Toolpath Display](#) preferences. [Show the dialog.](#)

### Simulation

Includes [Simulation Type](#), [Mode](#), [Accuracy](#), [Transparency](#) and other preferences. [Show the dialog.](#)

### User Interface

Includes [General](#), [Stock Information](#) and [Ribbon Style](#) preferences. [Show the dialog.](#)

### Post processor

Includes [Post-processing](#) and [posting](#) preferences. [Show the dialog.](#)

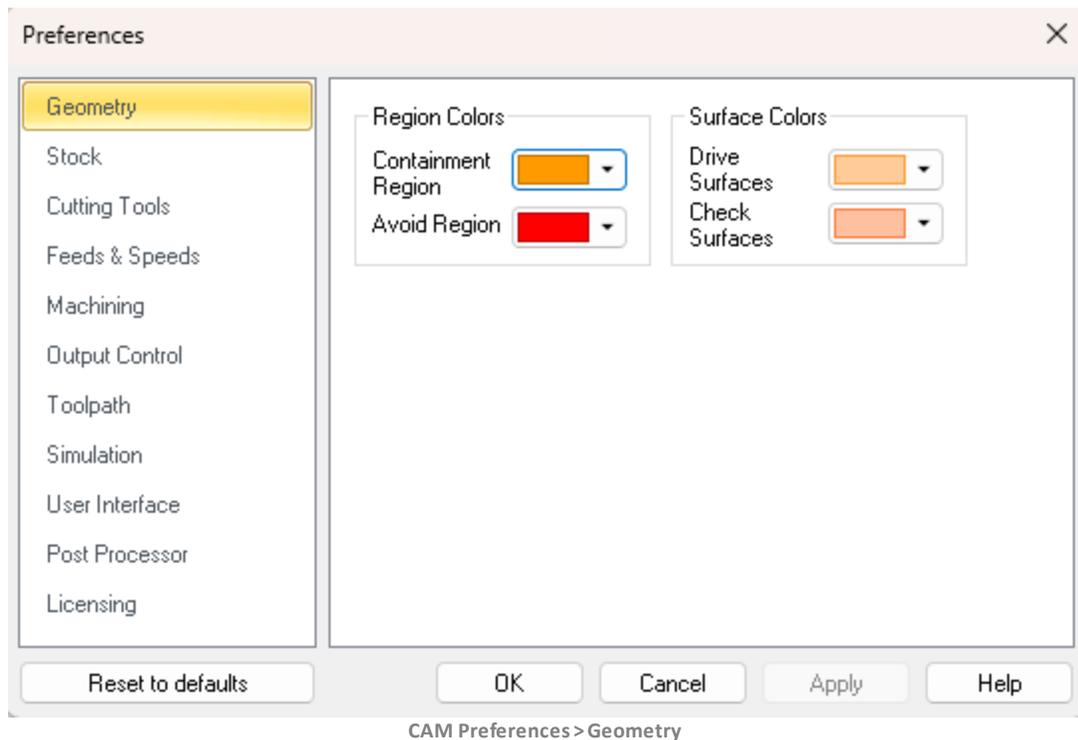
### Licensing

Includes network licensing preferences. [Show the dialog.](#)

## 4.7.1 Geometry

You can set the colors to display various objects using this dialog. To change each of the color settings in this dialog select the colored button next to the item of interest. This will bring up the color selection dialog, which can be used to choose the color needed. Once a color has been selected the button will change its color to the selected one. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.

### Dialog Box: CAM Preferences > Geometry



### Region Colors

#### **Containment Region**

Use this color selector to set the display color for [Containment Regions](#) (i.e., your [Control Geometry](#)).

#### **Avoid Region**

Use this color selector to set the display color for [Avoid Regions](#) (i.e., your [Control Geometry](#)).

### Surface Colors

#### **Drive Surfaces**

Use this color selector to set the display color for [Drive Surfaces \(5 Axis\)](#).

#### **Check Surfaces**

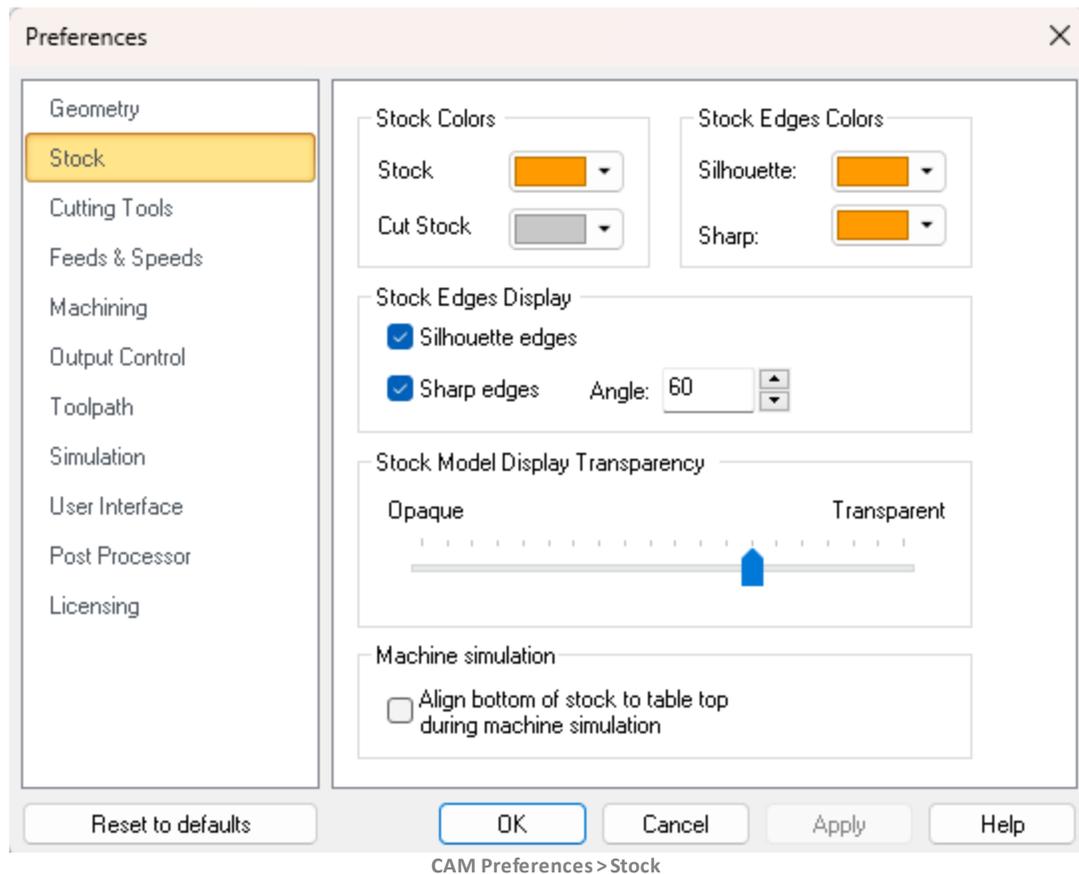
Use this color selector to set the display color for [Check Surfaces](#) (5 Axis).

## 4.7.2 Stock

You can set the simulation preferences using this dialog. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.

### Dialog Box: CAM Preferences > Stock

Users can set the simulation preferences using this dialog:



### Stock & Stock Edge Colors

Here you can set the stock colors. You can differentiate between cut and non-cut areas by specifying different colors for them here.

**Note:** If the [Simulation Display State](#) is set to  then the [Color](#) assigned using the [Machining Operation Properties](#) is used to display the cut stock. Right-click on an operation in the [Machining Job](#) tree and select [Properties](#) to set this color.

### Stock Edges Display

This section allows you to control the [Stock Edges Display](#) colors. You can set a different color for Sharp Edges (i.e., internal cut material) and Silhouette Edges (i.e., the exterior outline of the stock). Experimentation is advised until you are comfortable with the way your stock displays.



#### **Stock Model Transparency**

Use this slider to adjust the [Stock Model Transparency](#) when the [Program](#) tab is selected (i.e., when you are not simulating).



#### **Machine Simulation**

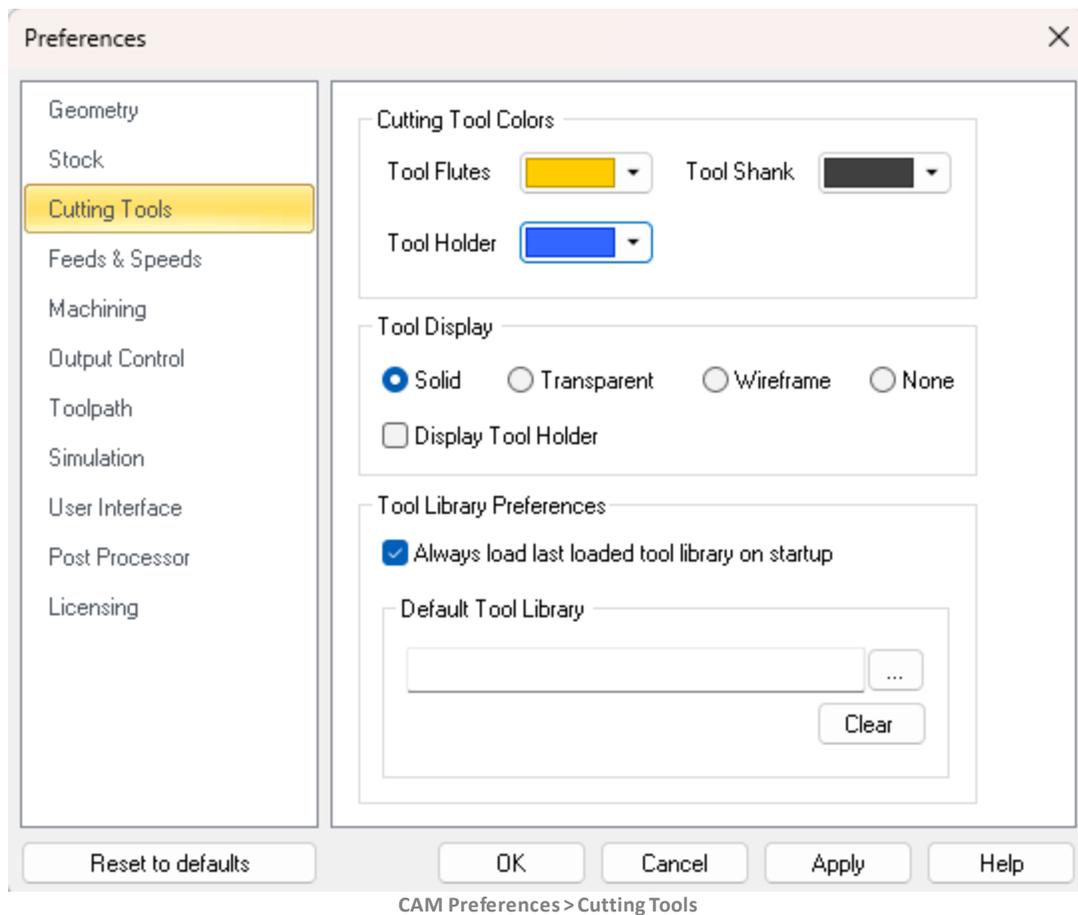
During [Machine Tool Simulations](#), you can check this box to automatically position the bottom of the in-process stock on the top of the machine bed.

### **4.7.3 Cutting Tools**

You can set the [Tool Library](#) to load on startup and also specify the location of your [Tool Library](#) files. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.

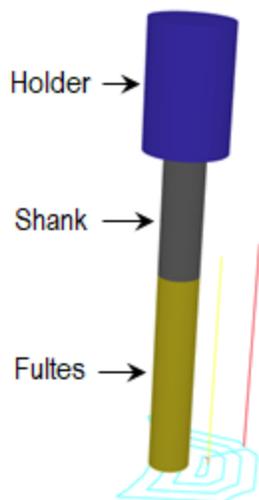


#### **CAM Preferences > Cutting Tools**



### Cutting Tool Colors

Use the color selectors to set the default display colors for the cutting tool. The **Tool Flutes**, **Tool Shank** and **Tool Holder** can each be assigned a different.





### Tool Display

The cutting tool can be displayed as either [Solid](#), [Transparent](#), [Wireframe](#) or [None](#) by selecting the desired option. You can also toggle the display of the [Tool Holder](#) by checking or un checking the box provided.



### Tool Library Preferences

This defines your [Tool Library](#) preferences:

#### **Always load last loaded tool library on startup**

If you check this box, every time [RhinoCAM](#) loads, the last loaded [Tool Library](#) will be loaded automatically.

#### **Default tool library path**

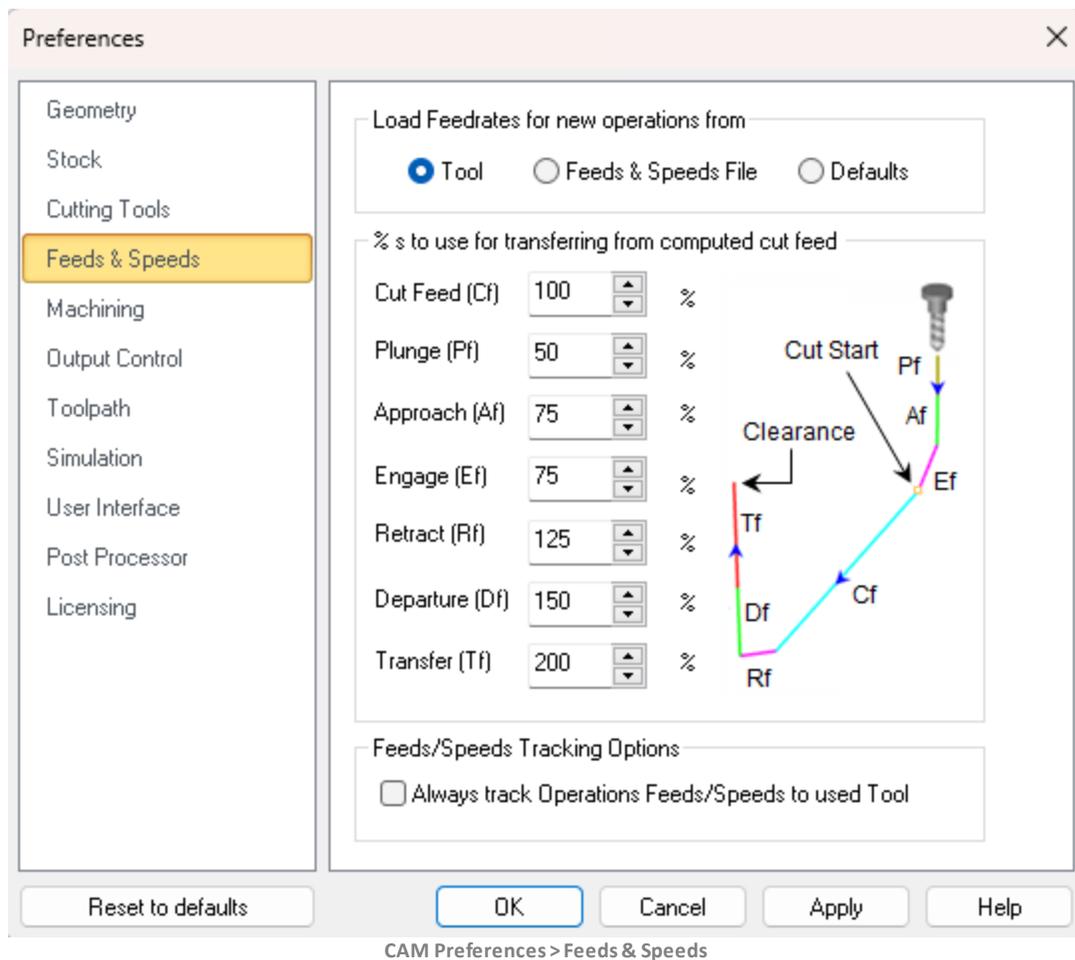
Optionally you can specify the file path for your default tool library files. **Note:** It is recommended that you save your custom tool library files to a location outside of the [RhinoCAM](#) install path. This will keep them from being overwritten when you install new updates of [RhinoCAM](#).

## 4.7.4 Feeds & Speeds

You can set the [Feeds & Speeds](#) preferences using this dialog. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.



### CAM Preferences > Feeds & Speeds



### Load Feedrates for operations from

This allows you to select a preference option for loading **Feeds/Speeds** from table or from tool or use defaults when creating a new operation.

#### **Tool**

Selecting this option loads the feeds/speeds saved with the tool when creating a new operation.

#### **Table**

Selecting this option loads the feeds/speeds based on the material selected when creating a new operation.

#### **Defaults**

Selecting this option loads the feeds/speeds from the default knowledge base when creating a new operation. If default knowledge base is set to undefined, the system defaults would be used for loading feeds and speeds.

### % s to use for transfer from computed cut feed

These % values apply when using the [Load from File](#) option (i.e., commonly referred to as the [Feeds & Speeds Calculator](#)) from either the [Create/Edit Tools](#) dialog or from the [Feeds & Speeds](#) tab of any of the toolpath operation dialogs. 100% of the [Cut Feed](#) specified in this dialog is applied and a percentage of the [Cut Feed](#) is used to populate the remaining feedrates for [Plunge](#), [Approach](#), [Engage](#), [Retract](#), [Departure](#) and [Transfer](#). You can set the % values to use here.



#### **Feeds/Speeds Tracking Options**

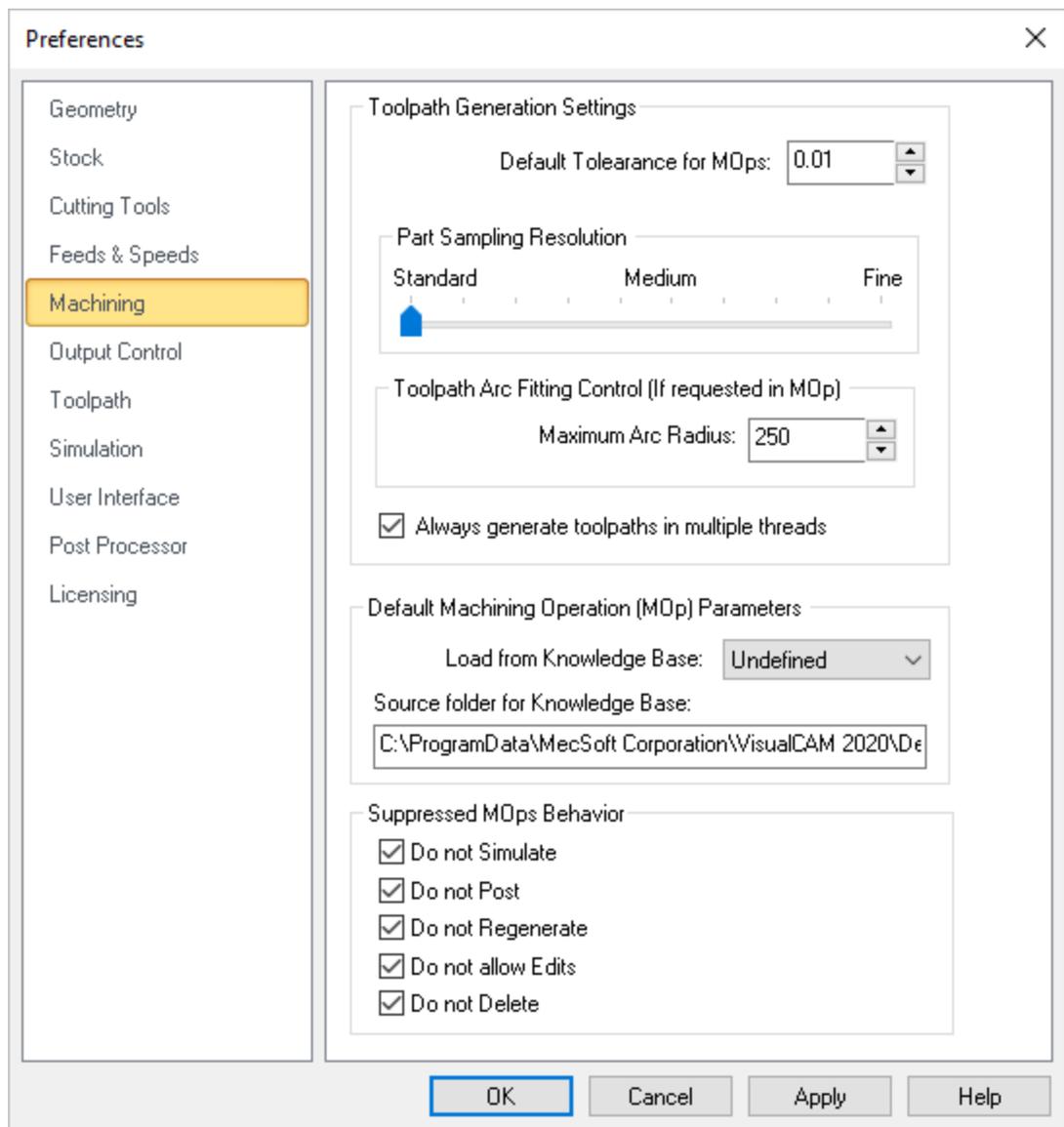
When you select the [Load from Tool](#) option from any of the toolpath operation dialogs, the [Feeds & Speeds](#) specified for the active tool are populated into the [Feeds & Speeds](#) tab of the operation's dialog. You can check this box to perform this automatically when new toolpath operations are created.

### **4.7.5 Machining**

You can set the machining preferences using this dialog. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.



#### **CAM Preferences > Machining**



CAM Preferences: Machining

## Toolpath General Settings

### Default Tolerance for Mops

Enter the default tolerance to use for new machining operations. You can edit this parameter manually from the [Cut Parameters](#) tab of each machining operation (Mop) dialog.

### Part Sampling Resolution

This slider is used to control the display quality of the simulated model. [Standard](#) is faster but with lower display quality. For large parts, use the [Standard](#) or [Medium](#) options, while for smaller parts [Medium](#) or [Fine](#) options would work satisfactorily.

### Meshing Parameters

Meshing parameters refer to the size and shape of each triangular mesh geometry element during the following: (a) for the calculation and display in-process stock models during polygonal simulation, (b) for the calculation and display of the simulation accuracy Part/Stock Compare dialog.

#### **Aspect Ratio**

In a mesh model, **Aspect Ratio** refers to the edge length ratio of each triangular facet in the mesh. A larger Aspect Ratio produces a mesh that is less dense and more adaptable to larger mesh features. A smaller **Aspect Ratio** produces a mesh that is more dense allowing for smaller feature to be more accurately represented.

#### **Maximum Edge Length**

In a mesh model, **Maximum Edge Length** refers to the length of any facet edge in the mesh model. A greater value will produce less facets to define the mesh model. A smaller value will produce more facets to define the mesh model.

#### **Toolpath Arc Fitting Control (If requested in Mop)**

Some toolpath operations support **Arc Fitting**. If supported, the option is located on the **Advanced Cut Parameters** tab of the operation's dialog.

#### **Maximum Arc Radius**

Some toolpath operations support **Arc Fitting**. You can enter here the **Maximum Arc Radius** that can be created.

#### **Always generate toolpath in multiple threads**

Check this box to **Always generate toolpath in multiple threads**. The system will distribute the computing of multiple toolpaths to different cores in your processor simultaneously rather than sequentially. Refer to **Multi-threading Manager** section for additional information.



### **Default Machining Operation (Mop) Parameters**

#### **Load from Knowledge Base**

This allows you to select a **Default Knowledge Base** to load for creating machining operations. Selecting a knowledge base as **Default** loads the operation parameters when creating new operations. If no **Default** knowledge base is specified, the system defaults are used for machining operation parameters.

#### **Source Folder for Knowledge Base**

This is the source folder where the **Default Knowledge Base** are stored.

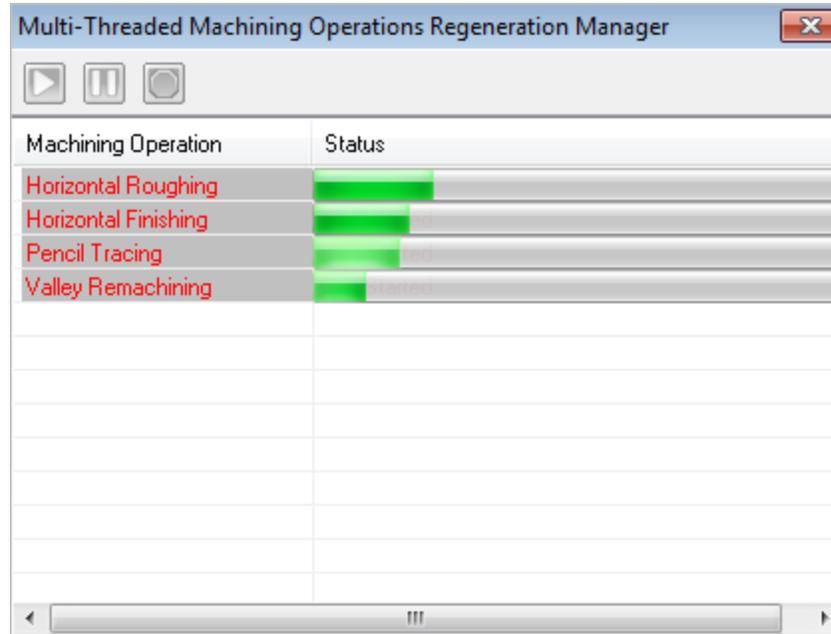


### **Suppressed Mops Behavior**

When you **Suppress Machining Operations (Mops)** you can apply one or more of these conditions. Check each box to enable that condition and then pick **OK** to close this dialog.

#### 4.7.5.1 Multi-threading Manager

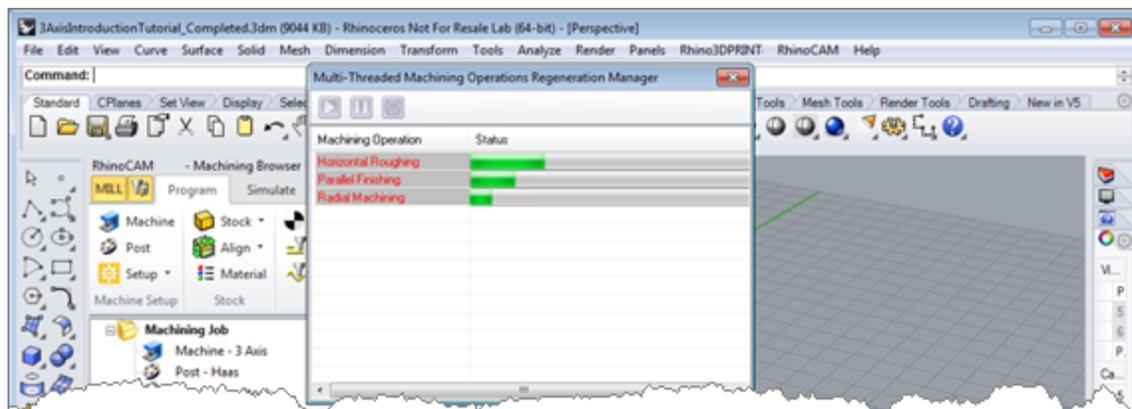
This distributes computing of toolpath to different cores in your processor simultaneously rather than process them sequentially when regenerating multiple operations.



Multi-threading Manager

To enable generation of toolpath using multi-threading manager, select [Always generate toolpath in multiple threads](#) from [Machining Preferences](#) located under [CAM Preferences](#) in the [Machining browser](#).

Regenerating the [Machining Job](#), [Setup](#) or machining operations displays the multi-threading manager window and indicates the progress of the toolpath computation.



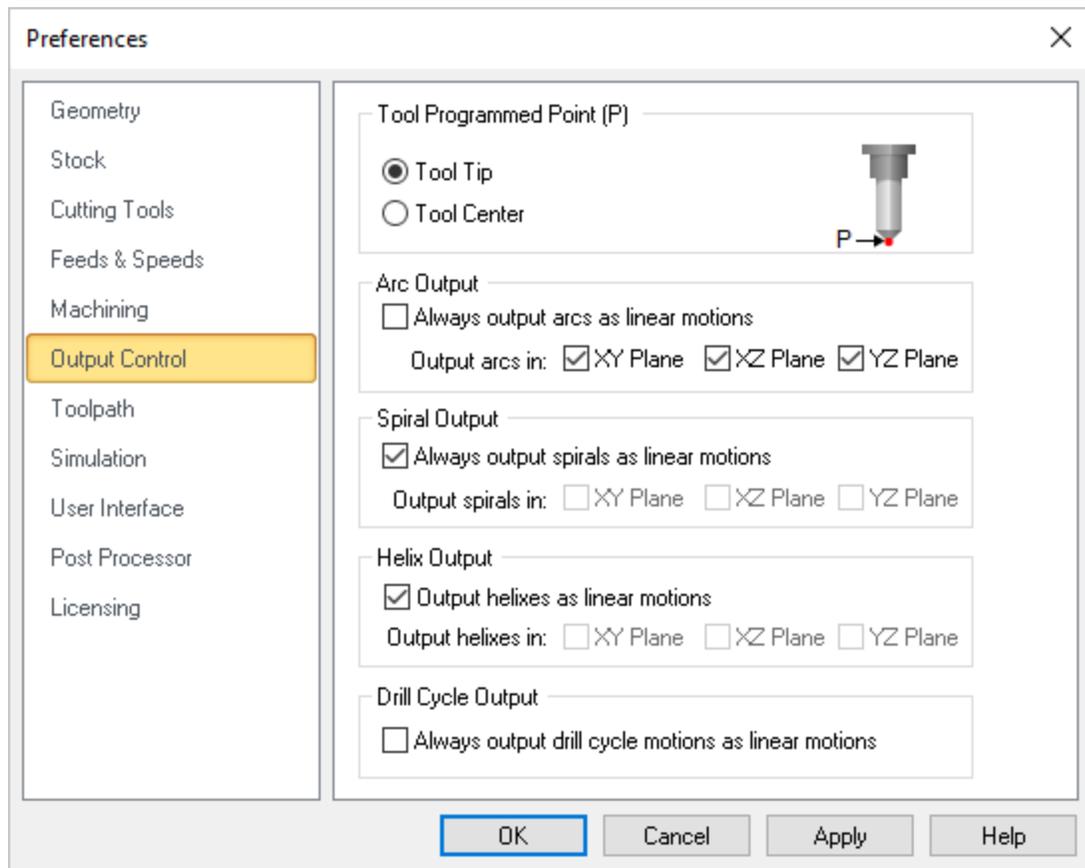
Multi-threading Manager window displayed

You can still continue working with the application when the toolpath generation is in progress with the multi-threading manager dialog active.

## 4.7.6 Output Control

You can set the output control preferences using this dialog. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.

### CAM Preferences > Output Control



CAM Preferences: Machining

### Tool Programmed Point (P)

The toolpath can be output as the tool tip or the tool center. If [Tool Center](#) is selected, the toolpath will be offset by the difference in the height of the tool tip and tool center. The default value is the [Tool Tip](#).



 Changing machining preferences requires regeneration of machining operations to apply the changes.



### Arc Output

Some NC machine controllers do not have arc, spiral and helical output (for example G2, G3). For such type of controllers, the arcs that are generated in the toolpath can be output as linear segments by selecting these check boxes.

#### Always Output Arcs as Linear Segments

If your controller does not support arc g-code motions, check this box to output arcs as linear segments.

#### Output Arcs In

For arc output, arcs can be fitted to linear toolpaths that lie on one of the three principal planes XY, XZ or YZ. Check the box for which plane to fit arcs to.



### Spiral Output

Some NC machine controllers do not have spiral output. For such type of controllers, the spirals that are generated in the toolpath can be output as linear segments by selecting these check boxes.

#### Output Spiral Motions as Linear Segments

If your controller does not support spiral g-code motions, check this box to output spiral motions as linear segments.

#### Output Spirals In

For spiral output, spirals can be fitted to linear toolpaths that lie on one of the three principal planes XY, XZ or YZ. Check the box for which plane to fit spirals to.



### Helical Output

Some NC machine controllers do not have helical output. For such type of controllers, the helixes that are generated in the toolpath can be output as linear segments by selecting these check boxes.

#### Output Helix Motions as Linear Segments

If your controller does not support spiral g-code motions, check this box to output spiral motions as linear segments.

#### Output Helixes In

For helical output, helixes can be fitted to linear toolpaths that lie on one of the three principal planes XY, XZ or YZ. Check the box for which plane to fit spirals to.



### Drill Cycle Output

This section refers to [Hole Machining Drill Cycles](#).

#### Always output Drill Cycles as linear motions.

Check the box if your wish to always output [Drill Cycles](#) as linear motions.



### 5 Axis Machining

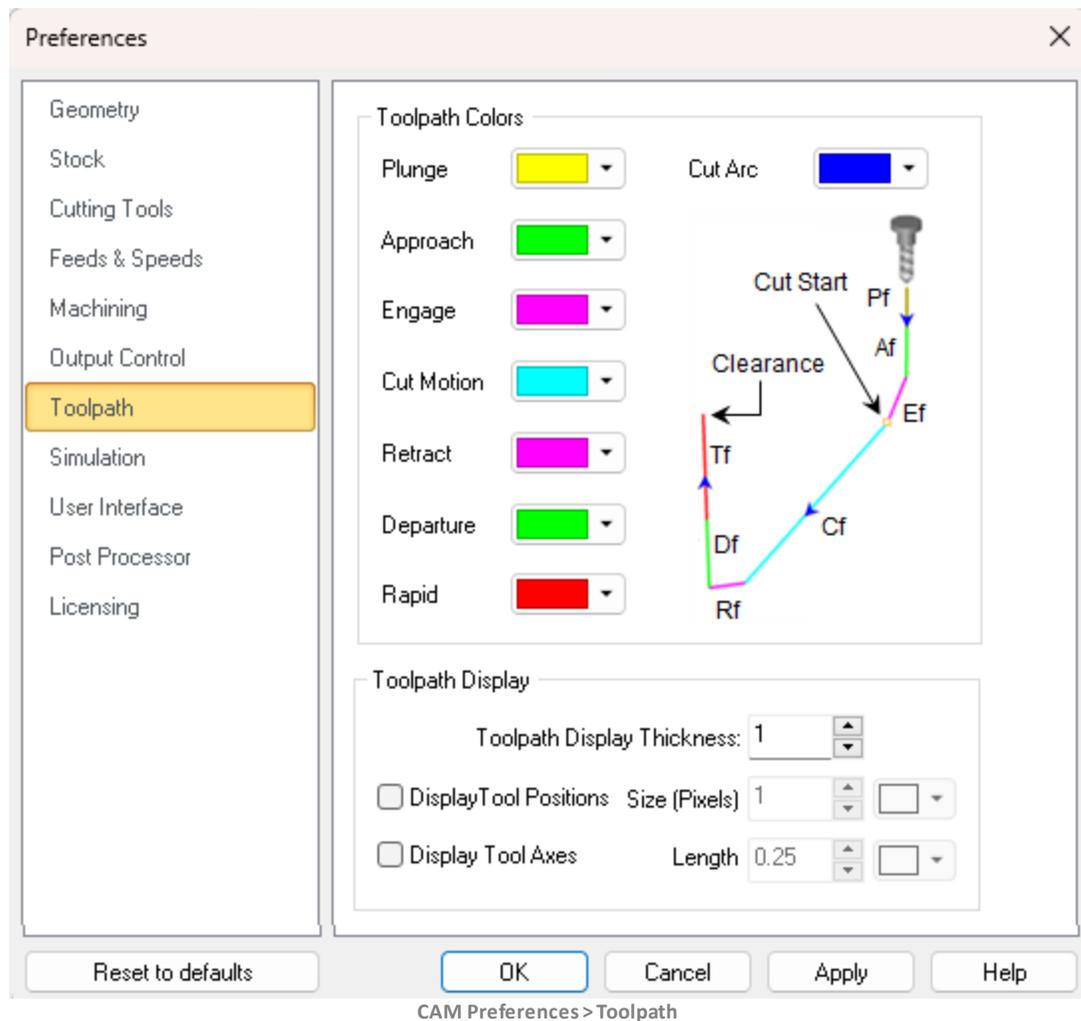
### Do not insert unwinds crossing the seam angle

When this box is un checked, the spindle head will rewind when it meets a surface seam. When checked, no un-winds are performed at seams.

## 4.7.7 Toolpath

These preferences relate to the graphical display of toolpath cut motions. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.

### CAM Preferences > Toolpath



### Toolpath Colors

Use the color selectors to define the display color for each motion in the toolpath. The following can be set: [Cut Motion](#), [Plunge](#), [Approach](#), [Engage](#), [Retract](#), [Departure](#), [Rapid](#) and [Cut Arc](#).



### Toolpath Display

These preferences control the display of the toolpath in the graphics window.

#### Toolpath Display

This refers to the graphical display of toolpaths. Enter a value to effect the size of the toolpath during display.

#### Display Tool Positions Size (Pixels)

Check this box to display tool position locators. Each coordinate represents one tool position. Then enter the [Pixel Size](#) for the locator point as well as the [Pixel Color](#) of the position points. You can also use the color selector to assign a color to these markers.

#### Display Tool Axis

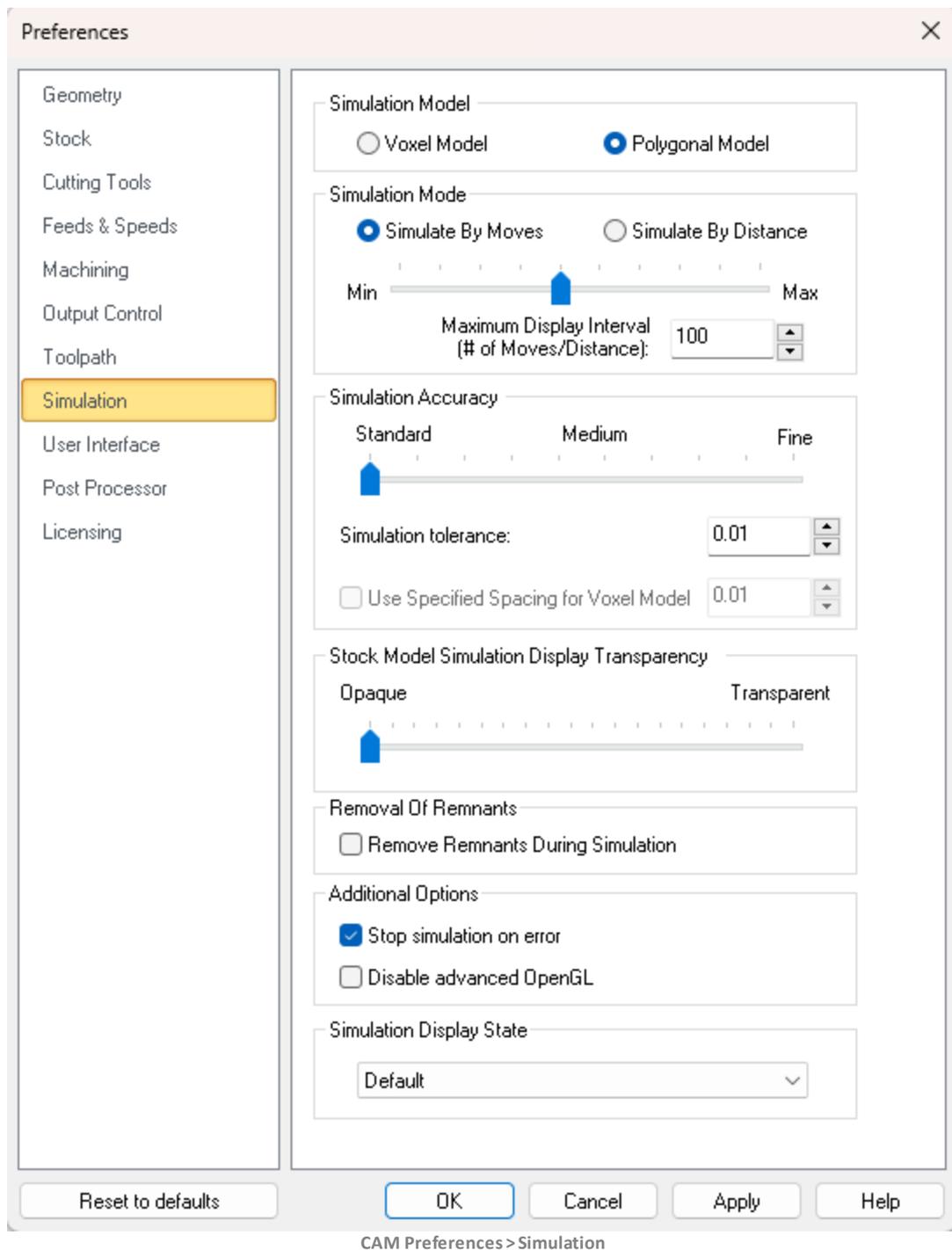
Check this box to display the [Tool Axis](#) line. You can then enter a [Length](#) for the axis line and use the [Color](#) selector to assign it a color.

## 4.7.8 Simulation

You can set the simulation preferences using this dialog. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.



### Dialog Box: CAM Preferences > Simulation



### Simulation Model

In the **RhinoCAM MILL** module you can choose between two simulation models. One is called the **Voxel Model** and the other the **Polygonal Model**.

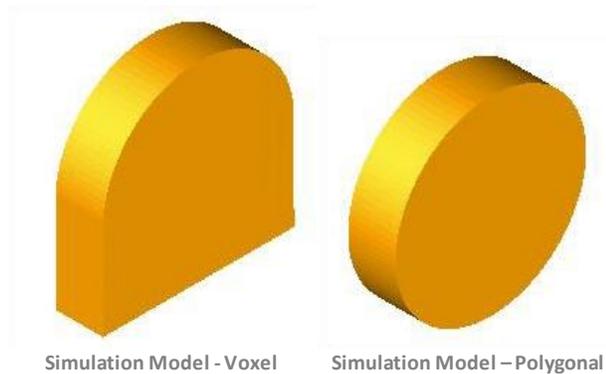
### Voxel Model

The **Voxel Model** is a fast simulation model that is primarily used for 3 axis applications. It is especially useful when there are large amounts of toolpath blocks to be simulated. This model is fast but suffers from some accuracy limitations near vertical walls. The display quality of this simulation might also be insufficient for some applications especially when simulating near vertical walls.

### Polygonal Model

The **Polygonal Model** on the other hand is a high quality simulation model. This model uses more accurate simulation algorithms at the expense of speed. The speed of this simulation can be relatively slow when compared to the **Voxel Model**. Additionally only the **Polygonal Model** of simulation can be used for 4 and 5 Axis simulations. The **Voxel Model** is limited strictly to 3 Axis applications.

Here is an example of a cylinder stock model representation with **Voxel** and **Polygonal** model.



### Simulation Mode

You can set the simulation mode to **Distance** or by **Motion**. **Simulate by Motion** simulates the toolpath based on the number of go to motions in the generated toolpath. **Simulate by Distance** uses a distance based approach.

### Simulation Speed

You can control the speed of the simulation using the slider bar and the **Maximum** display interval. When using **Simulate by distance** mode, the speed is determined as **# of Motions / Distance**.

### Simulation Accuracy

This setting is used to control the accuracy of display of the simulated model. You can control the accuracy of the stock model by selecting from **Standard**, **Medium** or **Fine**. The finer the stock model accuracy results in slower performance and increases the simulation time.

### Simulation Tolerance

When [Polygonal Model](#) is selected as the [Simulation Mode](#), you can also specify a [Simulation Tolerance](#). The [Simulation Accuracy](#) slider provides a high-level of adjustment and the [Simulation Tolerance](#) provides a more granular level of control. Note that the [Simulation Tolerance](#) will have a direct affect on simulation time.

#### Use Specified Simulation Spacing for Voxel Model

When [Voxel Model](#) is selected (see [Simulation Model](#) above), you can also specify the spacing for the [Voxel](#) model. Check the box and enter the [Spacing](#) distance desired.

#### Stock Model Simulation Display Transparency

Use this slider to adjust the [Stock Model Transparency](#) when the [Simulate](#) tab is selected (i.e., when you are performing a cut material simulation).

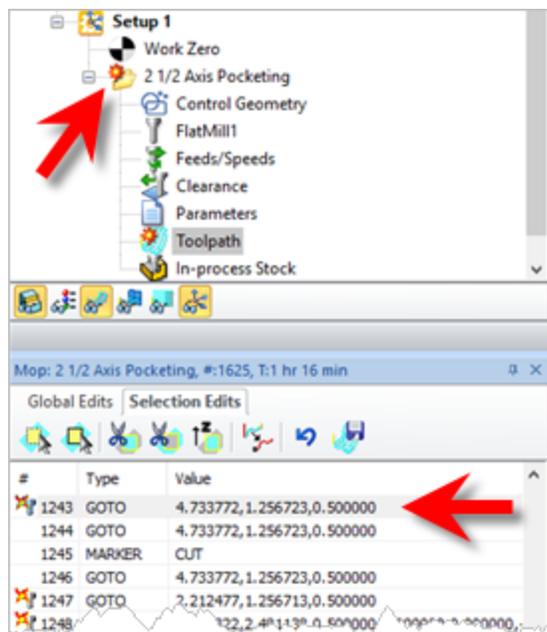
#### Removal of Remnants

Check this box to [Remove Remnants During Simulation](#). Any disassociated stock will be removed from the simulation.

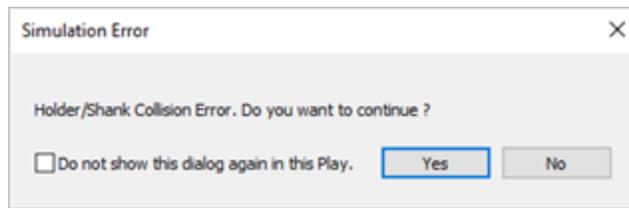
#### Additional Options

##### Stop Simulation in Error

Check this box to pause the [Simulation](#) at each error flag. If enabled, a message will display asking if you wish to continue with the simulation. Selecting [Play](#) will simulate to the next error flag and then pause. etc.



Stop Simulation at Error Flag



Stop Simulation at Error Flag message

### Disable Advanced OpenGL

Check this box only if you have an older graphics card adapter that does not support advanced OpenGL (i.e., OpenGL 2). Some older cards may only support OpenGL 1 for example. If you experience graphics instability checking this box may help resolve the issue.



### Simulation Display State

Select how color is applied to toolpaths during simulations. Choose from the following:

- **Default:** The CAM preferences for [Stock Colors](#) are applied. See the [Stock](#) tab in the [CAM Preferences](#) dialog.
- **Tool:** The [Cut Material](#) color assigned to the tool is applied. See the [Create/Edit Tool](#) Dialog
- **Mop:** The color properties of the [Machining Operations](#) (Mops) are applied. Right-click on the [MOp](#) and select [Properties](#).
- **Texture:** The material texture defined in the [Materials](#) dialog is applied. Select [Materials](#) from the [Program](#) tab.

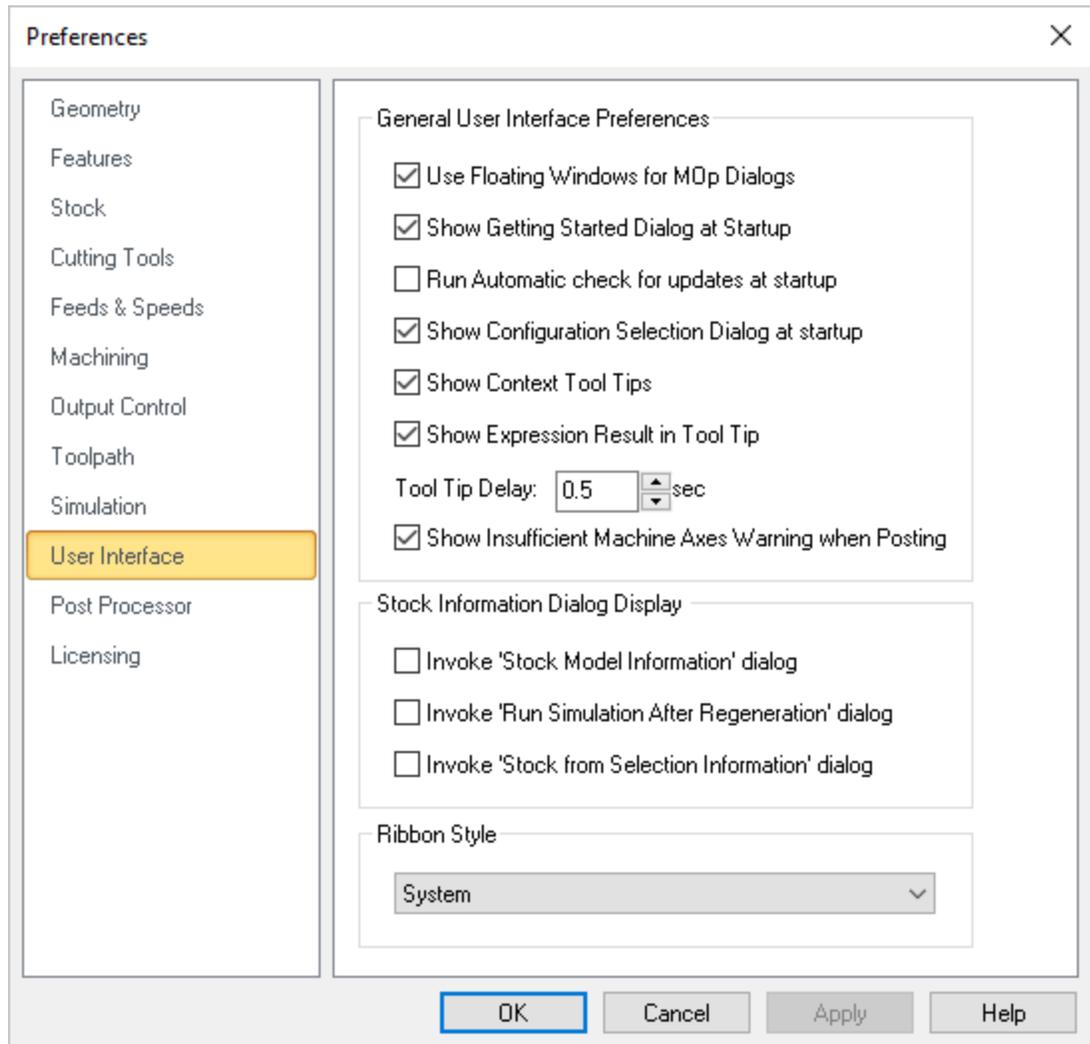
To change the display state manually, go to the [Simulate](#) tab and adjust the [Display State](#) menu located at the bottom of the [Machining Browser](#) as shown below.



## 4.7.9 User Interface

Added the Language setting. Added the Copy/Clone increment value options. From here you can set the various user interface options. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.

## Dialog Box: CAM Preferences > User Interface



Dialog Box: CAM Preferences > User Interface

## Language

Use this to set the system language of the plugin's User Interface.

## General User Interface Preferences

### Use Floating Windows for Mop Dialogs

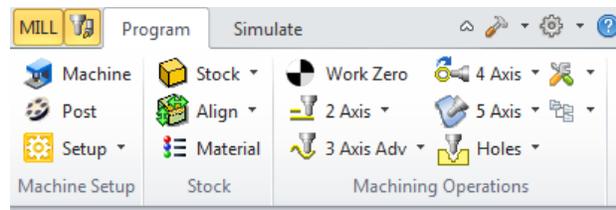
Selecting this option displays machining operation dialogs as a floating window where the dialog appears on top of the Machining Browser. If the above option is unchecked the machining operation dialog is docked and is displayed over the Machining Browser window.

### Run Automatic check for updates at startup

When this box is checked, the system automatically checks for updates and gives you the chance to install updates. An active internet connection is required to check for updates.

## Ribbon Style

This allows the selection of different themes that changes how the **Browser** windows appear. The borders, colors, highlighting, and shadowing of standard buttons, dialogs, and windows are controlled by which theme is selected.



Example Ribbon Style: Office 2010 Silver

## Copy/Clone Naming Conventions

Use this option to set the naming conventions when a MOp is Copied or Cloned.

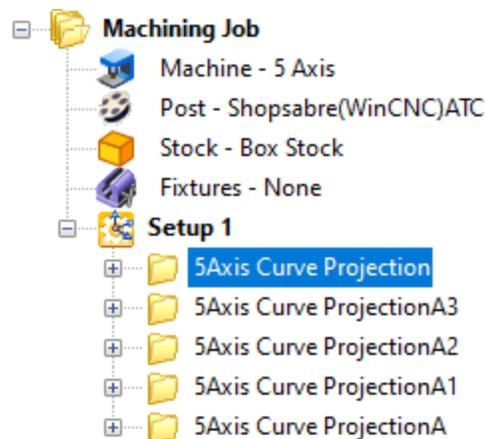
Copy/Clone Naming Conventions

Append Text

Append increment #

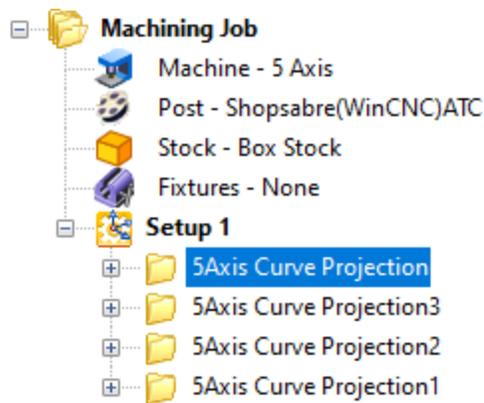
### Append Text

Check this box to append text to end of each copied or cloned operation in the Machining Job tree. First check the box located to the left of "**Append Text**", then enter the text that you want appended to each copy or cloned operation.



### Append Increment #

Check this box to append an incrementing numerical value (i.e., 1,2,3...) to end of each copied or cloned operation in the Machining Job tree. First check the box located to the left of "**Append Increment #**", then enter the starting number for the numerical increment.



### Save Preferences

#### Always load preferences from file when opening a new file

Check this box if you wish to always load CAM Preferences from the file you are opening. Remember, however, that your current settings including your selected post is subject to be being changed.

#### Always save current preferences to file on file save

Check this box if you wish to always save the current CAM preferences to the file on file save. Remember, however, that your current settings including your currently selected post will replace those preferences that were in the current file originally.

#### Always save current preferences to registry on exit

Check this box if you wish to always save the current CAM preferences to the Windows registry when you exit your MecSoft CAM plugin. This will ensure that your current CAM settings will always be used when starting a new file.

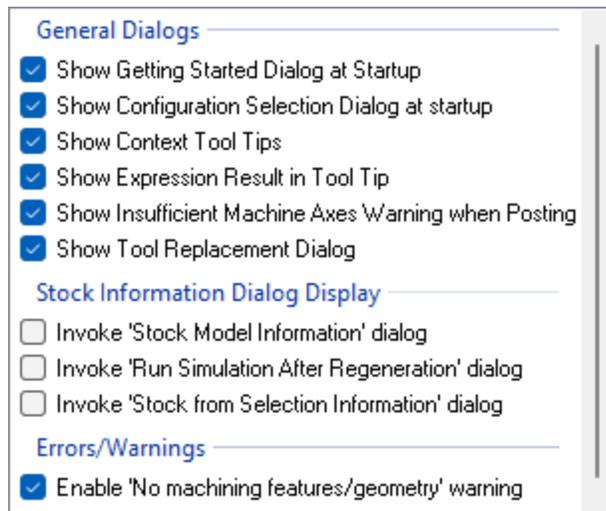
#### Save Current Preferences to Registry

If you have your preferences set the way you want them and do not want them to change, select this button to save the current preferences to your Windows registry. Doing this will force them to be loaded when you create new files.



### Enable/Disable Dialogs And Warnings

This section contains a list of the dialog that you can disable if desired. Make sure you understand what each dialog means and what affect it will have when it is NOT being displayed.

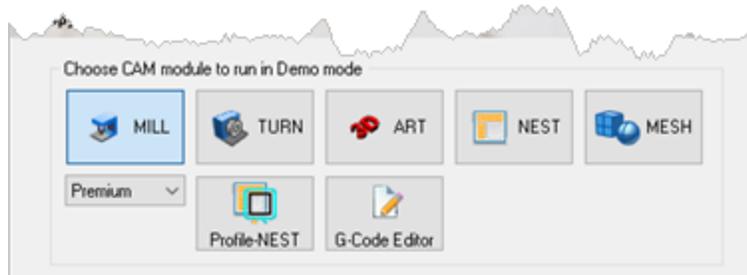


### Show Getting Started Guide at startup

This displays Getting Started dialog at program startup every time the program is loaded. This dialog provides quick access to resources on MecSoft's website.

### Show Configuration Selection Dialog at startup

Selecting this option displays the product configuration dialog to run when the program is loaded. You can select from the following configuration modules: MILL, TURN, ART, NEST, Profile-NEST and G-Code Editor. Additionally, you can select from the following MILL module configurations: Express, Standard, Expert, Professional and Premium.



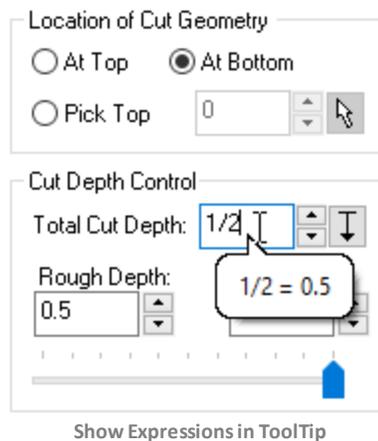
Configuration Selection Dialog at startup

### Show Context Tooltips

Check this box to display Context ToolTips when the mouse moves over a parameter in a dialog. A definition of the parameter will pop-up automatically. Note that Context ToolTips may not be available for ALL dialogs. You can also set the ToolTip Delay in seconds. This is the amount of time it takes to display the Context ToolTip when the mouse has activated it.

### Show Expression Results in Tooltip

You can enter expressions in any dialog field that expects a numerical value and the value will be computed and entered automatically. Check this box to pop-up the results of any expressions in a ToolTip balloon. An example is shown below.



### Show Insufficient Machine Axis Warning when Posting

With this checked, you will receive a warning message if the Machine Setup definition is not set to the required number of axis for the operation being posted.

### Show Tool Replacement Dialog

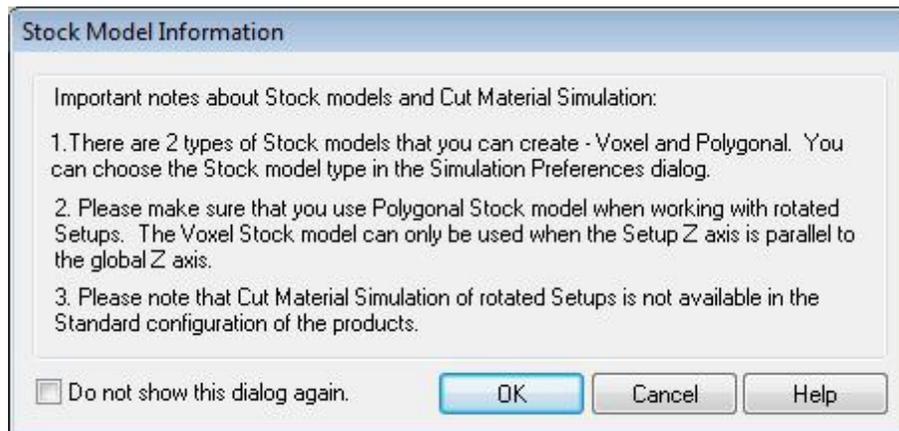
When you open a file that contains tool(s) whose names match a tool that is currently loaded, a dialog asks if you wish to replace the currently loaded tools with the tools from the file you are opening. You can check this box to replace tools by default and stop the dialog from displaying.

### Enable "No machining features/geometry" warning

The ability to suppress warnings when a user regenerates a Knowledge Base that has machining operations that cannot locate control geometry in the loaded part file was implemented. This helps in implementing automation without forcing human interactions with the system.

### Invoke 'Stock Model Information' dialog

The [Stock Model Information](#) dialog is displayed when a stock geometry is created.



Dialog Box: Stock Model Information

You can turn off this dialog by selecting [Do not show this dialog again](#) located on the bottom of the message window.

To display this dialog during stock creation, select [CAM Preferences > User Interface](#) and select [Invoke 'Stock Model Information' dialog](#).

### Invoke 'Run Simulation After Regeneration' dialog

This dialog is displayed when you regenerate a [Setup](#) or the [Machining Job](#).



Dialog Box: Run Simulation After Regeneration

### Run simulation after regenerating each Machining Operation

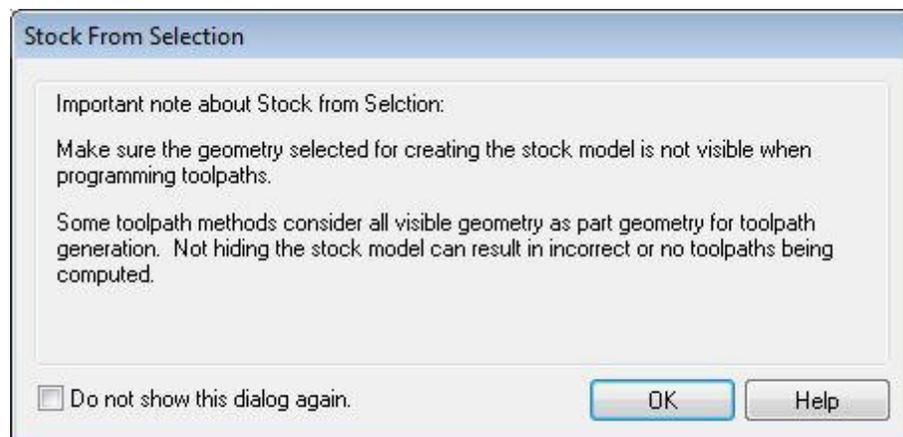
Selecting this option simulates every machining operation in the [Setup](#) after the operation is regenerated. This is generally selected when a re-roughing operation is part of a [Setup](#) as it requires the in-process stock of the previous roughing operation to generate the re-roughing toolpath.

 This process would take longer processing time to regenerate all operations in a [Setup](#) depending on the system resources and simulation preferences.

To display this dialog when regenerating a [Setup](#), select [CAM Preferences > User Interface](#) and select [Invoke 'Run Simulation after Regeneration' dialog](#).

### Invoke 'Stock from Selection Information' dialog

This dialog is displayed when creating [Stock](#) geometry using [Stock from Selection](#).



Dialog Box: Stock from Selection Information

To display this dialog again when creating [Stock](#) from Selection select [CAM Preferences > User Interface](#) and select [Invoke 'Invoke Stock from Selection Information' dialog](#).

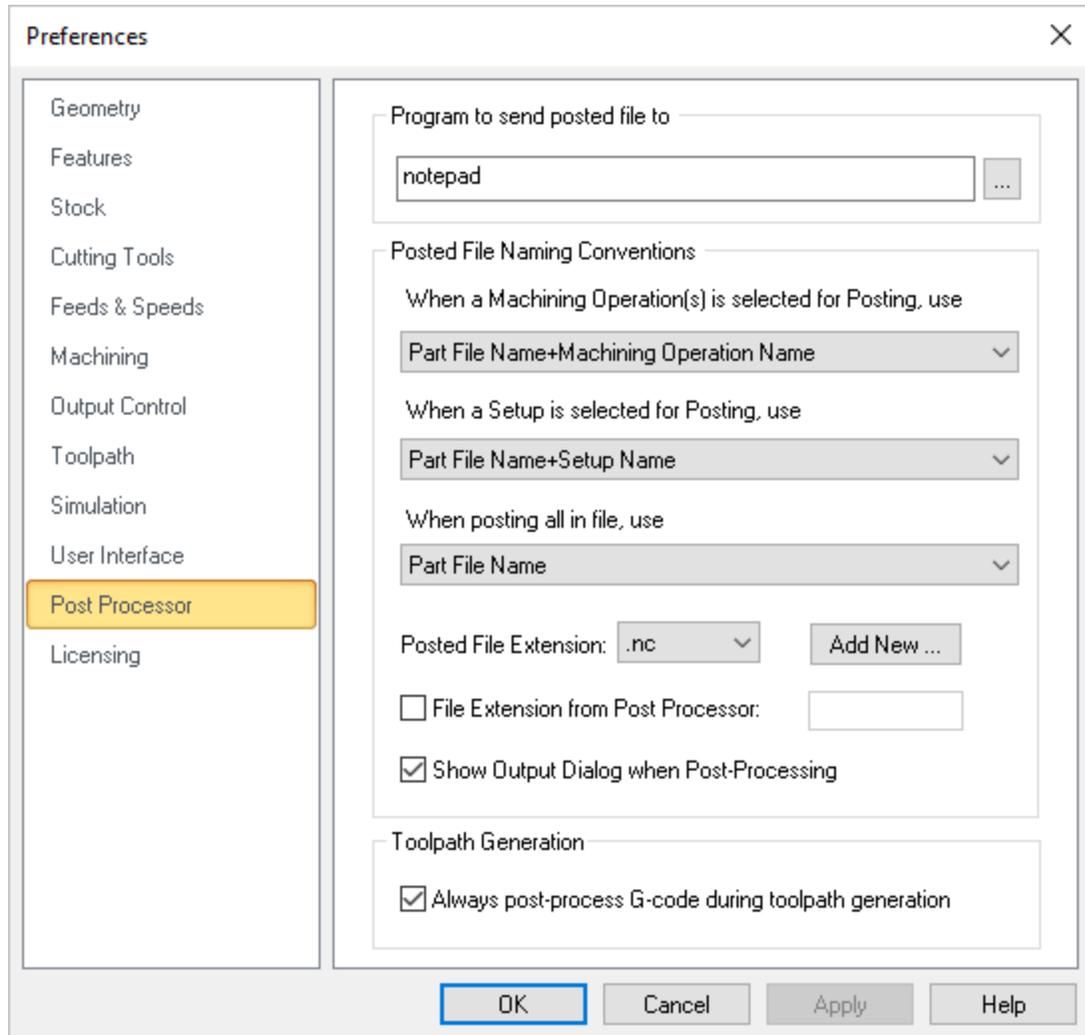
### Reset to defaults

You can use this button if you want to revert to the default factory install settings.

#### 4.7.10 Post Processor

These preferences relate to posting toolpath operations to gcode files. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.

##### CAM Preferences > Toolpath



Preferences

Geometry  
Features  
Stock  
Cutting Tools  
Feeds & Speeds  
Machining  
Output Control  
Toolpath  
Simulation  
User Interface  
Post Processor  
Licensing

Program to send posted file to  
notepad ...

Posted File Naming Conventions  
When a Machining Operation(s) is selected for Posting, use  
Part File Name+Machining Operation Name  
When a Setup is selected for Posting, use  
Part File Name+Setup Name  
When posting all in file, use  
Part File Name

Posted File Extension: .nc Add New ...

File Extension from Post Processor:

Show Output Dialog when Post-Processing

Toolpath Generation  
 Always post-process G-code during toolpath generation

OK Cancel Apply Help

CAM Preferences > Post

##### Program to send the Posted file to

This feature allows you to specify a program to display the posted file. This could be a NC editor or a text editor like [Notepad](#).

 You could also have this point to your control software's executable file and **RhinoCAM** will automatically launch this application when the machining operations are post processed.

### Posted File Naming Conventions

This allows you to set rules for posted file name when post processing machining operations.

When a machining operation is selected for posting you can set the output file name from one of the following options.

- Part File Name + Machining Operation Name
- Part File Name + Setup Name + Machining Operation Name
- Setup Name + Machining Operation Name
- Machining Operation Name

When a setup is selected for posting you can set the output file name from one of the following options.

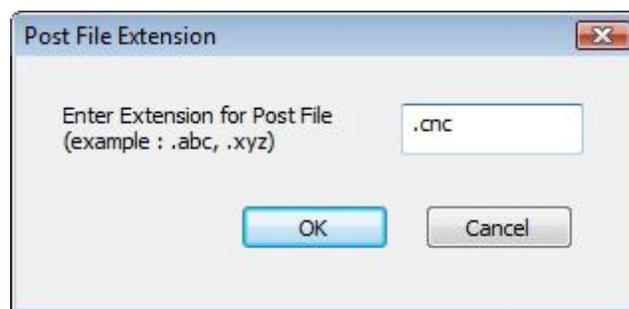
- Part File Name + Setup Name
- Setup Name

When **Machining Job** is selected to **Post All**, you can set the output file name from one of the following options.

- Part File Name
- Part File Name + First Setup Name
- First Setup Name

### Posted File extension

You can select a posted file extension from the list or add an extension to the list by selecting **Add new** button. This displays the **Post File Extension** dialog shown below where you can specify a new file extension and click **OK**.



Dialog Box: Post File Extension

The new file extension is now set as your posted file extension automatically.

By default **RhinoCAM** performs interactive post-processing. That is, when you select a toolpath for post-processing, **RhinoCAM** launches the post-processor and waits for it to complete. You can also turn off the display of the output dialog (post and save dialog).

During interactive post-processing, **RhinoCAM** launches the NC editor to view the output file. You can specify a different NC editor to use. See [Program to send the Posted file to](#) above for doing this.

#### **File Extension from Post Processor**

Check this box to "pull" the posted g-code file extension from the [Legacy Post-Processor](#) (\*.spm) file. This ensures that whichever post that you use, your posted g-code file will match the file extension defined in the active post. **Note:** You must edit your legacy post and set the [Output File Extension](#) value from the [General](#) tab in the [Post-Processor Generator](#).

#### **Show Output Dialog When Post Processing**

Check this box to always display the [Post & Save As](#) file dialog when you select [Post](#) from an operation ([Mop](#)), [Setup](#) or [Machining Job](#).



### **Toolpath Generation**

#### **Always post-process G-code during toolpath generation**

Your G-code is stored with your CAM file so that the latest G-code is always available to you when you open a file. Uncheck this box if you do not want new G-code generated every time you generate a toolpath operation.



### **Post Order**

Use these options to implement post priority.

#### **Post in created order**

Select this option to post operations in the order that they appear in the machining Job tree.

#### **Post in order of increasing tool #**

Select this option to post operations in the order of increasing tool number. The operation with the lowest tool number is posted first.

#### **Post in order of decreasing tool #**

Select this option to post operations in the order of decreasing tool number. The operation with the highest tool number is posted first.



### **Save Post**

#### **Always save post to file on file save**

The current post will be saved to the file when it is saved. CAUTION: The file's Current post will be replaced.

#### **Always load post from file on file load**

The post defined in a file you are open will become the new Current post post selected in the Post-processor options dialog. CAUTION: The post in the file you are opening will be replaced. If this is not desired, close and do not save the file.

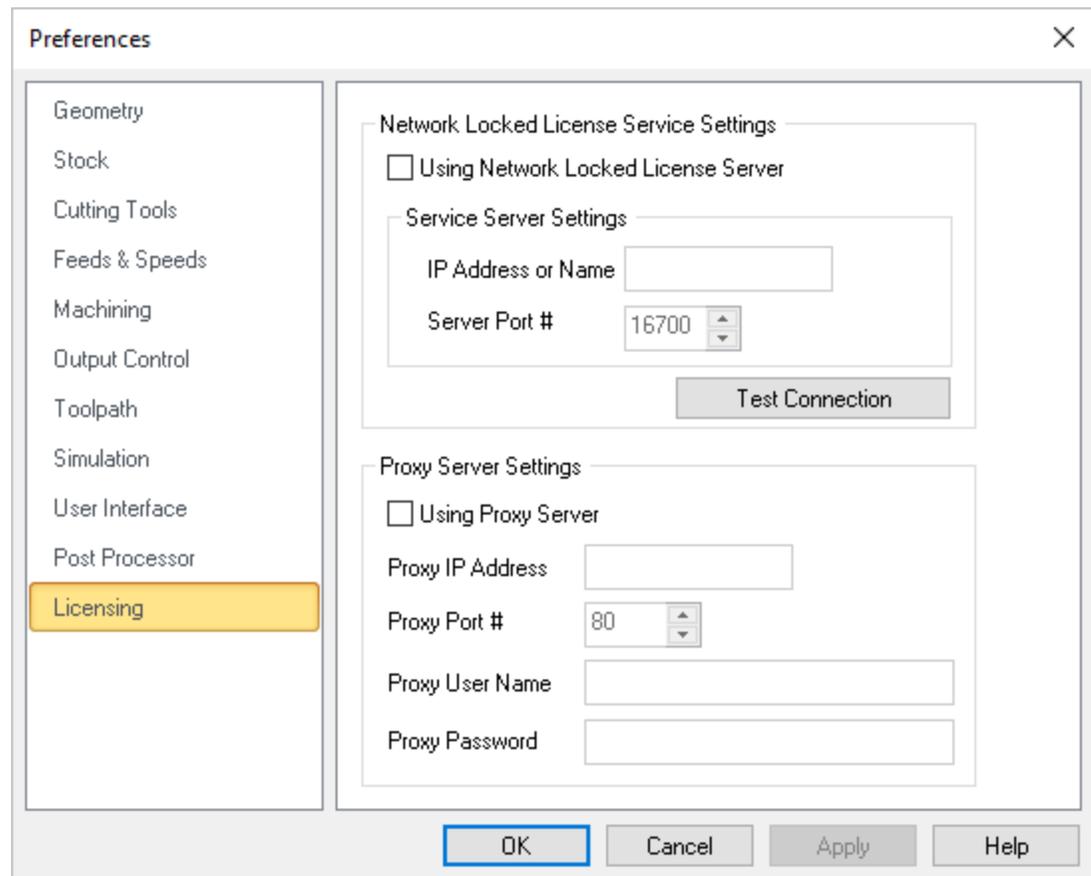
#### Export Saved Post

Use this option to save the Current post in the active file to a post definition file name ending in \*.spm

### 4.7.11 License

This dialog allows you to set [Licensing Preferences](#) for using a [Proxy Server](#) and/or a [LAN Daemon](#) (for [Network Licenses](#)). This information would be provided by your network administrator. You can use the [Reset to defaults](#) button if you want to revert to the default factory install settings.

