MecSoft Corporation
Your CAM Partner

What's New in RhinoCAM 2022

Feb 12, 2022

This document describes new features and enhancements introduced in the RhinoCAM 2022 product.

CONTENTS

This document describes new functionality that is being introduced with the release of the RhinoCAM 2022 product. This document is organized by listing and describing each of the enhancements incorporated into each of the constituent modules of RhinoCAM.

RhinoCAM 2022

RhinoCAM 2022 is a plug-in that runs inside the Rhinoceros 6.0 and 7.0 NURBS modeler from McNeel & Associates and hosts the following modules:

1. MILL
2. TURN
3. NEST
4. ART
5. G CODE EDITOR
6. PROFILE-NEST

Each of these modules can be licensed and invoked separately of the other modules. This section describes the various enhancements and improvements to each module.

Common Enhancements

This section describes the common enhancements and changes to RhinoCAM 2022.

1. RhinoCAM 2022 has been certified to run on Windows 11.
2. Handling of SubD surfaces in Rhino 7 has been enhanced and made more robust.
3. A new version of the windowing system for RhinoCAM has been integrated into the 2022 product.
4. New simulation libraries from Machineworks have been incorporated into all machining modules. These libraries have improved performance significantly as well as fixed many reported issues.

LICENSING ENHANCEMENTS

The following enhancements have been implemented in the licensing system for RhinoCAM.

1. A new Cloud license type has been introduced. This will be the default license model for users. The biggest benefit of this model is that lockouts from computers will be effectively eliminated, thereby reducing the need for MecSoft to intervene in resetting locked out licenses. To summarize, the following licensing models are available in RhinoCAM 2022.
    1. **Cloud** – This license has a lease time of 8 hours. If the license has not been in use for 8 hours, then it becomes available for use on other machines. This license needs public internet access for activation and periodic renewal of the license lease. This is the default license model all users will be supplied with.

> This is the default license model that users will be supplied with. This model requires that the CAM product has access to the internet, at the beginning of each session. to license the product.

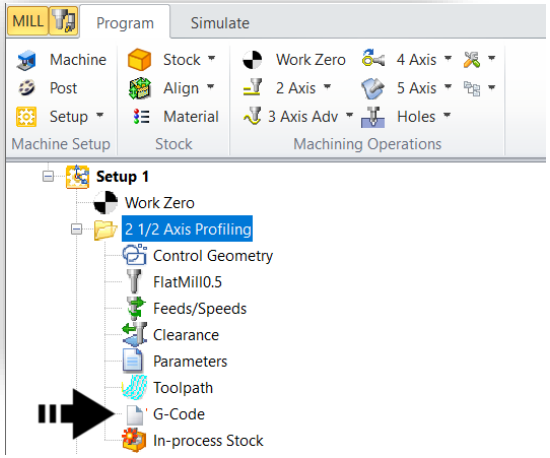
    2. **Node Locked** – This license is locked to a single machine and cannot be transferred from one machine to another. This license needs public internet access for first activation only. The biggest drawback to this license is that, if for any reason the machine becomes unusable, the license cannot be retrieved or transferred.
    3. **Network Locked** – This license is a multiple floating license that is locked to a network. Like the Floating license above it also needs public internet access for activation and periodic renewal of the license lease. The advantage of this license is that clients can be locked to a network thereby preventing inadvertent removal or theft of license(s)
    4. **Network** – This license uses a LAN Daemon built on top of CentOS 7.0 for serving licenses inside of a host network. This license is used only for completely dark sites such as military and highly sensitive sites. It is not normally available for commercial or educational institutions.
2. The Network Locked license model has been enhanced significantly and made more robust. This will be the default licensing model that will be used for multiple licenses that require to be run in a network.
3. Support for Centos 7.0 has been added to the MecSoft Network license server product.
4. Computer name is now captured and displayed when a license is activated

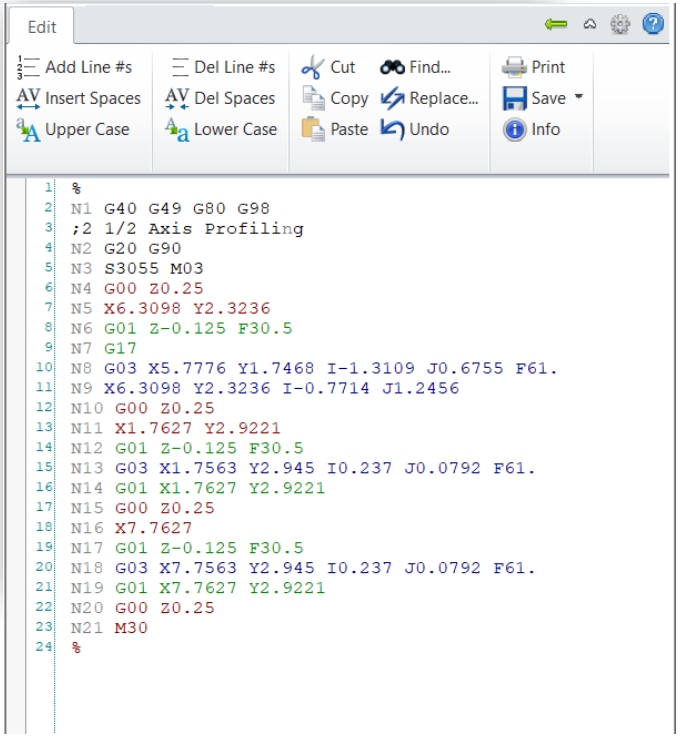
WHAT'S NEW IN THE MILL MODULE

This section describes the enhancements and changes to the MILL module.

