

ModuleWorks

Innovating for You

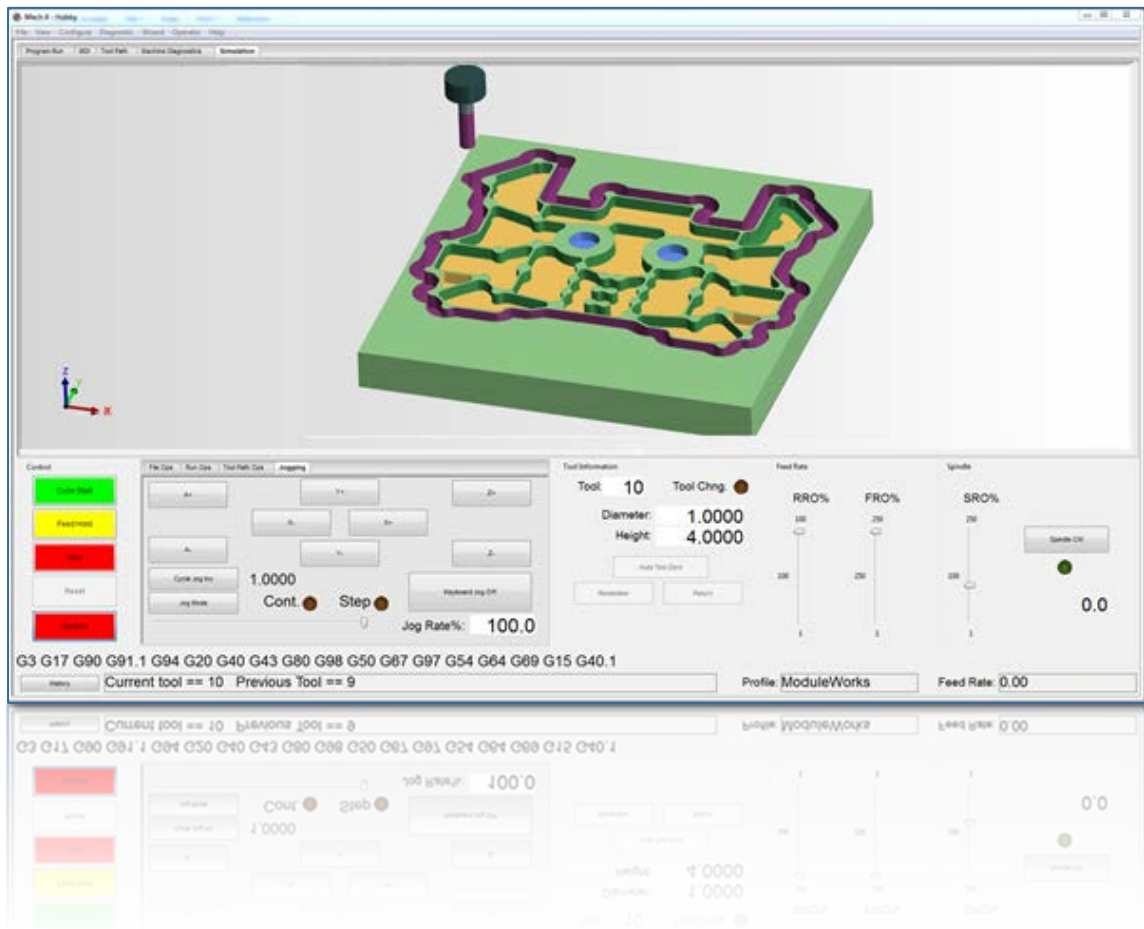


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Introduction:

The ModuleWorks Material Removal Simulation module in the Mach controller displays stock and tool geometries and performs material removal simulation by reading the toolpath coordinates from the machine coordinate system.