#### Dialog Box: License Preferences



**Preferences**

- Geometry
- Stock
- Cutting Tools
- Feeds & Speeds
- Machining
- Output Control
- Toolpath
- Simulation
- User Interface
- Post Processor
- Licensing**

**Network Locked License Service Settings**

Using Network Locked License Server

**Service Server Settings**

IP Address or Name

Server Port #

Test Connection

**Proxy Server Settings**

Using Proxy Server

Proxy IP Address

Proxy Port #

Proxy User Name

Proxy Password

OK Cancel Apply Help

Dialog Box: License Preferences

#### Network Locked License Service Settings

Network Locked License Service is a security process required when a computer on a network tries to connect to the server in order to use its resources. If the user's identity

has been stored by the server, entering a valid username and password completes the connection. In this method, the license is "locked" to this network only.

### Using Network Locked License Server

Check this box to enable [Network Authentication](#). Then complete the [Service Server Settings](#) provided here.

### Server IP Address

For [Network Authentication](#), enter the Service Server's [IP Address](#) here.

### Server Port #

For [Network Authentication](#), enter the Service Server's [Port #](#) here.

### Test Connection

Test the connection to the license service server (IP Address or Name) that you have specified in this dialog. A Diagnostics dialog will display with the test results. In the example, the test failed because the IP address of the host could not be reached.

Diagnostics	
Licensing System Initialized	OK
Internet Connection	OK
Cloud Service Reachable	OK
Host IP/Name Entered	Failure
Host Resolved	Not ...
Service Connected	Not ...
License Received	Not ...



### Proxy Server Settings

[Proxy Server Settings](#) need to be set if your computer or network is behind a proxy. A proxy server is a computer that acts as an intermediary between the user's computer and the Internet. It allows client computers to make indirect network connections to other network services.

### Using Proxy Server

Check this box to enable [Proxy Server Settings](#) and complete ALL of the following fields accurately. This information would be provided by your network administrator.

### Proxy IP Address

This is the [IP Address](#) for your [Proxy Server](#). This information would be provided by your network administrator.

### Proxy Port #

Enter the [Port Number](#) for your [Proxy Server](#). This information would be provided by your network administrator.

### Proxy User Name

Enter the [Proxy Server](#) user name. This information would be provided by your network administrator.

### Proxy Password

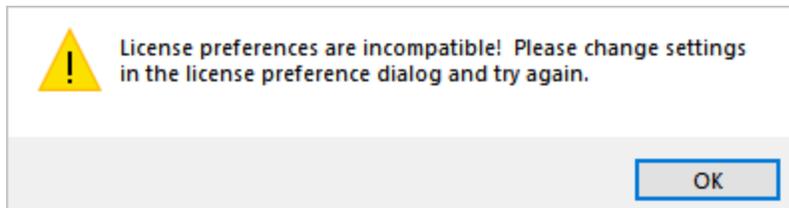
Enter your [Proxy Server](#) password. This information would be provided by your network administrator.



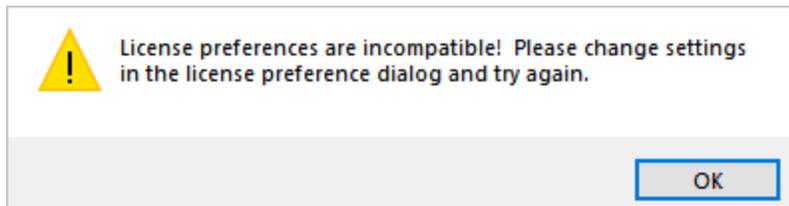
### Troubleshooting and Messages

Here are some troubleshooting messages that you may encounter.

If you have node locked license activated and you select [Using Lan Daemon](#), this will display the following message and release your node locked license.



If [Using Lan Daemon](#) is checked and you are entering a valid node locked activation code in the license dialog, the following message is displayed. Make sure [Using Lan Daemon](#) is unchecked before activating a node-locked license.



## Machining Methods

The *Profile-NEST* module includes the one most used *2½ Axis* machining method, *2½ Axis Profiling*. In *Profile-NEST*, this operation includes all of the same parameters available within the *MILL* module.

### 5.1 2 Axis Profiling



This method machines open and closed regions by tracing along one side of their contours. You can define offsets so that the tool makes multiple passes relative to the regions. *Profiling* can be used as a finishing operation after a *Pocketing* or *Facing* toolpath, or it can be used alone.

#### *2½ Axis Profiling Operation Example*

An example of the *Profiling* toolpath is shown below:



2½ Axis Profiling Operation

#### *2½ Axis Profiling Stock Simulation Example*

The stock simulation:



2½ Axis Profiling Stock Simulation

## Create Machining Operations

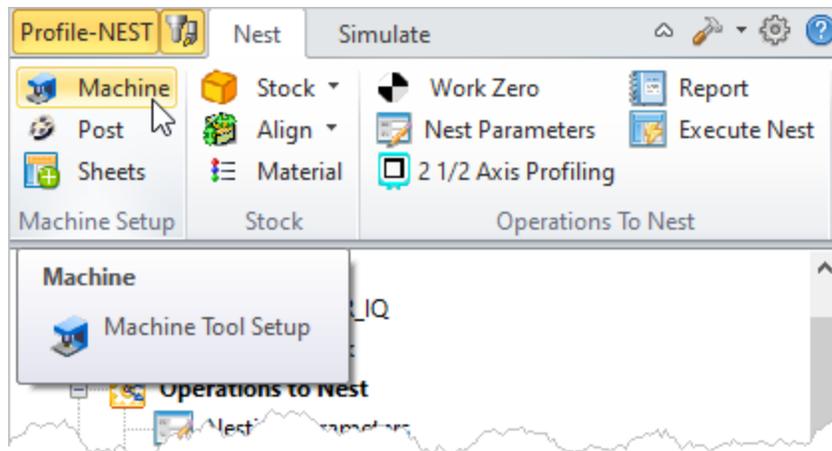
Creating machining operations in the [Profile-NEST](#) module is a very simple process. You load the part, the stock geometry if necessary, selects a tool, and specify the feeds and speeds to be used in the [Profiling](#) operation. Generation of the toolpath begins when you select [Generate](#) from the [Profiling](#) operation dialog. Once generated the [Profiling](#) operation will be created and displayed under the [Machining Job](#) in the [Machining Operations \(Mops\) Browser](#). It is also displayed graphically on the screen.

### 6.1 Machine Tool Setup

 This option on the [Program](#) tab allows you to manually setup your [Machine Tool Definition](#).

#### [Machining Browser: Machine Menu Item](#)

The dialog can be displayed by selecting [Machine](#) from the [Program](#) tab.



Machining Browser: Machine menu item

#### 6.1.1 Manual Definition

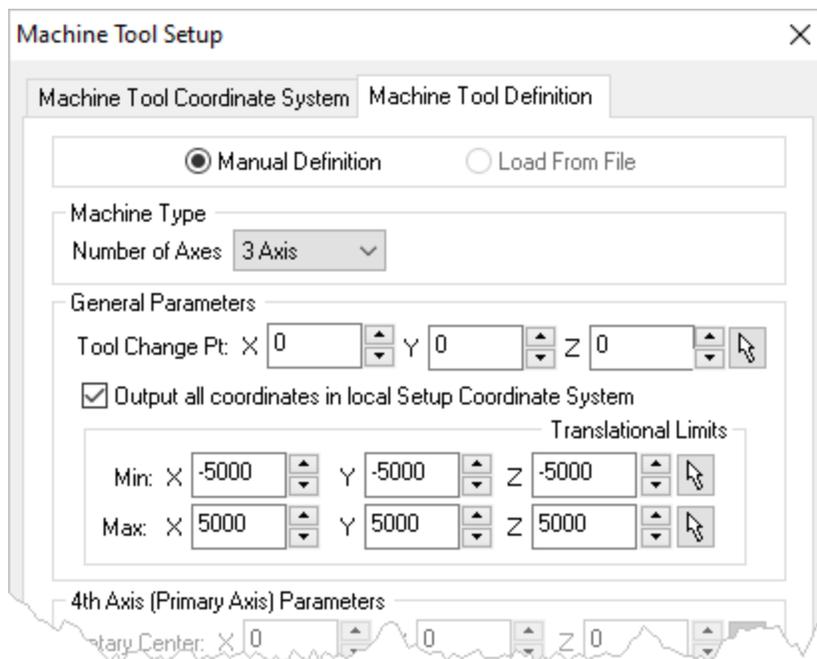
This dialog allows you to setup your [Machine Tool Definition](#). Refer to each section below for more information.

#### [Machine Tool Definition tab](#)

##### [Manual Definition](#)

This option allows you to manually setup your [Machine Tool Definition](#). Refer to each section below for more information.

See [Load From File, Machine Tool Setup](#) for more information.



Dialog Box: Machine Tool Setup - Manual Definition

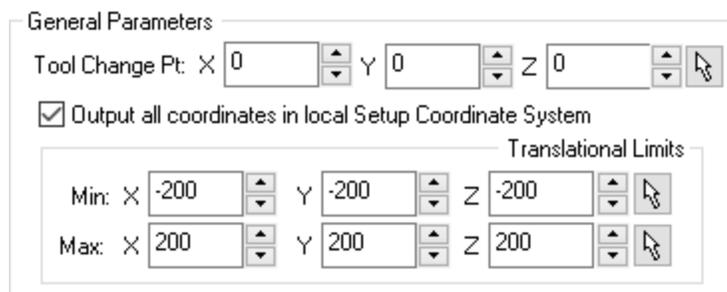
## Machine Type

### Number of Axis

- Select **3 Axis** for both **2½** and **3 Axis** machining methods.

## General Parameters

For all **Machine Types**, the following **General Parameters** are available.



### Tool Change Point

 Specify the **X Axis** coordinate location of a **Tool Change Point** or use the **Pick** button to select a point from your 3D model. This coordinate location will be output prior to every tool change. **Note:** Tool change variables may need to be configured in your selected **Post Processor**.

### Output all coordinates in local Setup Coordinate System

Check this box to output the G code's tool motion coordinates in the local setup

**Machine Coordinate System (MCS).** If left unchecked all coordinates will be output in the **World Coordinate System (WCS)**. **Note:** Rapid motions in all indexed operations are converted to federate motions when the setup is not aligned with the machine Z. This is done only when a head configuration is defined and the option **Output all coordinates in local Setup Coordinate System** is NOT set.

#### **Translational Limits**

This will be the **Minimum X** and Maximum XYZ direction **Translation Limits** allowed by your machine tool. **Note:** These parameters are not applied and are reserved for future use.

This will be the **Minimum X** direction **Translation Limit** allowed by your machine tool. **Note:** These parameters are not applied and are reserved for future use.

## **6.2 Profile-NEST Geometry**

### **6.2.1 Part Geometry**

**Part Geometry** is the CAD design geometry that exists in the part file. This design data could consist of both 2D and 3D data. Part geometry is utilized in the computation of toolpaths in the module. Geometry is used in utilized differently in each of the machining operations in **MILL**.

**2½ Axis Profile** Typically uses 2D wireframe geometry. 3D wireframe geometry is used in some operations and the 3D surface and/or mesh data as well as the 3D features can be optionally used for certain computations.

### **6.2.2 Stock Geometry**

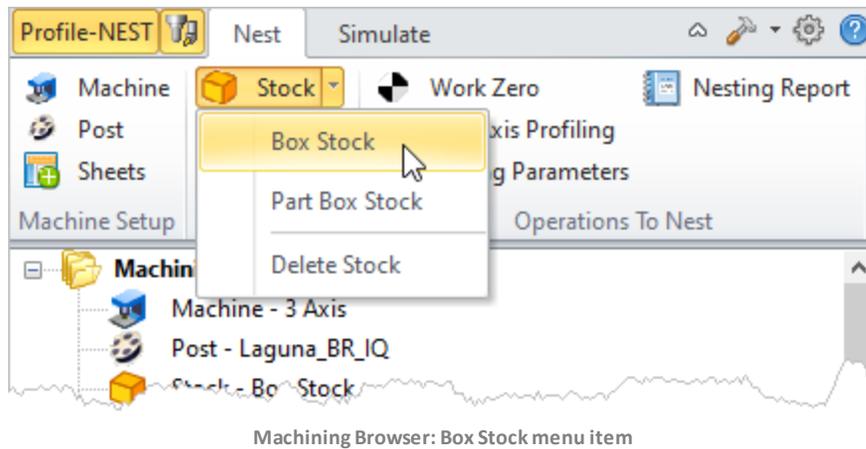
#### **6.2.2.1 Box Stock**



You can define the raw stock model as a simple box by selecting the **Box Stock** option from the **Stock** menu under the **Program** tab in **Machining Browser**.

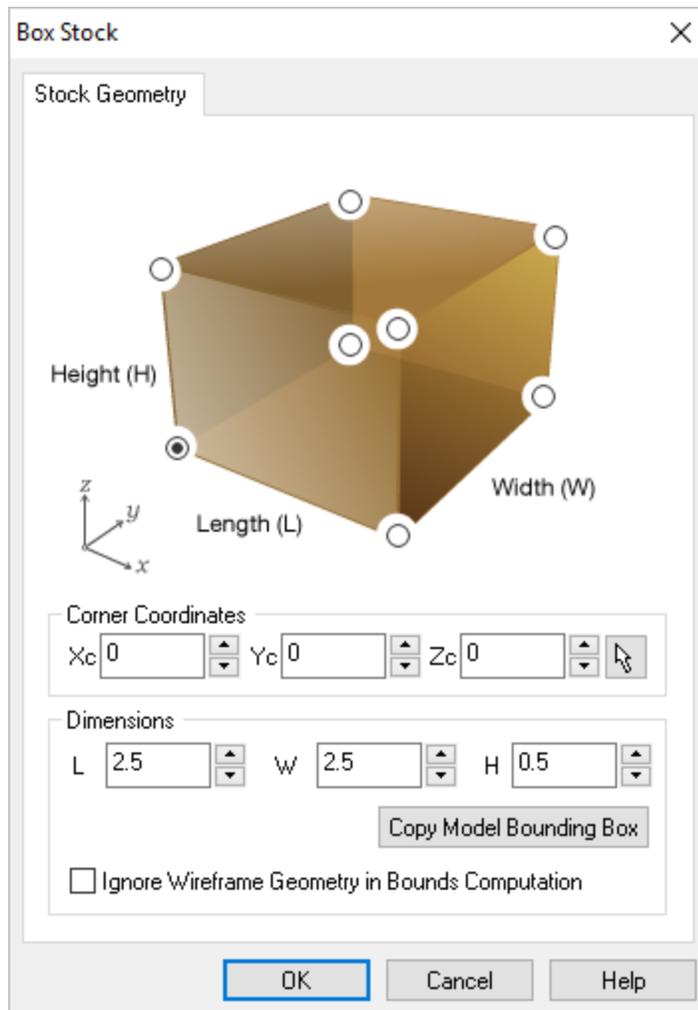


**Machining Browser: Box Stock menu item**



### Box Stock Dialog

Use this dialog to define your box stock. Corner position and dimension parameters are provided. Refer to the parameters below. When you pick **OK**, a stock model based on your definition will be created and displayed.

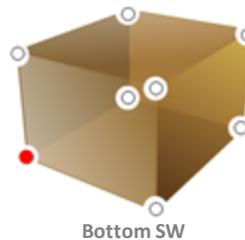


Box Stock Dialog

### Starting Corner

Select a location from the dialog image to use as the origin to measure your stock from. For example:

Set the **Bottom South West** corner of the **Stock** should serve as the origin to measured from. The **Stock** shown on your display will dynamically update accordingly.

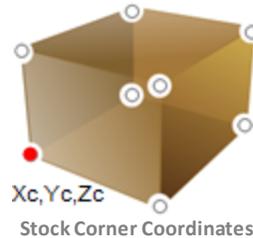


### Corner Coordinates

Alternatively, you can enter the world coordinates to determine where the corner of the **Stock Box** should be located. Your **Stock Dimensions** will be measured from this coordinate point ( $X_c, Y_c, Z_c$ ).

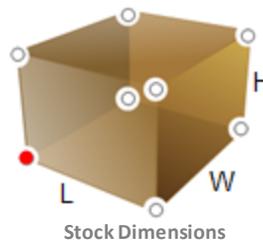


You can use the **Pick** button to select a point from your drawing or model.



### Dimensions

You can use these fields to enter the **Length (L)**, **Width (W)** and **Height (H)** of your desired **Box Stock**.



### Copy Model Bounding Box

This button only calculates based on the sheet size, not part geometry. Make sure you have defined a sheet first using the [Select Sheets dialog](#). The system calculates the bounding box extents of the sheet length, width and height and displays these values in the dialog.

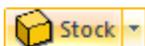


### Ignore Wireframe Geometry in Bounds Computation

If you check the box **Ignore Wireframe Geometry in Part Bounds Computation**, any wireframe geometry in your part will be ignored when calculating the **Part Bounds**.

Make sure to click **Copy Model Bounding Box** after you check or uncheck **Ignore Wireframe Geometry in Bounds Computation**.

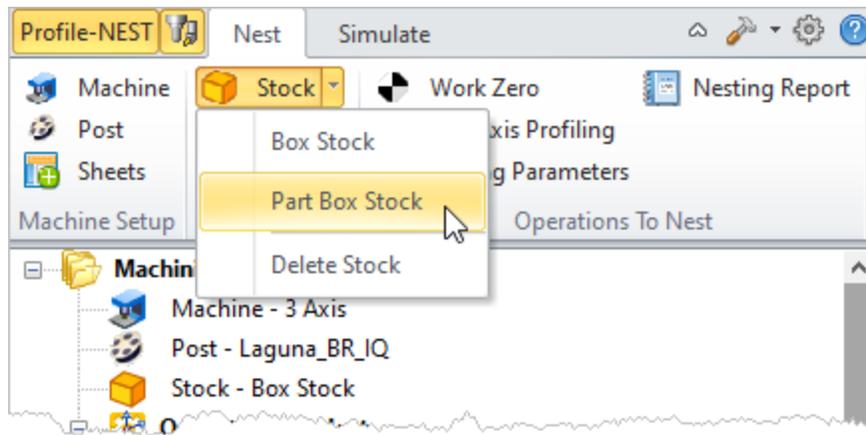
#### 6.2.2.2 Part Box Stock



You can define the raw stock model as a simple box that surrounds your part. This option is available from the **Stock** menu under the **Program** tab in **Machining Browser**.



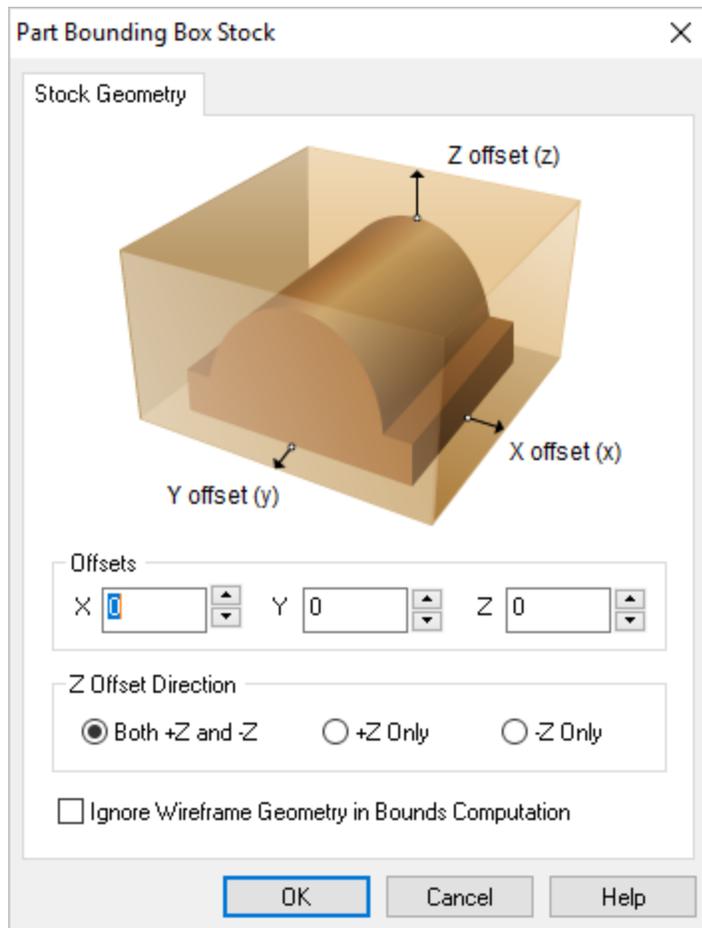
### Machining Browser: Part Box Stock menu item



Machining Browser: Part Box Stock menu item

### Dialog Box: Part Box Stock

The system calculates the bounding box of the part model as the **XYZ** extents of geometry of the part model. You can then define offsets in any of the three coordinate directions to apply to the computed bounding box. The system will expand the bounding box by the offset amount in each of the coordinate directions. When you click on the **OK** button, a stock model based on your definition will be created and displayed.

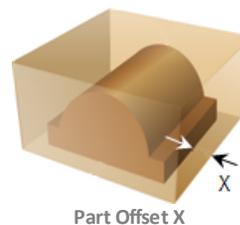


Dialog Box: Part Box Stock

## Offsets

### X Offset

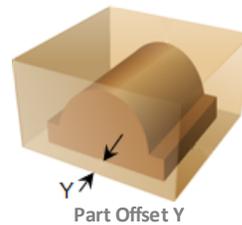
Enter the **X Offset** value for sizing your **Part Box Stock**. The system will expand the part model bounding box by the offset amount in the +/- X direction.



Part Offset X

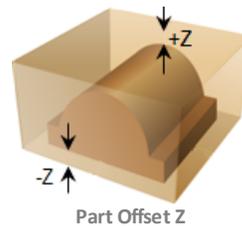
### Y Offset

Enter the **Y Offset** value for sizing your **Part Box Stock**. The system will expand the part model bounding box by the offset amount in the +/- Y direction.



### Z Offset

Enter the **Z Offset** value for sizing your **Part Box Stock**. The system will expand the part model bounding box by the offset amount in the +Z direction.



### Z Offset Direction

#### Both +Z and -Z / +Z Only / -Z Only

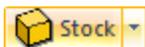
You can choose to apply the **Z Offset** value entered in this dialog to either the **+Z** direction, the **-Z** direction or both **+Z** and **-Z** directions.



### Ignore Wireframe Geometry in Bounds Computation

Check this to ignore all 2D and 3D curve geometries present in the part from stock bounding box computation.

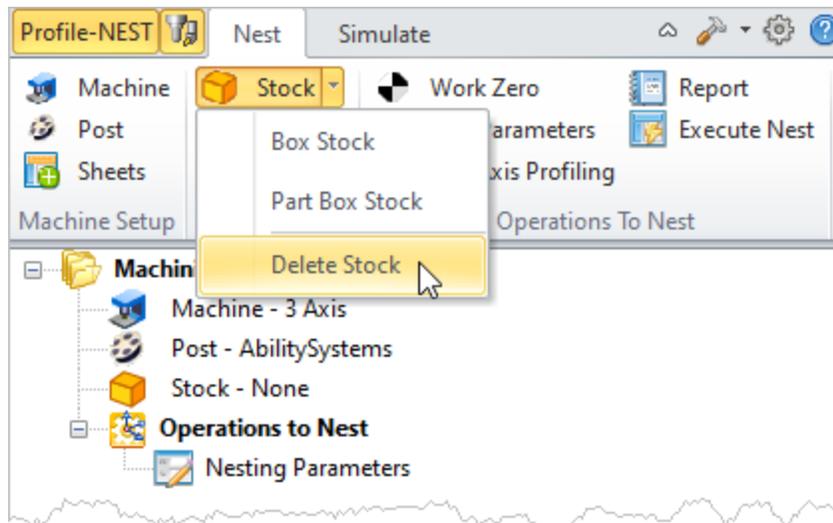
### 6.2.2.3 Delete Stock



You can delete the stock geometry by selecting **Delete Stock** from **Create Stock Model** under the **Program** tab in **Machining Browser**. The stock model can also be deleted by selecting the stock entry under **Machining Job**, right mouse button click and select **Delete Stock**.

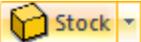


### Machining Browser: Delete Stock menu item

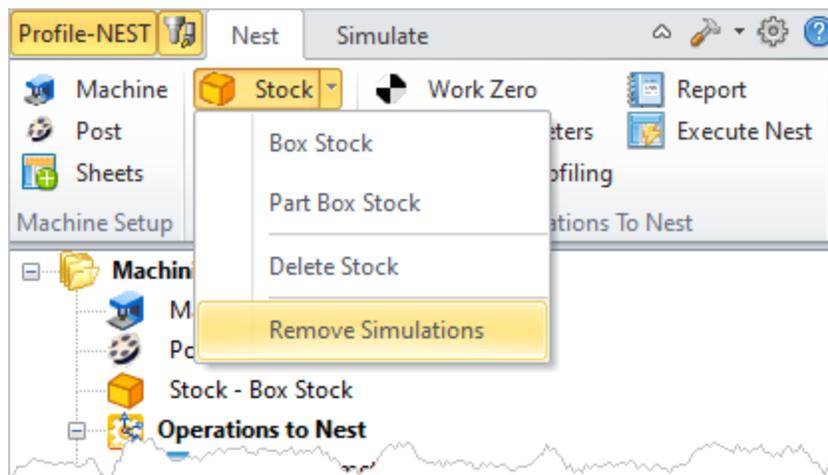


Delete Stock Menu Item

#### 6.2.2.4 Remove Simulations

 You can remove the in-process stock model by selecting [Remove Simulations](#) from [Stock](#) menu under the [Program](#) tab in [Machining Browser](#). This is different than the [Delete Stock](#) command. The stock is not deleted, only the current simulations are removed, changing the stock to its uncut state.

#### Machining Browser: Remove Simulations



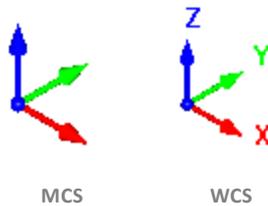
Machining Browser: Remove Simulations stock menu

## 6.3 Operations to Nest (Setup)

 This icon allows you to modify the orientation of the **Operations to Nest Setup** (referred to as the **Machine Coordinate System** or **MCS**) in relation to the **Work Coordinate System (WCS)**, the active **Construction Plane** or another curve or surface. This setup is the default orientation of each nested sheet.

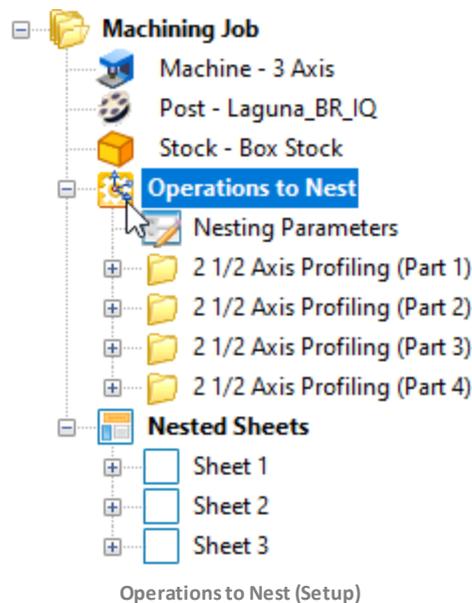
### Coordinate Systems Triad Displays

The **Operations to Nest Setup (MCS)** is displayed on your screen as a triad **Blue** representing the Z-axis, **Red** representing X-axis and **Green** representing the Y-axis. The **WCS (World Coordinate System)** is displayed the same way as but with XYZ axis letters labeled on top of it. These are shown below.



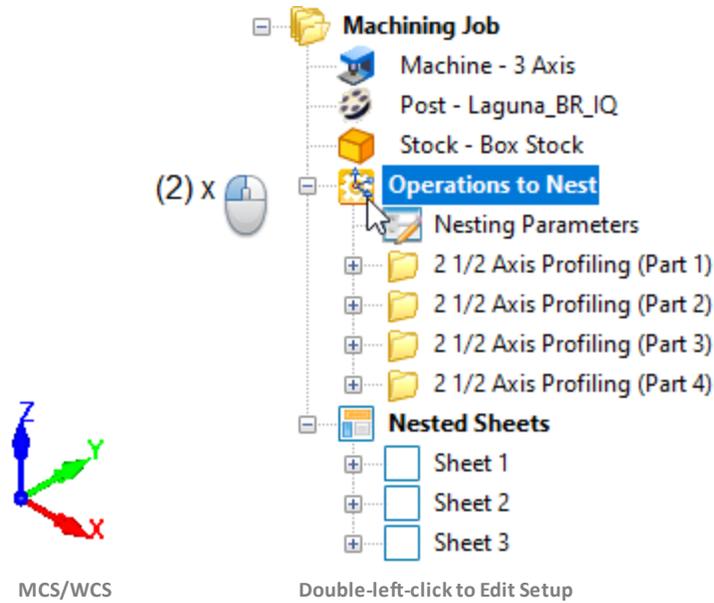
### The Default Operations to Nest Setup (MCS)

When the **Profile-NEST** module is loaded a default **Operations to Nest Setup (MCS)** is defined for you that is aligned with the **World Coordinate System (WCS)**.

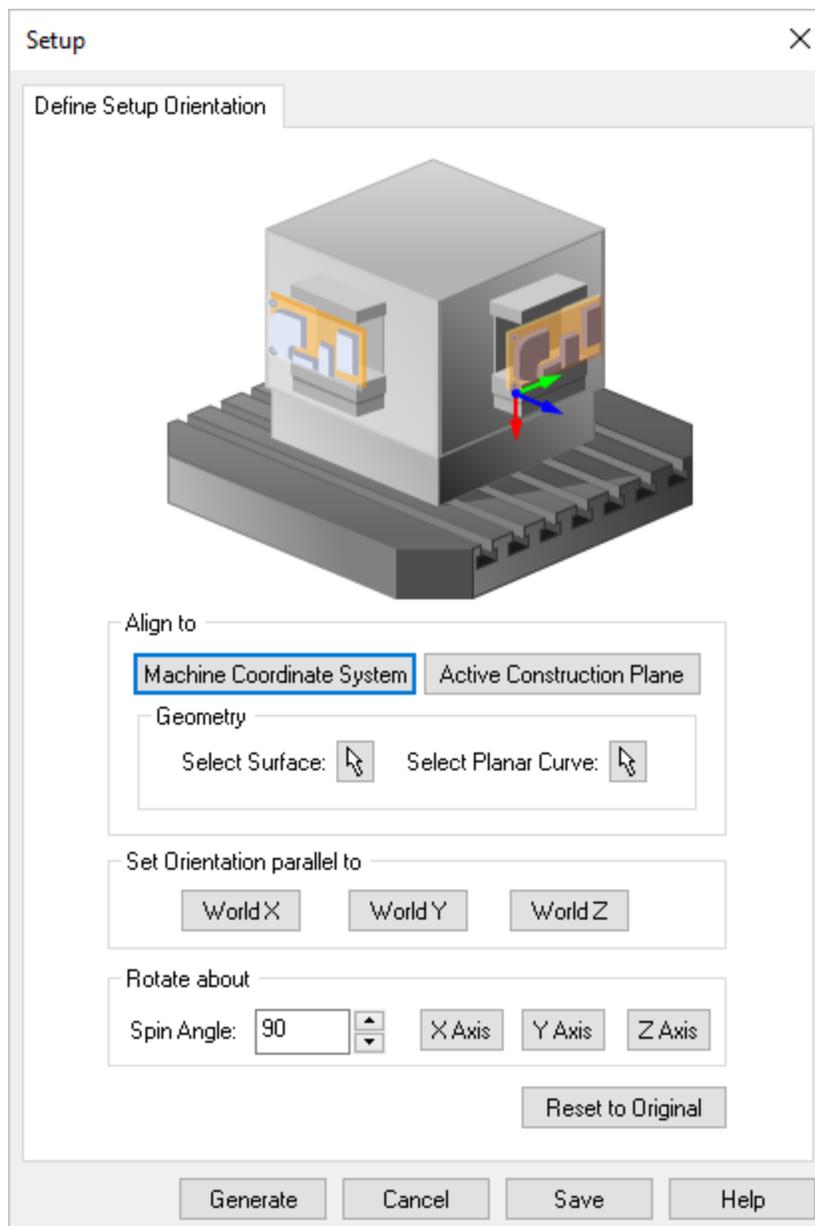


### To Modify the Default Setup Orientation

In **PRO** and higher configuration, the orientation of the default **Operations to Nest Setup (MCS)** can be modified by double-left-clicking on the **Setup** icon to load the **Setup** dialog (shown below).



Editing an **Operations to Nest Setup (MCS)** displays the **Setup** dialog. This dialog allows you to modify that **Setup** orientation.

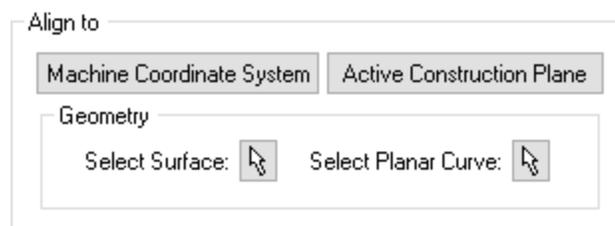


Dialog Box: Setup, Define Setup Orientation tab



### Align to

Use the controls in this section to align the **Z Axis** of the **Operations to Nest Setup (MCS)**.



### Machine Coordinate System

This will orient the clearance plane parallel to the defined [Setup XY \(Work Coordinate system\)](#).

### Active Construction Plane

This will align the new [Setup Coordinate System](#) to the active view's [Construction Plane \(C-Plane\)](#).

### Select Surface

 Use this option to align to a selected surface. The surface can be selected by using the [Pick](#) button.

### Select Planar Curve

 Use this option to [Align To](#) a selected curve. The curve can be selected by using the [Pick](#) button.



### Set Orientation Parallel To

Use the controls in this section to align the [Z Axis](#) of the [Operations to Nest Setup \(MCS\)](#) to one of the [WCS \(World Coordinate System\)](#) axes.

Set Orientation parallel to

World X
World Y
World Z

For the [Set Orientation parallel to options](#), you can select either the [World X](#), [World Y](#) or [World Z](#) buttons to align the [MCS](#) parallel to the selected axis.



### Rotate About

Use the controls in this section to rotate one axis or the [Operations to Nest Setup \(MCS\)](#) incrementally by a defined [Spin Angle](#).

**Note:** One click of either of these Axis buttons rotates the that setup axis by one increment.

Rotate about

Spin Angle:

### Spin Angle

This is the incremental [Spin Angle](#) that is applied when either the [X Axis](#), [Y Axis](#) or [Z Axis](#) buttons are selected from this dialog. The spin angle can be positive or negative.

### X Axis

Rotate the [Machine Tool Coordinate System](#) one [Spin Angle](#) increment about the [X Axis](#). Each pick of this button rotates one [Spin Angle](#) increment.

### Y Axis

Rotate the part one [Spin Angle](#) increment about the [Y Axis](#). Each pick of this button rotates one [Spin Angle](#) increment.

#### Z Axis

Rotate the part one [Spin Angle](#) increment about the [Z Axis](#). Each pick of this button rotates one [Spin Angle](#) increment.

#### **Reset to Original**

Pick [Reset to Original](#) to reset the [MCS](#) orientation to the current [WCS](#) orientation.

#### **Things to Remember about Setups**

-  Standard and [Expert](#) configurations.
-  Selecting [Setup](#) edits the default [Setup](#) in [Professional](#) and [Premium](#) configurations.

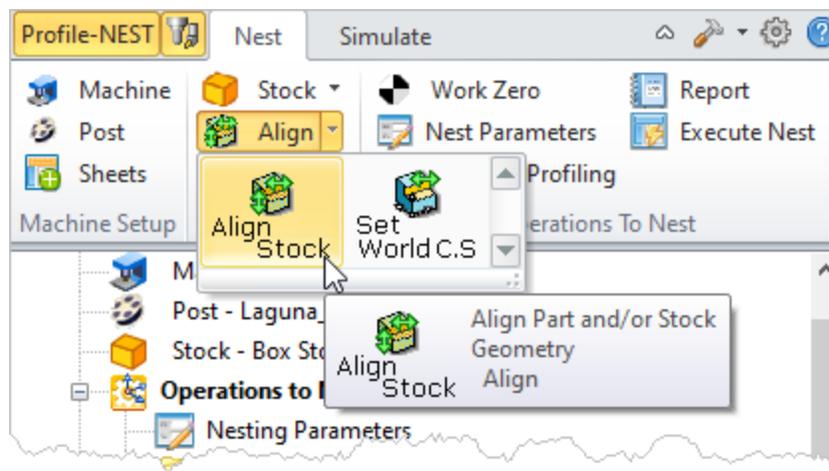
## 6.4 Align Stock



It is typical to need the ability to position stock geometry in some geometric relationship with the part geometry. A typical scenario is that you have modeled the part with a pre-determined origin. In such cases it would be desirable to locate the stock with respect to the already positioned part without having to go through actually calculating the transformation delta values.

#### **Machining Browser: Align Stock menu item**

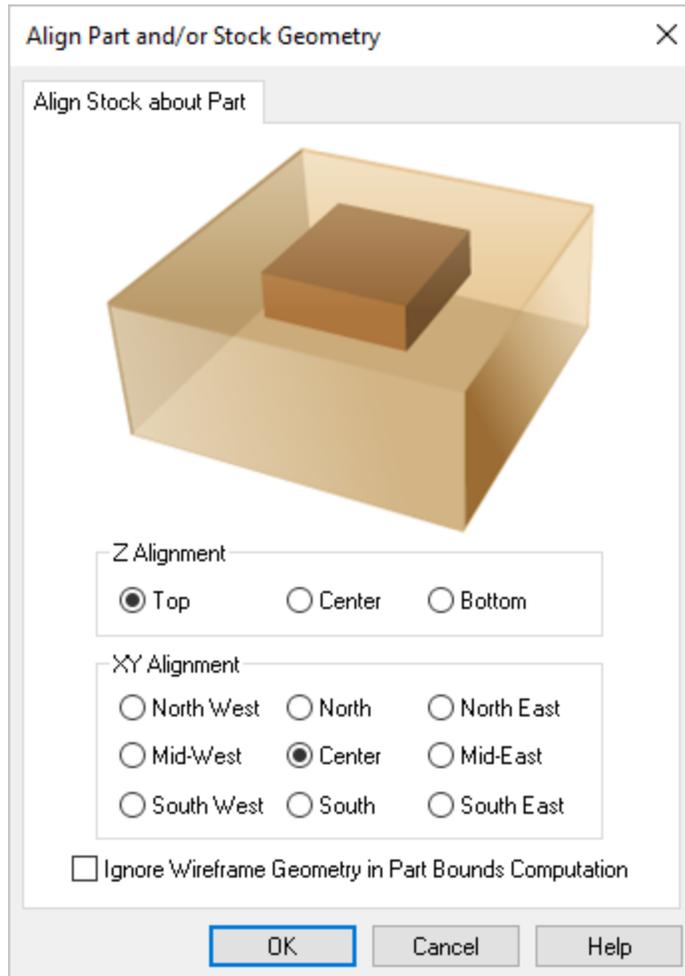
This dialog can be invoked by selecting [Align](#) and [Align Stock](#) from [Program](#) tab under the [Machining Browser](#).



Machining Browser: Align Stock menu item

### Dialog Box: Align Part and/or Stock Geometry

Once both part and stock geometry are loaded, use this dialog to perform the relative positioning. Both Z and XY alignment of different faces of the part with respect to the stock are possible. Select the necessary alignment options using the appropriate radio buttons in this dialog.



Dialog Box: Align Part and/or Stock Geometry

### X Alignment

#### Top

Specify the **Z Alignment** of the **Stock** to be at the **Top** of the part. The **Stock** preview will be dynamically updated on your screen.



Align at Top

### Center

Specify the **Z Alignment** of the **Stock** to be at the **Center** of the part. The **Stock** preview will be dynamically updated on your screen.



Align at Center

### Bottom

Specify the **Z Alignment** of the **Stock** to be at the **Bottom** of the part. The **Stock** preview will be dynamically updated on your screen.



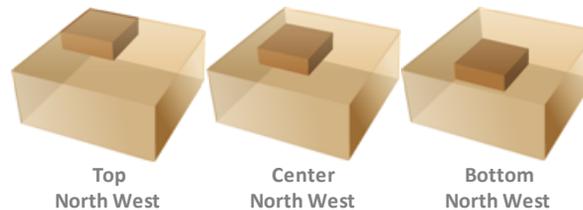
Align at Bottom



## XY Alignment

### North West

Specify the **XY Alignment** of the **Stock** to be at the **North West** of the part. The **Stock** preview will be dynamically updated on your screen.



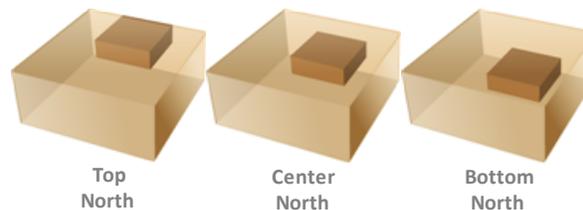
Top  
North West

Center  
North West

Bottom  
North West

### North

Specify the **XY Alignment** of the **Stock** to be at the **North** of the part. The **Stock** preview will be dynamically updated on your screen.



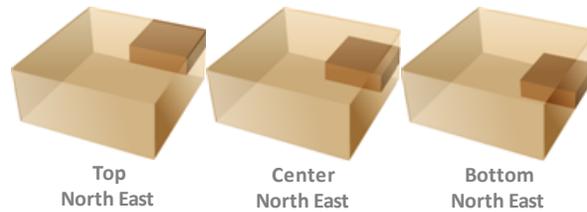
Top  
North

Center  
North

Bottom  
North

### North East

Specify the **XY Alignment** of the **Stock** to be at the **North East** of the part. The **Stock** preview will be dynamically updated on your screen.



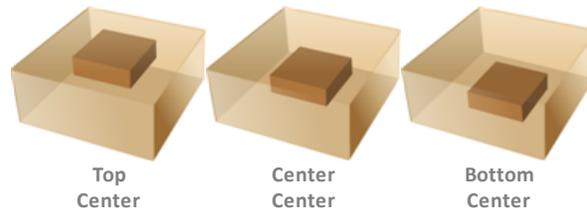
### Mid-West

Specify the **XY Alignment** of the **Stock** to be at the **Mid West** of the part. The **Stock** preview will be dynamically updated on your screen.



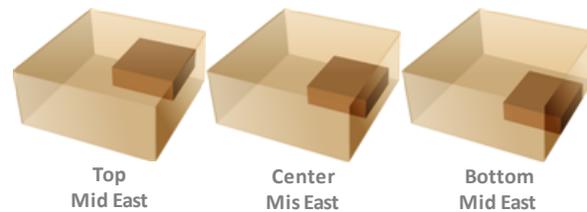
### Center

Specify the **XY Alignment** of the **Stock** to be at the **Center** of the part. The **Stock** preview will be dynamically updated on your screen.



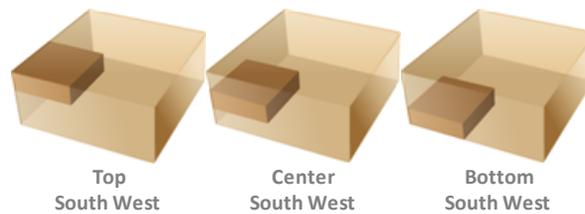
### Mid-East

Specify the **XY Alignment** of the **Stock** to be at the **Mid East** of the part. The **Stock** preview will be dynamically updated on your screen.



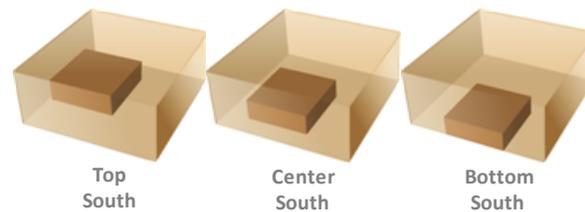
### South West

Specify the **XY Alignment** of the **Stock** to be at the **South West** of the part. The **Stock** preview will be dynamically updated on your screen.



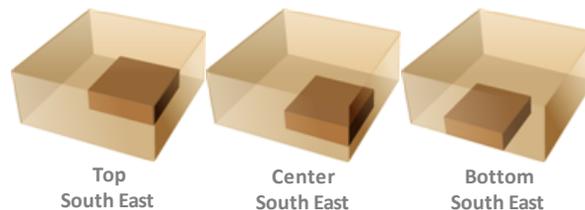
### South

Specify the **XY Alignment** of the **Stock** to be at the **South** of the part. The **Stock** preview will be dynamically updated on your screen.



### South East

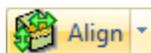
Specify the **XY Alignment** of the **Stock** to be at the **South East** of the part. The **Stock** preview will be dynamically updated on your screen.



### Ignore Wireframe Geometry in Bounds Computation

If you check the box **Ignore Wireframe Geometry in Part Bounds Computation**, any wireframe geometry in your part will be ignored when calculating the **Part Bounds**.

## 6.5 Set World CS

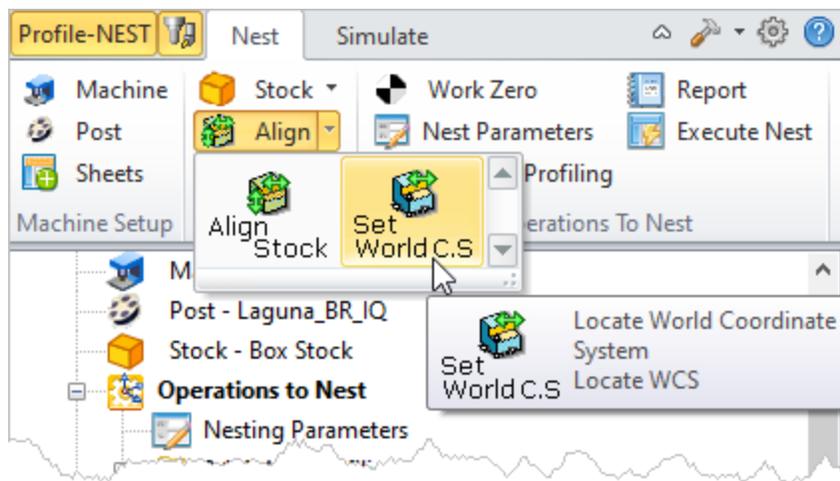


You can set the location of the **World Coordinate System (WCS)** origin with respect to the geometry. An alternative way of thinking about this is to transform all loaded geometry to an appropriate location. This **Locate WCS** dialog offers you a variety of ways of accomplishing this.



### Machining Browser: Set World CS menu item

This dialog can be invoked by selecting **Align** and **Set World CS** from the **Nest** tab under the **Machining Browser**.

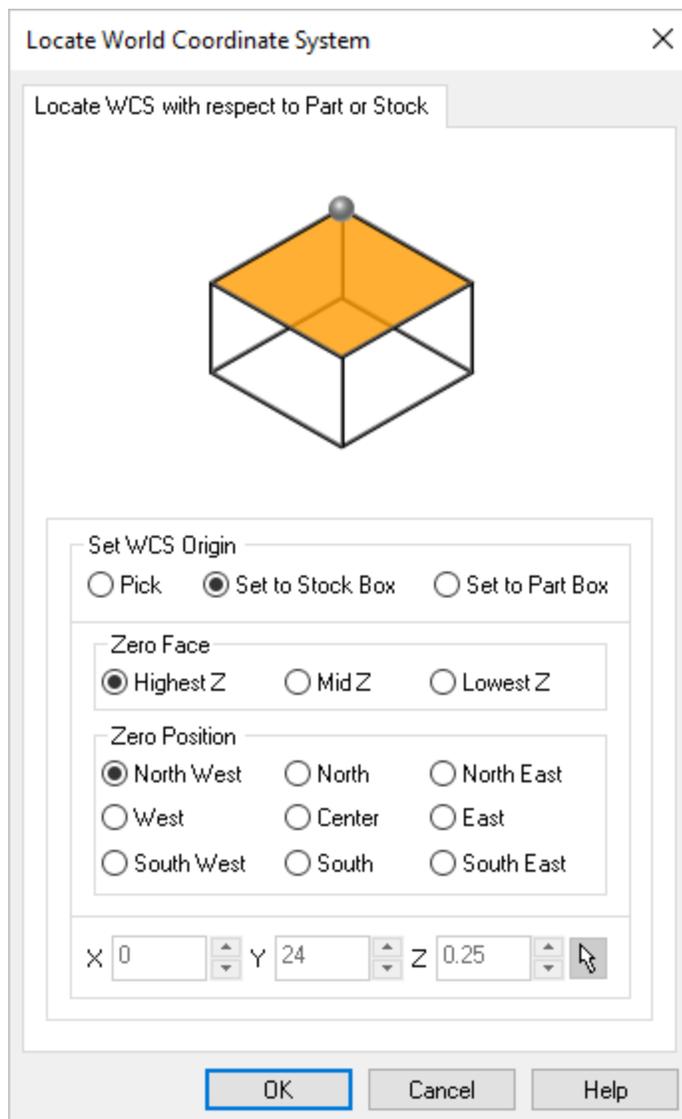


Machining Browser: Set World CS menu item



### Dialog Box: Locate World Coordinate System

The [Locate WCS](#) dialog appears as shown below



### Set WCS Origin

You can set the origin by explicitly picking a point or can set it with respect to the [Part](#) or [Stock](#) geometry bounding boxes.

#### Pick

If you select the [Pick](#) option, the button with the pick cursor  close to the bottom of the dialog will be activated. You can then click on this button to graphically select a point to align the [WCS](#) origin to.

#### X / Y / Z / Pick

 You can set the [X](#), [Y](#), [Z](#) values of the [WCS](#) ([World Coordinate System](#)) manually here. Optionally, you can select the [Pick](#) button to select a point. It's [XYZ](#) coordinate values will be added to this dialog.

### Set to Stock Box

Selecting this item will activate the Zero Face and the Zero Position sections of the dialog. You can then select the Z and the XY locations, with respect to the bounding box of the stock geometry, by choosing the appropriate selections in the dialog.

### Set to Part Box

Similar to the previous selection, selecting this item will activate the Zero Face and the Zero Position sections of the dialog. You can then select the Z and the XY locations, with respect to the bounding box of the stock geometry, by choosing the appropriate selections in the dialog.



### Zero Face

Make a selection to locate the Z zero of the **WCS**. This is referred to as the **Zero Face**.

#### Highest Z

This tells the system that the **Zero Face** should be at the **Highest Z** location of either the **Stock** or **Part**, depending on which **Set WCS Origin** option is selected.

#### Mid Z

This tells the system that the **Zero Face** should be at the **Mid Z** location of either the **Stock** or **Part**, depending on which **Set WCS Origin** option is selected.

#### Lowest Z

This tells the system that the **Zero Face** should be at the **Lowest Z** location of either the **Stock** or **Part**, depending on which **Set WCS Origin** option is selected.

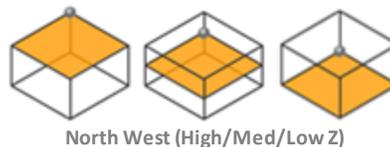


### Zero Position

Make a selection to locate the Zero Position of the **WCS**. You can select one of the cardinal directions listed below.

#### North West

Locate the **WCS** in the XY **North West** position.



North West (High/Med/Low Z)

#### North

Locate the **WCS** in the XY **North** position.



North (High/Med/Low Z)

#### North East

Locate the **WCS** in the XY **North East** position.



### Mid-West

Locate the WCS in the XY **West** position.



### Center

Locate the WCS in the XY **Center** position.



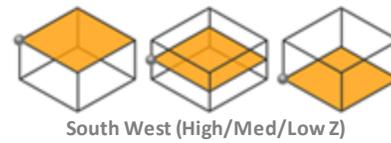
### Mid-East

Locate the WCS in the XY **East** position.



### South West

Locate the WCS in the XY **South West** position.



### South

Locate the WCS in the XY **South** position.



### South East

Locate the WCS in the XY **South East** position.

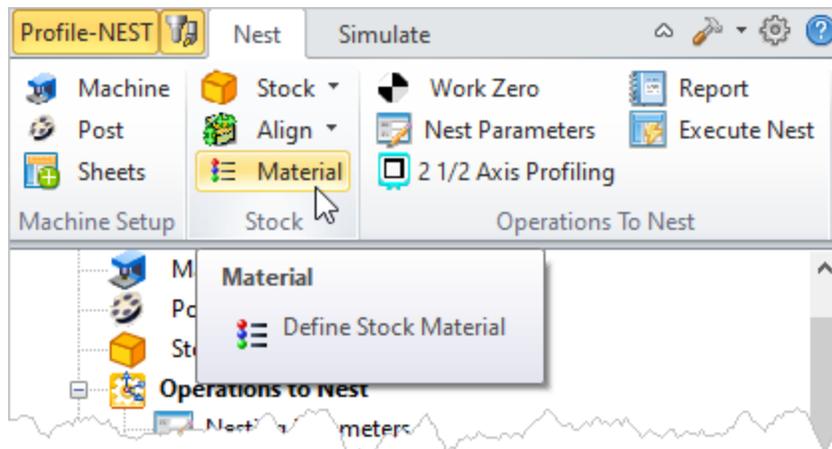


## 6.6 Material

 This allows you to assign a [Material](#) for [Stock](#) geometry. You can select a material from the available list of materials. Each Material has a texture that is applied to the stock geometry and can be displayed during simulation. [Material](#) is also used as a variable within the [Feeds & Speeds Calculator](#).

### Machining Browser: Material menu item

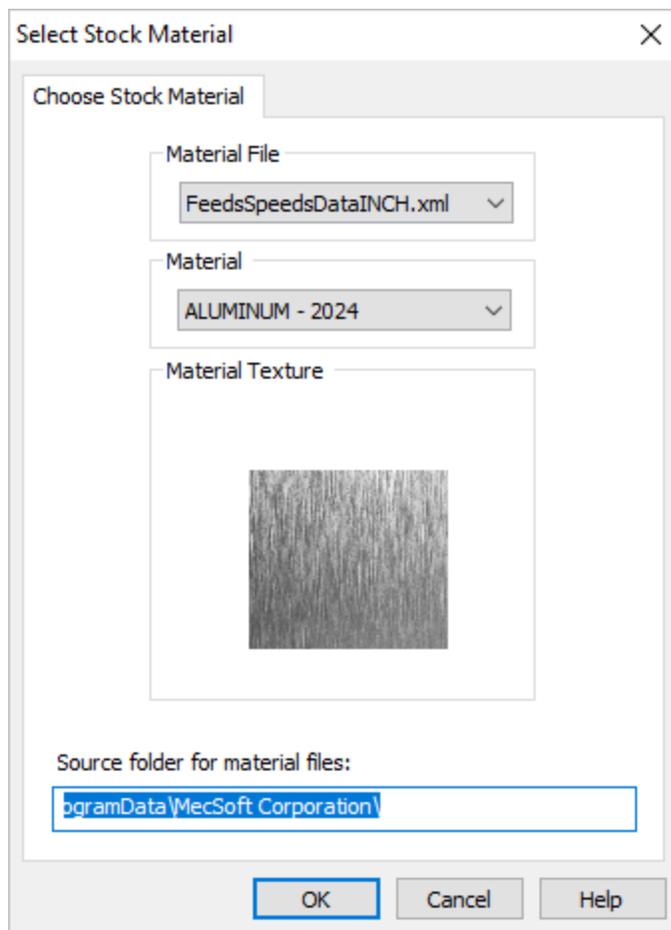
This dialog can be invoked by selecting [Material](#) from [Program](#) tab under the [Machining Browser](#).



Machining Browser: Material menu item

### Dialog Box: Select Stock Material

Choose [Stock Material](#) dialog appears as shown below.



Dialog Box: Select Stock Material



### Material File

This points to file where all materials are defined.

This xml contains the list of materials, texture, feeds and speeds. The file is located under Materials folder in RhinoCAM. (<C:\ProgramData\MecSoft Corporation\RhinoCAM 20xx for Rhino x.x\Materials>).

The [Materials](#) folder contains the following files

- [FeedsSpeedsDataINCH.xml](#)
- [FeedsSpeedsDataMM.xml](#)

If part unit is set to Inches, [RhinoCAM](#) automatically loads [FeedsSpeedsDataINCH.xml](#) and when part unit is set to [MM](#), [FeedsSpeedsDataMM.xml](#) is loaded.

The material file is an .xml file format, which can be edited using any text editor to add newer materials.

See [Feeds and Speeds](#) for information on the format of the material file and adding new materials.

### Material

This lists all materials available in the selected [Material File](#). Selecting a [Material](#) from the list displays the material name and material texture.

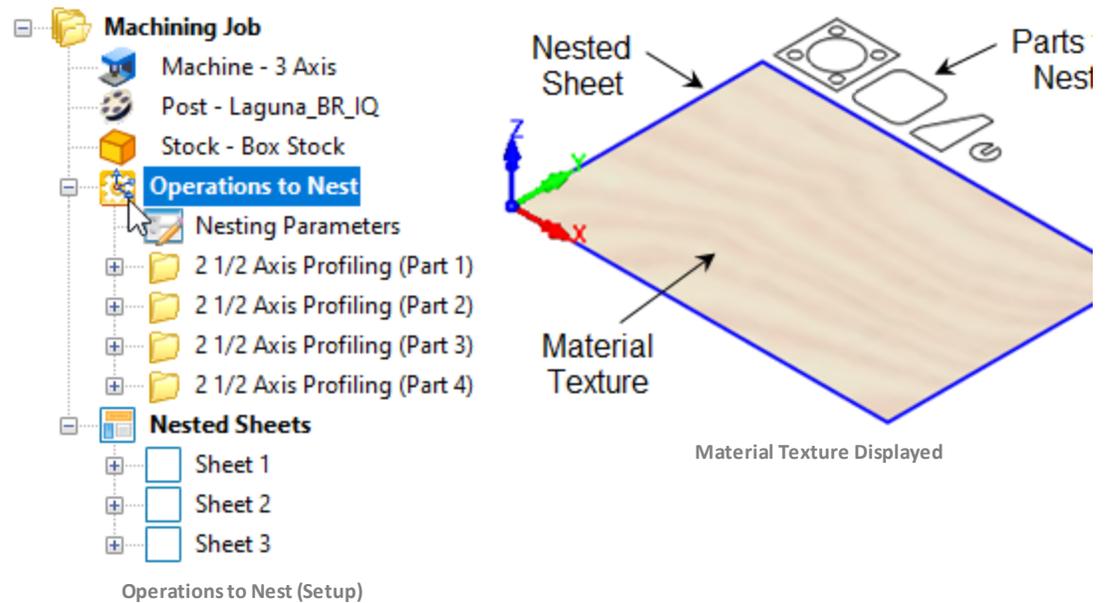
### Material Texture

A preview of the [Material Texture](#) is displayed for reference.

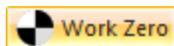
### Material Texture Visibility

 Once you have defined a [Material](#), click the [Material Texture Visibility](#) icon under [Program](#) or [Simulate](#) tab in [Machining Browser](#) to display the texture applied to the stock model.

Note that the [Material](#) texture only displayed when [Machining Job](#) or the [Operations to Nest](#) is selected from the [Machining Browser](#).



## 6.7 Work Zero

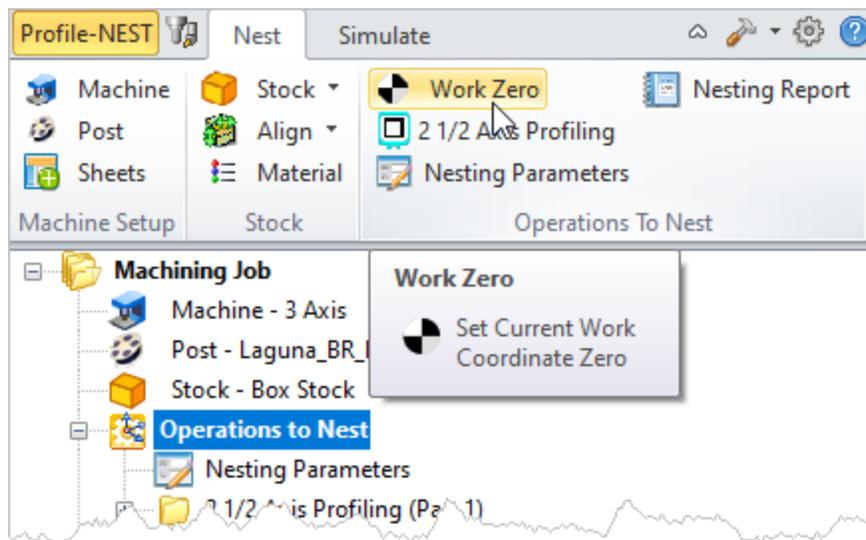


**Work Zero** defines the work coordinate (part or stock) origin. This is typically done after the [MCS](#) orientation is defined under [Setup](#). [Work Zero](#) translates the [MCS](#) origin from the [Setup](#) to the desired location. This can be set to any location on the part or stock geometry.

Refer to [Machine Tool Coordinate System](#) for orienting the [Machine Coordinate System](#).

### Machining Browser: Work Zero menu item

The Work Zero dialog can be invoked by selecting **Work Zero** from **Program** tab under the **Machining Browser**.

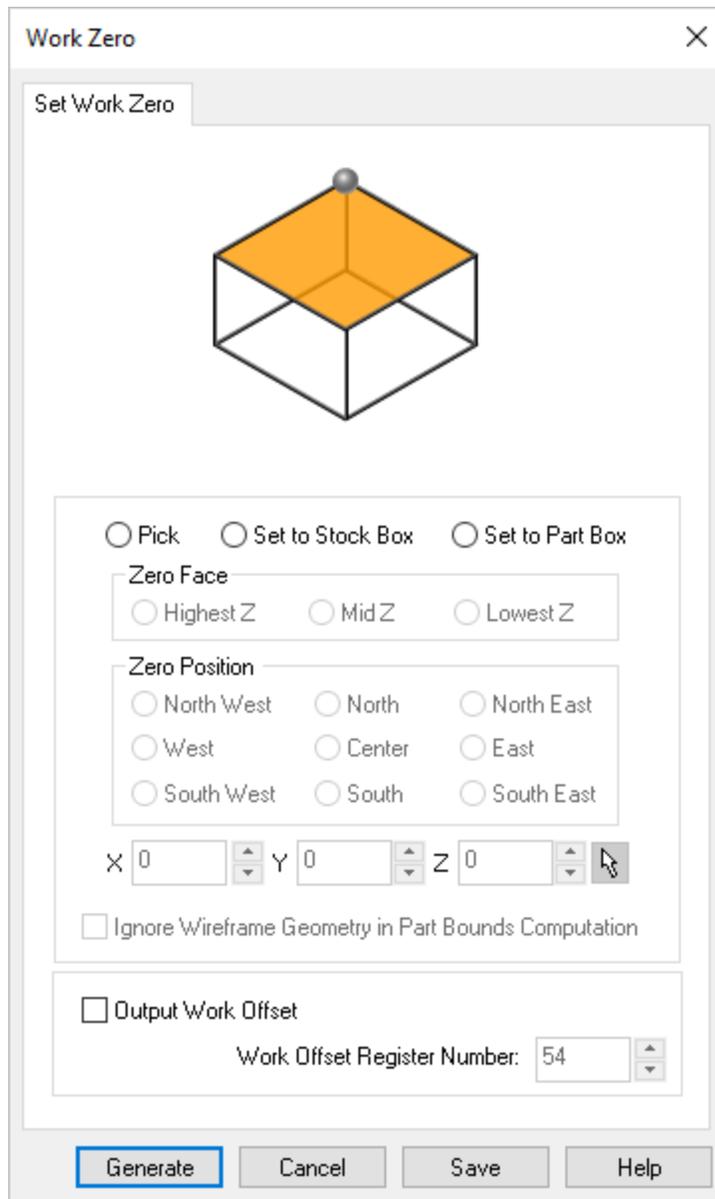


Machining Browser: Work Zero menu item



#### Dialog Box: Work Zero

Set **Work Zero** dialog appears as shown below. You can set the origin by explicitly picking a point or can set it with respect to the **Part** or **Stock** geometry bounding boxes. Each option is described below.



Dialog Box: Work Zero

### Pick

If you select the **Pick** option, the button  with the pick cursor close to the bottom of the dialog will be activated. You can then click on this button to graphically select a point to set the **Work Zero** to.

Pick    Set to Stock Box    Set to Part Box

Zero Face

Highest Z    Mid Z    Lowest Z

Zero Position

North West    North    North East  
 West    Center    East  
 South West    South    South East

X 0 Y 0 Z 0

Ignore Wireframe Geometry in Part Bounds Computation

Work Zero Pick Option

You can use object snaps located in VisualCAD's status bar to snap to part geometry.

### Set to Stock Box

Selecting this item will activate the [Zero Face](#) and the [Zero Position](#) sections of the dialog. You can then select the Z and the XY locations, with respect to the bounding box of the stock geometry, by choosing the appropriate selections in the dialog.

Pick    Set to Stock Box    Set to Part Box

Zero Face

Highest Z    Mid Z    Lowest Z

Zero Position

North West    North    North East  
 West    Center    East  
 South West    South    South East

X 0 Y 24 Z 0.25

Ignore Wireframe Geometry in Part Bounds Computation

Work Zero - Set to Stock Box

### Set to Part Box

Similar to the previous selection, selecting this item will activate the [Zero Face](#) and the [Zero Position](#) sections of the dialog. You can then select the Z and the XY locations, with respect to the bounding box of the stock geometry, by choosing the appropriate selections in the dialog.

Pick    Set to Stock Box    Set to Part Box

Zero Face

Highest Z    Mid Z    Lowest Z

Zero Position

North West    North    North East  
 West    Center    East  
 South West    South    South East

X: -8.88178   Y: 31.1332   Z: 0

Ignore Wireframe Geometry in Part Bounds Computation

Work Zero - Set to Part Box

Selecting [Ignore Wireframe Geometry in Bounds Computation](#) ignores all 2D and 3D curve geometries present in the part for bounding box computation.



### Output Work Offset

This allows you to specify a [Work Coordinate Offset](#) number which is then output in the posted code. This is set under [Work Offset Register Number](#). Work offsets are used to set work piece origin(s) on CNC machines that are assigned to a register number [G54](#), [G55](#) etc... Entering a positive number will make incremental offsets positive (i.e., [G54](#), [G55](#), etc.) Entering a negative number will make decremental offsets (i.e., [G54](#), [G53](#), etc.).

Output Work Offset

Work Offset Register Number: 54

Work Zero - Output Work Offset

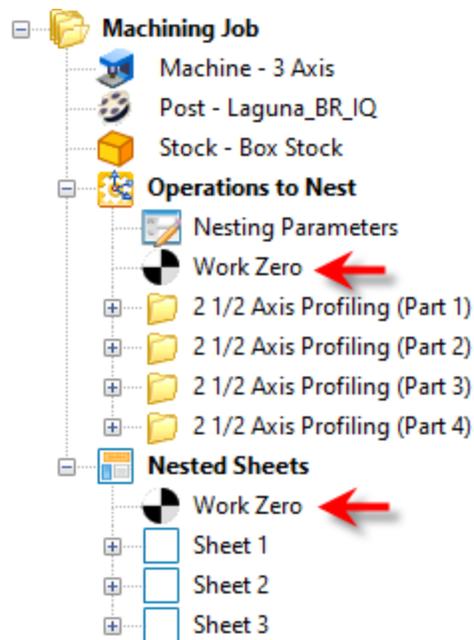
#### For example:

- To output [G54](#), [G55](#), etc., set the [Work Offset Register](#) number to [54](#). To output [G54](#), [G53](#), etc., set the [Work Offset Register](#) number to [-54](#) (negative).
- The [Work Offset Prefix "G"](#) is set in the post-processor generator.



### Generate

Click [Generate](#) and [Work Zero](#) is now listed under [Operations to Nest](#) and also under [Nested Sheets](#) in [Machining Browser](#). The [MCS](#) origin is now translated to the specified location.

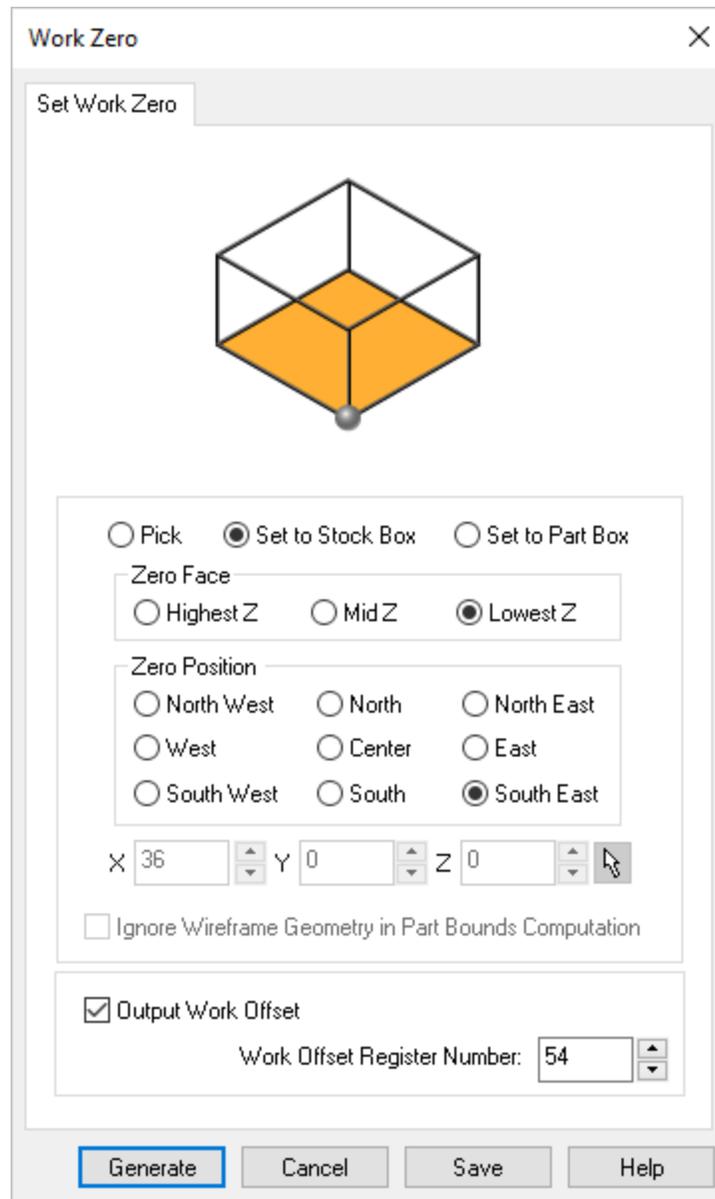


Work Zero displayed in the Machining Browser

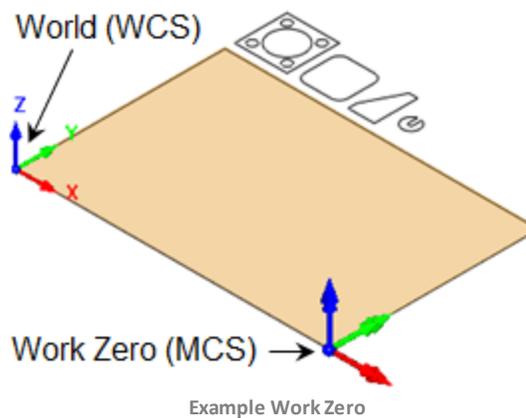
### Work Zero Example

In the example shown below Work Zero is set to

- **Set to Stock Box**
- **Zero Face – Highest Z**
- **Zero Position – South West**



Dialog Box: Work Zero



Example Work Zero

## 6.8 Machining Regions

**Machining Regions** also referred to as **Control Geometry** are curves or surface boundary edges that already exist in your model or separate new curves you create that coexist within your part. Be sure to read the **Important Notes** below before proceeding.



### Important Notes about Machining Regions

-  **Machining Regions** must be selected before they can be used in a **Profile** operation. It should be noted that regions can be created and be present in a part file but if they are not selected in a **Profile** operation they will be ignored during toolpath computation. So creating a region does not make it active; you must use one of the **Selection** buttons on the **Control Geometry** tab of the **Profile** operation dialog before **Generating** the toolpath.
-  Multiple regions can be defined and selected in a **Profile** operation. This is a very powerful feature and affords you fine control over the manufacturing process.
-  There are two ways of working with **Machining Regions**. The first is by creating/deleting regions in a part file. The second is selecting regions from the **Profile** operation dialog. These are both unique processes and each have independent methods of being invoked.



### Machining Region Types by Product Configuration

Machining Region Type	Product Configuration			
	Standard (STD)	Expert (EXP)	Professional (PRO)	Premium (PRE)
Curve	✓	✓	✓	✓
Surface Boundary/Edge	✓	✓	✓	✓
Flat Area	✓	✓	✓	✓
Avoid Regions	✓	✓	✓	✓

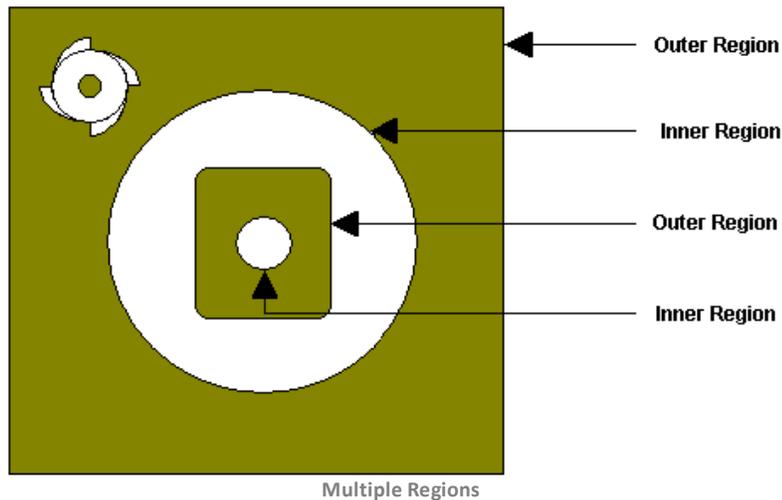


### Creating Regions

To create regions select the **Curve** option from the main menu. This will bring up the curve creation tools in **Rhino**. You will be able to create rectangular, circular and polygonal regions using this toolbar. **Regions** can also be extracted from the 3D model using the tools available under **Curve > Curve From Objects & Curve Edit Tools**.

