GIBBSCAM® 14

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Intermediate Tooling

CAMBRIO

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Contents

INTRODUCTION 5

About This Book 5

About Intermediate Tooling 5

What Is Intermediate Tooling? 5

Libraries 5

Setups 5

Who Uses Intermediate Tooling? 6

INTERFACE 7

Setting Preferences 7

Tool Setup Data 7

Visualizing Toolblocks 8

Visualization Panes 8

Visualization Windows 10

Using Toolblocks 10

Adding/Replacing Toolblocks 12

LIBRARIES 13

About Toolblock Libraries 13

Using Toolblock Libraries 13

Using Libraries 13

Creating a Toolblock Library 15

Types, Fittings, and Offsets 15

Receptors, CSs, and Orientations 15

U-Axis Turning 15

Adding a Toolblock to a Library 15

Types, Fittings, and Offsets 15

Receptors, CSs, and Orientations 15

U-Axis Turning 15

TOOLBLOCK DATA 16

Kinematic Tree 16

Receptor Data 16

Simulation Bodies 16

APPENDIXES 17

Folders and Files 17

Toolblocks\ Folder 17
Fixtures\ Folder 18
Templates\ Folder 18

Tool Setup Data 19

DCD: Toolblock Filtering 21

Templates 22

Configuring Libraries 24

Creating and Modifying Libraries 24

Shank Sizes 25

Adding Toolblocks 25

Toolblock Data 25
General Tab 26
Post Data 27
Root (Tree structure) 27

Fixture Data 29

Making Libraries Available to Machines 30

Introduction

About This Book

Welcome to the GibbsCAM *Intermediate Tooling* guide. The material in this guide was formerly located in the *Common Reference* guide. However, because of its advanced nature, most material for Intermediate Tooling was placed in its own separate guide at GibbsCAM 14.

To make best use of this guide, you should be familiar with the material in the *Common Reference* guide and at least one of the guides for *Mill* and *Turning*.

About Intermediate Tooling

What Is Intermediate Tooling?

Intermediate Tooling is the GibbsCAM term for two classes of items: *toolblocks* and *fixtures*. They are intermediate in two senses:

- Physically: Tools are held by toolblocks, which attach to toolgroups. Workpieces are held by fixtures, which attach to part stations.
- Conceptually: Tools and workpieces change constantly. Toolgroups and part stations are unchanging aspects of the machine definition. Intermediate tooling provides flexibility without permanent modification to the machine.

Libraries

GibbsCAM provides the ability to support *libraries* of toolblocks and fixtures. For example, a machine might have a 12-station turret and a 16-station turret as its two permanent toolgroups. Each station is capable of holding certain toolblocks (sometimes called *adapters*) from a library designed for that machine.

Libraries are often specific to a particular machine manufacturer or model, and are normally managed and configured by Resellers and developers.

Setups

After one or more libraries have been configured, part setups can associate specific tool stations with toolblocks, and can specify the default attachments, orientations, and offsets of toolblocks.

Each toolblock is characterized by its name, its library, its shank size, and its *toolblock type*. Toolblock types include: adapter blocks (turn blocks, drill blocks, boring bar blocks), cutoffs, right angle heads, and live blocks. Fixture types include: chucks, tailstocks, steadyrests, and user-defined fixtures.

Who Uses Intermediate Tooling?

Intermediate Tooling has three aspects, to serve three different types of audiences:

- **Part programmers** deal with tools. They use the Tool dialog to look at the toolblocks that have been set up for the current part. For more information, see “Using Toolblocks” on page 10.
- **Setup programmers** deal with part setups. They use the Document Control dialog (DCD) and Tool Setup dialog to specify default settings for the toolblocks that will be available to part programmers. For more information, see “Libraries” on page 13.
- **Resellers and Developers** deal with machine setups. They use File menu options to designate and configure libraries and to specify parameters of the toolblocks that will be available to setup programmers. For more information, see “Configuring Libraries” on page 24.

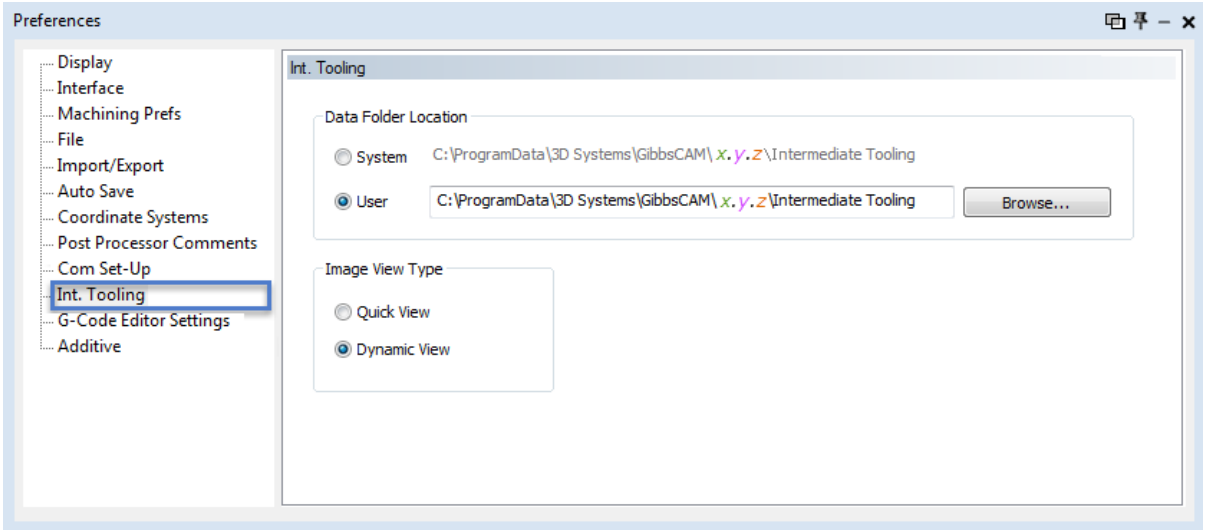
These three groups have areas of overlap. For example, they all need they ability to visualize toolblocks: see “Visualizing Toolblocks” on page 8.

Interface

- Preferences for Intermediate Tooling are set in the Preferences dialog. See Setting Preferences, next.
- The main user interface for Intermediate Tooling is the Tool Setup Data dialog. See “ Tool Setup Data” on page 7.

Setting Preferences

On the File menu, click Preferences to set preferences for Intermediate Tooling.



You can set the default view to either Quick View (static image) or Dynamic View:

- Quick View is suitable for slow systems with underpowered graphics.
- Dynamic View is recommended for most systems, because you can pan, rotate, and zoom the preview using many of the same mouse movements and keyboard shortcuts that you use in the workspace, like CTRL-drag to pan, center-mousebutton-drag to rotate, marquee to zoom in, CTRL+U to unzoom, and so forth.

Tool Setup Data

The **Tool Setup Data** dialog allows you to add, remove, and stack toolblocks. This assumes that your tool libraries have been set up and that machine data has been properly configured. For information on setting up tool libraries, see “Libraries” on page 13. For information on configuring machine data, see “Machine Data” on page 1.

In the Tools dialog, click . The Tool Setup Data dialog opens. See “Using Toolblocks” on page 10.

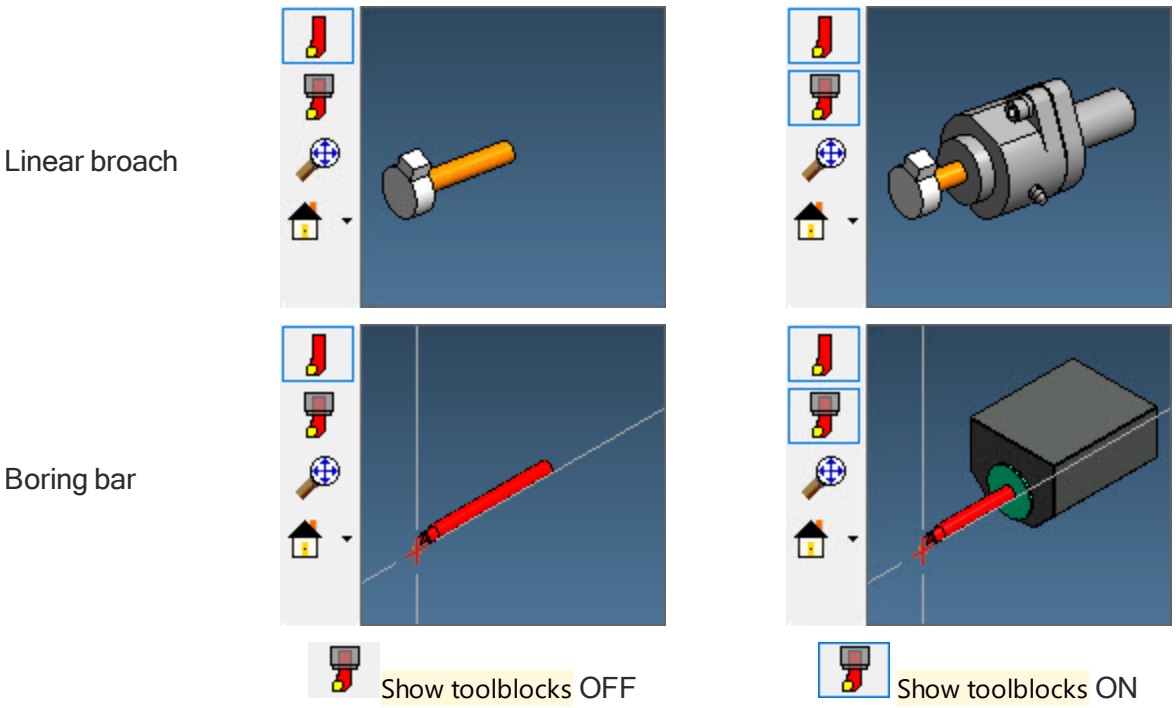
Visualizing Toolblocks

- Preview *panes* appear on the right side of several dialogs. See Visualization Panes, next.
- Preview *windows* are summoned by clicking a button, such as Preview Toolgroup, that opens the preview in a separate resizable window. This window includes view controls on a tool palette. See "Visualization Windows" on page 10.

