Version 14 : September 2020

Solids Import

Proprietary Notice

This document contains proprietary information of Cambrio Acquisition, LLC (“CAMBRIO”) and is to be used only pursuant to and in conjunction with the license granted to the licensee with respect to the accompanying licensed software from CAMBRIO. Except as expressly permitted in the license, no part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, electronic, magnetic, optical, chemical, manual or otherwise, without the prior expressed written permission from CAMBRIO or a duly authorized representative thereof.

It is strongly advised that users carefully review the license in order to understand the rights and obligations related to this licensed software and the accompanying documentation.

Use of the computer software and the user documentation has been provided pursuant to a CAMBRIO licensing agreement.

Copyright © 2021 CAMBRIO. All rights reserved. The Gibbs and GibbsCAM logos, GibbsCAM, Gibbs, Virtual Gibbs, and “Powerfully Simple. Simply Powerful.” are either trademark(s) or registered trademark(s) of CAMBRIO in the United States and/or other countries. All other trademark(s) belong to their respective owners.

Portions of this software and related documentation are copyrighted by and are the property of Siemens Digital Industries Software.

Microsoft, Windows, and the Windows logo are trademarks, or registered trademarks of Microsoft Corporation in the United States and/or other countries.

Contains PTC Creo GRANITE® Interoperability Kernel by PTC Inc. All PTC logos are used under license from PTC Inc., Boston, MA, USA. CAMBRIO is an Independent Software Provider.

Portions of this software © 1994-2021 Dassault Systèmes / Spatial Corp.

Portions of this software © 2001-2021 Geometric Software Solutions Co. Ltd.

Contains Autodesk® RealDWG™ kernel by Autodesk, Inc., © 1998-2021 Autodesk, Inc. All rights reserved.

DMG MORI Models provided in conjunction with GibbsCAM © 2007-2021 DMG Mori Seiki Co., Ltd.

Contains VoluMill™ and VoluTurn™ software by Celeritive Technologies, Inc. © 2007-2021 Celeritive Technologies, Inc. All rights reserved.

This Product includes software developed by the OpenSSL Project for use in the OpenSSL Toolkit (http://www.openssl.org/). This Product includes cryptographic software written by Eric Young (eay@cryptsoft.com).

Portions of this software © MachineWorks Ltd.

Portions of this software and related documentation are copyrighted by and are the property of Electronic Data Systems Corporation.

Other portions of GibbsCAM are licensed from GibbsCAM licensors, which may not be listed here.

Contents

INTRODUCTION 5

Definitions 5

SOLIDS IMPORT 7

Working With Bodies 7

Solids 7
Sheets 7
Workspace 7
Floating Toolbar 7
Commands Palette 8
Solid Modeling Palette 8
Body Menu Items 9
Edit 9
Modify 10
Context Menus 11
Body Context Menu 11
Face Selection Mode Options 13
Edge Context Menu 14
Properties 15
Body Information 15
Part, Fixture, or Stock 15
Chord Height 16
Physical Properties 16
Multiple Body Properties 17

Body Bag 17

About the Body Bag 18
Body Bag Context Menus 18
Body Bag Context Menu 19
Body Bag Page Context Menu 20
Body Bag Color Display 20
Body Bag Pages 20
Viewing Body Bag Pages 21
Selecting Body Bag Objects 21

Preferences 22

Display Preferences 22
Render Faceting 23

Extracting Geometry from Solids 24

CONVENTIONS 26

Text 26
Graphics 26

LINKS TO ONLINE RESOURCES 27

INDEX 28

Introduction

You use Solids Import to read files that contain solid and surface models, make minor modifications to the model, and extract geometry from the model to create machining operations. This resource provides reference and procedural information. For instructional exercises, see *Solids Import Tutorials*.

This resource assumes that you have a basic level of proficiency with geometry creation, coordinate systems, and machining. Advanced CS is not required, but adds more complete functionality to Solids Import. For more information about GibbsCAM, see the *Geometry Creation*, *Mill*, and *Advanced CS* guides.

Definitions

The terms and definitions provided below are used to describe objects and elements used by the system, and throughout this guide.

Body
The term “body” is a generic term that refers to both solids and sheets. A solid body can be thought of as a bowling ball, while a sheet body is more like a balloon with an infinitely thin wall.