### Multiple Regions

Multiple and nested regions can be selected, but not regions that intersect. Nested regions are handled according to the following rule: The tool will remain inside an outer region and outside an inner region. A region within an inner region is considered to be an outer region. In the following picture, the shaded areas are where the tool motions occur:



### Deleting Regions

Regions can be deleted using the tools available in [Rhino](#) .

### Editing Regions

Regions can be deleted by selecting them graphically in the display window or by using [Edit > Select Objects](#) tools from the menu bar. To delete the graphically selected regions, select [Edit > Cut](#). You can also hit the [Delete](#) key on the keyboard to delete the active selections.

## 6.8.1 Selecting Curve/Edge Regions

You can select curves & edges as machining regions for any [Profile](#) operation. You can pre-select the regions or select the [Select Curve/Edge Regions](#) button from the [Control Geometry](#) tab of the [Profile](#) operation dialog.

### Criteria for selecting Regions

- Open and closed curves ([Lines](#), [Polylines](#), [Arcs](#), [Circles](#), [Polycurves](#)) can be selected as regions in [Profile](#) operations.
- There is no limit on the number of curves that can be selected as regions.
- Closed curves can be nested within each other.

## Selecting Regions

 Select a **Part Region** first before selecting an **Avoid Region**. Regions can be selected using one of the following options:

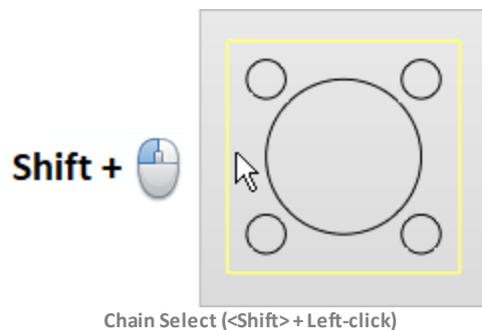
1. Select regions using the **Select** button on the menu bar.
2. Select regions graphically in the display window.
3. Multiple regions can be selected by pressing the **CTRL** button. These selected regions can be used to create **Profile** operations. The regions can be unselected using the **None** option (**Select > None**).
4. Select regions when creating or editing a **Profile** operation from the **Control Geometry** tab of the operation's dialog box shown below using:

### Multiple Selections:

Multiple regions can be selected by pressing the **CTRL** button. These selected regions can be used to create machining operations. The regions can be unselected using the **None** option (**Select > None**).

### Chain Selections:

You can automatically select a chain of curves or edges by pressing the **<Shift>** key while performing a **left-click** selection. This works with any curves or edges that are connected end-to-end.

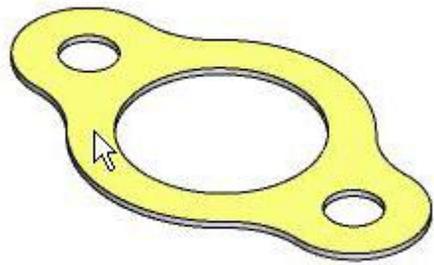


## 6.8.2 Selecting Flat Area Regions

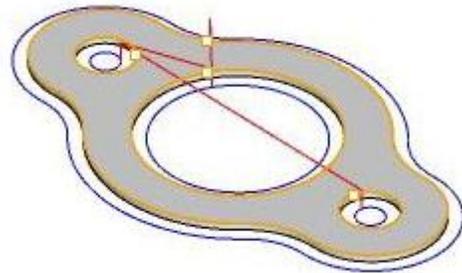
For flat areas, you can select the **Select Flat Area Regions** button from the **Control Geometry** tab of the **Profile** operation dialog. Refer to the example below.

### Flat Area Selection Example

#### Example



Selecting a Flat area Feature for Profiling



Profiling Toolpath generated for the Flat Area Feature

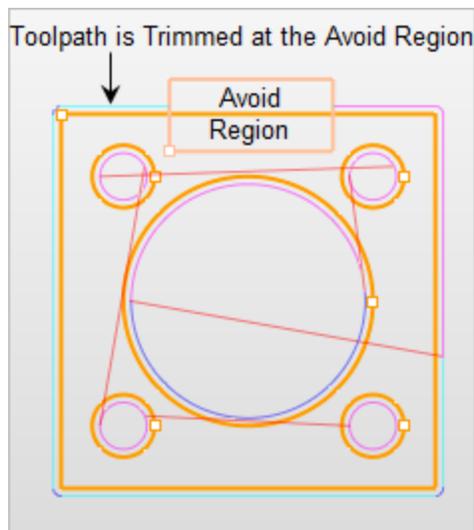
### 6.8.3 Selecting Avoid Regions

You can define regions to be avoided by the cutter during machining. These regions will be defined by 2D curves and selected from the [Avoid Regions](#) sub-tab of the [Control Geometry](#) tab of the [Profile](#) operation dialog.

#### Important Notes about Avoid Regions

-  Select curve(s) as a [Part Regions](#) first, before selecting an avoid region.
-  Note that the toolpath uses the avoid regions as trim regions. Which means, the toolpath will be trimmed by the avoid regions after generation.

#### Example of Avoid Region



Example of Avoid Region

## 6.8.4 Editing Regions

In order to use machining regions in a [Profile](#) operation, they must be first selected and made active. This can be done in several ways.

### Types of Regions

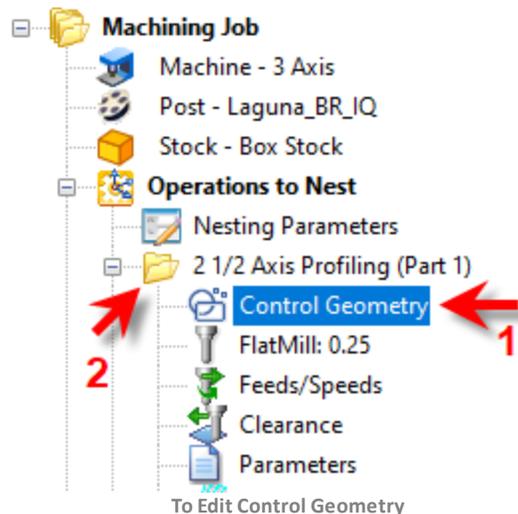
Here are the types of machining regions you can choose from:

1. **Part Regions**  
These are part curves that drive the location of the tool. Defined from the [Part Regions](#) sub-tab of the [Control Geometry](#) tab for each operation.
2. **Avoid Regions**  
These are 2D curve regions to be avoided by the cutter during machining. They are defined from the [Avoid Regions](#) sub-tab of the [Control Geometry](#) tab for each [Profile](#) operation.

### Editing Regions

Once a [Profile](#) operation is created, new regions can be selected or existing regions can be removed from the operation as well.

To edit the list of regions used in an existing [Profile](#) operation, expand the folder corresponding to the [Profile](#) operation in the [Machining Browser](#) window. Then double-click on the [Control Geometry](#) icon (1) or on the [Profile](#) operation folder (2). This will display the [Control Geometry](#) tab for that operation.



Now you can edit the list of regions using:

- **Remove All** to remove all the selected regions.
- **Move Up/Move Down** - these allow you to move a selected [Drive Region Up](#) or [Down](#) in the list

- **Remove Active** by selecting a region from the list of Selected Machining Region(s)
- Select regions using the **Select** buttons in the dialog.



### **Displaying Regions**

The display of the regions in the part file can be toggled on/off using the **Layer Manager**.

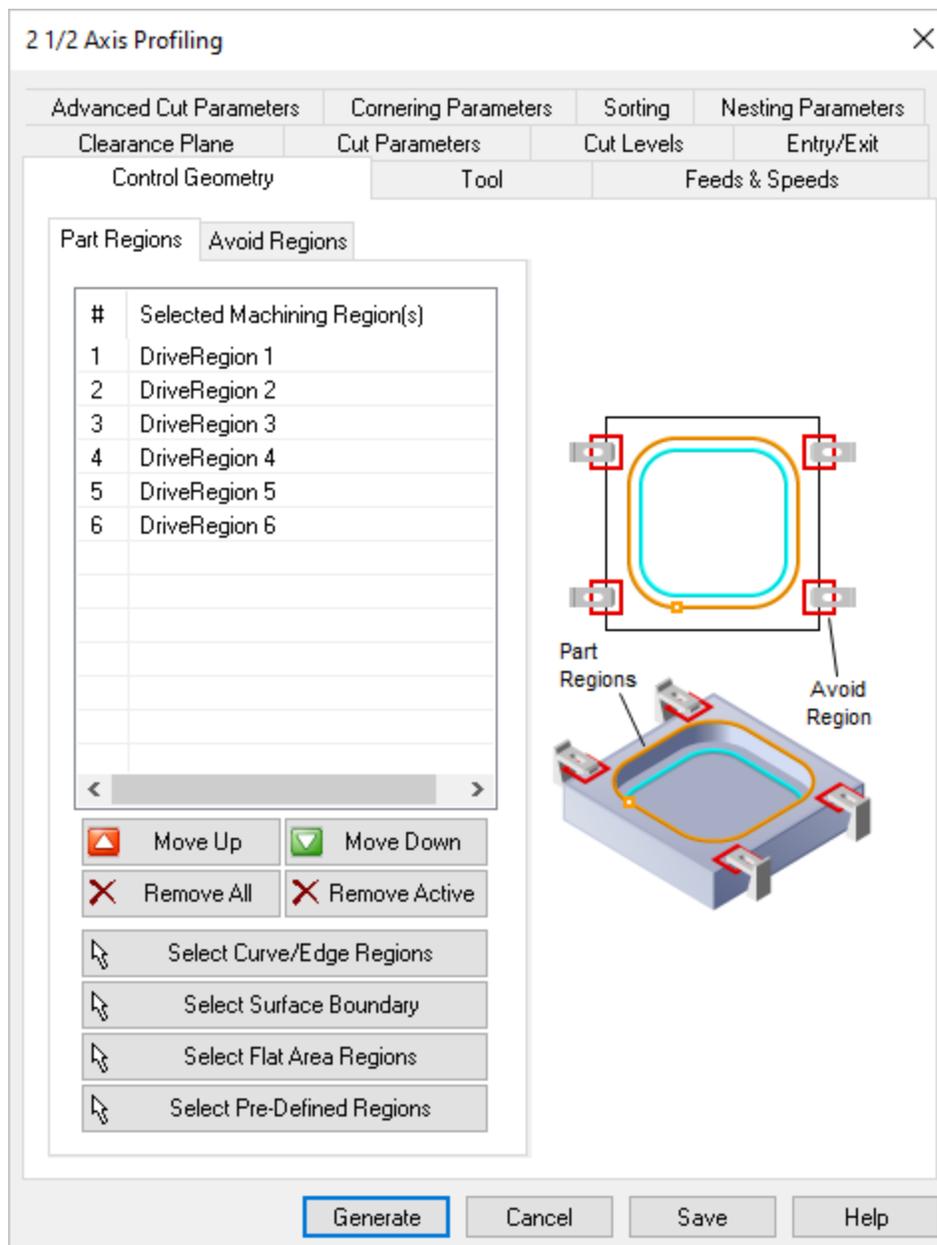


### **Saving/Loading Regions**

**Rhino** allows you to save/export regions as curves in **3dm**, **Dxf**, **Dwg** & other supported formats. Such a file can then be loaded into any part file to generate machining operations. To access the **Export** and the Import functions look under the **File** menu bar entry.



### **Dialog Box: Control Geometry tab, MILL Operations**



Profile Operation Dialog Box: Control Geometry tab

## 6.9 Cutting Tools

The MILL module allows you to define, use and archive various types of milling and drilling tools. The tool types that are currently supported are [Ball](#), [Flat](#), [Corner-radius](#) or [bull](#), [VeeMill](#), [Chamfer](#), [Taper](#), [Face](#), [Dove Tail](#), [Fillet](#), [Lollipop](#), and [User Defined](#).

 [Tool Types by Configuration](#)

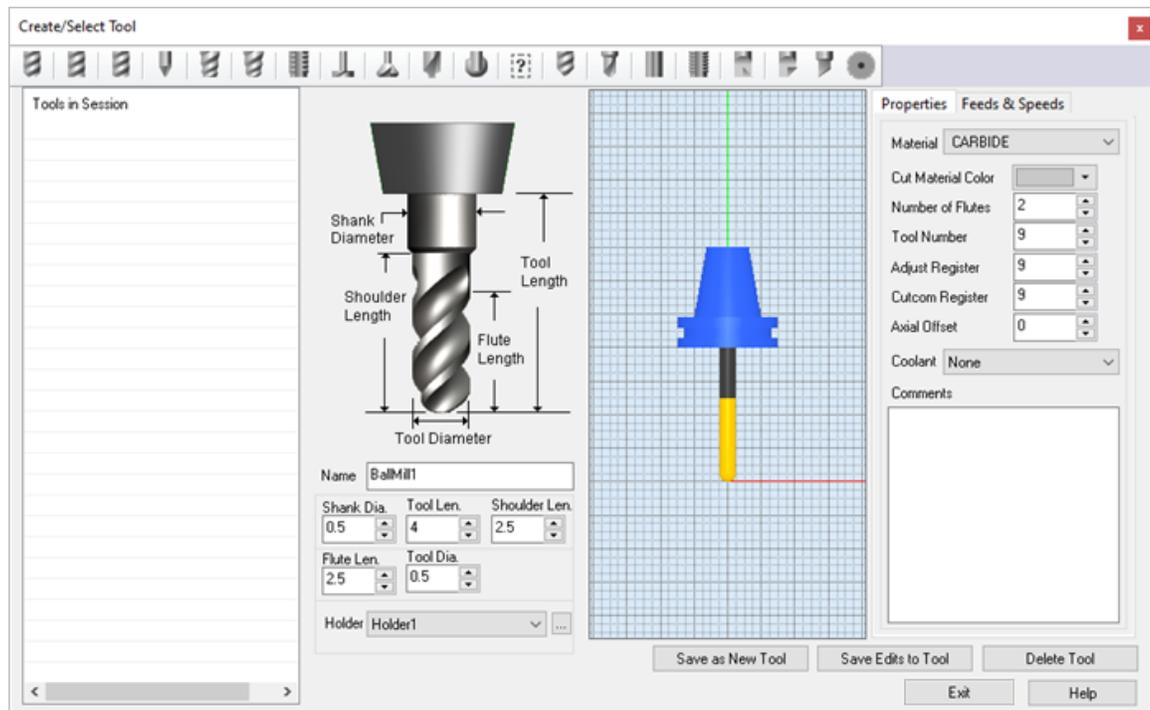
Tool Types		Configuration			
		Standard (STD)	Expert (EXP)	Professional (PRO)	Premium (PRE)
Ball Mills		✓	✓	✓	✓
Flat Mills		✓	✓	✓	✓
Corner Radius Mills		✓	✓	✓	✓
Vee Mills		✓	✓	✓	✓
Chamfer Mills		✓	✓	✓	✓
Taper Mills		✓	✓	✓	✓
Face Mills		✓	✓	✓	✓
Dovetail Cutters		✓	✓	✓	✓
Fillet Mills		✓	✓	✓	✓
Lollipop Cutters		✓	✓	✓	✓
User Defined Cutters		✓	✓	✓	✓

### 6.9.1 Create/Select Tools

 To create a tool, you either select the [Create/Edit Tool](#) option under the [Tools](#) tab in [Machining Objects Browser](#) or alternatively by selecting the [Create/Edit/Select Tool](#) button under the [Tool](#) tab in the machining operation. This brings up the following dialog box that you can utilize to create and edit tool definitions.

 **INCH & METRIC TOOLS:** If you use both inch and metric tools, you will need to create two separate tool libraries. That is because the tool dimensions adopt the current UNITS setting of the host CAD system.

 [Dialog Box: Create/Select Tools](#)



Dialog Box: Create/Select Tools

### Create Tools Toolbar

The tool icon bar on the top of the dialog displays the all various types of tools available in MILL module. Different tool types can be defined by selecting the desired icon in the dialog box.

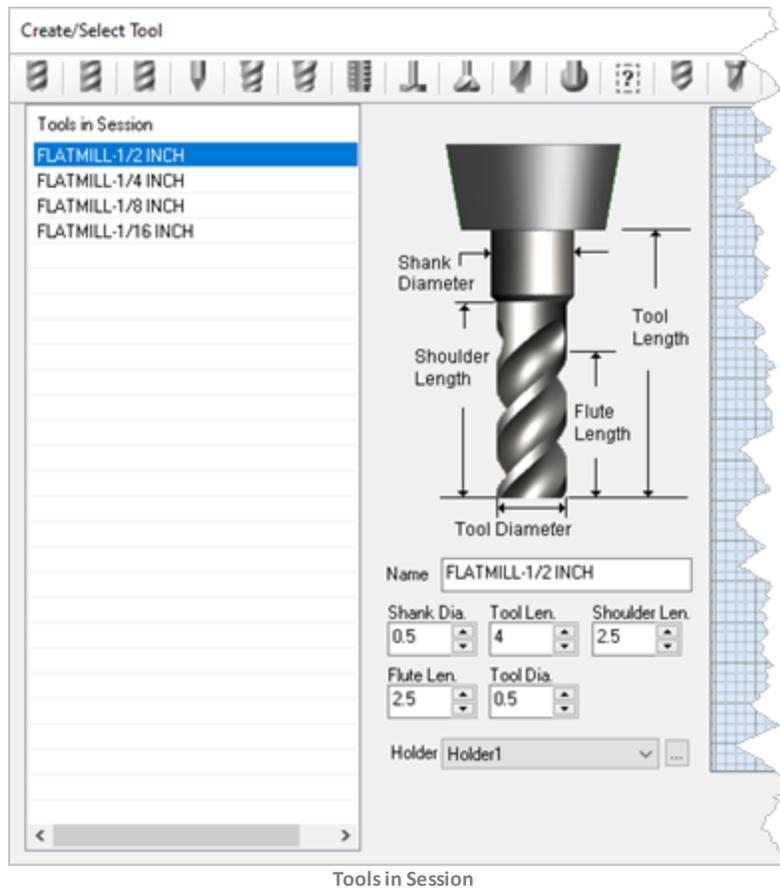
**Note:** The actual tools that you will see listed in this toolbar will depend on what module and what configuration you are currently running.



Create Tools Toolbar

### Tools in Session

The dialog box shows the tool name of the current selection if there is one selected in the list-box under Tools in Session. If there is no selection then the tool name will be the name used for a new tool definition. The list box itself lists all of the tools of the corresponding type.



### Tool Representation

The icon representation of the tool shows where the dimensions listed below are measured from. Please refer to this image when entering your tool dimensions.

### Name

Enter a unique name for the tool. Tools are defined by their **Name**. You cannot have more than one tool with the same name.

### Dimensions

Enter the tool dimensions using the fields provided. It is best to have the **Tool Dia.** and the **Shank Dia.** the same dimension even if your tool is different. **Shoulder Len.** must be larger than the **Flute Len.**

### Holder

If you have **Tool Holders** defined, select the holder that you want assigned to this tool. To create and manage **Holdes** select the ... button to display the **Create/Select Holder** dialog.



### Standard APT Parameters for Tool Definition

The geometry definition of the tool contains edit boxes for the diameter, corner radius, taper angle, flute length and the tool length. These definitions are standard APT

parameters for the tool definition. The flute length denotes the cutting length while the tool length denotes the total length of the tool to the tool holder.

## Save/Edit/Delete Tool

### Save As New Tool

Saves a new tool and lists under **Tools in Session**. If a tool of same name already exist under **Tools in Session**, **Save as New** tool button will be grayed out.

### Save Edits to Tool

Saves edits or changes made to tool parameters.

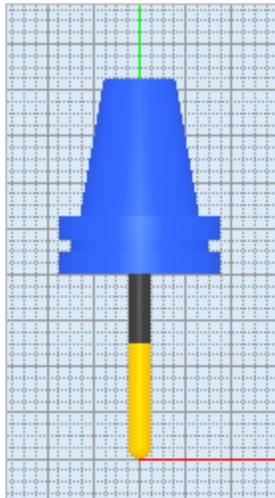
- ! When you **Save Edits to Tool**, each **Mop** in the **Machining Job** tree that uses the **Load from Tool** option, will be updated with the new feeds/speeds for that tool automatically.

### Delete Tool

Deletes the selected tool. A tool will not be deleted a tool if is being used in a machining operation.

## Tool Preview

As the tool geometry is defined, a preview of the tool is shown in the graphics window.



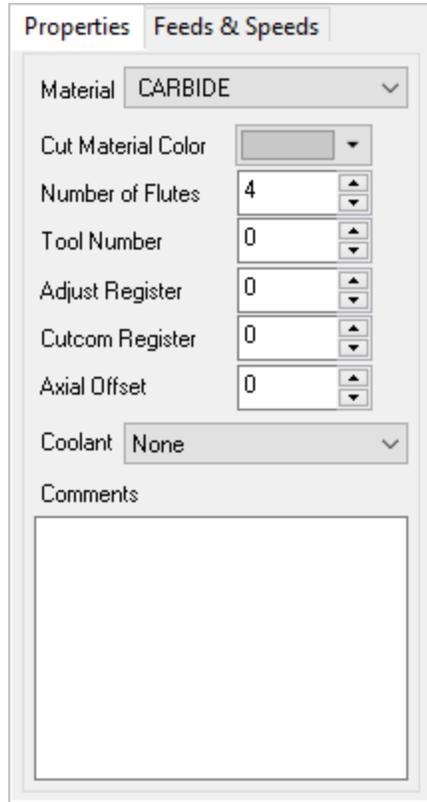
Tool Preview

## The Properties tab

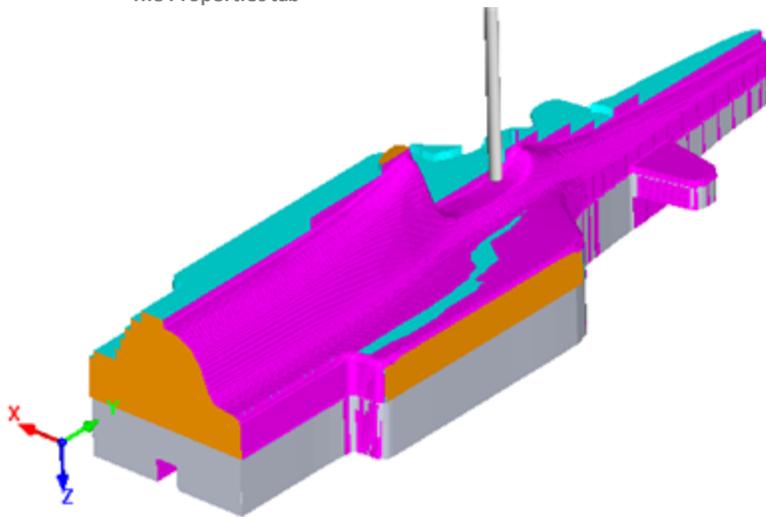
The **Properties** tab to the right side of the tool preview allows you to set the **Tool Material**, the **Cut Material Color** (for that **Tool**), **Number of Flutes** in the tool, **Tool Number**, **Adjust Register**, **Cutter Compensation Register**, **Axial Offset**, **Coolant Type**. The **Number of Flutes** is used in **Feeds & Speeds** calculations. The tool number is used when post processing toolpaths.

- ! The **Cut Material Color** selector will allow you to assign colors to each **Cut Material** created by this tool. set a you **Save Edits to Tool**, each **Mop** in the **Machining Job**

tree that uses the [Load from Tool](#) option, will be updated with the new feeds/speeds for that tool automatically.



The Properties tab



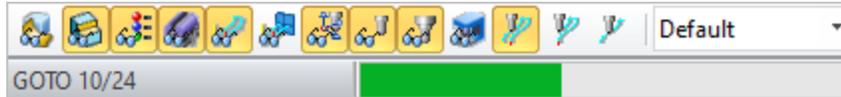
Cut Material by Color

### Material

This sets the material definition for the active tool. This material is also used in the [Load from File](#) option, also referred to as the Feeds & Speeds Calculator.

### Cut Material Color

You can set the cut material simulation color for this tool. To view this color during simulations, set the Simulation Display State to Tool. This control is located to the right of the toolbar at the bottom of the Simulate tab.



### Number of Flutes

This defines the total number of flutes for the active tool.

### Adjust Register

This is used to set the [Tool Length Offset](#) (an integer). Generally this is set the same as [Tool Number](#). The posted code would output `H<#>` and the `#` corresponds to the offset value in the controller's tool table. Note the post processor needs to be configured to output the [Adjust Register](#).

#### For example

```
N20 T1 M6  
N30 G43 H1 Z0.25
```

Where `H1` points to the controllers tool table for tool length compensation.

### Cutcom Register

This is used to set the [Tool Diameter Offset](#) (an integer) for cutter compensation / tool wear compensation at the controller. Generally this is set the same as [Tool Number](#). The posted code would output `D<#>` and the `#` corresponds to the offset value in the controller's tool table.

#### For example

```
N30 G41 X 2.0 Y 1.0 D1
```

Where `D1` points to the controllers tool table for diameter compensation.

Note the post processor needs to be configured to output the [Cutter Compensation](#). Refer to [Cutter Compensation](#) for detailed description.

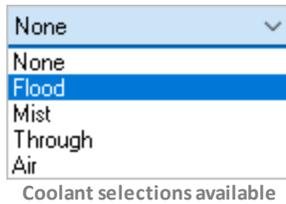
### Axial Offset

This parameter offsets the Z value in the posted g-code by the specified value. This can be set to a positive or negative value and can be an integer or decimal.

Use of [Dove Tail](#), [Fillet Mill](#), [Lollipop](#) cutter and [User Defined](#) tools are limited to [2½ Axis Profiling](#) and [Engraving](#) operations.

### Coolant

Here you can override the [Coolant](#) that is specified by the Tool. [Coolant](#) can be set to [Flood](#), [Mist](#), [Through](#) or [Air](#). [Coolant](#) codes are defined in the post processor generator under [Misc](#) tab. [Coolant Off](#) is also supported as a variable that can be added where needed using the post-processor generator.



### Comments

Outputs specified comments in the posted g-code before a tool change.



Adding \$ as prefix would skip the comment start and end characters in the posted output file.



The posted code would include the comments in the output as shown below.

 Make sure comments to output is selected in your post processor.

```
(END MILL – 0.5 INCH)
M00
```



### The Feeds & Speeds tab

The [Feeds & Speeds](#) tab located next to [Properties](#) tab allows you to set feeds and speeds for each tool.

Refer to the [Feeds and Speeds](#) section for additional information.

### Cut Depth

 You can set the [Cut Depth](#) specific for each tool you create. If you set this value here, you will see a [Depth From Tool](#) icon next to the [Rough Depth/Cut](#) parameter in the [Cut Levels](#) tab of each operation where it applies. Selecting the icon will use this value for [Rough Depth/Cut](#). If [Cut Depth](#) is left at 0 in this dialog, the icon will not appear in the [Cut Levels](#) tab.

**Properties** **Feeds & Speeds**

Spindle Parameters

Speed  RPM

Direction  CW  CCW

Feed Rates (in/min)

Plunge	Approach	Engage
<input type="text" value="23.468"/>	<input type="text" value="11.734"/>	<input type="text" value="8.8"/>
Cut	Retract	Departure
<input type="text" value="11.734"/>	<input type="text" value="8.8"/>	<input type="text" value="23.468"/>

Transfer

Use Rapid  Set

Feed Rate Reduction Factors

Plunge between levels	<input type="text" value="100"/> %
First XY pass	<input type="text" value="100"/> %
Bottom Z Level	<input type="text" value="100"/> %

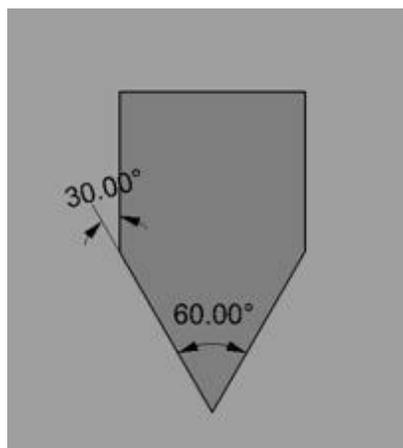
Cut Depth  in

Load from File ...

The Feeds &amp; Speeds tab

## Taper Angle

**Taper Angle** is set for [VeeMill](#), [ChamferMill](#) and [TaperMill](#). This angle is the included angle. For a 60 degree taper tool, the **Taper Angle** is set as 30.



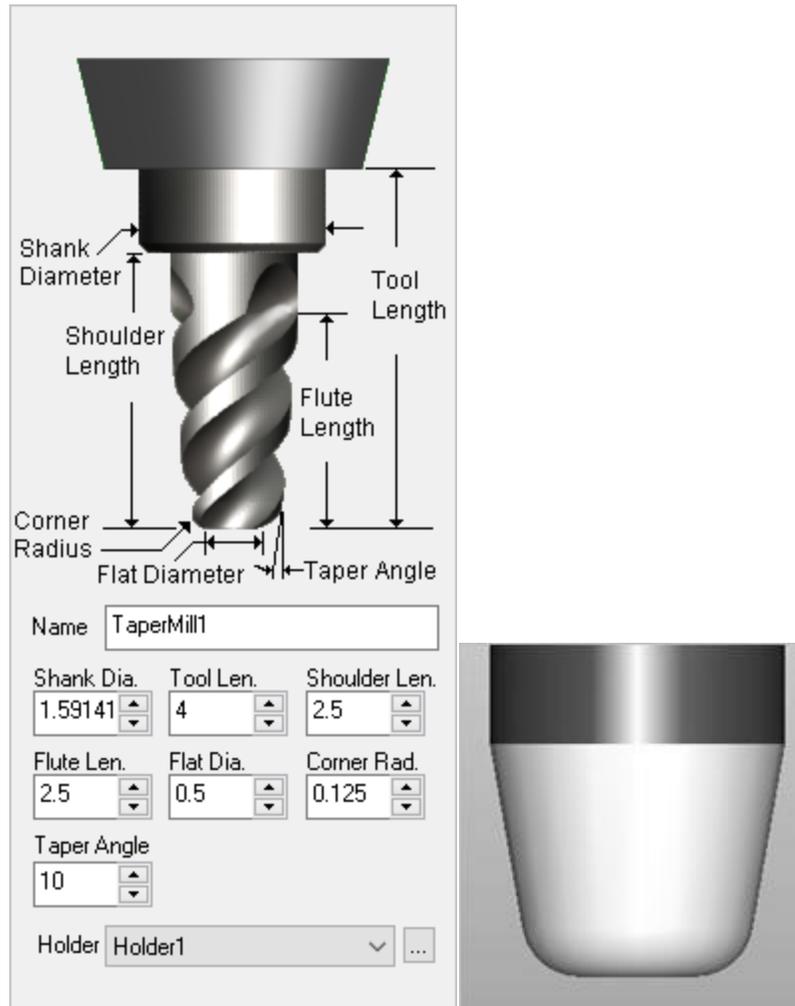
Taper Angle

## Flat Diameter Examples

**Flat Diameter** is set for **ChamferMill** and **TaperMill**. When **Flat diameter** is set =0, the tip converges to a point.

To define a ball mill with taper, set **Flat diameter** = 0 and **Corner Radius** = **tool radius**.

In the example shown below, **Flat Dia** = 0 and **Corner Radius** = 0.25. This creates a 0.5" ball mill with a 10 degree taper.



### 6.9.1.1 Adjust Register

This is used to set the **Tool Length Offset** (an integer). Generally this is set the same as **Tool Number**. The posted code would output **H<#>** and the **#** corresponds to the offset value in the controller's tool table. Note the post processor needs to be configured to output the **Adjust Register**.

**For example**

N20 T1 M6

N30 G43 H1 Z0.25

Where **H1** points to the controller's tool table for tool length compensation.

### 6.9.1.2 Cutcom Register

This is used to set the [Tool Diameter Offset](#) (an integer) for cutter compensation / tool wear compensation at the controller. Generally this is set the same as [Tool Number](#). The posted code would output `D<#>` and the `#` corresponds to the offset value in the controller's tool table.

#### For example

```
N30 G41 X 2.0 Y 1.0 D1
```

Where `D1` points to the controller's tool table for diameter compensation.

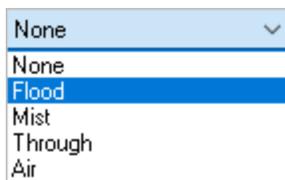
Note the post processor needs to be configured to output the [Cutter Compensation](#). Refer to [Cutter Compensation](#) for detailed description.

### 6.9.1.3 Axial Offset

This parameter offsets the Z value in the posted g-code by the specified value. This can be set to a positive or negative value and can be an integer or decimal. Use of [Dove Tail](#), [Fillet Mill](#), [Lollipop](#) cutter and [User Defined](#) tools are limited to [2½ Axis Profiling](#) and [Engraving](#) operations.

### 6.9.1.4 Coolant

Here you can override the [Coolant](#) that is specified by the Tool. [Coolant](#) can be set to [Flood](#), [Mist](#), [Through](#) or [Air](#). [Coolant](#) codes are defined in the post processor generator under [Misc](#) tab. [Coolant Off](#) is also supported as a variable that can be added where needed using the post-processor generator.



Coolant selections available

### 6.9.1.5 Comments

Outputs specified comments in the posted g-code before a tool change.



Tool Comments

Adding `$` as prefix would skip the comment start and end characters in the posted output file.



Tool Comments

The posted code would include the comments in the output as shown below.  Make sure comments to output is selected in your post processor.

```
(END MILL – 0.5 INCH)
M00
```

### 6.9.1.6 Create/Select Holders

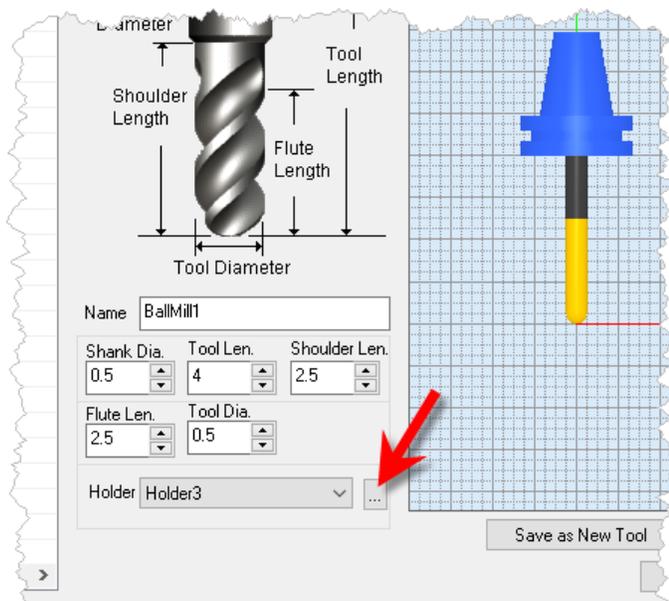


**Tool Holders** are defined separately from cutting tools. From the [Create/Select Tool](#) dialog you can select a **Holder** to assign it to the active tool. To create or edit your holders pick the  button to display the [Create/Select Holder](#) dialog shown below. Holders are save with your tool library



#### Activating the Create/Edit Tool Holders dialog

To display the [Create/Edit Tool Holder](#) dialog pick the  button to the right of the **Holder** selector menu on the [Create/Select Tool](#) dialog shown below.

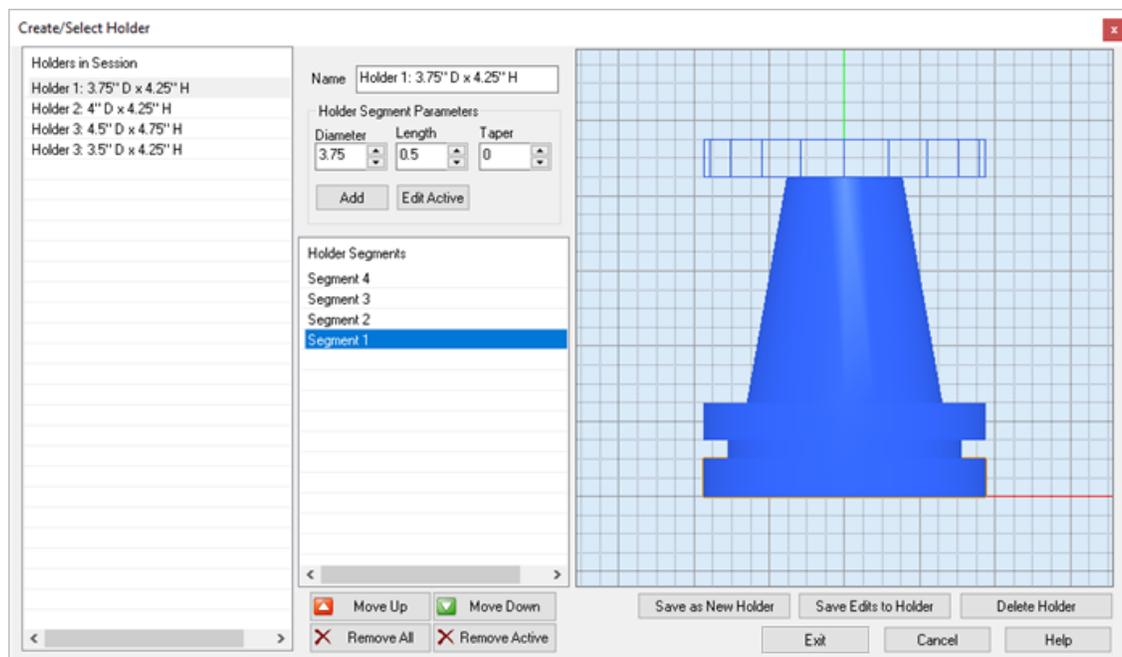


Dialog Box: Create/Edit Tool Holders



#### The Create/Edit Tool Holders dialog

Use this dialog to create your tool Holders.



Dialog Box: Create/Edit Tool Holders

### Holders in Session

On the left side is the **Holders in Session** list. When you pick the **Save as New Holder** button, the holder is added to the **Holders in Session** list.

### Holder Segment Parameters

Each Holder must have a unique name. Each Holder segment is defined by its **Diameter**, **Length** and **Taper** angle. Selecting the **Add** button adds the segment to the **Holder Segments** list. Select a segment from the list and then pick the **Edit Active** button to edit that segment's parameters.

### Holder Segments

**Tool Holders** are defined by segments. In the Holder preview shown in the dialog above we see that **Holder 3** has 4 segments. You can select a segment and edit its parameters. Use the **Move Up** and **Move Down** buttons below the Holder Segments list to adjust the sequence of the segments. **Remove All** deletes all segments in the list. **Remove Active** deletes the currently selected segment.

### Holder Preview

A preview of the Holder is shown on the right. When you select a segment it is previewed as a wireframe at the top of the holder. This preview is dynamically updated when you edit its **Diameter**, **Length** and/or **Taper** dimensions. Then selecting the **Edit Active** button updates that segment and the preview is also updated.

### Save As New Holder

When you are done editing segments for a new holder and you are satisfied with the preview, select the **Save as New Holder** button to create the holder and add it to the **Holders in Session** list on the left.

### Save Edits to Holder

To edit an existing Holder, select it from the [Holders in Session](#) list from the left. Then edit it's segments as desired changing dimensions, etc. and then pick the [Save Edits to Holder](#) button. Your edits are not save unless you pick this button.

### Delete Holder

To delete a holder, select it from the [Holders in Session](#) list and then pick the [Delete Holder](#) button.

## 6.9.2 Load Tool Library

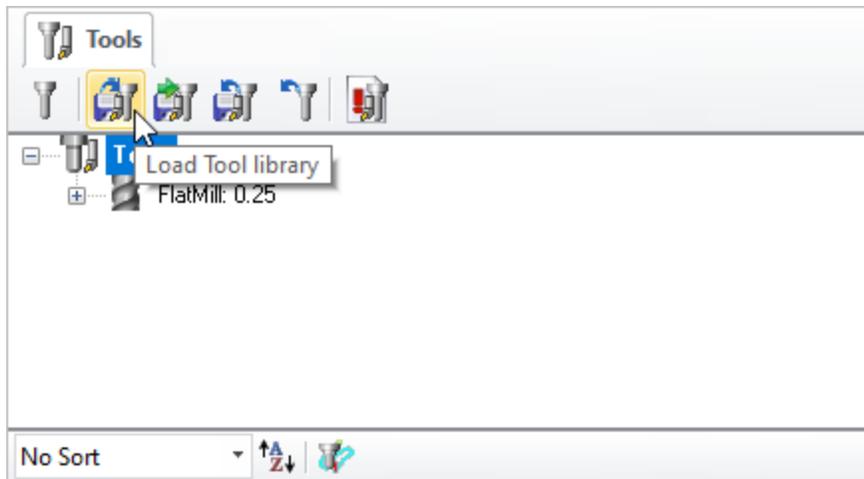


This allows you to load a previously saved tool library.

1. From the [Tools](#) tab of the [Machining Objects Browser](#), select the [Load Tool Library](#) button

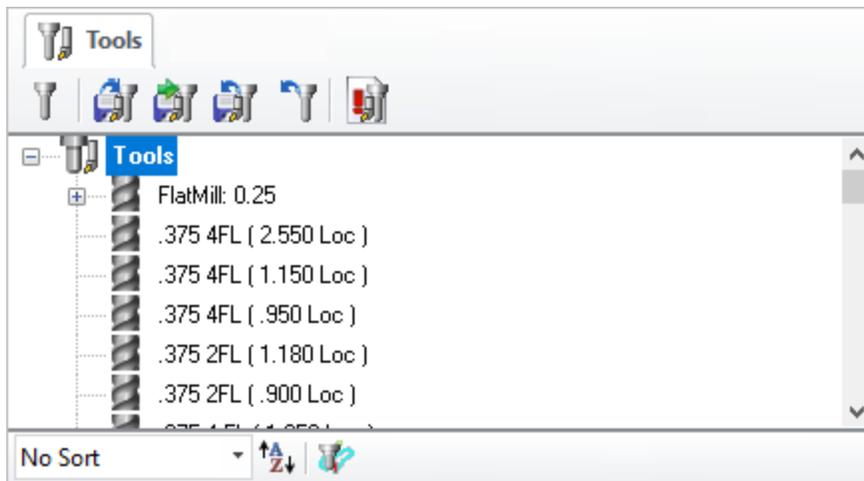


**Note:** The actual icons you see in this dialog will depend on what module and what configuration you are currently licensed to operate.



Machining Objects Browser, Load Tool Library

2. Browse to the folder, double click on the desired file to load it into [Profile-NEST](#) module. The folder of the last loaded tool library is displayed by default.
3. The loaded tool list will be seen under the tool button in the [Machining Objects Browser](#).



The loaded tool list will be seen under the tool button in the browser

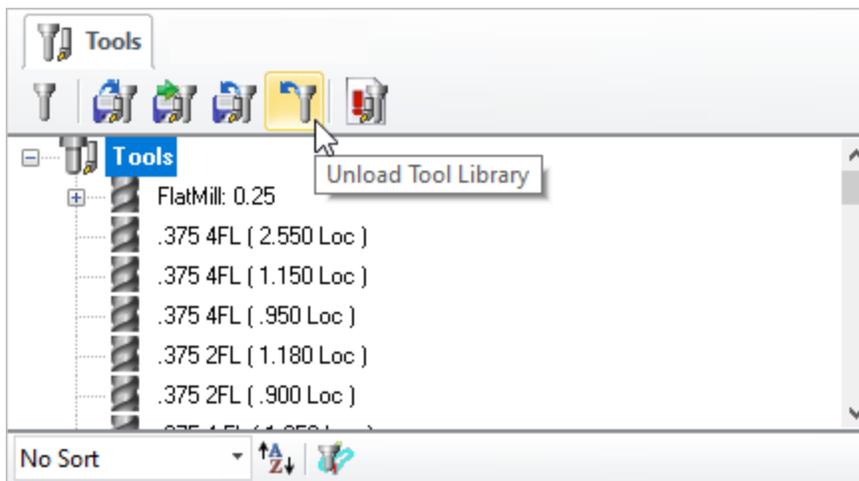
- To perform the [Edit](#), [Rename](#), [Cut](#), [Copy](#) or [Paste](#) operations on any of these tools, hit the right mouse button while highlighting the desired tool.

### 6.9.3 Unload Tool Library



This allows you to unload the current [Tool Library](#). From the [Tools](#) tab of the [Machining Objects Browser](#), select the [Unload Tool Library](#) button.

**Note:** The actual icons you see in this dialog will depend on what module and what configuration you are currently licensed to operate

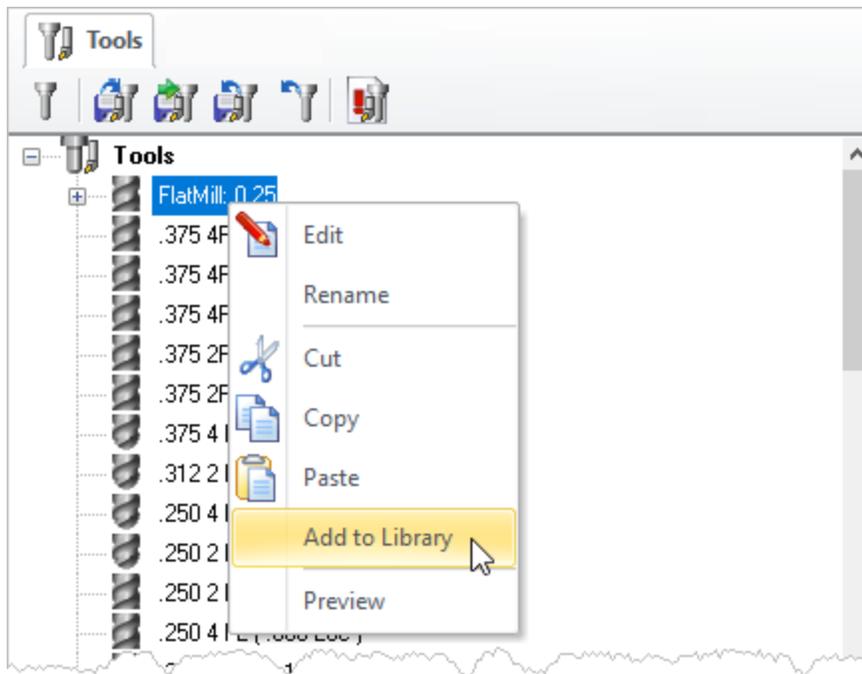


Machining Objects Browser, Unload Tool Library

### 6.9.4 Add Tool Library

You can right-click on a [Tool](#) listed in the [Mobs Browser](#) to [Add](#) the [Tool](#) to an exiting [Tool Library](#) \*.csv data file.

**Note:** The actual icons you see in this dialog will depend on what module and what configuration you are currently licensed to operate



Add Tool to Library

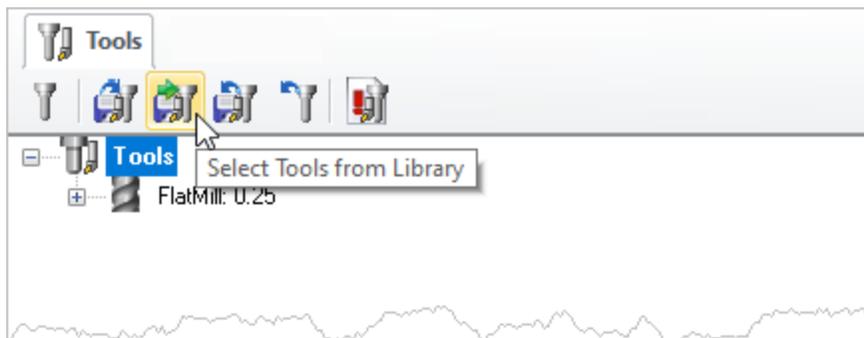
## 6.9.5 Select Tool from Library



This allows you to select tools from a previously saved tool library.

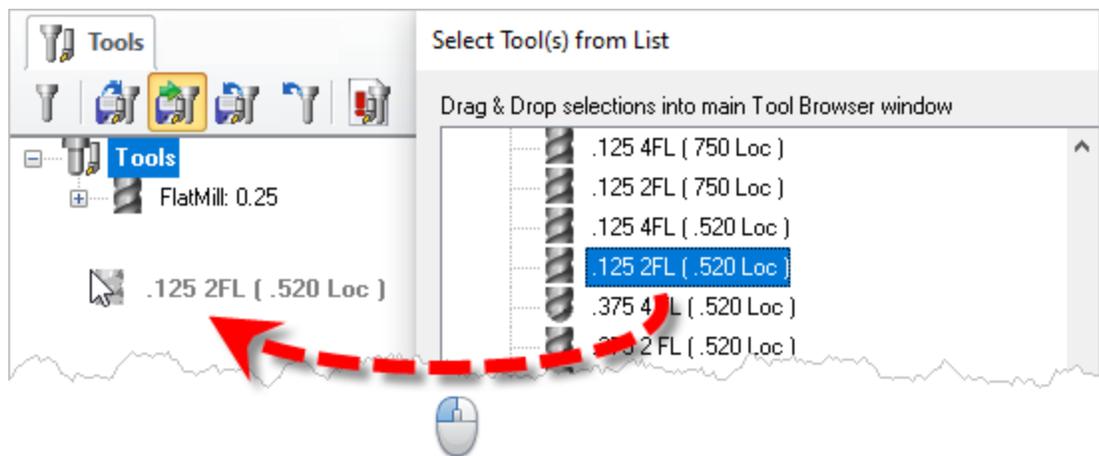
1. From the [Tools](#) tab of the [Machining Objects Browser](#), select the [Select Tools from Library](#) button .

**Note:** The actual icons you see in this dialog will depend on what module and what configuration you are currently licensed to operate



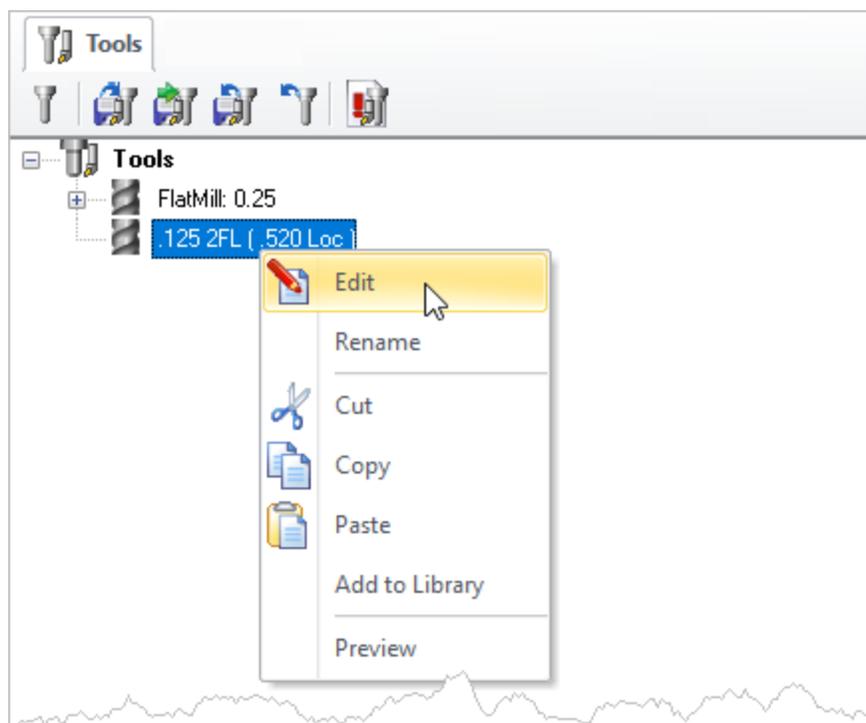
From the Tools tab of the Machining Objects Browser, select the Select Tools from Library button.

2. The list of tools will now be displayed under [Select Tools\(s\)](#) from list dialog and you can drag and drop the tools from the selection list to the cutting tools browser.



The list of tools will now be displayed under Select Tool(s) from list dialog.

3. To **Edit**, **Rename**, **Cut**, **Copy** or **Paste** on any of these tools, use right mouse button click after selecting the tool under **Tools** tab.



Right-click to edit a Tool in your Tool List

## 6.9.6 Save Tool Library

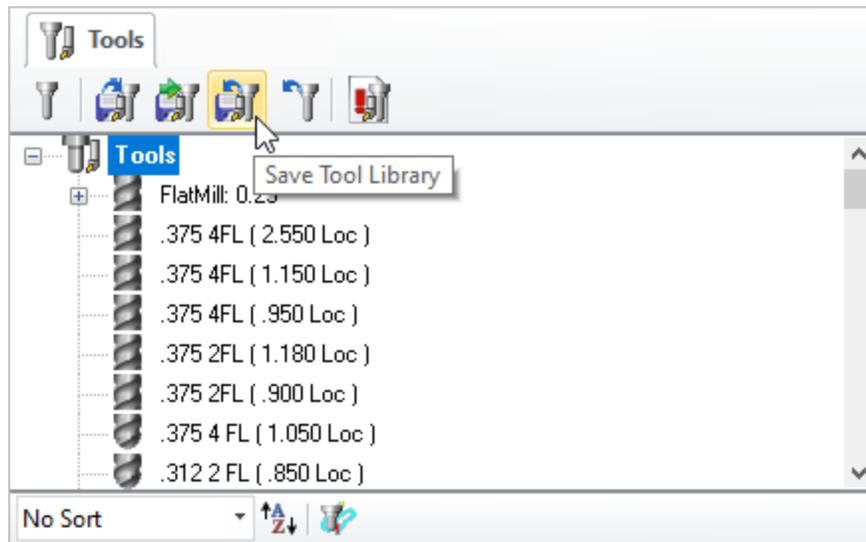


This allows you to **Save** your tools to a **Tool Library** file. The file can be saved in the desired directory and read in when required.

1. From the **Tools** tab of the **Machining Objects Browser**, select the **Save Tool Library** button



**Note:** The actual icons you see in this dialog will depend on what module and what configuration you are currently licensed to operate



From the Tools tab of the Machining Objects Browser, select the Save Tool Library button

2. Use the [File Save As](#) dialog box to save the [Tool Library](#) file. The folder of the last saved tool library is displayed by default.

**File Types Supported:** MILL Module supports [\\*.vkb](#) and [\\*.csv](#). tool library file formats. Both formats save and load tools with the feeds and speeds assigned for each tool.

3. Specify a file name and click [Save](#).

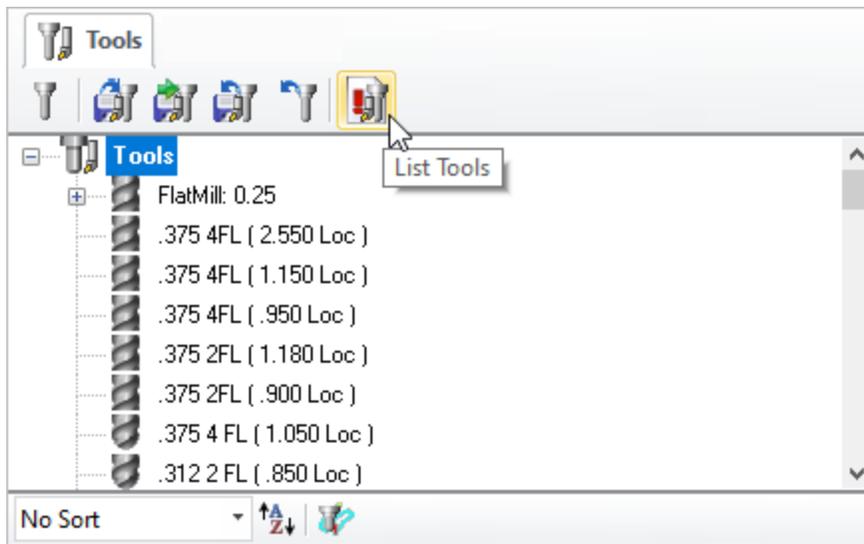
### 6.9.7 List Tools



This allows you to [List](#) and [Print](#) your tools.

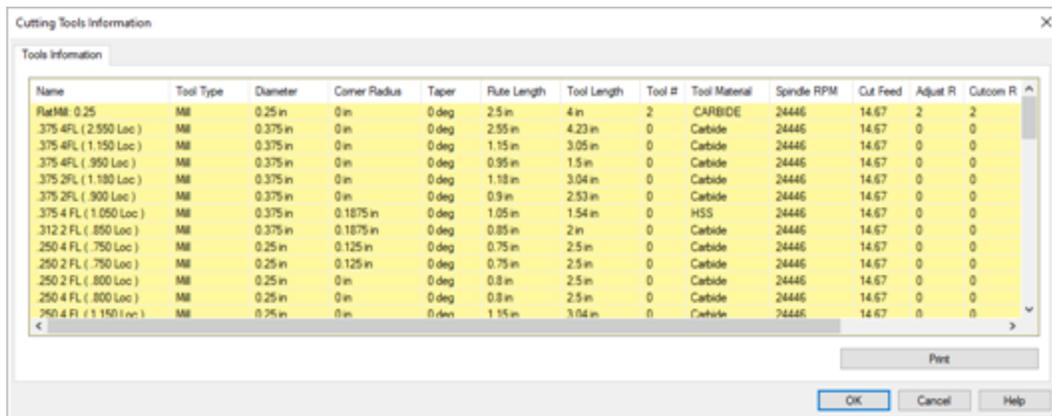
1. From the [Tools](#) tab of the [Machining Objects Browser](#), select the [List Tools](#) button .

**Note:** The actual icons you see in this dialog will depend on what module and what configuration you are currently licensed to operate



From the Tools tab of the Machining Objects Browser, select the List Tools button

- The button brings up all the tool properties associated with the tools currently recorded in the current session. From the [Cutting Tools Information](#) dialog box, you can view or [Print](#) your [Tool List](#).



From the Cutting Tools Information dialog box, you can view or Print your Tool List

- Pick **OK** to close the dialog.

## 6.9.8 User Defined Tools

**Available in:** Xpress    Standard ✓    Expert ✓    Professional ✓    Premium ✓

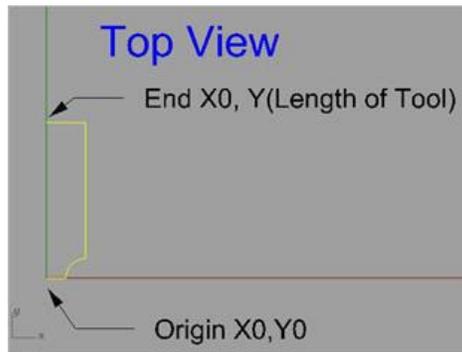
The [MILL](#) module allows creation of special purpose tools like form tools. These can be defined under user defined tool in the create/select tool dialog.

**User Defined Tools** can be used in [Drill](#) operations to allow multi-function tools to be defined as user defined tools and used in drilling operations. See [User Defined Tools](#) for more information.

 **Steps to create a user defined tool**

Steps to create a user defined tool:

1. Draw half the tool profile from the top view (XY plane of the world coordinate system) as shown in the picture above and then join the curves to form a single curve.
2. Make sure one end of the curve (tool tip) is at origin (0,0) and the other end at X0, Y<value>.



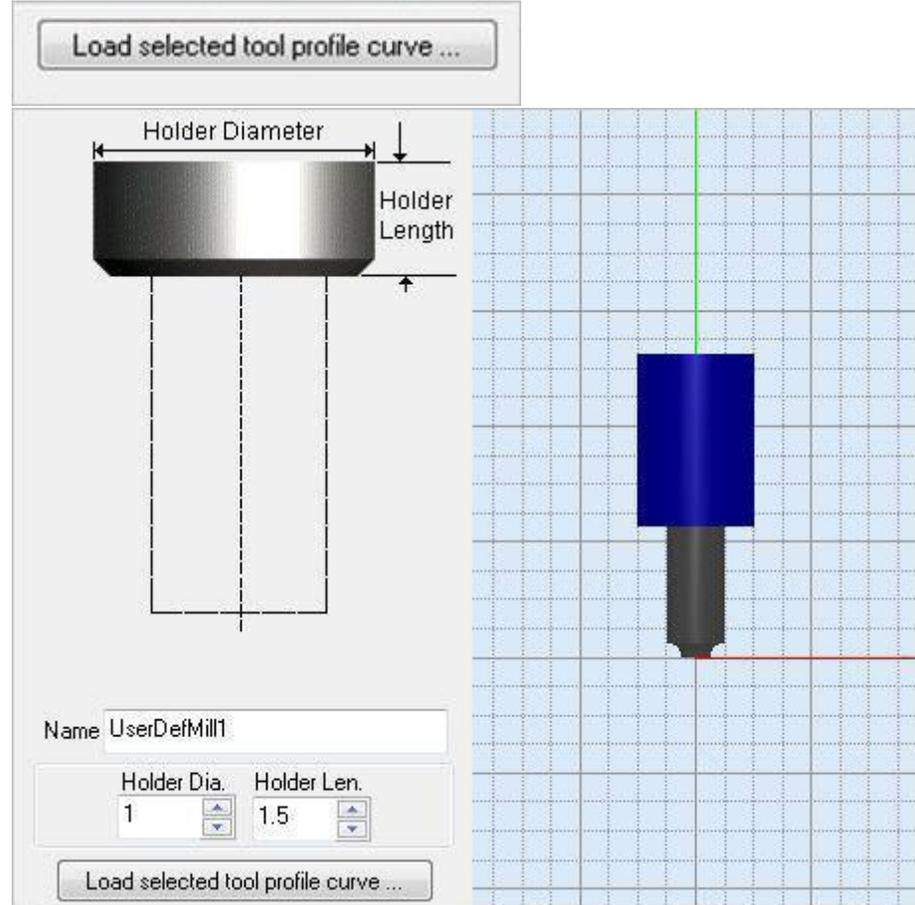
Steps to create a user defined tool

3. Select the profile. Note: The profile must be selected while the Create/Select Tool dialog is displayed.
4. From the **Tools** tab under the **Machining Objects Browser**, click **Create/Select Tool** and select **User Defined Tool**.



click Create/Select Tool and select User Defined Tool

5. Click [Load selected tool profile curve](#).



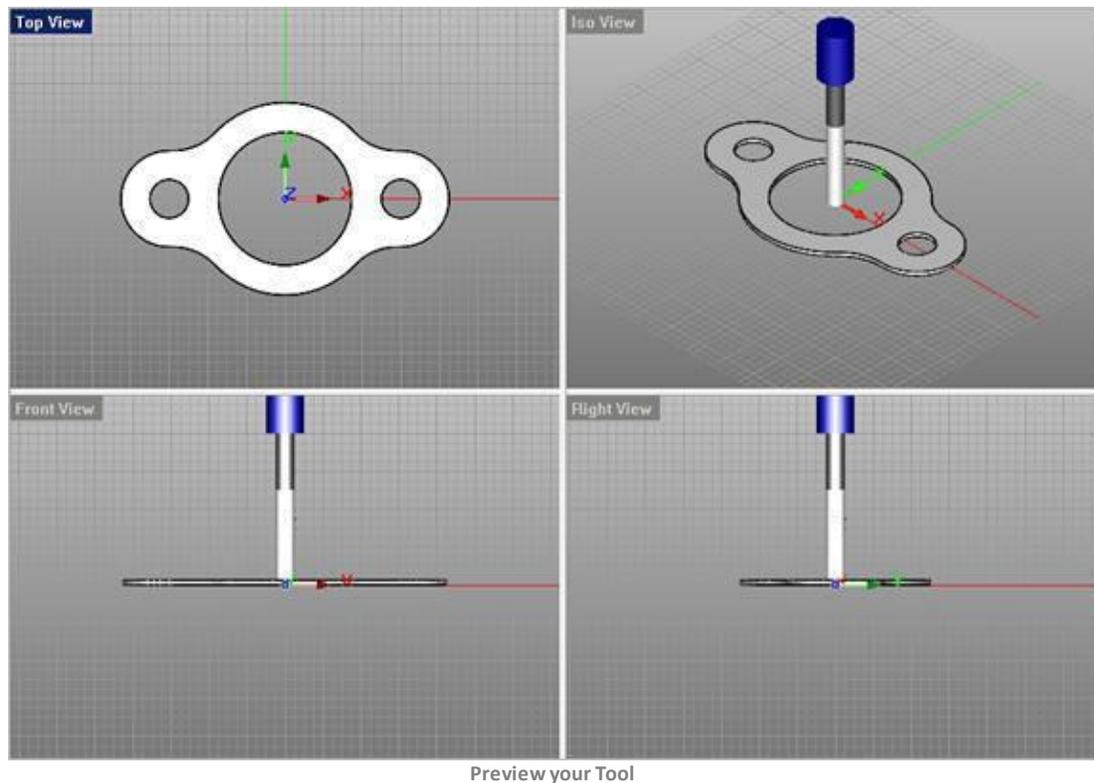
Click [Load selected tool profile curve](#)

6. Specify the [Holder Diameter](#), [Holder Length](#), [Properties](#), [Feed & Speeds](#) and Click [Save as New Tool](#).



### Preview your Tool

[Preview Tool](#) allows you to preview the highlighted tool in the workspace as seen below. The tool is previewed at the [WCS](#) origin.



## 6.9.9 Cutter Compensation

**Cutter Compensation** is used typically to compensate for the difference in the dimensions of the actual cutter used in machining and the cutter used for programming in **MILL** module. For example, if the cutter used in programming in **MILL** module is 0.25 inches and due to tool wear the actual cutter is only 0.24 inches in size, you can compensate for this in the controller rather than having to re-program the operation again. Refer to the [2½ Axis Control Matrix](#) for information about which toolpath operations support **Cutter Compensation**.

### Enabling Cutter Compensation

To do this you need to do the following:

1. Turn cutter compensation on in the **Operation Set Compensation** to **Auto/ON** or **Control/ON**.  
**Note:** Setting the **Compensation** to **Auto/ON** or **Control/ON** has the same behavior in **MILL** module.
2. Specify the cutter compensation value and the compensation register in the controller (the controller needs to be capable of doing this)

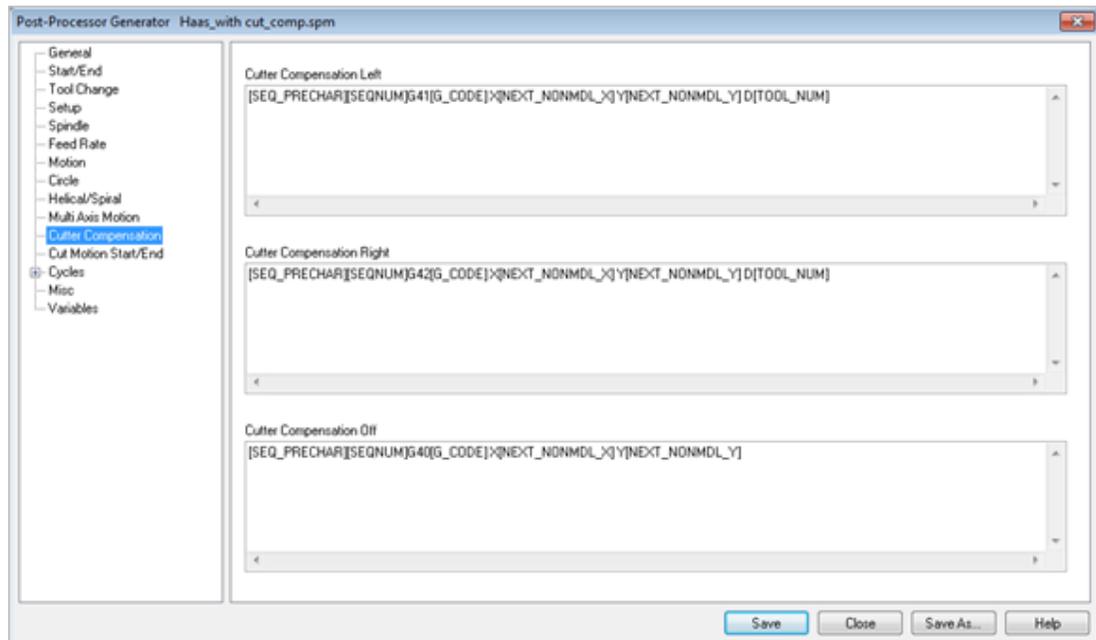
### A few things to watch out for:

- ❗ Cutter compensation makes sense only in 2-1/2 axis operations. If you are using roughing (pocketing and facing) the compensation will be turned on only in the final passes.
- ❗ Make sure you are not using [Zig-Zag](#) cut traversal in any of the methods that you want to turn compensation on.
- ❗ Make sure you have a linear motion for the controller to turn on the compensation value on. If your first motion is an arc the controller will not be able to turn on the compensation. Thus, in 2-1/2 axis profiling, make sure there is a linear entry motion for the controller to be able to turn compensation on.



### Select the Post Processor from the Post Processor generator

Select the [Post Processor](#) from the [Setup](#) tab in [Machining Browser](#) by selecting [Utilities](#) and [Post Processor generator](#).



Post Processor generator

## 6.9.10 Feeds & Speeds Calculator

This loads the [Feeds & Speeds](#) values from the [Feeds & Speeds Table](#) file. This will display the [Load Feeds from Table](#) dialog box to make your selections.



### Dialog Box: Load Feeds from Table

Selecting [OK](#) from this dialog transfers the spindle speed and cut feedrate to the [Feeds & Speeds](#) tab. The plunge, approach, engage, retract and departure feeds are determined using a percent of the cut feed. The percent to use for transferring the computed cut feed can be set under [Feeds & Speeds Preferences](#).

**Feeds/Speeds**

Load Feeds from Table

Data from Table

Stock Material: ALUMINUM - 2024

Tool Material: CARBIDE

Surface Speed: 1600 ft/min

Feed/Tooth: 0.004 in

Input Variables

Tool Diameter: 0.5 in

# of Flutes: 2

Maximum Limits for Computation

Max Spindle Speed: 14000 RPM

Max Cut Feed: 200 in/min

Computed Variables

Spindle Speed: 12223 RPM

Cut Feed (Cf): 97 in/min

OK Cancel Help

Dialog Box: Load Feeds from Table



### Data from Table

#### Stock Material

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

#### Tool Material

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

#### Surface Speed

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

#### Feed/Tooth

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

### **Input Variables**

The input variables - [Work Diameter](#) is automatically loaded from the Stock Radius. Based on this parameter and the [Variables Limits](#) parameters, the program computes [Spindle Speed](#) and [Cut Feedrate \(Cf\)](#), measured in [Unites/Revolution](#). Changing the spindle speed modifies the cut feedrate.

### **Maximum Limits for Computation**

Here you can set the [Max Spindle Speed](#) and [Max Cut Feed \(Cf\)](#) values. Once these two values are set, the [Spindle Speed](#) and [Cut Feed](#) calculated by this dialog will not exceed these values even if you attempt to enter higher values into the [Computed Variables](#) fields. To exceed these values, change them here or you must edit the operation or tool parameters manually.

### **Computed Variables**

The variables for [Spindle Speed](#) and [Cut Feed \(Cf\)](#) are computed for you based on the selections made in this dialog but will not exceed the values set in the [Maximum Limits for Computation](#) section of the dialog. These values are then assigned to the active toolpath operation or tool. You can override either of these variables and the other will update automatically. Since this dialog is a [Feeds & Speeds Calculator](#), you cannot override both values. To do so, you must edit the operation or tool parameters manually.

## 6.10 Feeds and Speeds

The following [Feeds & Speeds](#) tab is displayed for all [Mill](#) operations. It allows you to select the appropriate [Feeds & Speeds](#) for the current [Mill](#) operation. In this tab, [Spindle Parameters](#) and [Feed Rates](#) can be specified. [Speeds & Feeds](#) can also be loaded [from a File](#) or from [the Tool](#).

### **Feed Rates Explained**

[Feed Rate](#) is one of the most important factors to consider when implementing any CNC strategy. Simply put, feed rate is the speed at which the cutter engages the part and is typically measured in units/minute. Suggested cut feed rates will vary depending on the type of material you are cutting (i.e., aluminum, steel, wood, acrylic, etc.), the material of the cutter (carbide, high speed steel, ceramic, etc.) and many other cutting factors including desired surface and the characteristics of the CNC machine itself.



[Read the full article...](#)

## Dialog Box: Feeds & Speeds tab

2 1/2 Axis Top Facing

Cut Parameters	Cut Levels	Entry/Exit	Advanced Cut Parameters
Tool	Feeds & Speeds		Clearance Plane

Spindle Parameters

Speed: 5000 RPM

Direction:  CW  CCW

Feed Rates

Plunge (Pf): 20 in/min

Approach (Af): 30 in/min

Engage (Ef): 30 in/min

Cut (Cf): 40 in/min

Retract (Rf): 50 in/min

Departure (Df): 60 in/min

Transfer (Tf):  Use Rapid  Set 80 in/min

Feed Rate Reduction Factors

Plunge between levels: 100 %

First XY pass: 100 %

Bottom Z Level: 0 %

Coolant: None

Buttons: Load from Tool, Load from File ..., Generate, Cancel, Save, Help

The diagram illustrates a 2 1/2 Axis Top Facing operation. A tool is shown at the top right. The tool path is represented by a series of colored segments: a red segment (Pf) for Plunge, a green segment (Af) for Approach, a pink segment (Ef) for Engage, a cyan segment (Cf) for Cut, a blue segment (Rf) for Retract, a magenta segment (Df) for Departure, and a yellow segment (Tf) for Transfer. A 'Clearance Plane' is indicated by a vertical line, and a 'Cut Start' point is marked at the beginning of the cut segment (Cf).