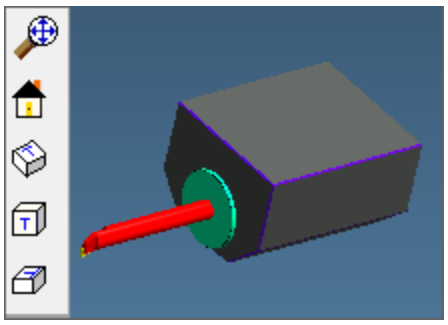
Visualization Panes

Visualization panes appear in several places:

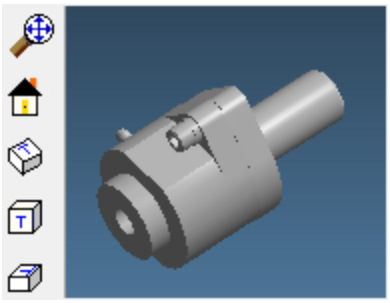
- In the **Tool** dialog, lower left, pressing the Show Toolblocks button shows the toolblocks for this tool:



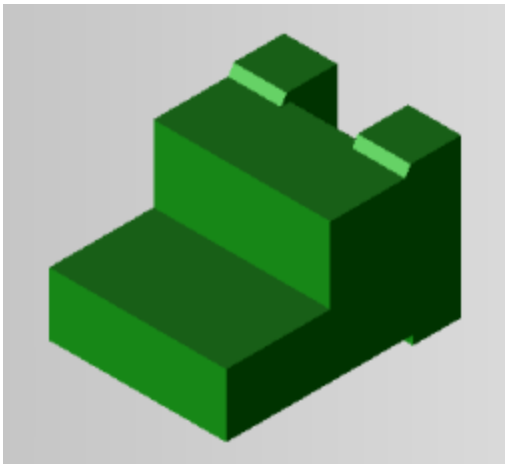
- In the **Tool Setup Data** dialog, upper right, a visualization pane shows all toolblocks for the current tool:



- In the **DCD**, Intermediate Tooling tab, clicking a row in the **Stationn / Toolblock** shows blocks at that station:



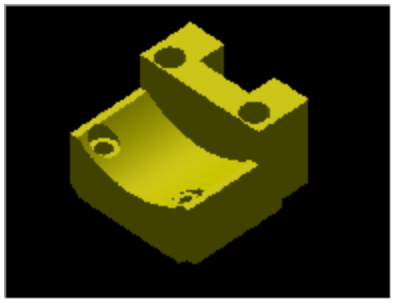
- In the **Toolblock Data** dialog, the lower right shows the current simulation body:



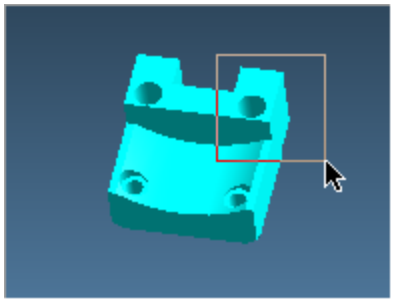
The pane's appearance and functionality depend on a preference setting in Files > Preferences > Int. Tooling under Image View Type:

You can set the default view to either Quick View (static image) or Dynamic View:

- Quick View is suitable for slow systems with underpowered graphics.
- Dynamic View is recommended for most systems, because you can pan, rotate, and zoom the preview using many of the same mouse movements and keyboard shortcuts that you use in the workspace, like CTRL-drag to pan, center-mousebutton-drag to rotate, marquee to zoom in, CTRL+U to unzoom, and so forth.



Preview pane when Image View Type

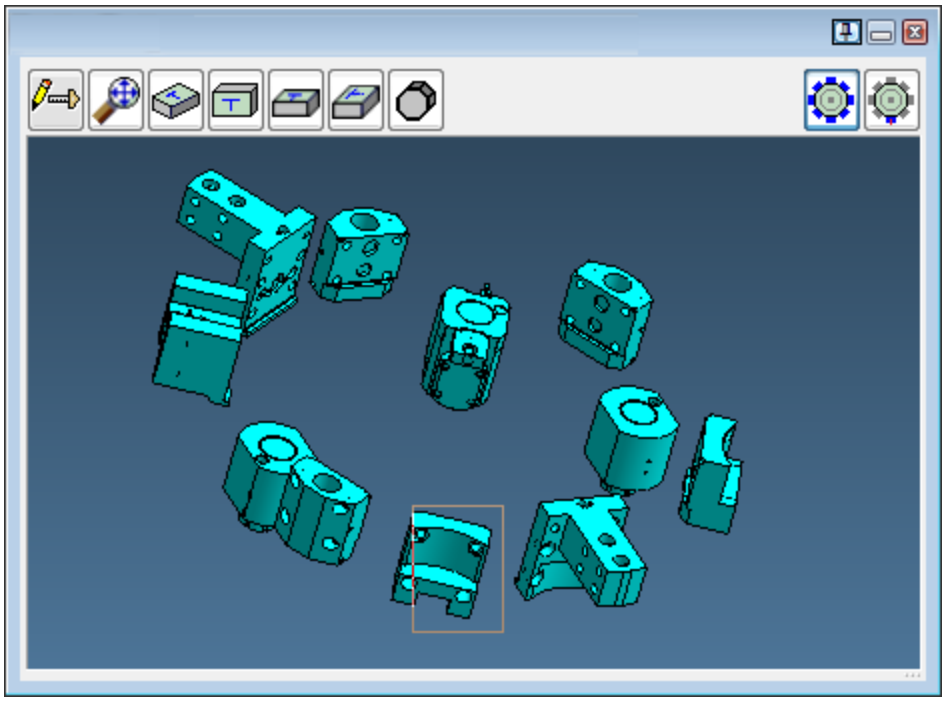


Preview pane when Image View Type

preference is set to **Quick View**	preference is set to **Dynamic View**

Visualization Windows

When you click a button, such as Preview Toolgroup, a toolblock preview opens in a separate resizable window that includes view controls on a tool palette. Some variants of this type of window let you show all toolblocks for the current toolgroup, as shown here:

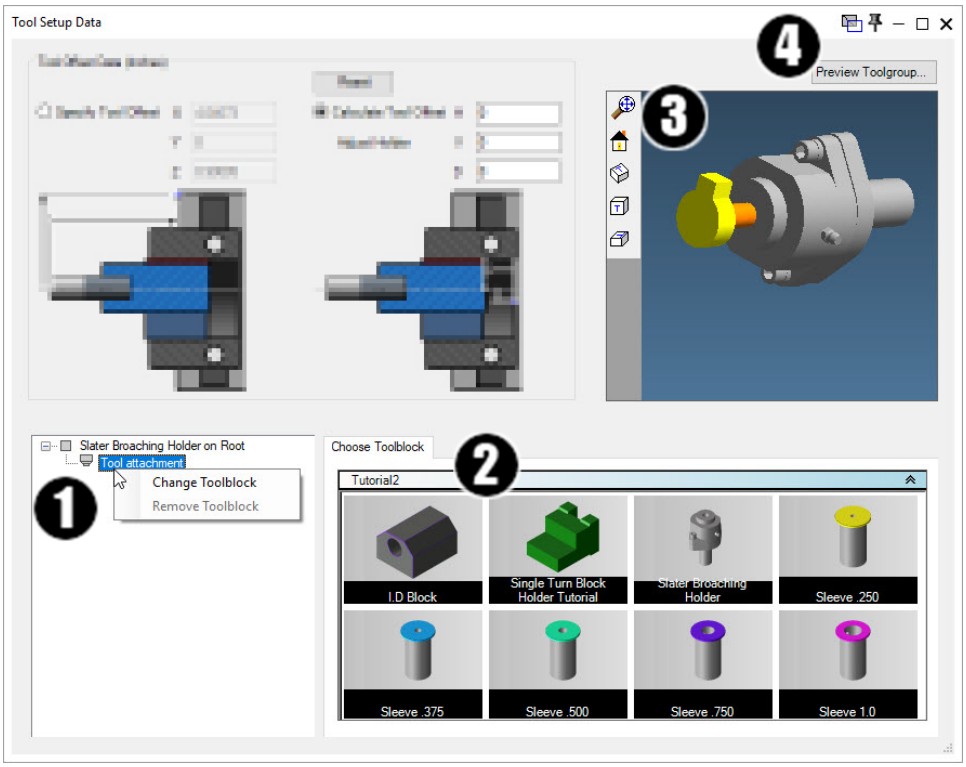


You can pan and zoom the toolgroup preview just as if it were a solid in the workspace, and you can also use buttons to manipulate the display, as follows:

- Redraw: Refreshes the display, possibly with updated information.
- Unzoom: Resizes the current display so that it fits entirely in the pane.
- Iso / Front / Top / Right: Let you see the intermediate tooling from any of the standard view orientations.
- Show Edges: Shows or hides edges on the solid models.
- Show All Toolblocks: Toggles between showing all toolblocks or just the currently selected toolblock.
- Show All Tools: Shows or hides the tools associated with other toolgroups. Applies only when all toolblocks are shown.