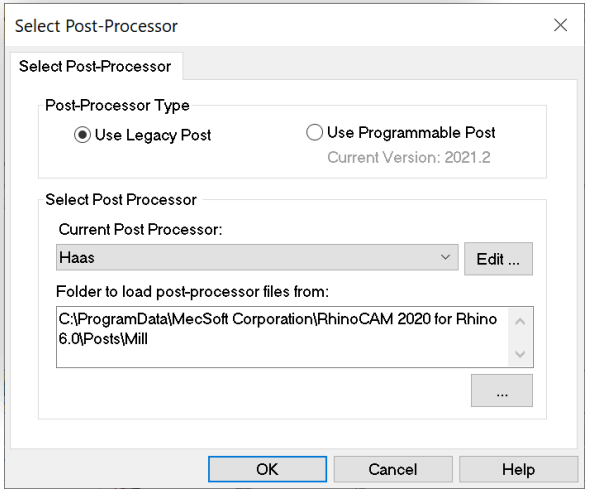
USABILITY ENHANCEMENTS

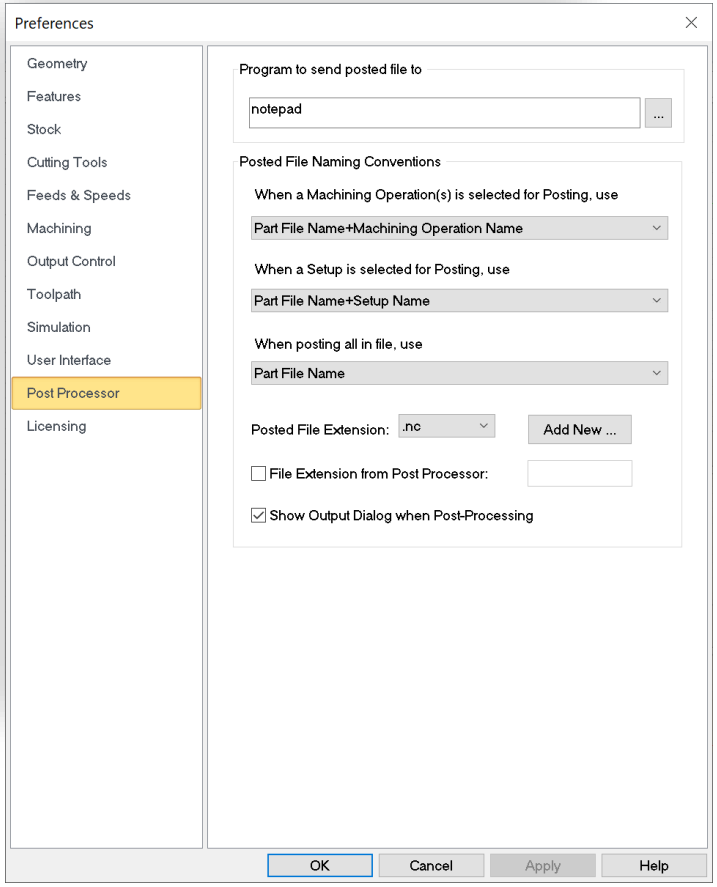
1. The Load settings from File dialog was completely removed. Settings now are always loaded from the file. Only when creating a new file are settings loaded from the Windows registry.
2. G-code output is now integrated into all Mill machining operations. G-code is now automatically generated once the toolpath is regenerated. A G-code icon is now part of the Machining Operations folder. Double clicking on this icon will launch the G-code editor wherein the generated G-code can be viewed and or edited.



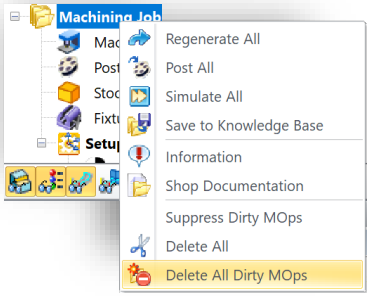


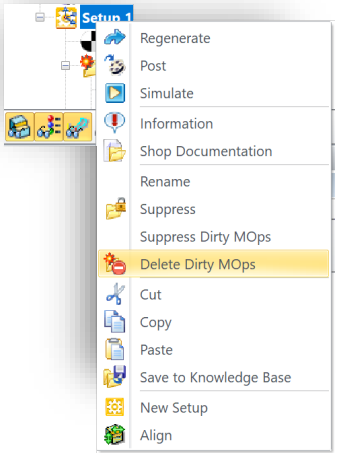
3. Set Post Options was split up into two dialogs. In addition to this, the selected post-processor is no longer loaded from the disc. It is saved with the part file and is available when the part file is loaded. The affected dialogs are shown below.



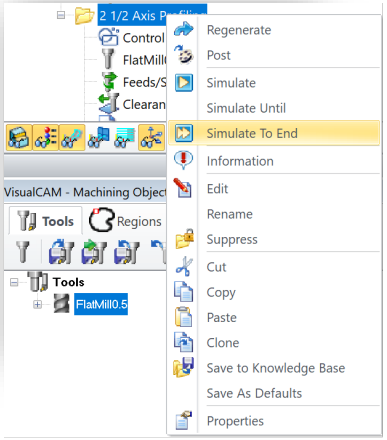


4. A *Delete Dirty Mops* command has been introduced in the Machining Operations right mouse button menu at the Machining Job and Setup Icons. Each are shown below.