Dialog Box: Feeds & Speeds tab, 2 Axis Drag Knife

## Spindle Parameters

These parameters refer to the spindle on your machine.

### Spindle Speed

This is the rotational **Speed (S)** of the milling spindle expressed in **RPM**.

### Spindle Direction (CW)

This sets the spindle rotation to be **Clockwise (CW)**.

### Spindle Direction (CCW)

This sets the spindle rotation **Direction** to be **Counter Clockwise (CCW)**.



### Feed Rates

These are the feedrates (in **Units/Min**) that will be applied to the current toolpath operation. If the values are currently populated from your **Tool** definition (**Load from Tool**), **Feeds & Speeds** table (**Load from File**) or from your **Knowledge Base**, you can override them for this operation.

### Plunge (Pf)

This is the rate is the feed before the tool starts to engage in material. This is always vertical.

### Approach (Af)

This is the **Approach (Af)** feedrate (in **Units/Min**) used to prepare the cutter just before it starts to **Engage** into material for cutting. **Approach** motions are dependent on the method of machining.

### Engage (Ef)

This is the **Engage (Ef)** feedrate (in **Units/Min**) used when the tool is **Engaging** the material just prior to cutting.

### Cut (Cf)

This is the **Cut (Cf)** feedrate (in **Units/Min**) used when the tool is **Cutting** material.

### Retract (Rf)

This is the **Retract (Rf)** feedrate (in **Units/Min**), when the tool is performing a **Retract** move away from material.

### Departure (Df)

The is the feedrate (in **Units/Min**), when the tool **Departs** from the material.

### Transfer (Tf) Use Rapid

This is the **Transfer (Tf)** feedrate (in **Units/Min**) used for **Transfer** motions. If you select **Use Rapid** the posted G-Code will output a rapid motion (G0) with no feed rate. **Note:** For more accurate machining time estimates, use the **Set** option and enter the feed rate to use.

### Transfer (Tf) Set

This is the **Transfer (Tf)** feedrate (in **Units/Min**) used for **Transfer** motions. If you select **Use Rapid** the posted G-Code will output a rapid motion (G0) with no feed rate. **Note:** For more accurate machining time estimates, use the **Set** option and enter the feed rate to use.



### Feed Rates Reduction Factors (Hole Operations Only)

This section of the dialog allows you to specify **Feed Rate Reduction Factors** for specific tool motions.

### Plunge between levels

This is a percentage of the [Cut \(Cf\)](#) feedrate to use when the tool is plunging between Z levels.

### First XY Pass

This is a percentage of the [Cut \(Cf\)](#) feedrate to use on the first XY cut motion when the toolpath uses the full width of the cutter.



### Coolant

Here you can override the [Coolant](#) that is specified by the Tool. [Coolant](#) can be set to [Flood](#), [Mist](#), [Through](#) or [Air](#). [Coolant](#) codes are defined in the post processor generator under [Misc](#) tab. [Coolant Off](#) is also supported as a variable that can be added where needed using the post-processor generator.



### Load from Tool

Load the [Feed & Speeds](#) values that are saved with the currently selected [Tool](#).

See: [Create/Edit Tools](#)



### Load from File

This loads the [Feeds & Speeds](#) values from the [Feeds & Speeds Table](#) file. This will display the [Load Feeds from Table](#) dialog box to make your selections.



### Dialog Box: Load Feeds from Table

Selecting [OK](#) from this dialog transfers the spindle speed and cut feedrate to the [Feeds & Speeds](#) tab. The plunge, approach, engage, retract and departure feeds are determined using a percent of the cut feed. The percent to use for transferring the computed cut feed can be set under [Feeds & Speeds Preferences](#).

**Feeds/Speeds**

Load Feeds from Table

Data from Table

Stock Material: ALUMINUM - 2024

Tool Material: CARBIDE

Surface Speed: 1600 ft/min

Feed/Tooth: 0.004 in

Input Variables

Tool Diameter: 0.5 in

# of Flutes: 2

Maximum Limits for Computation

Max Spindle Speed: 14000 RPM

Max Cut Feed: 200 in/min

Computed Variables

Spindle Speed: 12223 RPM

Cut Feed (Cf): 97 in/min

OK Cancel Help

Dialog Box: Load Feeds from Table



### Data from Table

#### Stock Material

Selecting a **Stock Material** and **Tool Material** displays the **Surface Speed** and **Feed/Tooth**. This information is contained in a feeds and speeds data file which can be edited to add newer materials.

#### Tool Material

Selecting a **Stock Material** and **Tool Material** displays the **Surface Speed** and **Feed/Tooth**. This information is contained in a feeds and speeds data file which can be edited to add newer materials.

#### Surface Speed

Selecting a **Stock Material** and **Tool Material** displays the **Surface Speed** and **Feed/Tooth**. This information is contained in a feeds and speeds data file which can be edited to add newer materials.

### Feed/Tooth

Selecting a **Stock Material** and **Tool Material** displays the **Surface Speed** and **Feed/Tooth**. This information is contained in a feeds and speeds data file which can be edited to add newer materials.



### Input Variables

The input variables - **Work Diameter** is automatically loaded from the Stock Radius. Based on this parameter and the **Variables Limits** parameters, the program computes **Spindle Speed** and **Cut Feedrate (Cf)**, measured in **Unites/Revolution**. Changing the spindle speed modifies the cut feedrate.



### Maximum Limits for Computation

Here you can set the **Max Spindle Speed** and **Max Cut Feed (Cf)** values. Once these two values are set, the **Spindle Speed** and **Cut Feed** calculated by this dialog will not exceed these values even if you attempt to enter higher values into the **Computed Variables** fields. To exceed these values, change them here or you must edit the operation or tool parameters manually.



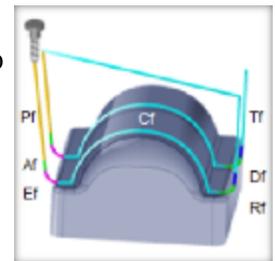
### Computed Variables

The variables for **Spindle Speed** and **Cut Feed (Cf)** are computed for you based on the selections made in this dialog but will not exceed the values set in the **Maximum Limits for Computation** section of the dialog. These values are then assigned to the active toolpath operation or tool. You can override either of these variables and the other will update automatically. Since this dialog is a **Feeds & Speeds Calculator**, you cannot override both values. To do so, you must edit the operation or tool parameters manually.



### The Milling Feeds & Speeds Calculator

Did you know that MecSoft's **MILL** Module plug-ins have a built-in **Feeds & Speeds Calculator**? That's right, you can ask the program to suggest feeds & speeds values based on your current stock material and active tool parameters! Once a **Cut Feed** is calculated, you can then choose to automatically assign feed rate values for the various toolpath motions in your operation including **Plunge**, **Approach**, **Engage**, **Retract** and **Departure**! The percentages of the **Cut Feed** to assign are all controlled from the **CAM Preferences** dialog. The Milling **Feeds & Speeds Calculator**...



[Read the full article...](#)



### Customizing Feeds & Speeds

**MILL** module allows you to customize the feeds and speeds based on the stock material being machined, the material of the cutter employed and also the operation type. This is

done by archiving your desired feeds and speeds settings in an external data file.

A default implementation of this table has been included with the [RhinoCAM](#) product and can be found in a folder called "[Materials](#)" under the product installation directory.

This xml contains the list of materials, texture, feeds and speeds. The file is located under [Materials](#) folder in the [RhinoCAM](#) install directory. (C:\ProgramData\MecSoft Corporation\RhinoCAM 20xx for Rhino x.x\Materials).

Materials folder contains the following files

- FeedsSpeedsDataINCH.xml
- FeedsSpeedsDataMM.xml

The [Feeds and speeds](#) file is an .xml file format, which can be edited using any text editor to add newer materials. These values can then be recalled at any time to compute the feeds/speeds to be used in the current program.

The format for this file is shown below.

```
<Units>Imperial</Units>
<FeedsSpeeds>
  <Material>
    <Name>Stock Material</Name>
    <TextureFile>Texture Bitmap</TextureFile>
    <FeedsSpeedsRecord>Operation type, Tool Material,
Surface Speed, Feed per Tooth</FeedsSpeedsRecord>
  </Material>
</FeedsSpeeds>
```

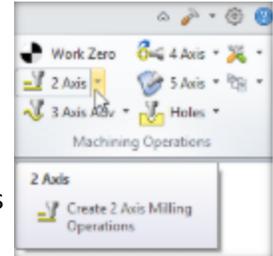
An example entry is shown below.

```
<Material>
  <Name>ALUMINUM - 2026</Name>
  <TextureFile>ALUMINUM.bmp</TextureFile>
  <FeedsSpeedsRecord>MILLING, CARBIDE, 1600.00, 0.0040</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>MILLING, HSS, 400.00, 0.0040</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>MILLING, CERAMIC, 400.00, 0.0040</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>DRILLING, CARBIDE, 960.00, 0.0048</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>DRILLING, HSS, 240.00, 0.0048</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>DRILLING, CERAMIC, 240.00, 0.0048</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>TURNING, CARBIDE, 1800.00,
0.0200</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>TURNING, CERAMIC, 1800.00,
0.0200</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>TURNING, CERMET, 1800.00, 0.0200</FeedsSpeedsRecord>
</Material>
```

 If part unit is set to Inches, MILL module automatically loads FeedsSpeedsDataINCH.xml and when part unit is set to MM, FeedsSpeedsDataMM.xml is loaded.

### [More on Customizing Materials Data](#)

Note: This blog post is intended for advanced users who are familiar with XML text editing and have administrative access to their Windows Operating System. MecSoft's CAM plug-ins have a built-in [Feeds & Speeds Calculator](#) that can suggest [Spindle Speeds](#) and [Cut Feed Rates](#) based on your stock material and active tool parameters! However, what if you are cutting stock material that is currently not in our [Materials Library](#)? Or what if you don't like what is currently assigned for the material of your choice in the [Materials Library](#)? This post will show you how to customize MecSoft CAM to add and manage multiple material files as well to add your own stock materials. If you are new to MecSoft's CAM plug-ins, you can review my earlier post on the [Feeds & Speeds Calculator](#) and how it works.



[Read the full article...](#)

## 6.10.1 Load from File

This loads the [Feeds & Speeds](#) values from the [Feeds & Speeds Table](#) file. This will display the [Load Feeds from Table](#) dialog box to make your selections.

### [Dialog Box: Load Feeds from Table](#)

Selecting [OK](#) from this dialog transfers the spindle speed and cut feedrate to the [Feeds & Speeds](#) tab. The plunge, approach, engage, retract and departure feeds are determined using a percent of the cut feed. The percent to use for transferring the computed cut feed can be set under [Feeds & Speeds Preferences](#).

**Feeds/Speeds**

Load Feeds from Table

Data from Table

Stock Material: ALUMINUM - 2024

Tool Material: CARBIDE

Surface Speed: 1600 ft/min

Feed/Tooth: 0.004 in

Input Variables

Tool Diameter: 0.5 in

# of Flutes: 2

Maximum Limits for Computation

Max Spindle Speed: 14000 RPM

Max Cut Feed: 200 in/min

Computed Variables

Spindle Speed: 12223 RPM

Cut Feed (Cf): 97 in/min

OK Cancel Help

Dialog Box: Load Feeds from Table



## Data from Table

### Stock Material

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

### Tool Material

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

### Surface Speed

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

### Feed/Tooth

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.



### Input Variables

The input variables - [Work Diameter](#) is automatically loaded from the Stock Radius. Based on this parameter and the [Variables Limits](#) parameters, the program computes [Spindle Speed](#) and [Cut Feedrate \(Cf\)](#). measured in [Unites/Revolution](#). Changing the spindle speed modifies the cut feedrate.



### Maximum Limits for Computation

Here you can set the [Max Spindle Speed](#) and [Max Cut Feed \(Cf\)](#) values. Once these two values are set, the [Spindle Speed](#) and [Cut Feed](#) calculated by this dialog will not exceed these values even if you attempt to enter higher values into the [Computed Variables](#) fields. To exceed these values, change them here or you must edit the operation or tool parameters manually.



### Computed Variables

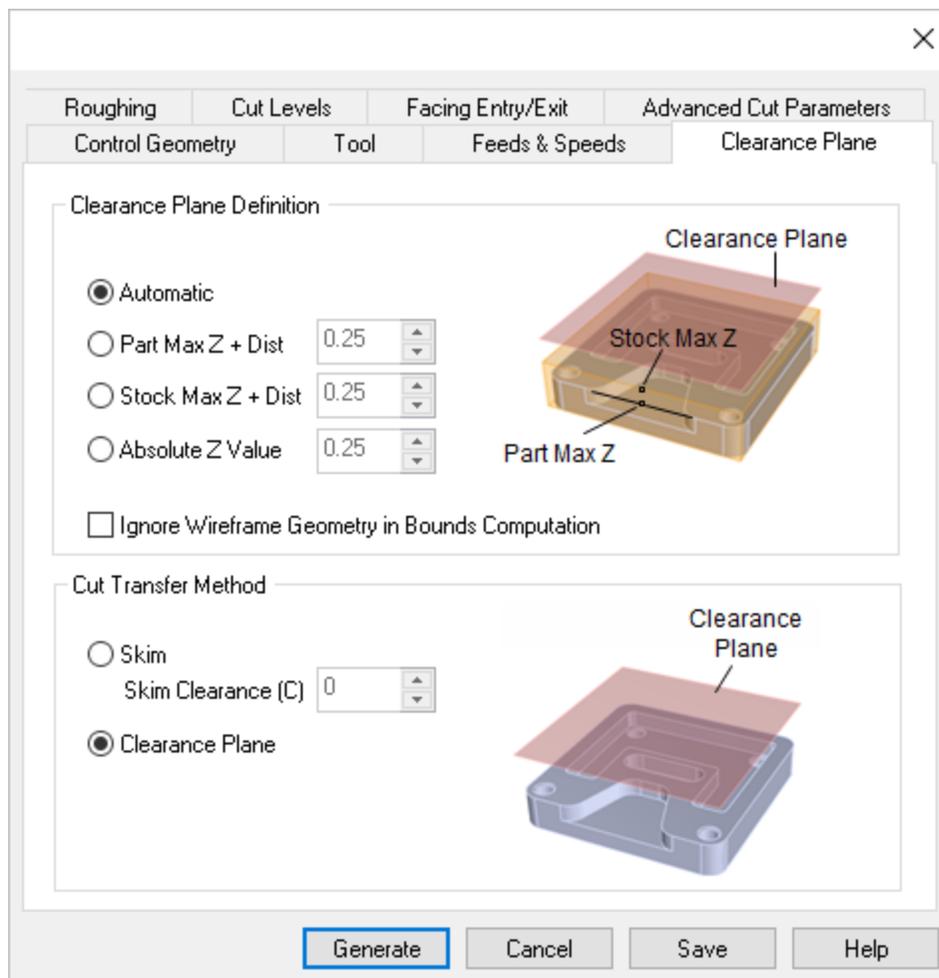
The variables for [Spindle Speed](#) and [Cut Feed \(Cf\)](#) are computed for you based on the selections made in this dialog but will not exceed the values set in the [Maximum Limits for Computation](#) section of the dialog. These values are then assigned to the active toolpath operation or tool. You can override either of these variables and the other will update automatically. Since this dialog is a [Feeds & Speeds Calculator](#), you cannot override both values. To do so, you must edit the operation or tool parameters manually.

## 6.11 Clearance Plane

The clearance plane is an XY plane wherein all transfer motions between a retract and engage motion takes place. In the case of 4 axis operations, the clearance plane is a cylinder and defined along the axis of rotation. Typically you would define this plane at a certain safety distance above the part geometry. This is done to prevent the tool from touching the part being machined during transfer motions since these motions usually use a very fast or rapid feed rate.



### Dialog Box: Clearance Plane tab



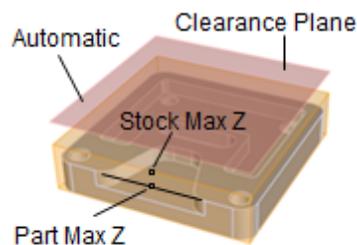
Dialog Box: Clearance Plane tab, similar for all Milling operations

### Clearance Plane Definition

This selection defines the [Clearance Plane](#) for the current toolpath operation.

#### Automatic

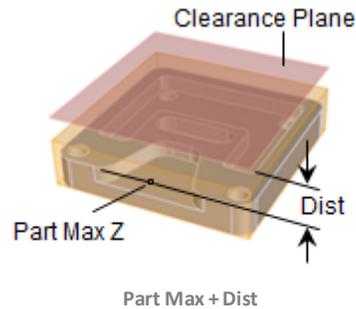
Allow the system to calculate a the clearance plane height automatically based on the part and stock geometry.



Automatic

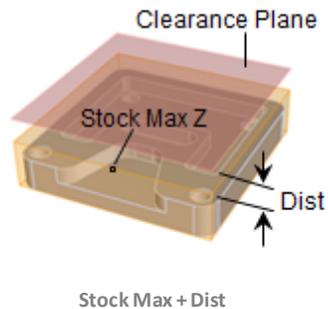
#### Part Max Z + Dist

Set the **Clearance Plane** height to the maximum Z height of the Part plus this added distance.



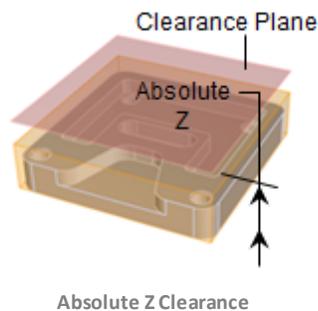
#### Stock Max Z + Dist

Select this option to use the **Stock's Maximum Z** height and then enter a **Distance** value to add to this for the total **Z height** for the **Clearance Plane**.



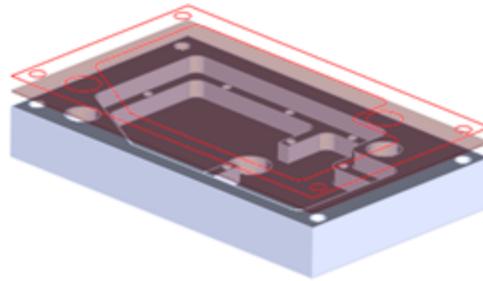
#### Absolute Z Value

Select this to specify the absolute Z clearance height to use and then enter Z height value. Be sure that the value you specify clears your part geometry.



#### Ignore Wireframe Geometry in Bounds Computation

Check this box to ignore all wireframe geometry when calculating the **Clearance Plane** definition. When checked, the **Automatic** and **Part Max** options for defining the **Clearance** will be calculated from actual surface geometry.



Ignore Wireframe Geometry in Bounds Computation

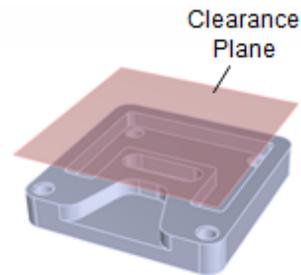


### Cut Transfer Method

This section allows you to control the tool's motions when it needs transfer to another region to begin cutting.

#### Clearance Plane

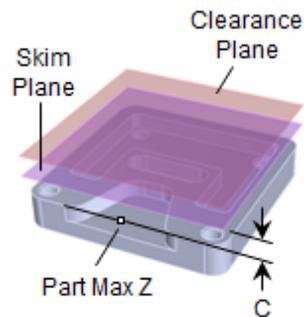
Select this option to move the tool to the **Clearance Plane** and then perform the **Transfer** motion to the next cut location.



Transfer at Clearance Plane

#### Skim

Select this option to perform transfer motions at a Skim plane. The system automatically determines a safe height and then adds this **Skim Clearance (C)** to the computed Z value to perform the **Transfer Motions**.

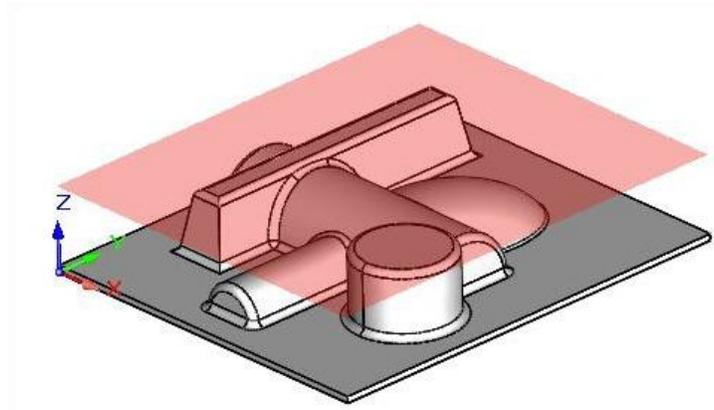


Transfer at Skim



### Display of Clearance Plane for Milling operations

When the clearance plane dialog is active, specifying a clearance plane definition, displays the clearance plane on the part in the view port.



Display of Clearance Plane for Milling operations

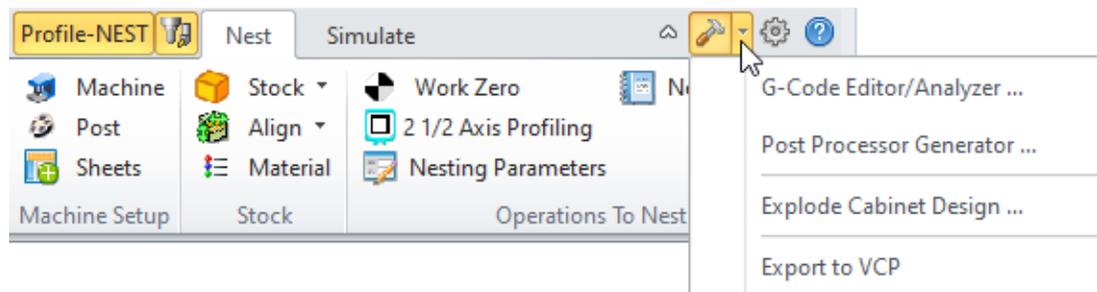
## 6.12 Tools and Utilities



CAM system **Tools and Utilities** provides access to [G-Code Editor/Analyzer](#) and [Post process generator](#). To access the functions, select the "Utilities" option under the [Machining Browser](#).



### Tools & Utilities Menu



CAM System Utilities Menu Item

#### **G-Code Editor/Analyzer ...**

Loads the NC editor. By default this is set to notepad. This is specified under [Program](#) to send posted file to which can be found in [Set Post-Processor Options](#) dialog. Refer to [Set Post Options](#) for additional information.

#### **Post Processor Generator ...**

This Loads [Post Processor Generator](#) utility.

#### **Explode Cabinet Design ...**

This loads the [Explode Cabinet Design](#) utility.

#### **Export to VCP**

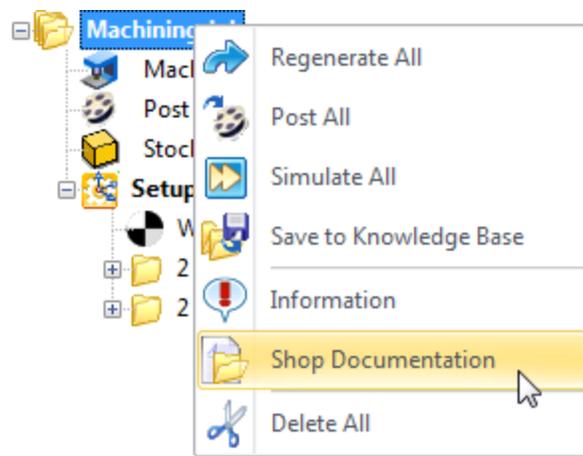
[Export](#) the CAD drawing/model including all CAM data to a \*.vcp VisualCAD file.

### 6.12.1 Shop Docs

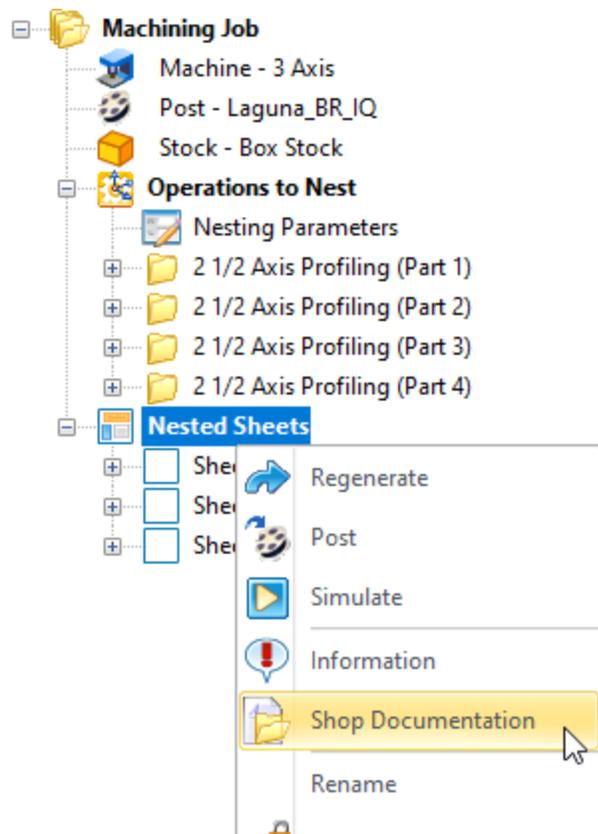
This creates a [Shop Document](#) (i.e., a [Setup Sheet](#)) for the programmed part which includes screen captures, estimated machining time, tool list and the machining operations list as well as stock size and other important information. The document can be saved in [HTML](#) or [Excel](#) format.

#### Select Shop Documentation from the Right-click Menu

Shop documentation can be generated by selecting [Setup](#) under the [Program](#) tab, right click and select [Shop Documentation](#).



Select Shop Documentation from the Right-click Menu  
(Mill Module Shown)



Select Shop Documentation from the Right-click Menu  
(Profile-NEST Module Shown)

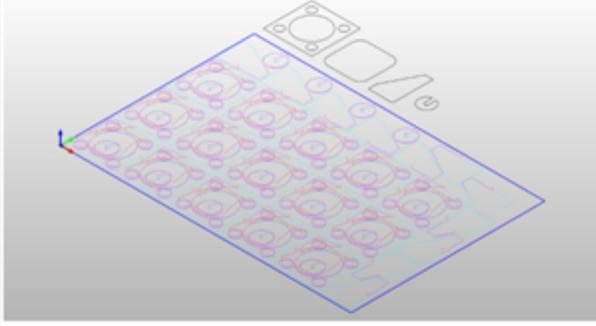
### The Setup Sheet is Saved and Displayed

You can select from an assortment of [HTML Templates](#) and an [Excel Template](#) from the [Save Shop Documentation File](#) dialog and then pick [Save](#) to generate shop documentation. This is saved as an external file and can be printed and handed over to the operator in preparation for the part to be machined on the CNC machine.

No.	Name	Number	Type	Dimensions					Coolant	Comments
				Radius	C-Radius	Taper	Length			
1	Finish 0.25	2	Mil	0.125	0.000	0.000	4.000		None	

MACHINE OPERATIONS LIST						
Operation Number: 1						
Operation Name	Tool Used	Cut Feed	Spindle Speed	Machining Time	Comments	
Sheet 1	0	0.000	0.000	Zero (0)		

Operation Number: 2						
Operation Name	Tool Used	Cut Feed	Spindle Speed	Machining Time	Comments	
2 1/2 Axis Profiling (Part 1) 1	2	04.667 in/min	24446.000	7 mins 27 secs		

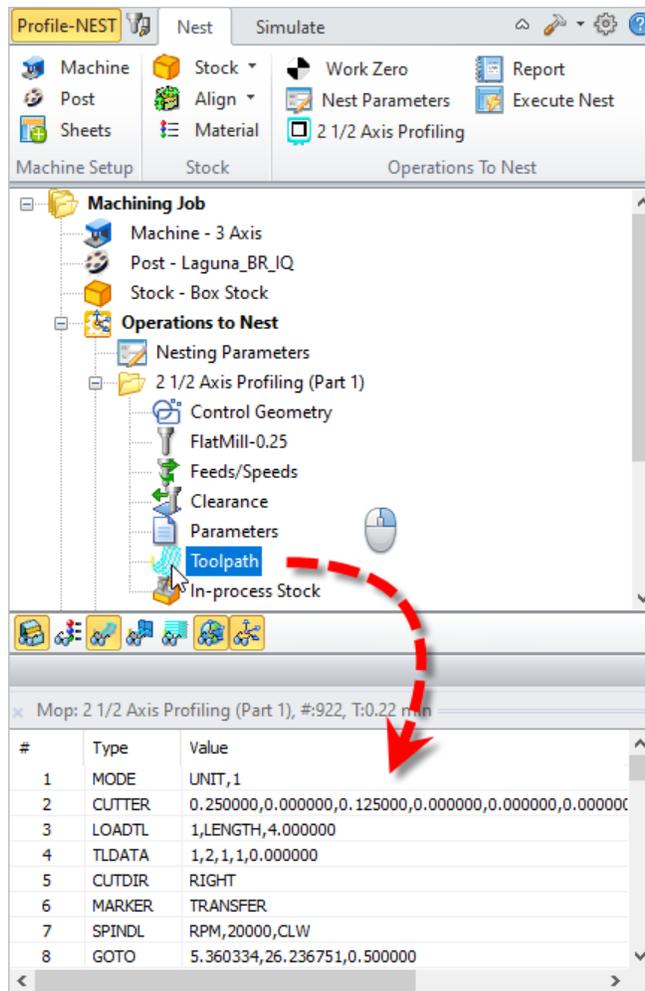
  


Sample Shop Document using Template 2

## 6.12.2 Toolpath Viewer

Once a machining operation is created, you can step through the toolpath motions using the [Toolpath Viewer](#). To display the viewer, expand the operation folder in the [Machining Browser](#) and right-click on the toolpath icon. The toolpath viewer is a dockable dialog bar that will be initially docked below or next to the [Machining Browser](#).

### The Toolpath Viewer Displayed

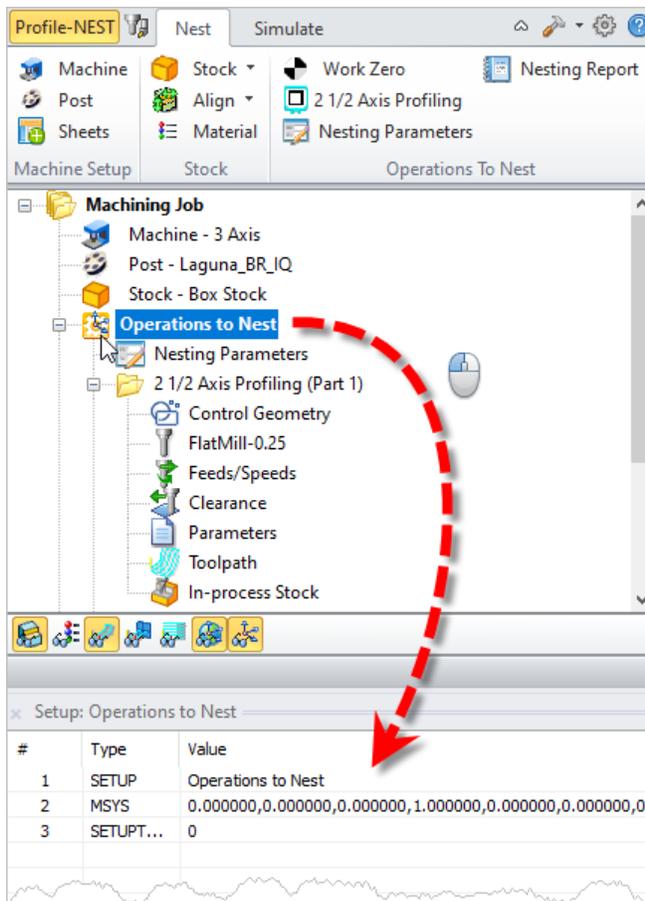


The Toolpath Viewer Displayed



### Previewing Setup Information in the Toolpath Viewer

If the **Toolpath Editor/Viewer** is currently displayed, selecting **Operations to Nest** will display the setup location and orientation. Errors are flagged and displayed in the toolpath editor/viewer if the setup orientation is not achievable.

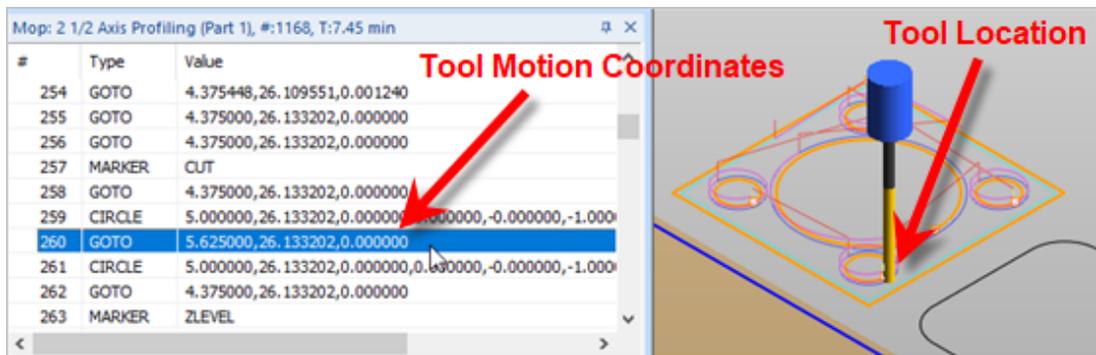


Setup Information is displayed in the Toolpath Viewer

### Previewing a GOTO Motion in the Toolpath Viewer

Select a GOTO motion in the Toolpath Viewer to view the tool motion for the generated toolpath.

Make sure to turn on  Toolpath Visibility.



Previewing a GOTO Motion in the Toolpath Viewer

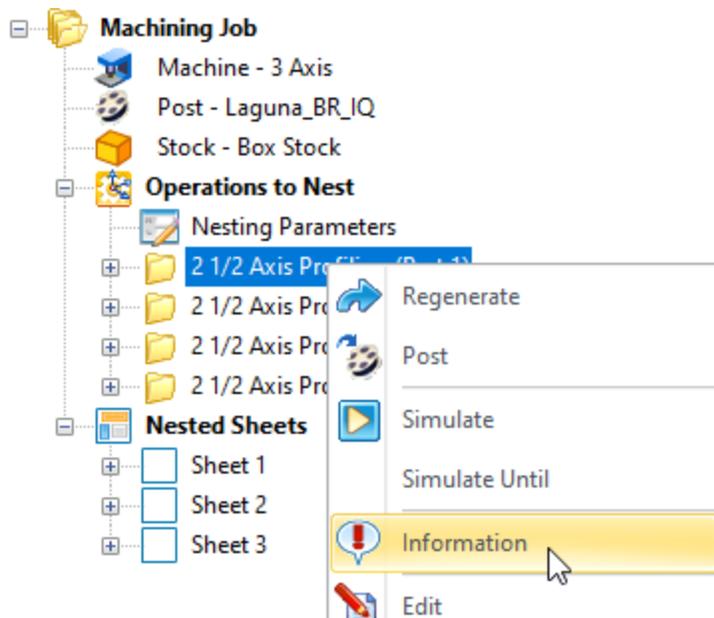
### 6.12.3 Get Information

This displays a dialog box with the following information about the selected [Operation](#), the [Setup](#) or the entire [Machining Job](#):

- [Status](#)
- [Tool Name](#)
- [Cut Feed Rate](#)
- [# of GOTOs](#)
- [Machine Time](#)

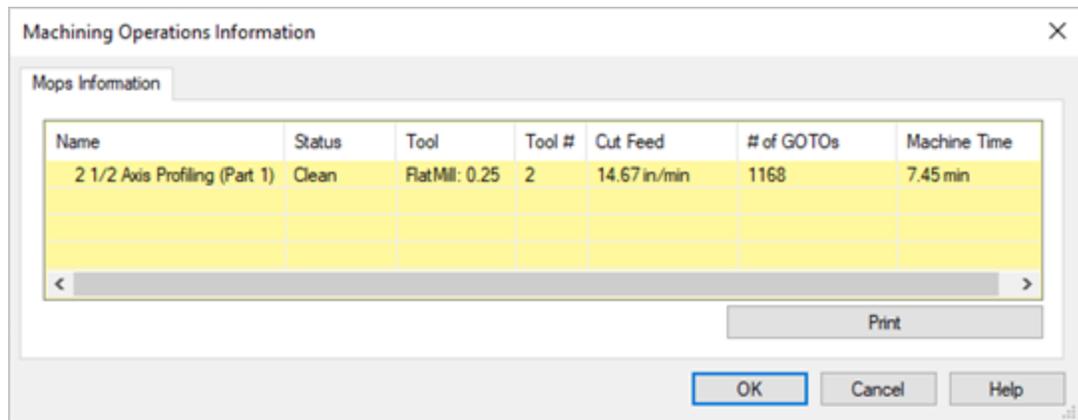
#### **Select Information from the Right-click Menu**

[Machining Operations Information](#) can be viewed by selecting a [Setup](#), right mouse button click and left click on [Information](#).



Select Information from the Right-click Menu

#### **Dialog Box: Machining Operations Information (MILL Module)**



Dialog Box: Machining Operations Information



### Optimize Machining Time Estimates!

In any MecSoft CAM product you can get an Information report about a selected toolpath operation, a [Setup](#) or all operations in the [Machining Job](#). This report contains some very useful information that includes the [Tool #s](#) used, the [Cut Feed](#), the [# of GOTO](#) motions and most importantly, the estimated [Machining Time](#).

[Read the full article...](#)

Machine Time
3 hr 32 min
10 hr 20 min
13 hr 52 min

## 6.12.4 Save as Defaults

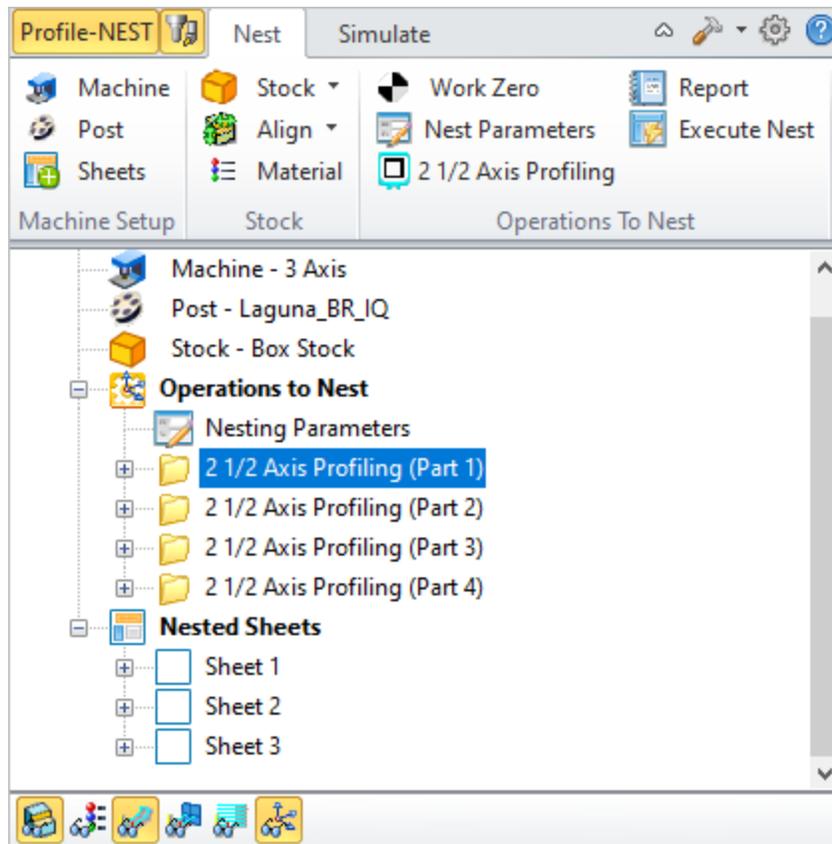
[Save As Defaults](#) allows you to set default parameters for machining operations. This allows the reuse of the machining parameters without having to enter the same parameters when creating new machining operations on same part or new part files.

To Save As Defaults:



### Step 1: Create or Select a Machining Operation

[Create](#) or [Select](#) a machining operation under the [Program](#) tab in [Machining Browser](#).

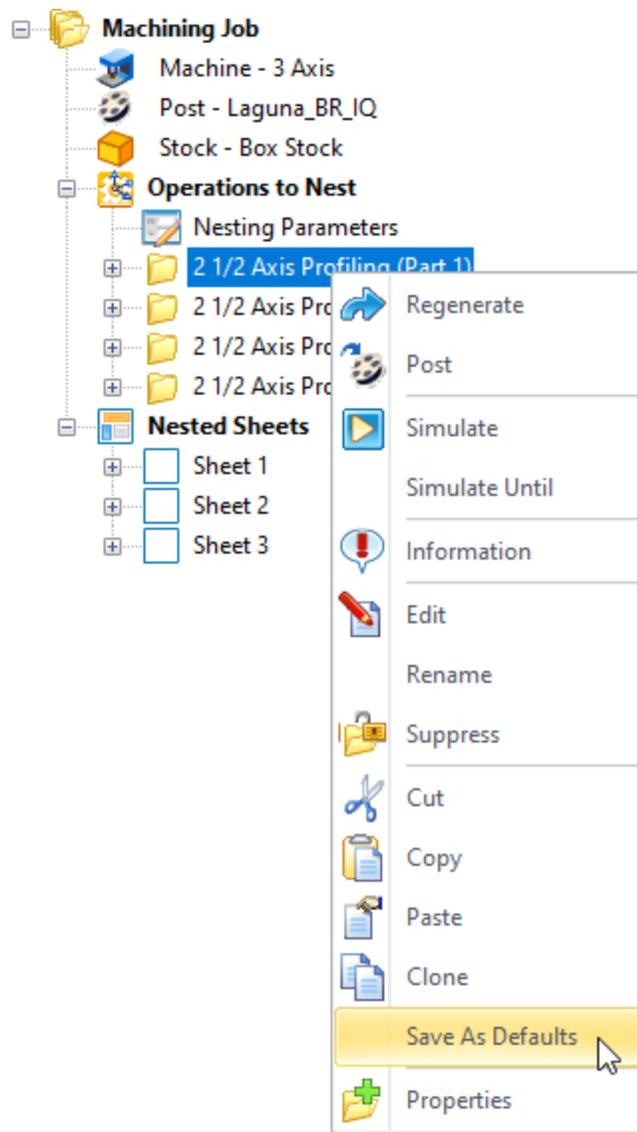


Step 1: Create or Select a Machining Operation



## Step 2: Save As Defaults

Right mouse button click on a machining operation and select [Save As Defaults](#).



Step 2: Save As Defaults

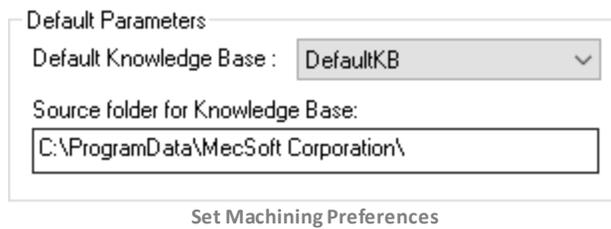
### Step 3: Specify a File Name

This displays a [Save As](#) dialog when a default knowledge base is not specified under [Set Machining Preferences](#).

Specify a file name Click [Save](#).

This creates a default knowledge base for the profiling operation and is saved to the [DefaultKB.vkb](#) file.

The saved knowledge base is automatically set as the default knowledge base to load under [Machining Preferences](#) and the parameters defined in the knowledge base are used when creating a new Profile machining operation.



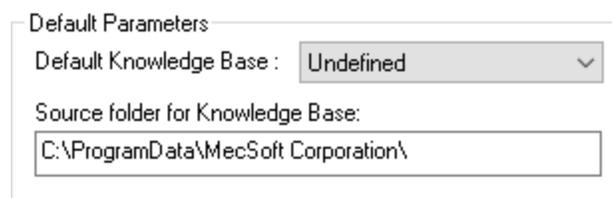
#### Step 4: Things to Remember

-  [Save As Defaults](#) can be set for all machining operation types.
-  Once a default [Knowledge base](#) is specified under [Machining Preferences](#), selecting [Save as Defaults](#) appends additional parameters to the same [Default knowledge](#) base file.
-  If a default for a specific operation type does not exist, the system defaults are used.
-  Changing the parameters saving as defaults overwrites the default parameters with the new one.
-  Multiple [Default Knowledge bases](#) can be created and saved. This could come in handy when machining different types of materials, which requires different cutting parameters. You could create one for machining [Steel](#), [Aluminum](#), [Wood](#), etc...

#### Step 5: To Create a NEW Default Knowledge Base

To create a new default knowledge base:

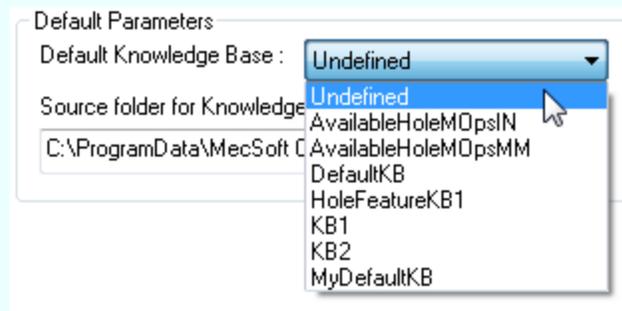
1. Under [Machining Preferences](#), change the [Default Knowledge Base](#) to [Undefined](#).



2. Select a machining operation under the [Machining Job](#), right mouse button click and select [Save As Defaults](#).
3. Specify a new file name and click [Save](#). The saved knowledge base is now set as the default knowledge base to load under [Machining Preferences](#) and the parameters defined in the knowledge base are used when creating a new machining operation.

 Only one [Default Knowledge base](#) can be loaded at one time. You can change the default knowledge base to load before creating a

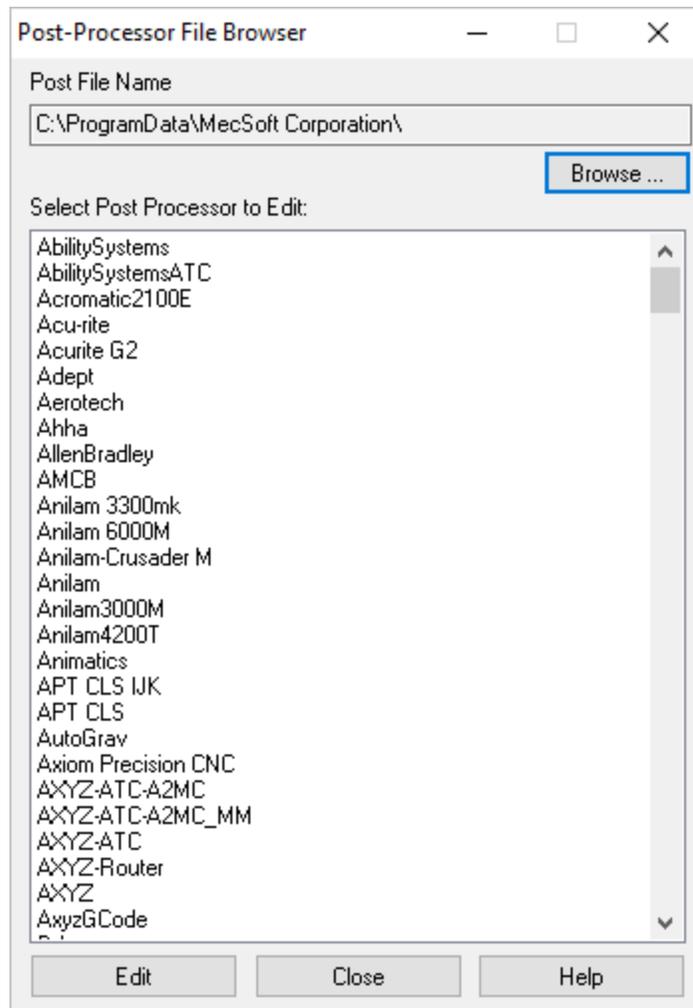
new machining operation.



! Refer to [Machining Preferences](#) for more information on selecting a default knowledge base.

### 6.12.5 Post Process Generator ...

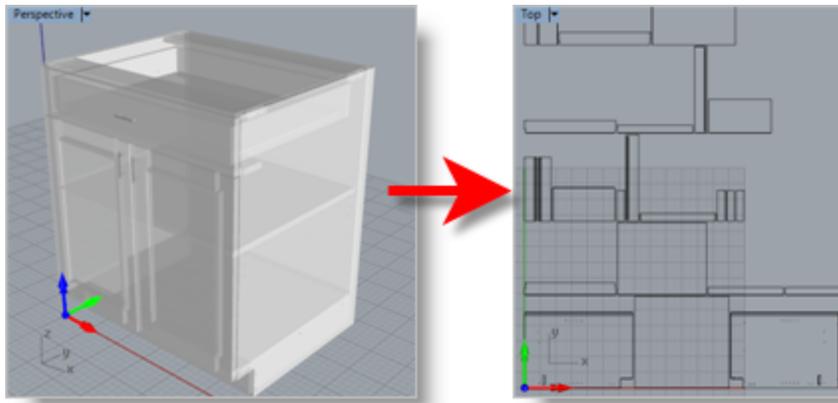
This utility can be used to edit and set up new post-processors to be used in [RhinoCAM](#). The default location of the [Post File Names](#) is selected. Pick [Browse ...](#) to select a different location. Select a post processor from the list and click [Edit](#) to display the [Post Processor Generator](#) dialog box.



Dialog Box: Post Process Generator

### 6.12.6 Explode Cabinet Design ...

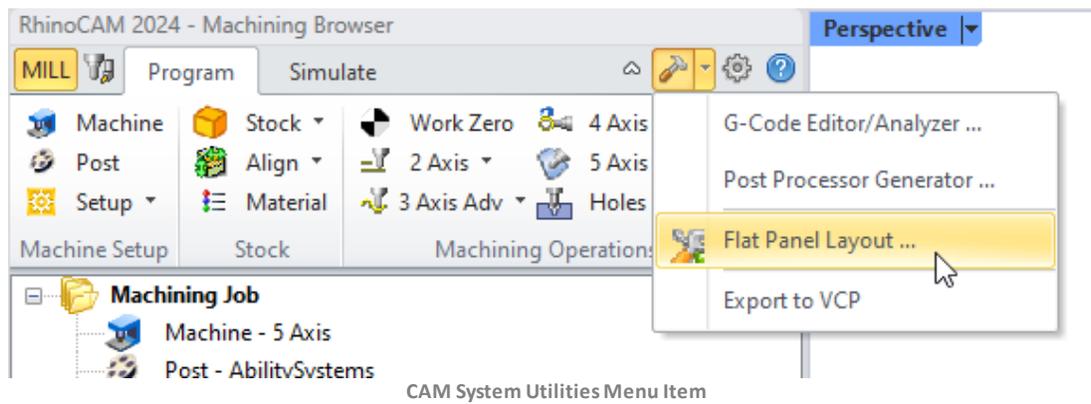
This utility is ONLY available when the [MILL](#) or [Profile-NEST](#) module is loaded. You can use this utility to explode and layout a [Cabinet Design](#) in preparation for the [NEST](#) or [MILL](#) modules. In the example below, a [Cabinet Design](#) file *Base.skp* (created in [SketchUp](#)) was opened in [Rhino](#). This utility is then used to explode and layout each planer component in the 3D part. Once the component geometry is exploded, you can arrange them for machining.



Explode Cabinet Design

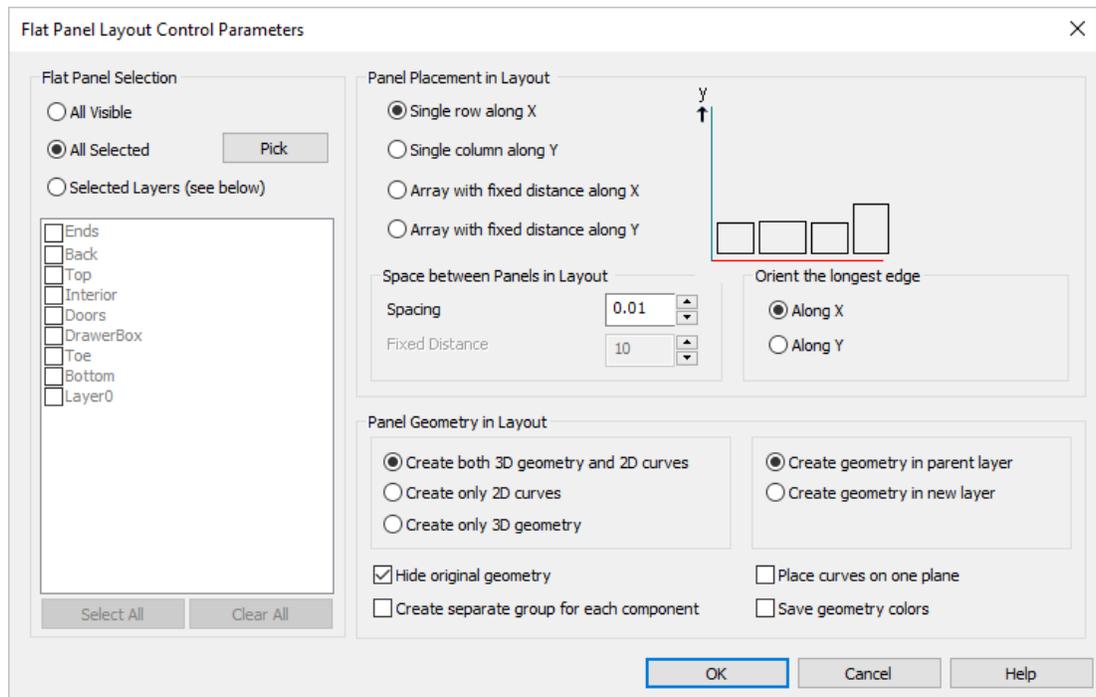
! This utility will be affected by the CAD system's [Absolute Tolerance](#). If you find that one or more geometry groups are not being exploded, try increasing the CAD system's tolerance settings and try again.

#### Explode Cabinet Design Menu Item



CAM System Utilities Menu Item

#### Dialog Box: Component Decomposition Control Parameters



Dialog Box: Component Decomposition Control Parameters



## Geometry Selection

You can use this section of the dialog to limit the selection of geometry to explode. You can select from the following:

### Explode all visible

This option will select all visible geometry in the file for use with this utility.

### Explode only following layers

This option allows you to select only geometry located on certain layers that reside in the file. When this option is selected, all layers present in the file are listed. You can check the box next to the layer(s) whose geometry you wish to select. The [Select All](#) and [Clear All](#) button can be used to assist in selecting layers.

### Explode selected

This option will allow you to select the geometry you wish to explode. With this option selected, select the [Pick](#) button and then select the geometry to explode.



## Component Placement

These options allow you to control the array placement of components on the XY plane after exploding. Select from the following:

### Single row along X

Select this option to arrange all components in a single row in the X direction on the XY Plane. Enter the [Spacing](#) between the components (refer to this value below).

### Single column along Y

Select this option to arrange all components in a single row in the Y direction on the XY plane. Enter the [Spacing](#) between the components (refer to this value below).

#### **Array with fixed distance along X**

Select this option to arrange the components along the X direction but at a fixed distance. This means that if the next component exceeds the [Fixed Distance](#) a new row is created. Enter the [Spacing](#) between components and the [Fixed Distance](#) (refer to these values below).

#### **Array with fixed distance along Y**

Select this option to arrange the components along the Y direction but at a fixed distance. This means that if the next component exceeds the [Fixed Distance](#) a new row is created. Enter the [Spacing](#) between components and the [Fixed Distance](#) (refer to these values below).



#### **Space between components**

These values are available depending on the [Component Placement](#) selection above:

##### **Spacing**

This is the minimum distance between all components in the layout.

##### **Fixed Distance**

This is the maximum distance allowed for the component array. If a component causes this distance to be exceeded it is moved to another row of components.



#### **Orient the longest edge**

##### **Along X / Along Y**

This controls how the nested sheets are oriented. Select which side (X or Y) will be the longest side. For example if you sheet is 96" x 48" then select [Along X](#) to align the 96" side along the [X Axis](#).



#### **Output Geometry**

These options determine the type of geometry that is created and on what layer they are placed. Select from the following:

##### **Create both 3D geometry and 2D curves**

If this option is selected, both 2D curves and 3D geometry is created.

##### **Create only 2D curves**

If this option is selected, only 2D curves are created.

##### **Create only 3D geometry**

If this option is selected, only 3D geometry is created.

#### Create geometry in parent layer

If this option is selected all 2D curves and/or 3D geometry is placed on the parent layer of each component they were extracted from.

#### Create geometry in a new layer

If this option is selected all 2D curves and/or 3D geometry is placed on a new layer with a system generated layer name.

Hide original geometry

Check this box to hide the original component geometry.

#### Create separate group for each component

Check this box to separate each decomposed component into its own geometry group.

#### Place curves on one plane

Check this box to project all curves onto the XY plane located at the world origin.

#### Create separate group for each component

Check this box to group each component separately.

#### Save geometry colors

Check this box to save the original geometry colors for each component.



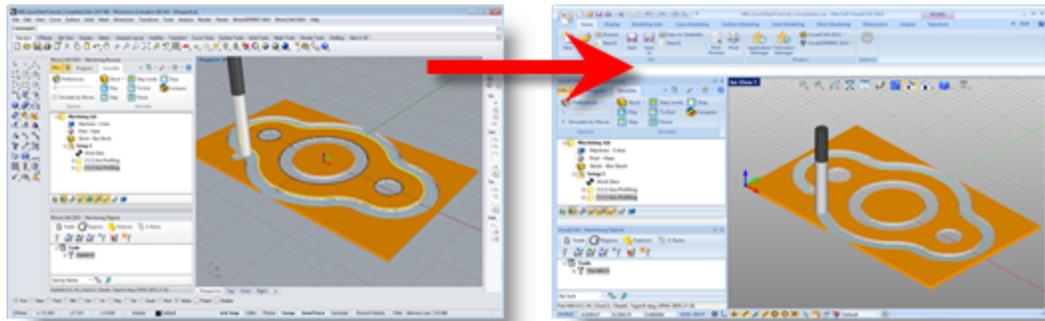
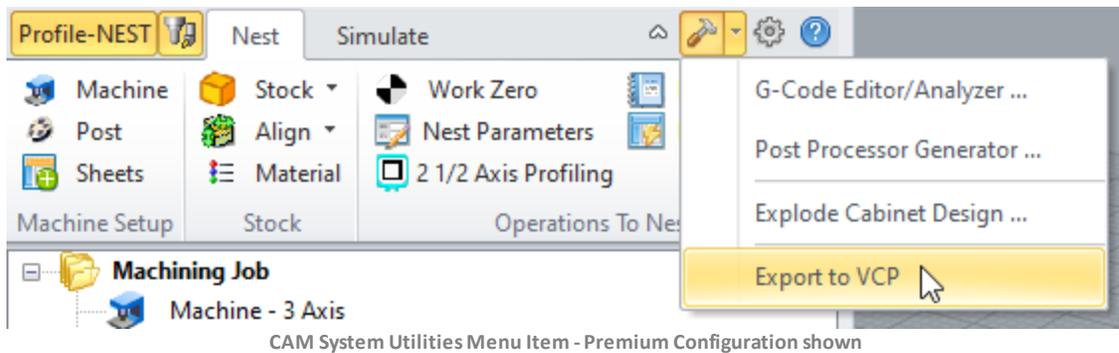
#### More Information

The Explode Cabinet Design utility creates curves from 3D geometry to represent features of interest in machining. The following features are detected and curves associated with these features are created with predefined colors:

Feature	RGB Value	Color
Through Holes	RGB (255,0,255)	
Blind Holes	RGB (192,0,192)	
Through Pockets	RGB (128,0,128)	
Blind Pockets	RGB (255,64,255)	
Dados	RGB (255,128,255)	
Outer Periphery	RGB (64,0,64)	

### 6.12.7 Export to VCP

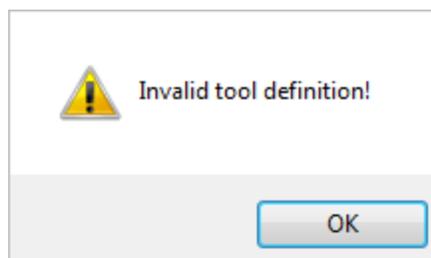
You can use this utility to export the current RhinoCAM part file (\*.3dm) to a VisualCAD/CAM part file (\*.vcp) retaining all part geometry and existing toolpath operation definitions.



## 6.13 Error Messages

The following are some error messages that you might encounter along with some tips when generating toolpaths using [RhinoCAM](#).

### Invalid tool definition.



When creating/editing tools for all tools types make sure:

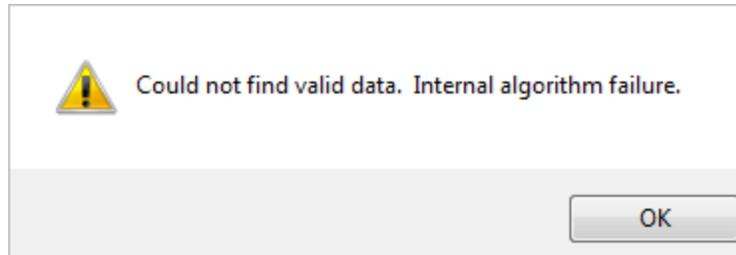
- [Flute Length](#) value is set smaller than [Shoulder Length](#) and [Flute Length](#)
- [Shoulder Length](#) value is set smaller than [Tool Length](#)

For [Dove Tail](#) tools check values for [Tool Diameter](#), [Flute Length](#) and [Taper Angle](#):

- Make sure these values are geometrically correct. **Hint:** Use the preview window to see if a preview of the [Tool](#) for the specified values can be seen.

- See [Create/Edit Tools](#).

 **Could not find valid data. Internal algorithm failure.**

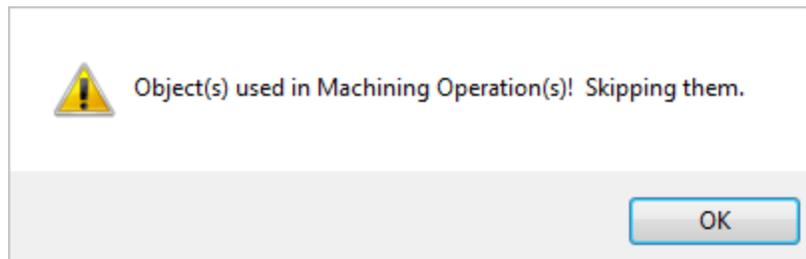


For [2 axis Profiling](#), if the toolpath you are trying to generate is on the inside of a closed curve/sketch check:

- If [Tool Diameter](#) is larger than the width of the selected drive geometry

For [2 Axis Re-machining](#) when the reference [Tool Diameter](#) under the cut parameters tab is set to be the same or less than the [Tool Diameter](#) of the tool being used for the current operation.

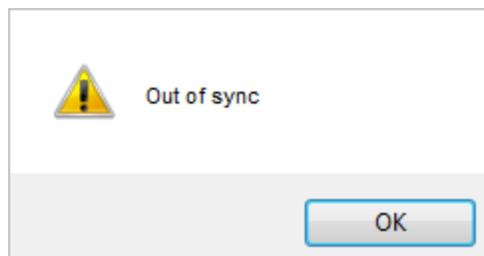
 **Object(s) used in Machining Operation(s)! Skipping them.**



This error can occur when attempting to delete a tool that is currently associated with machining operation:

- In the [Machining Objects Browser](#), expand the [Tool](#) icon by selecting the + sign (  ) to see there are any operations associated with that tool.

 **Out of Sync**



---

This error message tells us that [Rhino's](#) database and [RhinoCAM's](#) are not in sync. This can occur sometimes when you have other 3rd party plug-ins running in Rhino and the information is not shared between [RhinoCAM](#) & the other [Rhino](#) plug-in. Save the file in [Rhino](#), close and reopen [RhinoCAM](#) and regenerate the your toolpaths.

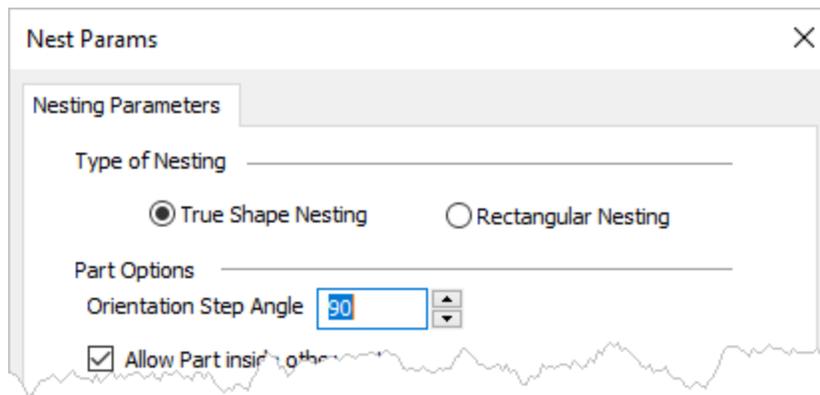
## Create Nested Sheets

Creating nested sheets of your toolpaths is performed automatically when a toolpath or the [Operations to Nest](#) setup are regenerated. Be sure to first define your sheets using the [Add Sheets](#) dialog and then define your [Nesting Parameters](#).

### 7.1 Type of Nesting

The [Nesting Parameters](#) dialog allows you to choose between [True Shape Nesting](#) and [Rectangular Nesting](#). Click on the radio button to choose the nesting type. You can refer to the table below for characteristics of each type.

#### Nesting Parameters Dialog, Select Type of Nesting



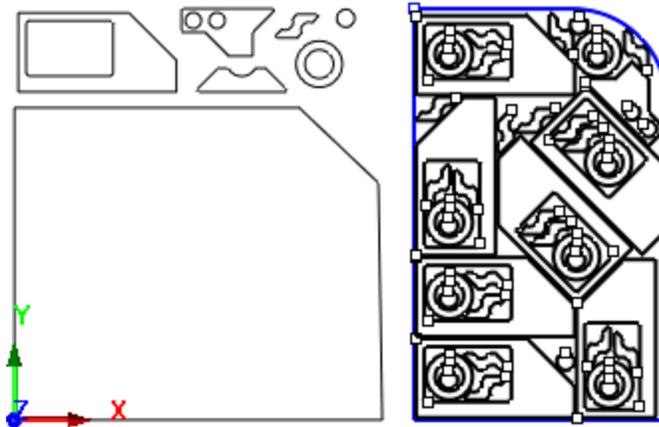
Nesting Parameters Dialog

#### Functionality Comparison Table

Function	True Shape	Rectangular
<b>Sheets</b>		
Allowable stock sheet shape	2D Arbitrary	2D Rectangular
Allows holes in stock sheet	<input type="checkbox"/>	<input type="checkbox"/>
Allows nesting start corner and direction	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Sheet thickness allowance	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Allows grain direction control for sheet and part	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Define sheets by parameters	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<b>Profile Operations</b>		
Uses true shape for profile nesting	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Uses minimum rectangular shape for profile nesting	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Allows grain direction control for sheet and profile	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Allows profile rotation by step angle	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Allows for mirroring of profiles	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Allows nesting of profile within profile	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Nest</b>		
Utilization Reports	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Minimum utilization control	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Accuracy control	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Auto Tagging Options	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nest Layout Controls	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Nest Preview	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

### True Shape Nesting

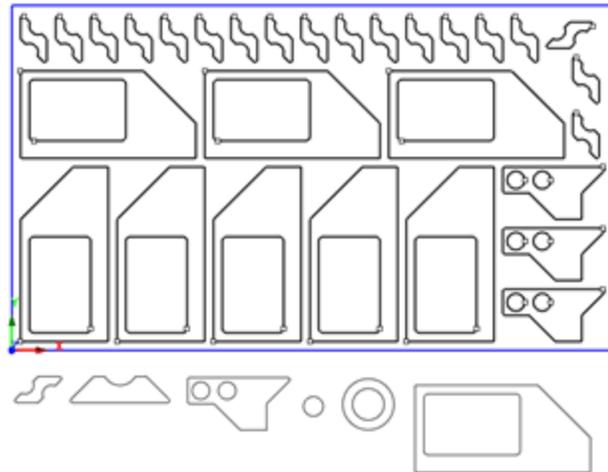
This method is useful when the actual geometric details of the part are taken into consideration while nesting. True shape nesting enables interlocking of parts, recognition of arbitrary shaped sheets.



True Shape Nesting Example

### Rectangular Nesting

This method is useful for nesting of parts on rectangular sheets. This is ideal for those nesting mostly square and rectangular profiles. For all part shapes, an imaginary rectangle is drawn around the shape and then the rectangles are laid side-by-side.

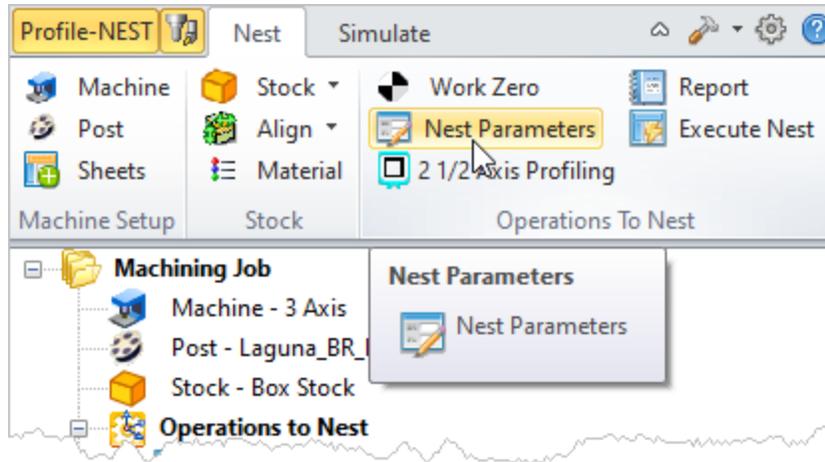


Rectangular Nesting Example

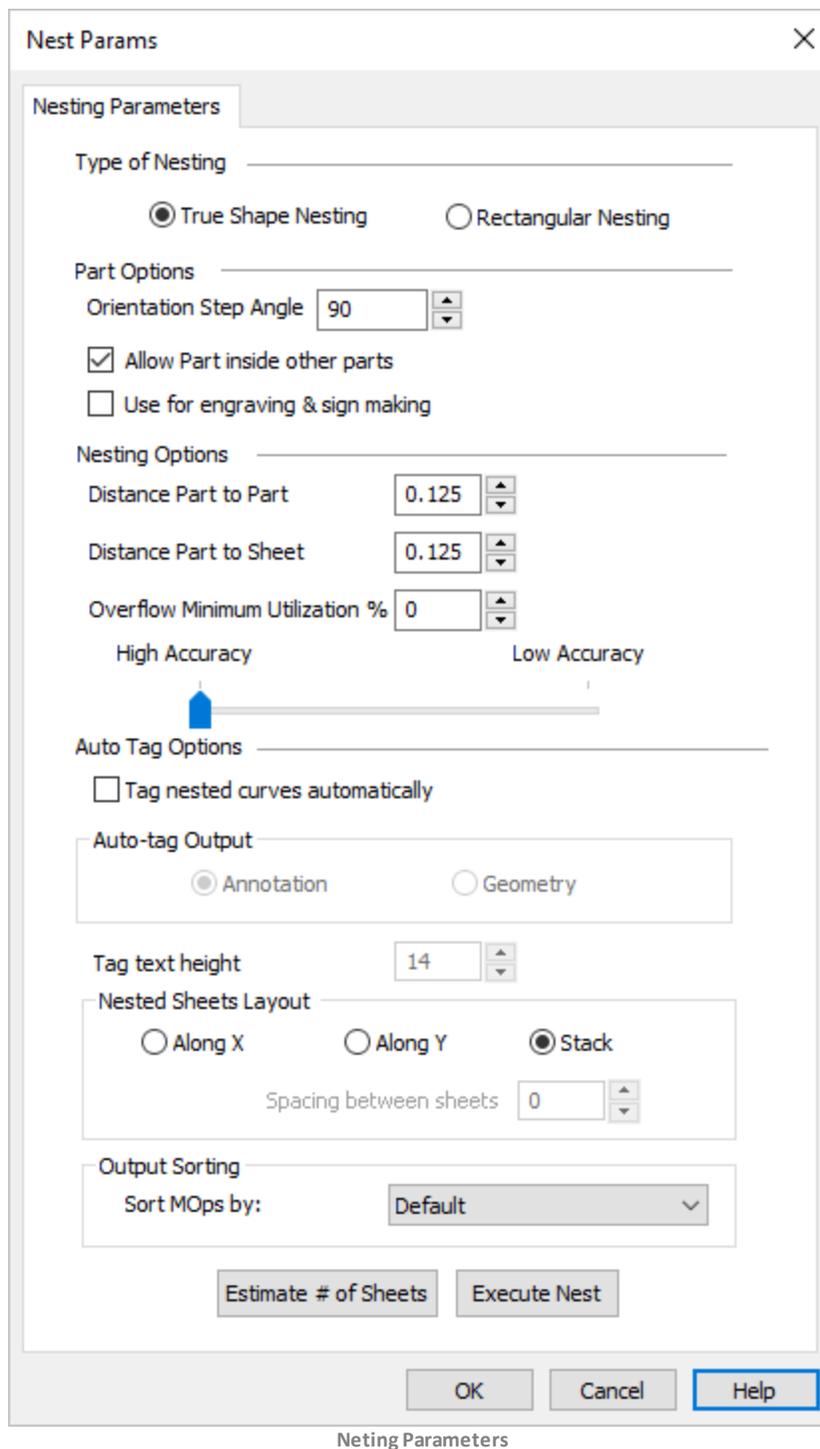
## 7.2 Nesting Parameters

This dialog is used to define the sheets in your nest. It is divided into two parts. The [Sheets List](#) at the top and the [Sheet Definition](#) at the bottom. Defining a sheet and then selecting the [Add Sheet\(s\)](#) button will create the sheet and add it to the list. Once listed, you can further control parameters for the sheet defined by each column in the list. Refer to each option listed below.