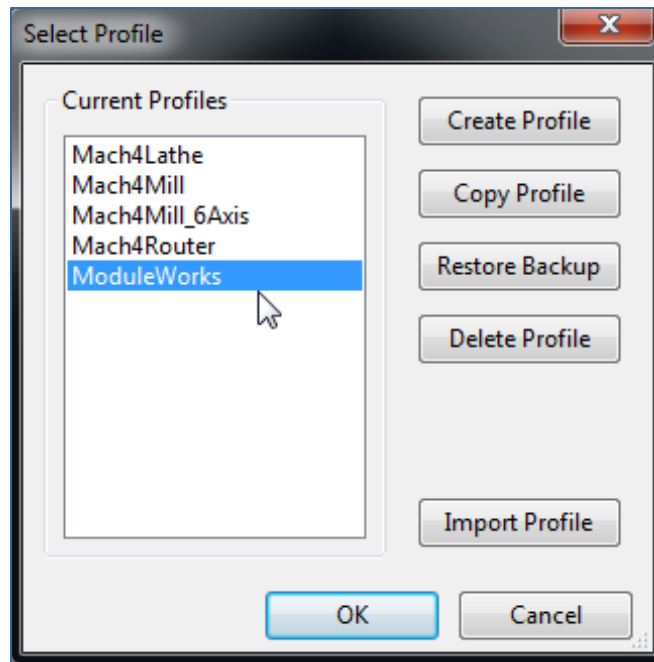
This document shows you how to set the parameters for the ModuleWorks Material Removal Simulation.

The simulation is displayed only when the program is run on the CNC controller.

Documents refers to Mach 4 version: 4.2.0.3390.

Select Profile:

Launch the Mach controller application and select the 'ModuleWorks' profile. This allows users to see 3D material removal simulation and other simulation related settings.



Tool Table - Create Tool(s)

On the top ribbon bar, click **View > Tool Table...**

Tool parameters used by the Mach controller

Tool parameters used for material removal simulation

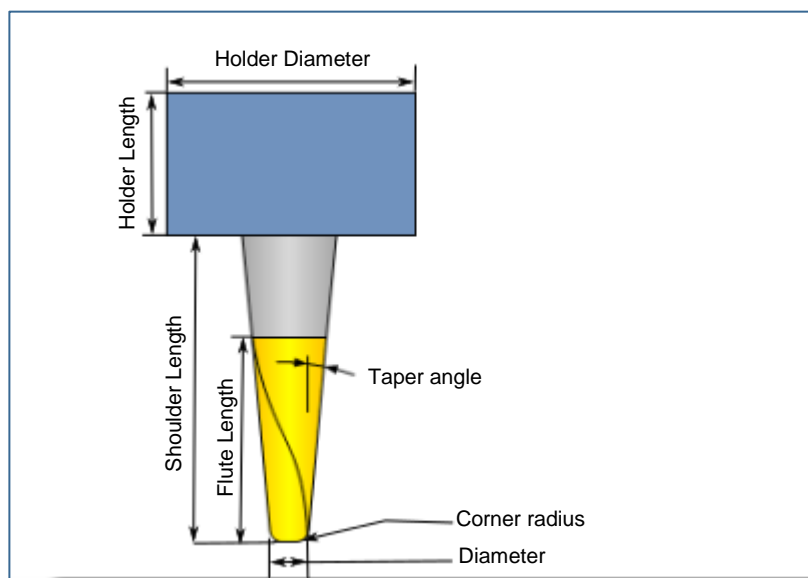
	Length	Length Wear	Dia	Dia Wear	Description	Diameter	Corner Radius	Taper Angle	Flute Length	Shoulder Length	Holder Length	Holder Diameter	Tool Color R	Tool Color G	Tool Color B
Tool #1	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	20.0000	40.0000	20.0000	15.0000	100	0	0
Tool #2	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #3	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #4	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #5	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #6	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #7	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #8	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #9	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #10	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #11	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #12	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #13	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #14	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #15	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #16	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #17	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #18	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #19	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #20	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0
Tool #21	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	0	0

Input Input + Measure

Quit

Tool properties:

The columns in the Tool Table contain the tool parameters. The parameters in the red rectangle in the above image, from Diameter to Tool Color B, are used for material removal simulation.