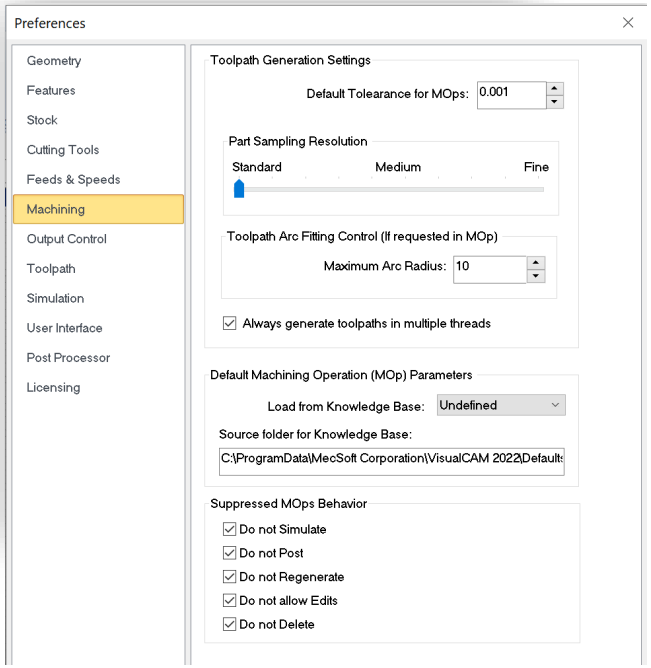




5. A *Simulate to End* button has been added in the Machining Operations right mouse button menu.



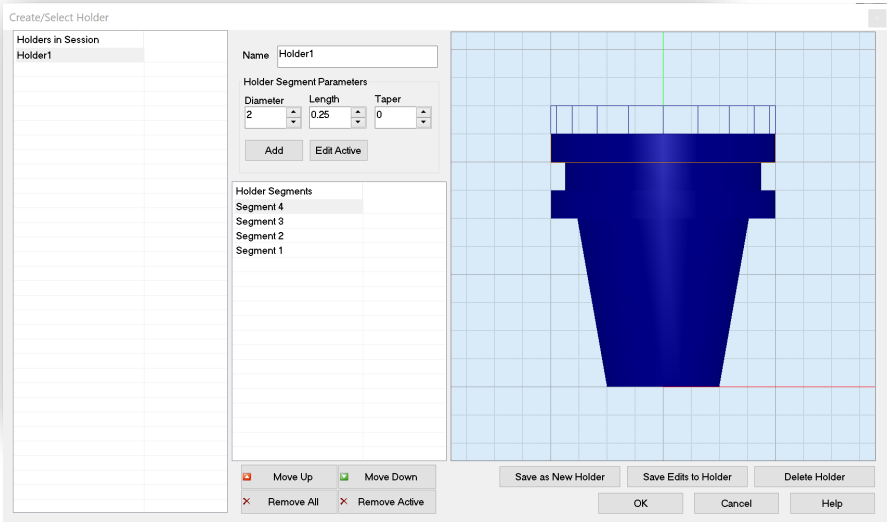
6. Suppressed operation behavior can now be customized in the Machining preferences dialog.



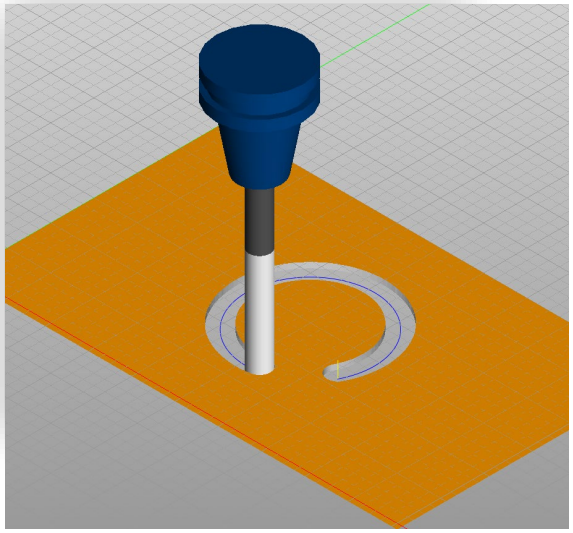
7. Icons and buttons for supporting high resolution (4k) monitors and custom scale factor displays was implemented.

TOOLING ENHANCEMENTS

1. The ability to create tool holders and use them for display and simulation has been added. Multiple holder segments can be created using the dialog shown below. Once tool holders are created, they can be associated with a tool and used in all milling operations.



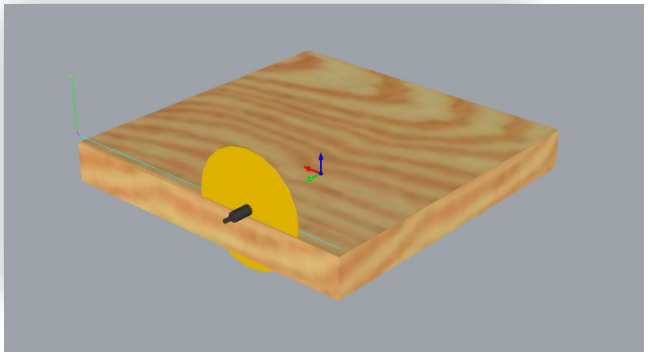
Tool Holder dialog to create holder segments