 **Locate the Nesting Parameters menu item**



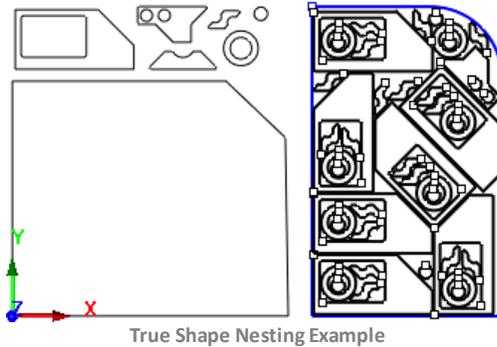
 **Nesting Parameters Dialog**



## Type of Nesting

### TrueShape Nesting

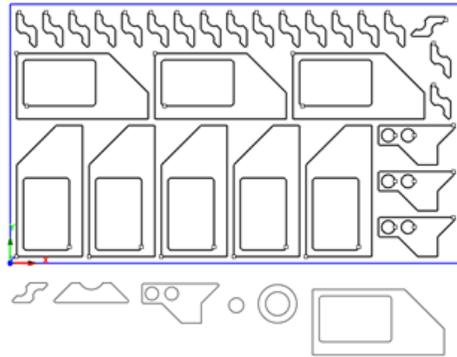
This method is useful when the actual geometric details of the part are taken into consideration while nesting. True shape nesting enables interlocking of parts, recognition of arbitrary shaped sheets.



True Shape Nesting Example

### Rectangular Nesting

This method is useful for nesting of parts on rectangular sheets. This is ideal for those nesting mostly square and rectangular profiles. For all part shapes, an imaginary rectangle is drawn around the shape and then the rectangles are laid side-by-side.



Rectangular Nesting Example



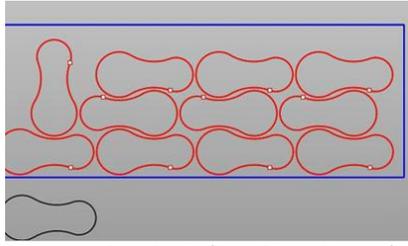
### Part Options

This section controls how toolpaths are grouped and oriented.

#### Orientation Step Angle

This allows rotation of the parts to nest and can be defined by specifying orientation step angle. For example, specifying a [Step Angle](#) of 90 would allow rotation of all parts by a step increment of 90, which could be 90, 180 or 270 to fill the sheet optimally.

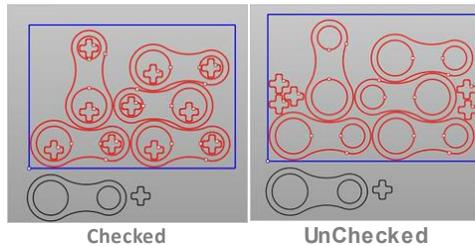
On this dialog you can use the [Orientation Step Angle](#) value in conjunction with the [Estimate # of Sheets](#) button to maximize the efficiency factor (i.e., adjust the step angle to achieve a minimum number of sheets).



Orientation Step Angle (True Shape Nesting)

### Allow Parts inside other Parts

Check this box to allow parts to be nested inside the cutouts of other parts to maximize sheet utilization.



Checked

UnChecked

### Use for Engraving & Sign Making

Check this box to use nesting for engraving & sign making. This allows the ability to nest curves inside a hole as shown below. In this example, the outer rectangle would be the part and the exterior & interior of the letters would be treated as holes.



Use for engraving &amp; sign making

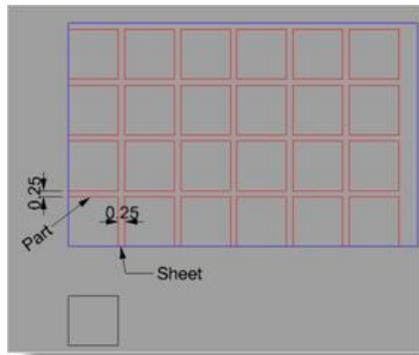


### Nesting Options

This section controls distances and accuracy of the nested toolpaths.

#### Distance Part to Part

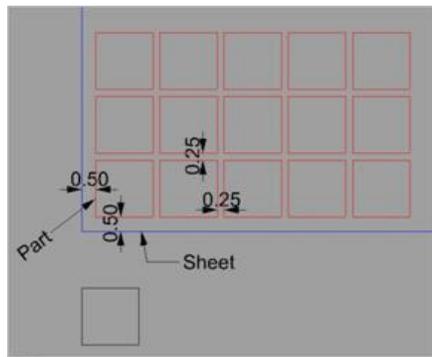
This parameter defines the minimum distance between each part within a sheet. In the example below, **Distance Part to Part** is set = 0.25. and **Distance Part to Sheet**=0.



Distance Part to Part

### Distance Part to Sheet

This parameter defines the minimum distance between parts to the edge of the sheet. In the example below, **Distance Part to Part** is set = 0.25. and **Distance Part to Sheet** = 0.50.



Distance Part to Sheet

### Overflow Minimum Utilization %

This defines the minimum percent of material utilization that is permitted on any sheet in the nest. If set, then the **% of utilization** of material for each sheet must exceed this value. If the **% of utilization** for any sheet is below this value, that sheet will be suppressed from the nest.



This can be used to eliminate remnants on the last sheet used which typically has the lowest **% of utilization**.

### Accuracy

Move this slider to adjust the **Simulation Accuracy** (**Standard**, **Medium** and **Fine**). This refers to the display accuracy. For example, in **Polygonal Mode**, more polygons will be added, thus increasing display accuracy.



### Auto Tag Options

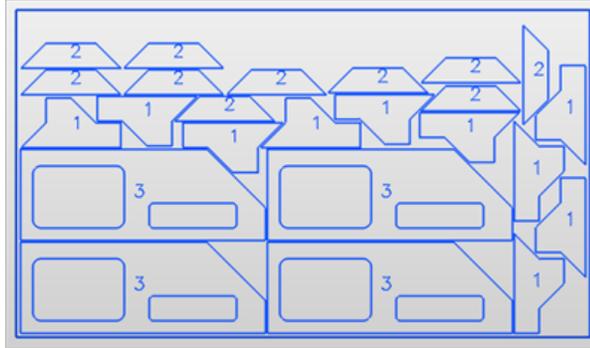
Use this section to auto tag your nested toolpaths.

#### Tag Nested Curves Automatically

**Tagging** allows you to identify nested parts. Check this box to turn **Tagging On**.

### Auto Tag Output

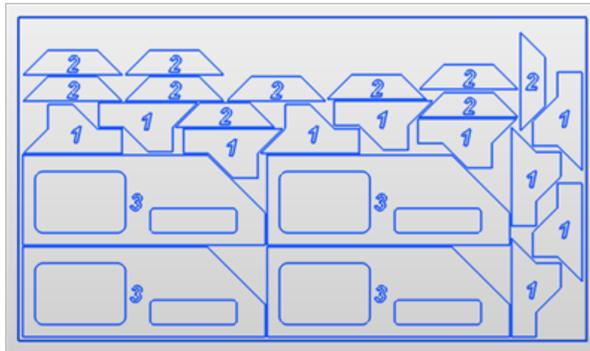
**Annotation** - The tag number is shown on the screen as graphics display text only. The height of the annotation text is dynamically controlled by the **Tag Text Height** value.



Annotation Tagging

### Geometry

The tag number is created as geometry curves, which are selectable as geometry. Enter the **Tag Text Height** for tagging.



Geometry Tagging

### Tag Text Height

This value is the **Text Height** for each generated **Tag**. When **Annotation** is selected, the **Tag** is only displayed graphically on the screen using the **Text Height** value. When **Geometry** is selected, the **Tag** geometry will equal the actual **Text Height** value.



### Nested Sheets Layout

Use this section to define the layout of the nested sheets.

#### Along X

Pick **Along X** to layout the nested sheets along the X direction (left to right) beginning at the XY origin.

#### Along Y

Pick **Along Y** to layout the nested sheets along the Y direction (bottom to top) beginning at the XY origin.

### Spacing between Sheets

If either [Along X](#) or [Along Y](#) is selected, enter a distance value for the [Spacing Between Sheets](#).



### Output Sorting

Use this section to determine how the machining operations ([Mops](#)) are listed in the [Machining Job](#) tree. The sorting is performed within each nested sheet folder in your [Machining Job](#).

#### Sort Mops by

Select a sorting method:

##### Default

Mops are sorted in the order they appear in your Operations to Nest setup.

##### Tool Size ASC

Mops are sorted by ascending tool size (smaller tool diameters first).

##### Tool Size

Mops are sorted by descending tool size (larger tool diameters first).

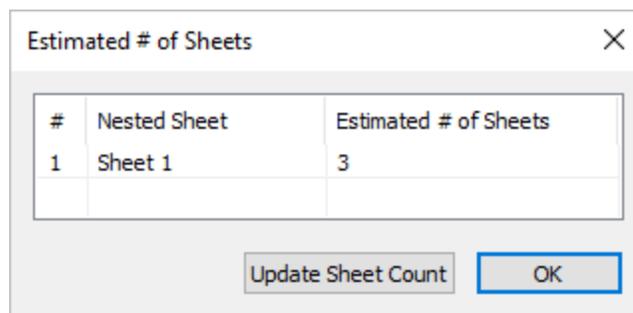


### Estimate # of Sheets

Select this button and the system will estimate how many sheets are needed and allow you the opportunity to update your sheet count.



On this dialog you can use the [Orientation Step Angle](#) value in conjunction with the [Estimate # of Sheets](#) button to maximize the efficiency factor (i.e., adjust the step angle to achieve a minimum number of sheets).



Estimate # of Sheets



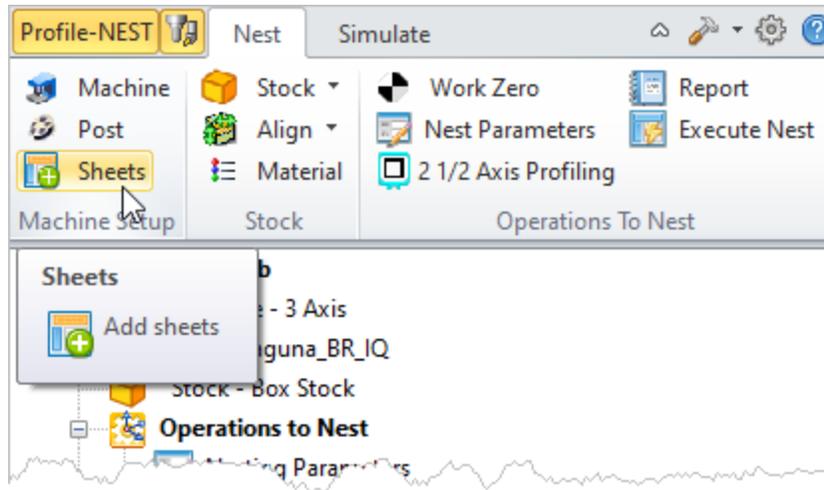
### Execute Nest

Pick [Execute Nest](#) to calculate the final Nest based on all parameters and selections you have made. You are then moved to the [Preview Nest](#) tab automatically.

## 7.3 Add Sheets to Nest

This dialog is used to define the sheets in your nest. It is divided into two parts. The [Sheets List](#) at the top and the Sheet [Definition](#) at the bottom. Defining a sheet and then selecting the [Add Sheet\(s\)](#) button will create the sheet and add it to the list. Once listed, you can further control parameters for the sheet defined by each column in the list. Refer to each option listed below.

### Locate the Sheets menu item



### Select Sheets Dialog

Use this dialog to define the sheets you want to use in this nesting job. You can define a sheet using the [Select Curve\(s\)](#) button or by specifying the sheet dimensions and selecting the [Add Sheet\(s\)](#) button. You can also select a defined sheet from the list and edit its parameters such as Name, Length, Width, etc. using the [Update Sheet](#) button.

Select sheets

Sheet Selection

Total # selected: 1

#	Name	Count	Thickness	Starting Corner	Nesting Direction	Grain Direction
1	Sheet 1	3	0.250	Lower left	Along X	None

Select Curve(s) Remove All Remove Active

Sheet Definition

Name RectSheet Length 0.001 Height 0.001 Thickness 0 Count 1

X 0 Y 0

Update Sheet Add Sheet(s)

OK Cancel Help

Add Sheet to Nest



## Sheets List

The sheet definition record includes the sheet **#**, **Name**, **Count**, **Thickness**, **Starting Corner**, **Nesting Direction** and **Grain Direction**. You can edit these parameters after the sheet is defined by selecting the **Update Sheet** button.

### #

Sheets are numerically identified at the time of creation.

### Name

This is the name of the sheet provided when it was created.

### Count

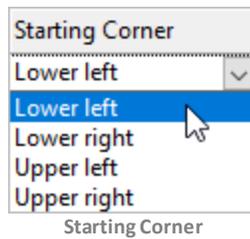
This is the total quantity for this sheet.

### Thickness

This is the designated thickness for the sheet.

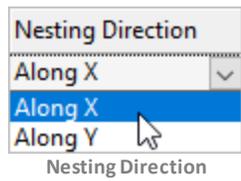
### Starting Corner

This is the starting corner for the toolpath operations nested on this sheet.



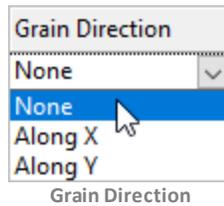
### Nesting Direction

This is the direction that toolpath operations will be nested on this sheet. For example, beginning at the [Lower Left](#), operations would be nested from left to right ([Along X](#)).



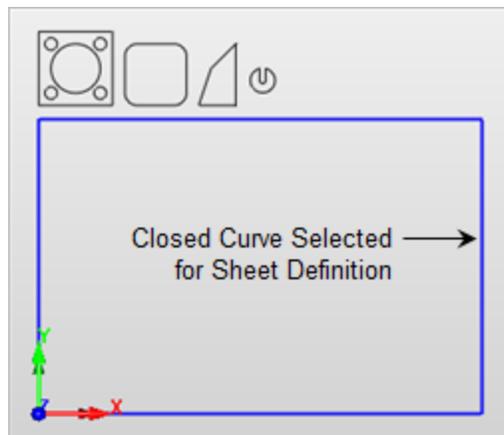
### Grain Direction

This is the grain direction for the sheet. It can be used to control how toolpath operations are oriented on the sheet. For example, if you select [Along X](#) here and then select [Along Y](#) for [Grain Direction](#) on the Nest [Parameters](#) tab of the toolpath operation dialog, then that toolpath would be rotated 90 degrees on this sheet.



### Select Curve(s)

Pick this button to select geometry to be used as [Sheets](#). You may window-select all closed curves and press [<Enter>](#) or [<Right-Click>](#) to add them to the selection list. Selecting open profiles is not supported. Sheets are Only periphery shapes and cannot contain holes or cutouts. test



[Remove All](#)

Pick this button to remove [ALL](#) items from the list.

#### Remove Active

Select the [Remove Active](#) button to remove the currently selected item from the list.



### Sheet Definition

Use these controls to define the parameters for a new sheet. Once the fields are defined, pick the [Add Sheet\(s\)](#) button to add the sheet to the list above.

#### Name

This will be the [Name](#) of the defined sheet.

#### Length

This will be the [Length](#) of the defined sheet measured in the default drawing units.

#### Height

This will be the [Height](#) of the defined sheet measured in the default drawing units.

#### Thickness

This will be the [Thickness](#) of the defined sheet measured in the default drawing units.

#### Count

This will be the [Count](#) total for the defined sheet.

#### X / Y / Pick



You can use this dialog to create a new nesting sheet by specifying the new sheet's dimensions. Specify the dimensions for X and Y or use the [Pick](#) button to select two diagonal points to define the sheet rectangle, starting with the lower right point and then [right-click](#) or press [<Enter>](#).

#### Update Sheet

Select this button to update the selected sheet with changes you have made to its parameters.

**Note:** [DO NOT](#) use the [Sheet Definition](#) parameters to update existing sheets. To edit an existing sheet modify it's parameters using the columns in the sheet list and then select [Update Sheet](#) to accept the changes.

#### Add Sheet(s)

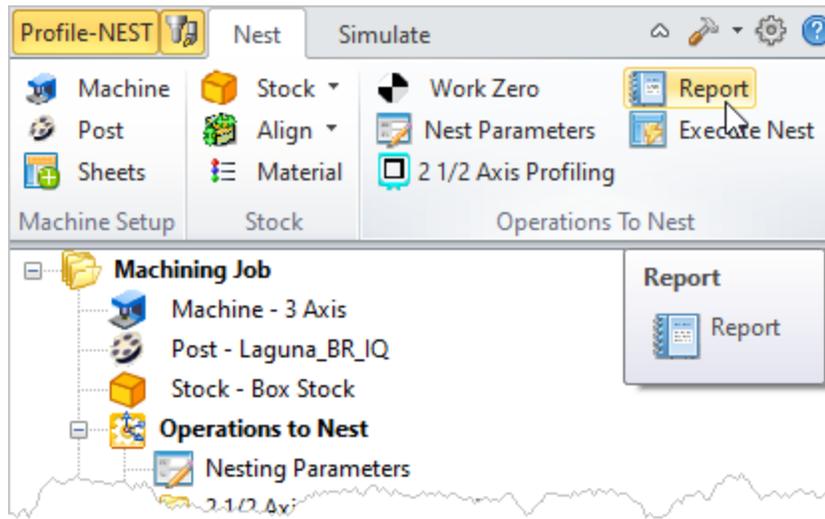
After entering the Sheet Definition parameters, select the [Add Sheet\(s\)](#) is button to add the sheet to the sheets list.

## 7.4 Nesting Report



**Report** This dialog display a report of the current nested sheets. First regenerate your [Operations to Nest](#) setup. This will update your nested sheets. Then display this report to get information on the [Nested Sheets](#) results.

### Locate the Nesting Report menu item



Locate the Nesting Report menu item

### Nesting Report Dialog

#	Nested Sheet	% Utilization	2 1/2 Axis Profiling (Part 1)	2 1/2 Axis Profiling (Part 2)
1	Sheet 1-1	64.63	15	1
2	Sheet 1-2	67.87	10	10
3	Sheet 1-3	68.85	0	14

Print OK

Nesting Report

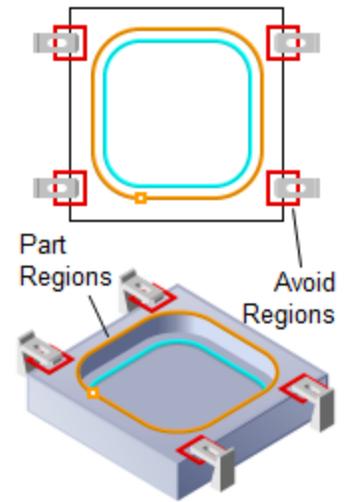
## 2 Axis Profiling



**2 Axis Profiling** is a toolpath method that employs regions and can be used either as a pre-finishing operation or as a finishing operation. These regions are treated as the tops of vertical walls spanning from the Z values of the regions down to your specified cut depth.

This system does not consider any part surface geometry during computation. The tool types commonly used in this method are **Flat End Mills**. The operation cuts in parallel XY planes until the desired depth is reached.

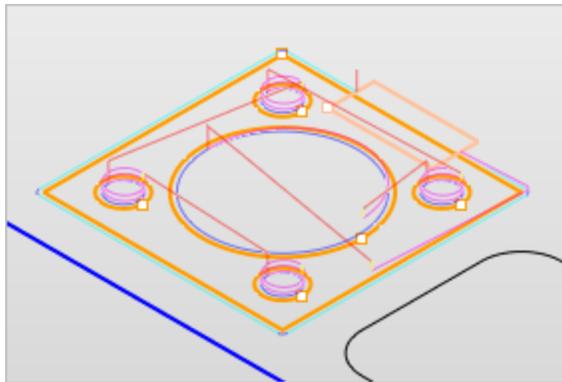
As the cutter follows these horizontal planes, it can maintain a climb, conventional or mixed cut direction.



Profiling, 2½ Axis



### 2 Axis Profiling Example

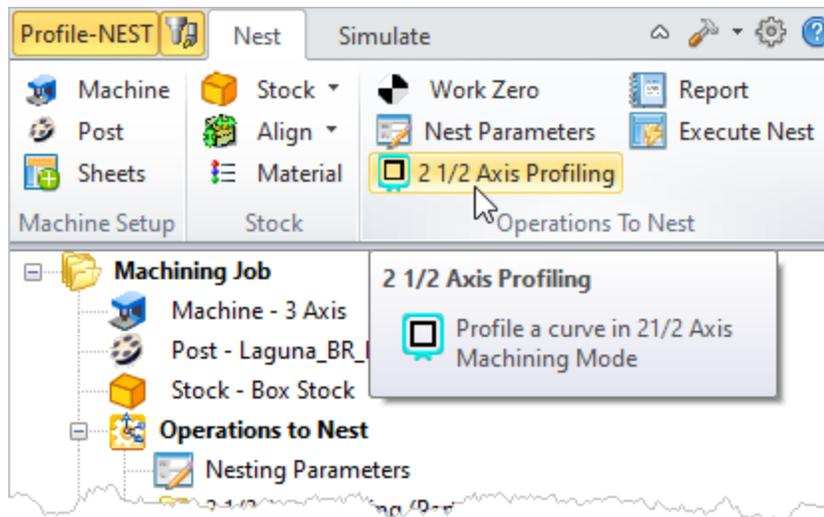


2½ Axis Profiling



### 2 Axis Profiling Menu Item

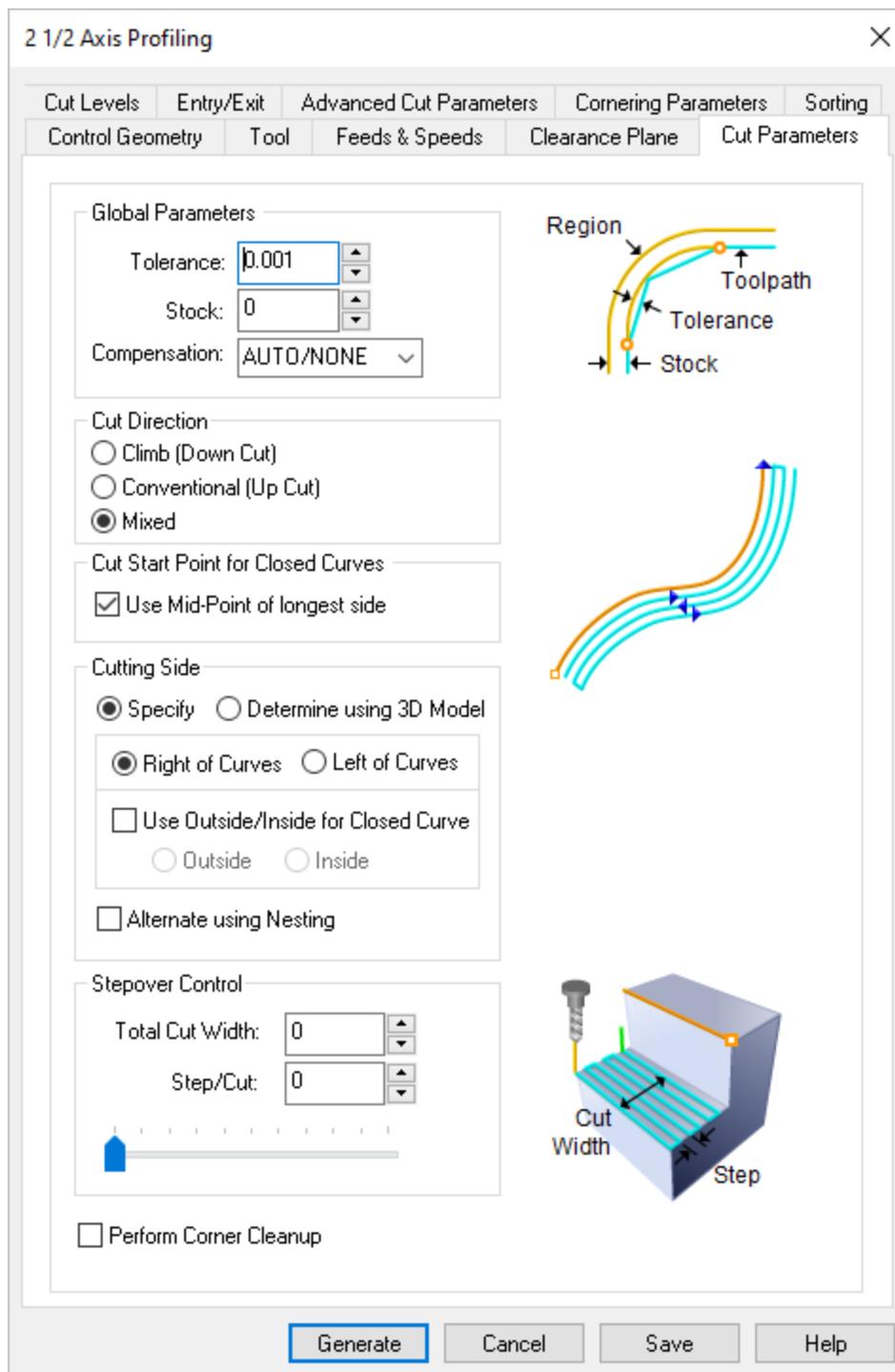
The **Profiling** toolpath method is invoked by selecting the **Program** tab and clicking on the **2½ Axis Profiling** operation menu selection.



2 1/2 Axis Profiling Menu Item

### 2 Axis Profiling Dialog

Here is a typical 2 Axis Profiling operation dialog with the [Cut Parameters](#) tab selected.



Dialog Box: 2½ Axis Profiling

## 8.1 Control Geometry

**Control Geometry** refers to the part geometry that controls the current operation. **2 Axis** operations can use 2D and even 3D curves and surface edges as **Control Geometry**. For **2 Axis**

operations, [Control Geometry](#) is divided into two possible categories: [Part Regions](#) and [Avoid Regions](#). The [Control Geometry](#) tab has sub-tabs for selecting each of these categories of geometry from your part.

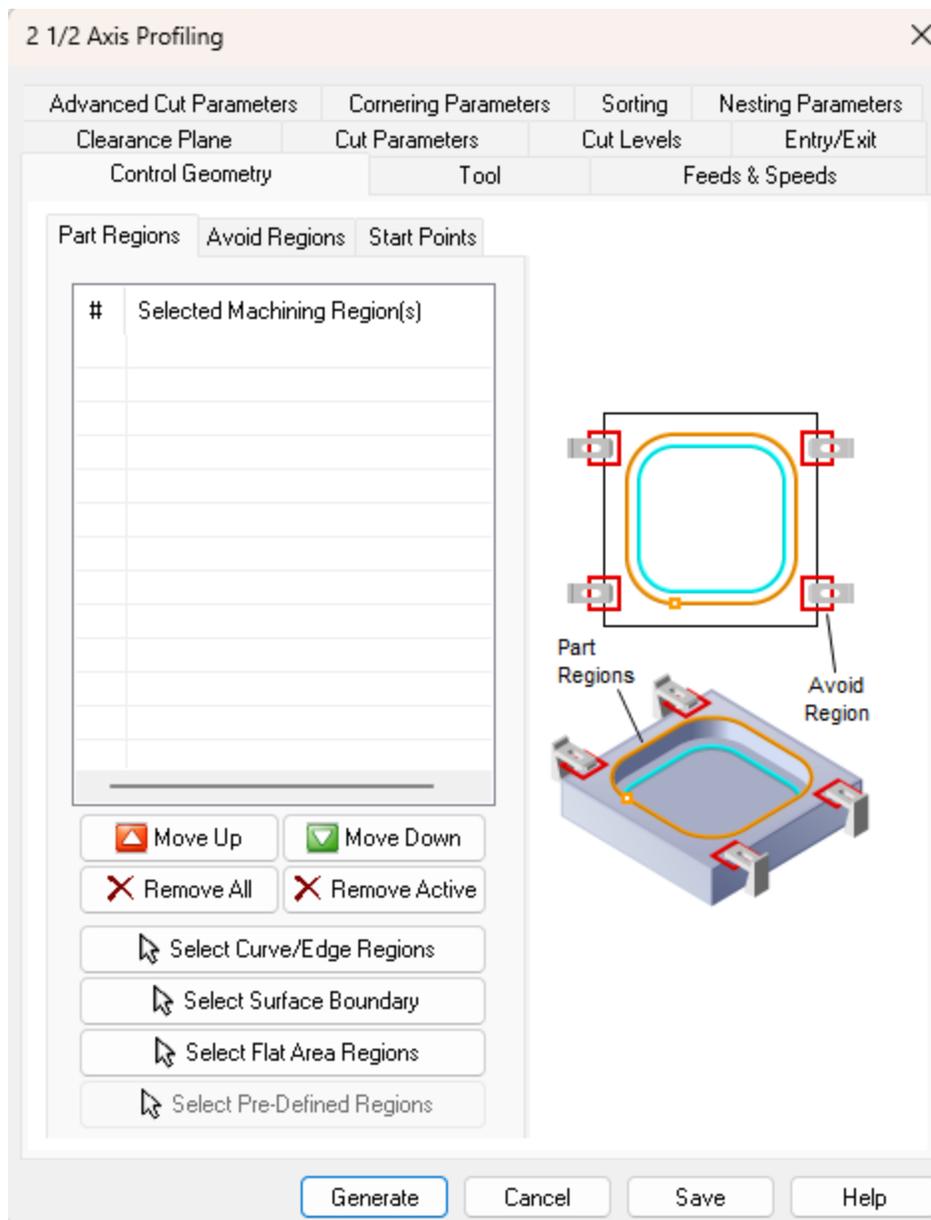
 [Regions](#) must be selected before they can be used in an operation. It should be noted that regions can be created and be present in a part file but if they are not selected in a machining operation then they will be ignored during toolpath computation. So creating a region does not make it active; you must use one of the select button from the [Control Geometry](#) tab of the [Profile](#) operation before you select [Generate](#).

### Region Types by Configuration

Region Type	Region Types by Configuration			
	Standard (STD)	Expert (EXP)	Professional (PRO)	Premium (PRE)
Curve	✓	✓	✓	✓
Surface Edge	✓	✓	✓	✓
Flat Area	✓	✓	✓	✓
Avoid Regions	✓	✓	✓	✓
Start Points	✓	✓	✓	✓

**Note:** Some region types are not supported by all operation types.

### Dialog Box: Control Geometry tab



Dialog Box: Control Geometry tab, Profiling, 2 Axis

### Part Regions tab

The **Part Regions** tab displays in all **2½ Axis** and some **3 Axis** operations. It is used to drive the tool during the operation. Use one of the **Select...** buttons in this dialog to add **Part Regions** to the **Selected Machining Region(s)** list.

See **Select Part/Containment Regions** for more information.

### Avoid Regions tab

The **Avoid Regions** tab lists the geometry (i.e., **Regions**) to be avoided by the cutter during the current Mill operation. The outer diameter of the tool will not enter this region.

**NOTE: The Avoid Regions controls are not enabled UNTIL you select Control Geometry from the Part Regions tab in this same dialog.**

See [Avoid Regions](#) for more information. This tab is available on the following operation dialogs: [Facing, 2½ Axis](#), [Pocketing, 2½ Axis](#), [Profiling, 2½ Axis](#)

#### **Start Points tab**

The [Start Points](#) tab allows you to define an alternate start point for the profiling operation. If a point entity is added to this tab it will be used as the start point of the profiling operation instead of the normal curve or regions start points.

#### **Move Up**

This button moves the selected item up (i.e., higher) in the list. Items are machined in the order listed.

#### **Move Down**

This button moves the selected item down (i.e., lower) in the list. Items are machined in the order listed.

#### **Remove All**

If your controller does not support spiral g-code motions, check this box to output spiral motions as linear segments.

#### **Remove Active**

Pick this button to [Remove](#) the selected [Active](#) region from the list. You can select multiple [Regions](#) from the list using the [Ctrl](#) key and then pick this button to remove them all. The geometry itself is not deleted from the part model.

#### **Select Curve/Edge Regions**

Pick this button and the dialog will minimize, prompting you to make a selection from your part. You can select curves or face edges. After completing the selection, the dialog will re-appear with your [Region](#) selections listed.

#### **Select Surface Boundary**

Pick this button and the dialog will minimize, prompting you *Select surface for boundary*. You can select one or more part surfaces. After completing the selection, the dialog will re-appear with each surface edge boundary listed in the [Selected Machining Region\(s\)](#) list.

#### **Select Flat Area Regions**

Pick this button and you are prompted to make a selection from your part. You can select flat planar face geometry. After completing the selection, the dialog will re-appear with your region selections listed.

#### **Select pre-Defined**

If you pick this button, the [Select Pre-defined Machining Regions](#) dialog will display, allowing you to select one or more [Regions](#). This operation dialog will then re-appear with your region selections listed. [Pre-Defined Regions](#) can be created using the options on the [Regions](#) tab of the [Machining Objects Browser](#).

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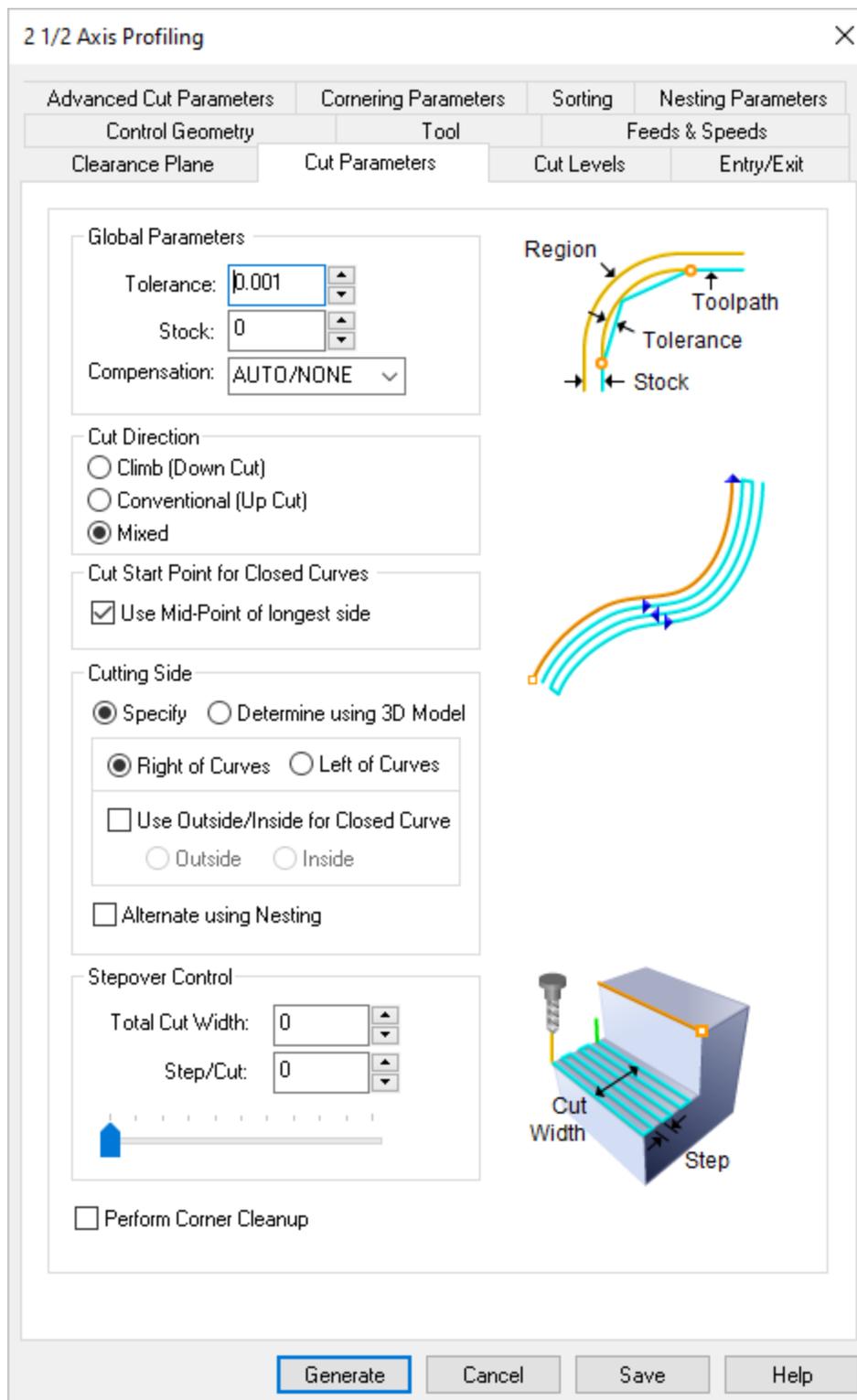
See [Predefined Machining Regions](#) for more information.

## 8.2 Cut Parameters

This [Cut Parameters](#) tab is similar for the [Mill](#) operations listed below. It allows you to define the cut parameters for the current [Profiling](#) operation. You can set [Global Parameters](#), [Cut Direction](#) and the [Stepover Distance](#) via this tab of the operation dialog. The [Global Parameters](#) section allows you to set the tolerance value to be used in machining. A uniform thickness or stock that needs to be left around the part can also be specified here. Refer to each option below.



[Dialog Box: Cut Parameters tab, Profiling Operations](#)



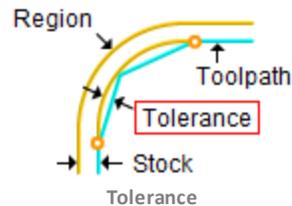
Cut Parameters tab, Profiling Operations

 **Global Parameters**

The [Global Parameters](#) section allows you to set the tolerance value to be used in machining. A uniform thickness or stock that needs to be left around the part can be specified here.

### Tolerance

This is the allowable deviation from the actual part geometry plus the [Stock](#) allowance (if any). In [2 Axis](#) methods, this [Tolerance](#) is applied to [XY](#) motions only.



### How to Increase Tool Path Accuracy

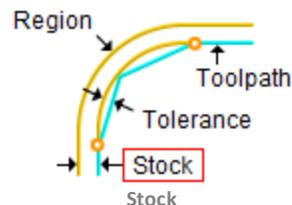
[Tolerances](#) play a vital role in both design engineering and digital manufacturing. In design, the goal is to allow the broadest tolerance range possible while meeting your design specifications. This is because, generally speaking, there is a direct correlation between tighter tolerances and higher manufacturing costs.



[Read the full article...](#)

### Stock

This is the thickness of the layer that will remain on top of the part after the toolpath is complete. Roughing operations generally leave a thin layer of stock. For finishing operations this value is zero.



### Compensation

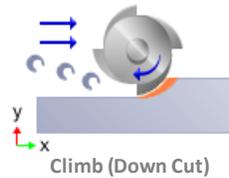
This enables cutter compensation. The compensation direction, left or right, is determined by the [Cut Direction](#) selected ([Climb](#) or [Conventional](#)).



### Cut Direction

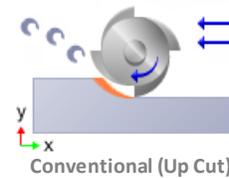
#### Climb (Down Cut)

Select [Climb \(Down Cut\)](#) and the tool will be maintained in a downward motion into the stock.



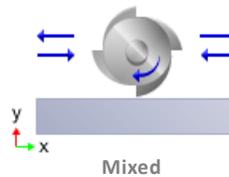
### Conventional (Up Cut)

Select **Conventional (Up Cut)** and the direction of the tool will be maintained in an upward motion out of the stock.



### Mixed

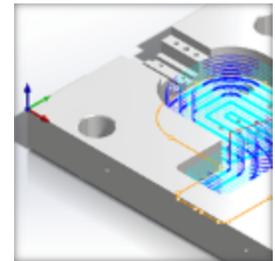
Select **Mixed** and the direction of cutting is alternated between each parallel plane. This is a mixture of both **Climb** and **Conventional** cutting of the stock.



### Understanding Climb vs Conventional Milling

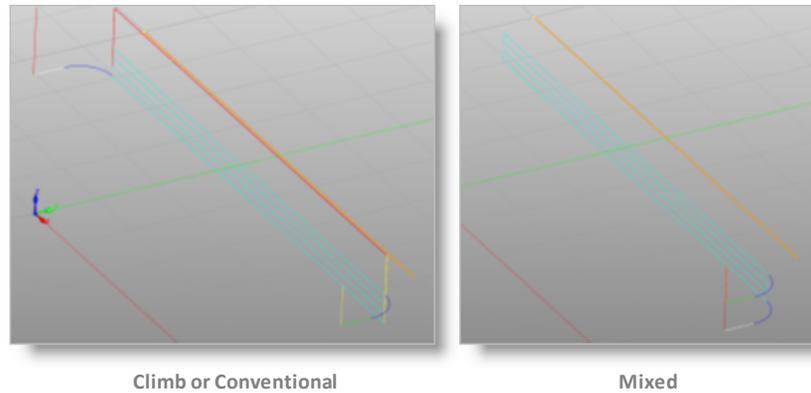
One of the basic concepts to understand in any milling operation is **Cut Direction**. It can be characterized by how the flutes of the cutting tool engage the stock material and form the chip that is removed during cutting. In many of MecSoft CAM's 2½ & 3 Axis toolpath strategies you will see that **Cut Direction** is defined by selecting one of three options, **Climb**, **Conventional** or **Mixed**. Let's take a look at the characteristics of each option.

[Read the full article...](#)



### For Z Level Cuts:

When **Mixed** is selected, zigzag motions are applied between step downs to eliminate tool retracts between z levels. If **Climb** or **Conventional** is selected, retract between z levels are applied. Refer to the images below:

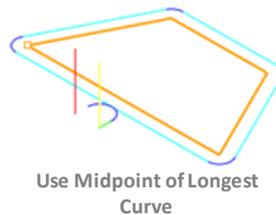


Climb or Conventional

Mixed

### **Cut Start Point for Closed Curves**

Check this box to move the cut start point to the mid-point of the longest side of a closed curve.



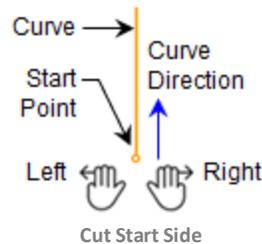
Use Midpoint of Longest Curve

### **Cutting Side** **Specify**

Select this option to activate the **Cutting Side** parameters in this dialog.

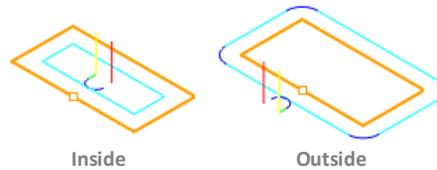
#### **Right of Curve / Left of Curve**

**Right** or **Left** determines the side of the curve to cut. This can be set for both open and closed curves. **Right** or **Left** is determined by the start point and direction.



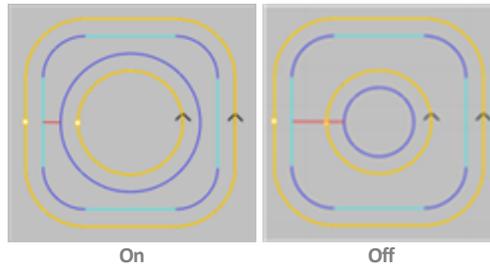
#### **Use Inside/Outside for Closed Curves**

Select this option if you have a closed curve region. Then select **Inside** or **Outside** to have the tool cut on that side.



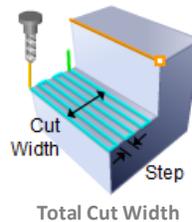
### Alternate using Nesting

If your control geometry has nested curves, check this box to alternate the cut side (i.e., [Outside/Inside](#) or [Inside/Outside](#)). You can use the [Sort Parameters](#) tab to sort clustered profiles.

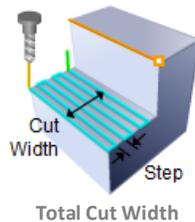


### Stepmover Control

This is how wide your cut should be. The [Step/Cut](#) determines your stepover. For example if Total [Cut Width](#) is set to 1.0 and [Step/Cut](#) is set to 0.25, there will be 4 passes created.



This will determine the stepover for each cutting pass beginning at your total cut width and ending at your control geometry.

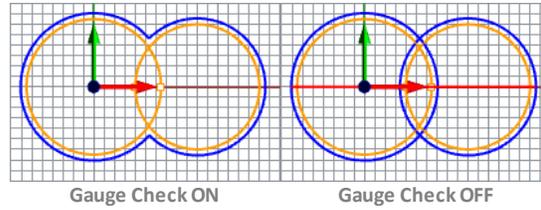


### Corner Cleanup

Check the [Corner Cleanup](#) box to automatically detect corners that the tool could not reach between each pass. The system will then add a toolpath based on the uncut area detected.

### Perform Global Gauge Check

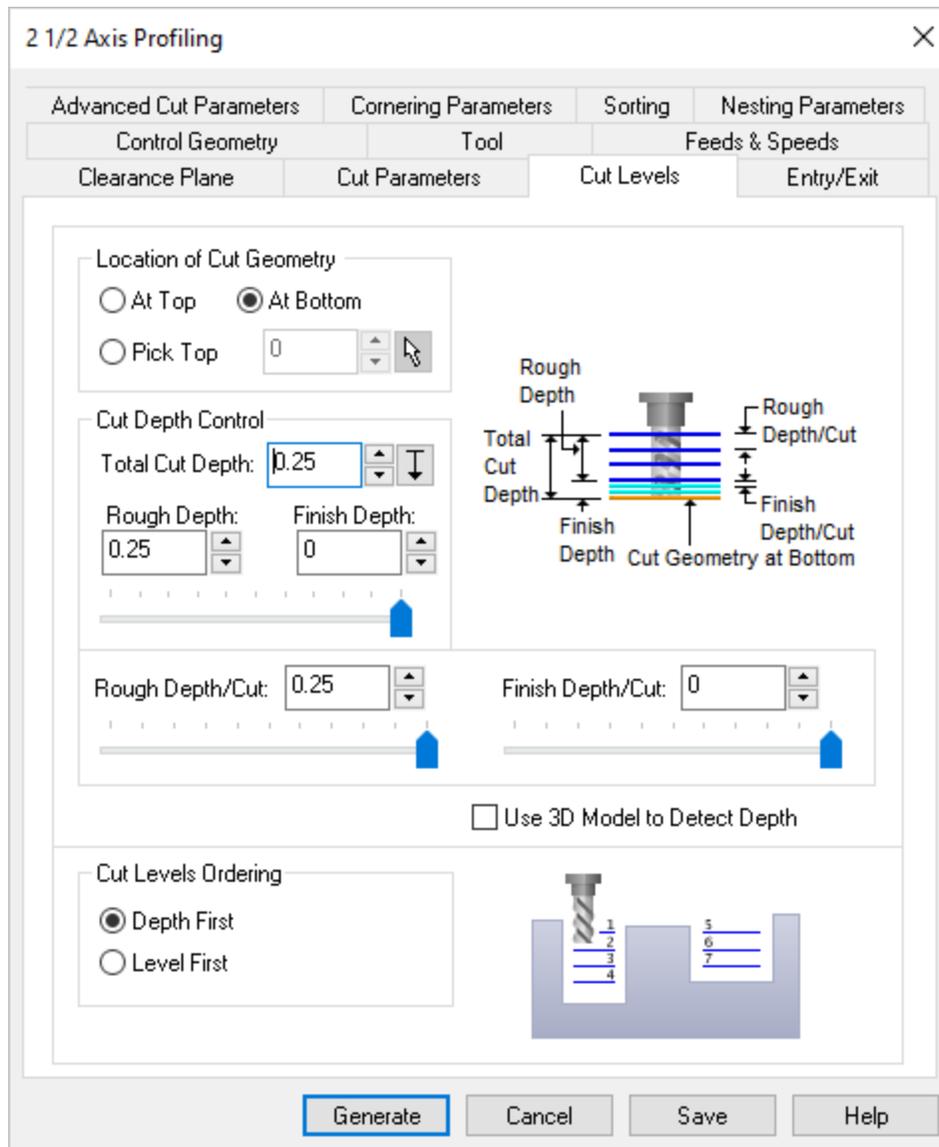
With this parameter checked, the cutter will not violate any of the selected control geometry. This option only works with closed curves as shown in the illustration below.



## 8.3 Cut levels

The following [Cut Levels](#) tab allows you to define the location of the [Cut Geometry](#) and various [Rough](#) and [Finish Cut Level](#) parameters. Refer to each of the sections below for more information. [MecSoft Tech Blog: Understanding Cut Levels in 2½ Axis Machining.](#)

### Dialog Box: Cut Levels tab



Cut Levels tab, MILL Operations

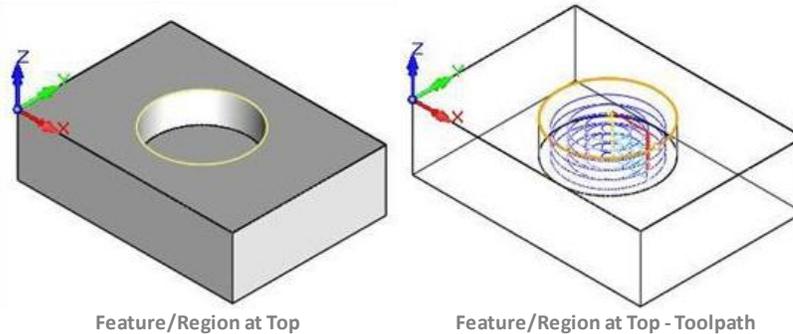
### Location of Cut Geometry

The [Location of Cut Geometry](#) can be set to [At Top](#) (top Z level), [At Bottom](#) (bottom Z level) or [Pick Top](#) (specifying the Z location) by entering a Z value location or by selecting the pick  button and selecting the point on the part.

### At Top

This uses the Z location of the selected [Machining Feature/Region](#) as the top of cut. The generated cuts will start at this Z location and cut down in Z to the

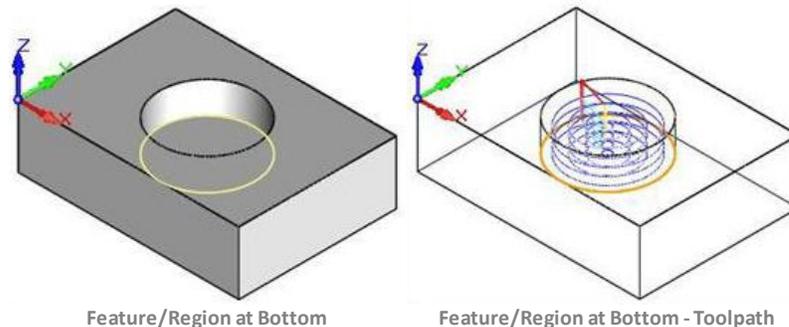
specified total cut depth. **At Top** is typically used when you select the top edge as your machining region.



### **At Bottom**

This uses the Z location of the selected **Machining Feature/Region** as the bottom of cut. The generated cuts will be above the selected machining region and last cut would be at the Z location of the specified region. **At Bottom** is typically used when you select a pocket bottom at your machining region.

#### **2½ Axis Facing Operation Examples:**

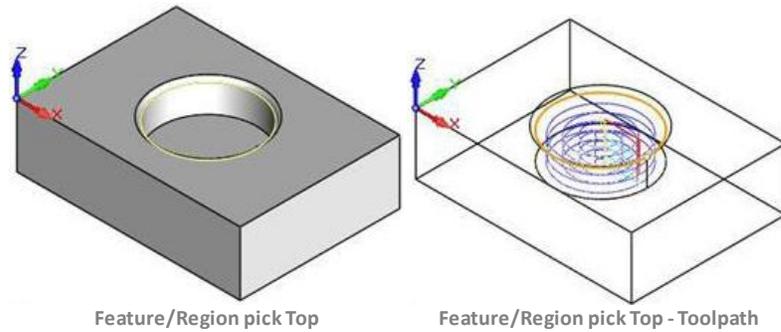


### **Pick Top**

This allows you to specify the **Top of Cut** for the selected **Machining Feature/Region** and is typically used when the selected region is not at top or bottom. The generated cuts will start at this specified Z location and cut down in Z to the specified total cut depth. This would be useful when the selected machining region is at the bottom edge of a fillet or chamfer.

When two or more curves are selected as **Machining Features/Regions**, and using **Pick Top** for **Location of Cut Geometry**, sets the **Top** of cut for all regions at the same Z level.

#### **2½ Axis Facing Operation Examples:**

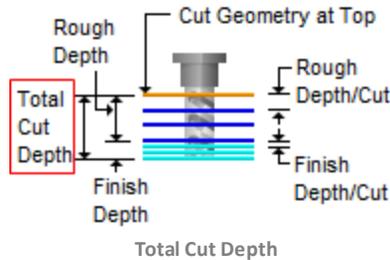


## Cut Depth Control

The **Cut Depth Control** section provides controls for defining the depth of the cut. First define the **Total Cut Depth**. Then, enter the **Rough Depth** and **Finish Depth** values. You can then define the **Depth per Cut** for both **Rough** and **Finish** passes by entering values.

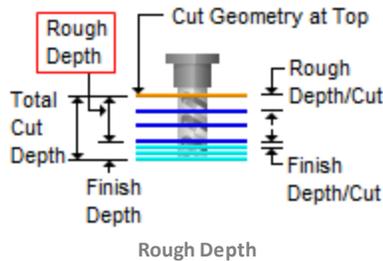
### Total Cut Depth

 Enter the **Total Cut Depth** or select the **Pick** button and select two points on your part. The depth will be calculated automatically and added to this dialog. Refer to the illustration below for reference. You can then divide this into a **Rough Depth** and **Finish Depth**.



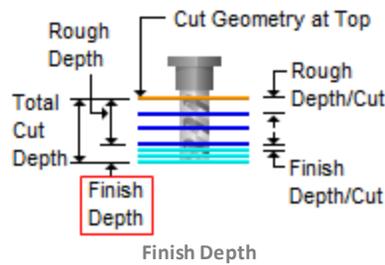
### Rough Depth

The **Total Cut Depth** can be divided into a **Rough Depth** and a **Finish Depth**. Enter the **Rough Depth** here. Refer to the illustration below for reference.



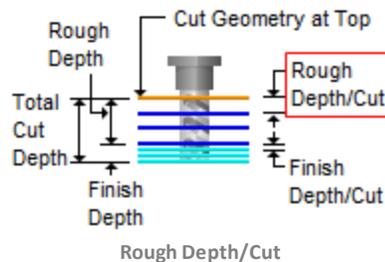
### Finish Depth

The **Total Cut Depth** can be divided into a **Rough Depth** and a **Finish Depth**. Enter the **Finish Depth** here. Refer to the illustration below for reference.



### Rough Depth/Cut

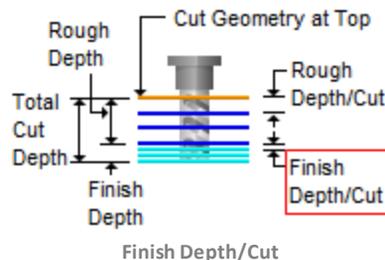
The **Rough Depth** can be divided into a multiple depths. Enter the **Rough Depth/Cut** here.



Select this icon to assign the **Cut Depth** value that is defined by the tool that is currently active for this operation. **Note:** This icon will ONLY appear in this dialog if the currently active tool has a **Cut Depth** value assigned to it. Edit the tool definition if desired.

### Finish Depth/Cut

The **Finish Depth** can also be divided into a multiple depths. Enter the **Finish Depth/Cut** here.

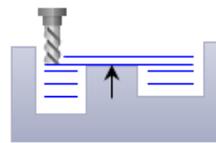


Select this icon to assign the **Cut Depth** value that is defined by the tool that is currently active for this operation. **Note:** This icon will ONLY appear in this dialog if the currently active tool has a **Cut Depth** value assigned to it. Edit the tool definition if desired.



### Clear Island Tops

Check this box to insert an extra cut level at the top of any inner islands or connected step regions.



Clear Island Tops

### Use 3D Model to Detect Depth

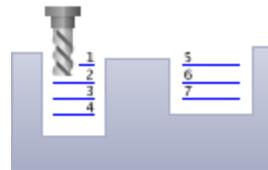
When checked, the bottom most level of the part is detected and cut levels will be added to this depth level. Only the [Finish Depth](#) needs to be specified. The [Rough Depth](#) is automatically determined.

### Use Distance as Specified

The actual calculated cut depth for each cut level may vary depending on the total cut depth. You can check this box to force each cut levels to be the exact value specified in this dialog beginning at the top of the cut.

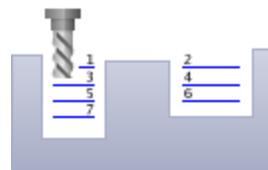
### Cut Level Ordering

Order the [Cut Levels](#) in this operation so that the entire Z depth of each feature is machined before moving on to the next feature.



Depth First

Order the [Cut Levels](#) in this operation so that all regions in a single Z level are machined first before moving on to machine the next cut level.



Levels First

## 8.4 Entry/Exit

The following [Entry/Exit](#) tab is similar for the [Mill](#) operations listed below. [Entry](#) and [Exit](#) determines the way in which tool enters and leaves the part geometry. [MILL](#) Module allows you to specify how the cutter approaches, engages, retracts and departs when starting and stopping a cut.

### Dialog Box: [Entry/Exit](#) tab

Advanced Cut Parameters
Cornering Parameters
Sorting
Nesting Parameters

Control Geometry
Tool
Feeds & Speeds

Clearance Plane
Cut Parameters
Cut Levels
Entry/Exit

**Entry Motions**

Lines & Arcs  Along Path  None

**Approach Motion**

Length (L)

Normal  Tangent  Specify

Angle (A)

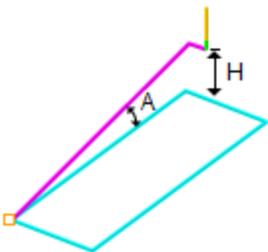
**Engage Motion**

Linear Length (L)

Angle (A)

Radial Radius (R)

Engage Ramp Height



Along Path Angle (A)

Along Path Height (H)

**Exit Motions**

Lines & Arcs  None

**Retract Motion**

Linear Length (L)

Angle (A)

Radial Radius (R)

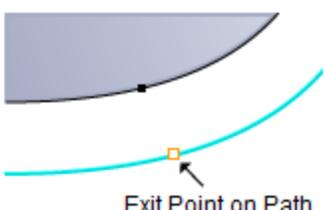
Retract Ramp Height

**Departure Motion**

Length (L)

Normal  Tangent  Specify

Angle (A)



Apply entry/exit at each cut level

Overlap Dist for Closed Profiles

Generate
Cancel
Save
Help

Dialog Box: Entry/Exit tab, 2½ Axis Milling operations

## Entry Motions

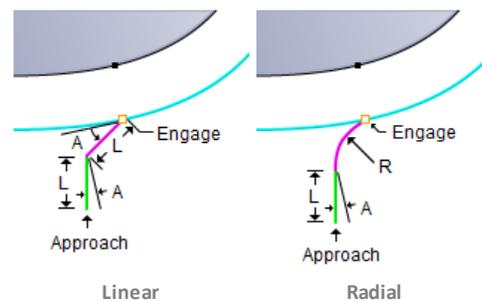
You can set different feeds for plunge, approach, engage, cut, retract and depart moves. The tool moves to the position above the approach point with a plunge feed, then uses the approach feed rate for the vertical approach motion and engage feed rate for the engage motion.

### Lines & Arcs

This is a 2D entry motion consisting of an **Approach Motion** and an **Engage Motion**.

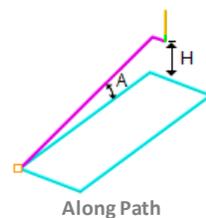
For the **Approach Motion**, enter the approach **Length (L)**. Then, depending on the stock material and cut pattern select the approach angle as either **Normal**, **Tangent** or Specify **Angle (A)** with respect to the stock.

For the **Engage Motion** select **Linear** or **Radial**. In the Linear motion the cutter follows a linear ramp motion, **Ramping** back and forth from a user specified height to the engage point. The **Length (L)** of this move, as well as the **Angle (A)** of this motion can be specified.



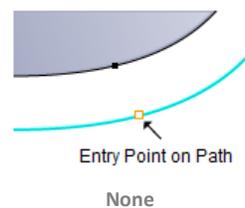
### Along Path

The **Entry** path can be defined as a **3D Entry** along a specified **Path Angle** with a **Path Height**.



### None

No entry motion is defined for the current operation.

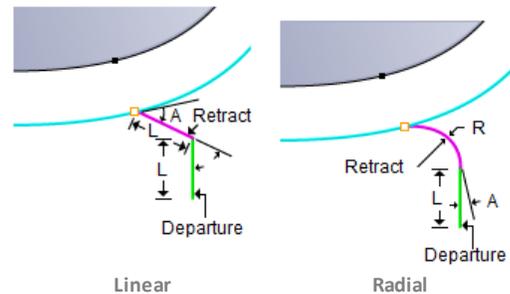


### Exit Motions

The **Exit motion** consists of a **Retract Motion** followed by a **Departure Motion**. The departure motion is a linear motion.

### Lines & Arcs

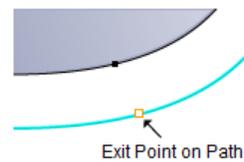
The **2D Exit motion** consists of **Approach Motion** and an **Engage Motion**. You can set the **Retract Motion** to **Linear** and then enter the **Length (L)** and the **Angle (A)**. Likewise you can select **Radial** and then simply enter the **Radius (R)**.



For the **Departure Motion**, enter the departure **Length (L)**. Then, depending on the stock material and cut pattern select the departure angle as either **Normal**, **Tangent** or **Specify Angle (A)** with respect to the stock.

### None

No exit motion is defined for the current operation.



None



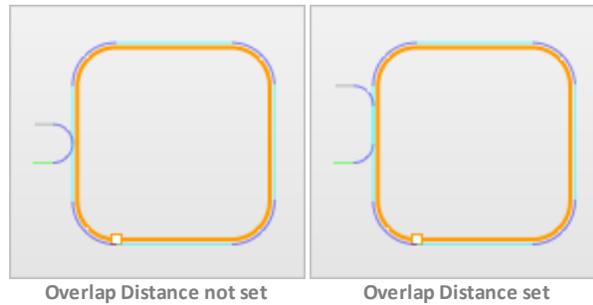
### Apply entry/exit at each cut level

Check this box to apply the **Entry/Exit Motions** to each cut level.



### Overlap Dist for Closed Profiles

This option allows you to specify an overlap distance for closed profiles to avoid leaving small tool marks at the start point of the part. The toolpath will start as specified, follow the closed profile back to the start point and then continue past for the specified distance. The overlap distance will be restricted so that it cannot exceed the profile length.



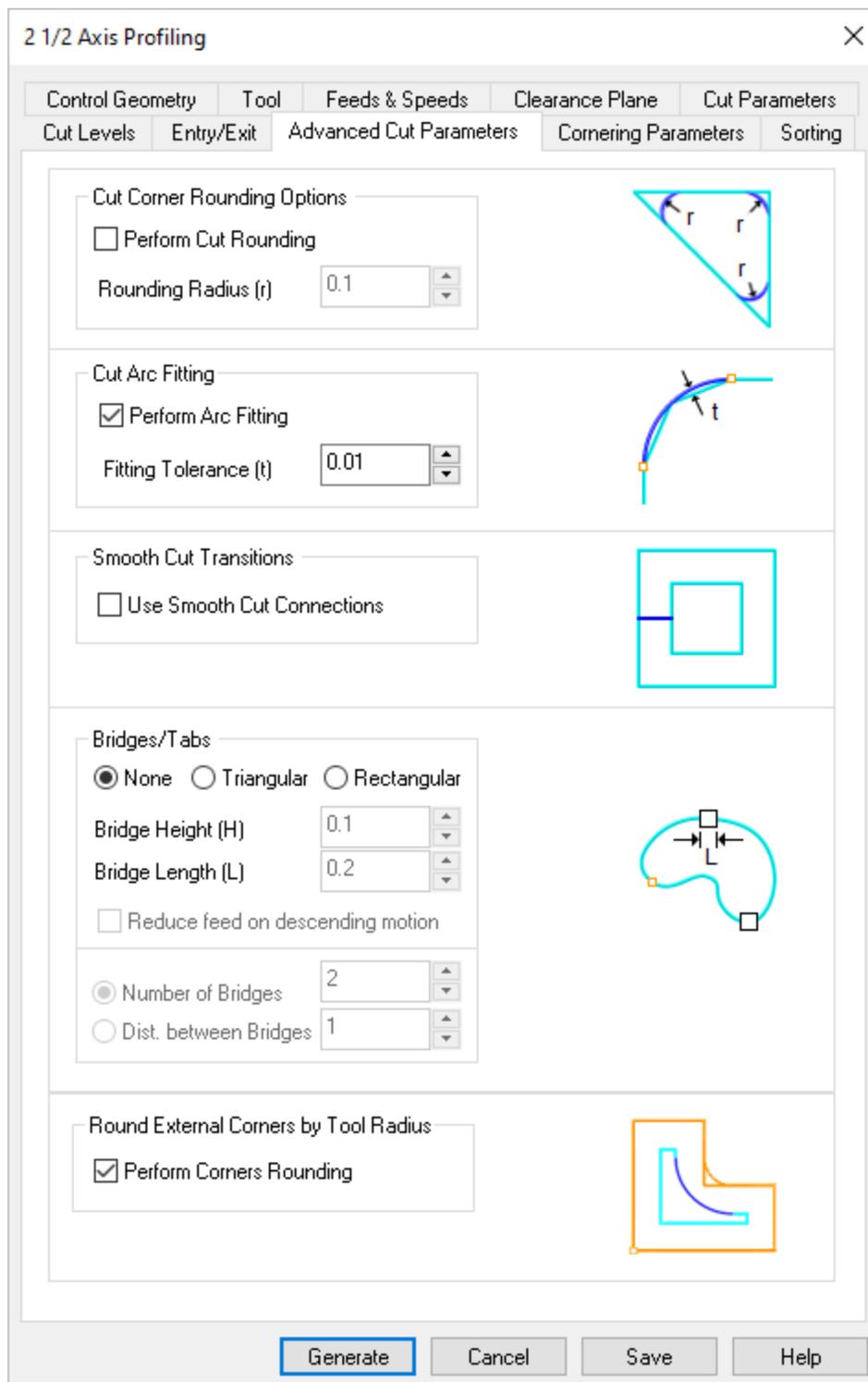
## 8.5 Advanced Cut Parameters

The following [Advanced Cut Parameters](#) are similar for the [Mill](#) operations where the tab is available. Some parameters listed below may not be supported for every applicable operation. These parameters can be used to control the cuts for high speed machining and are designed to reduce rapid acceleration and deceleration of the machine during the cutting process. They allow smoothing of the toolpaths by introduction of arcs.

💡 You can use these parameters even if the controller does not support arcs. In this case, make sure that the output is set to [Linear](#) output. This can be set in the [Set Machining Preferences](#) dialog located on the [Machining Browser](#) under [CAM Preferences](#).

📖 **Dialog Box: Advanced Cut Parameters tab**

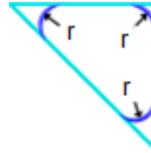
✎ Some options shown below are not available for all operations.



Dialog Box: Advanced Cut Parameters tab, Milling Operations

## Cut Corner Rounding Options

Check this box to round sharp corners in the toolpath and specify a **Rounding Radius (r)**. Fillets of the specified radius will be introduced in sharp corners if possible. These fillets will only be introduced on planes parallel to the XY plane.

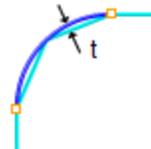


Perform Cut Rounding



### Cut Arc Fitting

Check this box to **Perform Arc Fitting**. The system will attempt to fit arcs along the computer toolpath if they lie within the three principal planes (**XY Plane**, **XZ Plane** or **YZ Plane**).

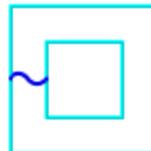


Tolerance (t)



### Smooth Cut Transitions

Check this box to add "S" or "C" shaped cut transitions between two successive offset cuts that lie parallel to the XY plane. These **Smooth Cut Connections** reduce rapid acceleration and deceleration on the machine and extend tool life.



Smooth Cut Connections

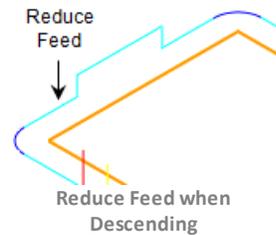


### Bridges/Tabs

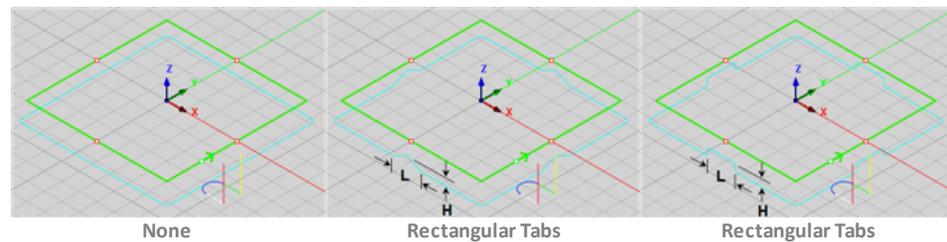
For the **2½ Axis Profiling** operations, select **None**, **Triangular** or **Rectangular** to create bridges along the part boundary. These bridges can be used to hold the part on the table during the actual machining operation. The following parameters are supported:

- **Bridge Height (H)**: See illustrations below.
- **Bridge Length (L)**: See illustrations below.
- **Reduce feed on descending motion**:

Check this box to reduce the feed rate for the descending motion after each tab. The reduction is governed by the **Plunge between levels** percentage value defined by the **Feeds & Speeds** tab of the operation.

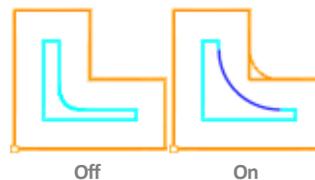


- **Number of Bridges:** See note 1 below.
- **Distance between Bridges:** See note 1 below.



### Round External Corners by Tool Radius

Check this box to round any external corners in your control geometry automatically. "External" depends on which side of the control geometry the tool is moving. The illustrations below shows an external corner when the tool is traveling along the inner side of the control geometry. This helpful when cutting inlay pockets and profiles.



## 8.6 Cornering Parameters

The following **Cornering Parameters** are available for all **Profiling** operations. You can control both **External Corners** and **Interior Corners**. You can also filter which corners these controls are applied to by specifying a corner angle range. Please be sure to read the notes below before using these parameters and perform cut material simulations to fully understand how they affect cutter movement.

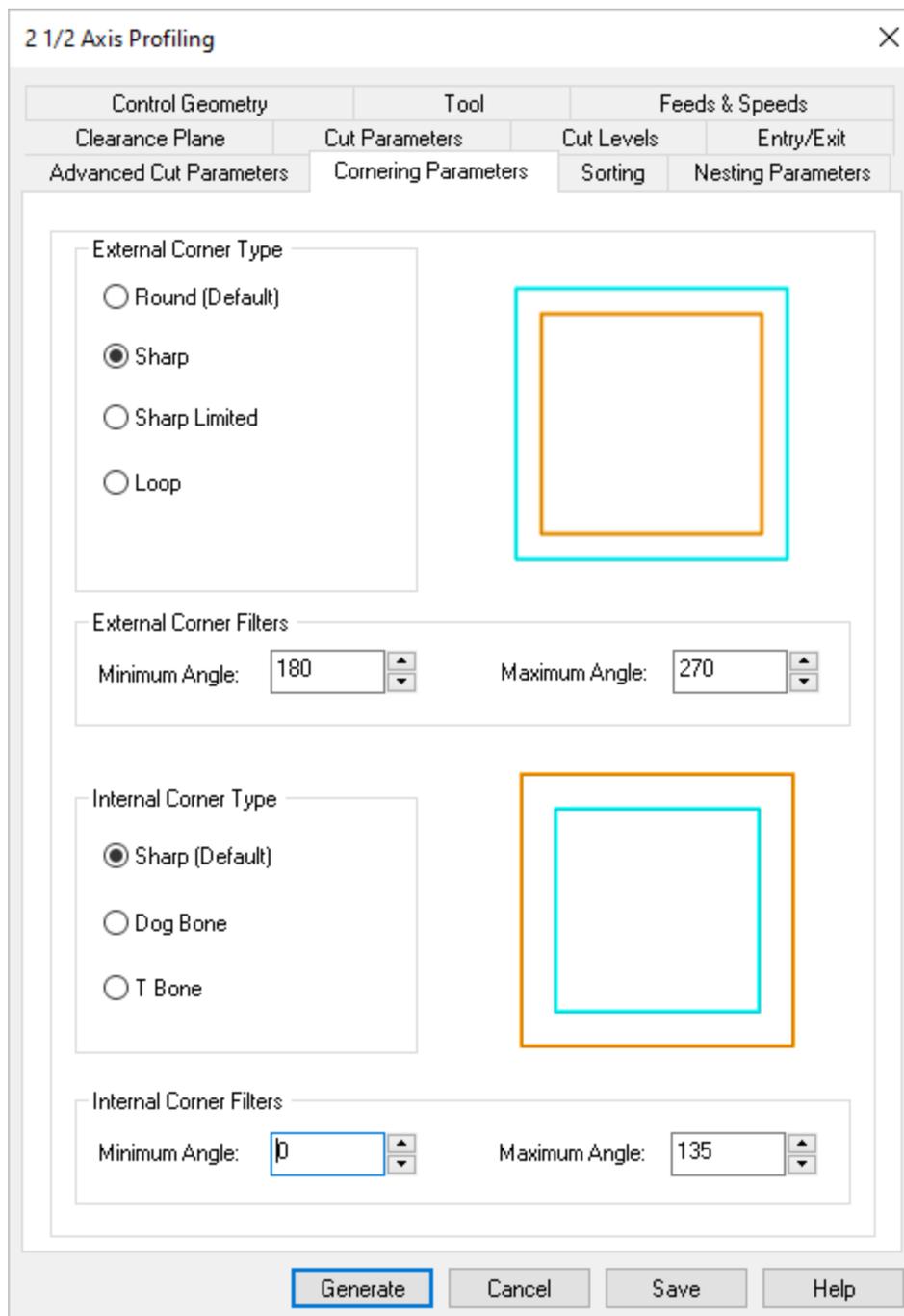
**! Important Note:** These **Internal** and **External Corner Types** require that the **Control Geometry** selected for the Profiling operation be closed regions or open poly-lines. If your **Control Geometry** is a single line or multiple disconnected lines, you must use the **Default** selections or an error message will be returned.