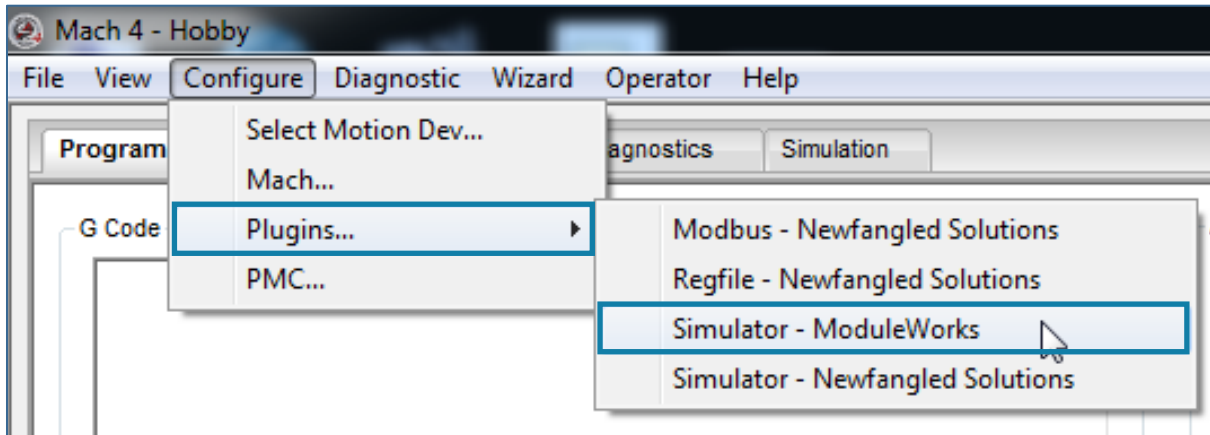
Tool Color R/G/B:

The tool's flute length can be colored using RGB values. The raw material cut from the stock is colored according to the color of the tool used to cut the material.

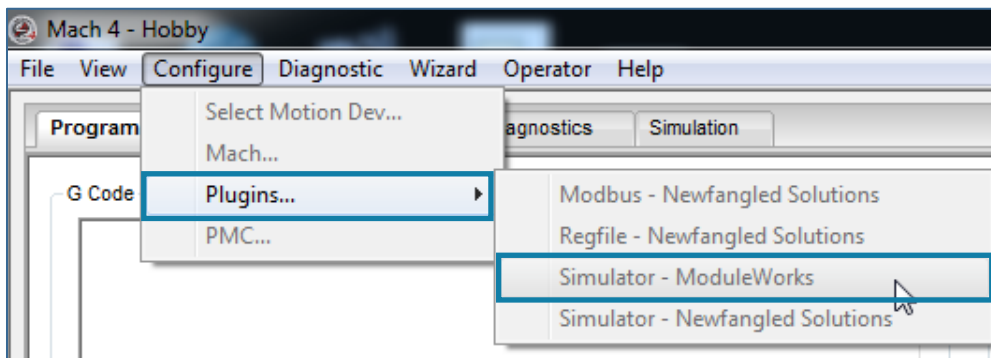
The simulation modules read the coordinates from the machine coordinate system. This means the tool length must be compensated by the machine or in the toolpath itself.

Simulation Configurations - create stock

On the top ribbon bar, select **Configure > Plugins...> Simulator - ModuleWorks**