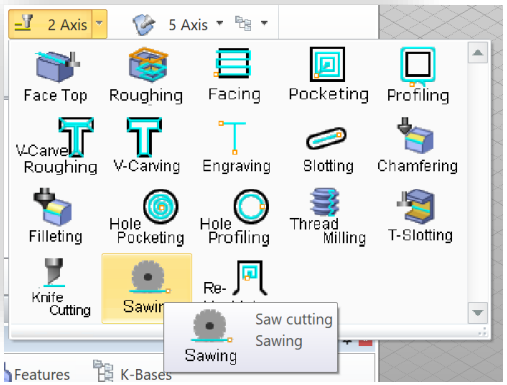


Tool holder shown in simulation

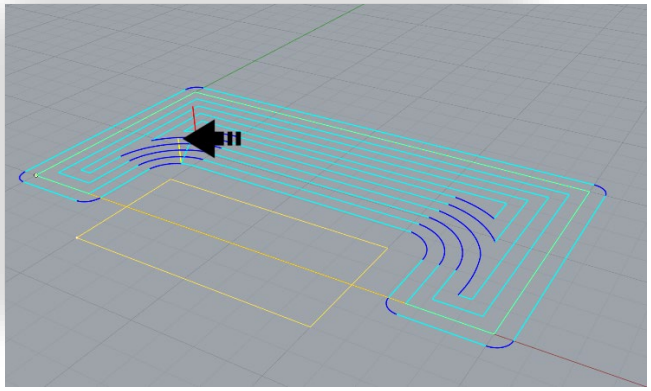
2-AXIS ENHANCEMENTS

1. A new Disc Cutter/Saw machining operation has been introduced. Users can define a saw cutter tool to make rip cuts in blocks and other geometry.

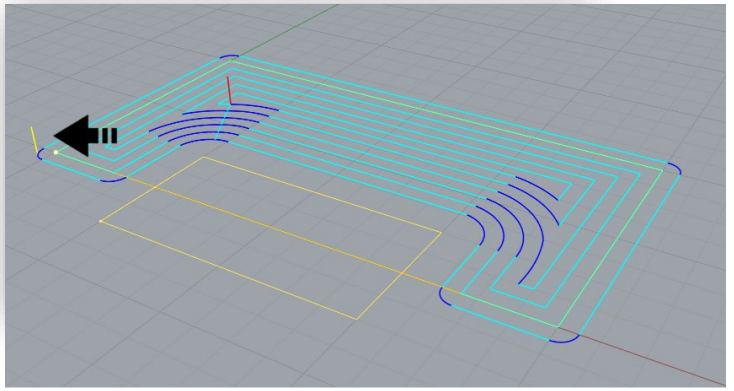




2. Start points can now be defined in the 2½ Axis Facing operations.

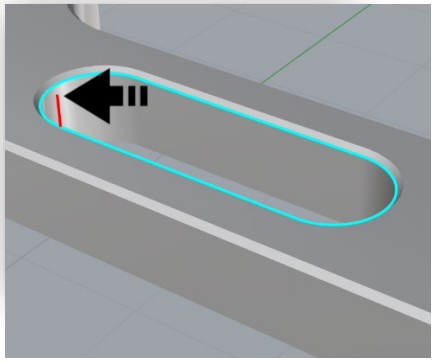


No start points defined. Note starting close to avoid region.

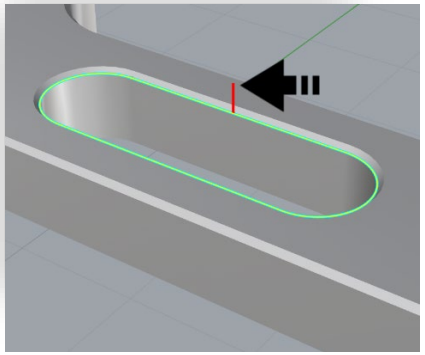


Start point defined to move away from avoid region.

3. Users can now select the mid-Point of longest side as the start point for Chamfering & Filleting operations. An example is shown for chamfer machining below.

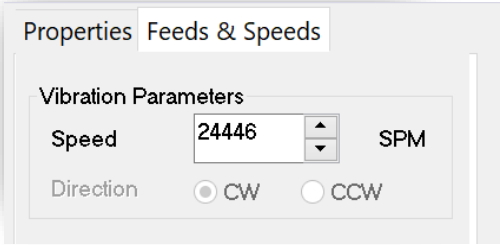


No start point defined for the chamfer toolpath



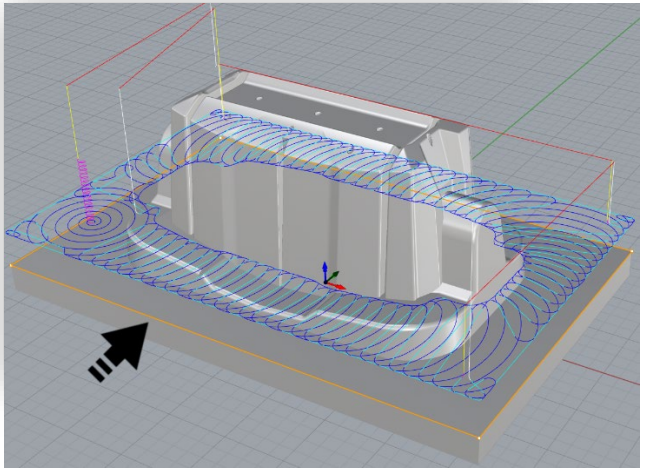
Start point defined to be the center of longest side

4. The Knife machining toolpath method has been enhanced to handle Uni-directional or Bi-directional Knife tools. In versions prior to 2022, the toolpaths generated work only if the knife is bi-directional. Users can set the number of flutes to 1 or 2 in the knife definition to specify whether a Knife Tool is unidirectional (1) or bidirectional (2). In addition to this, a vibration speed variable has been introduced for oscillating knives.