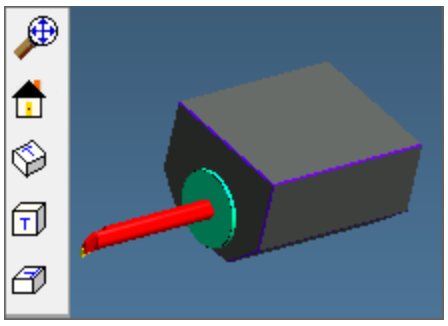
Using Toolblocks

When you open the **Tool Setup Data** dialog for a particular tool, the **Choose Toolblock** tab offers all toolblocks that are suitable for that tool.

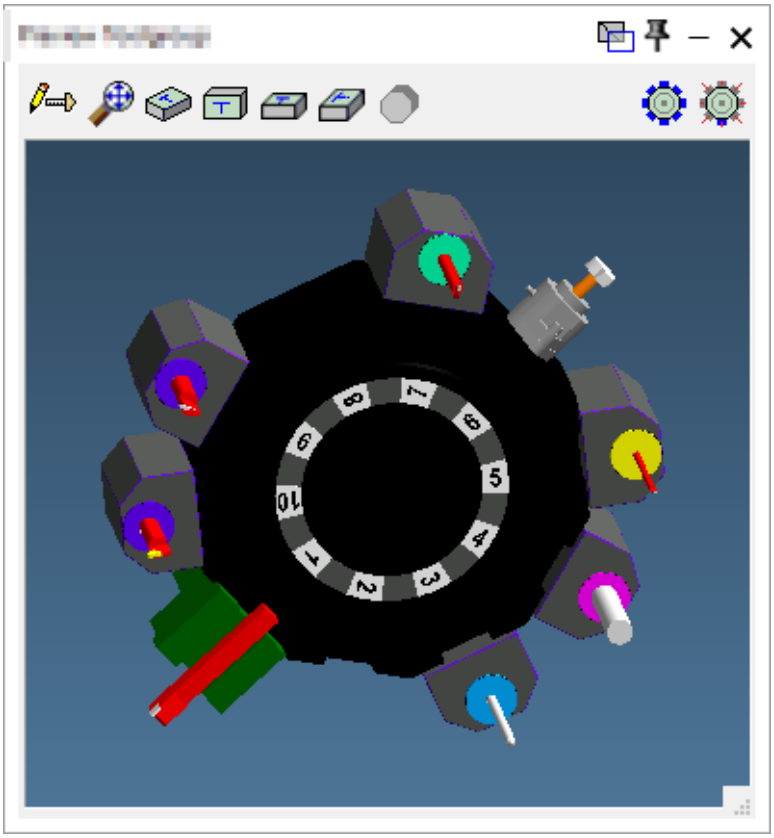


1. Kinematic tree
2. Palette of Toolblock choices
3. Visualization pane: tool with toolblock(s)
4. Preview Toolgroup button

- To add a toolblock, click its picture in the palette (area 2 in the illustration).
- To remove a toolblock, right-click its parent node in the kinematic tree (area 1 in the illustration) and, on the context menu, click Remove Toolblock. Or, to change to a different toolblock, right-click its parent node, click Change Toolblock, and select the toolblock you want.
- To stack one toolblock onto another, select the node in the kinematic tree where you want to add another toolblock, and then click a toolblock picture in the palette. The software imposes no limit on the height of the stack. A typical use for this is to combine a block with a sleeve, as shown below.



- To verify that toolblocks and tools are loading correctly, click Preview Toolgroup (item 4 in the illustration) to open a resizable visualization window with controls that let you see or suppress edges, tools, or toolblocks.



Adding/Replacing Toolblocks

Libraries

About Toolblock Libraries

Using Toolblock Libraries

Using Libraries

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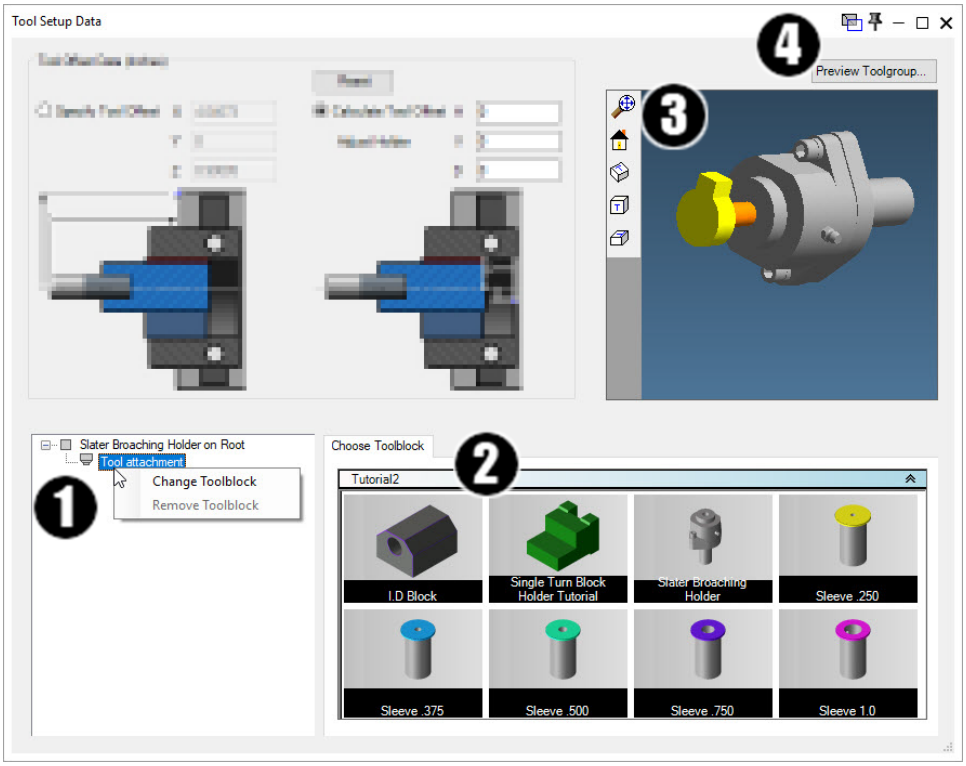

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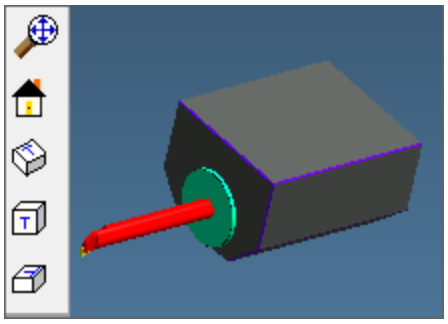

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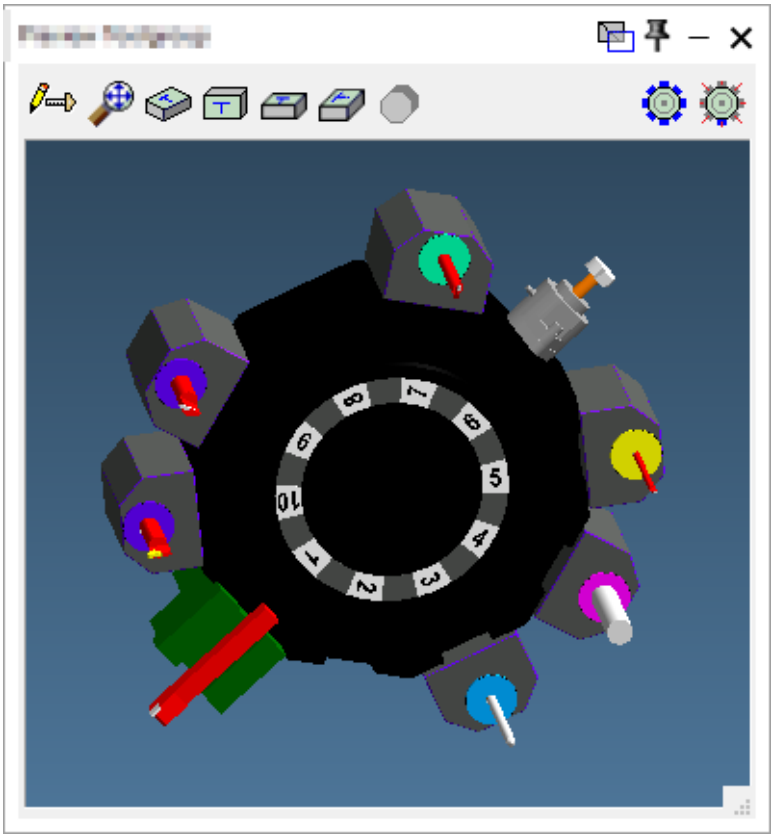