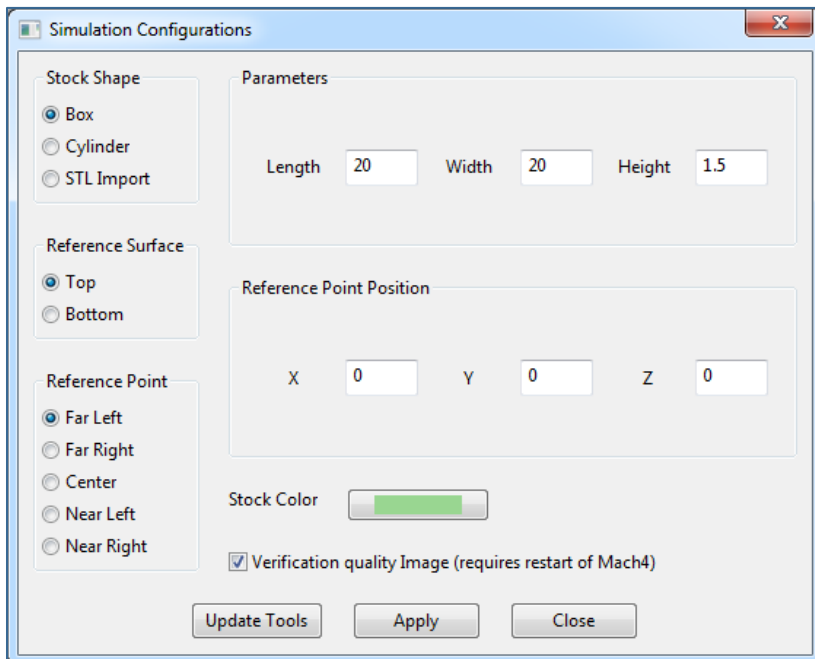
What if plugin is greyed out



Ensure that the control is disabled to allow plugin function.



This will open a dialog box for setting the Simulation Configurations.



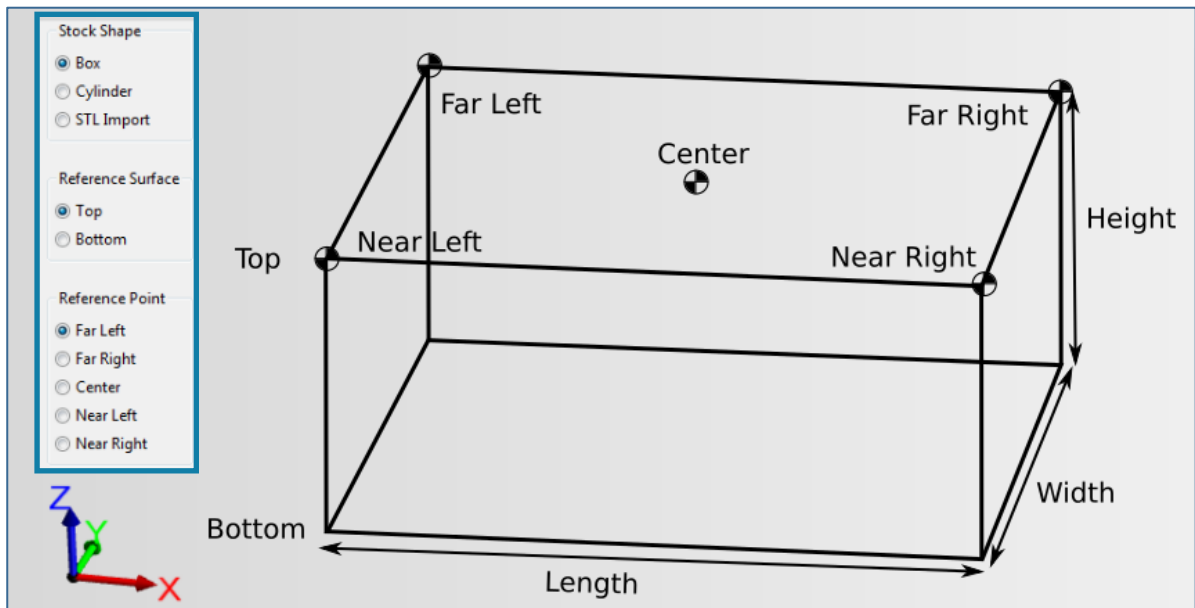
Stock:

Stock is raw material used for machining. There are three stock options for setting the stock.

By default the stock origin is placed at the table center position in the machine coordinate system (X0, Y0, Z0). However, it can be translated using the bottom center position.