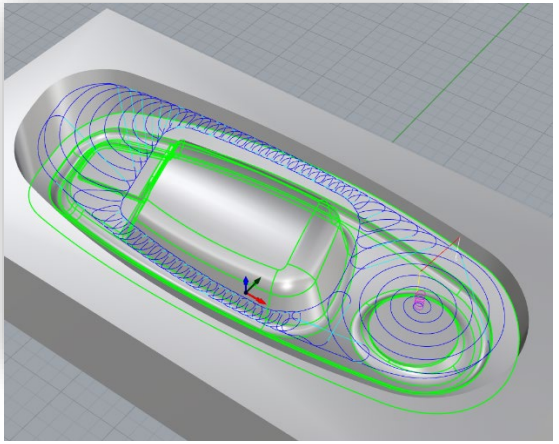


3-AXIS ENHANCEMENTS

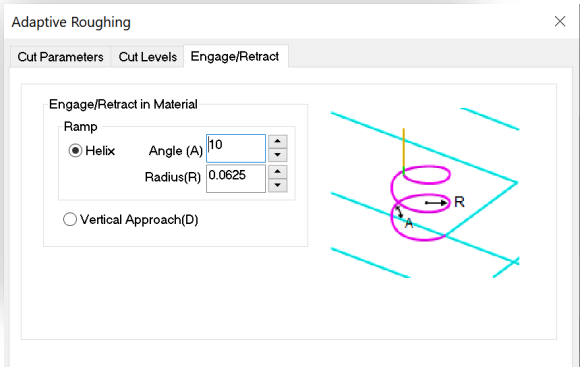
1. Containment regions were implemented in Adaptive Roughing operations. An example of rectangular curve containment in an adaptive roughing toolpath is shown on the right.



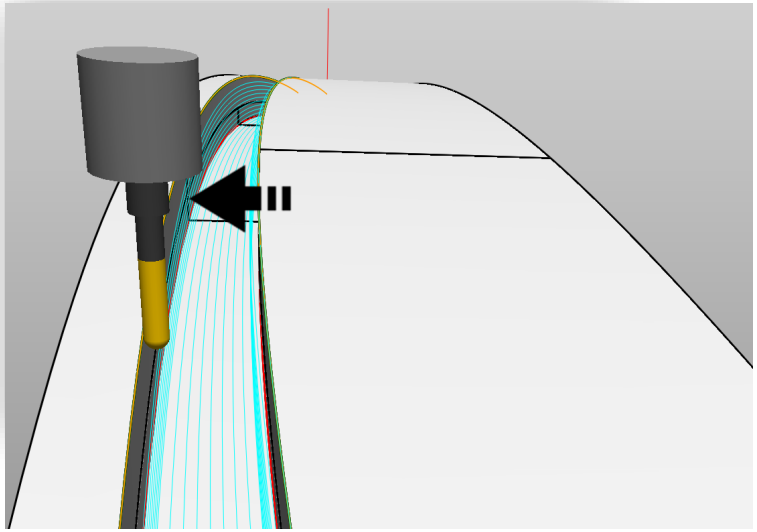
2. Surface Extent conditions were also implemented in Adaptive Roughing operations. An example of a sculpted surface pocket using surface containment and TO condition control is shown here.



3. Helical Engagements are now implemented for Adaptive Roughing.

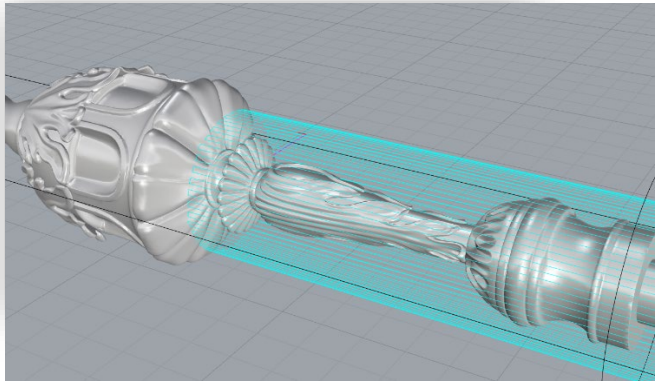


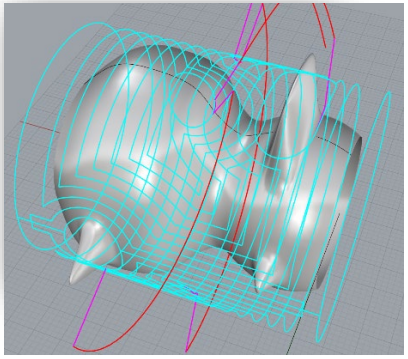
4. Stepped tooling, where the shank diameter can be larger than the tool diameter, was implemented for all 3 Axis machining methods. An example of stepped tooling being used in a *Between 2 Curves* 3 axis finishing operation is shown on the right.

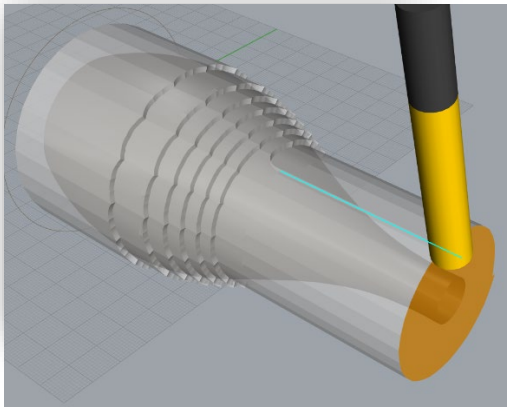


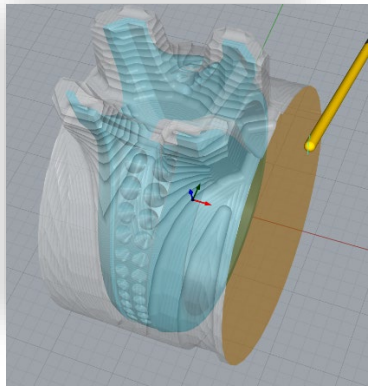
4 AXIS TOOLPATH ENHANCEMENTS

1. The 4 Axis R-level Roughing toolpath method has been completely revamped and rewritten. This allows multiple new classes of parts to be machined. Some examples are shown below.