Creating a Toolblock Library

Types, Fittings, and Offsets

Receptors, CSs, and Orientations

U-Axis Turning

Adding a Toolblock to a Library

Types, Fittings, and Offsets

Receptors, CSs, and Orientations

U-Axis Turning

Toolblock Data

Kinematic Tree

Receptor Data

Simulation Bodies

Appendixes

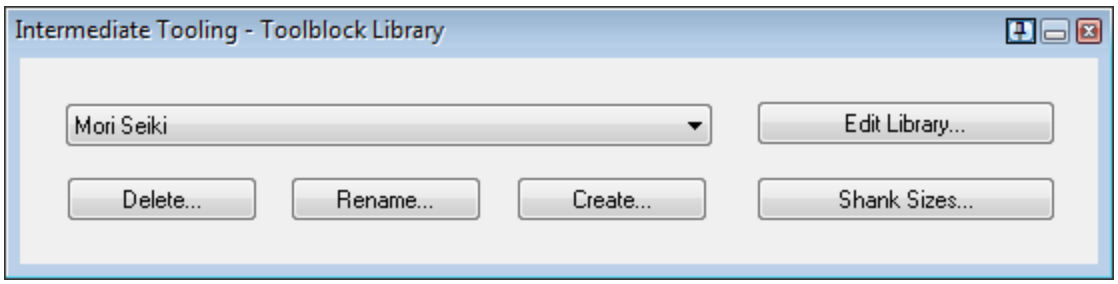
Folders and Files

By default, machines that can use intermediate tooling look for their data in the `Intermediate Tooling\` subfolder of the user data folder (default `C:\ProgramData\CAMBRIO\GibbsCAM\<version>`). This document assumes that you have kept the default paths and foldernames.

The `Intermediate Tooling\` folder contains subfolders `Toolblocks\`, `Fixtures\`, and `Templates\` .

> **Do not make manual changes to any of these folders or files!** They are managed by GibbsCAM Intermediate Tooling.

`Toolblocks\` Folder



The `Toolblocks\` folder contains libraries of toolblocks, organized by manufacturer (such as Mori Seiki NTX1000). Each toolblock library contains:

- One master `Toolblocks.xml` file that organizes all the toolblocks for this manufacturer
- One master `ShankSizes.xml` file that tracks the shank sizes supported by this library
- For each toolblock:
  - One `.vnc` file (GibbsCAM part file) that models the toolblock geometry
  - One `.bmp` file (image preview file) for visualization
  - Multiple `*.fb2` files to codify the toolblock's attachment and orientation capabilities

`Fixtures\` Folder

The `Fixtures\` folder contains libraries of fixtures in subfolders. These libraries can contain fixtures supplied by the manufacturer and user-created fixtures, separately or in combination. Each fixture library contains:

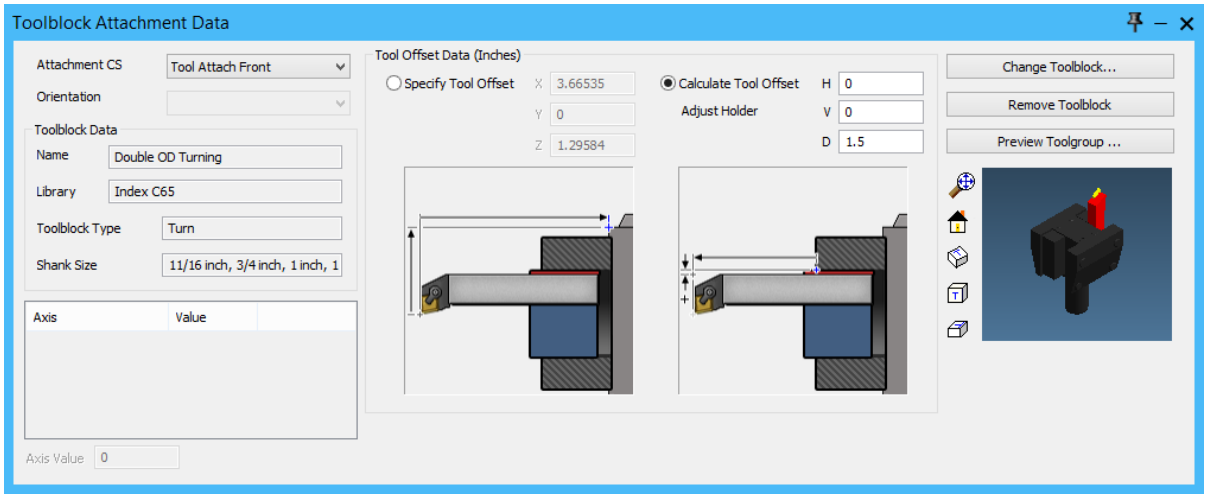
- One master `Fixtures.xml` file that organizes all fixtures in this library
- For each fixture:
  - One `.vnc` file (GibbsCAM part file) that models the fixture geometry
  - One `.bmp` file (image preview file) for visualization
  - Multiple `*.fb2` files to codify the fixture's attachment and orientation capabilities
  - Zero or more `*.mac` files (GibbsCAM macro files), typically used to create a family of parts that differ only in one or two specified parameters

`Templates\` Folder

The `Templates\` folder contains zero or more GibbsCAM part files that have been set up with toolblocks and/or fixtures in a useful way that setup programmers want to re-use.

Tool Setup Data

In the Tool dialog, the button opens the **Tool Data Setup** dialog, The upper portion of this dialog allows you to view information on available toolblocks and to specify the attachment between the current tool and a selected block.



The **Toolblock Attachment Data** dialog offers the following types of settings:

Attachment CS

If this toolblock has more than one location where the tool can attach, select the appropriate CS from this pull-down menu.

Orientation

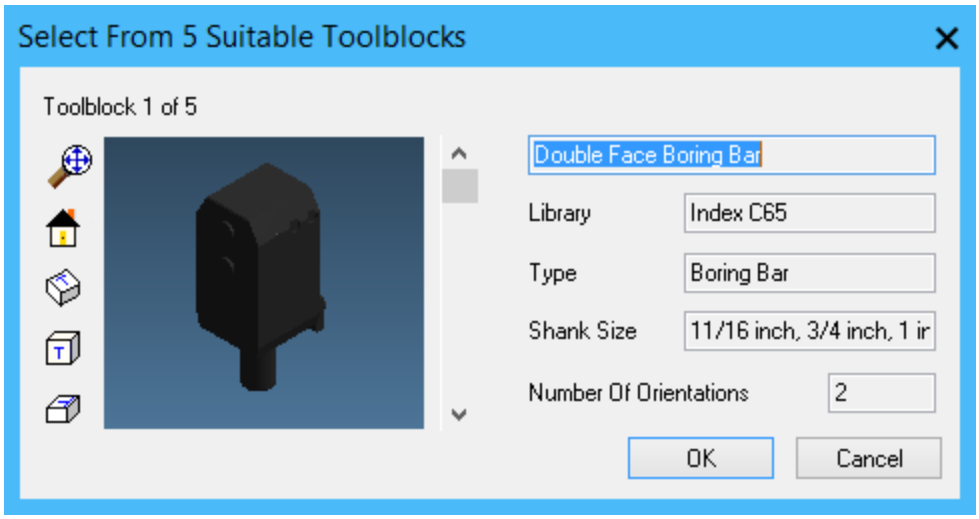
If this toolblock can be oriented in more than one way, select the appropriate orientation from this pull-down menu.

Toolblock Data

Four fields provide information for identifying the toolblock: name, library name, type, and shank size.

Add / Change Toolblock

Click to open a dialog that lets you view toolblocks and make a selection. Use the scrollbar next to the preview pane to browse through blocks that are defined in the current part setup.



