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PartMaker 2012

What's New

PartMaker 2012

What's New

Important User Notices

Acknowledgements

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Patents

PartMaker software is subject to the following patents:

Patent granted: US 6, 112, 133 Visual system and method for generating a CNC program for machining parts with planar and curvilinear surfaces

Patent granted: US 6, 741, 905 Visual system for programming of simultaneous and synchronous machining operations on lathes

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Introduction 1

Introduction

PartMaker 2012 contains many new features and enhancements.

Full Machine Simulation in PartMaker/Mill

Simulation enables you to visualize the machining of the part you have programmed, so you can identify errors before machining.

PartMaker/Mill 2012 offers a new Full Machine Simulation (FMS) module for you to visualize the following machine tool components during simulation:

- the machine housing;
- the machine table and its components; and
- the tool spindle and its components.

By saving details of the machine simulation to a Machine Data (.mchdat) file, you can use the same machine simulation with different .job files.

PartMaker/Mill 2012 also includes a new setup assemblies feature (see page 7) that enables you to visualize the stock and any fixtures, such as clamps. By using Full Machine Simulation together with setup assemblies, you can now visualize the complete machine tool in PartMaker/Mill.

Setting up FMS

To set up Full Machine Simulation in PartMaker/Mill for an existing .job file:

1 Open a Machine Data (.mchdat) file in PartMaker.

Select **ToolMinder > Machine** to display the **Machine Data File** dialog. If a .mchdat file is open, the filename is displayed in the title bar of the dialog. If no .mchdat file is open, or you want to select a different one, click **Open Machine File** and then select the .mchdat file you want to use.

2 Details of the .mchdat file are displayed on the **Machine Data File** dialog. You can view, or modify, the following details:

- The type of machine, including its axis configuration and table configuration. These details are displayed in the **Milling Machine Configuration** area of the dialog.

- The machine table and its motion axes. Click **Properties** in the **Table** area of the dialog to display the **Table Properties** dialog.

- The tool spindle and its motion axes. Click **Properties** in the **Tool Spindle** area of the dialog to display the **Tool Spindle Properties** dialog.

- The components comprising the machine housing and their motion axes. Click **Components** to display the **Components** dialog.

- The tool holders used. Click **Holder Data** to display the **Holder Data** dialog.

If you use solid models to represent parts of the milling machine, these models must meet the requirements listed in Creating solid models for FMS (see page 4).

3 Attach any tool holders defined in the Machine Data file to tools that are used in the Process Table, so the holders appear during simulation.

To attach tool holders to tools, select **Job Optimizer > Tool Assembly** to display the **Tool Assembly** dialog. The dialog displays a list of the tools used in the Process Table and the name of the tool holder to which each tool is attached. To attach a tool holder to a tool:

a Select a tool from the list.

b Click **Select Holder** to display the **Select Holder** dialog and then select a tool holder from the list.

c Click **OK** to return to the **Tool Assembly** dialog.

d To check if the tool assembly is correct, click the **Tool Assembly Preview** to preview a 3D model of the tool and tool holder.

See Attaching a tool to a holder for FMS (see page 6) for details of how PartMaker attaches the tool to the holder and then mounts the holder into the tool spindle for Full Machine Simulation in PartMaker/Mill.

4 Select **Simulation > Simulation Options** to display the **Simulation Options** dialog, where you can select options to control the simulation, for example the types of collisions detected.

For more details about any of the dialogs used to set up Full Machine Simulation in PartMaker/Mill, refer to the PartMaker Reference Help.

Running FMS

To run Full Machine Simulation in PartMaker/Mill:

1 Select **Simulation > Full Machine Simulation**.

2 Select **Simulation > Simulation** to display the Simulation window. The name of the Machine Data (.mchdat) file you are using is displayed in the window's title bar:
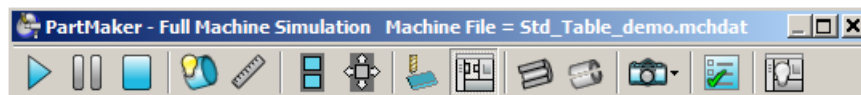
3 To display the travel limits of the table and/or tool spindle during simulation, select the corresponding menu option(s) from the **Simulation > Show Travel Limits** menu:
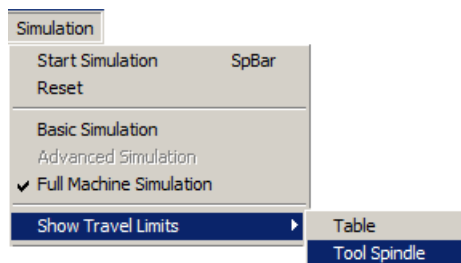
4 Click ▷ on the **Simulation window** toolbar to start the simulation.

PartMaker uses the information in the Machine Data (.mchdat) file to display a visual representation of the part being machined on the milling machine. For example:
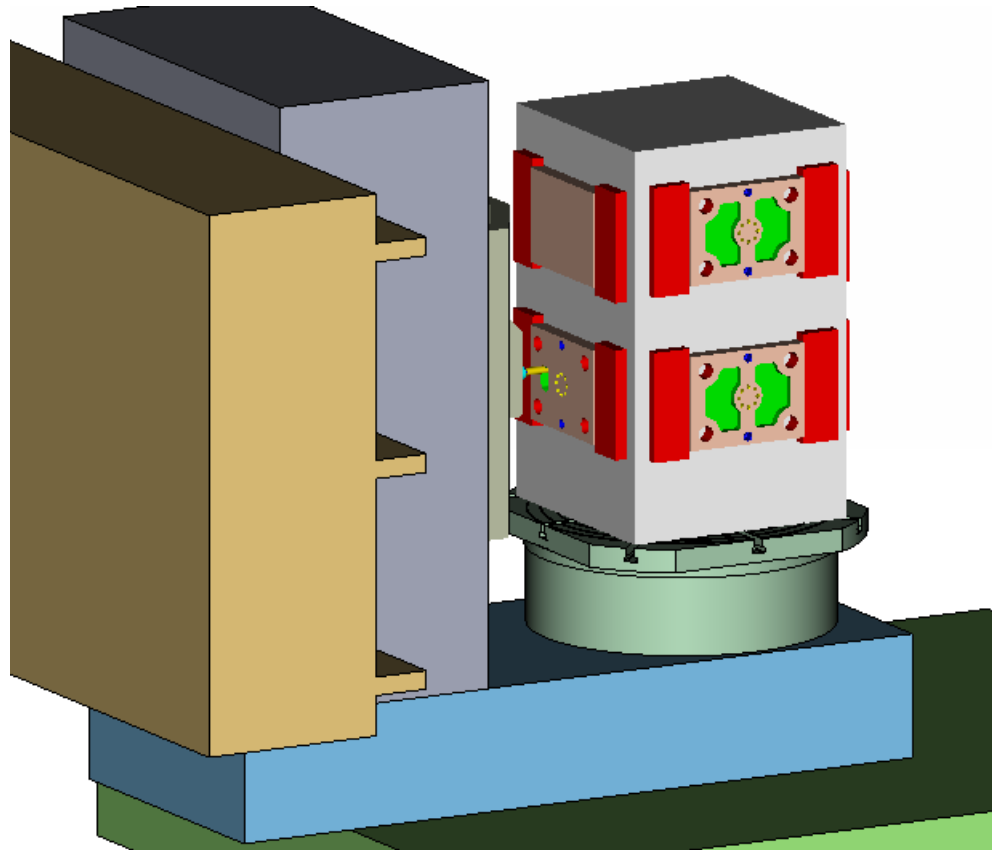
Creating solid models for FMS

When creating solid models for Full Machine Simulation in PartMaker/Mill, follow these rules:

Machine Coordinate System

- The Machine Origin must be at:
  - the zero point of the Top Table model for **5-axis milling tables** when the table is in its home position.
  - the zero point of the Table model for **tombstones, standard tables** and **4-axis milling tables** when the table is in its home position.
- Ensure the Z axis is parallel with the tool axis.

Table Model Origin

The Table Origin must be at:

- the bottom-left corner of the top of the table for **standard tables**.
- the top of the table on the axis of rotation of the tombstone for **tombstones**.
- the top of the table on the axis of rotation for **4-axis milling tables**.
- the top of the table on the primary axis of rotation for **5-axis milling tables**.

The table model's axes must align with the Machine Coordinate System.

Tool Spindle

The Tool Spindle Origin must be coincident with the Holder to Tool Spindle Attachment Point.

The Tool Spindle's model axes must align with the Machine Coordinate System.

Tool Holders

You can define holders using a solid model or using a .dxf file:

- **Using a solid model**
  - The holder can be in a different orientation to the Machine Coordinate System. PartMaker rotates the holder so the Holder to Tool Spindle Attachment direction aligns with the Tool to Holder Attachment direction.
  - Define all holder data in the Holder Coordinate System.
- **Using a .dxf file**
  - Draw the holder in the XY plane in 2D.
  - The origin of the geometry must be at the Tool to Holder Attachment Point.
  - The axis of the holder must be along the Y axis.
  - The .dxf file units must match the, job file's **Input Units** (as specified on the **Preferences** dialog).

Components

Each component model's axes must align with the Machine Coordinate System.

Attaching a tool to a holder for FMS

When using Full Machine Simulation in PartMaker/Mill, PartMaker mounts the tool to the holder and then mounts the holder into the tool spindle as follows:

If you use solid models to represent parts of the milling machine, the models must meet the requirements listed in Creating solid models for FMS in PartMaker/Mill (see page 4).

1 The Holder is rotated so the Tool to Holder Attachment vector is along the negative Z axis:
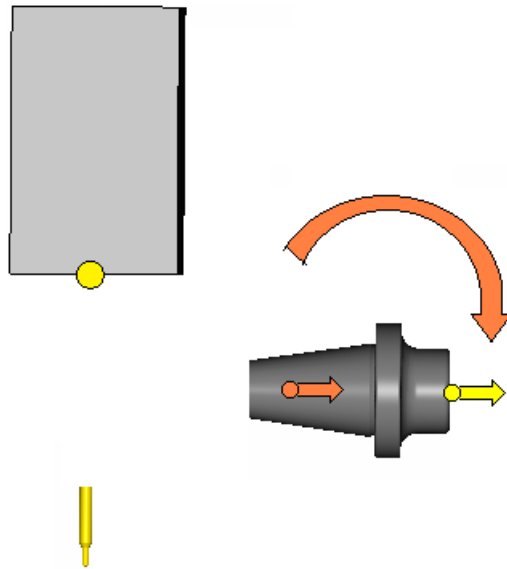
2 The Holder to Tool Spindle Attachment Point is positioned to the Tool Spindle's origin, then the Tool is positioned to the Tool to Holder Attachment Point:
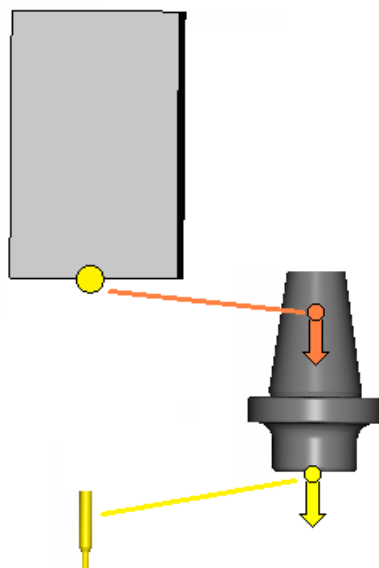
3 The final result is shown below:

Using setup assemblies in PartMaker/Mill

In PartMaker/Mill 2012 you can now view setup assemblies in the Solids window.

A setup assembly is a solid model file that can contain 3D representations of the stock, milling table and other machine fixtures, such as clamps. Using a setup assembly, you can view how the part appears on the milling table, with any fixtures attached, while you are programming and verifying toolpaths. You can also view the setup assembly during simulation.

By using setup assemblies together with the new Full Machine Simulation module (see page 1), you can now visualize the complete machine tool during simulation.

> *To avoid confusion between setup assemblies and solid model files that contain an assembly of parts or surfaces, some menu options have been renamed in PartMaker 2012, as described in General improvements (see page 44).*

Using a solid part model and a setup assembly

To use both a solid model of a part and a setup assembly when programming in PartMaker/Mill:

1 Select **File > New Job** to create a new .job file.

2 In the **Setup** dialog, select the type of table used on the machine from the **Table** drop-down list, and then complete the dialog.

3 Select **ToolMinder > Setup Assembly > Import Setup Assembly,** and select the file containing the setup assembly for this .job file. PartMaker imports the setup assembly (see page 12) into the Solids window in Setup Assembly mode.

> *Using the **Solids > Utilities > Paste from PowerSHAPE** option, you can paste solids from PowerSHAPE into PartMaker's Solids window to create a setup assembly.*

> *The solid models you use to represent the setup assembly must meet the requirements listed in Creating solid models for setup assemblies (see page 9).*

4 Select **ToolMinder > Setup Assembly > Component Properties** to display the **Component Properties** dialog (see page 14). Use this dialog to identify each component in the setup assembly and specify how it appears in the Solids window.