 You can use these parameters even if the controller does not support arcs. In this case, make sure that the output is set to [Linear](#) output. This can be set in the [Set Machining Preferences](#) dialog located on the [Machining Browser](#) under [CAM Preferences](#).

 Tip: **Location of Start Points**: If the start point is at a vertex where the corner is being applied, it is automatically moved to the corner.



**Dialog Box: Cornering Parameters tab**



Dialog Box: Cornering Parameters tab, Profiling, 2 Axis

### External Corner Type

The **External Corner Type** selected will be applied to all corners measured between the **Minimum Angle** and **Maximum Angle** values provided.

#### **Round (Default)**

This the default **External Corner Type**. The tool rolls around the sharp corner.

Depending on the toolpath [Tolerance](#), this method can cause rounding of the sharp corner. NOTE: This option must be used if your [Control Geometry](#) is not closed or is not a ploy-line!



Round

### Sharp

This [External Corner Type](#) will force the tool to proceed past the corner vertex. When the tool diameter becomes tangent with the projected edge direction, it proceeds along the secondary edge.



Sharp

### Sharp Limited

This [External Corner Type](#) will force the tool to proceed past the corner vertex by a specified [Overshoot Length](#). If the [Overshoot Length](#) is specified as a distance less than the tool radius, a round is added at the corner. The radius of the round is equal to the tool radius minus the [Overshoot Length](#). If the [Overshoot Length](#) is equal to or greater than the tool radius the [Sharp Corner Type](#) is used.



Sharp Limited

### Loop

This [External Corner Type](#) will force the tool to proceed past the corner vertex by a specified [Loop Radius](#) before it proceeds tangent to the secondary edge. The radius is measured tangent to the secondary edge.



Loop

 **External Corner Filters****Minimum Angle**

This is the [Minimum Angle](#) for corners to be considered for an [External Corner Type](#). Corner angles below this value will use the default round method for external corners.

**Maximum Angle**

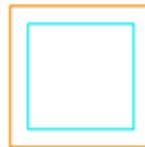
This is the [Maximum Angle](#) for corners to be considered for an [External Corner Type](#). Corner angles above this value will use the default round method for external corners.

 **Internal Corner Type**

The [Internal Corner Type](#) selected will be applied to all internal corners measured between the [Minimum Angle](#) and [Maximum Angle](#) values provided.

**Sharp (Default)**

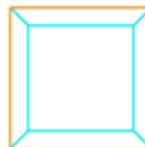
This is the default [Internal Corner Type](#). The tool will change directions when it meets the approaching edge. NOTE: This option must be used if your [Control Geometry](#) is not closed or is not a ploy-line!



Sharp

**Dog Bone**

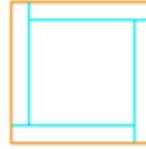
In this [Internal Corner Type](#), the tool will stop when it meets the approaching edge and then proceed directly to the corner vertex point. The tool will then reverse direction back to the previous point and proceed tangent with the approaching edge.



Dog Bone

**T-Bone**

In this [Internal Corner Type](#), the tool will stop when its diameter meets the approaching edge and then continue tangent until it reaches the corner vertex. The tool will then reverse direction back to the previous point and proceed tangent with the approaching edge.



T-Bone



### Internal Corner Filters

#### Minimum Angle

This is the [Minimum Angle](#) for corners to be considered for an [Internal Corner Type](#). Corner angles below this value will use the default sharp method for internal corners.

#### Maximum Angle

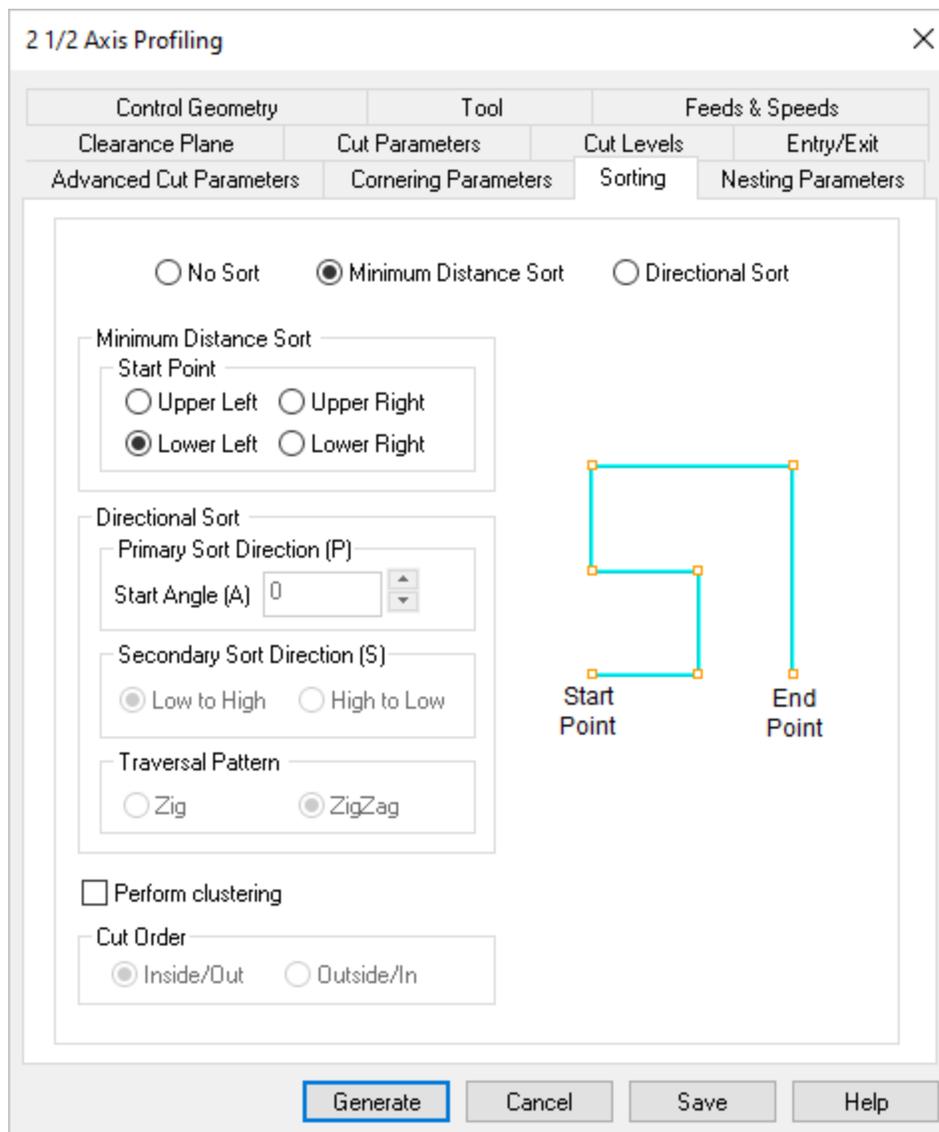
This is the [Maximum Angle](#) for corners to be considered for an [Internal Corner Type](#). Corner angles above this value will use the default sharp method for internal corners.

## 8.7 Sorting

The following tab allows you to define [Sorting](#) parameters for the current [Profiling](#) operation. If [No Sort](#) is selected, operations will be performed in the order in which the regions were created or selected. The [Minimum Distance Sort](#) and [Directional Sort](#) options are described below.



### Dialog Box: Sorting tab



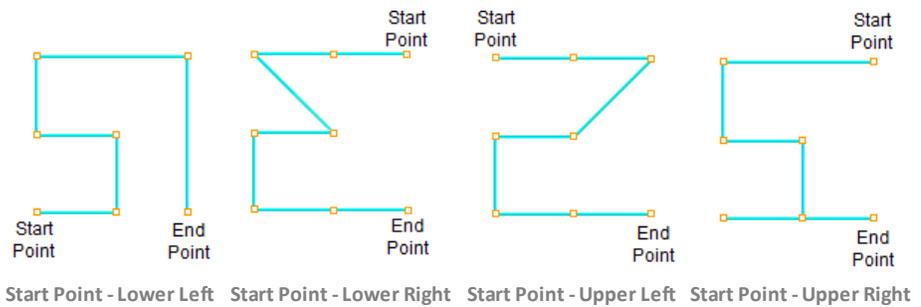
Dialog Box: Sorting tab, similar for 2½ Axis Hole Making, Pocketing & Profiling Operations

### No Sort

If **No Sort** is selected, operations will be performed in the order in which the regions were created or selected.

### Minimum Distance Sort

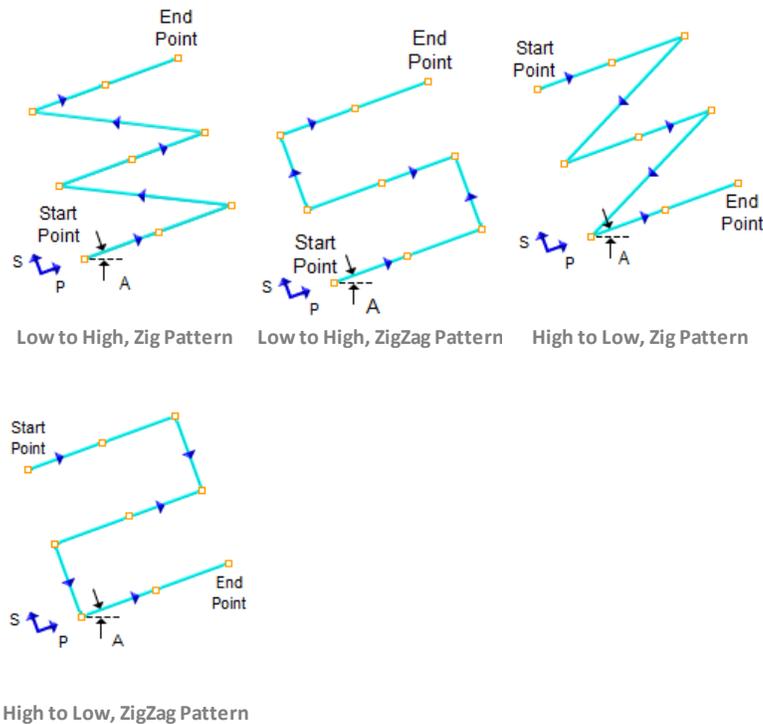
This option sorts based on the shortest distance between regions based on the start point of the regions. This option allows you to set the sort based on the **Start** point. This start point can be one of the following:



### Directional Sort

The directional sorting is performed according to the **Primary** and **Secondary** sort directions. The **Primary Sort Direction (P)** is defined by **Start Angle (A)**.

The **Secondary Sort Direction (S)** is always perpendicular to primary direction and can be defined to go from **Low to High** value or from **High to Low** value. In addition to this the traversal of the cutter can also be defined as either **Zig** (one way) or **ZigZag** (two ways). Refer to the dialog box images below:

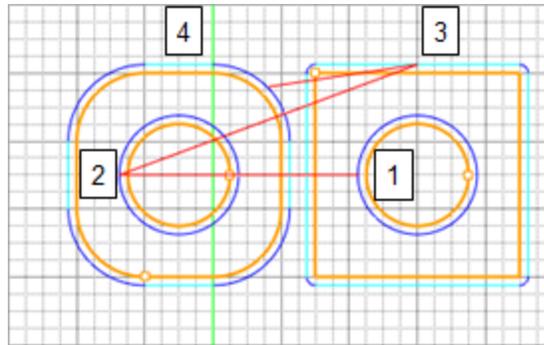


### Perform Clustering (not available for all operation types)

These parameters allow you to sort machining regions by clusters. A cluster is when one region is completely enclosed within the boundary of another region. This relationship defines one cluster. There can be multiple clusters selected for an operation and these options will sort them for machining.

### Perform Clustering

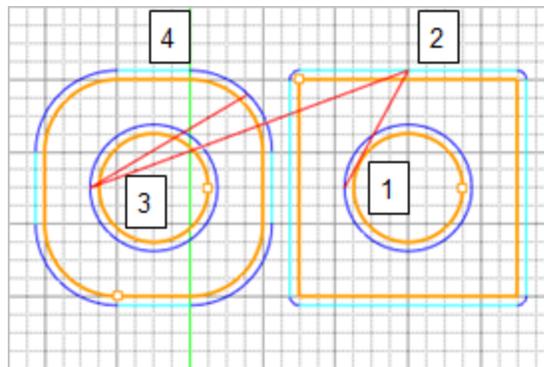
Check this box to enable clustering and then select which method to use. A cluster is when multiple regions are completely enclosed within the boundary of another region.



No Clustering

### Inside/Out

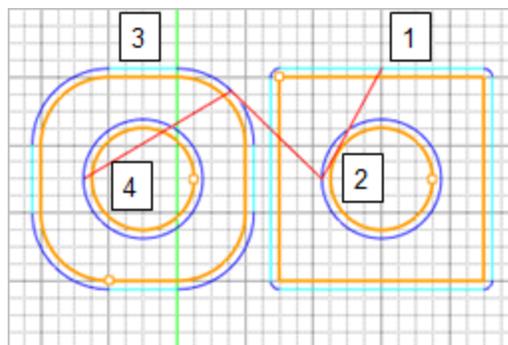
Select this option to machine one complete cluster at a time starting with all of its inner regions first before machining its outer region.



Inside/Out Clustering

### Outside/In

Select this option to machine one complete cluster at a time starting with its outer region before machining all of its inner regions.

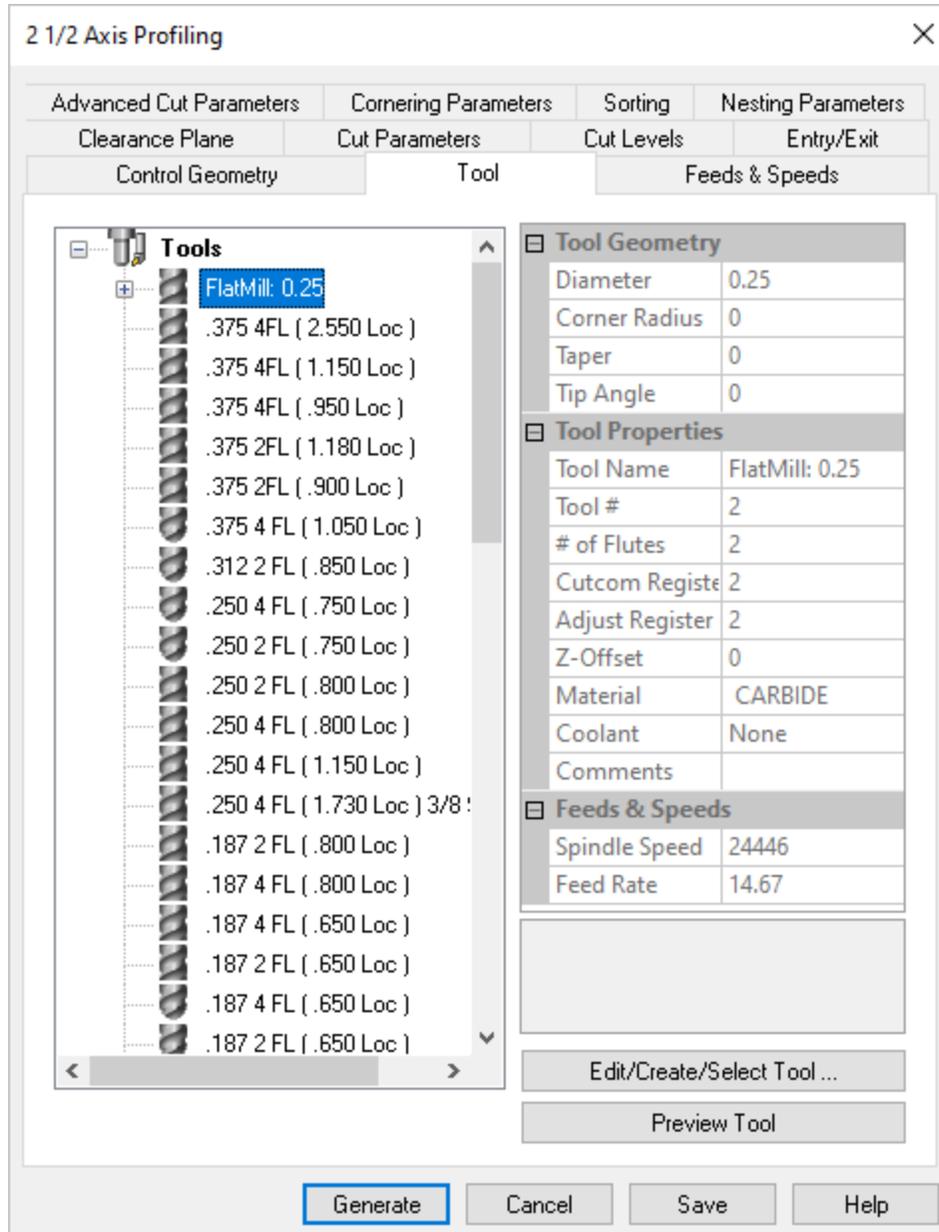


Outside/In Clustering

## 8.8 Tool Tab

The following dialog allows you to select the appropriate tool for the current operation. The [Tools in Session](#) are listed on the left. Expanding the [Tool](#) tree will list the current operations assigned to that tool. See [Create Edit Tools](#) for more information.

 Dialog Box: Tool tab



**2 1/2 Axis Profiling** [X]

Advanced Cut Parameters | Cornering Parameters | Sorting | Nesting Parameters

Clearance Plane | Cut Parameters | Cut Levels | Entry/Exit

Control Geometry | Tool | Feeds & Speeds

**Tools**

- FlatMill: 0.25
- .375 4FL ( 2.550 Loc )
- .375 4FL ( 1.150 Loc )
- .375 4FL ( .950 Loc )
- .375 2FL ( 1.180 Loc )
- .375 2FL ( .900 Loc )
- .375 4 FL ( 1.050 Loc )
- .312 2 FL ( .850 Loc )
- .250 4 FL ( .750 Loc )
- .250 2 FL ( .750 Loc )
- .250 2 FL ( .800 Loc )
- .250 4 FL ( .800 Loc )
- .250 4 FL ( 1.150 Loc )
- .250 4 FL ( 1.730 Loc ) 3/8 :
- .187 2 FL ( .800 Loc )
- .187 4 FL ( .800 Loc )
- .187 4 FL ( .650 Loc )
- .187 2 FL ( .650 Loc )
- .187 4 FL ( .650 Loc )
- .187 2 FL ( .650 Loc )

**Tool Geometry**

Diameter	0.25
Corner Radius	0
Taper	0
Tip Angle	0

**Tool Properties**

Tool Name	FlatMill: 0.25
Tool #	2
# of Flutes	2
Cutcom Register	2
Adjust Register	2
Z-Offset	0
Material	CARBIDE
Coolant	None
Comments	

**Feeds & Speeds**

Spindle Speed	24446
Feed Rate	14.67

Edit/Create/Select Tool ...

Preview Tool

Generate Cancel Save Help

Dialog Box: Tool tab, similar for all Milling Operations

[Edit/Create/Select Tool ...](#)

If there are no **Tools** listed, select this button to Create a new tool. If a tool is listed and selected by default, select this button to **Edit** the parameters for that tool or to Select a different tool for the current operation.

#### Preview Tool

Select this button to display a graphical representation of the currently selected tool. This is the same **Preview** of the tool that you see displayed in the **Edit/Create/Select Tool** dialog.

## 8.9 Feeds & Speeds

The following **Feeds & Speeds** tab is displayed for all **Mill** operations. It allows you to select the appropriate **Feeds & Speeds** for the current **Mill** operation. In this tab, **Spindle Parameters** and **Feed Rates** can be specified. **Speeds & Feeds** can also be loaded **from a File** or from **the Tool**.



#### Feed Rates Explained

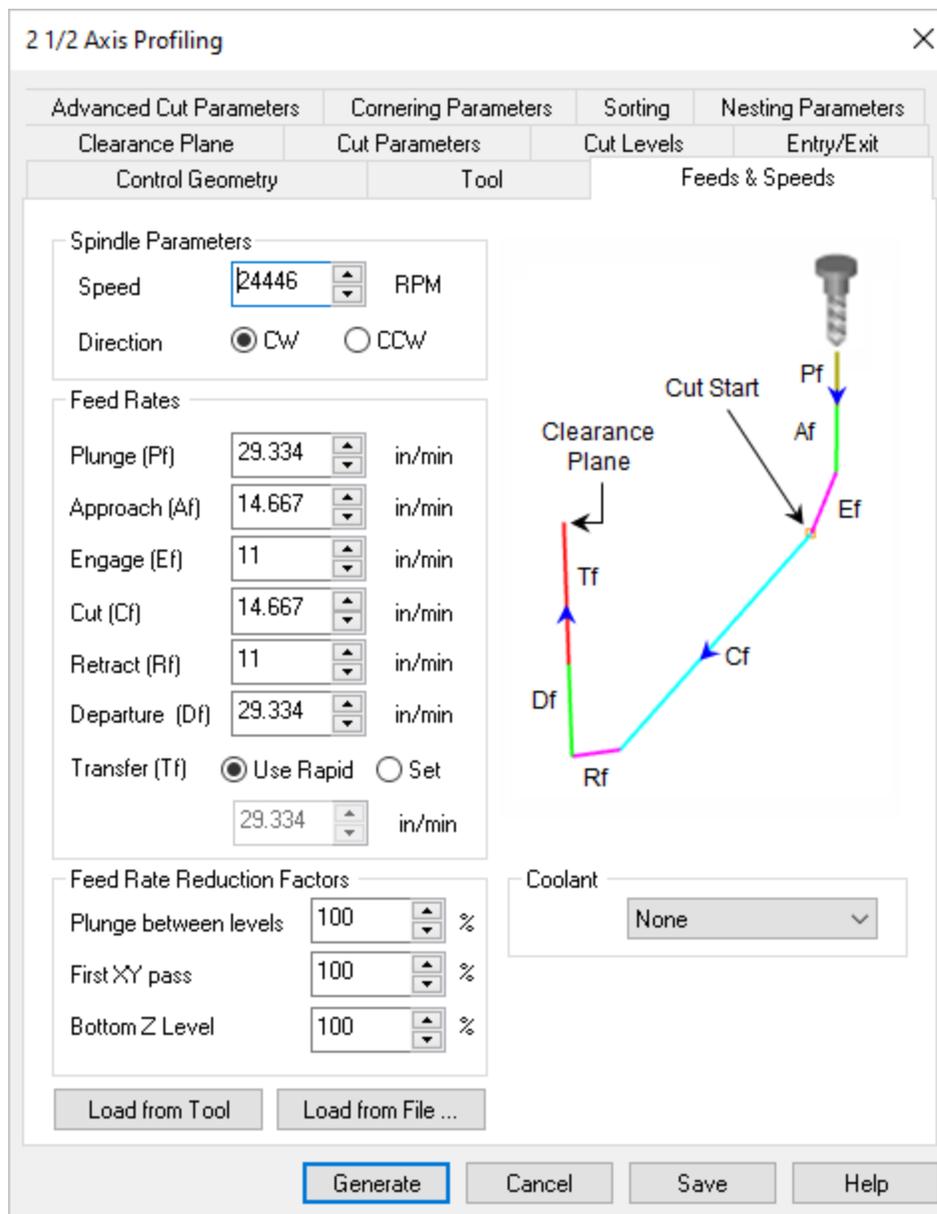
**Feed Rate** is one of the most important factors to consider when implementing any CNC strategy. Simply put, feed rate is the speed at which the cutter engages the part and is typically measured in units/minute. Suggested cut feed rates will vary depending on the type of material you are cutting (i.e., aluminum, steel, wood, acrylic, etc.), the material of the cutter (carbide, high speed steel, ceramic, etc.) and many other cutting factors including desired surface and the characteristics of the CNC machine itself.



[Read the full article...](#)



#### Dialog Box: Feeds & Speeds tab



Dialog Box: Feeds &amp; Speeds tab, 2 Axis Profiling

## Spindle Parameters

These parameters refer to the spindle on your machine.

### Spindle Speed

This is the rotational **Speed (S)** of the milling spindle expressed in **RPM**.

### Spindle Direction (CW)

This sets the spindle rotation to be **Clockwise (CW)**.

### Spindle Direction (CCW)

This sets the spindle rotation **Direction** to be **Counter Clockwise (CCW)**.



## Feed Rates

These are the feedrates (in [Units/Min](#)) that will be applied to the current toolpath operation. If the values are currently populated from your [Tool](#) definition ([Load from Tool](#)), [Feeds & Speeds](#) table ([Load from File](#)) or from your [Knowledge Base](#), you can override them for this operation.

### Plunge (Pf)

This is the rate is the feed before the tool starts to engage in material. This is always vertical.

### Approach (Af)

This is the [Approach \(Af\)](#) feedrate (in [Units/Min](#)) used to prepare the cutter just before it starts to [Engage](#) into material for cutting. [Approach](#) motions are dependent on the method of machining.

### Engage (Ef)

This is the [Engage \(Ef\)](#) feedrate (in [Units/Min](#)) used when the tool is [Engaging](#) the material just prior to cutting.

### Cut (Cf)

This is the [Cut \(Cf\)](#) feedrate (in [Units/Min](#)) used when the tool is [Cutting](#) material.

### Retract (Rf)

This is the [Retract \(Rf\)](#) feedrate (in [Units/Min](#)), when the tool is performing a [Retract](#) move away from material.

### Departure (Df)

The is the feedrate (in [Units/Min](#)), when the tool [Departs](#) from the material.

### Transfer (Tf) Use Rapid

This is the [Transfer \(Tf\)](#) feedrate (in [Units/Min](#)) used for [Transfer](#) motions. If you select [Use Rapid](#) the posted G-Code will output a rapid motion (G0) with no feed rate. **Note:** For more accurate machining time estimates, use the [Set](#) option and enter the feed rate to use.

### Transfer (Tf) Set

This is the [Transfer \(Tf\)](#) feedrate (in [Units/Min](#)) used for [Transfer](#) motions. Select [Set](#) to enter an actual feedrate value for rapid motions (G0). This is only used for calculating the estimated machining time.



## Feed Rates Reduction Factors (Hole Operations Only)

This section of the dialog allows you to specify [Feed Rate Reduction Factors](#) for specific tool motions.

### Plunge between levels

This is a percentage of the [Cut \(Cf\)](#) feedrate to use when the tool is plunging between Z levels.

### First XY Pass

This is a percentage of the [Cut \(Cf\)](#) feedrate to use on the first XY cut motion when the toolpath uses the full width of the cutter.

#### **Bottom Z Level**

This is the percentage of the [Cut \(Cf\)](#) feedrate that will be applied to the last (bottom most) level of the toolpath operation. For example in [Pocketing](#), it refers to the floor of the pocket. In [Profiling](#) it refers to the bottom level of the profile cut.



#### **Coolant**

Here you can override the [Coolant](#) that is specified by the Tool. [Coolant](#) can be set to [Flood](#), [Mist](#) or [Through](#). [Coolant](#) codes are defined in the post processor generator under [Misc](#) tab.



#### **Load from Tool**

Load the [Feed & Speeds](#) values that are saved with the currently selected [Tool](#).

See: [Create/Edit Tools](#)



#### **Load from File**

This loads the [Feeds & Speeds](#) values from the [Feeds & Speeds Table](#) file. This will display the [Load Feeds from Table](#) dialog box to make your selections.



#### **Dialog Box: Load Feeds from Table**

Selecting [OK](#) from this dialog transfers the spindle speed and cut feedrate to the [Feeds & Speeds](#) tab. The plunge, approach, engage, retract and departure feeds are determined using a percent of the cut feed. The percent to use for transferring the computed cut feed can be set under [Feeds & Speeds Preferences](#).

**Feeds/Speeds**

Load Feeds from Table

Data from Table

Stock Material: ALUMINUM - 2024

Tool Material: CARBIDE

Surface Speed: 1600 ft/min

Feed/Tooth: 0.004 in

Input Variables

Tool Diameter: 0.5 in

# of Flutes: 2

Maximum Limits for Computation

Max Spindle Speed: 14000 RPM

Max Cut Feed: 200 in/min

Computed Variables

Spindle Speed: 12223 RPM

Cut Feed (Cf): 97 in/min

OK Cancel Help

Dialog Box: Load Feeds from Table



## Data from Table

### Stock Material

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

### Tool Material

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

### Surface Speed

Selecting a [Stock Material](#) and [Tool Material](#) displays the [Surface Speed](#) and [Feed/Tooth](#). This information is contained in a feeds and speeds data file which can be edited to add newer materials.

### Feed/Tooth

Selecting a **Stock Material** and **Tool Material** displays the **Surface Speed** and **Feed/Tooth**. This information is contained in a feeds and speeds data file which can be edited to add newer materials.



### Input Variables

The input variables - **Work Diameter** is automatically loaded from the Stock Radius. Based on this parameter and the **Variables Limits** parameters, the program computes **Spindle Speed** and **Cut Feedrate (Cf)**, measured in **Unites/Revolution**. Changing the spindle speed modifies the cut feedrate.



### Maximum Limits for Computation

Here you can set the **Max Spindle Speed** and **Max Cut Feed (Cf)** values. Once these two values are set, the **Spindle Speed** and **Cut Feed** calculated by this dialog will not exceed these values even if you attempt to enter higher values into the **Computed Variables** fields. To exceed these values, change them here or you must edit the operation or tool parameters manually.



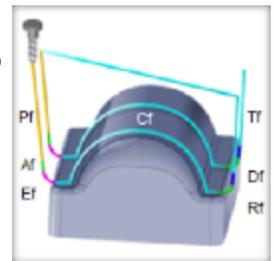
### Computed Variables

The variables for **Spindle Speed** and **Cut Feed (Cf)** are computed for you based on the selections made in this dialog but will not exceed the values set in the **Maximum Limits for Computation** section of the dialog. These values are then assigned to the active toolpath operation or tool. You can override either of these variables and the other will update automatically. Since this dialog is a **Feeds & Speeds Calculator**, you cannot override both values. To do so, you must edit the operation or tool parameters manually.



### The Milling Feeds & Speeds Calculator

Did you know that MecSoft's **MILL** Module plug-ins have a built-in **Feeds & Speeds Calculator**? That's right, you can ask the program to suggest feeds & speeds values based on your current stock material and active tool parameters! Once a **Cut Feed** is calculated, you can then choose to automatically assign feed rate values for the various toolpath motions in your operation including **Plunge**, **Approach**, **Engage**, **Retract** and **Departure**! The percentages of the **Cut Feed** to assign are all controlled from the **CAM Preferences** dialog. The Milling **Feeds & Speeds Calculator**...



[Read the full article...](#)



### Customizing Feeds & Speeds

**MILL** module allows you to customize the feeds and speeds based on the stock material being machined, the material of the cutter employed and also the operation type. This is

done by archiving your desired feeds and speeds settings in an external data file.

A default implementation of this table has been included with the [RhinoCAM](#) product and can be found in a folder called "[Materials](#)" under the product installation directory.

This xml contains the list of materials, texture, feeds and speeds. The file is located under [Materials](#) folder in the [RhinoCAM](#) install directory. ([C:\ProgramData\MecSoft Corporation\RhinoCAM 20xx for Rhino x.x\Materials](#)).

Materials folder contains the following files

- FeedsSpeedsDataINCH.xml
- FeedsSpeedsDataMM.xml

The [Feeds and speeds](#) file is an .xml file format, which can be edited using any text editor to add newer materials. These values can then be recalled at any time to compute the feeds/speeds to be used in the current program.

The format for this file is shown below.

```
<Units>Imperial</Units>
<FeedsSpeeds>
  <Material>
    <Name>Stock Material</Name>
    <TextureFile>Texture Bitmap</TextureFile>
    <FeedsSpeedsRecord>Operation type, Tool Material,
Surface Speed, Feed per Tooth</FeedsSpeedsRecord>
  </Material>
</FeedsSpeeds>
```

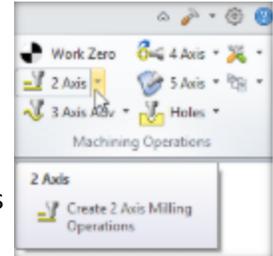
An example entry is shown below.

```
<Material>
  <Name>ALUMINUM - 2024</Name>
  <TextureFile>ALUMINUM.bmp</TextureFile>
  <FeedsSpeedsRecord>MILLING, CARBIDE, 1600.00, 0.0040</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>MILLING, HSS, 400.00, 0.0040</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>MILLING, CERAMIC, 400.00, 0.0040</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>DRILLING, CARBIDE, 960.00, 0.0048</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>DRILLING, HSS, 240.00, 0.0048</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>DRILLING, CERAMIC, 240.00, 0.0048</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>TURNING, CARBIDE, 1800.00,
0.0200</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>TURNING, CERAMIC, 1800.00,
0.0200</FeedsSpeedsRecord>
  <FeedsSpeedsRecord>TURNING, CERMET, 1800.00, 0.0200</FeedsSpeedsRecord>
</Material>
```

**!** If part unit is set to Inches, MILL module automatically loads FeedsSpeedsDataINCH.xml and when part unit is set to MM, FeedsSpeedsDataMM.xml is loaded.

### **More on Customizing Materials Data**

Note: This blog post is intended for advanced users who are familiar with XML text editing and have administrative access to their Windows Operating System. MecSoft's CAM plug-ins have a built-in [Feeds & Speeds Calculator](#) that can suggest [Spindle Speeds](#) and [Cut Feed Rates](#) based on your stock material and active tool parameters! However, what if you are cutting stock material that is currently not in our [Materials Library](#)? Or what if you don't like what is currently assigned for the material of your choice in the [Materials Library](#)? This post will show you how to customize MecSoft CAM to add and manage multiple material files as well to add your own stock materials. If you are new to MecSoft's CAM plug-ins, you can review my earlier post on the [Feeds & Speeds Calculator](#) and how it works.

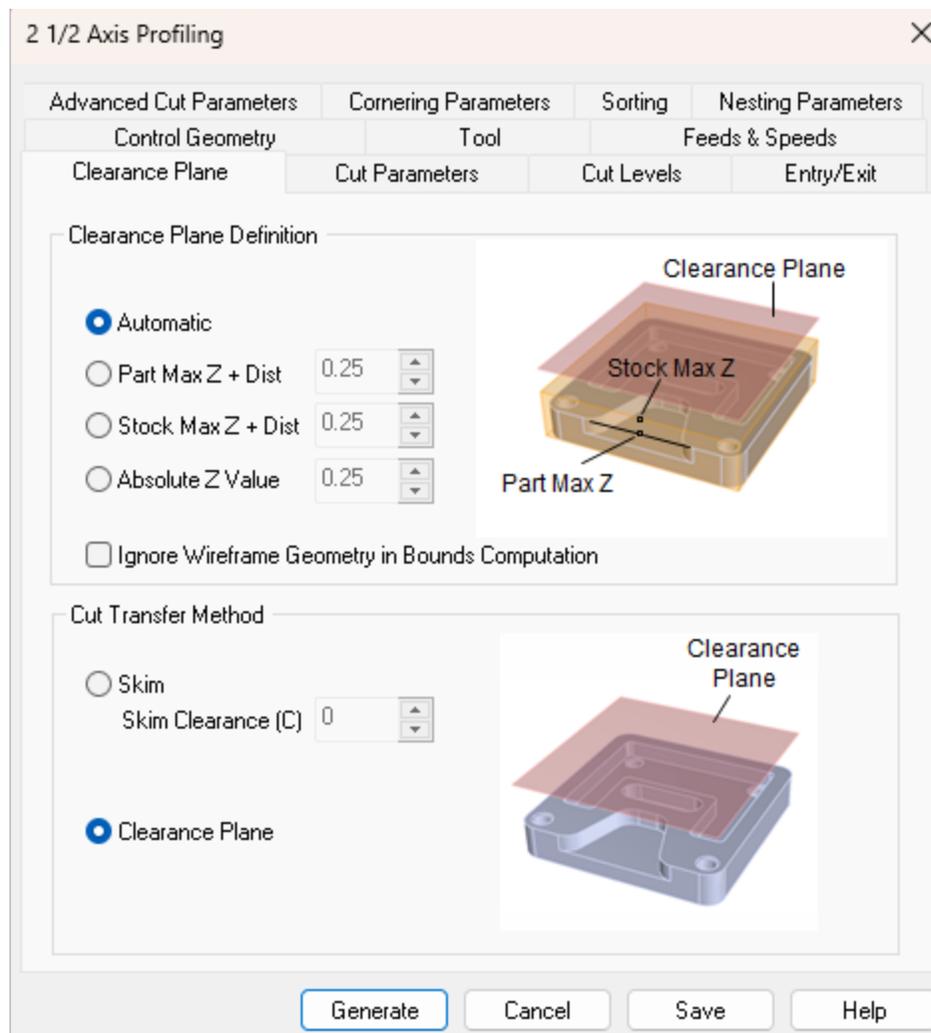


[Read the full article...](#)

## 8.10 Clearance Plane

The clearance plane is an XY plane wherein all transfer motions between a retract and engage motion takes place. In the case of 4 axis operations, the clearance plane is a cylinder and defined along the axis of rotation. Typically you would define this plane at a certain safety distance above the part geometry. This is done to prevent the tool from touching the part being machined during transfer motions since these motions usually use a very fast or rapid feed rate.

### **Dialog Box: Clearance Plane tab**



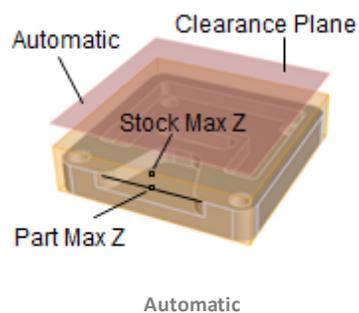
Dialog Box: Clearance Plane tab, similar for all Milling operations

### Clearance Plane Definition

This selection defines the **Clearance Plane** for the current toolpath operation.

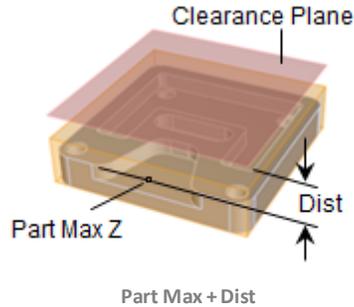
#### **Automatic**

Allow the system to calculate a the clearance plane height automatically based on the part and stock geometry.



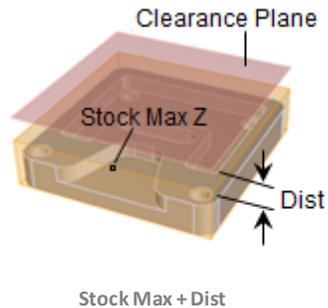
### Part Max Z + Dist

Set the [Clearance Plane](#) height to the maximum Z height of the Part plus this added distance.



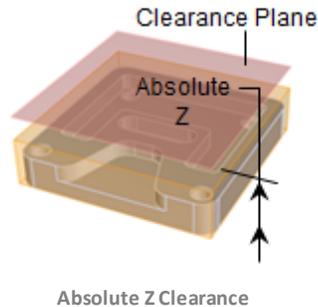
### Stock Max Z + Dist

Select this option to use the [Stock's Maximum Z](#) height and then enter a [Distance](#) value to add to this for the total Z height for the [Clearance Plane](#).



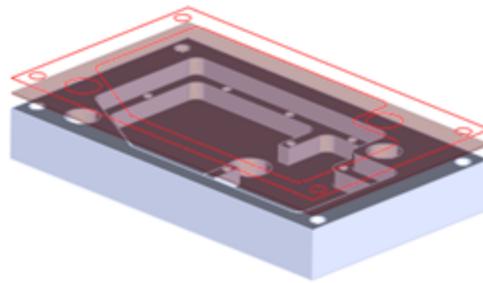
### Absolute Z Value

Select this to specify the absolute Z clearance height to use and then enter Z height value. Be sure that the value you specify clears your part geometry.



### Ignore Wireframe Geometry in Bounds Computation

Check this box to ignore all wireframe geometry when calculating the [Clearance Plane](#) definition. When checked, the [Automatic](#) and [Part Max](#) options for defining the [Clearance](#) will be calculated from actual surface geometry.



Ignore Wireframe Geometry in Bounds Computation

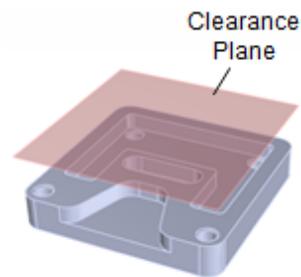


### Cut Transfer Method

This section allows you to control the tool's motions when it needs transfer to another region to begin cutting.

#### Clearance Plane

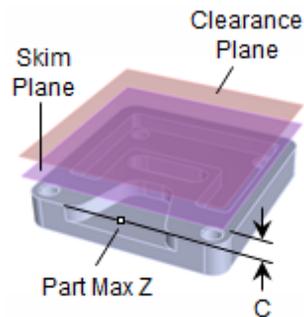
Select this option to move the tool to the **Clearance Plane** and then perform the **Transfer** motion to the next cut location.



Transfer at Clearance Plane

#### Skim

Select this option to perform transfer motions at a Skim plane. The system automatically determines a safe height and then adds this **Skim Clearance (C)** to the computed Z value to perform the **Transfer Motions**.

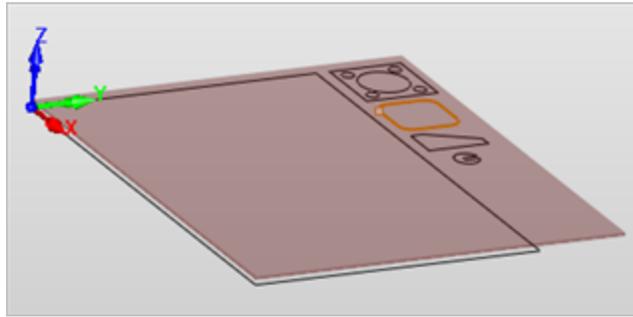


Transfer at Skim



### Display of Clearance Plane for Milling operations

When the clearance plane dialog is active, specifying a clearance plane definition, displays the clearance plane on the part in the view port.

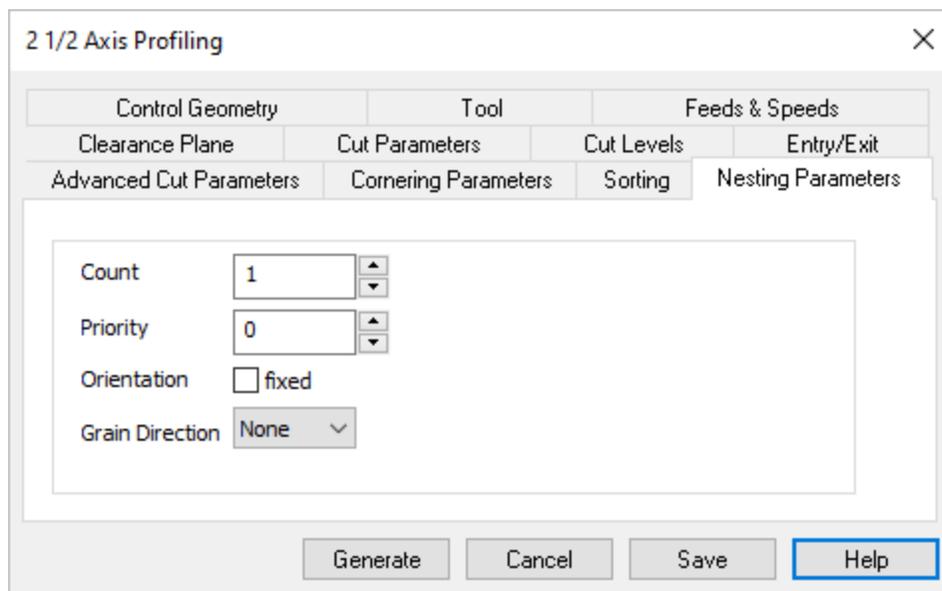


Display of Clearance Plane for Milling operations

## 8.11 Nesting Parameters

This [Nesting Parameters](#) tab allows you to set parameters for a specific 2-1/2 Axis Profiling operation. The Nesting Parameters dialog applies to all profiling operations in the nest. This Nesting Parameters tab applies only to the profiling operation defined by this tab of the dialog.

### Dialog Box: 2-1/2 Axis Profiling, Nesting Parameters tab



Cut Parameters tab, Profiling Operations

#### Count

Enter the total number of this profiling operation to be included in the nested sheet. All control geometry in this profile operation is considered to be one count. If you want different counts for multiple profiles, create a separate operation for each.

#### Priority

---

You can set a priority level for each part in the nest. Higher priority parts will be nested first, beginning with sheet 1.

**Orientation**

Selecting **Fixed** does not permit rotation of parts when nested in the sheet.

**Grain Direction**

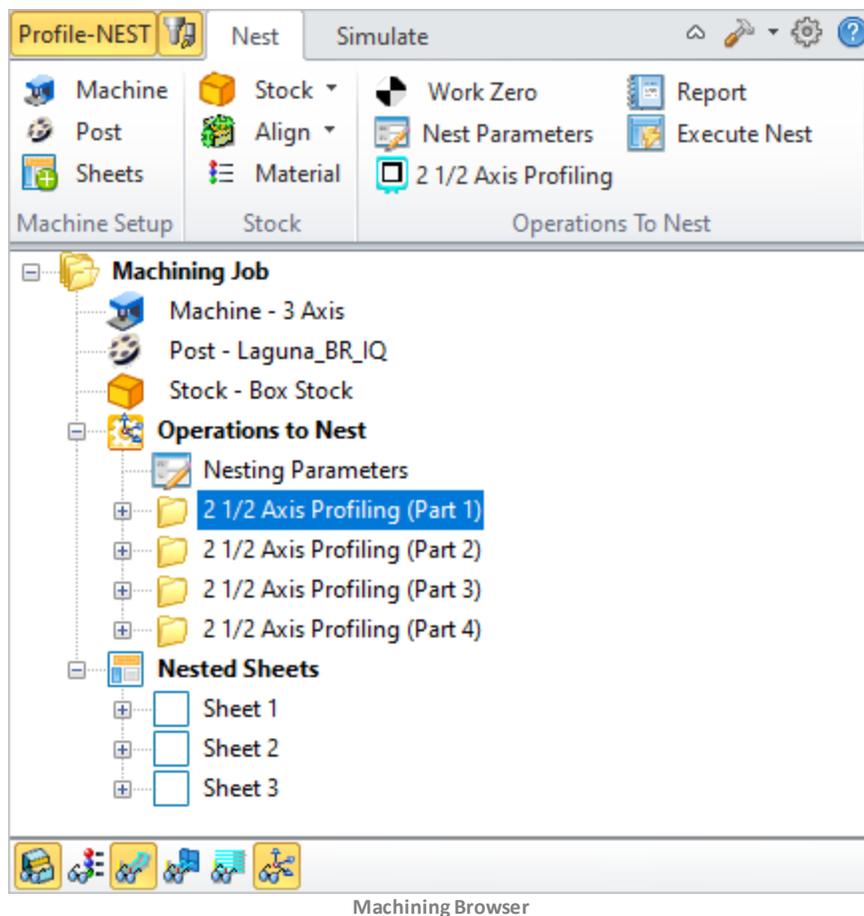
If **Grain Direction** has been specified for sheets (see **Nest > Sheets**), then it can be specified for any parts that require this control during nesting. Parts that have a **Grain Direction** specified will be aligned with the **Grain Direction** of the sheet(s).

## Edit Operations

Once a [Profile](#) operation is created it is listed under the [Machining Browser](#). By default all the operations are created under the setup named [Operations to Nest](#). The setup can hold several [Profile](#) operations and each operation can be associatively edited and regenerated.

### The Program Tab of the Machining Browser

Changes can be made to any of the objects that make up the operation such as the [Control Geometry](#), [Tool](#), [Feeds/Speeds](#), [Clearance Plane](#) and [Machining Parameters](#). Any edits made to an operation are saved with the operation and upon regeneration the changes will take affect.



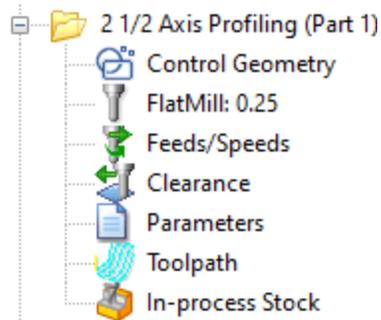
Machining Browser

## 9.1 Edit Associatively

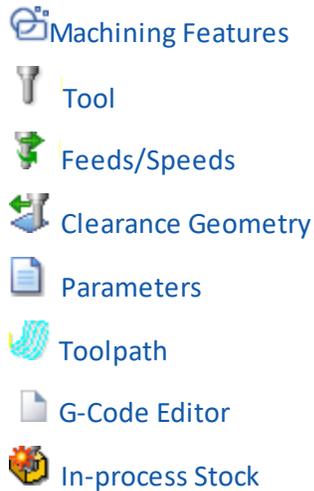
[Machining Operations](#) can be edited by using the [Machining Browser](#). Each machining operation is represented as a folder in the browser. In the expanded state of this folder icon, seven icons representing different objects that make up the operation are displayed. The first five can be associatively edited.

## The Machining Operation Tree Icons

The following icons are displayed under a machining operation's folder and represent the different objects that make up the operation. The first five ([Machining Features](#), [Tool](#), [Feeds/Speeds](#), [Clearance Geometry](#) and [Parameters](#)) can be associatively edited.

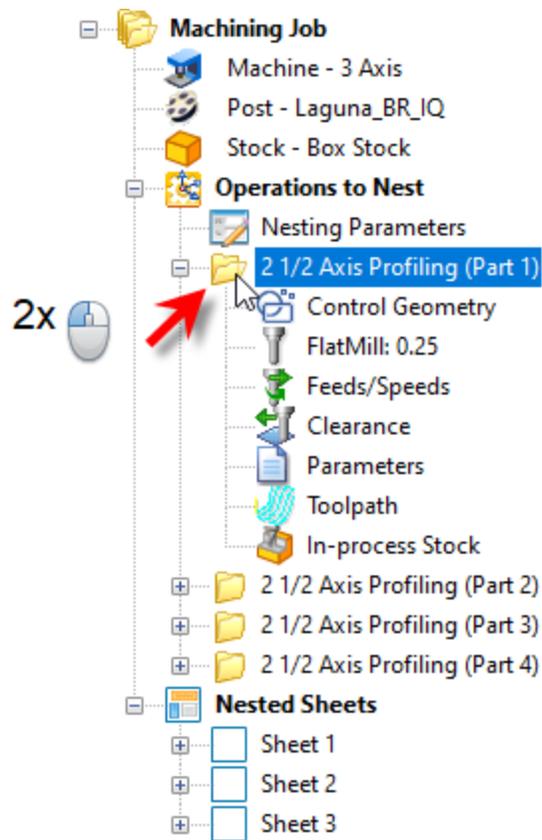


Operation Folder Expanded



## Double Click to Open an Operation Dialog for Editing

Double clicking on the operation folder (or name) will open the operation's properties dialog with all tabs displayed for editing.



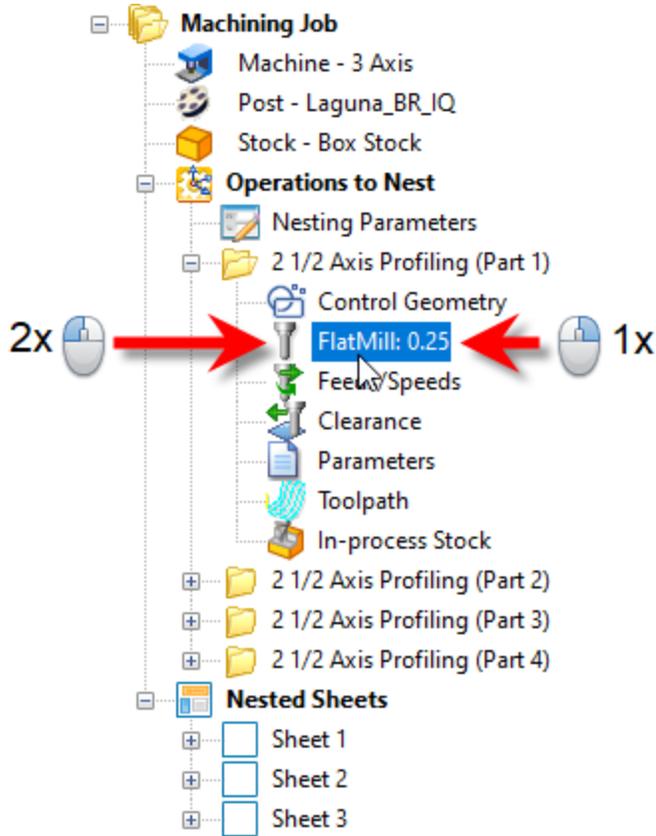
Double Click to Open a Machining Operations Dialog for Editing



### Right or Double Click one of an Operation's Icons to Edit its Properties

Right mouse click or double clicking a specific icon, for example the **Tool** icon would bring up the **Tool Creation** dialog, upon which you can substitute the current tool with another or edit the parameters of the current tool.

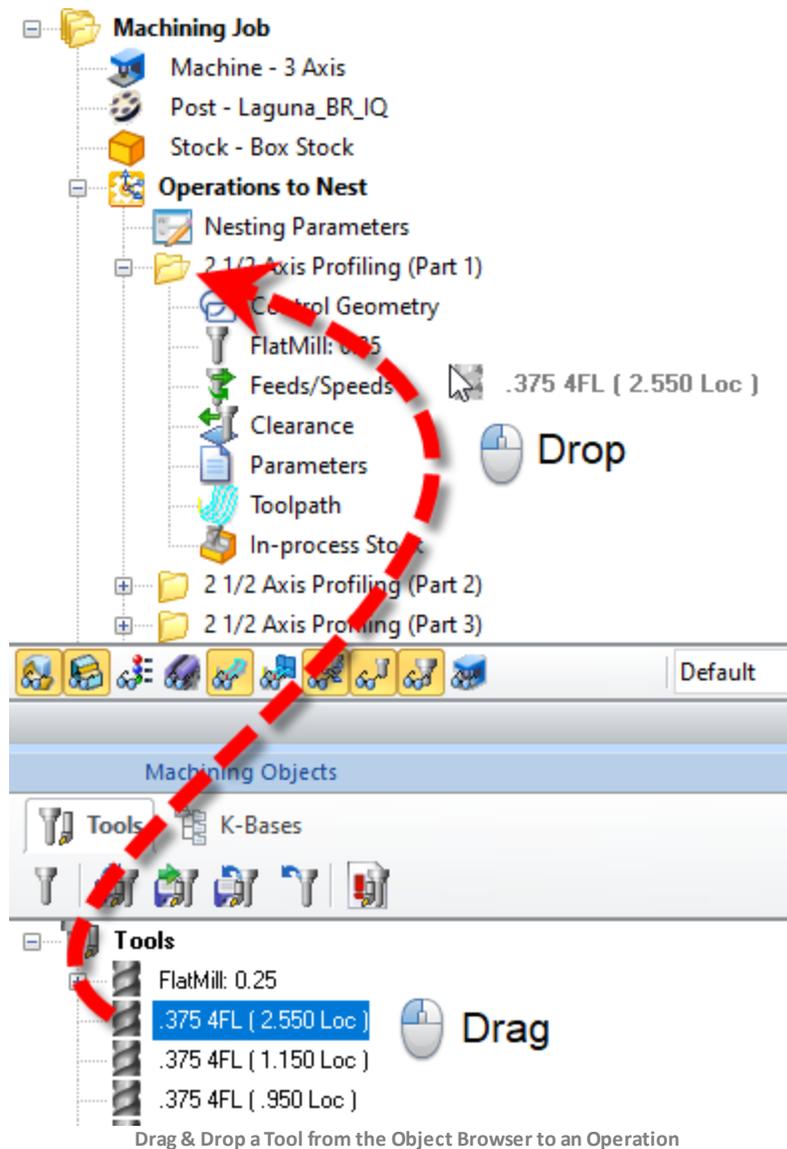
Click on this Icon	Displays the Operation's
	Control Geometry tab
	Tool tab
	Feeds/Speeds tab
	Clearance tab
	Cut Parameters tab
	Toolpath in the Toolpath Viewer
	Toolpath in the G-Code Editor
	In-Process Stock



Right or Double Click one of an Operation's Icons to Edit its Properties

 **Drag & Drop a Tool from the Object Browser to an Operation**

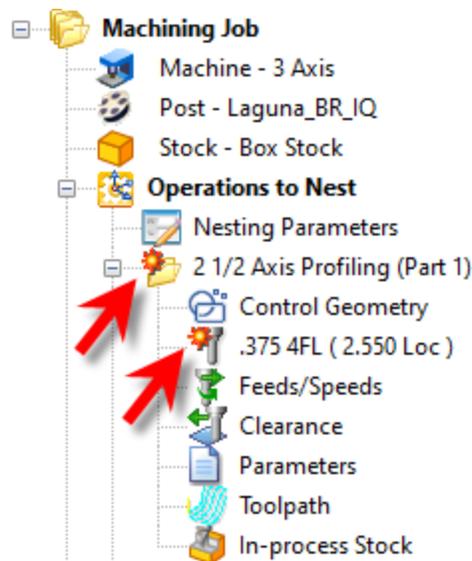
The tool can also be edited by dragging and dropping a tool from **Tools** tab to the **Machining Browser**.



### Display of Operations that need Regenerating after Editing

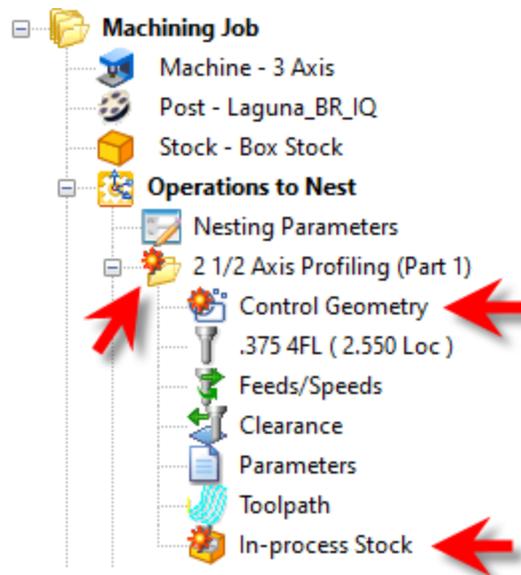
If any of the objects that make up the operation were to be edited after the toolpath was initially generated, the operation will be flagged dirty (i.e., needing regeneration). This condition is indicated by adding a red marker  to the operation folder. Also, the object that necessitated this condition  is also displayed with a red marker.

An example of this is shown below. In this case the tool used in the operation was edited after the machining operation was created and so is shown differently, as is the operation.



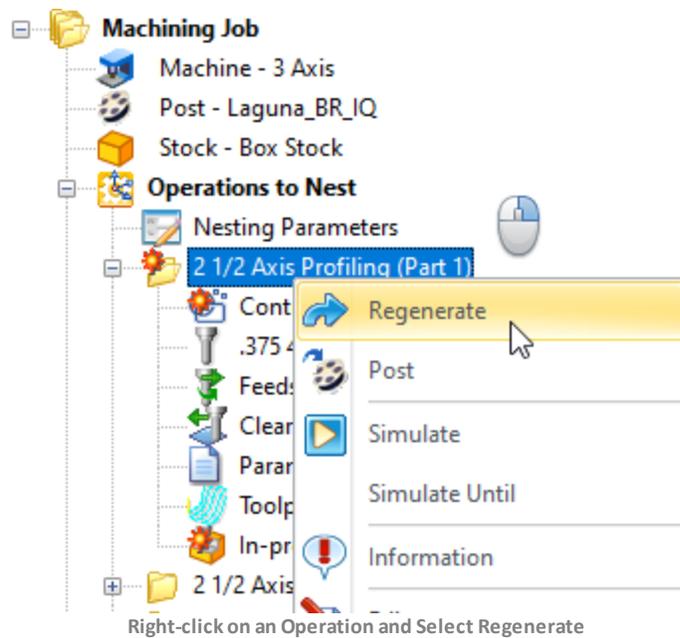
Display of Operations that need Regenerating after Editing

**Profile** operations will be flagged if any associated parameters outside of the operation are edited. For example, if the geometry is modified, all **Profile** operations dependent on that geometry will be flagged for regeneration. In the example below you see that the **Profile** folder, **Control Geometry** and the **In-process Stock** are flagged, letting you know that the operation needs to be regenerated and simulated.

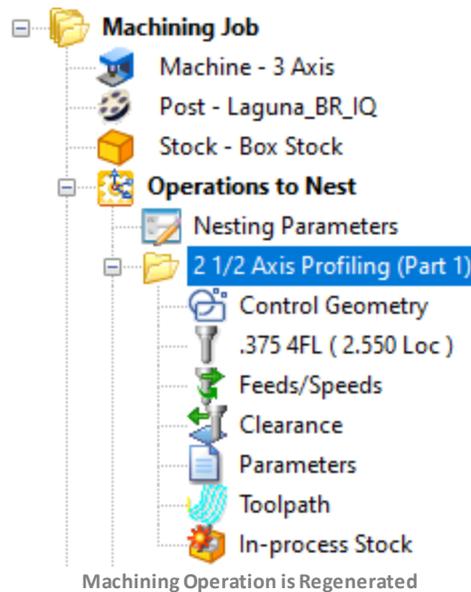


### Regenerating "Flagged" Machining Operations

In order to regenerate the operation that is flagged with a red marker, you would have to select the operation, right click and select **Regenerate**.



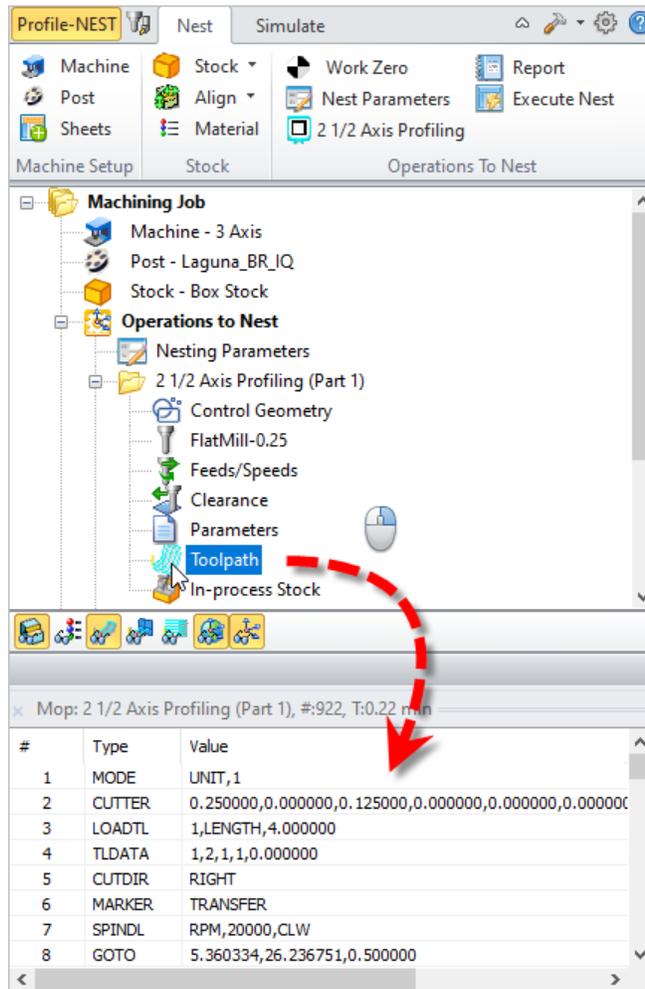
The toolpath is now generated with the modified settings. Notice that the In-process [Stock](#) is still flagged. This alerts you that it has not been simulated yet.



## 9.2 Toolpath Viewer

Once a machining operation is created, you can step through the toolpath motions using the [Toolpath Viewer](#). To display the viewer, expand the operation folder in the [Machining Browser](#) and right-click on the toolpath icon. The toolpath viewer is a dockable dialog bar that will be initially docked below or next to the [Machining Browser](#).

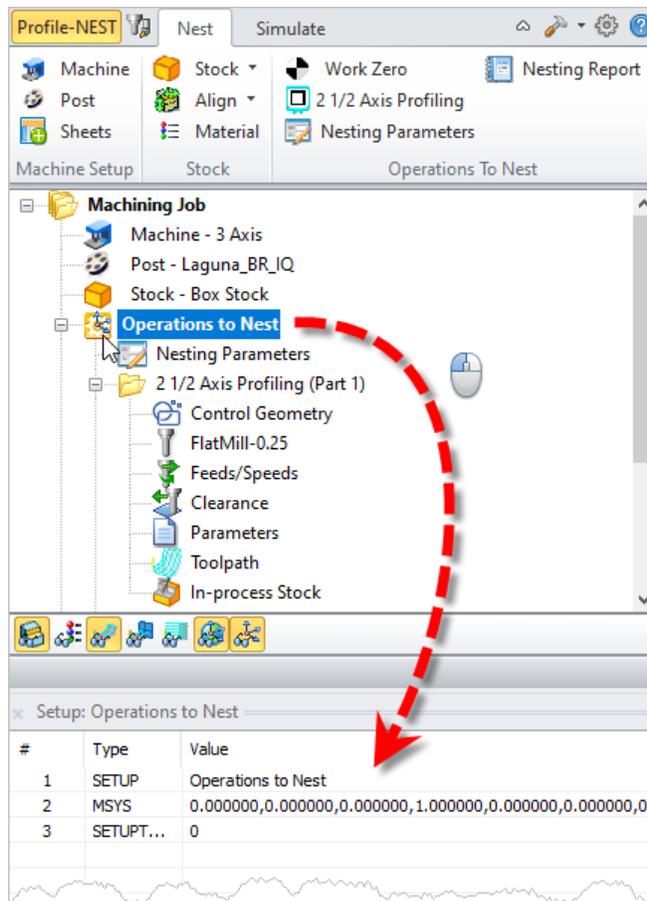
## The Toolpath Viewer Displayed



The Toolpath Viewer Displayed

## Previewing Setup Information in the Toolpath Viewer

If the **Toolpath Editor/Viewer** is currently displayed, selecting **Operations to Nest** will display the setup location and orientation. Errors are flagged and displayed in the toolpath editor/viewer if the setup orientation is not achievable.



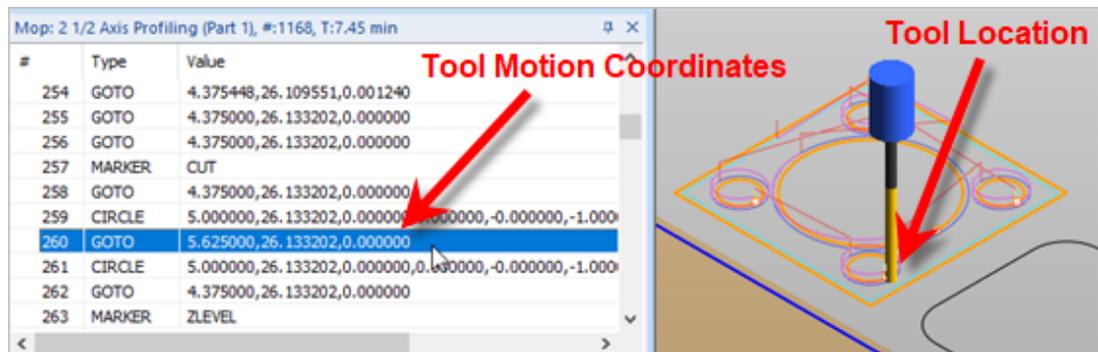
Setup Information is displayed in the Toolpath Viewer



### Previewing a GOTO Motion in the Toolpath Viewer

Select a **GOTO** motion in the **Toolpath Viewer** to view the tool motion for the generated toolpath.

Make sure to turn on  **Toolpath Visibility**.



Previewing a GOTO Motion in the Toolpath Viewer

## 9.3 Toolpath Editor

Available in: Xpress Standard Expert Professional Premium



Once a machining operation is created, the toolpath can be edited to add post-processor commands.



### Selecting a Toolpath for Editing

To display the toolpath editor, double click on the toolpath  icon of the operation in the [Machining Browser](#). The [Toolpath Editor](#) is a dockable dialog bar that will be initially docked below the machining browser.

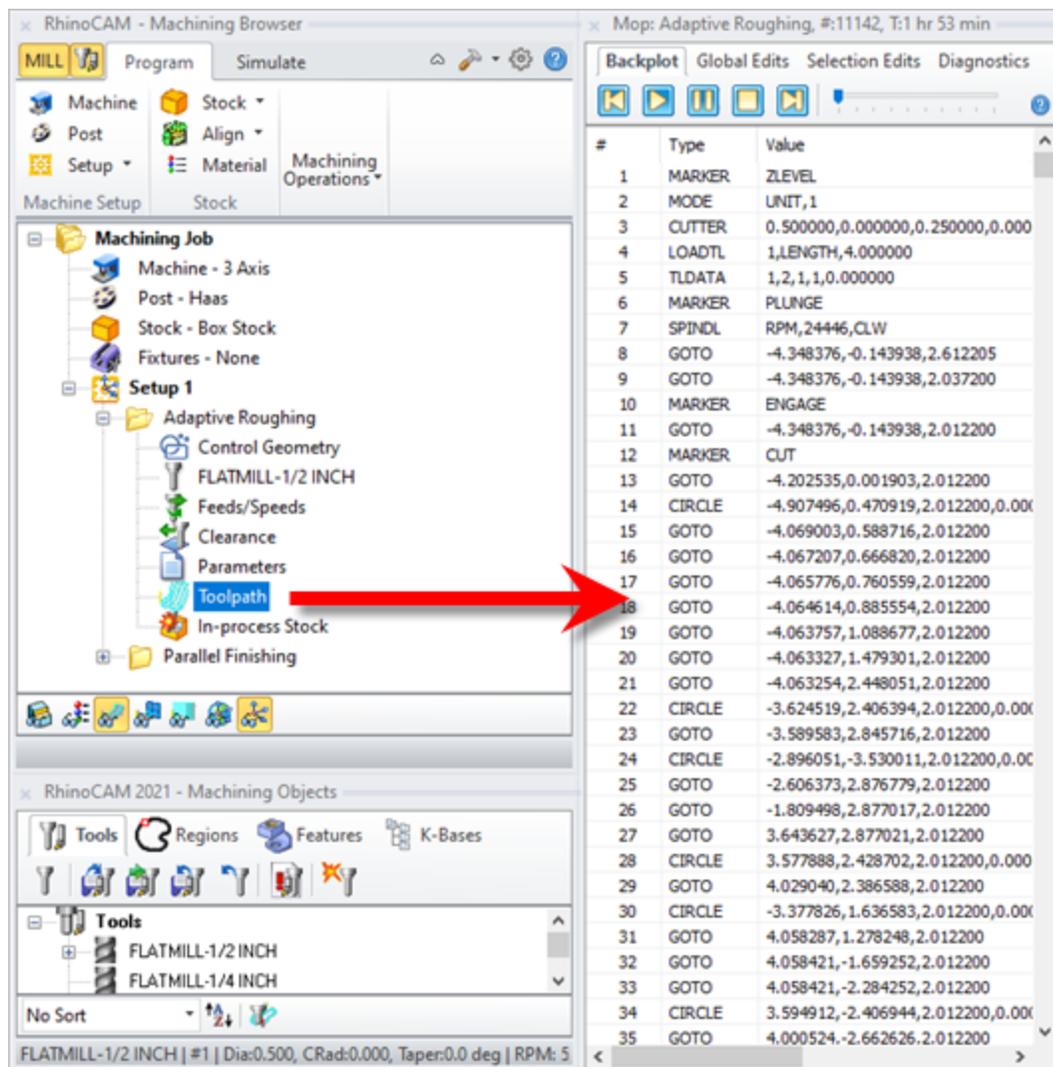


### The Toolpath Editor

The [Toolpath Editor](#) dialog shows 2 tabs [Global Edits](#) and [Selection Edits](#) on the top with a list box that lists the tool motions that can be edited. Below this list box there is another list box that displays the operation name, the number of toolpath points as well as the estimated machining time. You can remove individual tool motions from the tool path by selecting the desired lines.



Editing the toolpaths using the [Toolpath Editor](#) flags the [Machining Operation](#) folder to red marker that the toolpaths have been edited graphically.

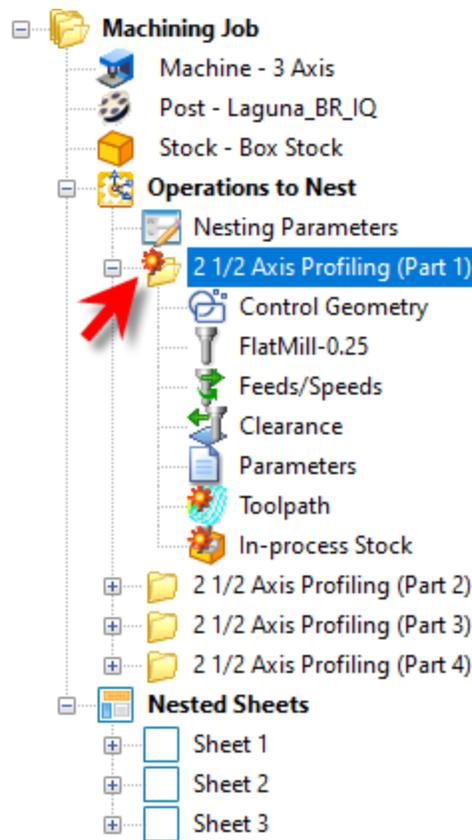


The screenshot displays the RhinoCAM Machining Browser interface. The left pane shows a tree view of the machining job, with 'Toolpath' selected under 'Setup 1'. A red arrow points from the 'Toolpath' node to the right pane. The right pane shows a list of operations with columns for '#', 'Type', and 'Value'.