Remove Toolblock

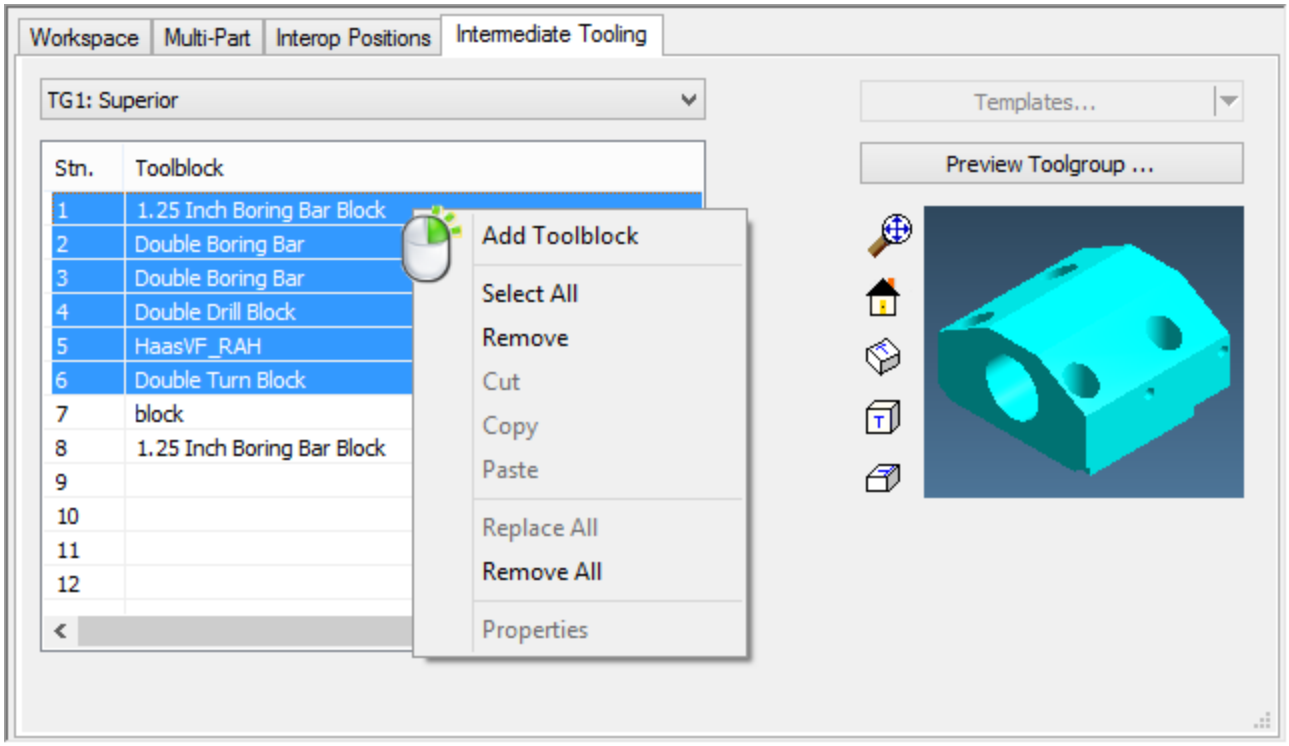
Click to disassociate the current tool from any of the available toolblocks.

Preview Toolgroup

Click to open a separate resizable window with full view controls. This is different from the preview pane within the dialog box, which offers limited view controls. For more information, see “Visualizing Toolblocks” on page 8

DCD: Toolblock Filtering

In the Document Control dialog (DCD), use the Intermediate Tooling tab to specify the toolblocks and fixtures that will be available to the part programmers for the current part.



The **Intermediate Tooling** tab offers the following types of settings:

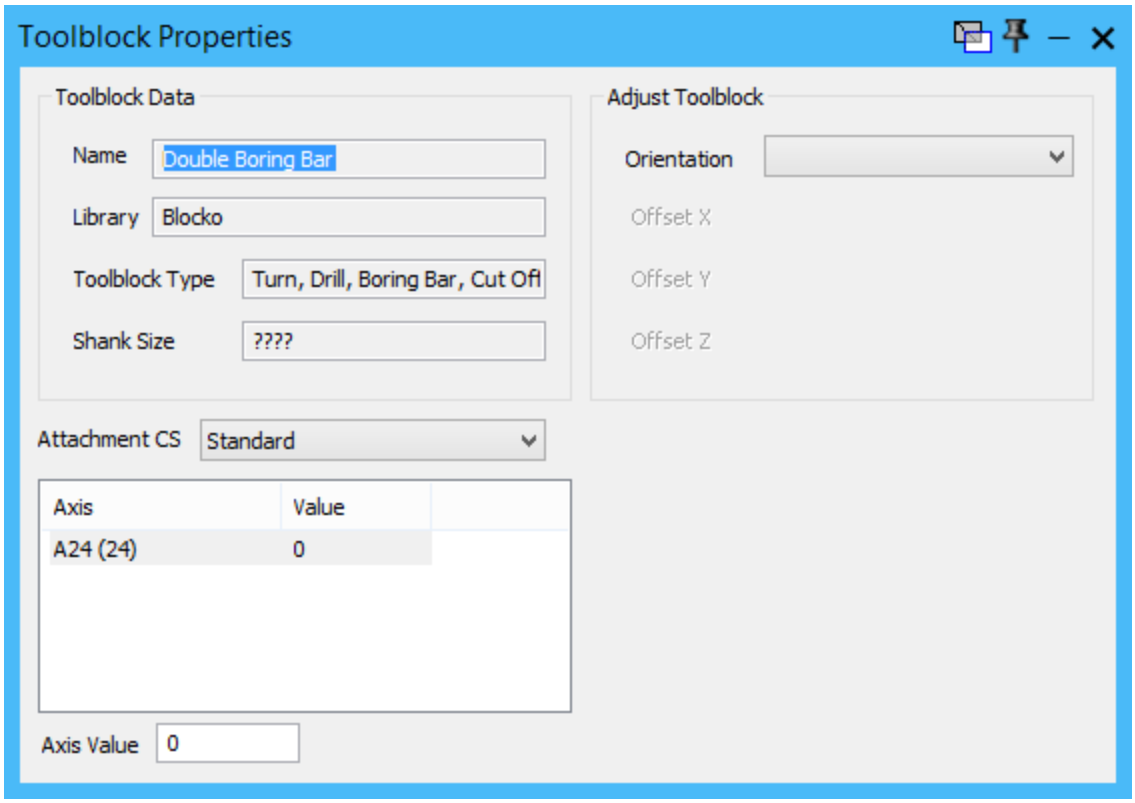
Pull-down menu of toolgroups and tixtures

On the pull-down menu, choose the appropriate toolgroup (to set up toolblocks for this part), or choose Fixture to set up fixtures.

Table of toolstations/blocks or nodes/fixtures

Depending on the current selection (toolgroup or Fixture), this table lists all toolblocks or fixtures that have been defined for this part. Right-click a row on the table and use the context menu to add, remove, cut/copy/paste, and so forth.

- Choose Add to open a dialog that lets you scroll through available toolblocks or fixtures in the current library and select the item you want in the current row of the table.
- Choose Properties to open a dialog that provides full information on the selected toolblock or fixture:



Toolblock Data
Information that identifies the selected toolblock or fixture

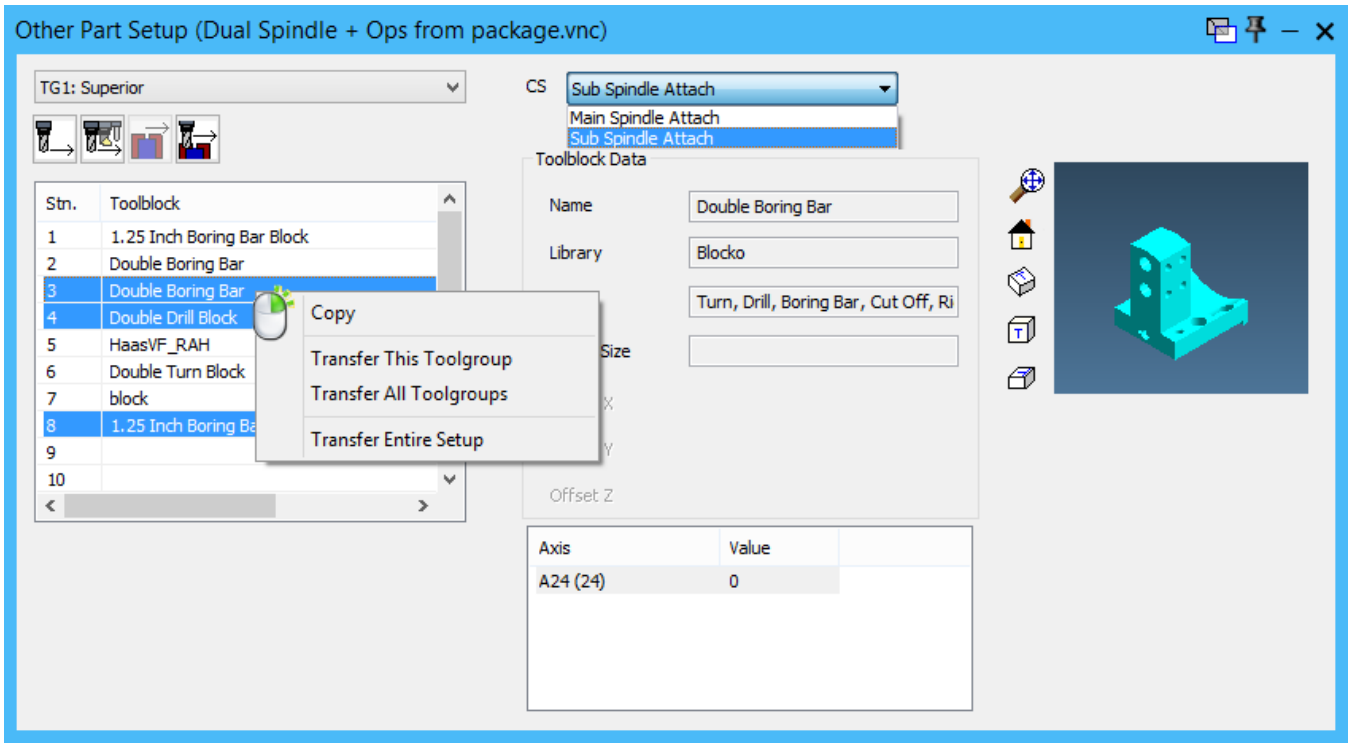
Attachment CS
If the toolblock provides multiple attachment locations, choose the CS that you want part programmers to see as the default.