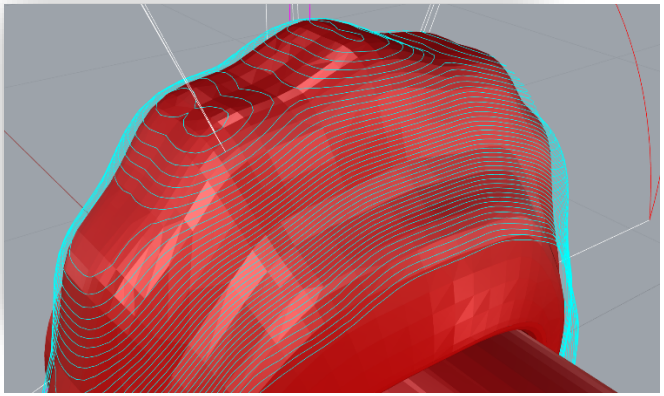


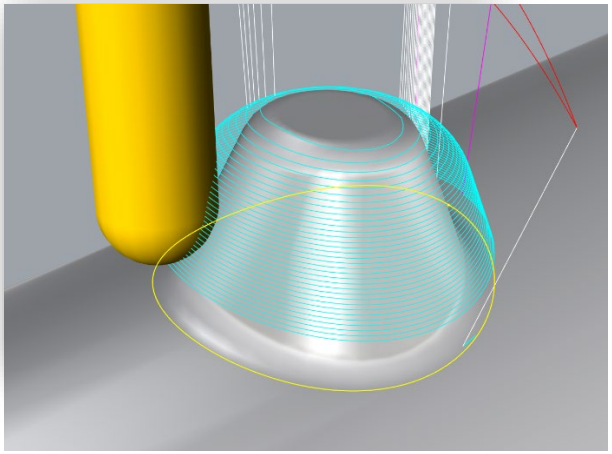






2. The 4 Axis R-level Finishing toolpath method has also been completely revamped and rewritten. Examples of new types of parts that can be machined are shown below.





5 AXIS TOOLPATH ENHANCEMENTS

1. Roll, Pitch and Yaw angles for indexed 5 axis for use with Tilted Work Planes has been implemented. The following post-processor variables have been introduced**: [ANGLE_ROLL], [ANGLE_PITCH], [ANGLE_YAW]**

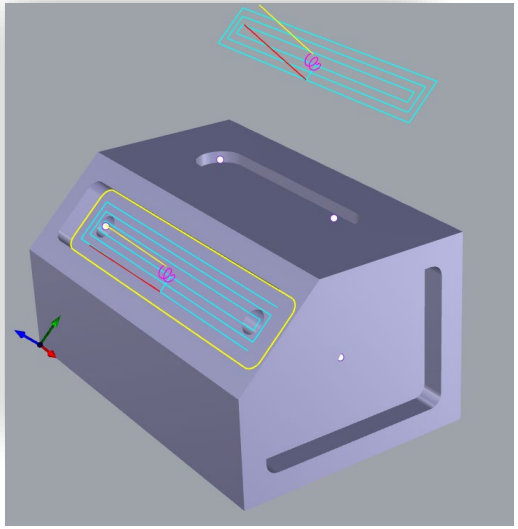
   An example of the usage of these variables in the post is shown below:
   G68.2 P1 Q123 X[SETUP_X] Y[SETUP_Y] Z[SETUP_Z] I[ANGLE_ROLL] J[ANGLE_PITCH] K[ANGLE_YAW]
   G68.2 P1 Q312 X[SETUP_X] Y[SETUP_Y] Z[SETUP_Z] I[ANGLE_ROLL] J[ANGLE_PITCH] K[ANGLE_YAW]

   In addition to this, the axis rotation order can be specified by using characters XYZ, ZYX etc. (OSAI format)

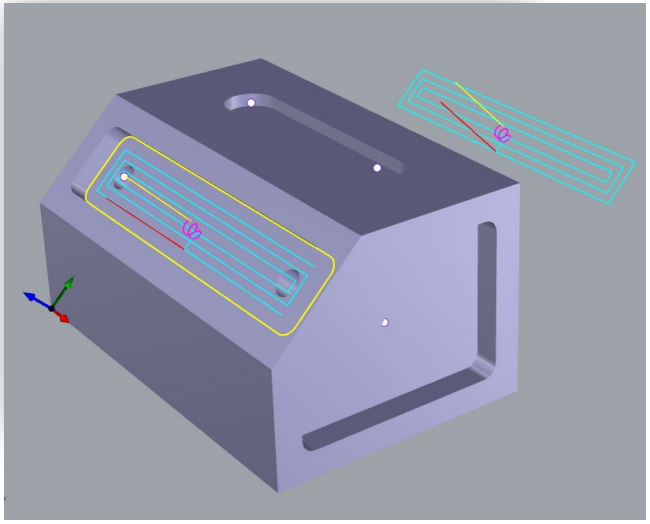
2. New toolpath generation libraries for 5 axis machining have been integrated with the 2022 products. This implements bug-fixes and performance improvements in 5 Axis continuous machining.

OTHER TOOLPATH ENHANCEMENTS

1. An option to set an XY instance to instance parallel to world coordinate system when Setups are not parallel to the world coordinate system was implemented. This allows for machining of multiple parts that have many oriented sides.