5 Select **File > Import** and select the file that contains the part model you want to use in the .job file. PartMaker imports the part model into the Solids window in Part mode.

6 Program all the hole, profile and/or surface groups required to machine the part and verify the toolpaths.

> *Remember to switch between Part mode and Setup Assembly mode (see page 15), depending on what you want to see when programming and verifying the part.*

7 Repeat Steps 2–6 for any other Face windows you want to create.

8 Select **Job Optimizer > Generate Process Table** to generate the Process Table containing all the processes needed to machine the part.

9 Select **Simulation > Simulation Options** to display the **Simulation Options** dialog and select the **Use Setup Assembly** option to view the setup assembly during simulation.

10 Select **Simulation > Simulation** to display the Simulation window, then select **Simulation > Start Simulation** to run the simulation (see page 17).

# Creating solid models for setup assemblies

When creating solid models for use in setup assemblies, follow these rules for setting up the setup assembly origin and coordinate axes:

Standard Table

With a standard table, set:

- the origin at bottom left corner of the top of the table; and
- the Z axis perpendicular to the table, directed outwards from the top face of the table.
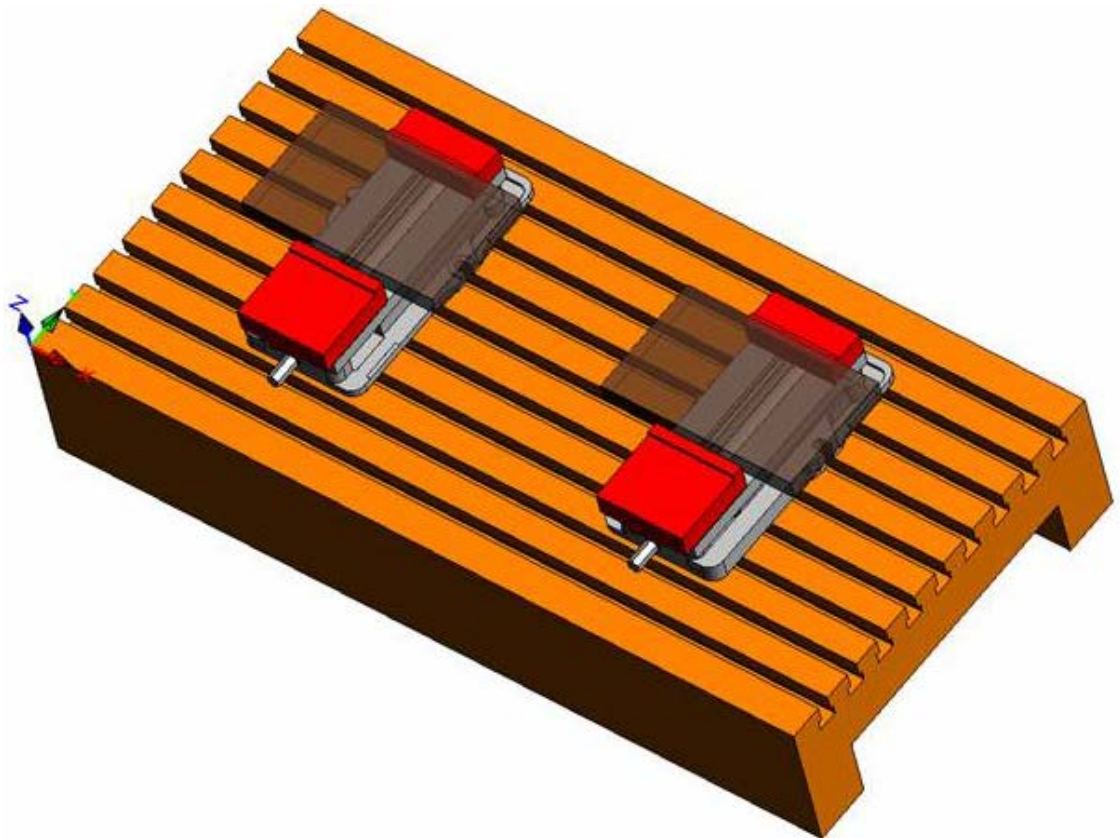
For example:

Tombstone

With a Tombstone, set:

- the origin on top of the table on the tombstone's axis of rotation; and

- the Y axis parallel to the tombstone's axis of rotation of the tombstone, directed outwards from the top face of the table.

For example:

4-Axis Table

With a 4-Axis Table, set:

- the origin on top of the table, on the table's axis of rotation; and
- X axis parallel to the table's axis of rotation, directed outwards from the top face of the table.

For example:

5-Axis Table
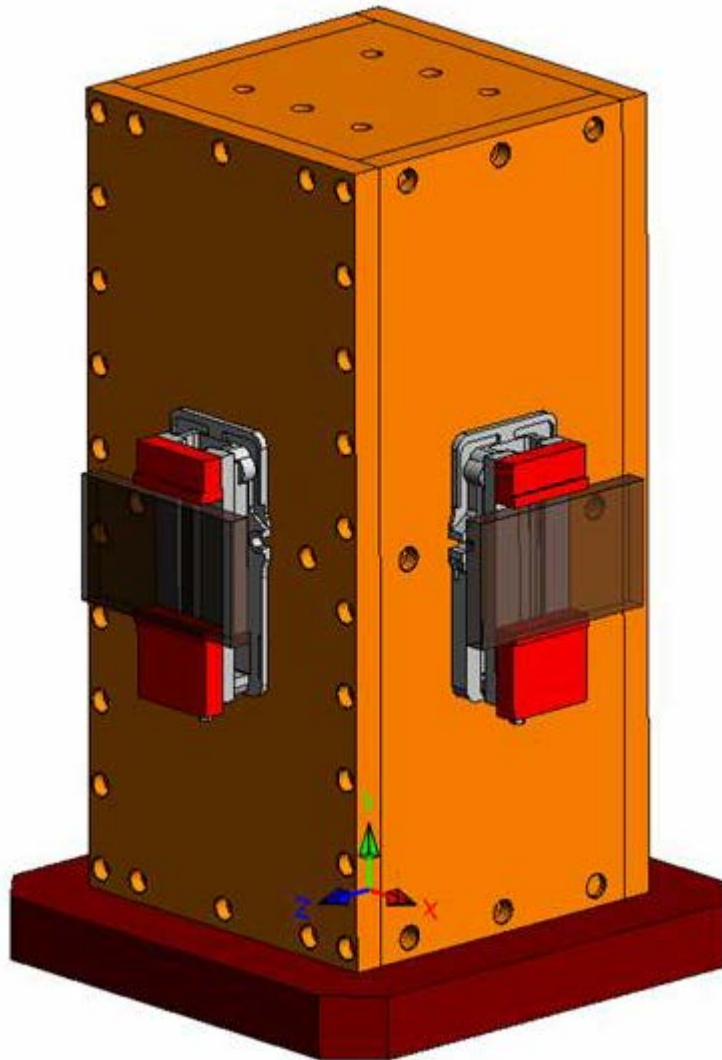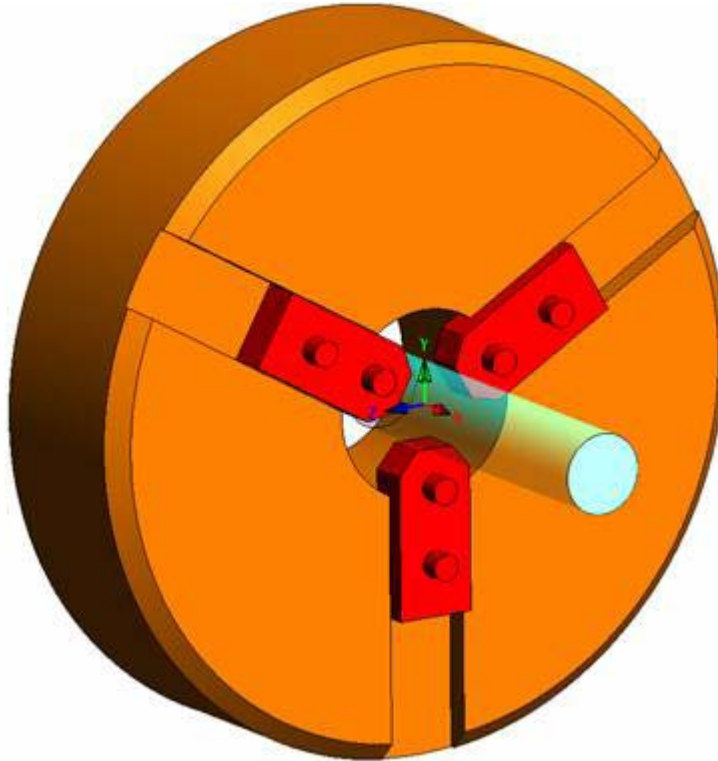
With a 5-Axis Table, set:

- the origin on top of the table, on the table's axis of rotation; and

- the Z axis parallel to the table's axis of rotation, directed outwards from the top face of the table.

For example:
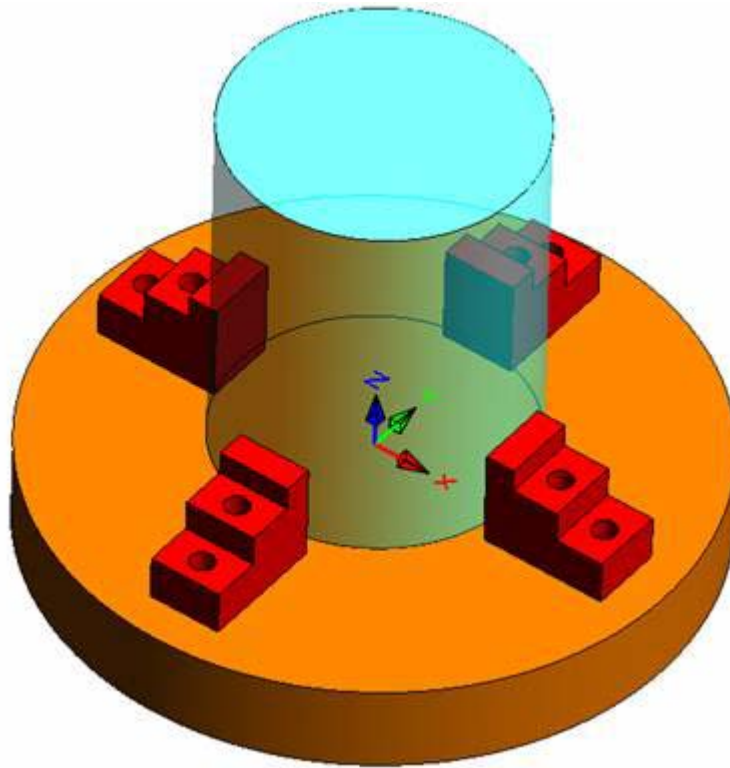
Importing a setup assembly

To import a setup assembly into PartMaker/Mill:

1   Select **ToolMinder > Setup Assembly > Import Setup Assembly,** then select the menu option for the type of file you want to import. You can import the following file types:

- X_T Parasolid Transmit file.

- X_B Parasolid Transmit Binary file.

- SLDPRT SolidWorks Part file.

- IPT AutoDesk Inventor Part file.

- PRO/E file.

- STEP file.

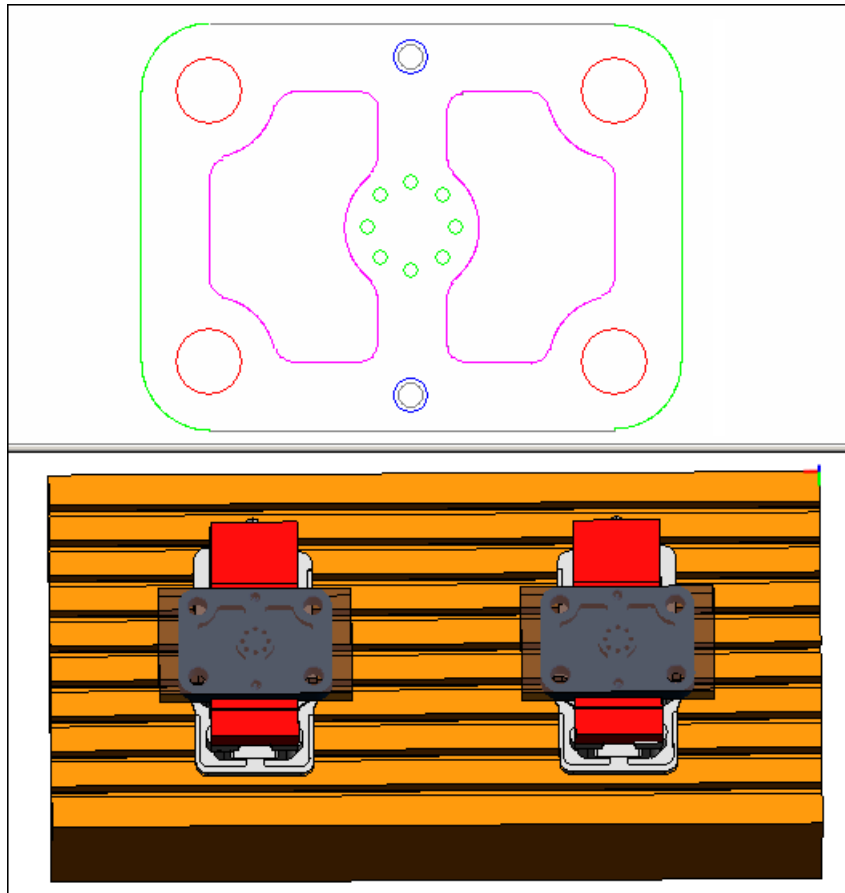**2** In the **Import** dialog, select the folder and filename of the file containing the setup assembly and click **Open**.