Orientation
If the toolblock provides multiple orientations, choose the one that you want part programmers to see as the default.

Offset
If these textboxes are available, specify offset values that you want part programmers to see as defaults.

Templates

Click to open a dialog box that lets you navigate to and select a `.vnc` file (part file) whose setup is the same as, or similar to, the setup you want for the current part.



Command buttons and context menu items

On the context menu (right-mouse menu), use the Copy command when you want to copy the selection (one or more highlighted rows) from the template into the part.

Transfer This Toolgroup

Use the button or context menu item Transfer This Toolgroup to copy the entries for the current toolgroup from the template into the part. To change the current toolgroup, choose from the pull-down menu at the top left of the dialog box.

Transfer All Toolgroups

Use the button or context menu item Transfer All Toolgroups to copy the entries for all toolgroups from the template into the part.

Transfer All Fixtures

This command becomes available when the template contains one or more fixtures. Use the button or context menu item Transfer All Fixtures to copy the entries for all toolgroups from the template into the part.

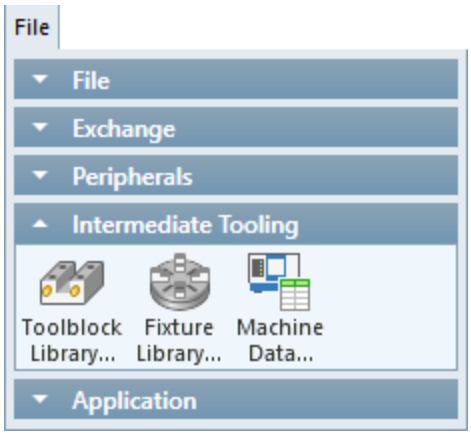
Transfer Entire Setup

Use the button or context menu item Transfer Entire Setup to copy all fixtures and all toolblocks in all toolgroups from the template into the part.

Configuring Libraries

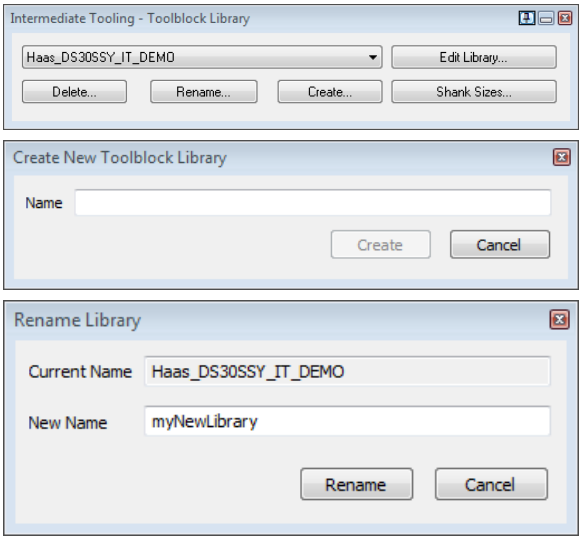
To manage libraries of toolblocks and fixtures: On the main File menu, choose the appropriate submenu item from File > Intermediate Tooling.

Dialogs for adding and configuring libraries allow you to specify parameters of the toolblocks that will be available to setup programmers.

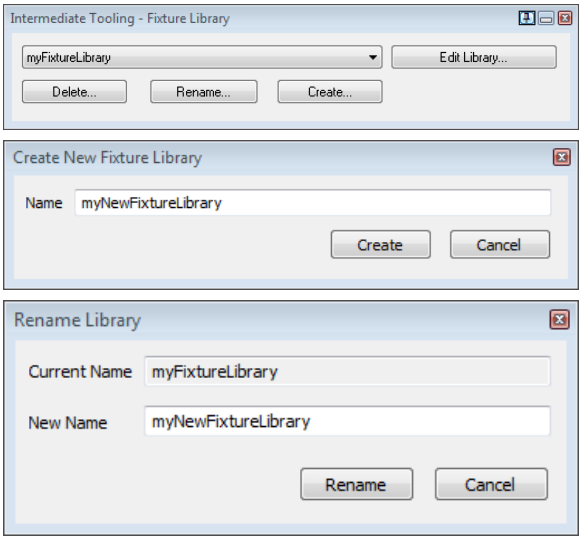


Creating and Modifying Libraries

Dialogs to create, delete, rename, and edit fixture libraries are very similar to the corresponding dialogs for toolblock libraries, occasionally with fewer settings. For example:



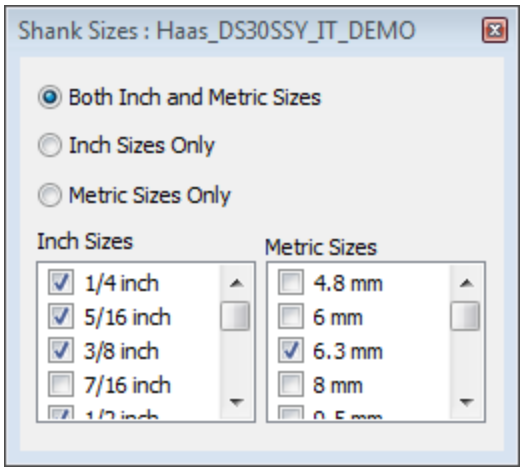
Basic dialogs for toolblock libraries



Basic dialogs for fixture libraries

Shank Sizes

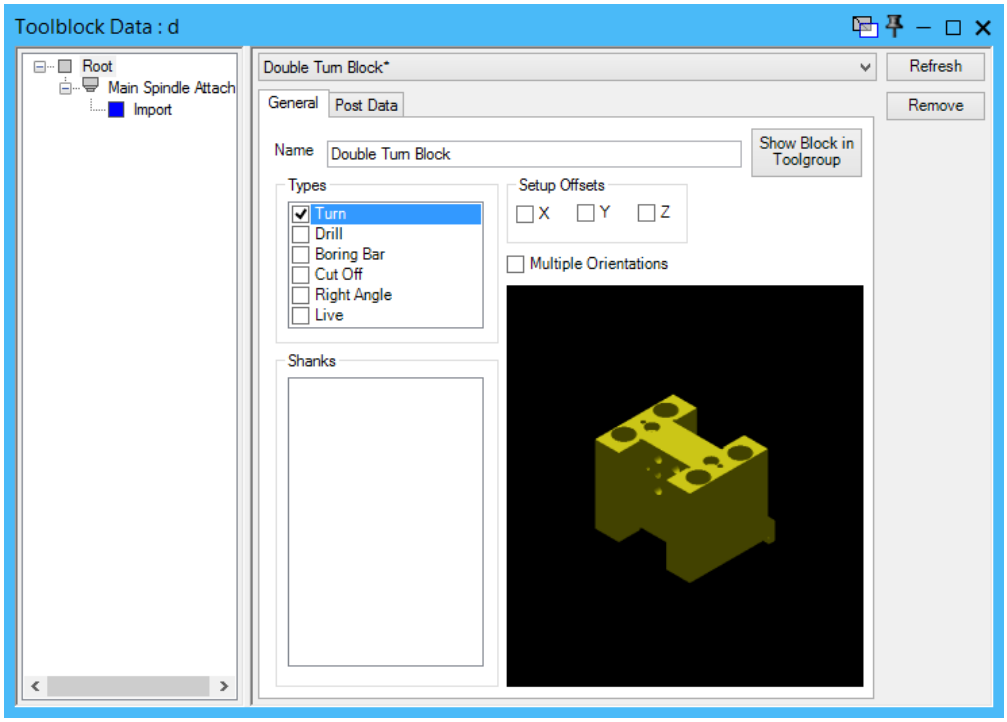
The **Shank Sizes** dialog applies to toolblock libraries only. Use it to specify the subset of checkboxes that will be shown when setting up toolblocks from this library.



Adding Toolblocks

Toolblock Data

This dialog is the main tool for adding, removing, and configuring toolblocks in the library. Its controls are explained below.



Filename

The .vnc filename of the Toolblock is automatically entered and becomes the name of the Toolblock. Use the dropdown arrow to view other toolblocks in the library.

Add (or) Refresh

If the currently selected toolblock.vnc is not already in the library, then click the Add button to add it to the library.

If the currently selected toolblock is already in the library, then you can click the Refresh button to resynchronize the fixture with the latest version of the .vnc file. In other words, if the part file has changed, the changes will not appear in the toolblock until you refresh it.

Remove

Click to make the current toolblock unavailable as a toolblock until it is re-added. This action does not delete the .vnc file; instead, it simply designates it as not currently a toolblock.

General Tab

Type

Choose one or more toolblock types from the checkboxes. When end users look for toolblocks of a certain type, their search results will show only those toolblocks whose checkboxes are selected here.