#	Type	Value
1	MARKER	ZLEVEL
2	MODE	UNIT, 1
3	CUTTER	0.500000,0.000000,0.250000,0.000
4	LOADTL	1,LENGTH,4.000000
5	TLDATA	1,2,1,1,0.000000
6	MARKER	PLUNGE
7	SPINDL	RPM,24446,CLW
8	GOTO	-4.348376,-0.143938,2.612205
9	GOTO	-4.348376,-0.143938,2.037200
10	MARKER	ENGAGE
11	GOTO	-4.348376,-0.143938,2.012200
12	MARKER	CUT
13	GOTO	-4.202535,0.001903,2.012200
14	CIRCLE	-4.907496,0.470919,2.012200,0.000
15	GOTO	-4.069003,0.588716,2.012200
16	GOTO	-4.067207,0.666820,2.012200
17	GOTO	-4.065776,0.760559,2.012200
18	GOTO	-4.064614,0.885554,2.012200
19	GOTO	-4.063757,1.088677,2.012200
20	GOTO	-4.063327,1.479301,2.012200
21	GOTO	-4.063254,2.448051,2.012200
22	CIRCLE	-3.624519,2.406394,2.012200,0.000
23	GOTO	-3.589583,2.845716,2.012200
24	CIRCLE	-2.896051,-3.530011,2.012200,0.000
25	GOTO	-2.606373,2.876779,2.012200
26	GOTO	-1.809498,2.877017,2.012200
27	GOTO	3.643627,2.877021,2.012200
28	CIRCLE	3.577888,2.428702,2.012200,0.000
29	GOTO	4.029040,2.386588,2.012200
30	CIRCLE	-3.377826,1.636583,2.012200,0.000
31	GOTO	4.058287,1.278248,2.012200
32	GOTO	4.058421,-1.659252,2.012200
33	GOTO	4.058421,-2.284252,2.012200
34	CIRCLE	3.594912,-2.406944,2.012200,0.000
35	GOTO	4.000524,-2.662626,2.012200

The Toolpath Editor

 Operations that need Regenerating after Editing 



Display of Operations that need Regenerating after Editing

### Tool Motion Flags in the Toolpath Editor

If you see an operation in your [Machining Job](#) that is flagged, you will see the flagged toolpath motions in the [Toolpath Editor](#). Double-clicking on a flagged motion in the [Toolpath Editor](#) will display the tool at that coordinate location. Conditions that can flag operations include [Tool Holder](#) collisions or if the [Setup](#) orientation is not reachable.

	Type	Value
20	GOTO	3.000000,31.258202,0.000000
21	GOTO	6.000000,31.258202,0.000000
22	GOTO	6.125000,31.258202,0.000000
23	GOTO	6.125000,31.133202,0.000000
24	GOTO	6.125000,25.133202,0.000000
25	GOTO	6.125000,25.008202,0.000000
26	GOTO	6.000000,25.008202,0.000000
27	GOTO	0.000000,25.008202,0.000000
28	GOTO	-0.125000,25.008202,0.000000
29	GOTO	-0.125000,25.133202,0.000000
30	GOTO	-0.125000,31.133202,0.000000
31	GOTO	-0.125000,31.258202,0.000000
32	GOTO	0.000000,31.258202,0.000000
33	GOTO	3.000000,31.258202,0.000000
34	MARKER	ZLEVEL
35	MARKER	TRANSFER
36	GOTO	3.000000,31.258202,0.500000
37	MARKER	TRANSFER
38	GOTO	3.478473,29.946059,0.500000
39	MARKER	PLUNGE
40	GOTO	3.478473,29.946059,0.300000
41	GOTO	3.478473,29.946059,0.300000
42	MARKER	PATHRAMP_ENGAGE
43	GOTO	3.478473,29.946059,0.300000
44	GOTO	3.445661,29.954468,0.297037
45	GOTO	3.405824,29.963757,0.293458
46	GOTO	3.365794,29.972174,0.289879
47	GOTO	3.325590,29.979716,0.286300
48	GOTO	3.285231,29.986380,0.282722

Tool motion errors are flagged for evaluation.

### 9.3.1 Backplot Toolpath

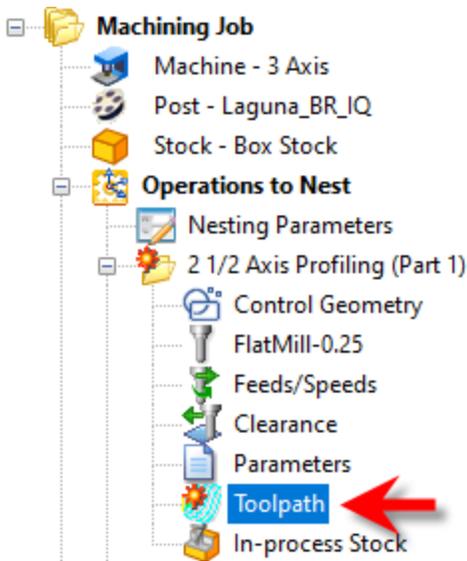
Available in: Xpress    Standard    Expert    Professional ✓    Premium ✓

Use the [Backplot](#) tab of the [Toolpath Editor](#) to perform a backplot of the tool motions contained within the active toolpath. This is similar to a cut material simulation but is performed with only the toolpath and the tool.

**Note:** If the toolpath contains flagged motions (i.e., there were errors during toolpath generation and simulation) running a [Backplot](#) WILL ignore these flags. Use the [Diagnostics](#) tab of the [Toolpath Editor](#) to diagnose such errors.

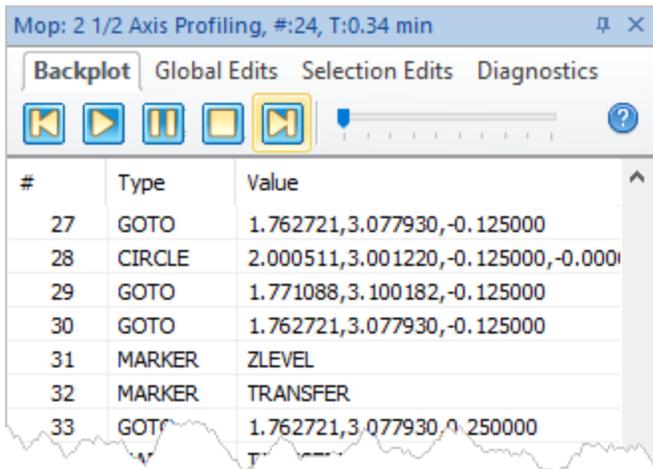
#### Basic Procedure

1. You must first generate a toolpath before a backplot can be performed.
2.  In the [Machining Job](#) tree, expand the [Machining Operation](#) folder and double-left-clicking on the operation's [Toolpath](#) icon to display the [Toolpath Editor](#).



3. From the [Toolpath Editor](#) select the [Backplot](#) tab.
4. Use the icons on the toolbar to navigate through the backplot. These controls are similar to those located on the Simulate tab of the Machining Browser.
5. **Note:** If the toolpath contains flagged motions (i.e., there were errors during toolpath generation and simulation) running a [Backplot](#) WILL ignore these flags. Use the [Diagnostics](#) tab of the [Toolpath Editor](#) to diagnose such errors.

**Backplot tab, Toolpath Editor**



Backplot tab, Toolpath Editor

**Backplot Toolbar**



**Rewind Backplot:** Select this icon to [Rewind](#) the backplot back to the beginning at line number 1.



**Play Backplot:** Select this icon to **Play** the backplot forward from the current line number.



**Pause Backplot:** Select this icon to **Pause** the backplot at the current line number.



**Stop Backplot:** Select this icon to **Stop** the backplot.



**Fast Forward Backplot:** Select this icon to **Fast Forward** the backplot at the end (i.e., last line number).



**Backplot Speed Selector:** Use this slider to adjust the speed of the backplot tool motion.

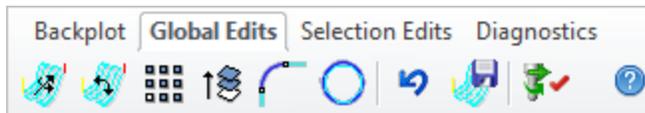
### 9.3.2 Global Edits

**Available in:** Xpress    Standard    Expert    Professional ✓    Premium ✓

These edits apply the changes to the entire toolpath.



#### Global Edits tab, Toolpath Editor



Global Edits tab, Toolpath Editor - Premium Configuration Shown



**Transform Toolpath:** Clicking on this button will bring up a **Transform Toolpath** dialog that allows the transformation of the toolpath. Toolpaths can be moved, rotated, scaled and mirrored.



**Reverse Toolpath:** Clicking on this button allows the reversal of the direction of the toolpath. All engage motions are changed to retract motions and all retract motions are converted to engage motions.



**Instance Toolpath:** Once a toolpath is generated, you can create multiple instances of the toolpath in XY by clicking on this button and bringing up the following **Instance Toolpath** dialog.



**Z Instance Toolpath:** Once a toolpath is generated, you can create multiple instances of the toolpath in Z by clicking on this button and bringing up the following **Z Instance Toolpath** dialog.



**Fit Arcs to Toolpath:** Clicking on this button will bring up the [Fit Arcs to Toolpath](#) dialog that allows fitting of circular motions to point-to-point toolpath motions.



**Linearized Toolpaths:** Clicking on this button will bring up the [Linearized Toolpath](#) dialog. This option is used to optimize the toolpath. A tolerance value can be specified and this will remove any additional toolpath points, which are less than the tolerance specified.



**Undo Toolpath Edits:** Clicking on this performs an undo operation and restores the toolpath back to its original un-edited state.



**Save Toolpath Edits:** Saves the edited toolpaths.



**Feedrate Optimization:** Used to [Optimize Feedrates](#) in corners. Allows you to specify feedrate percentages for geometric conditions.

### 9.3.2.1 Transform

Available in:

Xpress

Standard

Expert

Professional

Premium

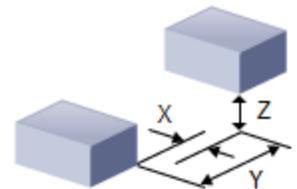


Transform allows you to [Move](#), [Rotate](#), [Scale](#) and [Edit Toolpath](#).

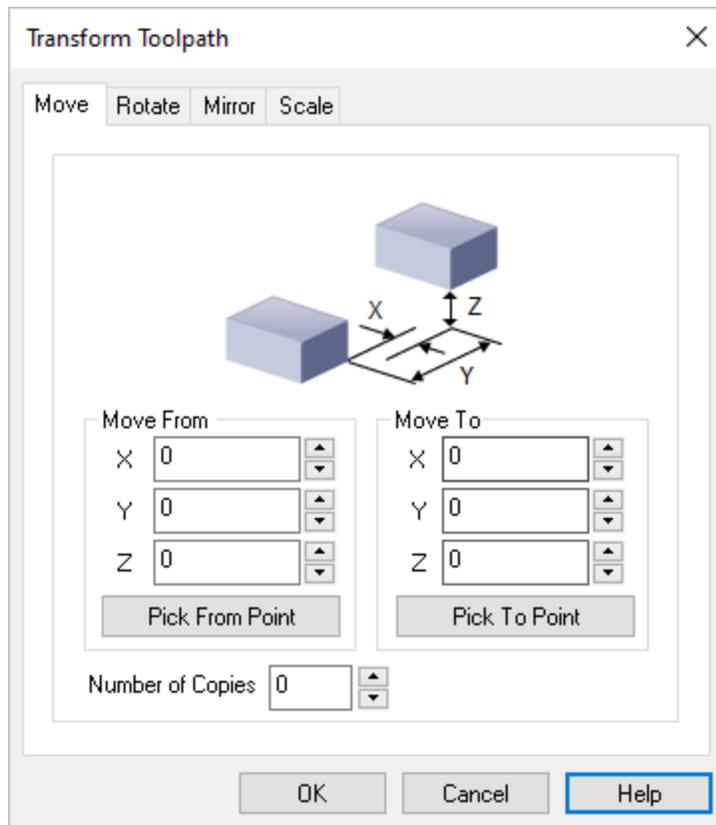


#### Move Toolpath

The [Move](#) tab of the [Transform Toolpath](#) dialog allows you to translate the toolpath by specifying [From](#) and [To](#) points for the move. You can either specify these points by coordinate entry in the corresponding edit fields or could graphically pick the points by selecting the [Pick](#) buttons. Once the points are specified, selecting the apply button will perform the move operation.



Transform Toolpath, Toolpath Editor



Dialog Box: Transform Toolpath, Move tab

**Move From**

Enter the *X,Y,Z* coordinate values for the **Move From** point or select the **Pick From Part** button to select a point from the model.

**Move To**

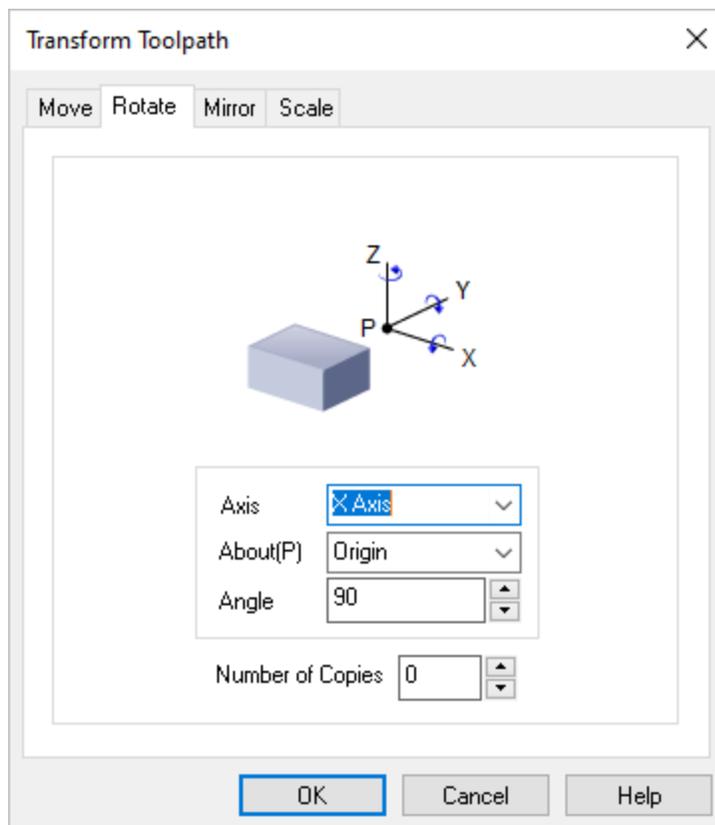
Enter the *X,Y,Z* coordinate values for the **Move To** point or select the **Pick To Part** button to select a point from the model.

**Number of Copies**

You can also **Copy** the toolpath by entering the number of copies.

**Rotate Toolpath**

Selecting the **Rotate** tab allows you to rotate the toolpath.



Dialog Box: Transform Toolpath, Rotate tab

### Axis / About(P) / Angle

Rotation can be performed around any of the three principal axes. The angle of rotation as well as the point and **Axis** of rotation can be specified.

The point of rotation could be one of the **Origin**, **Center** of the part, **Minimum** point of the part and the **Maximum** point of the part.

The **Axis** of rotation could be the **X**, **Y** or the **Z Axis**. You can specify any arbitrary rotation **Angle**.

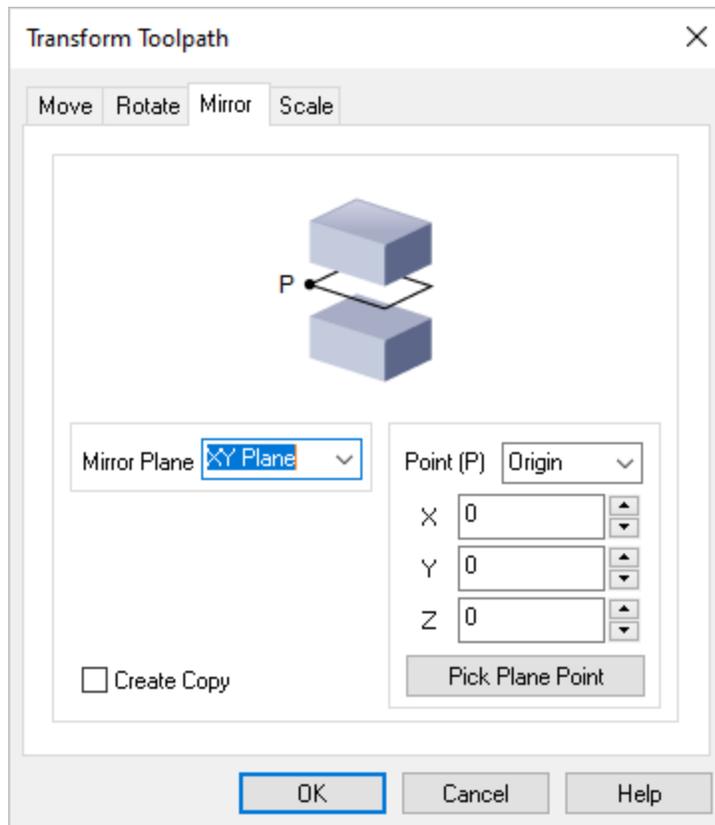
### Number of Copies

You can also **Copy** the toolpath by entering the number of copies.



### Mirror Toolpath

Selecting the **Mirror** tab allows you to Mirror the selected toolpath.



Dialog Box: Transform Toolpath, Mirror tab

### Mirror Plane

Select the **Mirror Plane** from the list ([XY Plane](#), [XZ Plane](#) or [YZ Plane](#)).

### Point (P)

Select a **Mirror Point (P)** from the list ([Origin](#), [Center](#) of the part, [Minimum](#) point of the part) or enter the **X,Y,Z** coordinate values of the desired point.

You can also select the [Pick Plane Point](#) button to select a point from the model.

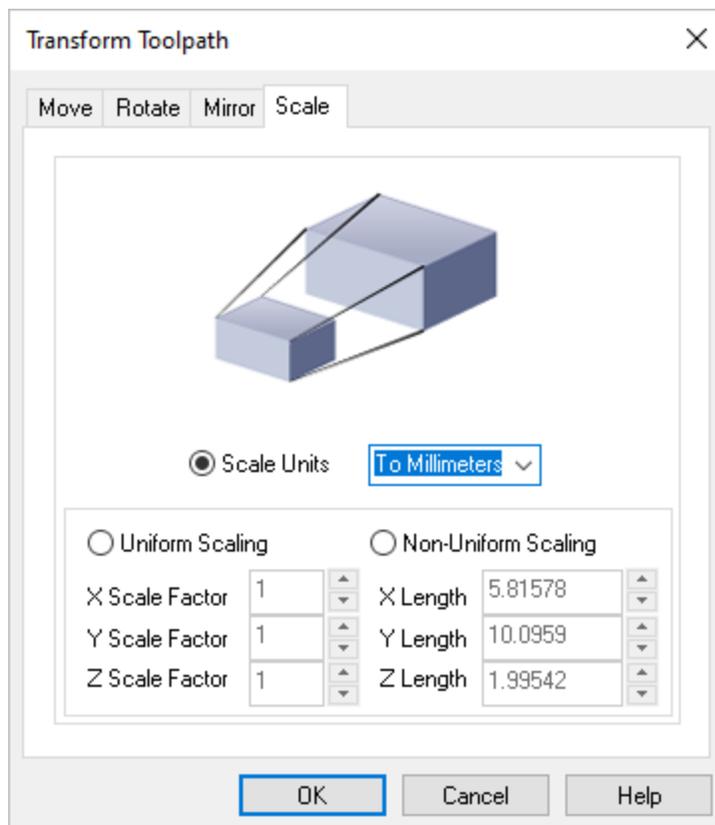
### Create Copy

Check this box to create a **Copy** of the mirrored toolpath.



### Scale Toolpath

Selecting the **Scale** tab allows you to scale the selected toolpath. All scaling is performed about the zero of the coordinate axes. You can optionally scale from a mm to an inch or vice-versa or by specifying a scale factor. You can also scale the selections uniformly or perform non-uniform scaling in each of the three principal axes.



Dialog Box: Transform Toolpath, Scale tab

### Scale Units

Select the **Scale Units** from the list (**To Millimeters** or **To Inches**).

### Uniform Scaling

Select this option and then enter the uniform **X**, **Y** and **Z** scale factors.

### Non-Uniform Scaling

Select this option and then enter the actual non-uniform **X**, **Y** and **Z** length values.

#### 9.3.2.2 Instance

Available in:

Xpress

Standard

Expert

Professional

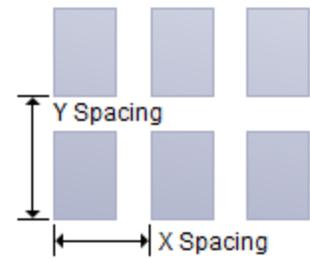
Premium



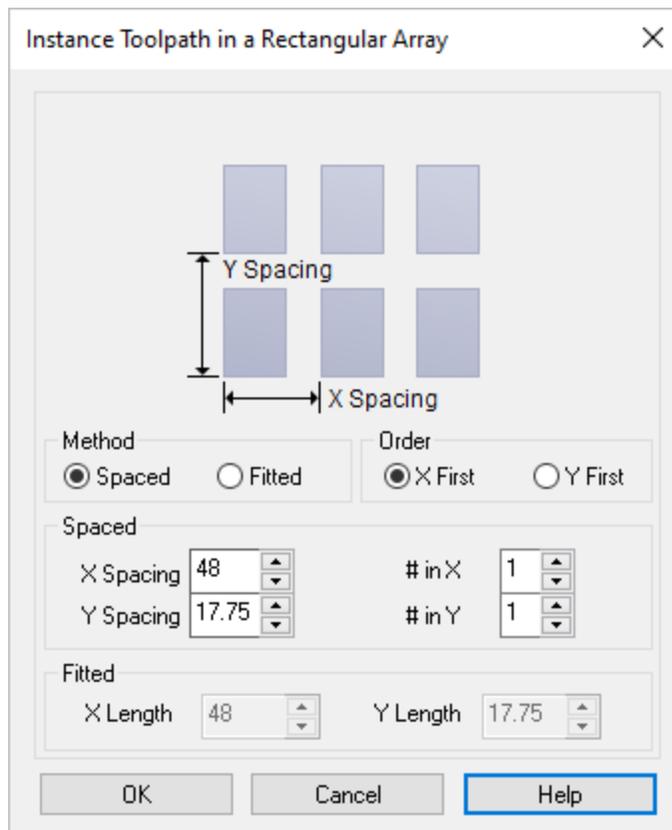
 Once a toolpath is generated, you can create multiple instances of the toolpath via this dialog. This can be useful in situations where you are manufacturing multiple instances of the same part.

 **Dialog Box: Instance Toolpath in a Rectangular Array**

You can specify multiple instances in the X and Y directions in two different ways.



Instance Toolpath, Toolpath Editor



Dialog Box: Instance Toolpath in a Rectangular Array

 **Method = Spaced**

Using the **Spaced** method, you specify the independent **X Spacing** and **Y Spacing** values between the toolpaths.

The spacing is then used and applied to the bounding box of the part geometry as shown in the picture on the dialog.

Enter the number of copies of the instanced toolpath using the **# in X** and **# in Y** values.

### Method = Fitted

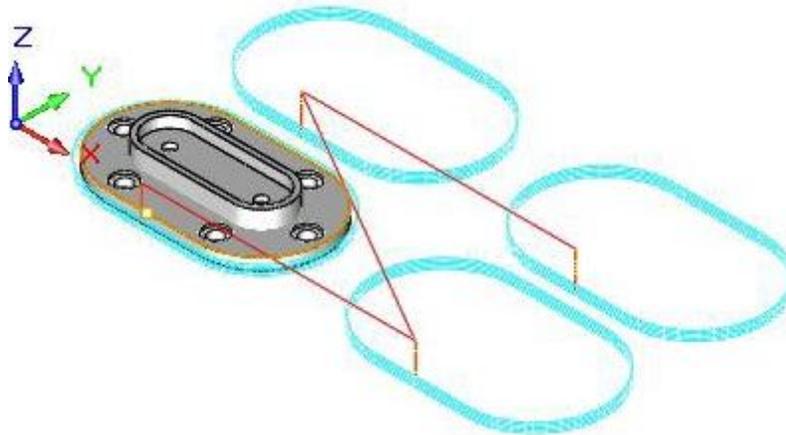
Using the **Fitted** method, you specify a rectangle in which the toolpaths will be fitted by using the **X Length** and **Y Length** values.

The bounding box of the part geometry is considered when computing the number of toolpaths that can be fitted in the specified space.

### Order

The order of the instancing can also be specified by selecting either **X First** or **Y First**.

### Instanced Toolpath Example



Instanced Toolpath Example

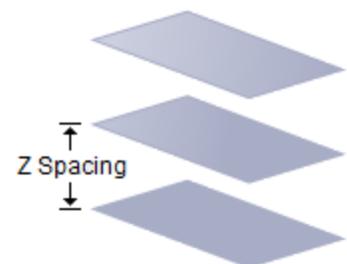
#### 9.3.2.3 Z Instance

Available in: **Xpress**   **Standard**   **Expert**   **Professional** ✓   **Premium** ✓

 Once a toolpath is generated, you can create multiple Z level instances of the toolpath via this dialog. This can be useful in situations where you are manufacturing multiple instances of the same part.

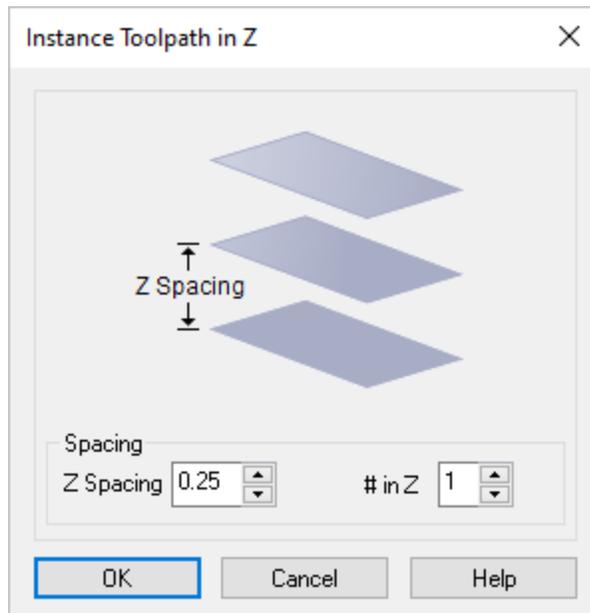
### Dialog Box: Instance Toolpath in Z

The toolpath will be copied multiple times and the tool initial engage will start from the top-most instance and work its way to the bottom most instance. Negative values



Z Instance Toolpath, Toolpath Editor

can be specified in the Z spacing. In this case the instances will proceed below the current location of the toolpath.



Dialog Box: Instance Toolpath in Z

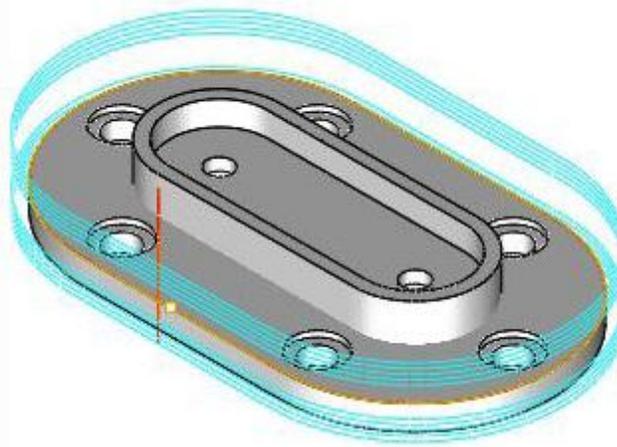
### Spacing

Specify the Spacing between the toolpaths in the Z direction.

### # in Z

Specify the total number of instances of the toolpath to create.

### Instanced Z Toolpath Example



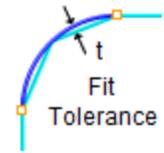
Instanced Z Toolpath Example

### 9.3.2.4 Fit Arcs to

Available in: Xpress Standard Expert Professional Premium



Arc or circular motions can be fitted to point-to-point toolpath motions in the toolpath editor. This serves to reduce the size of the post-processed toolpath as well as to improve surface finish. To fit arcs to a toolpath, click on this button. The following dialog will be then be invoked.



Fit Arcs to Toolpath, Toolpath Editor



#### Dialog Box: Arc Fit Parameters

Use this dialog to specify parameters within which the arcs motions will be fitted.

Arc Fit Parameters

Arc Fit Tolerance (t) 0.001

Minimum Length (L) 0.0447213E

Maximum Radius (r) 100

Constraint Plane

XY Plane  XZ Plane  YZ Plane

OK Cancel Help

Dialog Box: Instance Toolpath in Z

#### Arc Fit Tolerance (t)

Specify the tolerance arc fitting.

#### Minimum Length (L)

Specify the minimum length for each fitted arc segment.

#### Maximum Radius (r)

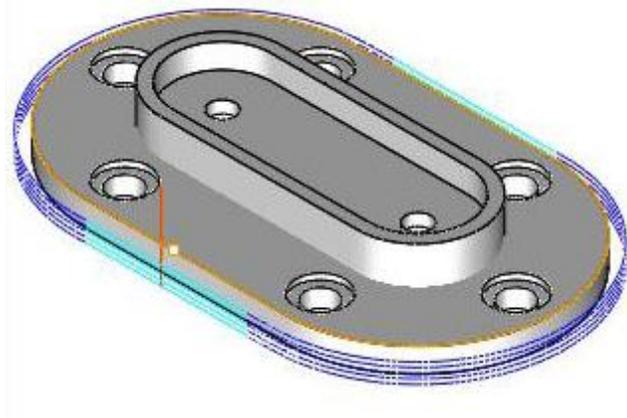
Specify the maximum arc radius that will be allowed during fitting.

#### Constraint Plane

The arc motions can further be restricted to be created in any or all of the principal planes.



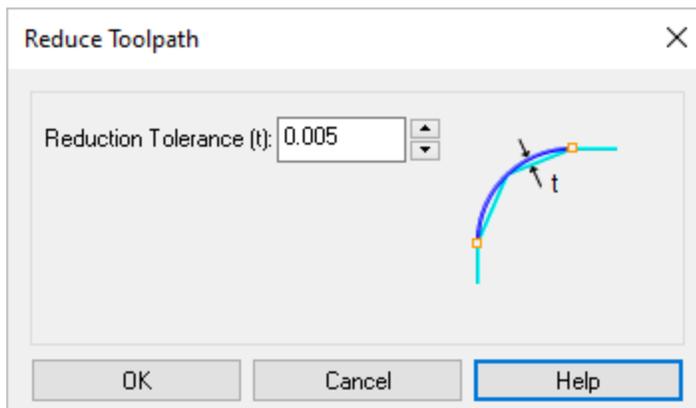
#### Instanced Z Toolpath Example



### 9.3.2.5 Linearized

**Available in:** Xpress   Standard   Expert   Professional ✓   Premium ✓

 This option is used to optimize the toolpath. A tolerance value can be specified and this will remove any additional toolpath points, which are less than the tolerance specified.



Dialog Box: Reduce Toolpaths



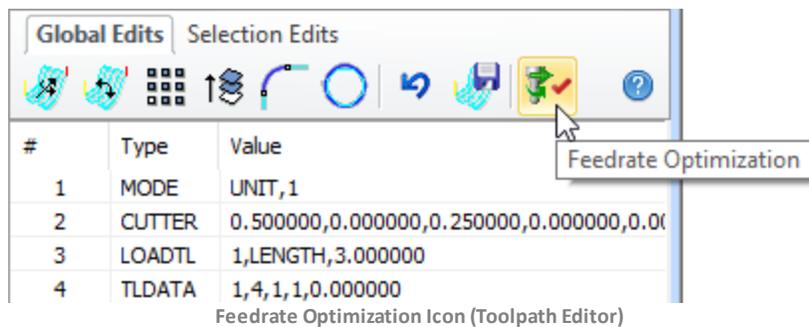
### 9.3.2.6 Feedrate Optimization

**Available in:** Xpress   Standard   Expert   Professional ✓   Premium ✓

 This option is used to optimize the toolpath feedrate in corners by slowing down the cutter before a corner and resuming its programmed speed after the corner. The values listed are percentages of the current feedrate assigned to the operation.

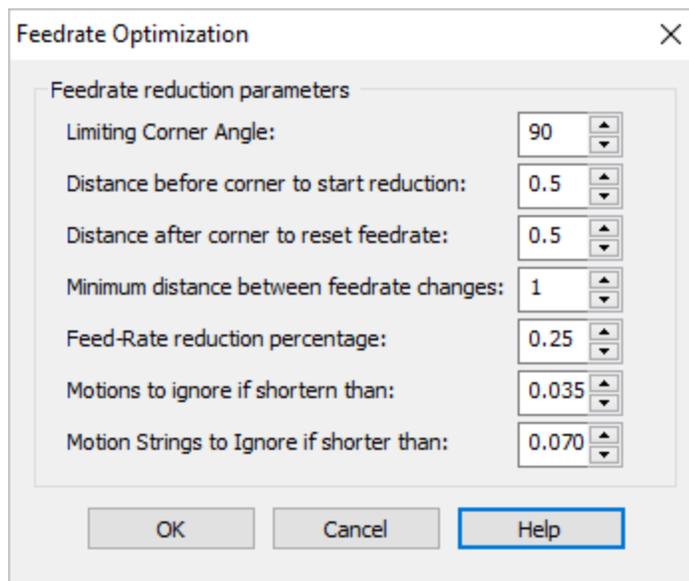
 **Feedrate Optimization** will only apply to planar toolpaths such as **2½ Axis** operations and some **3 Axis** operations.

 **Feedrate Optimization Icon**



Feedrate Optimization Icon (Toolpath Editor)

## Feedrate Optimization Dialog



Dialog Box: Feedrate Optimization

## Feedrate reduction parameters

### Limiting Corner Angle

Toolpaths equal to or below this [Angle](#) will be subject to these [Feedrate Optimization](#) rules.

### Distance before corner to start reduction

This is the linear [Distance](#) BEFORE a corner when [Feedrate Optimization](#) begins.

### Distance after corner to reset feedrate

This is the linear [Distance](#) AFTER a corner when [Feedrate Optimization](#) ends.

### Minimum distance between feedrate changes

This is the [Minimum Distance](#) between within which [Feedrate Optimization](#) will occur. Adjust this value to the minimum distance between corners on your part.

### Feedrate reduction percentage

This is the percentage of the default feedrate to apply for [Feedrate Optimization](#).

For example, entering **0.25** will apply a **25%** reduction in feedrate at the corner angles specified. This value must be be less than 1 to apply the correct feedrate reduction.

#### Motions to ignore if shorter than

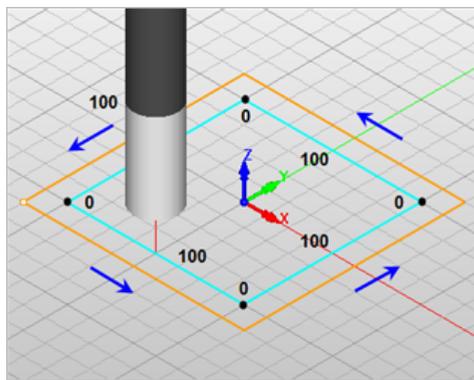
Individual toolpath motions shorter than this distance will be ignored for **Feedrate Optimization**.

#### Motion strings to ignore if shorter than

Accumulative (i.e., consecutive) toolpath motions shorter than this distance will be ignored for **Feedrate Optimization**.



#### Example without Feedrate Optimization

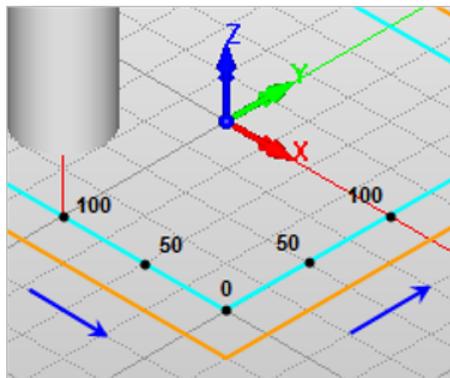


Example without Feedrate Optimization

```
N1G90
N2M3
N3T1
N4 S3055
N5M3
N6 G0 Z0.50
N7 G0 X0.00 Y-1.00
N8 G1 X0.00 Y-1.00 Z0.00 F50.
N9 G1 X1.00 Y-1.00 Z0.00 F100.
N10 G1 X1.00 Y1.00 Z0.00 F100.
N11 G1 X-1.00 Y1.00 Z0.00 F100.
N12 G1 X-1.00 Y-1.00 Z0.00 F100.
N13 G1 X0.00 Y-1.00 Z0.00 F100.
N14 G0 Z0.50
N15 G0 X0.00 Y-1.00
N16M5
N17G53 Z
N18X0Y0
```



#### Example with Feedrate Optimization



Example with Feedrate Optimization

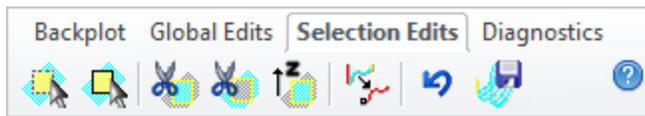
```
N1G90
N2M3
N3T1
N4 S3055
N5M3
N6 G0 Z0.50
N7 G0 X0.00 Y-1.00
N8 G1 X0.00 Y-1.00 Z0.00 F50.
N9 G1 X0.50 Y-1.00 Z0.00 F100.
N10 G1 X1.00 Y-1.00 Z0.00 F50.
N11 G1 X1.00 Y-0.50 Z0.00 F50.
N12 G1 X1.00 Y0.50 Z0.00 F100.
N13 G1 X1.00 Y1.00 Z0.00 F50.
N14 G1 X0.50 Y1.00 Z0.00 F50.
N15 G1 X-0.50 Y1.00 Z0.00 F100.
N16 G1 X-1.00 Y1.00 Z0.00 F50.
N17 G1 X-1.00 Y0.50 Z0.00 F50.
N18 G1 X-1.00 Y-0.50 Z0.00 F100.
N19 G1 X-1.00 Y-1.00 Z0.00 F50.
N20 G1 X-0.50 Y-1.00 Z0.00 F50.
N21 G1 X0.00 Y-1.00 Z0.00 F100.
N22 G0 Z0.50
N23 G0 X0.00 Y-1.00
N24M5
N25G53 Z
N26X0Y0
```

### 9.3.3 Selection Edits

Available in: Xpress Standard Expert Professional Premium

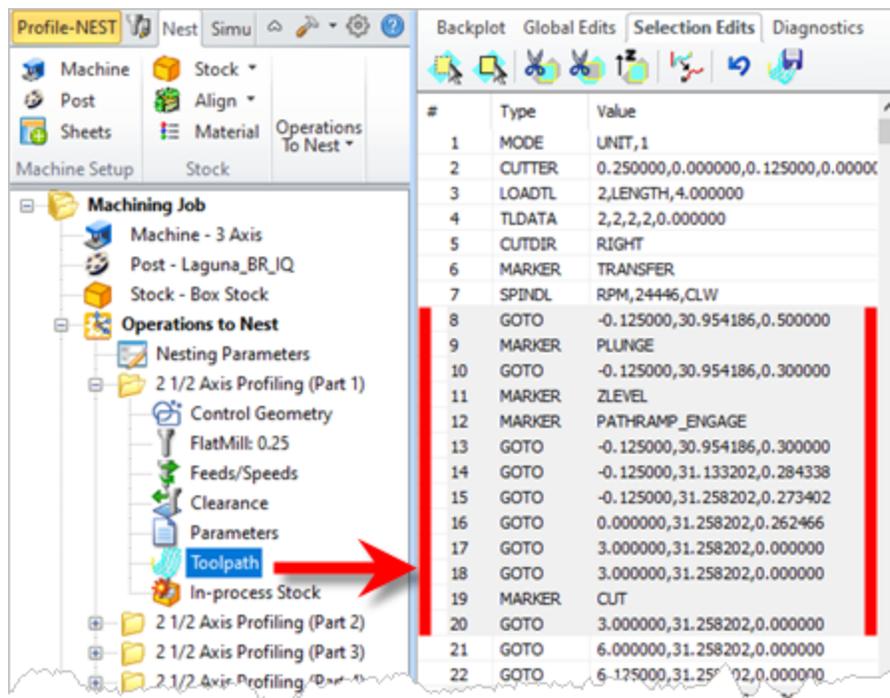
These edits apply to the selected motions of the toolpath. The motions can be selected by selecting the rows of toolpath motions in the toolpath editor and the selections are highlighted on toolpath display.

#### Selection Edits tab, Toolpath Editor



Selection Edits tab, Toolpath Editor

#### Toolpath Editor, Selection Edits Example



Toolpath Editor, Selection Edits Example

#### Select cuts by single pick or drag rectangle

Clicking on this tool allows you to graphically select sections of toolpath for editing.

#### Select closed curves to select cuts inside it

Allows you to select a closed curve as region to eliminate cuts inside it.

 **Cut Selections**
 Clicking on this button will remove all tool motions that are currently selected. It should be noted that in the case of tool motions that intersect with the selection regions the tool motions would be clipped against the selection regions and removed.

 **Isolate Selections**
 Clicking on this button will remove all tool motions other than those currently selected. Tool motions that intersect with the selection regions will be clipped and isolated.

 **Move Selection in Z**
 Clicking on this button will bring up the [Move Selection in Z](#) dialog to move in Z all tool motions that are currently selected. As with the cut and isolate actions, tool motions that intersect with the selection regions will be clipped and moved in Z.

 **Convert Selection to curve**
 The toolpath or a part of it can be selected using the selection commands. Then this command can be used to convert that toolpath into a Curve (region).

 **Undo Toolpath Edits**
 Clicking on this performs an undo operation and restores the toolpath back to its original un-edited state.

 **Save Toolpath Edits**
 Saves the edited toolpaths.

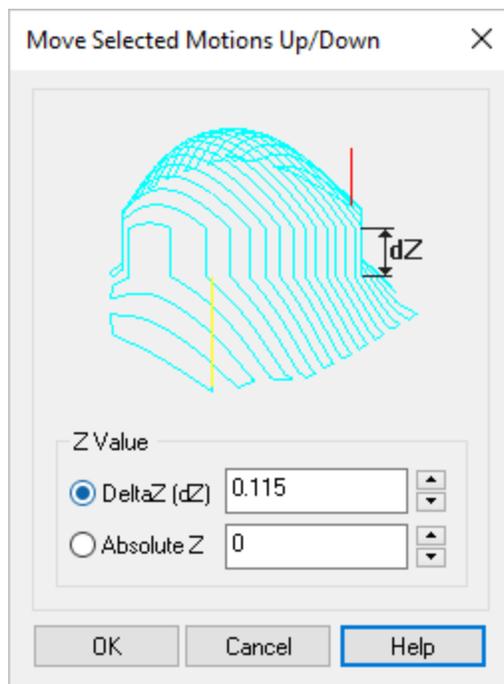
### 9.3.3.1 Move Selection in Z

**Available in:**    Xpress    Standard    Expert    Professional     Premium 

 This dialog can be used to move the selected motions up by either a delta amount or move the toolpath to an absolute Z coordinate. You can select the entire toolpath or a section of the toolpath to be moved.

In the first case the toolpath selection is merely shifted up in Z by the delta amount. In the second case, the starting point of the selection is moved to the specified absolute Z coordinate. All other selections will be shifted up by the same relative amount as the first point of the toolpath point.

 **Dialog Box: Move Selected Motions Up/Down**



### 9.3.4 Diagnostics

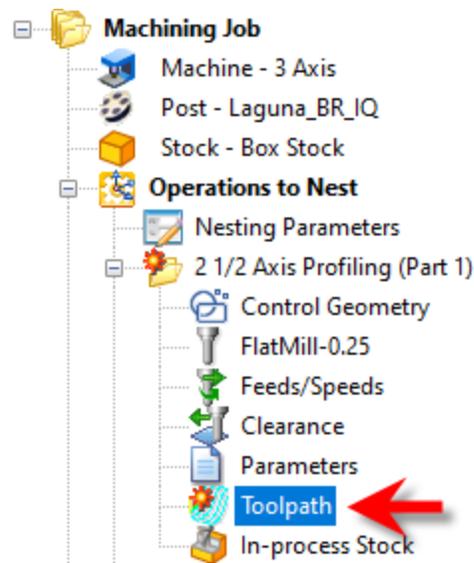
**Available in:** Xpress    Standard    Expert    Professional ✓    Premium ✓

Use the [Backplot](#) tab of the [Toolpath Editor](#) to perform a backplot of the tool motions contained within the active toolpath. This is similar to a cut material simulation but is performed with only the toolpath and the tool.

**Note:** You MUST perform a cut material simulation prior to utilizing the commands on this [Diagnostics](#) tab.

#### Basic Procedure

1. You must first perform a cut material simulation of the Machining Operation (Mop) using the Simulate tab.
2. If errors occur during the simulation accept them and continue the simulation to the end of the toolpath.
3.  In the [Machining Job](#) tree, expand the [Machining Operation](#) folder and double-left-clicking on the operation's Toolpath icon to display the [Toolpath Editor](#).



- From the **Toolpath Editor** select the **Diagnostics** tab. From here you can navigate through each error and also get an error report

#### Diagnostics tab, Toolpath Editor

#	Type	Value
578	GOTO	4.852163,3.268397,-1.500000
 579	GOTO	5.600882,3.269069,-1.500000
 580	GOTO	5.668103,3.218202,-1.500000
 581	GOTO	4.031906,3.217483,-1.500000
 582	GOTO	4.103445,3.267724,-1.500000
 583	GOTO	4.852163,3.268397,-1.500000
584	MARKER	FEEDFACTOR_CUT
585	GOTO	4.852163,3.268397,-1.500000
586	MARKER	CUT_TRANSITION
587	GOTO	

Diagnostics tab, Toolpath Editor

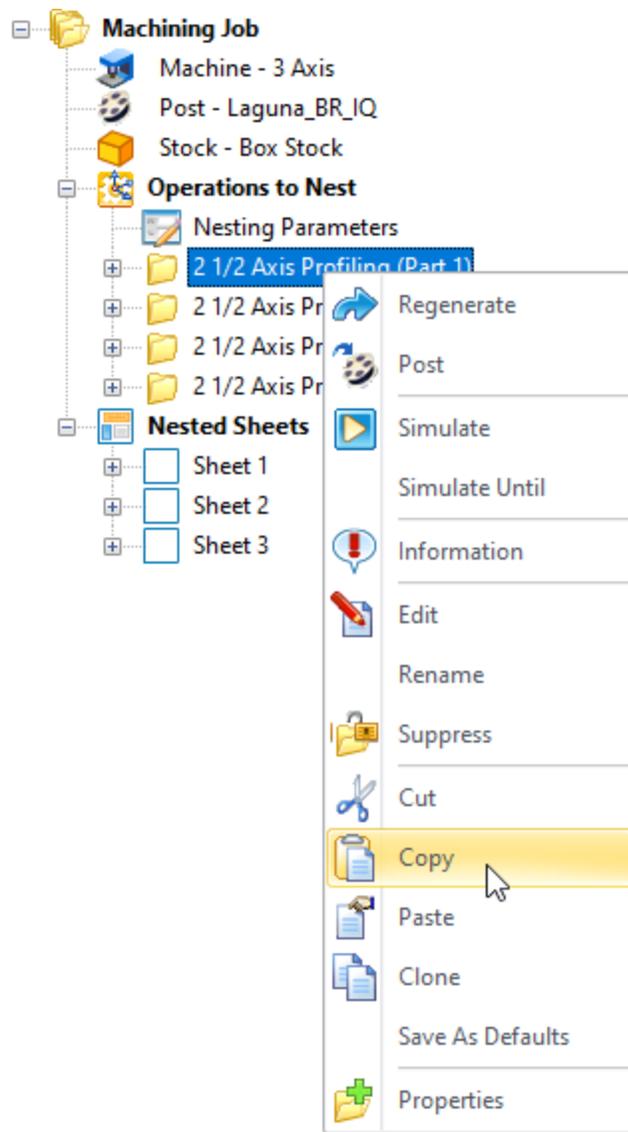
#### Diagnostics Toolbar

	<p><b>Go to Next Error:</b> Select this icon to move to the next error.</p>																											
	<p><b>Go to Previous Error:</b> Select this icon to move to the previous error.</p> <p>An error in a tool motion will look like this:</p> <table border="1" data-bbox="683 478 1279 516"> <tr> <td></td> <td>2051</td> <td>GOTO</td> <td>3.687965,4.881718,-1.000000</td> </tr> </table> <p style="text-align: center;">Tool motion error</p> <p>A highlighted or selected error in a tool motion will look like this:</p> <table border="1" data-bbox="683 625 1279 663"> <tr> <td></td> <td>2050</td> <td>GOTO</td> <td>3.778712,4.892433,-1.000000</td> </tr> </table> <p style="text-align: center;">Tool motion error selected</p>		2051	GOTO	3.687965,4.881718,-1.000000		2050	GOTO	3.778712,4.892433,-1.000000																			
	2051	GOTO	3.687965,4.881718,-1.000000																									
	2050	GOTO	3.778712,4.892433,-1.000000																									
	<p><b>Display Error Report:</b> Select this icon to display an Error Report. The report will list each tool motion line, motion type and error message for all error contained within the target toolpath.</p> <div data-bbox="678 863 1317 1346" style="border: 1px solid gray; padding: 5px;"> <p>Toolpath Errors Report</p> <p>Tool Operations</p> <table border="1"> <thead> <tr> <th>#</th> <th>Type</th> <th>Error</th> </tr> </thead> <tbody> <tr><td>2046</td><td>GOTO</td><td>Holder/Shank Collision</td></tr> <tr><td>2050</td><td>GOTO</td><td>Holder/Shank Collision</td></tr> <tr><td>2051</td><td>GOTO</td><td>Holder/Shank Collision</td></tr> <tr><td>2052</td><td>GOTO</td><td>Holder/Shank Collision</td></tr> <tr><td>2053</td><td>GOTO</td><td>Holder/Shank Collision</td></tr> <tr><td>2054</td><td>GOTO</td><td>Holder/Shank Collision</td></tr> <tr><td>2055</td><td>GOTO</td><td>Holder/Shank Collision</td></tr> <tr><td>2056</td><td>GOTO</td><td>Holder/Shank Collision</td></tr> </tbody> </table> <p style="text-align: right;">Print</p> <p style="text-align: center;">OK Cancel Help</p> </div> <p style="text-align: center;">Toolpath Errors Report</p>	#	Type	Error	2046	GOTO	Holder/Shank Collision	2050	GOTO	Holder/Shank Collision	2051	GOTO	Holder/Shank Collision	2052	GOTO	Holder/Shank Collision	2053	GOTO	Holder/Shank Collision	2054	GOTO	Holder/Shank Collision	2055	GOTO	Holder/Shank Collision	2056	GOTO	Holder/Shank Collision
#	Type	Error																										
2046	GOTO	Holder/Shank Collision																										
2050	GOTO	Holder/Shank Collision																										
2051	GOTO	Holder/Shank Collision																										
2052	GOTO	Holder/Shank Collision																										
2053	GOTO	Holder/Shank Collision																										
2054	GOTO	Holder/Shank Collision																										
2055	GOTO	Holder/Shank Collision																										
2056	GOTO	Holder/Shank Collision																										

## 9.4 Copy/Paste

You can [Copy](#) and [Paste](#) machining operations in [Machining Browser](#). To [Copy](#) an operation, select the operation under the [Machining Browser](#), right-click and select [Copy](#).

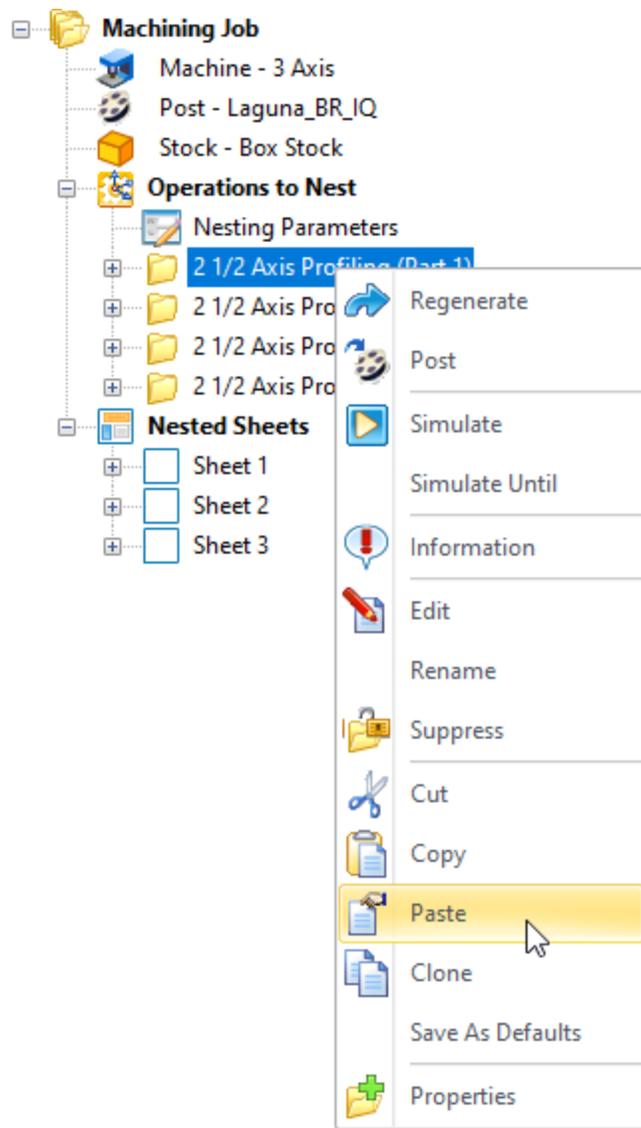
### Copy the Operation



Machining Browser: Copy an Operation

### Paste the Operation

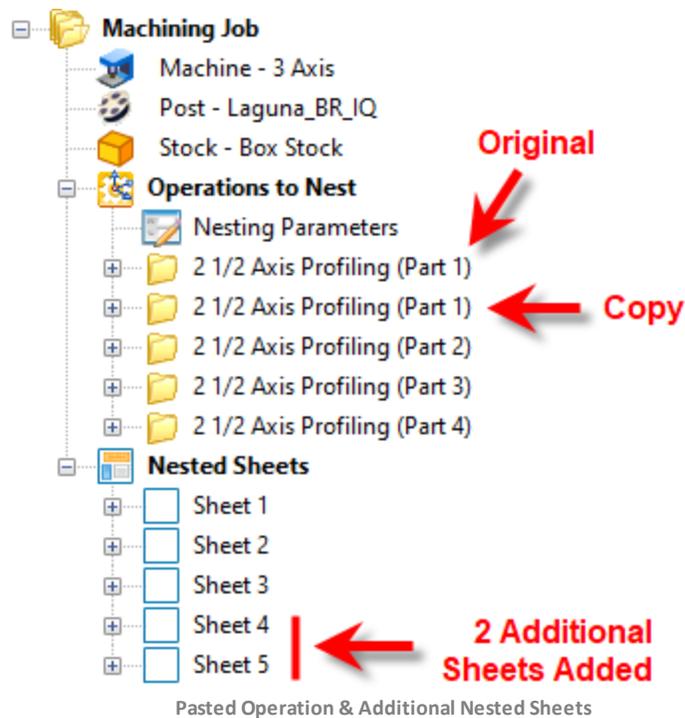
Right click on the operation and left click on [Paste](#).



Machining Browser: Paste an Operation

### Edit or Regenerate the Operation

This creates a copy of the operation located under the currently selected operation. If you picked Yes to the Execute Nest message dialog, additional sheets are added to the Nested Sheets list to accommodate the additional operation.

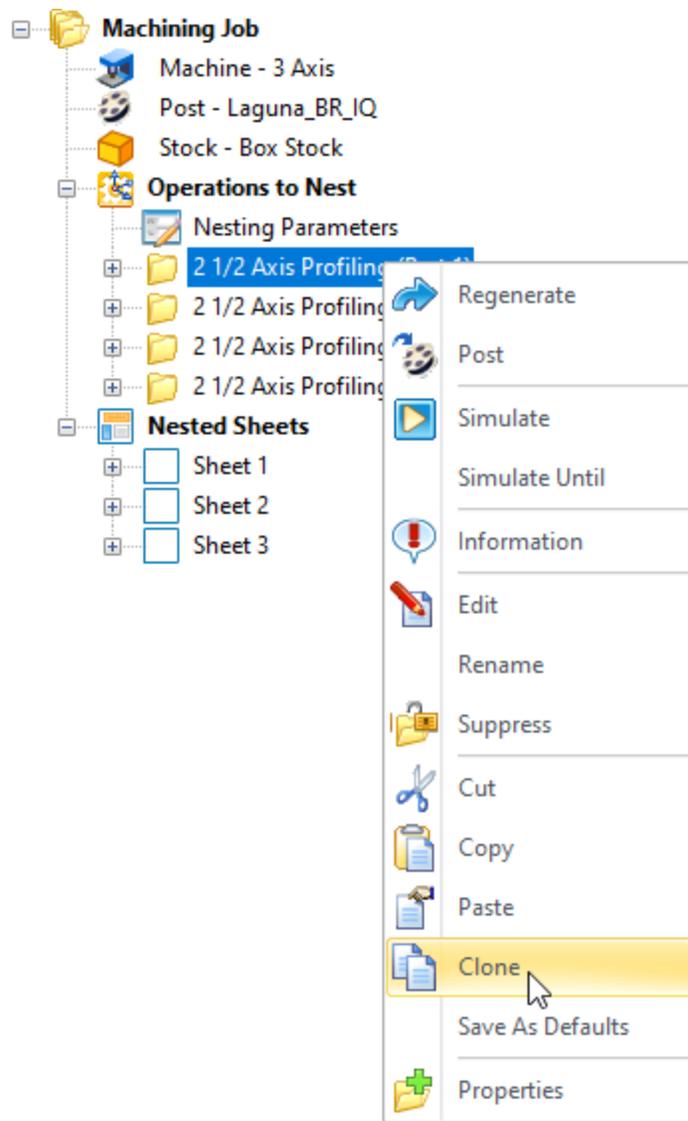


You can then edit the operation and regenerate toolpath.

## 9.5 Clone

You can [Clone](#) machining operations in [Machining Browser](#). To [Clone](#) an operation, select the operation under the [Machining Browser](#), right-click and select [Clone](#). This performs a Copy/Paste on the selected operation.

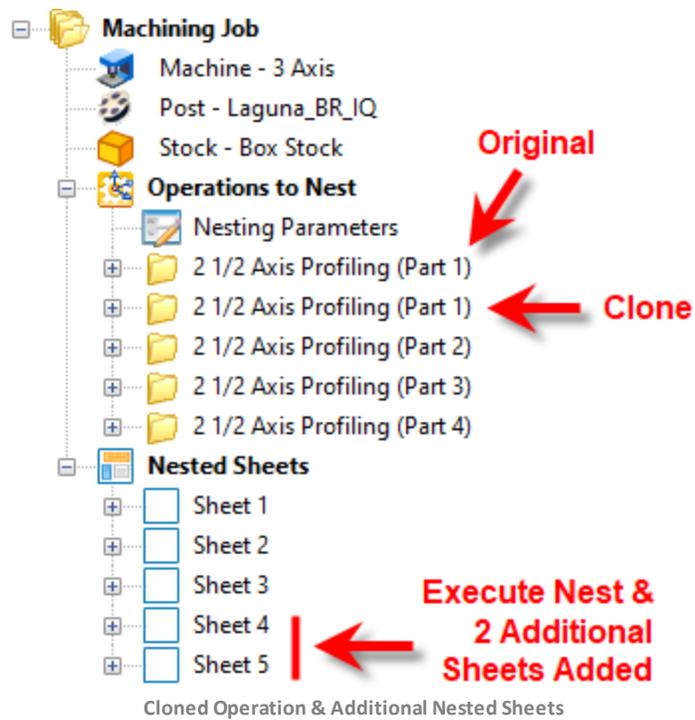
 [Copy the Operation](#)



Machining Browser: Clone an Operation

### Edit or Regenerate the Operation

This creates a copy of the operation located under the currently selected operation.

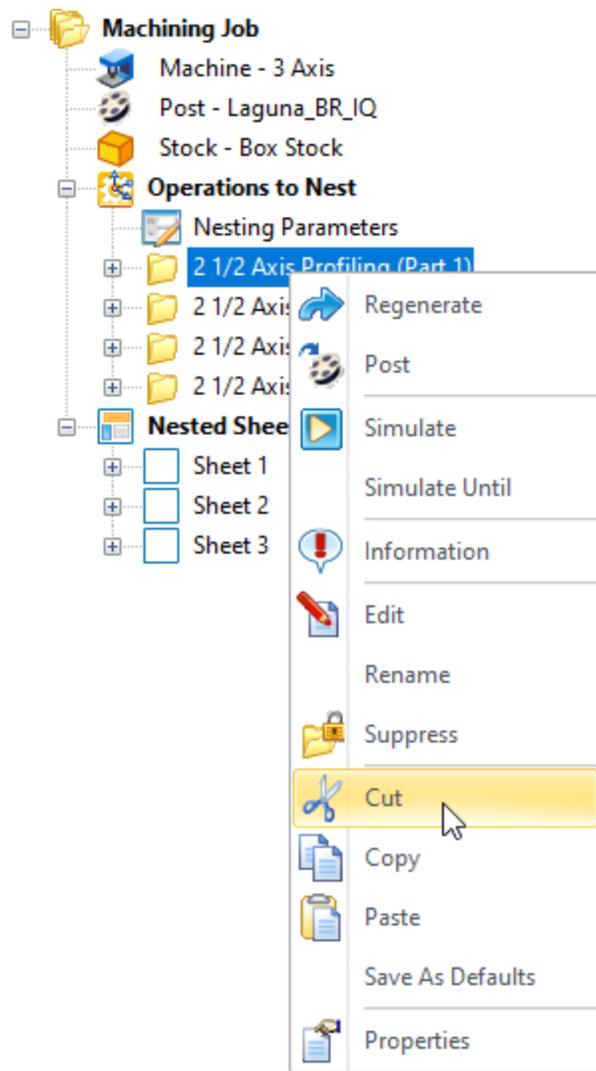


You can then edit the operation and regenerate toolpath.

## 9.6 Delete

To [Delete](#) a machining operation, select it from the [Machining Browser](#), right click and select [Cut](#) from the context menu.

 [Cut an Operation](#)



Delete from Right-Click Menu

### Alternate Methods to Delete an Operation

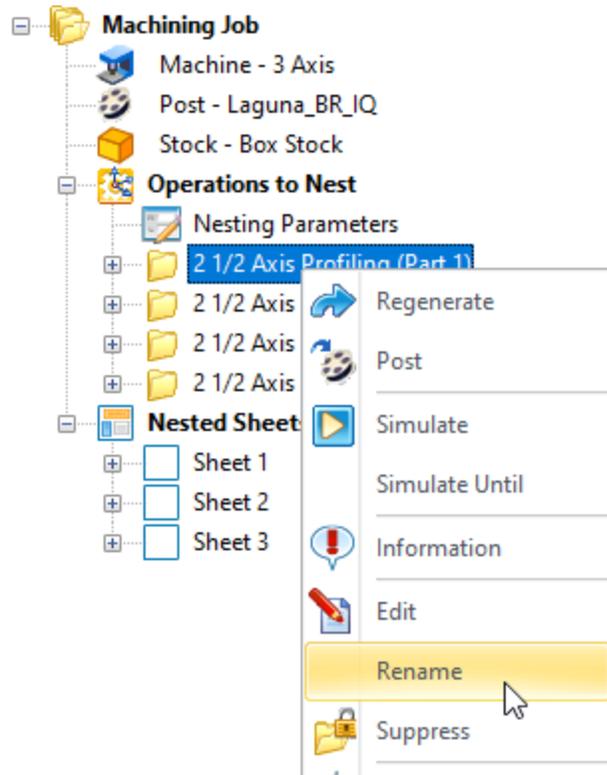
Alternatively you can delete a machining operation by:

- Selecting the operation and pressing the [Delete](#) key on your keyboard.
- Selecting the operation and dragging the operation out of the mops browser to the viewport area.

## 9.7 Rename

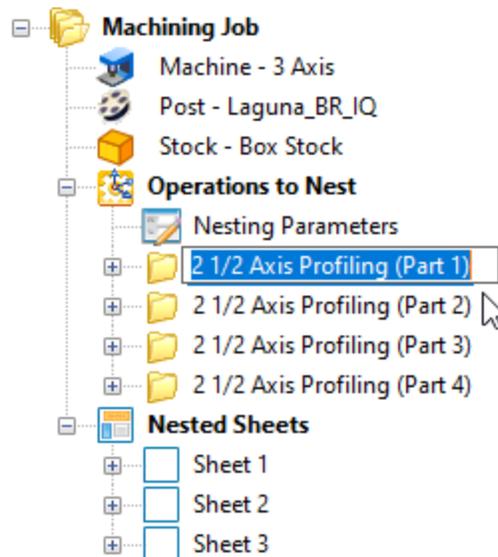
You can [Rename](#) a machining operation or the [Setup](#) in the [Machining Browser](#) by selecting it, right click and select [Rename](#) from the context menu.

## Select Rename from the Right-click Menu



Select Rename from the Right-click Menu

Selecting **Rename** allows you to edit the operation name.



Edit the Operation's Name

## Conventions for Renaming Operations

Do not use any of these common illegal characters/symbols in your **Mop Names**:

DO NOT USE these Characters when renaming Mops			
#	pound	?	question mark
%	percent	/	forward slash
&	ampersand	\$	dollar sign
{	left bracket	!	exclamation point
}	right bracket	'	single quotes
\	back slash	"	double quotes
<	left angle bracket	:	colon
>	right angle bracket	@	at sign
*	asterisk		

Also, keep these rules in mind:

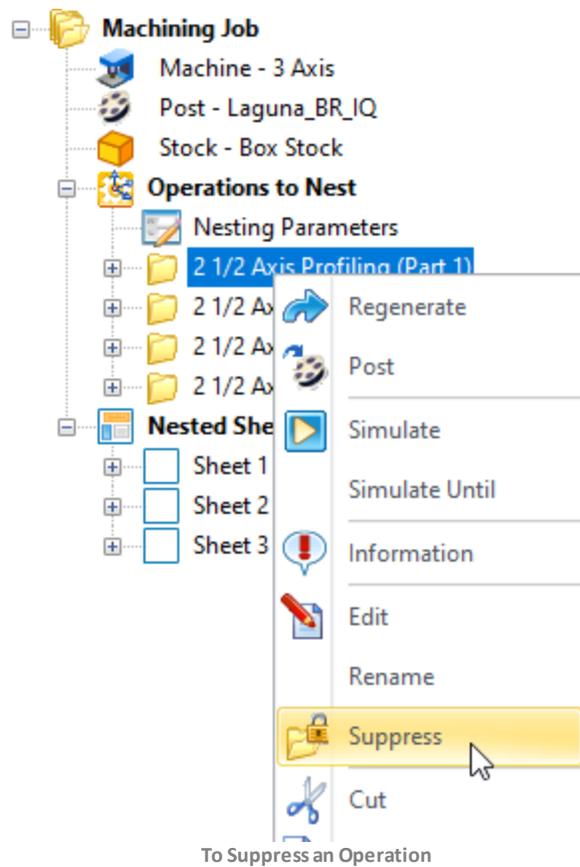
- Do not start or end your [Mop Names](#) with a space or period
- Keep your file names to a reasonable length and be sure they are under 31 characters.

## 9.8 Suppress

You can [Suppress](#) a machining operation in the [Machining Browser](#) by selecting it, right click and select [Suppress](#) from the context menu. Suppressed operations will not be displayed, posted or simulated. You can also right-click and [Unsuppress](#) an operation. **Note:** You can customize how suppressed operations are managed using the [Machining Preferences](#) dialog.

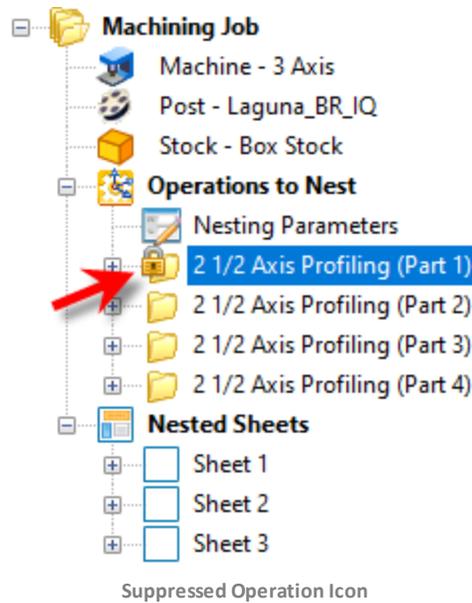


### To Suppress an Operation



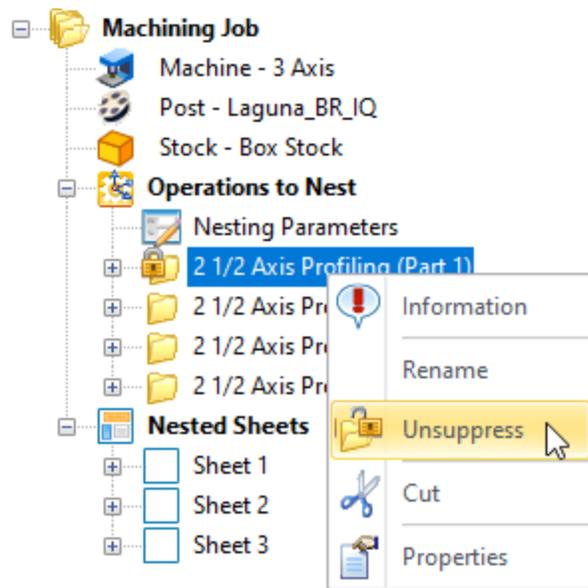
### The Suppressed Operation Icon

A Suppress operation will display in the **Machining Job** with the following icon:



### To Unsuppress an Operation

To **Unsuppress** an operation, right-click on it and select **Unsuppress**.



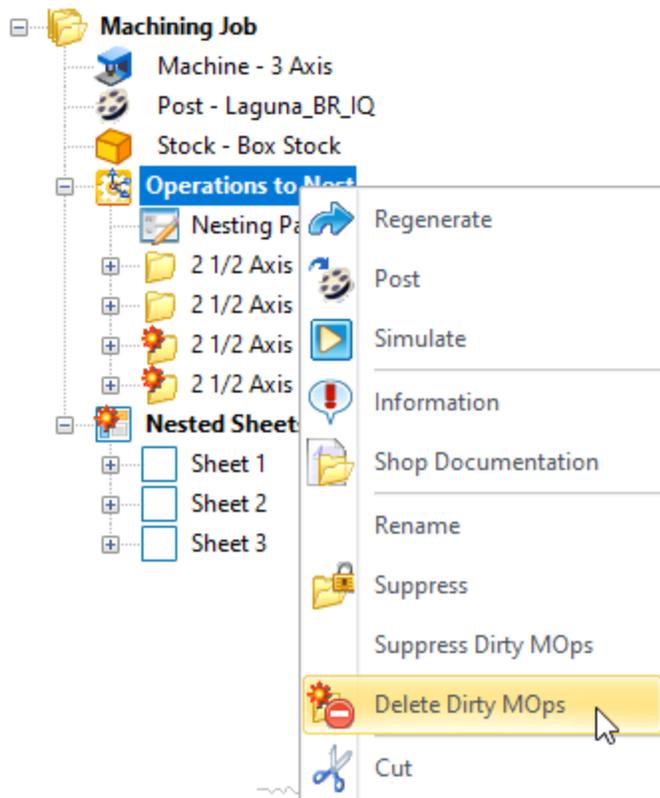
To Unsuppress an Operation

## 9.9 Delete Dirty Mops

You can **Delete** all machining operations in a **Setup** that are flagged as dirty . Warning: This a permanent operation and cannot be undone. Select the **Setup**, right click and select **Delete Dirty Mops** from the context menu. This command can also be executed from right-clicking on the **Machining Job** to delete ALL dirty Mops in all **Setups**.

 **Delete All Dirty Mops (BEFORE)**

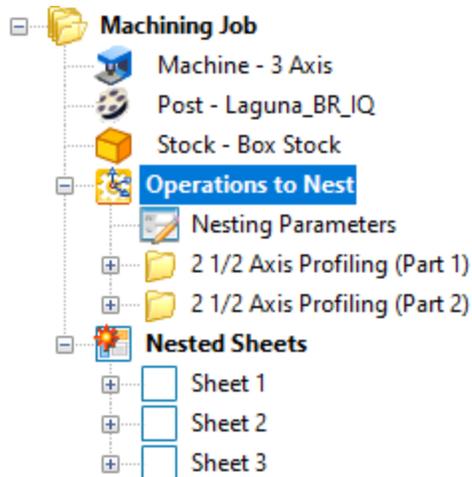
 **Warning!** This operation is permanent and cannot be undone!



Delete all Dirty MOps  
Profile-NEST Module shown, Similar for MILL and TURN

### Delete All Dirty Mops (AFTER)

A dirty Mops  within the Setup are deleted.