PartMaker imports the file into the Solids window, for example:

When you have imported a setup assembly, PartMaker saves it together with the .job file.

*Using the **Solids > Utilities > Paste from PowerSHAPE** option, you can paste solids from PowerSHAPE into PartMaker's Solids window to create a setup assembly.*

The solid models you use to represent the setup assembly must meet the requirements listed in Creating solid models for setup assemblies (see page 9).

Identifying the components in a setup assembly

Use the **Components Properties** dialog to identify the different types of components (stock, table or fixture) in a setup assembly and specify how each component appears in the Solids window:
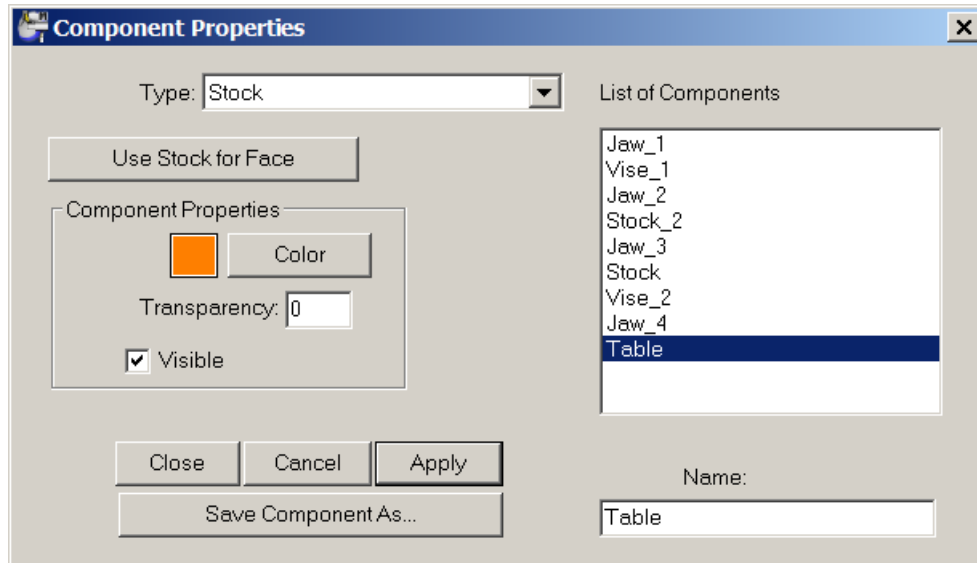
1 To display the **Component Properties** dialog:

- Select **ToolMinder > Setup Assembly > Component Properties;** or

- Double-click a component in the Solids window when in Setup Assembly mode.

2 Select the component you want to work with from the **List of Components**. If you double-clicked a component in the Solids window to display this dialog, PartMaker automatically selects this component in the list.

3 PartMaker gives default names to the components in the setup assembly. To use a different name, enter a new name in the **Name** field.

4 You can specify the following settings for the selected component:

Type. Specify whether the component represents a **Fixture**, **Stock** or **Table**.

Use Stock for Face. For **Stock** components, click this button to display the **Use Stock For Face** dialog, where you can select the Face window that uses this stock component.

Component Properties. These options control how the component appears in the Solids window:

- **Color**. Click to display the **Color** dialog, where you can select the color of the component.

- **Transparency**. Specify the transparency for the component. 0% displays a solid component. 100% displays a fully transparent (invisible) component.

- **Visible**. Select this option to display the component in the Solids window.

5 Click **Close** to apply any changes and close the dialog.

*Use the **Save Component As** button to save the selected component to a separate X_T Parasolid Transmit file, so you can use it with other setup assemblies.*

Switching modes in the Solids window

In PartMaker 2012, the Solids window has separate modes for working with the part model and the setup assembly. To switch between modes:

- Select **Solids > Set View > Part Mode** or click on the **Solids Window** toolbar to view, and work with, the part model.
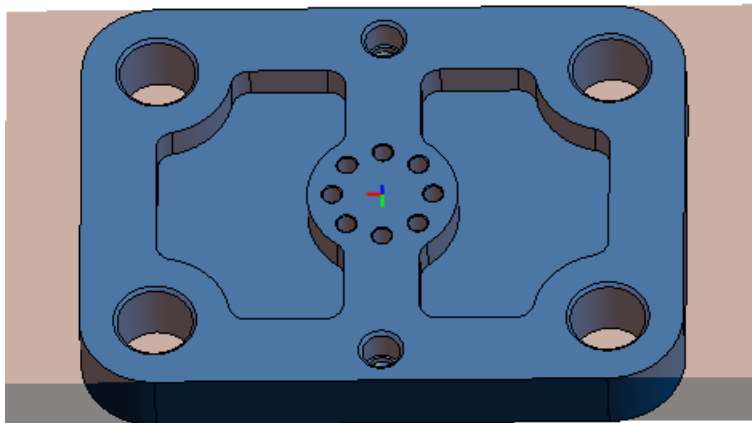
- Select **Solids > Set View > Setup Assembly Mode** or click on the **Solids Window** toolbar to view, and work with, the setup assembly model.
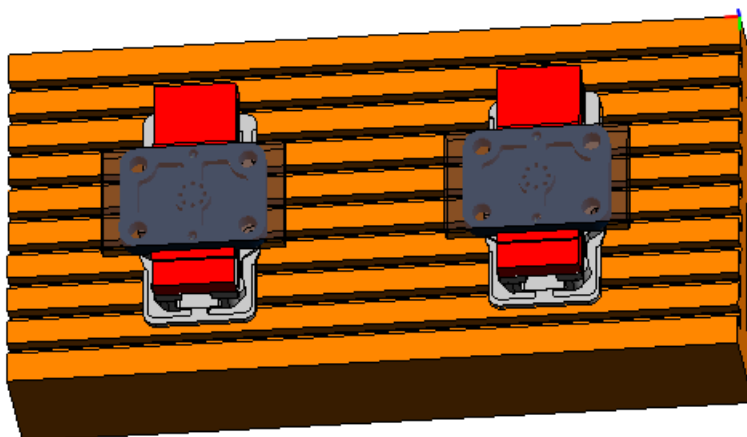
Viewing the setup assembly with toolpaths

When you have imported a setup assembly into the Solids window, you can program and verify toolpaths while visualizing the part on the machine table with any fixtures attached. For example:

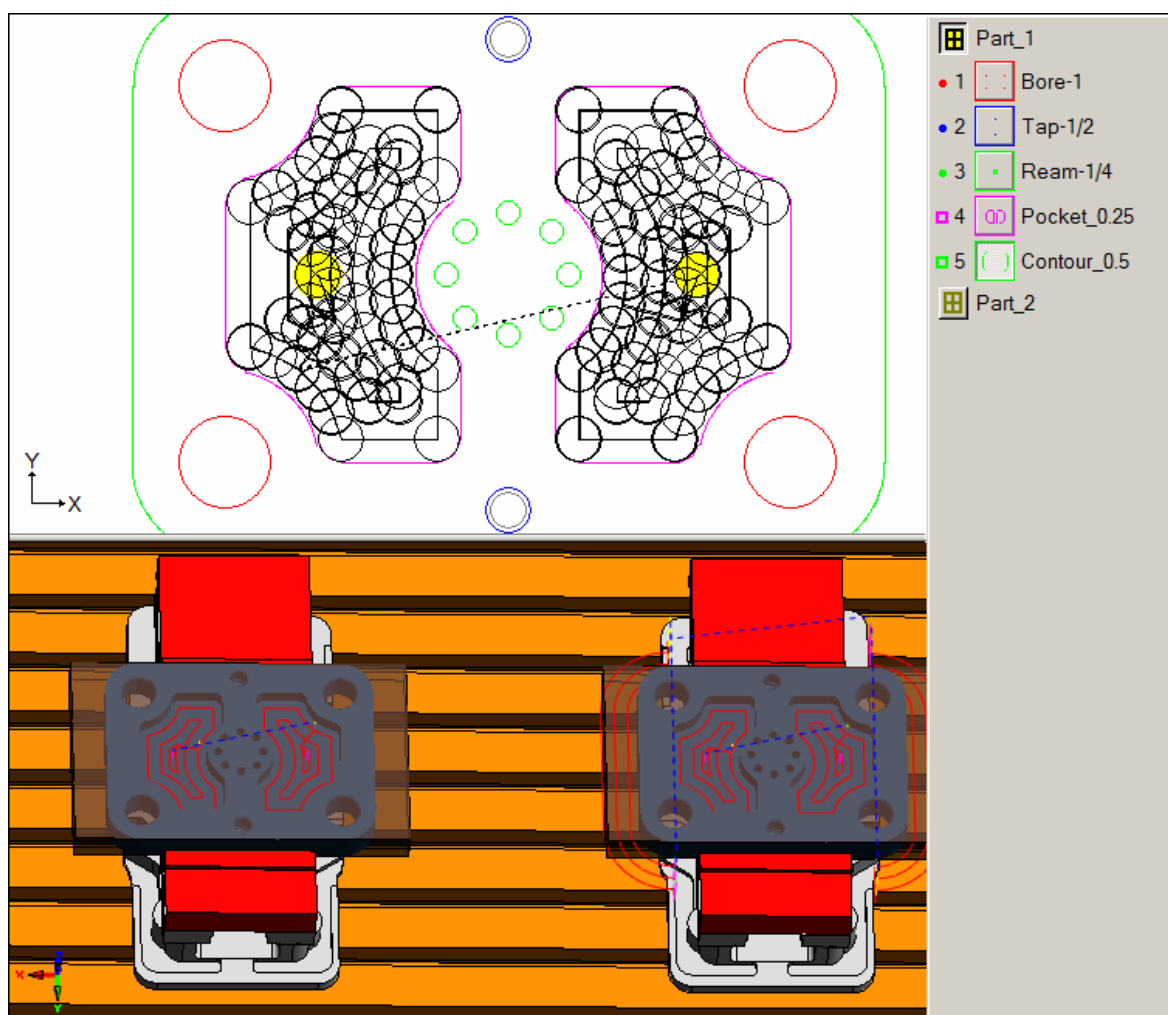## Viewing a setup assembly during simulation

To display a setup assembly during simulation:

1   Select **Simulation > Simulation Options** to display the **Simulation Options** dialog.

2   Select the **Use Setup Assembly** option.

3   Click **OK** to close the dialog.

PartMaker displays the setup assembly during simulation, for example:
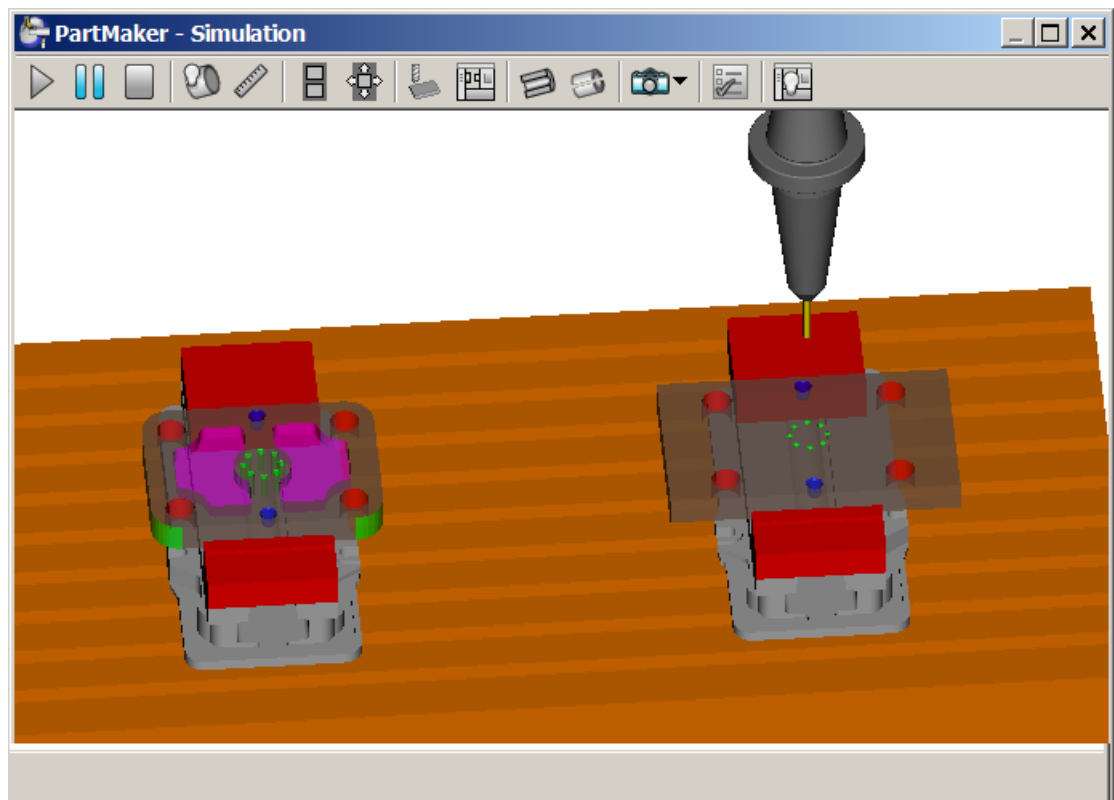
Working with Solids

PartMaker 2012 includes the following enhancements for working with solids:

- Ability to view a 3D stock model in the Solids window (see page 18).