Shank

Choose one or more shank sizes from the checkboxes. When end users look for toolblocks of a certain shank size, their search results will show only those toolblocks whose checkboxes are selected here.

Show Block in Toolgroup

Requires exactly one tool tile to be selected. Click to open a preview window that shows the selected tool in the current toolblock.

Multiple Orientations

Select this checkbox to designate the number of possible orientations this toolblock can have. (Most toolblocks fit into a toolgroup in only one way, and so the default unchecked value is 1.)

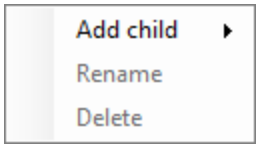
Post Data

Use this tab to add Toolblock data to be output in the post.

Root (Tree structure)

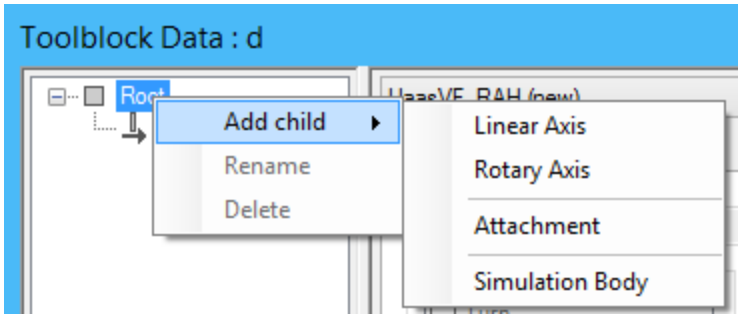
To specify the axes and attachment points and also to load a body to be used in Simulation, right-click Root in the left hand pane of the dialog. You will be presented with a dropdown menu. Note that Root cannot be renamed or deleted. These options become active once a ♦Child♦ has been added.

You might find it extremely helpful to view the Intermediate Tooling Tutorial, which takes you through adding a tree structure to a Toolblock.



Add Child

A further menu appears. This is where you specify the Toolblock type (Linear or Rotary) and its attachment point(s). You can also select a body to be used in simulation.



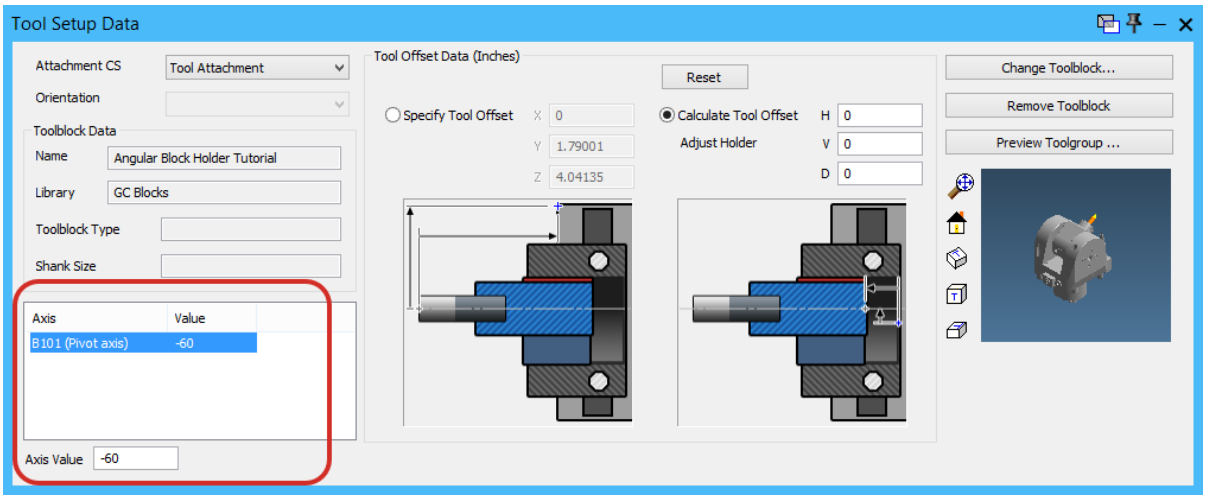
Linear Axis

A simple Toolblock which can have one or more attachment points. You specify the direction vector of the block which can be Standard or Reverse X, Y and Z or Custom, which can utilize a CS already set up for this purpose in the .vnc file. Use the Axis Limits checkbox if limits need to be specified.

Rotary Axis

In addition to the settings available for a linear axis, a pivot point can be specified for a rotary Axis. This means that Adjustable Angle Head Holders are supported. Again, you can utilize a CS

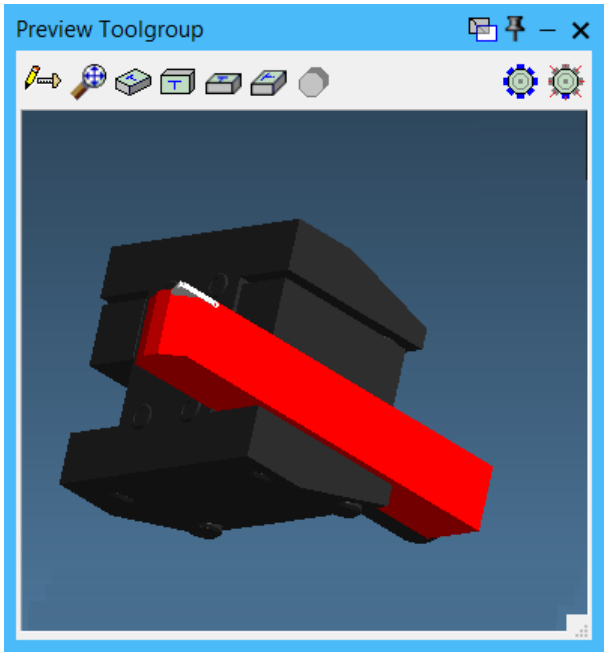
already set up in the .vnc file. This can then be programmed in the Tool Setup Data dialog, available when you define a tool (as shown below).



Please note that when adding Axes Labels, these must be in the format: Upper case letter, then a number (eg A100).

Attachment

This is the attachment point relative to the Root and must be specified for each axis. Use the Show Tool in Block option to check the validity of what has been entered. The label can be any format of letters/numbers.

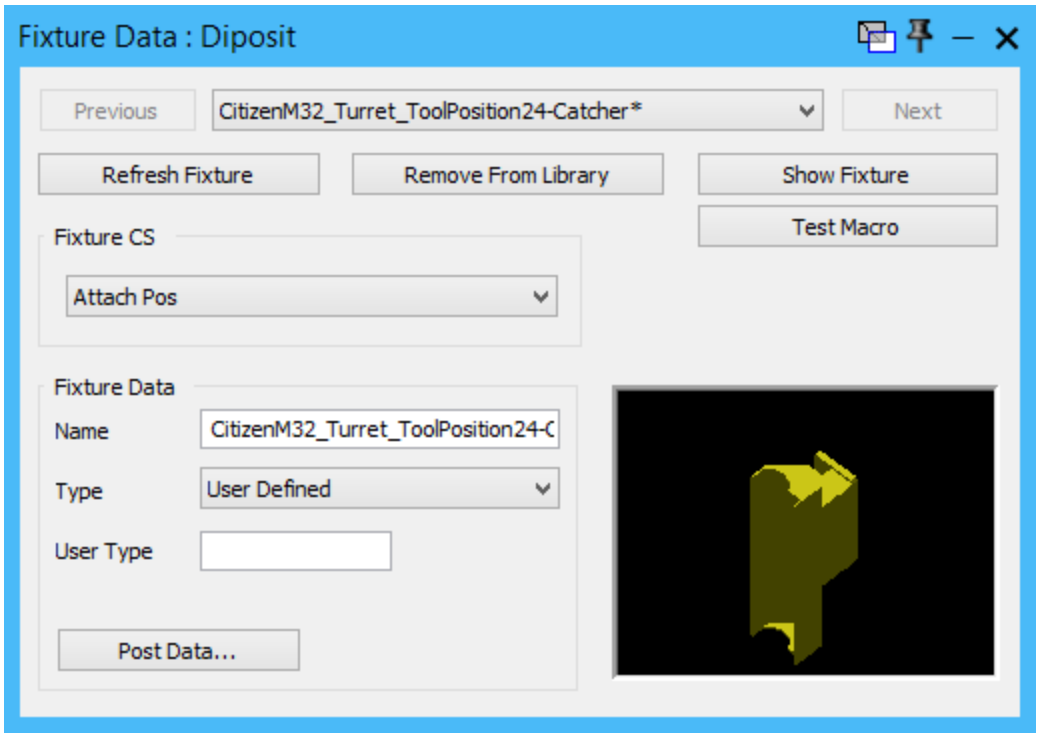


Simulation Body

You can select a solid or part solid for display in Simulation.

Fixture Data

The **Fixture Data** dialog is has fewer parameters than the Toolblock Data dialog.



Previous ◆ *filename pull-down* ◆ Next

You can use the Previous and Next buttons to scroll through the fixtures in the current library, or choose a filename from the pull-down menu. The choices shown here constitute all the `.vnc` files that have been designated as fixtures in the current library.