Box:

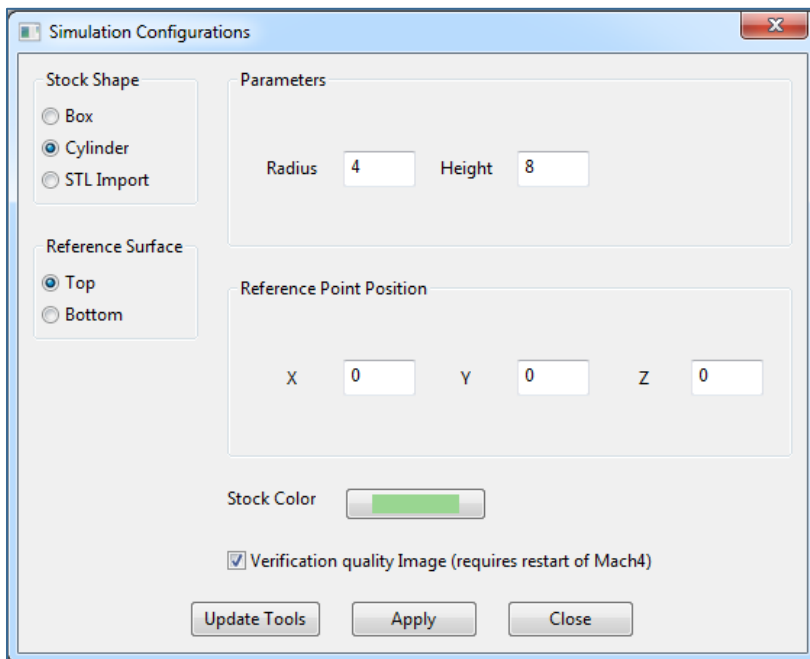
A cube is a rectangular piece of raw material. The cube can be configured by setting the length, width and height.

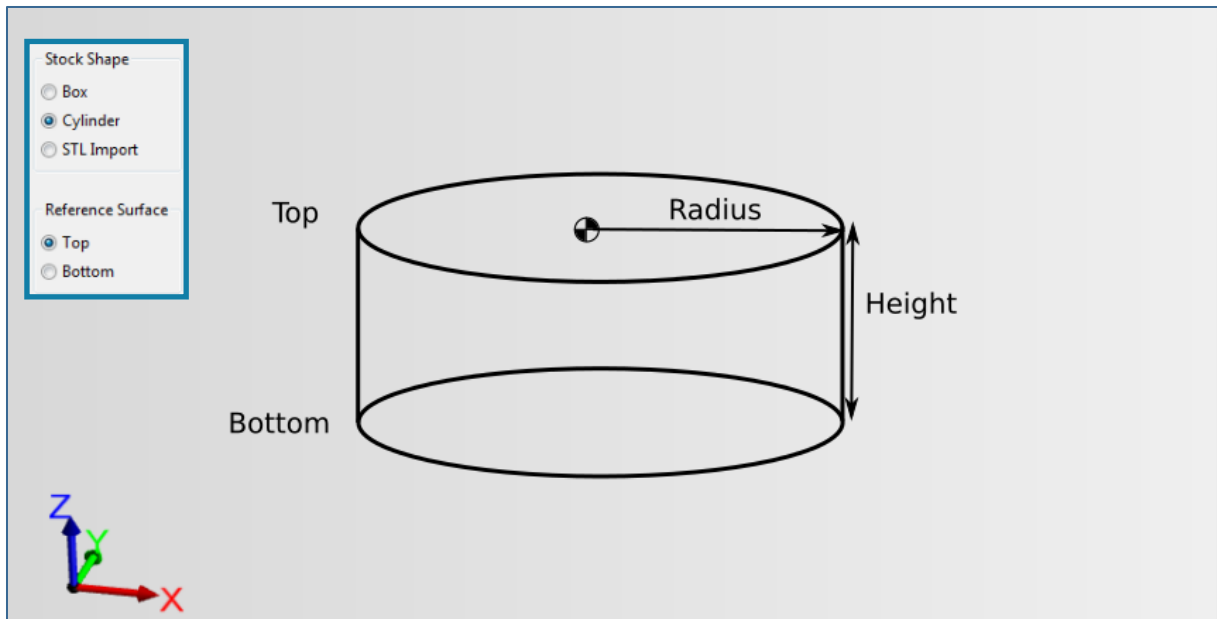


Cylinder:

A cylinder is configured by entering the radius and height.