- Enhanced copy and paste in the Solids window (see page 20).

- View the rules for a model's Part Coordinate System (see page 21).

- When importing and exporting solids, PartMaker 2012 is now compatible with:
  - SolidWorks 2012
  - Parasolid v24.0

PartMaker/Mill 2012 also enables you to display setup assemblies in the Solids window (see page 7).

Displaying stock models in the Solids window

In previous releases of PartMaker you could import a solid model of a part into the Solids window to see a 3D view of the toolpaths needed to machine the part.

In PartMaker 2012 you can now display a stock model in the Solids window. This enables you to view toolpaths in 3D, without needing a solid model of the part.

Displaying stock models in the Solids window requires the Solid Modeling Input cost option.

For more information, see:

- Displaying toolpaths on a stock model (see page 18).
- Working with a stock model in the Solids window (see page 19).

Displaying toolpaths on a stock model

To display toolpaths on a stock model in the Solids window:

1 Open a .job file that contains toolpaths. The Face window displays a 2D representation of the toolpaths.

2 Select **Window > Solid Model** to open a Solids window.

3 Click 💡 ▾ on the **Solids Window** toolbar and select the **Show Stock** option to display the stock in the Solids window.

4 Click 💡 ▾ and select the **Show Profiles and Holes on Solid Model** option to display the toolpaths on the stock:
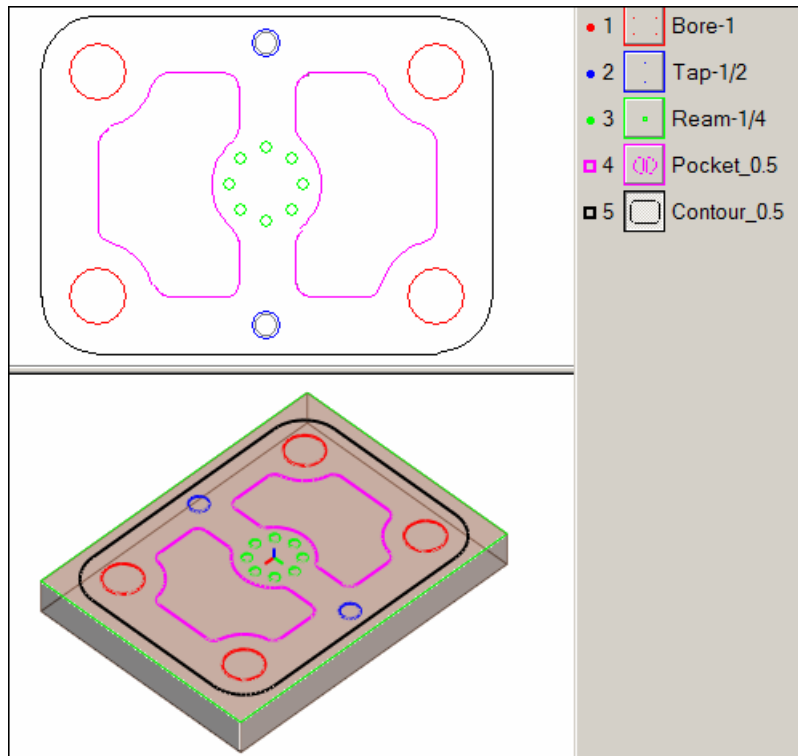
📝 *You can also verify toolpaths on a stock model if you enable toolpath verification on solid models using the **Tool Path Verification Options** dialog.*

Working with stock in the Solids window

To work with stock models in the Solids window, use the buttons on the **Solids Window** toolbar or the options in the **Solids** menu. For example:

▪ To change the appearance, or view, of the stock model, click 📷 ▾ on the **Solids Window** toolbar and select a different option from the menu:
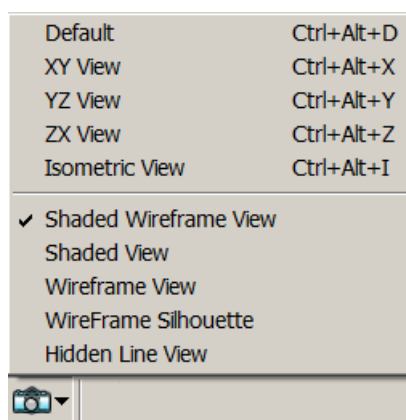
- To define the face plane for the current Face window using the stock model:

  a   Click on the stock model to select a plane.

  b   Select **Solids > Face Coordinate System > Define Face Plane** to display the **Define Face Plane** dialog.

  c   Complete the **Define Face Plane** dialog and click **OK**.

Copy and paste in the Solids window

The copy and paste functions in PartMaker have been extended to improve PartMaker's ability to work with other Delcam products.

In PartMaker/Mill, for example, you can now paste solids directly from PowerSHAPE into the PartMaker Solids window to create a setup assembly (see page 7).

To use copy and paste in the Solids window, click the **Utilities** button on the **Solids Window** toolbar or select **Solids > Utilities** to display the following options:

- **Select All Surfaces**. Selects all of the surfaces in the solid model displayed in the PartMaker Solids window.

- **Copy to PowerSHAPE**. Copies the selected surfaces or solids from the Solids window to the clipboard, ready for you to paste to your intended location.

- **Paste from PowerSHAPE**. Pastes the selected surfaces or solids from the clipboard into the PartMaker Solids window.

The following table describes where you can copy and paste solids or selected surfaces:

Solids window mode	Selection	Copy/paste to
Part mode	Solids	- PowerSHAPE - PowerMILL - Solids window - Setup Assembly mode (PartMaker/Mill only)
Part mode	Selected surfaces	- PowerSHAPE - PowerMILL
Setup Assembly mode (PartMaker/Mill only)	Solids	- PowerSHAPE - PowerMILL - Solids window - Part mode

Viewing PCS rules

A Part Coordinate System (PCS) is the coordinate system in which a solid model is oriented. The rules for setting the PCS for a solid model depend on the type of stock and/or table you are using.

In PartMaker 2012 you can display these rules while using the **Edit Part Coordinate System** dialog:

1   Ensure the part model appears in the Solids window.

2   Select **Solids > Edit Part Coordinate System**. PartMaker displays the **Edit Part Coordinate System** dialog.

3   Click **Part Coordinate System Rules** to display the **PartMaker Coordinate System Rules** dialog. For example, when using Block stock on a Standard table in PartMaker/Mill, the following rules apply:
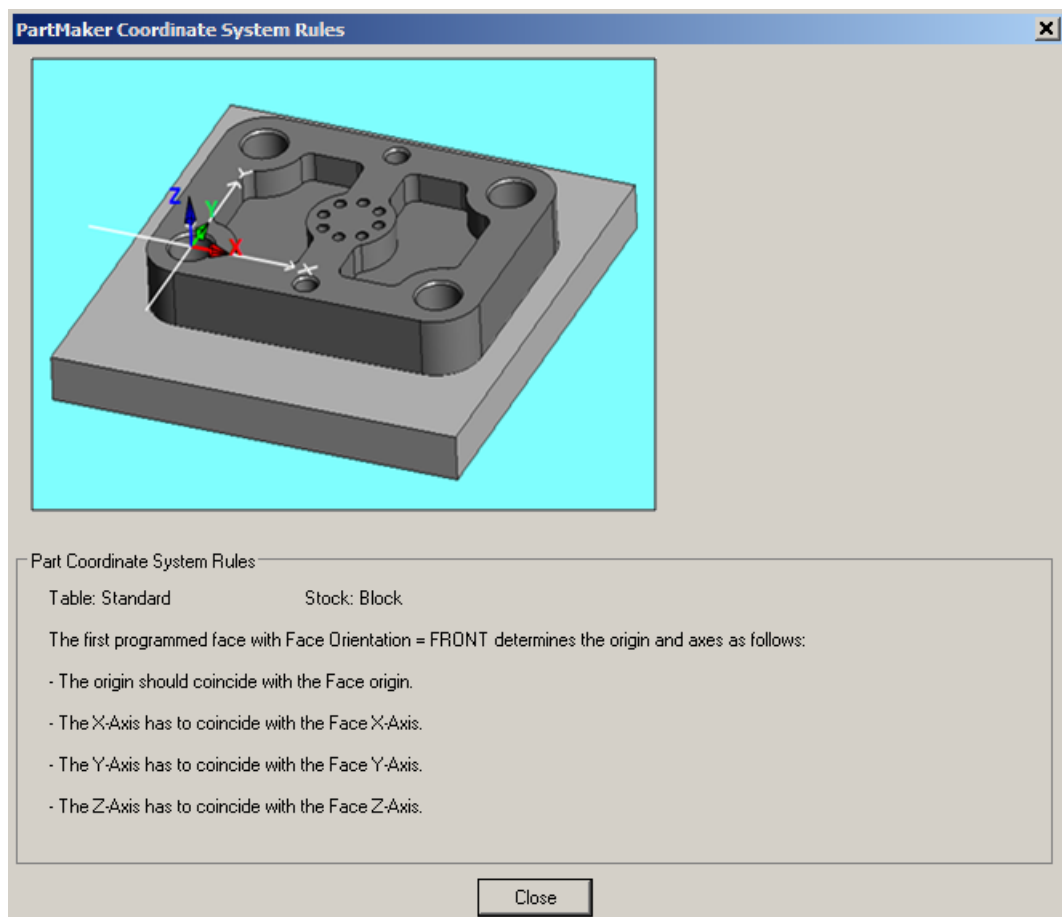
4   Click **Close** to close the **PartMaker Coordinate System Rules** dialog.

5   Use the options on the **Edit Part Coordinate System** dialog to set the coordinate system according to the rules.

6   Click **Close** to close the **Edit Part Coordinate System** dialog.

Simulation

Simulation enables you to visualize the machining of the part you have programmed, so you can identify errors before machining.

PartMaker 2012 includes several enhancements to simulation:

- Ability to display rotary attachments in PartMaker/SwissCAM (see page 22).

- Enhanced collision checking in PartMaker/Mill (see page 24).

- New way of displaying the machine housing during simulation (see page 24).

- Improvements to the **Components** dialog (see page 24).

- New way of specifying how sub-spindles and turrets rotate (see page 25).

- Ability to display a sub-spindle attached to a tool head in simulation (see page 27).

A new Full Machine Simulation module is also available in PartMaker/Mill (see page 1).

Displaying rotary attachments in PartMaker/SwissCAM

Some Swiss machines use rotary attachments to allow 5-axis simultaneous cutting and 3+2-axis cutting. In PartMaker/SwissCAM 2012, you can now specify details of rotary attachments on a gang tool post for use in Full Machine Simulation.

To specify details of a rotary attachment:

1 Select the **B** option on the **Machine Data File** dialog to specify that the gang tool post using the rotary attachment can rotate around the B-axis.

2 Click the **Properties** button to display the **Tool Post Properties** dialog for the gang.

3 On the **Tool Post Properties** dialog, click the **Rotary Attachment** button to display the **Rotary Attachment** dialog and specify details about the attachment:
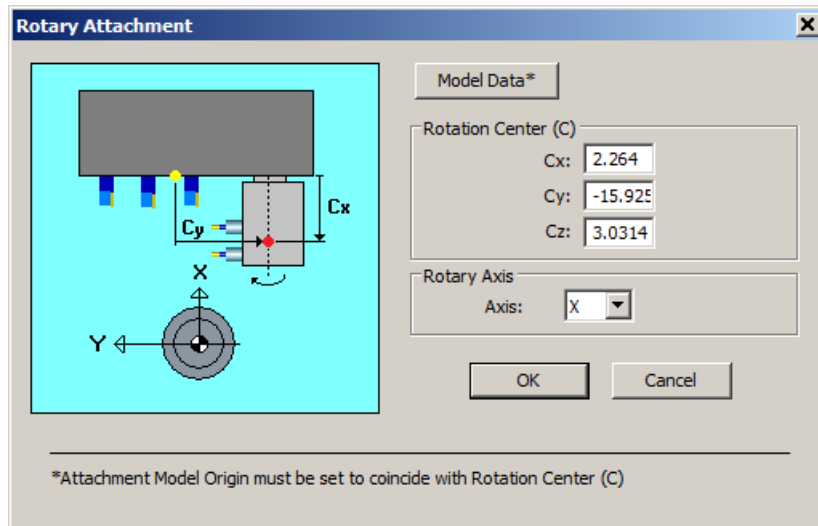
- **Model Data**. Click this button to display the **Model Data** dialog, where you can select a solid model to represent the rotary attachment during simulation.