Instancing along the Y axis of the Setup coordinate system not very useful for instancing multi-sided parts



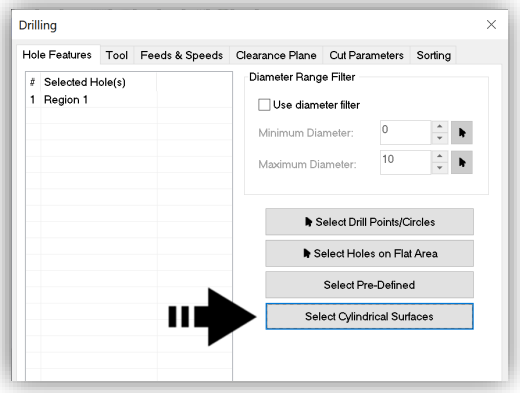
Instancing along World Y axis allows for multiple part machining

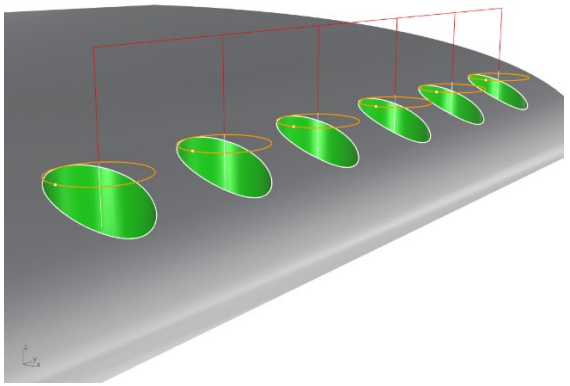
HOLE MAKING ENHANCEMENTS

1. Users can now program drill banks in RhinoCAM 2022 using the updated programmable posts. Examples of G-code using drill banks are shown on the right.

```
N007 (ALL DRILLS)
N008 G5.1 Q1 R5
N009 G55
N010 M06 T0
N011 M601 (DRILL UNIT DOWN - ON)
N012 G00 X24. Y12.
N013 G53 (CANCEL WORK OFFSETS)
N014 M606T511
N015 G49
N016 G43 H13 Z2.
N017 Z2.
N018 G01 X24. Y12. Z0.5 F50.
N019 G00 X24. Y12. Z2.
N020 M606 T0
N021 M05
```

3. Users can now select Cylinders for Hole Making in both 2½ Axis and 4 Axis Hole Making operations.





The slected cyclinders are shown in green. The drill region is shown as the cross section of the cylinder at the highest point of the cylinder

TOOLPATH EDITOR ENHANCEMENTS

1. Additional diagnostics are being displayed in the toolpath editor in case of tool collisions.
2. A Help icon in the Toolpath Editor dialog was added.

FEEDS/SPEEDS ENHANCEMENTS

1. Feeds & Speeds information stored with the tool are now written out to the CSV tool library format.

SIMULATION ENHANCEMENTS

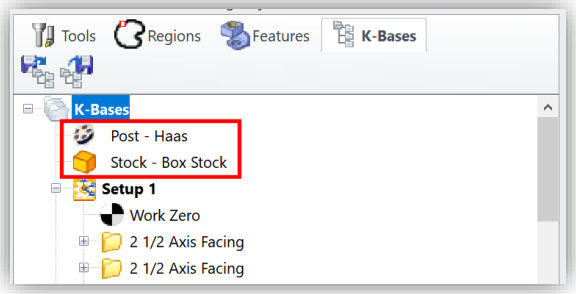
1. The simulation of holders and collisions with tool holders have been enhanced to include the new holders that can now be created.
2. The simulation color control found in the Simulation status bar is now also available from the Simulation Preferences dialog.

MACHINE TOOL SIMULATION ENHANCEMENTS

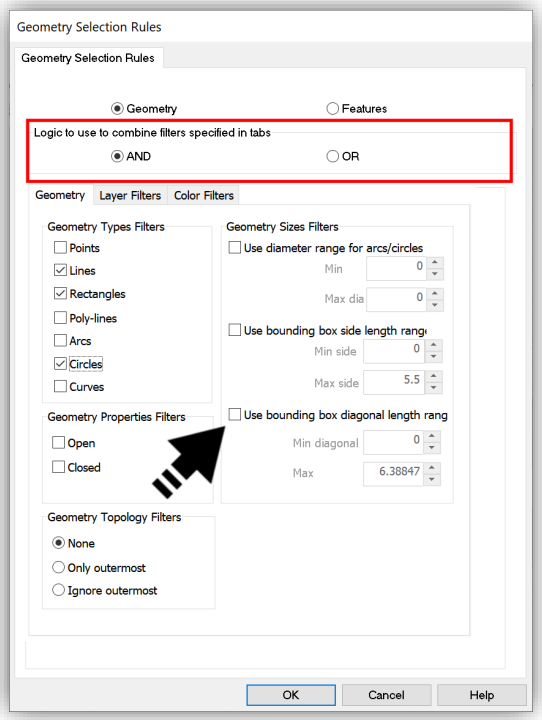
1. Additional machine tool models have been added as part of the installed machine tool simulation library.

KNOWLEDGE BASE ENHANCEMENTS

1. Additional global objects in Knowledge Bases have been implemented:
   - Posts can now be saved with Knowledge Bases.
   - Stock definition can now be saved with Knowledge Bases.

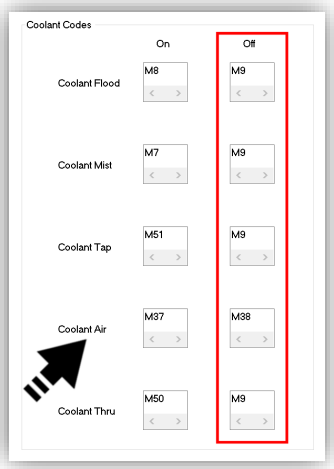


2. Geometry selection rules have been improved with the following:
   - AND/OR logic for use of geometry selection has been introduced.
   - Geometry size filter enhancement for min and max bounding box diagonal range has also been introduced.