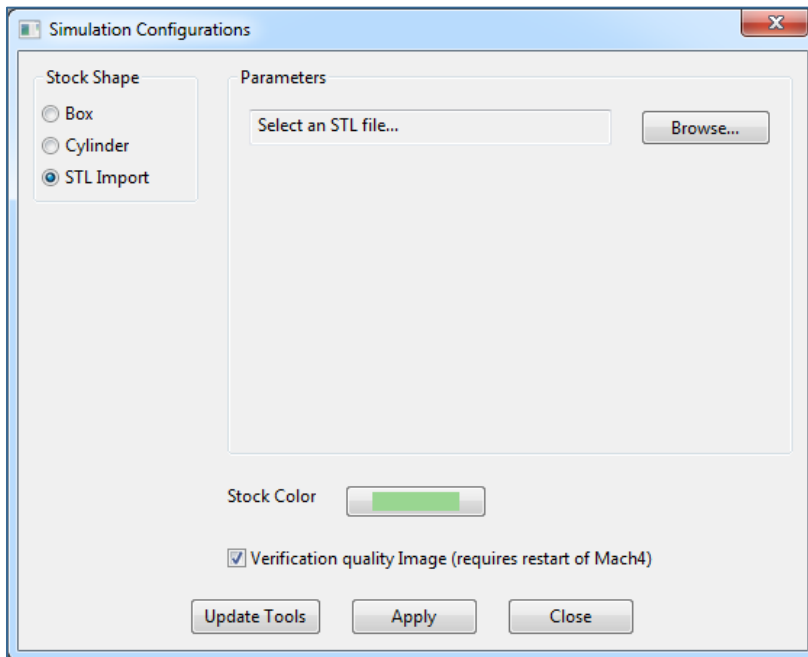
By default, the stock origin is placed at the table center position in the machine coordinate system (X0, Y0, Z0). However, it can be translated using the bottom center position.





STL Import:

A STL file can be imported and used as stock. Click the **Browse...** button and select the file from the computer hard drive.



STL stock are imported from the origin that was used to export the data to the file. It is not possible to translate STL stock after they have been imported into the Mach controller. To translate STL stock, you must export it again (from the source software) using the correct origin.

Reference Surface:

Reference point position on the stock Top / Bottom surface in Z axis.

Reference Point:

Reference point position on the stock in XY plane.

Reference Point Position:

Defines Reference Point Position in machine coordinate system.

Color:

The Color button shows the color of the stock.

To change the color of a stock, click the **Color** button. In the Color dialog box, select a color from the color palette, and then click **OK**.

Verification quality Image:

Whenever the cutting is paused / stopped, the resolution of the material verification is enhanced locally where features are recognized. For use with small features on a large stock, increases memory usage. After activating this feature Mach4 application must be restarted.

Update Tools:

Click the **Update Tools** button to apply the changes made to the tool(s) parameters.

Apply:

Click **Apply** to apply the changes to the simulation configuration. At any time during the simulation, the stock geometry can be reset by clicking the **Apply** button.

Close:

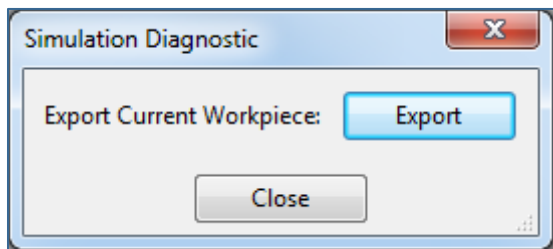
Click the **Close** button to close the Simulation Configuration dialog box.

Save Simulation data:

Simulation data are saved in *.ini file under profile directory, so that last used data is loaded every time when the application is started.