- **Rotation Center (C)**. Enter values in the **Cx**, **Cy**, and **Cz** fields to specify the point about which the attachment rotates.

  The model's origin must coincide with this point.

- **Rotary Axis**. Select the axis around which the attachment rotates.

4 Click **OK** to return to the **Tool Post Properties** dialog.

5 On the **Tool Post Properties** dialog, click the **Tool Post Layout** button to display the **Tool Post Layout** dialog:

a Select **On Rotary Attachment** to specify that the selected tool number is located on a rotary attachment.
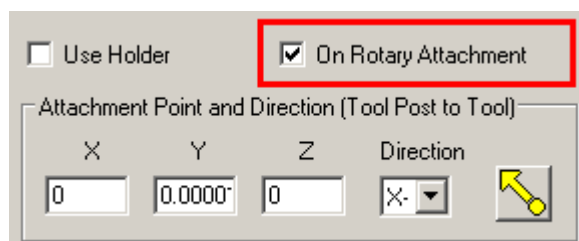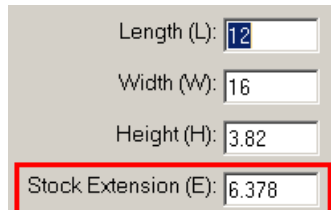

b Click **OK** to return to the **Tool Post Properties** dialog.

6 When you have specified the tool post, click **OK** to return to the **Machine Data File** dialog.

Enhanced collision checking in PartMaker/Mill

In PartMaker/Mill, a **Stock Extension** field has been added to the **4-Axis Rotary Table Settings** and **5-Axis Rotary Table Settings** dialogs for specifying the length of stock section that protrudes from the chuck, or another fixture, on the machine. PartMaker uses this value for collision checking during simulation.

Displaying the machine housing

In PartMaker 2012 you can show or hide the machine housing during Full Machine Simulation by using:

- the **Simulation > Set View > Show Machine Housing** menu option; or

- the **Show Machine Housing** button on the **Simulation Window** toolbar:

*The **Show Machine Housing** option on the **Simulation Options** dialog, which controlled the display of the machine housing in earlier versions of PartMaker, is no longer required and has been removed.*

Using the Components dialog

The **Components** dialog specifies the machine-housing or machine-part components displayed during Full Machine Simulation.

PartMaker 2012 contains several improvements to this dialog:

- A new layout for specifying the position of a component's solid model (see page 25).

- New **Rotation Axes** options for turret and sub-spindle components (see page 25).

Specifying a solid model's position

PartMaker 2012 uses a new layout in the **Components** dialog for specifying the origin of a component's solid model:
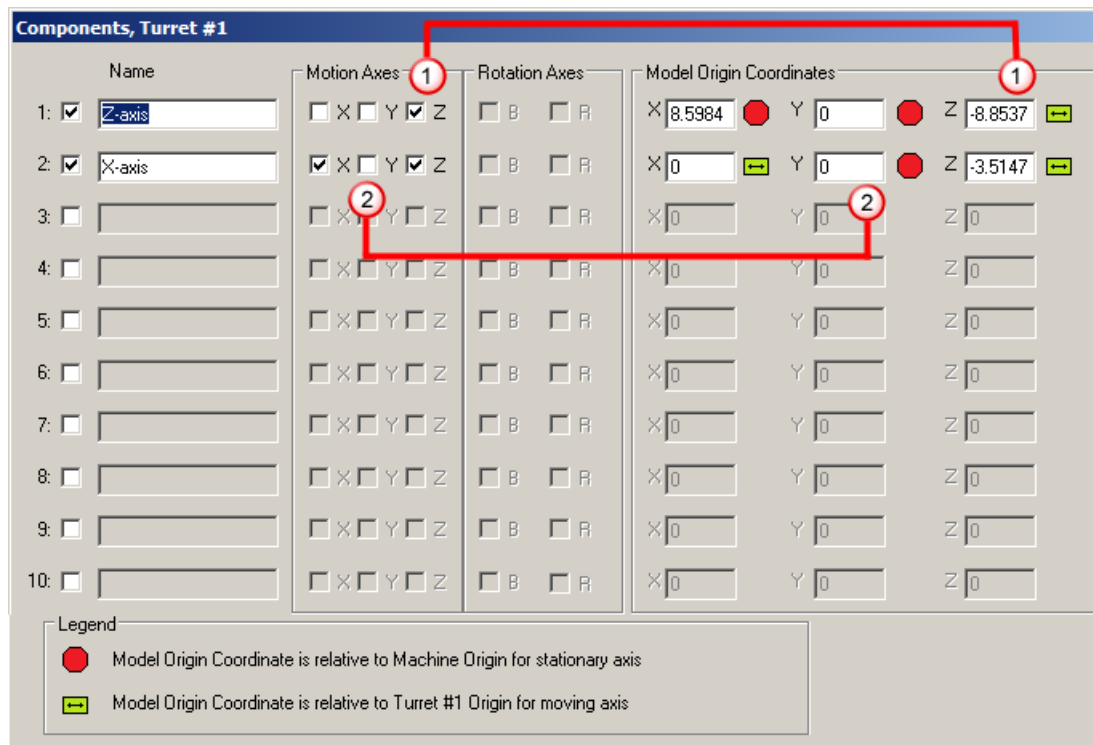
Motion Axes. Select a check box (**X**, **Y**, or **Z**) if the component can move in that axis.

Model Origin Coordinates. These specify the origin of the solid model for that component. PartMaker uses these values to position the component correctly during simulation. The values you specify depend on the component's motion axes:

① The coordinate for a **moving axis** (Z) is relative to the machine part (in this example, Turret #1) origin, as denoted by ⬌.

② The coordinate for a **stationary axis** (Y) is relative to the machine origin, as denoted by 🛑.
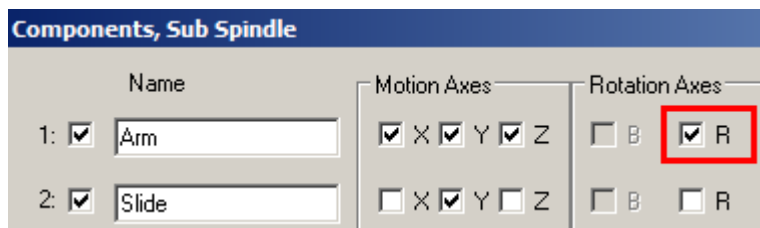
Specifying how sub-spindles and turrets rotate

PartMaker 2012 provides an easier, and more flexible, way of specifying how a sub-spindle or turret rotates for Full Machine Simulation in PartMaker/SwissCAM and PartMaker/Turn-Mill. For more details, see:

- Specifying how a sub-spindle rotates (see page 26).
- Specifying how a turret rotates (see page 27).

Specifying how a sub-spindle rotates

To specify how a sub-spindle rotates for simulation:

1 Select **ToolMinder > Machine** to display the **Machine Data** dialog. The dialog displays details of the current Machine Data (.mch) file.

2 In the **Sub-Spindle** area of the dialog, select **R** to specify that the sub-spindle rotates.

3 Click the **Rotation Options** button to display the **Sub-Spindle Rotation Options** dialog. In this dialog, specify:

 - **Rotation Axis (R)**. This is the axis about which the sub-spindle rotates. This can be an axis that is parallel to the Y-axis or an axis inclined at 45 degrees in the ZX plane.

 - **Rotation Center (C)**. This is the pivot point about which the sub-spindle rotates. PartMaker can calculate this automatically or you can specify that the point is the model origin of the first component (Component #1) attached to the sub-spindle.

4 Click **OK** to close the **Sub-Spindle Rotation Option**s dialog.

5 To specify how components attached to the sub-spindle rotate, click the **Properties** button in the **Sub-Spindle** area of the **Machine Data File** dialog to display the **Sub-Spindle Properties** dialog.

6 Click the **Components** button in the **Sub-Spindle Properties** dialog to display the **Components** dialog.

7 Specify which components on the sub-spindle rotate by selecting **R** in the **Rotation Axes** area of the dialog:
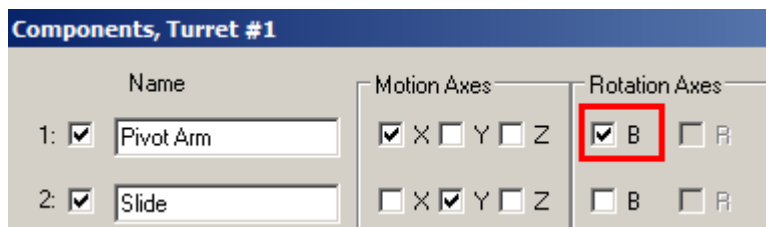

The **R** option is available in the **Components** dialog only if the **R** option is selected as the rotation axis for the sub-spindle in the **Machine Data** dialog.

8 Click **OK** to close the dialogs.

Specifying how a turret rotates

To specify how a turret rotates for simulation:

1 Select **ToolMinder > Machine** to display the **Machine Data** dialog. The dialog displays details of the current Machine Data (.mch) file.

2 In the **Tool Posts** area of the dialog, select **B** to specify that the turret can rotate about the **B** axis.

3 Click the **Properties** button alongside the turret to display the **Tool Post Properties** dialog.

4 Select **XY Plane** from the **Turret Plane** drop-down list, and then click the **Component** buttons in the **Definition** area of the dialog to display the **Components** dialog.

5 Specify which components rotate by selecting **B** in the **Rotation Axes** area of the dialog:


> *The **B** rotation axis is available in the **Components** dialog only if the **B** motion axis option is selected for the turret in the **Machine Data** dialog and the XY Plane is specified as the turret plane in the **Tool Post Properties, Turret** dialog.*

6 Click **OK** to close the dialogs.

Displaying a sub-spindle attached to a tool head

If you are using a Bar-Fed Mill machine where the sub-spindle attaches directly to the tool head, you can now display this during simulation:

1 On the **Machine Data** dialog, click **Properties** in the **Sub-Spindle** area of the dialog. PartMaker displays the **Sub-Spindle Properties** dialog.

2 Select **Tool Head Collet** from the **Work Holding** drop-down list:
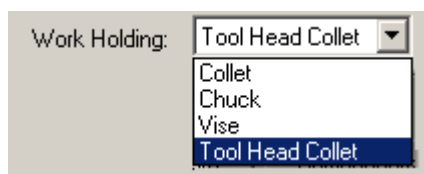
3 Click **OK** to close the dialog and return to the **Machine Data** dialog.

Setting up this type of machine architecture for programming a part is described in Specifying that the sub-spindle attaches to the tool head (see page 28).

Bar-Fed Mill machines

PartMaker/Turn-Mill 2012 now supports programming for Bar-Fed Mill (BFM) machines where:

- the sub-spindle attaches to the tool head (see page 28); or
- the sub-spindle work-holding device rotates to an orientation other than 0 or 90 degrees (see page 29).

Specifying that the sub-spindle attaches to the tool head

To specify that you are using a machine where the sub-spindle attaches to the tool head:

1 Select **Main Spindle** on the **Setup** dialog, then click **Settings** to display the **Spindle Settings** dialog.

2 Select **Tool Head Collet** as sub-spindle work holding in the **Sub-Spindle** area of the dialog.
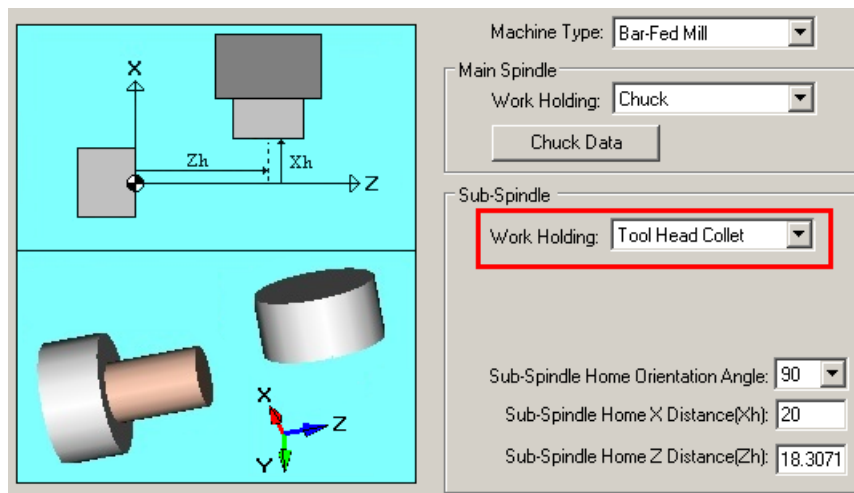
3 Complete the **Spindle Settings** dialog, then click **OK** to return to the **Setup** dialog.