POST PROCESSOR ENHANCEMENTS

1. Separate g-codes for turning off coolant for each coolant type was implemented. A new variable [COOLANT_OFF] was added to the post-processor to output coolant the off code. A new "Air" coolant type was added to the coolant list.



2. The Python Programmable post processor has been improved to add the following methods:
   - OnMOpStart()
   - OnMOpEnd()
3. Register number decrement for work offsets has been introduced.
4. A new variable [SETUP_NAME] was added to the post-processor to output setup names.
5. Support of multiple lines for linear motion (Cut and Rapid) was implemented.
6. Post file extension definition can now be selected from the spm file in the case of the legacy post processor.
7. The ability to output macros for Work Zero Offset was implemented for the legacy post processor.
8. Programmable post-processor version string is now displayed in the "Post Options" dialog, to eliminate errors when using programmable posts.
9. A new variable to output a cycle Z value was implemented. This is useful for setting up drill operation posts.

Over 200 new mill posts have been added to the 2022 product

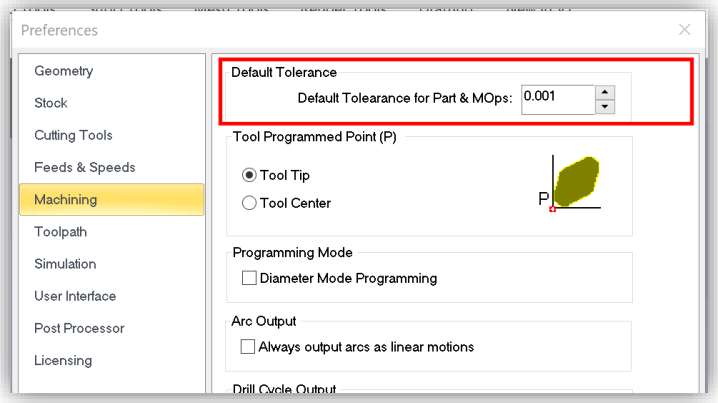
RHINOCAM SOFTWARE DEVELOPMENT KIT (SDK) ENHANCEMENTS

The following enhancements have been added to the RhinoCAM SDK.

1. The ability to load Knowledge Bases has been added.
2. The ability to select a post processor has been added.
3. The ability to get the coordinate system of the current Setup has been added.
4. The API has been enhanced to add and modify additional Machining Parameters.
5. New API example programs have been added to the installer.

WHAT'S NEW IN THE TURN MODULE

1. A global tolerance setting in the Machining Preferences dialog was implemented. Changing this tolerance should affect the quality of the Part being generated.



2. Parting off toolpath now the program point defined in the parting off tool.

What's new in the G-code Editor Module

1. The G-Code Editor Module is nor integrated with the MILL Module
2. A "Save As" command in G-Code Editor was implemented.
3. Full line selection is now possible in the G-code editor.
4. Stock type definition caption in the G-Code Editor tree was implemented.

What's new in the NEST module

1. Create Remnants after nesting and save as a sheet was implemented.
2. Setting the priority for sheets was implemented.
3. Allowing overlapping curves when using the "use for engraving" option was implemented.

What's new in the Profile-NEST module

1. Setting priority for sheets, similar to the nesting module, was implemented.

What's new in the ART module

No major enhancements were introduced in the ART module. Selected user reported bug-fixes were implemented.

What's new in the MESH module

New Machinework's Polygonica libraries were integrated to implement additional robustness and improved performance within most mesh functions.

Bugs Fixed

Numerous bugs have been fixed to make the product more reliable and robust.

1. Bridges/tabs not being generated at specified bridge point locations for Engraving was fixed.

2. Adaptive Roughing issue "Clearance height when set to Automatic, goes 2.75" above the stock height when MCS & Work Zero is translated." was fixed.
3. Editing the mop and selecting the surface from the list does not highlight the surface in the graphics screen.
4. Criss-cross horizontal finishing issue from bug C2B 585 was fixed.
5. Slotting does not honor the start point of each curve in an XY array of curves in the test case.
6. Tool Length not being displayed in the tool collision dialog.
7. Issue with MOp's G-Code icon was fixed.
8. Holes filter behavior was improved.
9. Max spindle speed is being exceeded when changing materials from the fs calculator.
10. The issue "Engage / Retract motions cut through material" was fixed.
11. When new operations are created and saved, nothing gets saved was isolated and fixed.
12. RhinoCAM API: post output file always have *.nc extension, even when output file extension specified in *.spm file" was fixed.
13. Peck Tapping operations not honoring the Optimize check box as the other drill operations" was fixed in the post.
14. LAN License Service issues were fixed.
15. Icons not scaled in the module selection menu with display scaling different from 100%.
16. RhinoCAM API: Regenerated Tool path does not have "DRILL CYCLE" was fixed.
17. R-Level issue of stock and part z-level traces computation was fixed.
18. R-Level roughing stepover issue was fixed.
19. R-Level roughing rotary axis issue was fixed.
20. Using Number of levels under cut levels in 4 axis R-level Roughing & Finishing runs out of memory and brings the computer to a crawl and crashes app to desktop was isolated and fixed.
21. R-Level boundary toolpath gouge issue was fixed.
22. DWG load issue: "The file loading freezes on the inserting meshes to the tree stage" was fixed.
23. Issue with updating Program Start/End blocks from post processor was fixed.

Numerous other smaller bugs and under the hood changes were made.