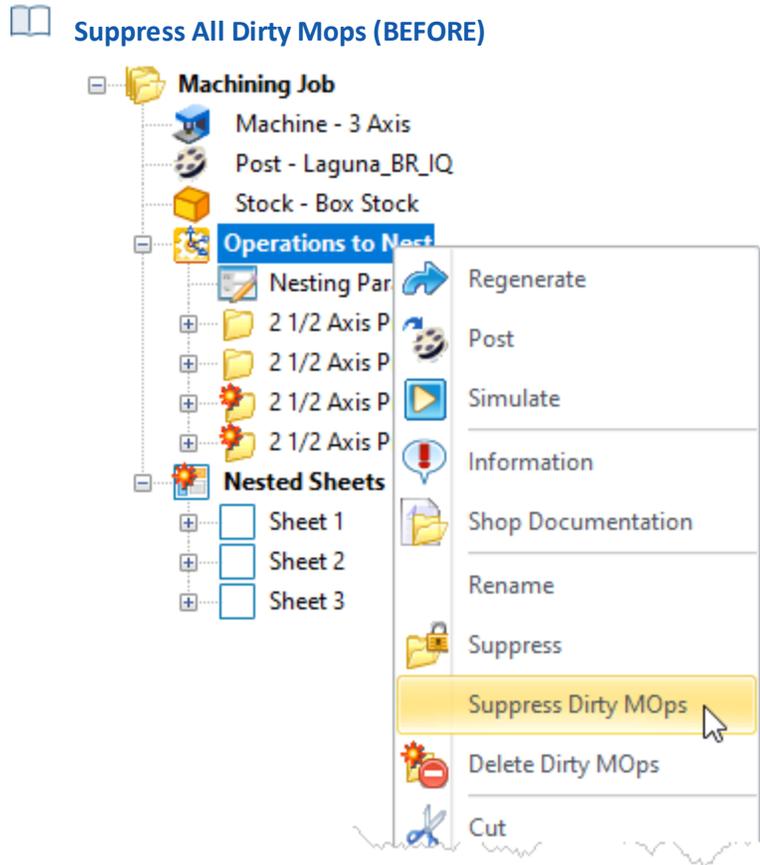


All Dirty MOps are deleted  
Profile-NEST Module shown, Similar for MILL and TURN

## 9.10 Suppress Dirty Mops

You can [Suppress](#) all machining operations in a [Setup](#) that are flagged as dirty . Select the [Setup](#), right click and select [Suppress Dirty Mops](#) from the context menu. This command can also be executed from right-clicking on the [Machining Job](#) to suppress ALL dirty Mops in all [Setups](#).

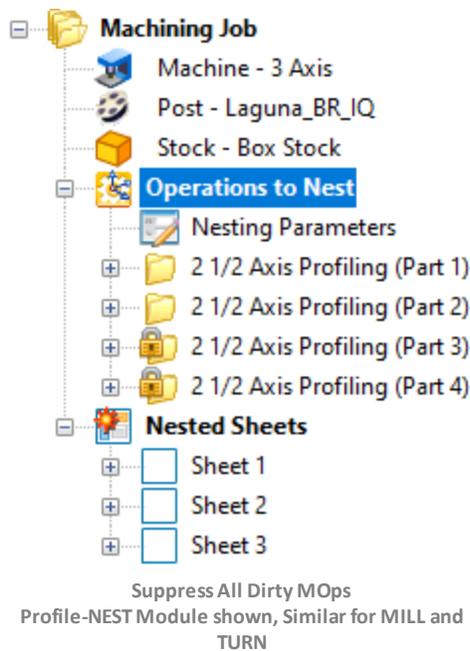
**Note:** You can customize how suppressed operations are managed using the [Machining Preferences](#) dialog.



Suppress all Dirty MOps  
Profile-NEST Module shown, Similar for MILL and TURN

### Suppress All Dirty Mops (AFTER)

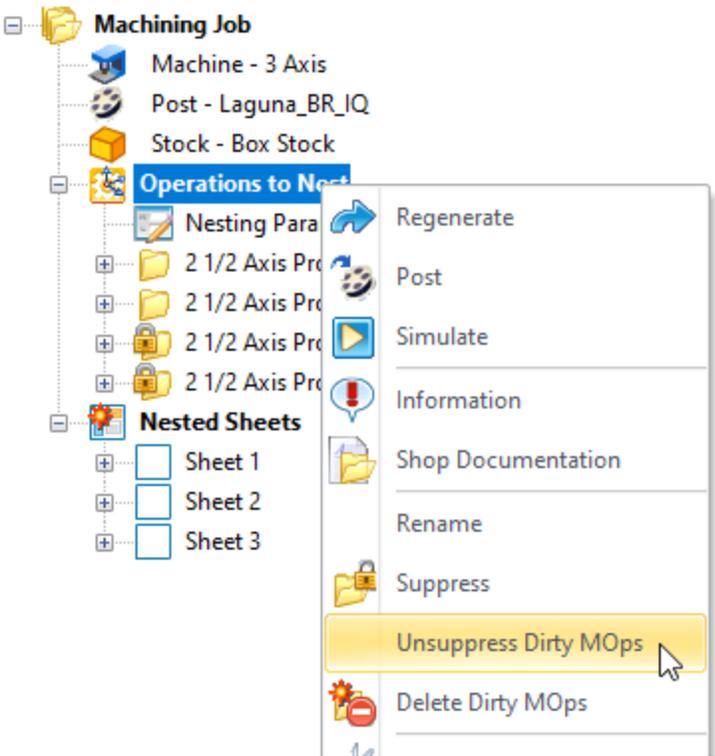
Suppressed operation will display with the icon shown in the [Machining Job](#) below.



## 9.11 Unsuppress Dirty Mops

You can [Unsuppress](#) all machining operations in a [Setup](#) that are flagged as dirty . Select the [Setup](#), right click and select [Unsuppress Dirty Mops](#) from the context menu. This command can also be executed from right-clicking on the [Machining Job](#) to unsuppress ALL dirty Mops in all [Setups](#). **Note:** You can customize how suppressed operations are managed using the [Machining Preferences](#) dialog.

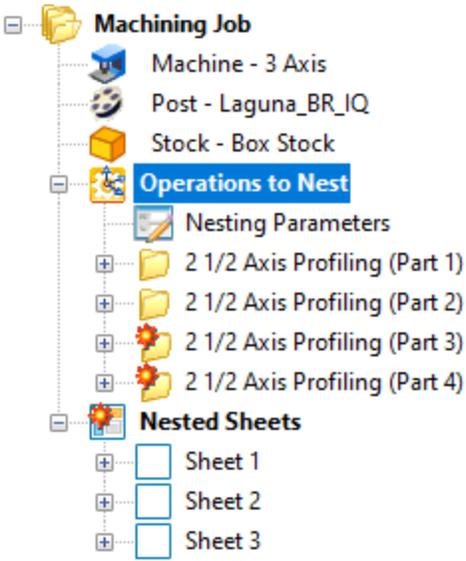
 [Unsuppress All Dirty Mops \(BEFORE\)](#)



Unsuppress all Dirty MOps  
Profile-NEST Module shown, Similar for MILL and TURN

**Unsuppress All Dirty Mops (AFTER)**

Unsuppressed dirty Mops will display with the icon shown in the [Machining Job](#) below.



Unsupress All Dirty MOps  
Profile-NEST Module shown, Similar for MILL and  
TURN

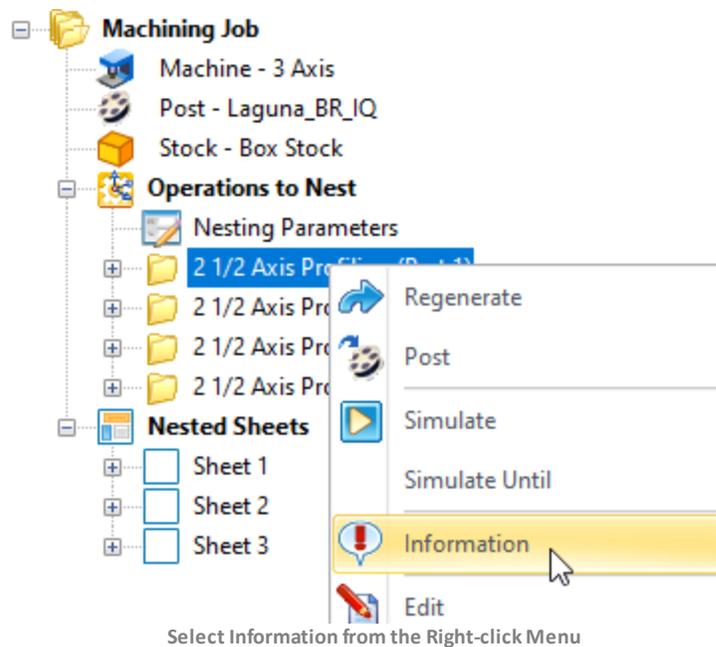
## 9.12 Information

This displays a dialog box with the following information about the selected [Operation](#), the [Setup](#) or the entire [Machining Job](#):

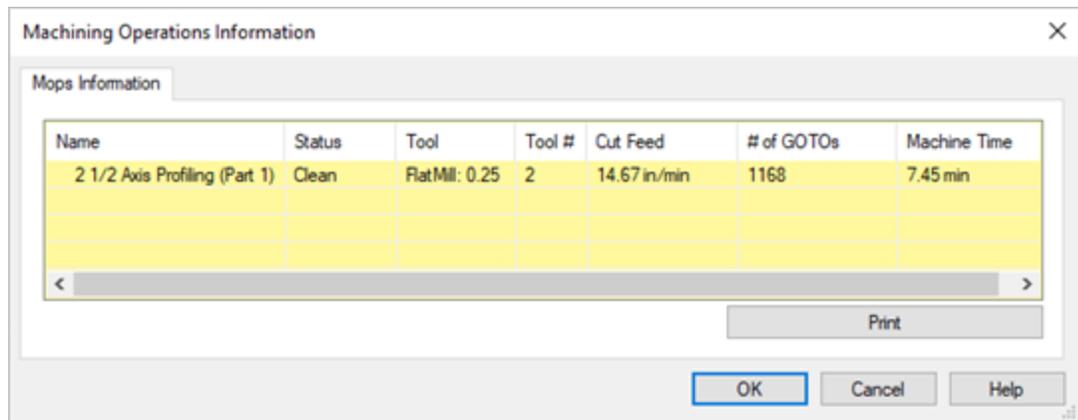
- Status
- Tool Name
- Cut Feed Rate
- # of GOTOs
- Machine Time

### Select Information from the Right-click Menu

[Machining Operations Information](#) can be viewed by selecting a [Setup](#), right mouse button click and left click on [Information](#).



### Dialog Box: Machining Operations Information (MILL Module)



Dialog Box: Machining Operations Information



### Optimize Machining Time Estimates!

In any MecSoft CAM product you can get an Information report about a selected toolpath operation, a [Setup](#) or all operations in the [Machining Job](#). This report contains some very useful information that includes the [Tool #s](#) used, the [Cut Feed](#), the [# of GOTO](#) motions and most importantly, the estimated [Machining Time](#).

[Read the full article...](#)

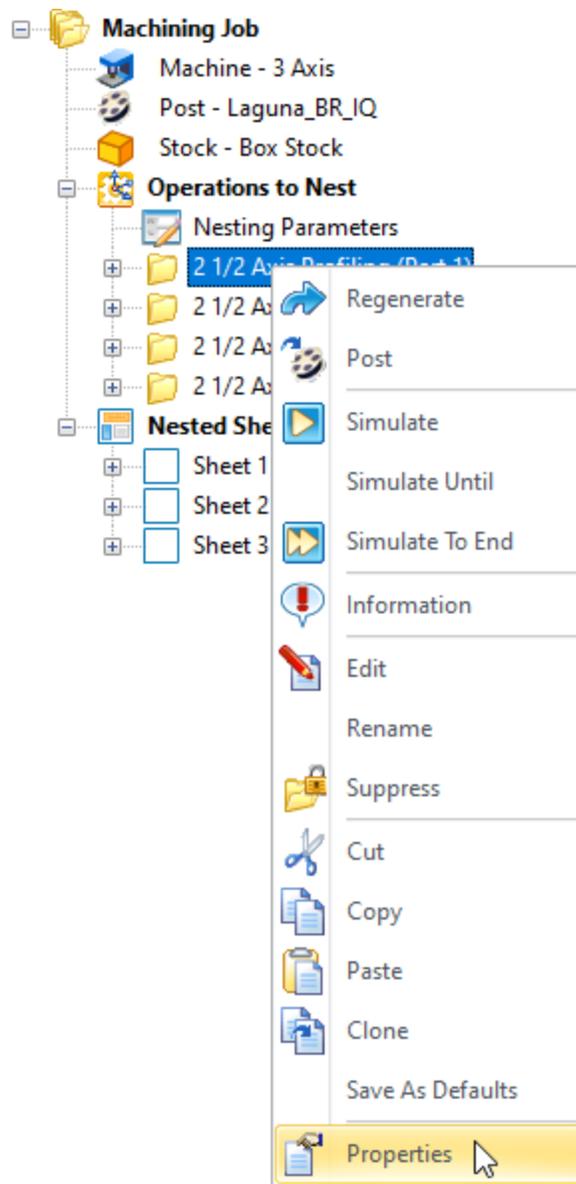
Machine Time
3 hr 32 min
10 hr 20 min
13 hr 52 min

## 9.13 Edit Properties

You can set the properties of a [Operation](#) by selecting it in the [Machining Browser](#) window, clicking on the right mouse button and selecting the [Properties](#) menu item.



### Select Properties from the Right-click Menu (in the MILL Module)



Select Properties from the Right-click Menu

### Dialog Box: Machining Operation Properties

This will bring up the dialog that is shown below.

**Machining Operation Properties**

Name:

Program #:

Simulation Color:

Comments to Output

Previously Output To File

Previously Output On

Dialog Box: Machining Operation Properties

### Name

Change the **Name** of the **Machining Operation**.

### Program #

Specify **Program #** for the operation. This program number will be output during post processing of the operation.

### Simulation Color

This allows you to specify a unique color for this operation during **Simulation** display. Refer to the **Simulate tab Status Bar** for setting the simulation to display by Mop (i.e., machining operation type).

### Comments to Output

You can also include commands that will be saved with the operation. These comments will also be output during post-processing of the operation. This might be a good place to put in comments or instructions for the machine tool operator.

 This can be used to put in add comments or instructions for the machine tool operator!

### Previously Output To File

This refers to the name of the external post-processed file that this particular operation was output to.

**Previously Output On**

This refers to the last time the operation was post-processed and the time the post-processing was performed.

## Simulate

**MILL** module offers very powerful cut material simulation functionality to allow you to simulate actual machining of the generated toolpaths. The output of this simulation is a true 3D cut model. This 3D model can be rotated, zoomed and manipulated.

This cut model can be visually compared with the part model to show areas of uncut material and/or areas of over-cut material using this component. The simulation features allow the early detection and correction of programming errors.



### 3 Types of Simulation Available

There are three kinds of toolpath simulation available in **MILL** module. These are

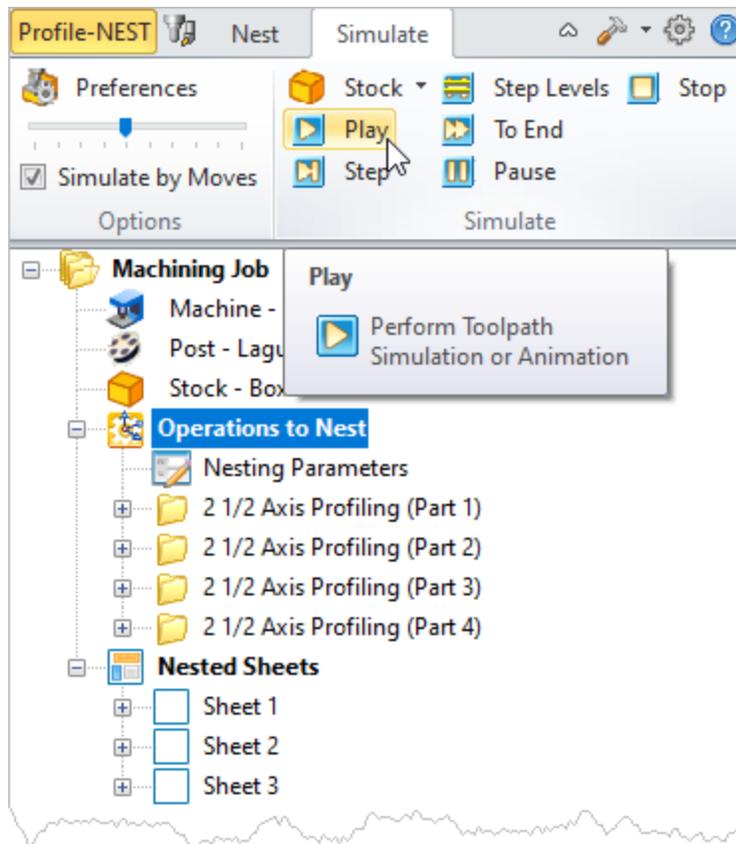
1. [Tool Animation](#)
2. [Cut Material Simulation](#)
3. [Machine Tool Simulation](#)

The simulation can be performed either on the currently active machining operation or on multiple operations.

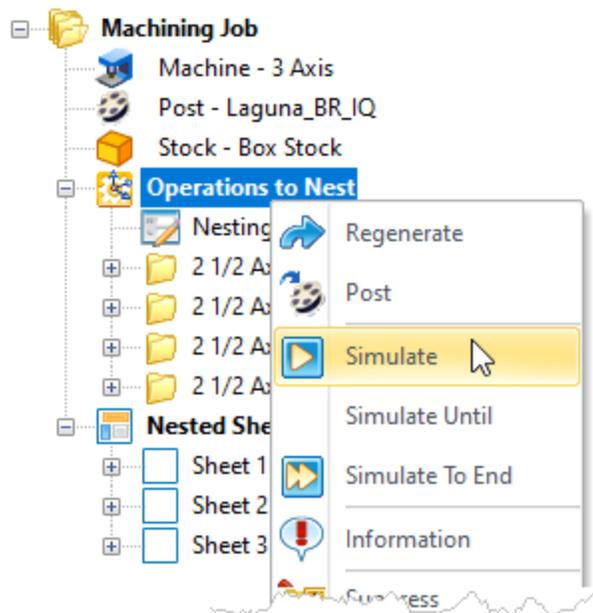


### Simulate the Active Operation

The active operation is the one that is selected and shown highlighted in the [Machining Browser](#). Typically, this would be the last toolpath that was generated. To simulate any operation, select the operation in the browser and click [Simulate](#) from simulate tab of the browser or by using [right click](#) and [Simulate](#).



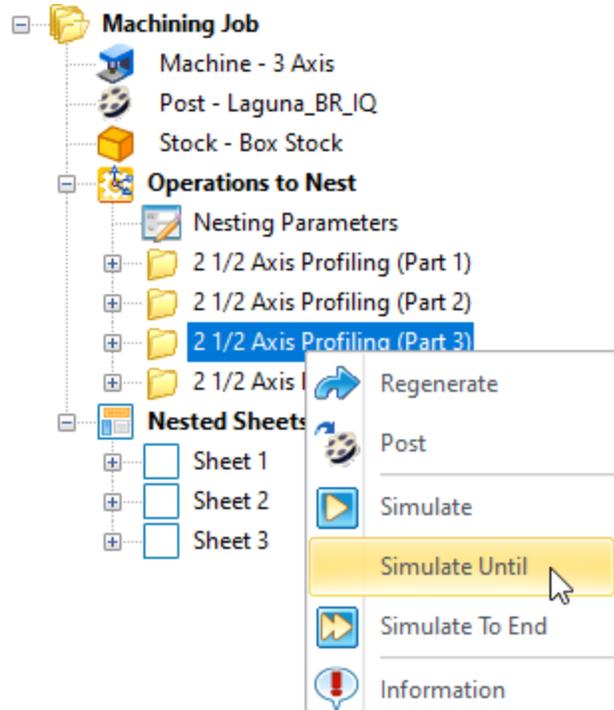
Simulate the Active Operation



Simulate the Active Operation

## Simulate Multiple Operations

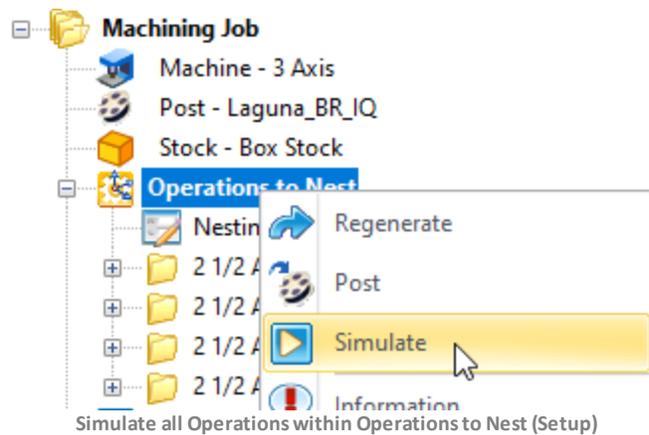
To perform simulation on multiple operations select the last operation, right click and choose **Simulate Until**. You can also select multiple operations by holding down the **Ctrl** key.



Simulate Until the Active Operation

**Simulate all Operations within the Operations to Nest (Setup)**

Alternatively you can select a **Setup** and select **Simulate** to simulate all the operations within a **Setup**.

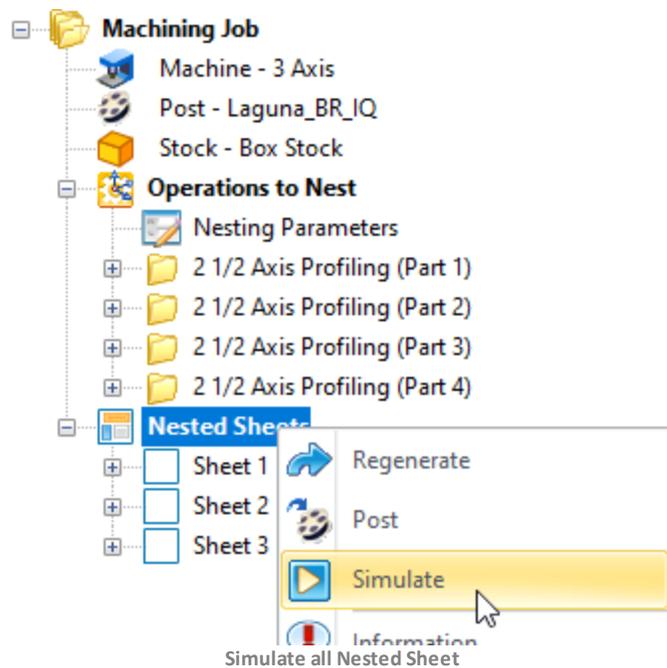
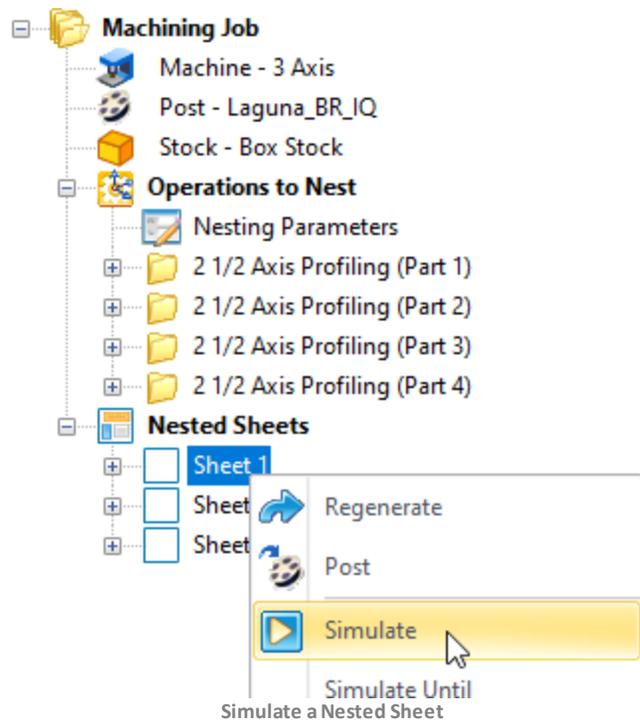


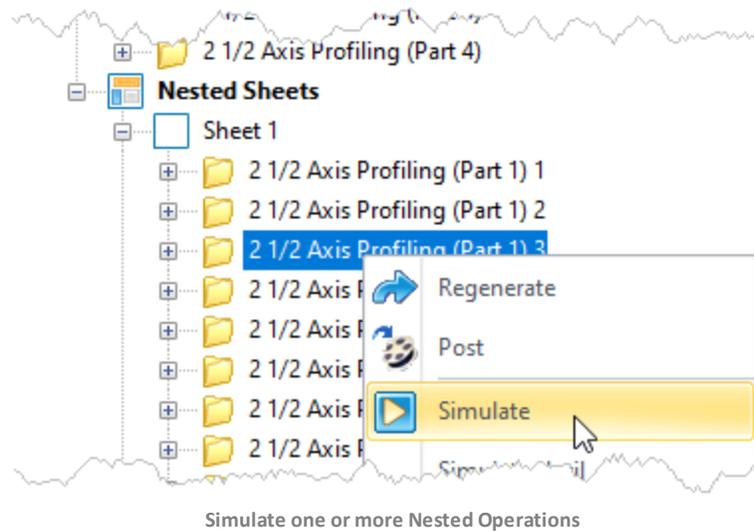
Simulate all Operations within Operations to Nest (Setup)

**Simulate one or more Nested Sheet**

You can also simulate one or all of your currently nested sheets or one or more nested operations within a nested sheet. You can use the same selection and right-click options

on sheets as you can of operations. you can select a [Setup](#) and select [Simulate](#) to simulate all the operations within a [Setup](#).

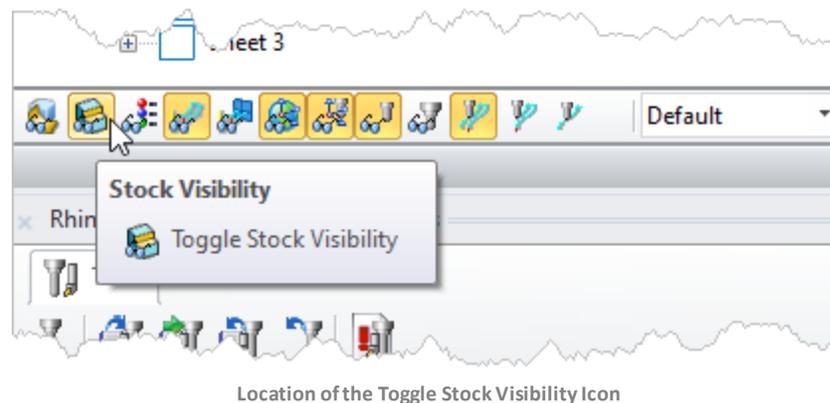




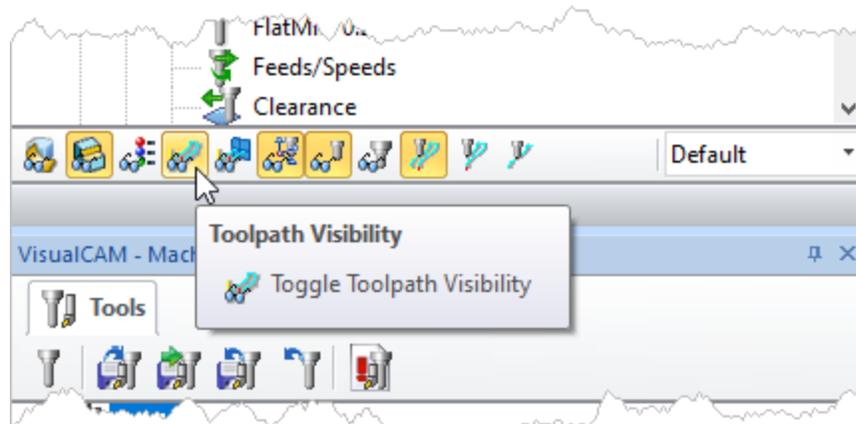
## 10.1 Tool Animation

Available in: Xpress    Standard ✓    Expert ✓    Professional ✓    Premium ✓

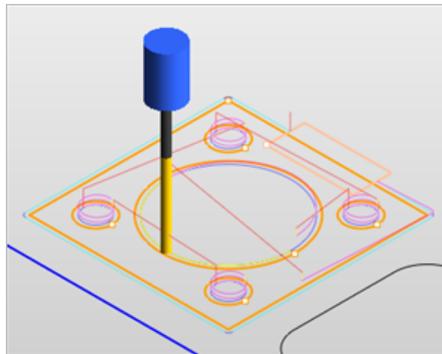
Simple tool animation can be carried out in **MILL** module by using the controls on the **Simulate** tab. If there is no stock loaded or if the stock is loaded and the stock visibility is turned off then the tool can be animated to follow the toolpath by setting the step increment to the desired value and clicking on the **Simulate** button on the **Simulate** tab of the browser or by selecting an operation and choosing right click to simulate.



You can also choose to display the toolpath as the tool is being animated. This is a powerful function that allows you to actually watch the toolpath being displayed on the screen incrementally. To do this make sure **Toolpath Visibility** is turned on before starting the tool animation along the toolpath.



Location of the Toggle Toolpath Visibility Icon



Tool Animation

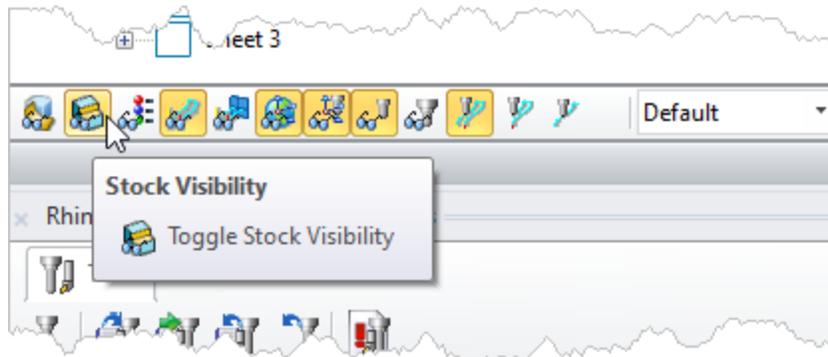
## 10.2 Cut Material

**Available in:** Xpress    Standard ✓    Expert ✓    Professional ✓    Premium ✓

As mentioned earlier, the [Profile-NEST](#) module offers very powerful cut material simulation functionality to allow you to simulate actual machining of the generated toolpaths. To perform cutting simulation, a [Stock](#) model must be defined and displayed and a machining operation must be active.



[Location of the Toggle Stock Visibility Icon](#)

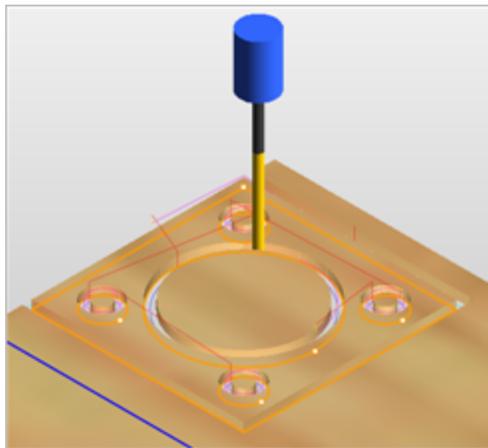


Location of the Toggle Stock Visibility Icon

Selecting [Play](#) on the [Simulate](#) tab simulates the selected operation.

### An Example of Cut Material Simulation

The output of this simulation is a true 3D cut model. This 3D model can be rotated, zoomed and manipulated. This cut model can be visually compared with the part model to show areas of uncut material and/or areas of over-cut material using this component. An example of cut material simulation is shown below.

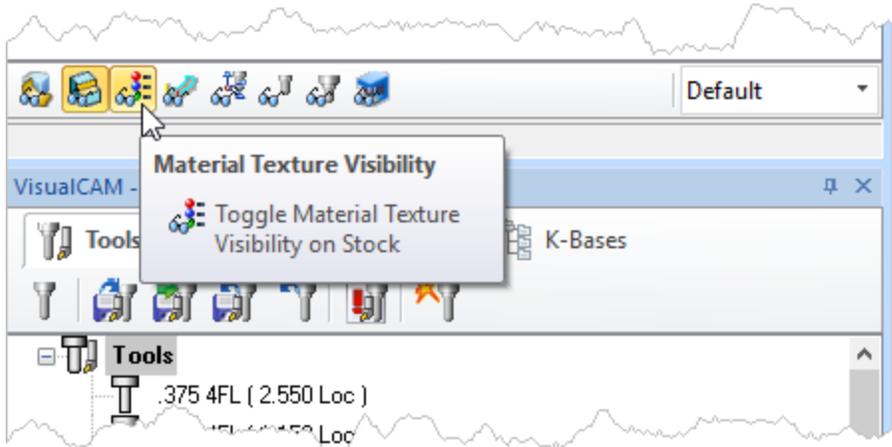


An Example of Cut Material Simulation

### An Example of Voxel Simulation Visual Artifacts

When the [Simulation Model](#) is set to [Voxel](#), in some cases, especially when simulating cutting of vertical walls (as is typically done in 2 axis machining), the [Voxel](#) simulation model leaves visual artifacts at these areas. The reason for this is that the [Voxel](#) simulation model display resolution is not very high along the Z-axis. This causes jagged areas to be displayed under these circumstances. It should be emphasized that these are purely visual artifacts and do not represent the true output that would be generated on the machine tool. An example of this visual artifact is shown below. To avoid this, change the [Simulation Model](#) to [Polygonal](#) under [Preferences](#)..





Location of the Material Texture Visibility Icon

4. A machining operation must be active.

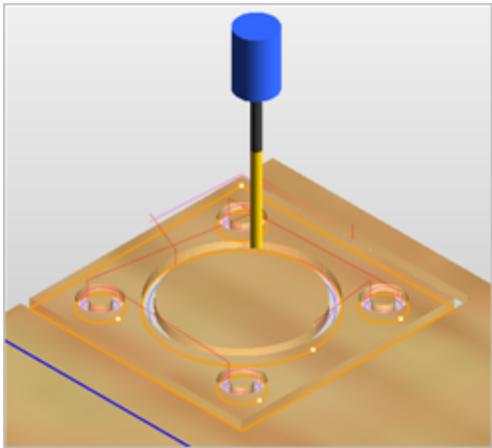
**To Perform the Simulation**

Then using the controls in the **Simulate** tab of the **Machining Browser** you can perform the cutting simulation.

See **Material** for a detailed description.

**Example of Cut Material Simulation with Material Texture**

An example of cut material simulation with material texture is shown below. The **Material** is set to **Wood** under **Choose Stock Material**.



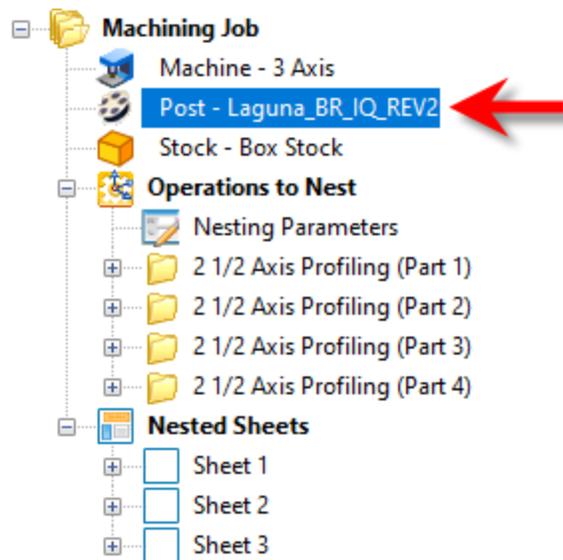
Example of Cut Material Simulation with Material Texture

## Post-Process

Once nested sheets are created they can be post processed to a specific machine controller. Once machining operations are created they can be post-processed to a specific machine controller. To post-process a machining operation, select the operation in the browser, right click and select [Post](#). The product comes with a set of over 300 post-processors to choose from. The current post-processor and g-code is also stored with the Part file. The current post-processor and latest G-Code is stored with the part file for better [CAM Life-cycle Management](#).

### How your Post-Processor is Stored

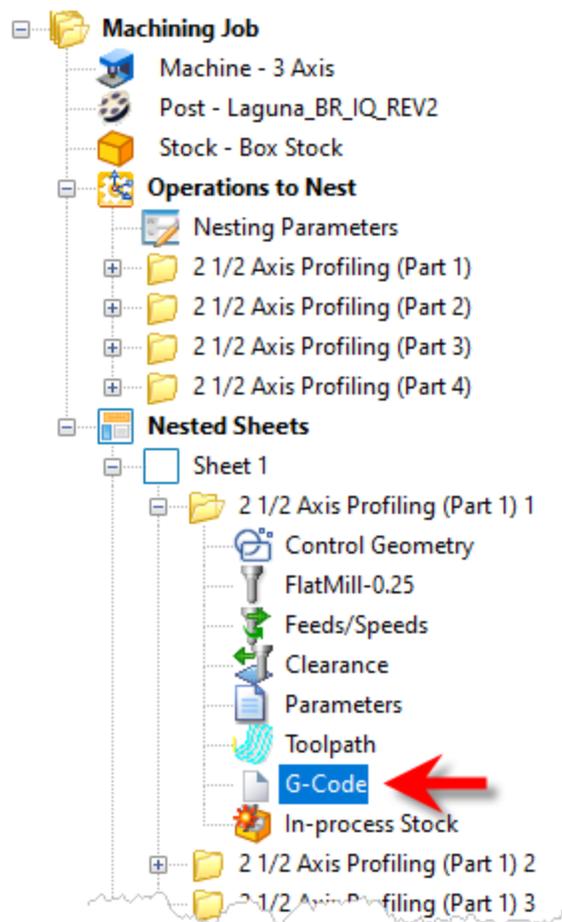
When you set the current post-processor for your [Machining Job](#) it is saved with your part file when the file is saved. This keeps the post-processor used to generate your g-code associated with your part file for better [CAM Life-cycle Management](#).



The Current Post-Processor is stored with your Part File

### How G-Code is Stored

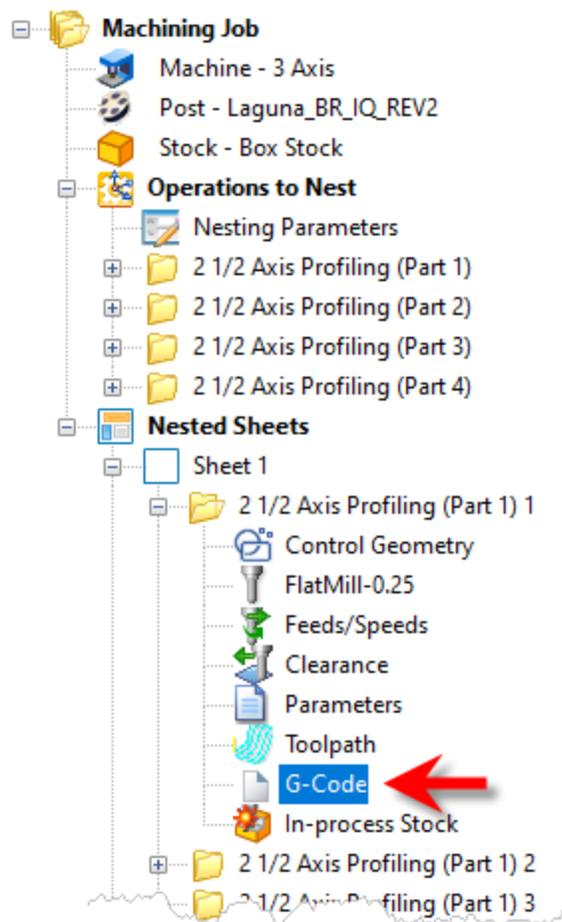
When you post-process a machining operation from the [Machining Job](#), the G-Code data is also saved with your part file when the file is saved. This keeps all cam data together for better [CAM Life-cycle Management](#). If you see that the G-Code icon is flagged, it means that the latest G-Code has not been captured. Regenerate the operation and the flag will be removed.



The G-Code Item within the MOp Folder

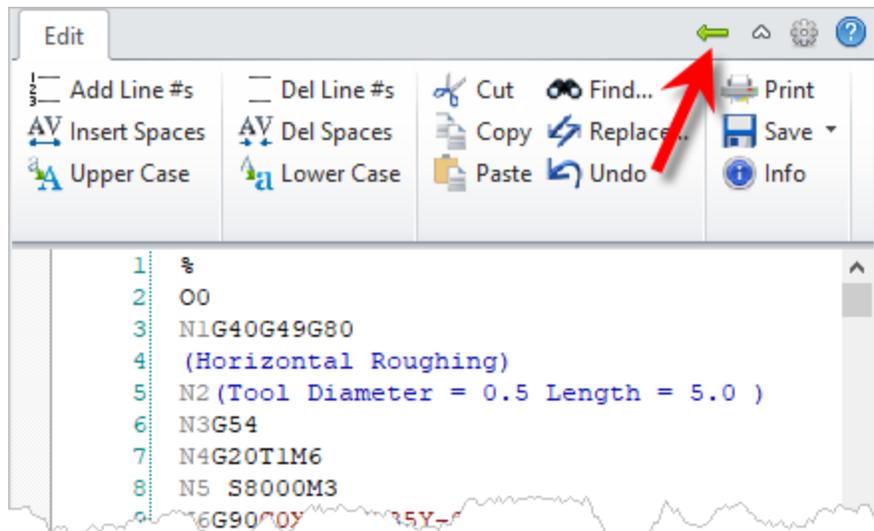
### Editing G-Code from the MILL module

You can view or edit your G-Code from an operation that you have generated by simply clicking on the [G-Code](#) icon within the mop folder.



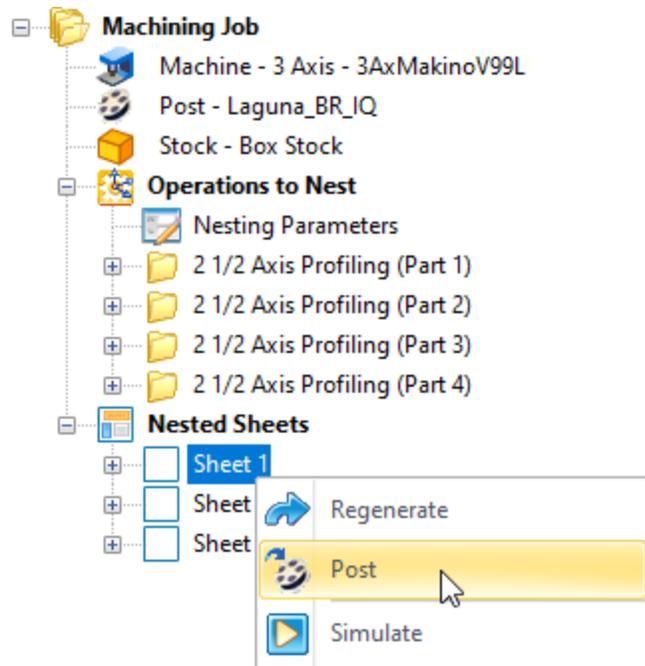
The G-Code Item within the MOp Folder

The [Machining Browser](#) will be replaced with the [Edit](#) tab of the [G-Code Editor](#) module. To return to the [MILL](#) module pick the left arrow icon at the top of the [G-Code Editor](#) browser. For documentation on using the G-Code Editor [Edit](#) tab click on the "?" help icon located at the top right side of the [G-Code Editor](#) browser.



G-Code Browser: Tool Crib menu item

**Example of Posting a Nested Sheet.**



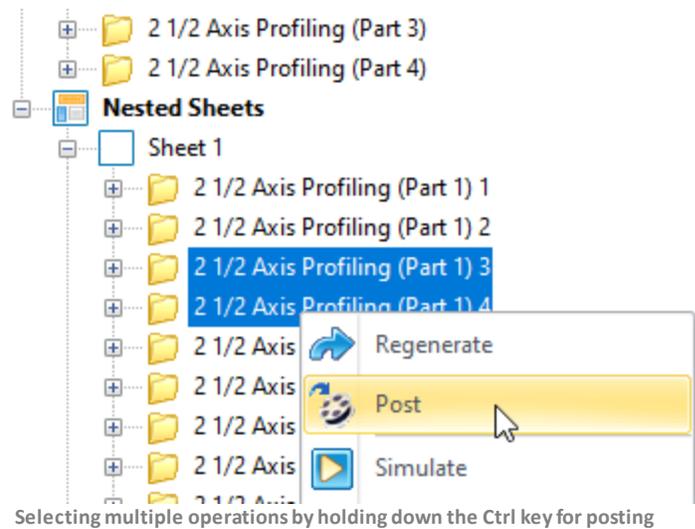
Example of Posting a Nested Sheet

**Post-processing Multiple Machining Operations**

You have the ability to select multiple operations within a nested sheet of machining and post process them with a single button click. To do this expand the nested sheet, select the operations and right click and select **Post**.

You can select multiple operations by holding down the **Ctrl** key.

Example below shows posting multiple machining operations.



### Post from the Program & Simulate tabs

Post-processing can be done from the [Program](#) or [Simulate](#) tabs under the [Machining Browser](#).

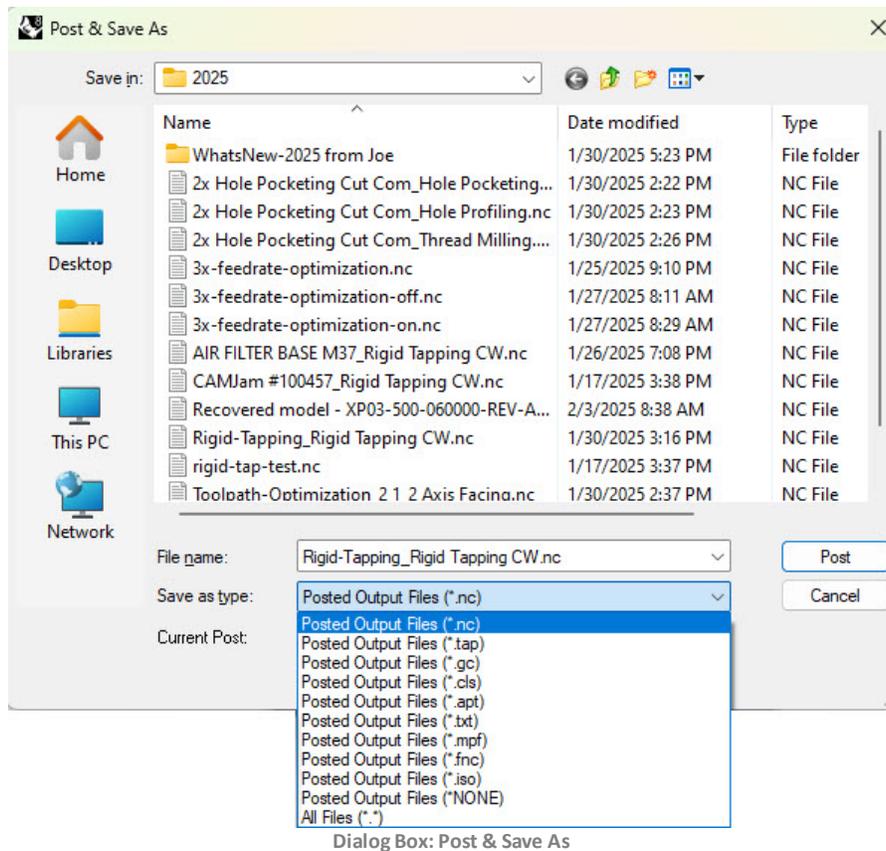
Selecting [Post](#) will display the [Post and Save As Dialog](#).

The following are the default settings when the [Post and Save As Dialog](#) is displayed.

- [Post & Save As Dialog](#) points to the folder location where the part geometry is located.
- [Save as type](#) – this refers to post file extension. This information is obtained from the [Program](#) tab > [Set Post Options](#) dialog.
- [Current Post](#) - this refers to the controller/post processor to post process the toolpath. This information is also obtained from the [Program](#) tab > [Set Post Options](#) dialog.

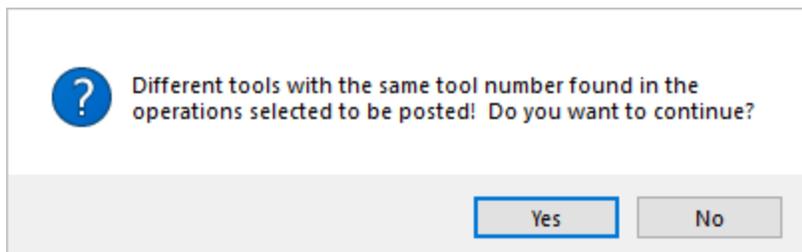
You can override the default settings using the [Post & Save As Dialog](#).

Select [Post](#) and the posted file will be written to the specified folder.

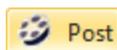


### Tool Number Validation during Posting

Tool number conflicts are flagged before post-processing multiple operations. If multiple machining operations use different tools but with one or more coincident tool numbers, you are notified of this condition with the following message:



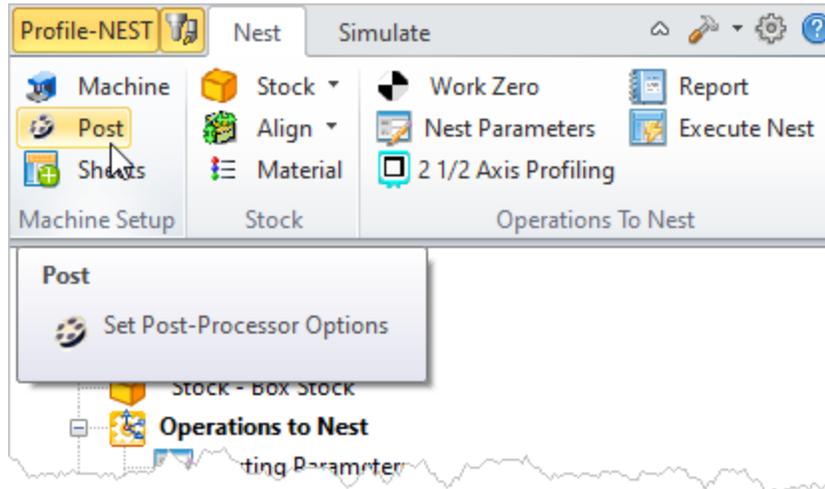
## 11.1 Set Post Options



You can specify certain post-processor options and rules for post processing. This is done by selecting "Set Post Options" from the [Program](#) tab under the [Machining Browser](#).

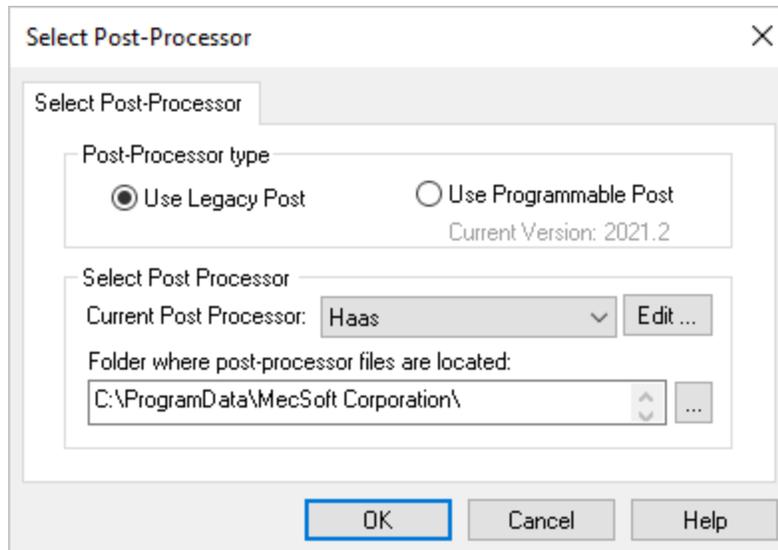
This will bring up the following dialog.

### Locate the Post Options menu item



Post menu selection, Nest tab, Machining Browser

### Dialog Box: Set Post-Processor Options



Dialog Box: Set Post-Processor Options

### Post Processor Type

Use these options to define the post type to use when posting toolpath operations. Each option is documented further in the [Post-processor Generator On-Line Help](#).

#### Legacy (.spm) Post

Select this option to use your "Legacy Post" when posting toolpath operations. "Legacy Post" refers to your post definition (\*.spm) file you used prior to this current release. This option also lists the over 300 existing post-processors. See [Current Post Processor](#)

below. Refer to the [PPG Online Help](#), [Reference Guide](#) and [PPG Decoded Guide](#) for help understanding the [Legacy Post Definition](#) files.

### Python (.py) Post Post

Select this option to use your "Programmable Post" (PPPG) when posting toolpath operations. "Programmable Post" refers to your programmable post created with our version 2021 and newer CAM plugins. This option will list only one post processor selection called [PostModifier](#). This post definition is defined using the [Programmable Post API](#). The current version of the PPPG is shown in the dialog. Refer to the [PPG Online Help](#), [Reference Guide](#) and [PPG Decoded Guide](#) for help understanding the [Programmable Post](#) files.



## Select Post Processor

### Current Post Processor

You can change the current post processor by selecting a post from the list of available post processors under [Current Post Processor](#). If [Use Legacy Post](#) is selected, the [Current Post Processor](#) list will contain MecSoft's standard list of over 300 post processors. If [Use Programmable Post](#) is selected, this will list only one post processor selection called [PostModifier](#). This post definition is defined using the [Programmable Post API](#). Refer to the [Programmable Post API](#) documentation for more about the API.

### Folder to load post-processor files from

The [MILL](#) module uses macro files with a *.spm* file extension to handle post-processing to different controllers. These files are typically located in the "Posts" directory under the [RhinoCAM](#) installation folder(*C:\ProgramData\MecSoft Corporation\RhinoCAM 2026 for Rhino x.x\Posts\Mill*).

The [MILL](#) module by default looks in this directory to build the list of available post-processors shown under the [Current Post](#).

### Set to Default Folder

Select this button to change the [Folder to load post-processor files from](#) location folder to the system default location. This folder location will be located within the current plug-in installation path.

Example: *C:\ProgramData\MecSoft Corporation\RhinoCAM 2026 for Rhino 8.0\Posts\MILL\SPM*

Example: *C:\ProgramData\MecSoft Corporation\VisualCAM 2026\Posts\MILL\SPM*

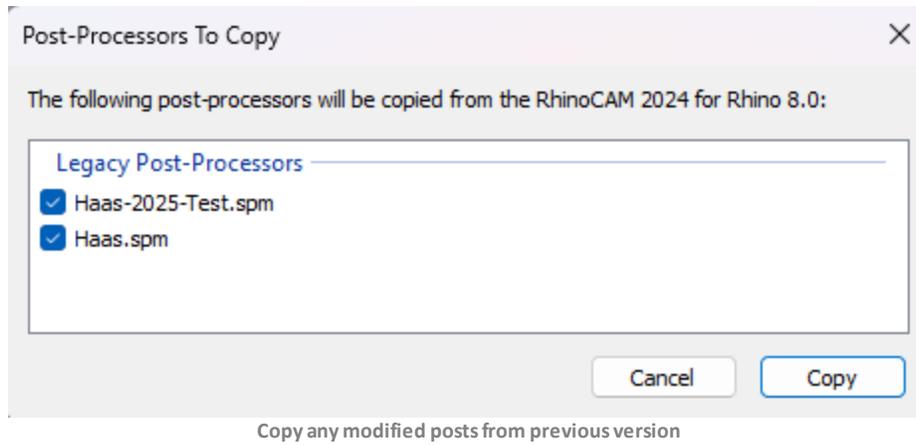
### Browse for folder



To set the posts location folder to a folder of your choice, select the ... button and then select a folder using the [Browse for Folder](#) dialog shown below.



Use this button to copy any posts from the previous version of [RhinoCAM](#) or [VisualCAM](#) and paste them into the current version so that they appear in the Current Post-Processor list.



To use this feature:

1. First, you must have posts in your "[Folder to load post-processor files from](#)" that are new or have been revised after the previous [RhinoCAM](#) or [VisualCAM](#) version was installed.
2. Select the [Copy any modified posts from previous version](#) button.
3. The [Post-Processors To Copy](#) dialog will display listing the post that will be copied.
4. Then pick **Copy** to accept and close the dialog.
5. When you display the [Select Post-processor](#) dialog again, your previous posts will be listed for selection from the [Current post-processor](#) list.

 **NOTE:** It is advisable that you rename any modified posts and backup all of your post-processor definition files and keep them in a safe location outside of the plug-in installation path so that you can access them manually if needed.

 **NOTE:** This feature only looks for revised posts from the immediate previous version (i.e., one version back) and not multiple previous versions. Also, the revised posts must be newer than when the previous version was installed.

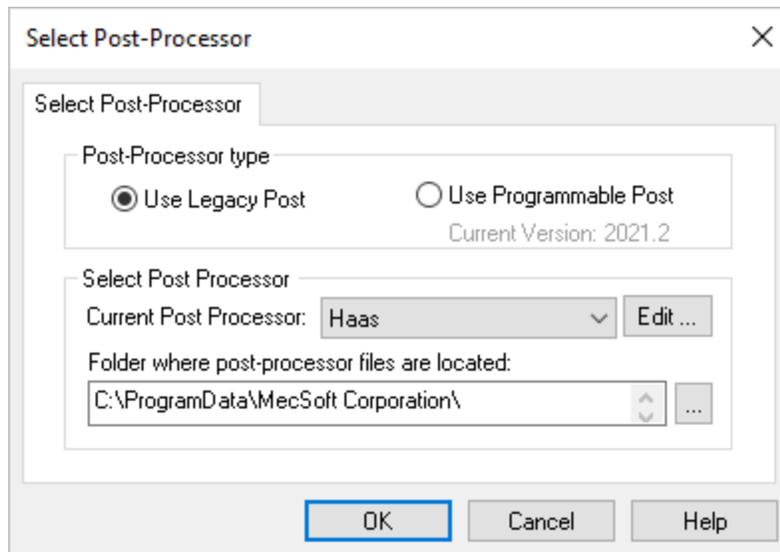
## 11.2 Use Legacy Post



Select this option from the Post-Processor Options dialog to use your "*Legacy Post*" when posting toolpath operations. "*Legacy Post*" refers to your post definition (\*.spm) file you used prior to version 2021. This option also lists the over 300 existing post-processors. See [Current Post Processor](#) below.



**Dialog Box: Set Post-Processor Options**



Dialog Box: Set Post-Processor Options



### Post Processor Type

Use these options to define the post type to use when posting toolpath operations. Each option is documented further in the [Post-processor Generator On-Line Help](#).

#### Legacy (.spm) Post

Select this option to use your "Legacy Post" when posting toolpath operations. "Legacy Post" refers to your post definition (\*.spm) file you used prior to this current release. This option also lists the over 300 existing post-processors. See [Current Post Processor](#) below. Refer to the [PPG Online Help](#), [Reference Guide](#) and [PPG Decoded Guide](#) for help understanding the [Legacy Post Definition](#) files.

#### Python (.py) Post Post

Select this option to use your "Programmable Post" (PPPG) when posting toolpath operations. "Programmable Post" refers to your programmable post created with our version 2021 and newer CAM plugins. This option will list only one post processor selection called [PostModifier](#). This post definition is defined using the [Programmable Post API](#). The current version of the PPPG is shown in the dialog. Refer to the [PPG Online Help](#), [Reference Guide](#) and [PPG Decoded Guide](#) for help understanding the [Programmable Post](#) files.



### Select Post Processor

#### Current Post Processor

You can change the current post processor by selecting a post from the list of available post processors under [Current Post Processor](#). If [Use Legacy Post](#) is selected, the [Current Post Processor](#) list will contain MecSoft's standard list of over 300 post processors. If [Use Programmable Post](#) is selected, this will list only one post processor selection called [PostModifier](#). This post definition is defined using the [Programmable Post API](#). Refer to the [Programmable Post API](#) documentation for more about the API.

### Current Post Processor

You can change the default post processor by selecting a post from the list of available post processors under **Current Post Processor**. If **Use Legacy Post** is selected, the **Current Post Processor** list will contain MecSoft's standard list of over 300 post processors. If **Use Programmable Post** is selected, this will list only one post processor selection called **PostModifier**. This post definition is defined using the **Programmable Post API**. Refer to the **Programmable Post API** documentation for more about the API.

### Folder to load post-processor files from

The **MILL** module uses macro files with a *.spm* file extension to handle post-processing to different controllers. These files are typically located in the "Posts" directory under the **RhinoCAM** installation folder (*C:\ProgramData\MecSoft Corporation\RhinoCAM 2026 for Rhino x.x\Posts\Mill*).

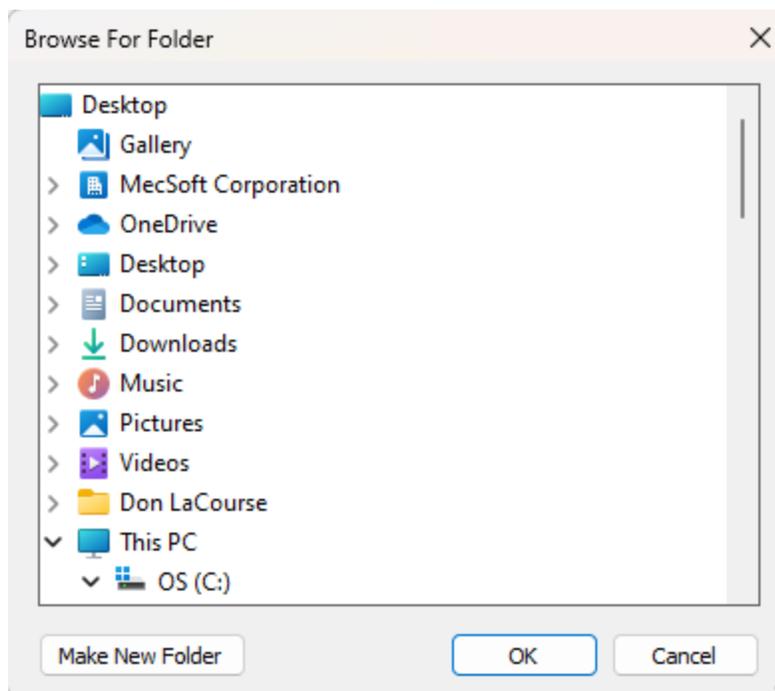
The **MILL** module by default looks in this directory to build the list of available post-processors shown under the **Current Post**.

#### Set to Default Folder

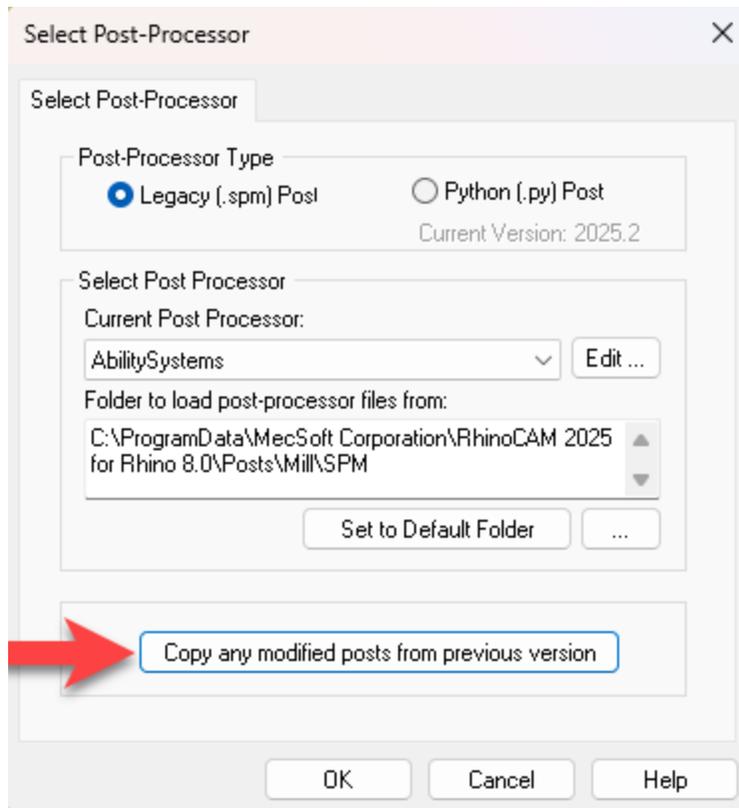
Select this button to change the posts location folder to the system default location. This folder location will be located within the current plug-in installation path.

#### Browse for folder

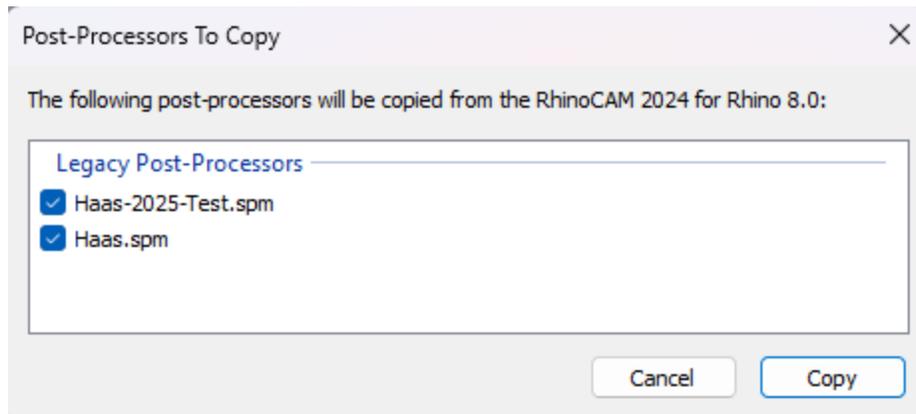
To set the posts location folder to a folder of your choice, select the ... button and then select a folder using the **Browse for Folder** dialog shown below.



### Copy any modified posts from previous version



This button will be active when you have post definition files from the previous [RhinoCAM](#) or [VisualCAM](#) version residing in the "Folder to load post processor files from".



Copy any modified posts from previous version

To use this feature:

1. First, you must have posts you your "Folder to load post-processor files from" that are new or have been revised after the previous [RhinoCAM](#) or [VisualCAM](#) version was installed.
2. Select the [Copy any modified posts from previous version](#) button.

3. The **Post-Processors To Copy** dialog will display listing the post that will be copied.
4. Then pick **Copy** to accept and close the dialog.
5. When you display the **Select Post-processor** dialog again, your previous posts will be listed for selection from the **Current post-processor** list.

 **NOTE:** It is advisable that you backup all of your post-processor definition files and keep them in a safe location outside of the plug-in installation path so that you can access them manually if needed.

 **NOTE:** This feature only looks for revised posts from the immediate previous version (i.e., one version back) and not multiple previous versions. Also, the revised posts must be newer than when the previous version was installed.

## 11.3 Use Programmable Post

The Programmable Post Processor allows you to use Python script files for G-Code generation during toolpath processing by each MecSoft CAM plugin. You can create new post scripts or modify existing ones. Using the Python language for post scripts allows you to more efficiently generate the needed G-Code output allowing the use of programming elements, such as condition processing, loops, logical operations, and more.

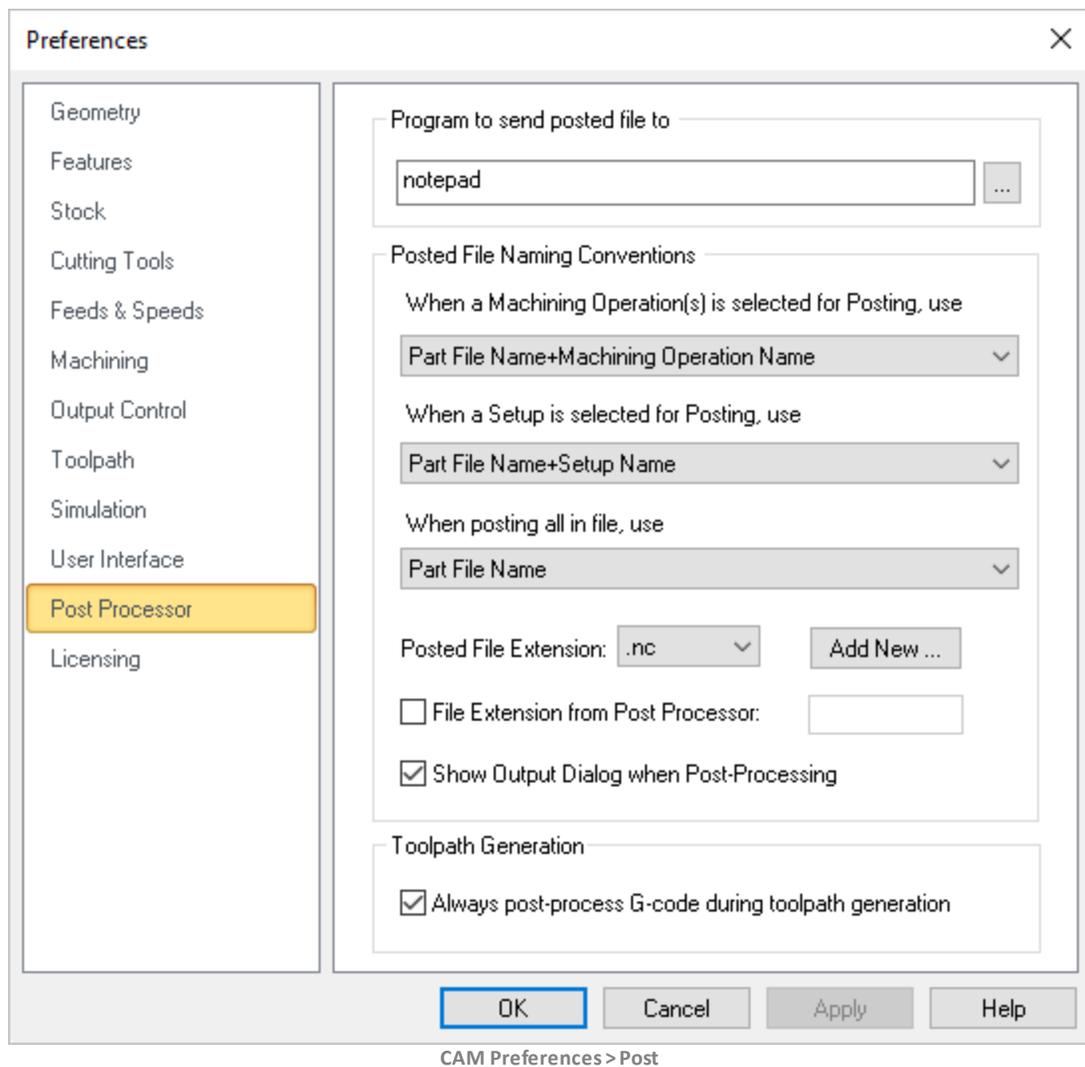
You can find documentation and sample files on our programmable Post here:

<C:\Program Files\Rhino x\Plug-ins\RhinoCAM 20xx for Rx\SDK>

## 11.4 Post Processor Preferences

These preferences relate to posting toolpath operations to gcode files.

 [CAM Preferences > Toolpath](#)



### Program to send the Posted file to

This feature allows you to specify a program to display the posted file. This could be a NC editor or a text editor like [Notepad](#).

 You could also have this point to your control software's executable file and [RhinoCAM](#) will automatically launch this application when the machining operations are post processed.

### Posted File Naming Conventions

This allows you to set rules for posted file name when post processing machining operations.

When a machining operation is selected for posting you can set the output file name from one of the following options.

- Part File Name + Machining Operation Name
- Part File Name + Setup Name + Machining Operation Name
- Setup Name + Machining Operation Name
- Machining Operation Name

When a setup is selected for posting you can set the output file name from one of the following options.

- Part File Name + Setup Name
- Setup Name

When **Machining Job** is selected to **Post All**, you can set the output file name from one of the following options.

- Part File Name
- Part File Name + First Setup Name
- First Setup Name

#### Posted File extension

You can select a posted file extension from the list or add an extension to the list by selecting **Add new** button. This displays the **Post File Extension** dialog shown below where you can specify a new file extension and click **OK**.



Dialog Box: Post File Extension

The new file extension is now set as your posted file extension automatically.

By default **RhinoCAM** performs interactive post-processing. That is, when you select a toolpath for post-processing, **RhinoCAM** launches the post-processor and waits for it to complete. You can also turn off the display of the output dialog (post and save dialog).

During interactive post-processing, **RhinoCAM** launches the NC editor to view the output file. You can specify a different NC editor to use. See [Program to send the Posted file to](#) above for doing this.

#### File Extension from Post Processor

Check this box to "pull" the posted g-code file extension from the **Legacy Post-Processor** (\*.spm) file. This ensures that whichever post that you use, your posted g-code file will match the file extension defined in the active post. **Note:** You must edit your legacy post

and set the [Output File Extension](#) value from the [General](#) tab in the [Post-Processor Generator](#).

**Show Output Dialog When Post Processing**

Check this box to always display the [Post & Save As](#) file dialog when you select [Post](#) from an operation ([Mop](#)), [Setup](#) or [Machining Job](#).

---

## Archive

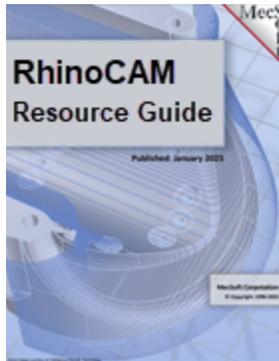
Once machining operations are created they can be archived along with the [Rhino](#) part (.3dm) file. This can be accomplished by simply saving the part file. When the part file is retrieved, all archived operations will be loaded along with the part file.

## Find More Resources

Download this PDF Guide for a list of the available [RhinoCAM Resources](#).



### 2025 RhinoCAM Resource Guide



### The 2026 RhinoCAM Resource Guide!

*18 Pages*

Lists PDF downloads and Online resources including [Quick Start Guides](#), [Reference Guides](#), [Exercise Guides](#), [Tutorials](#) and [More](#).

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