4 On the **Setup** dialog, select **Sub-Spindle**, then click the **Machining Position** icon to display the **Sub-Spindle Machining Position** dialog:
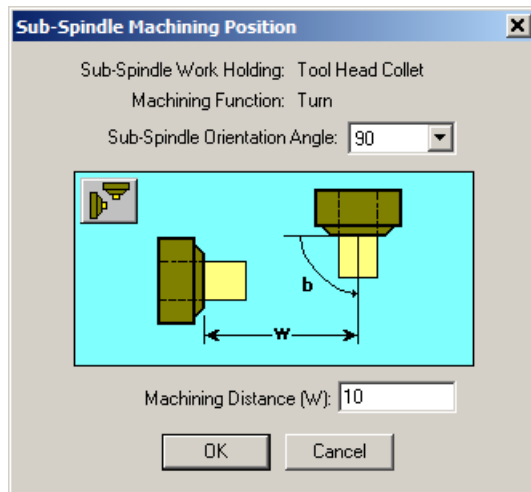
5 To specify the machining position of the Tool Head Collet:

a Select the orientation angle during machining from the **Sub-Spindle Orientation Angle** drop-down list.

b Enter the distance between the face of the main spindle and the face of the sub-spindle in the **Machining Distance** field.

Displaying this type of machine architecture in Full Machine Simulation is described in Displaying a sub-spindle attached to a tool head (see page 27).

Specifying the work holding's orientation angle

To specify that you are using a machine where the sub-spindle work-holding device rotates to an orientation other than 0 or 90 degrees:

1 Click the **Machining Position** icon (for example,) in the **Setup** dialog for a sub-spindle Face window. PartMaker displays the **Sub-Spindle Machining Position** dialog.

*This dialog is available only when Bar-Fed Mill is selected as the **Machine Type** in the **Spindle Settings** dialog in PartMaker/Turn-Mill.*

2 Click the **Sub-Spindle Orientation Angle** drop-down list to display the available orientation angles for the selected work-holding device, and select the angle appropriate for your machine:
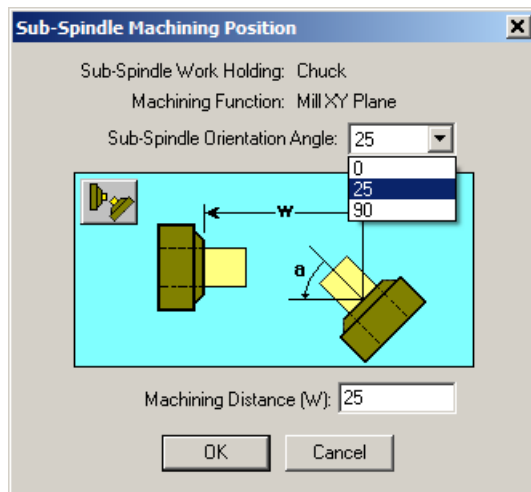
3 Click **OK** to close the **Sub-Spindle Machining Position** dialog. PartMaker reflects the orientation angle you select on:

- the **Machining Position** icon in the **Setup** dialog; and

- the **Set Mode** icon in the Process Table for any processes programmed in the sub-spindle Face window.

> *Setting up rotating components for use in Full Machine simulation is described in Setting up rotating components (see page 25).*

Editing the Process Table

The Process Table lists the processes required to machine a part.

By default, PartMaker orders the processes in the Process Table according to the sequence in which you programmed the part. It starts by creating processes for all the part features in the first Face window you created, before moving onto the next Face window you created and so on. You can re-order the processes in the table if the default order does not reflect the machining sequence you want.

PartMaker 2012 includes several enhancements to make it easier, and quicker, to re-order processes in the table:

- Ability to select multiple processes (see page 31).

- Improved appearance of selected and excluded processes (see page 31).

- Ability to drag and drop processes (see page 32).

Selecting multiple processes

In previous versions of PartMaker, you could select only one process at a time in the Process Table. PartMaker 2012 allows you to select multiple processes as follows:

Selection type	Mouse/keyboard action
Selecting a group of consecutive processes.	Click the first process in the group, hold down the **Shift** key and then click the last process in the group.
Selecting non-consecutive processes.	Hold down the **Ctrl** key, and then click each process you want to select.
Selecting all processes.	**Ctrl+A**.

Appearance of processes

PartMaker 2012 improves the appearance of selected and excluded processes as follows:

- Selected processes are highlighted using a solid highlight color.
- Processes that are excluded from simulation and post processing are now shown using a strikethrough line.

The following example shows a Process Table with various selected and/or excluded processes:

Dragging and dropping processes

In PartMaker 2012 you can now drag and drop processes to a new location in the Process Table:

1 Click to select the process(es) you want to move, for example:

P01	T001	2/Gang	OD Turn 80-I	1/Face Part	Main Spindle - Turn	0.0010upr	599fpm	0.05
P02	T001	2/Gang	OD Turn 80-I	2/1st Turn	Main Spindle - Turn	0.0010upr	599fpm	0.14
P03	T004	25/End	Spot Drill-Ma	3/Drill .120-Main	Main Spindle - Turn	0.0014upr	1761rpm	0.09
P04	T005	24/End	Drill .120 Dia	3/Drill .120-Main	Main Spindle - Turn	0.0029upr	7452rpm	0.03
P05	T006	23/End	.12 Bore Bar	4/ID Bore	Main Spindle - Turn	0.0010upr	599fpm	0.03
P06	T002	4/Gang	Grooving	5/Groove	Main Spindle - Turn	0.0014upr	399fpm	0.08

2 Holding down the left mouse button, drag the selected process(es) to the new location. An arrow cursor indicates the new location, for example:

P01	T001	2/Gang	OD Turn 80-I	1/Face Part	Main Spindle - Turn	0.0010upr	599fpm	0.05
P02	T001	2/Gan	OD Turn 80-I	2/1st Turn	Main Spindle - Turn	0.0010upr	599fpm	0.14
P03	T004	25/End	Spot Drill-Ma	3/Drill .120-Main	Main Spindle - Turn	0.0014upr	1761rpm	0.09
P04	T005	24/End	Drill .120 Dia	3/Drill .120-Main	Main Spindle - Turn	0.0029upr	7452rpm	0.03
P05	T006	23/End	.12 Bore Bar	4/ID Bore	Main Spindle - Turn	0.0010upr	599fpm	0.03
P06	T002	4/Gang	Grooving	5/Groove	Main Spindle - Turn	0.0014upr	399fpm	0.08

3 Release the left mouse button to move the process(es) to the new location:

P01	T001	2/Gang	OD Turn 80-I	1/Face Part	Main Spindle - Turn	0.0010upr	599fpm	0.05
P03	T004	25/End	Spot Drill-Ma	3/Drill .120-Main	Main Spindle - Turn	0.0014upr	1761rpm	0.09
P04	T005	24/End	Drill .120 Dia	3/Drill .120-Main	Main Spindle - Turn	0.0029upr	7452rpm	0.03
P05	T006	23/End	.12 Bore Bar	4/ID Bore	Main Spindle - Turn	0.0010upr	599fpm	0.03
P02	T001	2/Gang	OD Turn 80-I	2/1st Turn	Main Spindle - Turn	0.0010upr	599fpm	0.14
P06	T002	4/Gang	Grooving	5/Groove	Main Spindle - Turn	0.0014upr	399fpm	0.08

*Use **Ctrl+Z** if you drop process(es) in the wrong location and want to undo this action.*

Setup sheets

Setup sheets provide specific instructions for the machine operators who run NC programs created in PartMaker.

PartMaker 2012 includes several enhancements to setup sheets:

- You can now use an Excel template to generate setup sheets (see page 33).

- Four new setup sheet parameters are available:

  - {cut-off-sub-grip-z}

  - {sub-support-z}

  - {tool-second-offset}

  - {work-offset}

- The PartMaker Reference Help now includes descriptions of the setup sheet parameters.

Generating a setup sheet using an Excel template

To generate a setup sheet using an Excel template:

1 After generating the Process Table for your part, select **File > Setup Sheets > Generate Setup Sheet** to display the **Generate Setup Sheet** dialog.

2 Click the **Setup Sheet Viewer** button to display the **Setup Sheet Viewer** dialog. In the **Path** field, enter the location where Microsoft Excel is installed on your computer:
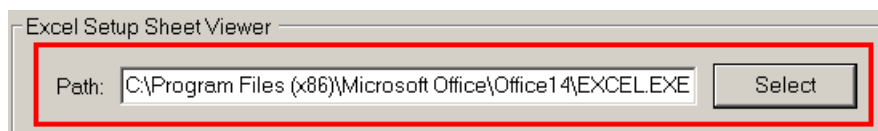

> *If you do not specify a location, PartMaker uses Window's default spreadsheet program.*

3 Click **OK** to return to the **Generate Setup Sheet** dialog and select **Excel** to display the Excel templates available:
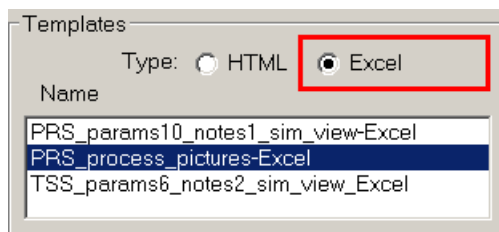
4 To add job parameters or graphics to the setup sheet, use the **Optional Job Parameters** and **Logos and Pictures** buttons.

5 Click **Generate** to display the **Save Setup Sheet File** dialog.

6 Specify a name and location for the setup sheet, then click **Save**. PartMaker generates the setup sheet and displays it in Microsoft Excel:
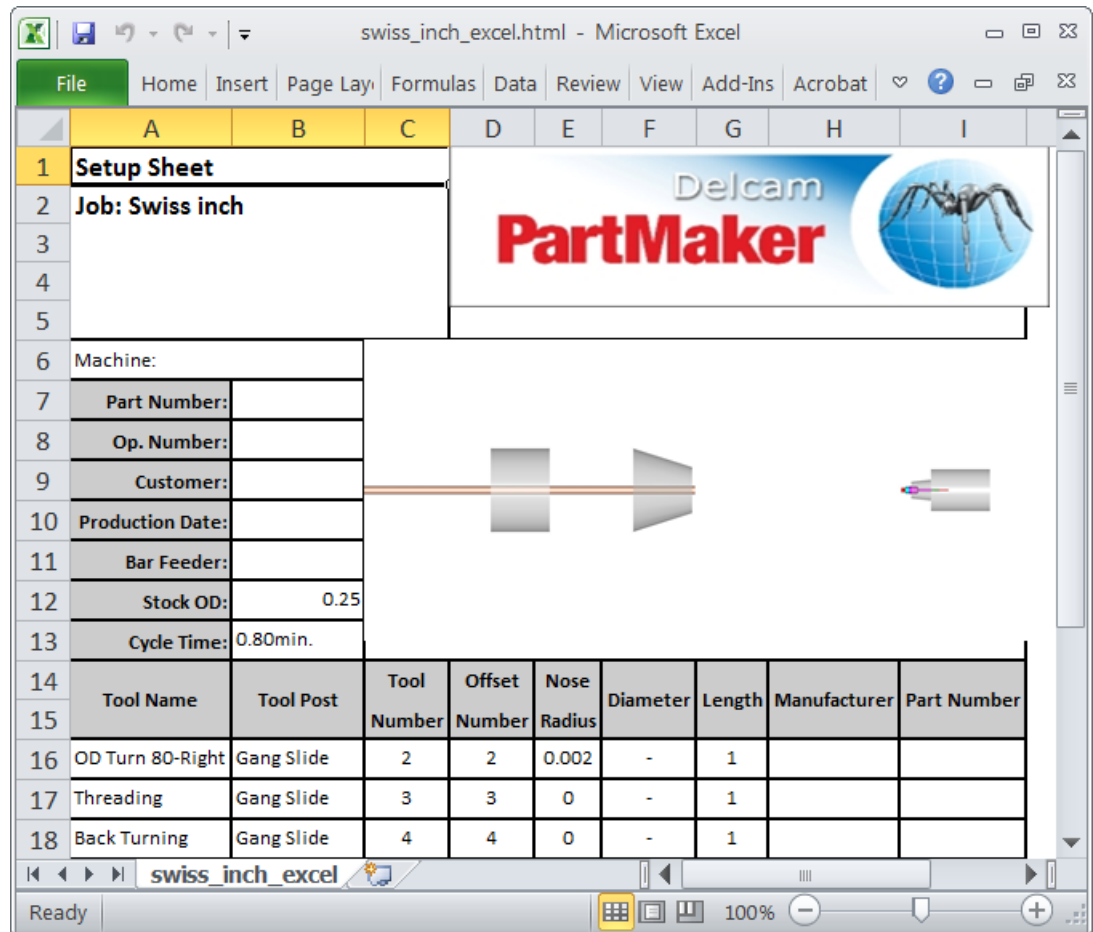
Surface Machining Wizard (SMW)

The Surface Machining Wizard (SMW) uses machining strategies to create toolpaths for milling free-shape surfaces.