Add Fixture To Library (or) Refresh Fixture

If the currently selected fixture is not already in the library, then click the Add Fixture To Library button to open a dialog that lets you select `.vnc` files in the current library that are not currently designated as fixtures.

If the currently selected fixture is already in the library, then you can click the Refresh Fixture button to resynchronize the fixture with the latest version of the `.vnc` file. In other words, if the part file has changed, the changes will not appear in the fixture until you refresh it.

Remove From Library

Click to make the current fixture unavailable as a fixture until it is re-added. This action does not delete the `.vnc` file; instead, it simply designates it as not currently a fixture.

Show Fixture

Click to open a preview window that shows the selected fixture.

Test Macro

Requires a macro file to be available for creating or manipulating fixtures. For example, a macro is typically used to duplicate and rotate a single jaw to form a 3-jaw chuck.

The macro file must have a filename that is identical to the fixture's part name, but with a different file extension (`*.mac`) rather than `*.vnc`, and it must reside in the same folder where the part file resides.

Clicking the Test Macro button triggers the same sequence of actions that are triggered automatically when the fixture is added to Machine Manager.

Fixture Data

Name

Enter a descriptive text string that will identify this fixture to end users (setup and part programmers).

Type

Choose a fixture type from the pull-down menu.

Chuck Width

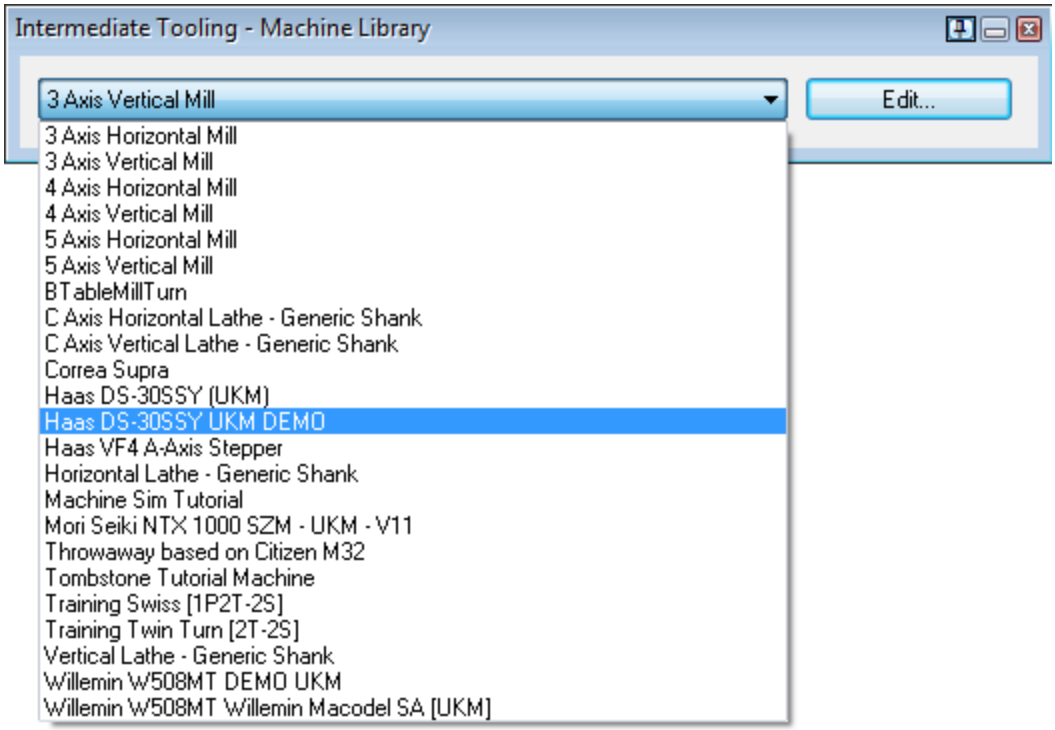
Available only when Type is Chuck. Enter a value for the width of the chuck.

User Type

Available only when Type is User Defined. Enter a descriptive text string to identify the fixture.

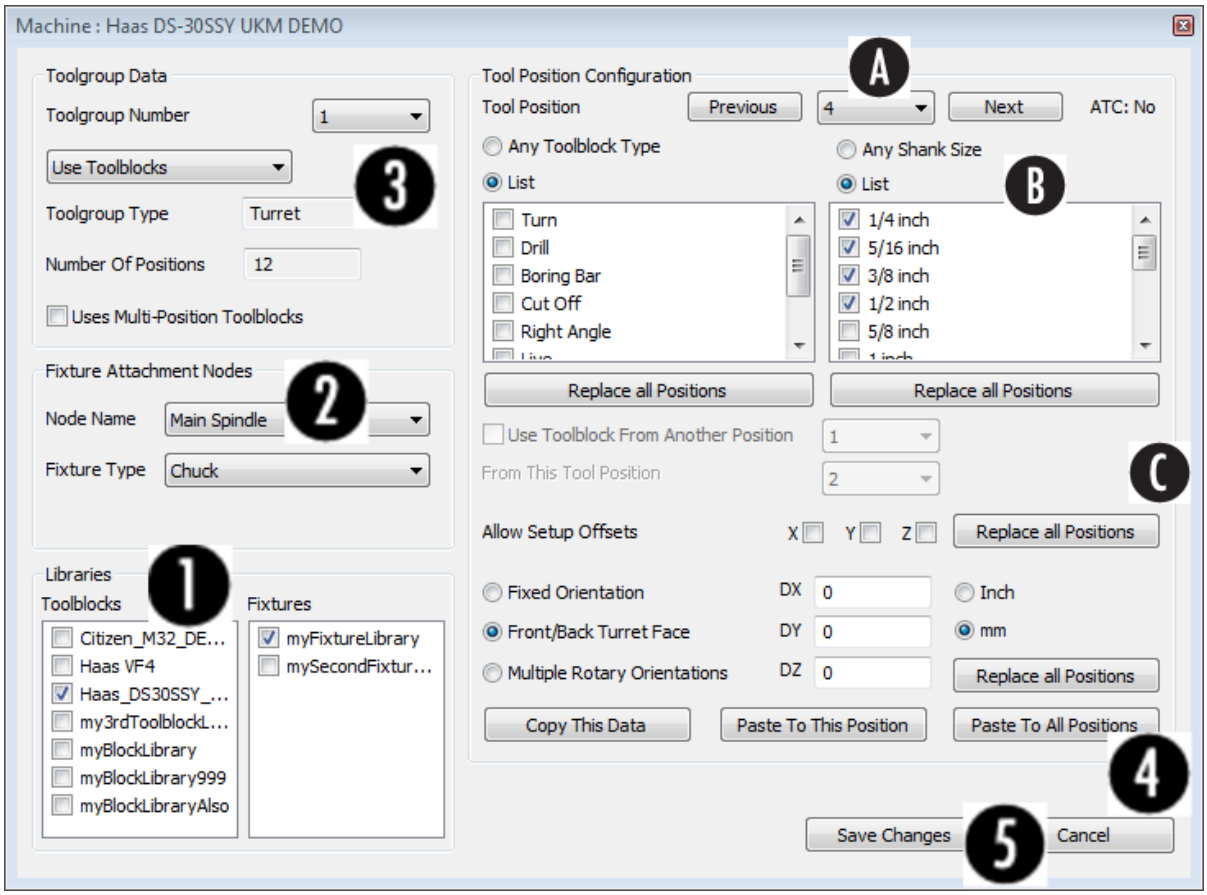
Making Libraries Available to Machines

After you have created and configured libraries of toolblocks and fixtures, you make them available to machines using File > Intermediate Tooling > Machine Data.



Select a machine from the pull-down list, and then click the Edit button to open the **Machine : *<libraryname>*** dialog, which offers settings appropriate for the selected machine (MDD). For example:

- The **Toolgroup Data** section will present only as many toolgroups as are defined for this machine, and each toolgroup type and position count will reflect the values in the MDD.
- In the **Fixture Attachment Nodes** section, the Node Name pulldown lists all the names of part stations that can accept fixtures.
- In the upper far right, ATC echoes whether the machine does or does not designate the selected tool position as an automatic tool changer.



The suggested workflow for using this dialog is to start in the lower left and move counterclockwise, as follows:

1. In the **Libraries** section on the lower left, select the libraries of toolblocks and fixtures that are suitable for this machine.
2. For fixtures (optional): Choose a Fixture Type other than Any if (and only if) you want to restrict a certain node selected under Node Name so that it accepts only a specific type of fixture.
3. For toolgroups (required): Choose a toolgroup number, choose whether or not that toolgroup can use toolblocks, specify whether the toolgroup is permitted to use multi-position toolblocks, and then configure settings for each tool position using the controls in the right half of the dialog.

a. Use the Tool Position controls to select a tool position.

b. For the current tool position, you can optionally do any of the following:

   - List to restrict toolblock type and/or shank size.
   - Select zero or more checkboxes to allow or restrict setup offsets
   - Choose an orientation and a unit of measure.

c. For any of the preceding items, you can click Replace all Positions to propagate the restriction to all tool positions.

4. If you want to copy settings from tool position to another position, or to all positions, use the Copy and Paste buttons near the lower right.

5. When you are satisfied with the settings for this machine, click Save Changes.