Export current workpiece

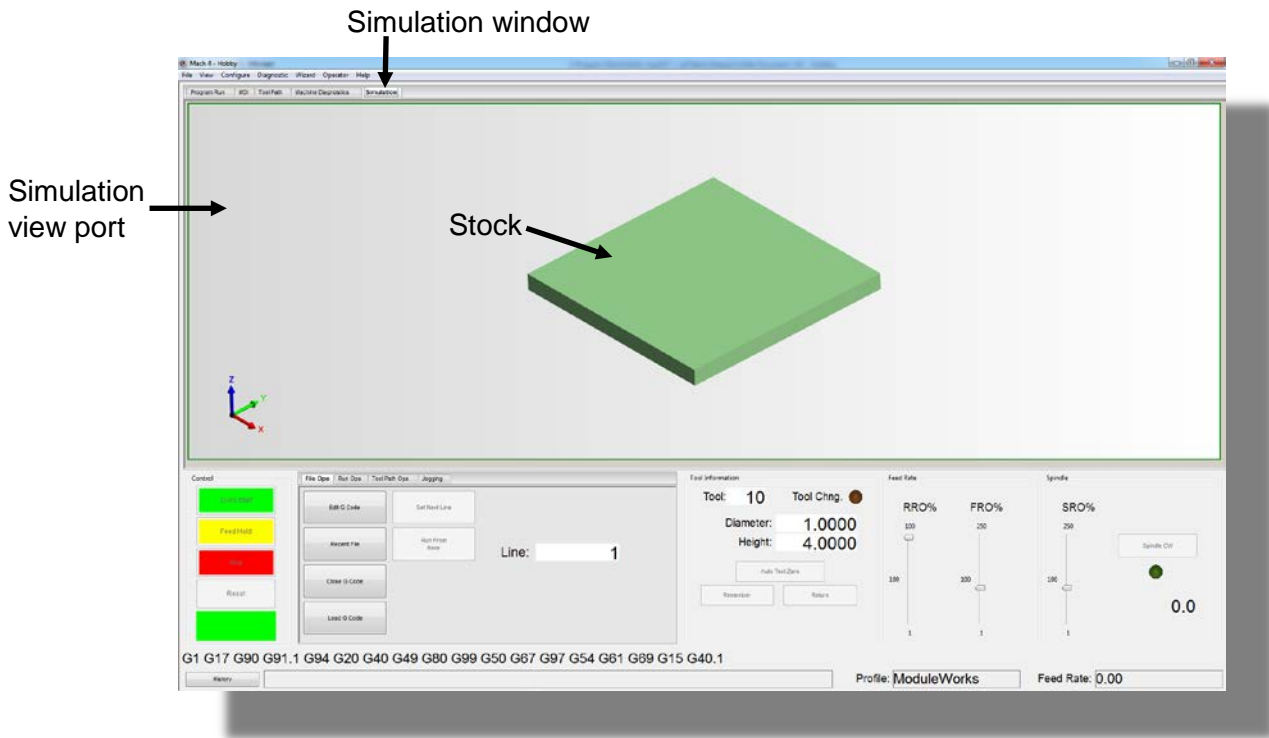
On the top ribbon bar, click **Diagnostic > Simulator – ModuleWorks**



This will export the cut stock material to a STL file. This file can be further utilized, for example as stock material for the next operation.

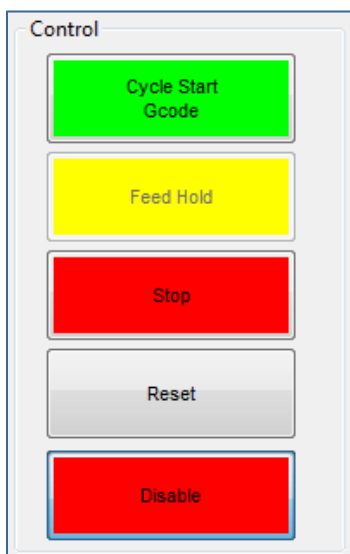
Simulation window

The Simulation window offers 3D visualization of the stock and tool and displays the material removal simulation. The Simulation window also enables you to Pan, Zoom and Rotate the view.



How to start Simulation

Enable the control and **click Cycle Start**



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