In PartMaker 2012 there is a new **Radial Projection** strategy for use in a Mill Cylinder Face window. This strategy enables you to perform 3D surface machining for cylindrical interpolation and so create complex part features when using:

- 4-axis and 5-axis milling machines (PartMaker/Mill),
- Turn-Mill Centers (PartMaker/Turn-Mill); and
- Swiss-type lathes (PartMaker/SwissCAM).

To use this machining strategy:

1 In a Mill Cylinder Face window, click on the **Face Window** toolbar to create a surface group.

PartMaker displays the **Surface Group Parameters** dialog with the **Radial Projection** strategy selected:

2 In the **Surface Group Parameters** dialog, click **Select Tools** to select the tool you want to use for the operation and use the options in the **Surface Selection** area of the dialog to specify how to select the surfaces for this group.

3 To view, or modify, the settings for the **Radial Projection** strategy, click the **Options** button to display the **Surface Machining Options** dialog.

4 In the Face window, define a 2D profile (for example, by using the **Define Profile** icon). PartMaker projects the profile radially along the tool axis:
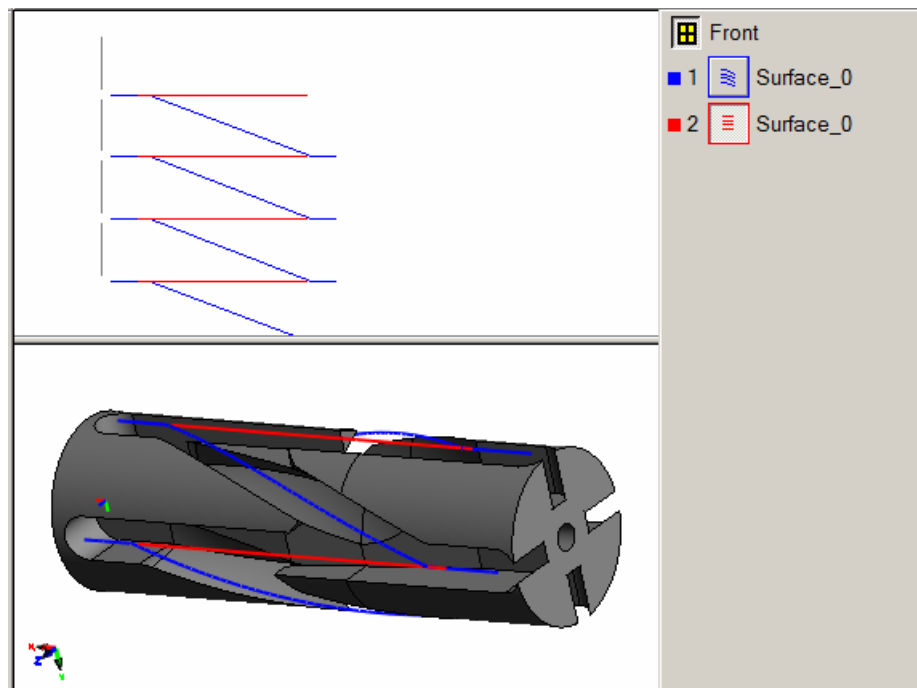
Tapered thread milling

PartMaker 2012 includes a new **Thread Mill Options** dialog that enables you to:

- Set the angle at which the thread starts; and
- Specify a taper angle to machine a tapered thread.

*The **Thread Mill** cycle is available in the **Mill XY Plane**, **Mill 5 Axis Plane**, **Mill ZY Plane** and **Mill End, Polar** Face windows.*

When a Thread Mill cycle is selected in the **Profile Group Parameters** dialog or the **Hole Group Parameters** dialog, click the **Thread Mill Options** button to display the **Thread Mill Options** dialog.
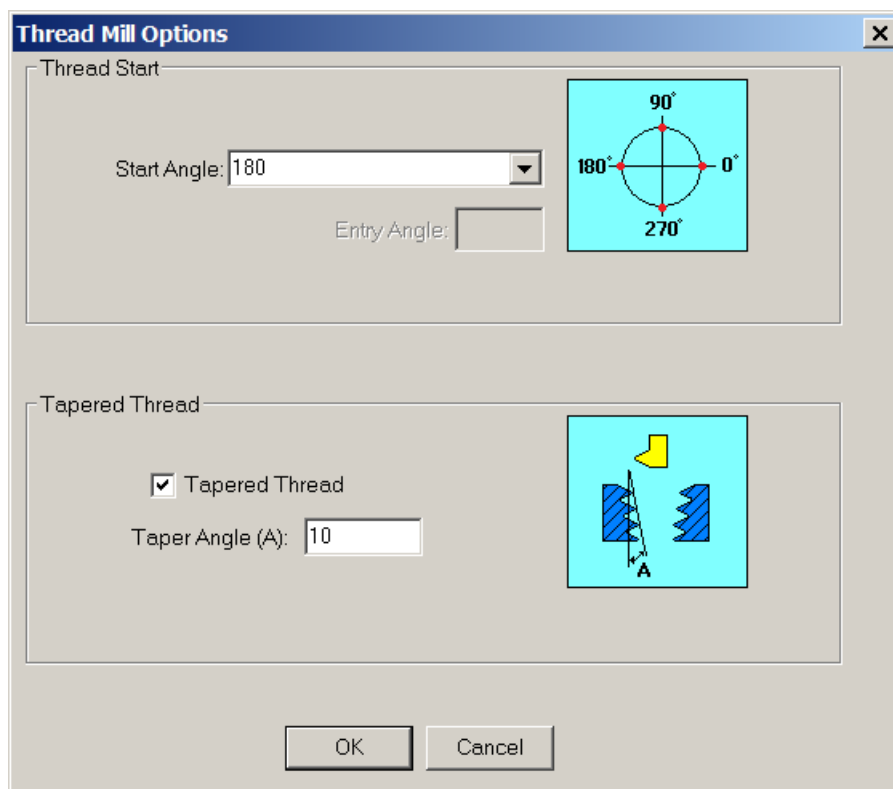
The following options are available:

Thread Start. By default, PartMaker uses a start angle of 180 degrees for the thread. However, you can specify a different angle if you wish:

Start Angle. You can specify the start angle in either of the following ways:

- Select the quadrant angle (**0**, **90**, **180** or **270**) where you want the thread mill toolpath to lead in.

- Select the **Defined by Entry Angle** option to define the **Start Angle** using the angle you specify in the **Entry Angle** field.

Entry Angle. Enter the angle you want to use. When you specify an **Entry Angle**, the thread crosses the **Z_Surf** (as specified on the **Profile Group Parameters** or the **Hole Group Parameters** dialog) at this angle. The **Entry Angle** does not specify where the toolpath leads in.

**Tapered Thread.** A tapered thread toolpath increases in diameter at a specified angle:

Tapered Thread. Select this option to use a tapered thread.

Taper Angle (A). Enter the angle at which PartMaker applies the taper.

*If you want the toolpaths in a Face window to use lines instead of arcs, use the **Arc Output Options** on the **Face Options** dialog. For Thread Mill toolpaths, PartMaker uses the **Roughing Tolerance** value to determine the length of lines in the toolpath.*

You can see the results of the thread milling options during simulation. The following example shows a thread tapered using a **Taper Angle** of 3 degrees:
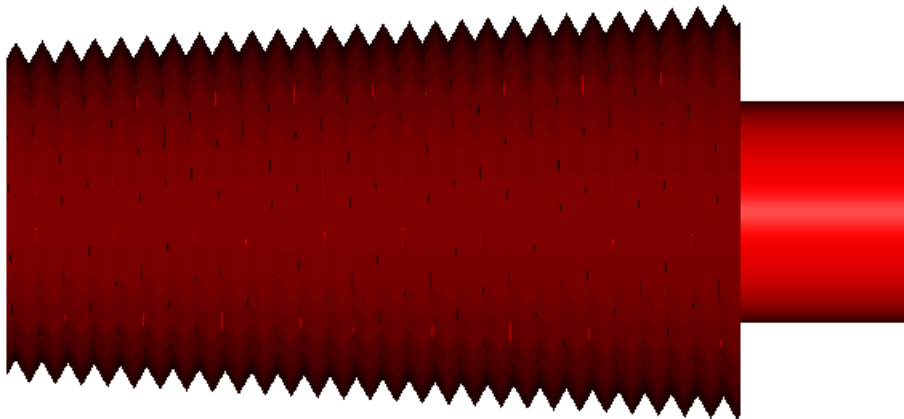
Defining Approach and Escape points

Approach and escape points define the location of the tool at the start and end of a toolpath.

PartMaker 2012 provides a new way of defining approach and escape points, so you can now select points interactively in the CAM Face window. Snap modes are also available to ensure that your selection 'snaps' to the correct location (for example, you may want your selection to snap to a grid location).

The method of defining approach and escape points by specifying coordinate values is still available if you wish to continue using it.

To define an approach or escape point interactively:

1 In the CAM Face window, select the profile for which you want to define an approach and/or escape point.

2 Click ![icon] on the Face window toolbar to display the **Approach/Escape** dialog.

3 Select **Approach Point (A)**. This example describes how to define an approach point, but the same process is used to define escape points.

PartMaker displays:

- The current location of the approach point in the Face window (see ①).

- A cross-hair cursor that you can drag to define a new location for the approach point (see ②).

- The **Snap Modes** toolbar so you can select a snap mode to position the cross-hair cursor (see ③).
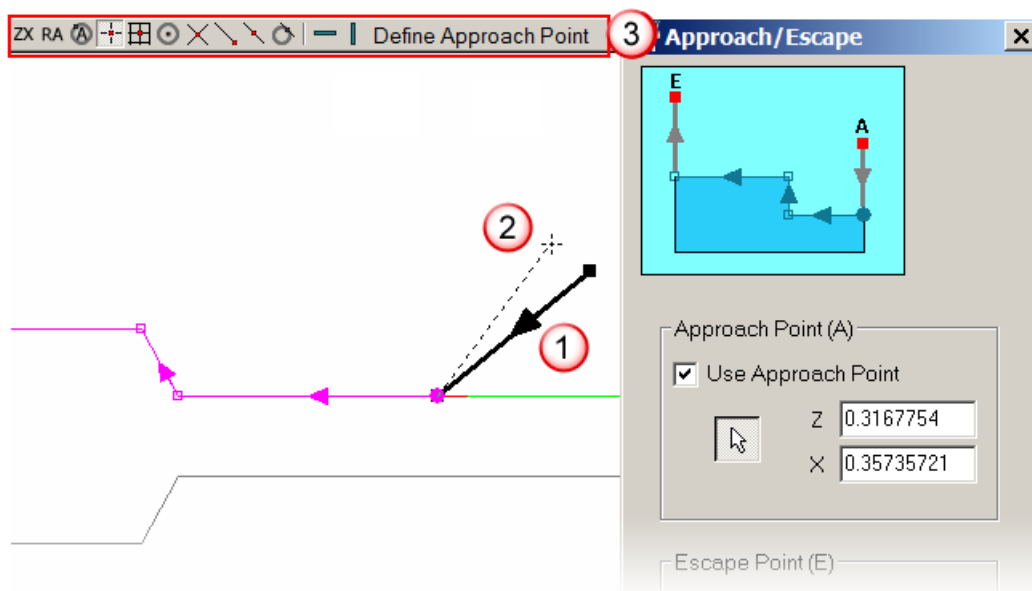
4 When the cross-hair cursor is positioned at the location for the approach point, click the left mouse button. PartMaker updates the display in the CAM Face window and updates the coordinate values displayed on the **Approach/Escape** dialog to reflect your selection:
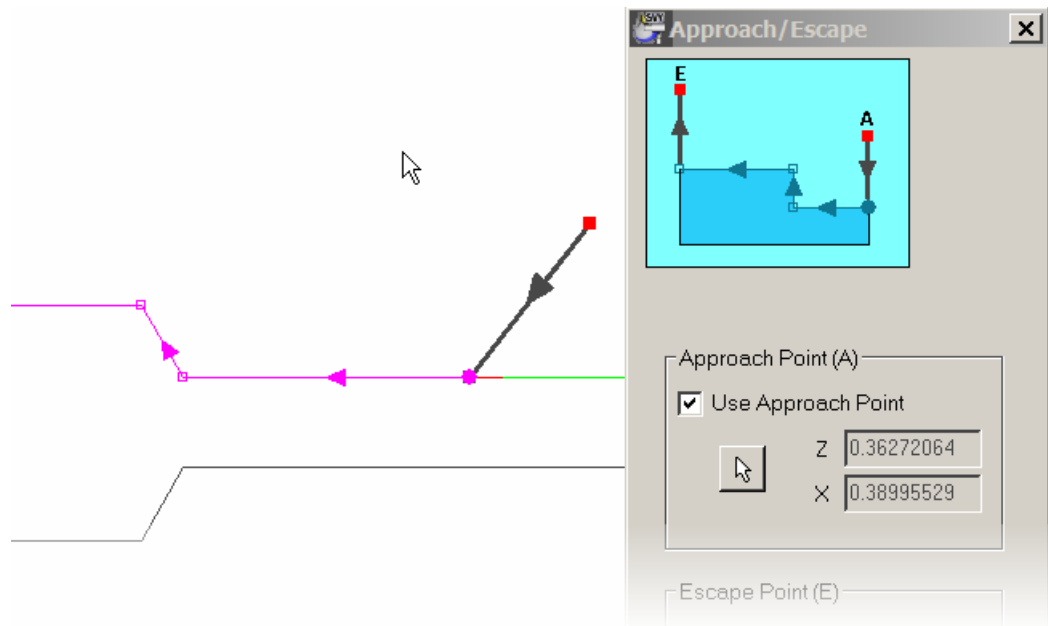
5 Click **Close** to save your changes and close the dialog.

Installation

PartMaker 2012 includes several enhancements to the PartMaker installation:

- PartMaker 2012 is available in 32-bit and 64-bit versions. You can choose which version to use during the installation process.

  The 64-bit version of PartMaker is supported only if you are using the Windows 7 operating system.

- You no longer need to select a Workstation or a Network installation of PartMaker. PartMaker uses the same installation, but uses PAF licensing protection for a single PC and RMS licensing protection on a network.

  When using RMS licensing protection, there is a new way of sharing licenses between PCs (see page 40).

Network licensing

PartMaker 2012 includes a new way of managing licenses for PartMaker installations that use RMS licensing protection. For more details, see:

Licensing multiple sessions of PartMaker (see page 40).

Sharing licensed modules (see page 41).

*To check if your PartMaker installation uses RMS licensing protection, select **Help > License Info** to display the **License Info** dialog. The type of licensing protection (**RMS** or **PAF**) is displayed in the **Security** area of the dialog.*

Licensing multiple sessions of PartMaker

Each PartMaker license enables you to run two sessions of a PartMaker application on a computer.

For example, if there are three PartMaker/SwissCAM licenses available and you run multiple sessions of PartMaker on a computer, the licenses are allocated as follows:

1 SwissCAM session uses 1 license
2 SwissCAM sessions use 1 license
3 SwissCAM sessions use 2 licenses
4 SwissCAM sessions use 2 licenses
5 SwissCAM sessions use 3 licenses
6 SwissCAM sessions use 3 licenses.

Sharing licensed modules

RMS licensing also uses licensed modules that can be shared between different users on a network. By sharing licensed modules across the network, you can make full use of your PartMaker licenses. The following example shows how PartMaker/Mill licensed modules could be shared between users on a network:
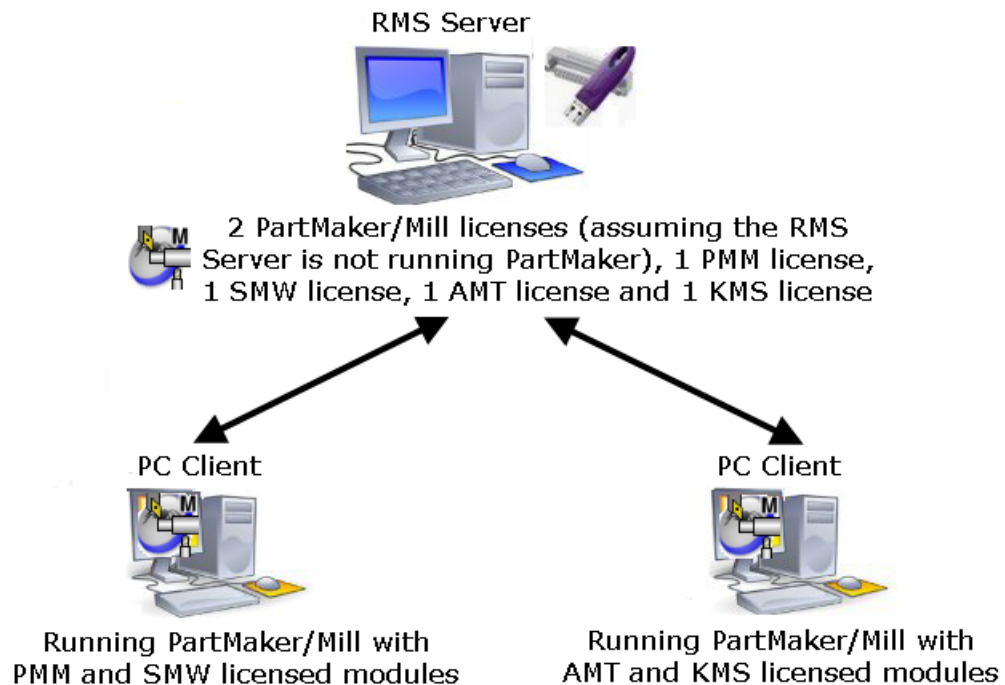
By default, PartMaker automatically allocates all of the licensed modules available for a product when the user starts that product on a client PC. However, you can share the licensed modules across the network using the following menu options:

Help > Release Licenses (see page 42).

**Help > Request Licenses** (see page 43).

Release Licenses

Use this menu option to release one or more licensed modules so they are available to other PartMaker users on the network.

This option is available only at the start of a PartMaker session in PartMaker installations that use RMS security protection.

When you start a PartMaker product on a client PC, PartMaker automatically allocates all available licensed modules for that product to your PartMaker session. To release a licensed module, select **Help > Release Licenses** and then select the licensed module you want to release from the submenu. For example:
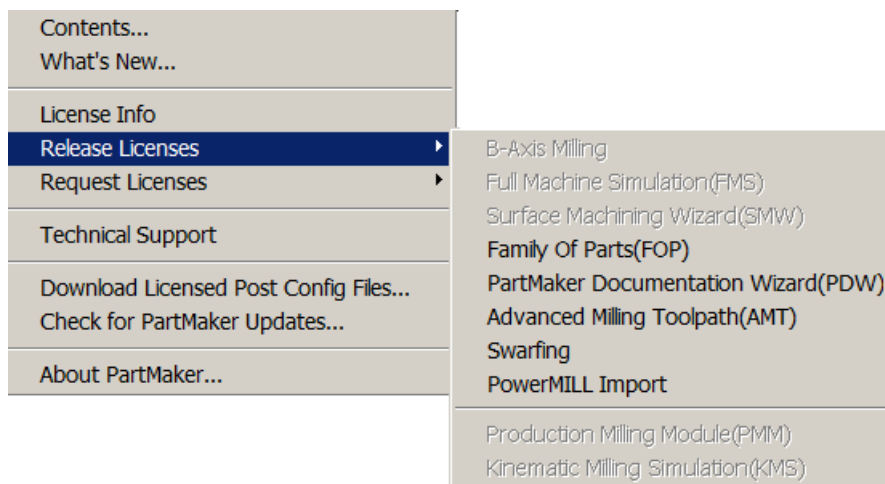
PartMaker automatically releases any licensed modules allocated to your PartMaker session when you close PartMaker.

*The options available in the **Help > Release Licenses** submenu vary depending on which product you are using and the modules your company has licensed.*
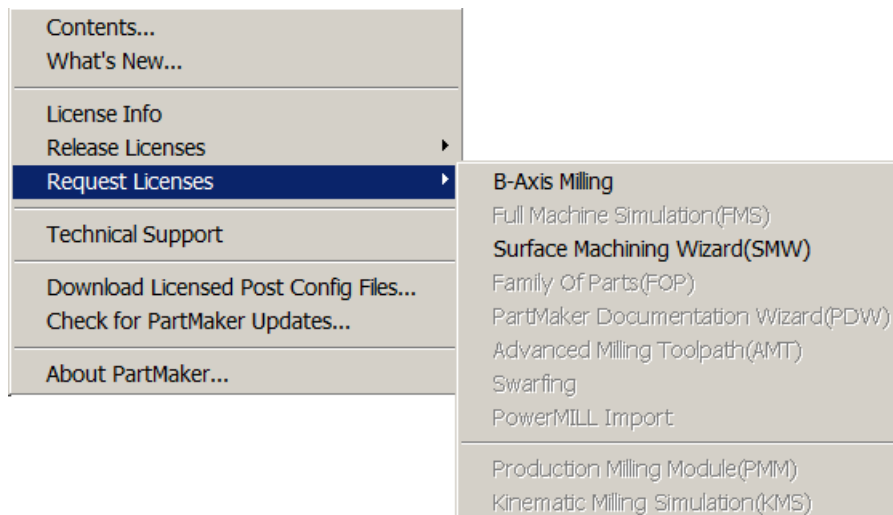
Request Licenses

Use this menu option to request a licensed module, so you can use the features available in that module in your PartMaker session.

This option is available only at the start of a PartMaker session in PartMaker installations that use RMS security protection.

When you start a PartMaker product on a client PC, PartMaker automatically allocates all available licensed modules for that product to your PartMaker session. However, if you need a licensed module that is being used by another user on the network, that user can release the licensed module (see page 42) and you can then request it for your PartMaker session.

To request a licensed module, select **Help > Request Licenses** and then select the licensed module you want from the submenu. For example:

PartMaker automatically releases any licensed modules allocated to your PartMaker session when you close PartMaker.

*The options available in the **Help > Request Licenses** submenu vary depending on which product you are using and the modules your company has licensed.*

General improvements

PartMaker 2012 contains the following general improvements:

- On the **Defaults for Milling** dialog, you can now define a default **Width of Cut** value if you choose to specify this value as a percentage of the tool diameter:
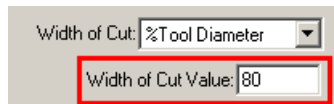
  PartMaker uses the value you specify as the default **Width of Cut** value on the **Profile Group Parameters** dialog when you create profile groups for pockets, contours and face milling:
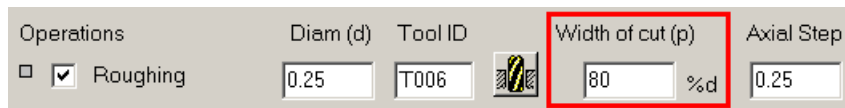
- The following menu options have been renamed to avoid confusion between the new setup assemblies feature in PartMaker/Mill 2012 and the functionality for working with solids models that contain an assembly of parts or surfaces:

  - **Extract Part From Assembly** renamed to **Extract Part From Model**.

  - **Restore Assembly** renamed to **Restore Model**.

- In PartMaker/SwissCAM and PartMaker/Turn-Mill, the **Set Modes** dialog includes a new **Sub-Spindle Z Distance From Home** field to specify the machining position of a sub-spindle relative to its home position. This field is available for the M0S1, M1S1, M0S2, M1S2, or M2S1 synchronization modes for processes programmed on the sub-spindle.
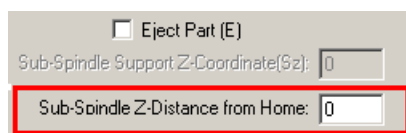
  The field is available only if the post processor uses the `<sub-spindle-distance>` *reserved word (see page 45).*

- PartMaker 2012 can import PowerMILL project files created in PowerMILL 2012 when using the **File > PowerMILL Interface > Import PowerMILL Project** option.

ConfigPost enhancements

PartMaker uses Post files to convert processes in the Process Table into NC program code. Using ConfigPost you can create and save custom Post files.

In ConfigPost 2012, the `<sub-spindle-distance>` reserved word has been enhanced to support the new **Sub-Spindle Z Distance From Home** field on the **Set Modes** dialog in PartMaker/SwissCAM and PartMaker/Turn-Mill. You can use this field to specify the machining position of a sub-spindle relative to its home position (see page 44).

PartMaker 2012

PartMaker 2012
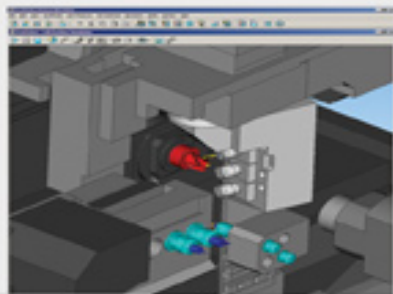
new features

Delcam TV

www.delcam.tv

PartMaker 2012 Learning Zone

www.delcam.tv/lz

PartMaker Website

www.partmaker.com

THE QUEEN'S AWARDS
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To contact your local reseller, visit **www.delcam.com/resellers**