Face
A face is one surface of a solid or sheet. A Sheet face includes the positive and negative sides while a solid only includes the positive side. Faces are surfaces that have knowledge of the surfaces that surround them. For example, one side of a cube would be considered a face. Each face is bound by loops. A simple face is bounded by one loop.

Surface
A surface is either a face, group of faces (depending on how the surface was created) of a solid or side of a sheet. Sheets have two surface sides and a solids have only one.

Solid
A solid is a body composed of faces and the area enclosed by the faces. Solids have volume. Solids bodies are used as the building blocks in creating part models in GibbsCAM. Unlike sheets, solids only have a positive side.

Sheet
A sheet is an surface with two sides, positive and negative. A sheet has no volume or thickness associated with it.

Edge
An edge is a curve/line between two faces. An edge of a solid must have exactly two faces connected to it. Note that more than two faces at an edge produces an invalid solid. The edge of a sheet can have a single face connected to that.

Loop
A loop is a series of connected edges that outline a face.

Vertex

A vertex is an endpoint of an edge.

Solids Import

- “Working With Bodies” on page 7
- “Body Menu Items” on page 9
- “Extracting Geometry from Solids ” on page 24

Working With Bodies

A 3D body can be made up of solids or sheets. Bodies can have geometry extracted from them for machining. The Solid Import option allows users to import bodies and machine them without the SolidSurfacer option. In this first section we will discuss the interface items and details of 3D models. In the second section we will discuss the tools to extract geometry to machine the model.

Solids

Solid models have volume. Solids can either be viewed as wireframe drawings but only rendered objects can be selected.

Sheets

Sheets do not have any thickness or volume. A sheet has knowledge of the neighboring sheets that surround it. Sheets may have either one face or several faces. Similar to solids, sheets may also be defined as a part, stock, or fixture. When a surface files is imported, each surface entity is brought in as a single sheet.

Lumps

Each body is either a single conjoined object called a lumps or a disconjoined single object, called a multi-lump body. Multi-lump solids can be separated to create single lump bodies. See the Separate function on the following page.

Workspace

Bodies exist in the workspace or the Body Bag (when visible). Bodies are not contained in workgroups . Bodies are assigned to the coordinate system they were created in.

Floating Toolbar

The Floating Toolbar contains five items that are part of the Solids Import interface. For more detailed information on these Floating Toolbar items, see the Interface section in the *Getting Started* guide.

1. Show Solids
2. Render/Wireframe
3. Indicate Sheet Side
4. Face Selection
5. Edge Selection

Show Solids
This button will show and hide all bodies, including sheets.

Render/Wireframe
Render fully shaded objects or simple wireframe.

Indicate Sheet Side
Indicate the positive and negative sides of a sheet.

Face Selection
Enable/disable face selection mode.

Edge Selection
Enable/disable edge selection mode.

Commands Palette

Two buttons in the Commands palette are part of the main functionality of Solid Import. The Surface and Solid Modeling palettes help to create and modify bodies and the Body Bag is an organizational container for bodies

Solid Modeling Palette

Click the Solid Modeling button in the Commands palette to open Solid Modeling. All of the modeling functions that are used with solids are accessed from this palette. The Solid Import options allows the use of slicing and separating solids and sheets.

1. Slice
2. Separate

Slice

This function slices selected solids or sheets into separate entities. The slicing entity can either be the current Coordinate System (CS) or a selected sheet. When using a sheet as the slicing tool, the sheet must extend all the way through the target. If a solid and sheet are selected when this button is clicked, the body will be sliced into two separate bodies where the selected sheet intersects the body. Likewise, if two sheets are selected, the first sheet selected will be sliced where the second intersects the first. Slicing a solid with a sheet is a type of Boolean operation; therefore, the sheet will be destroyed or deleted once the slicing operation is complete. The slicing function also works only if a solid or sheet is selected. In that case, the solid or sheet will be sliced with the current coordinate system. It is recommended that slicing operations be performed as early in the modeling process as possible due to the fact that coordinate systems and planes act as very big (potentially infinite) knives when slicing and may unintentionally slice other entities.

Separate

This function will separate a selected multi-lumped bodies.

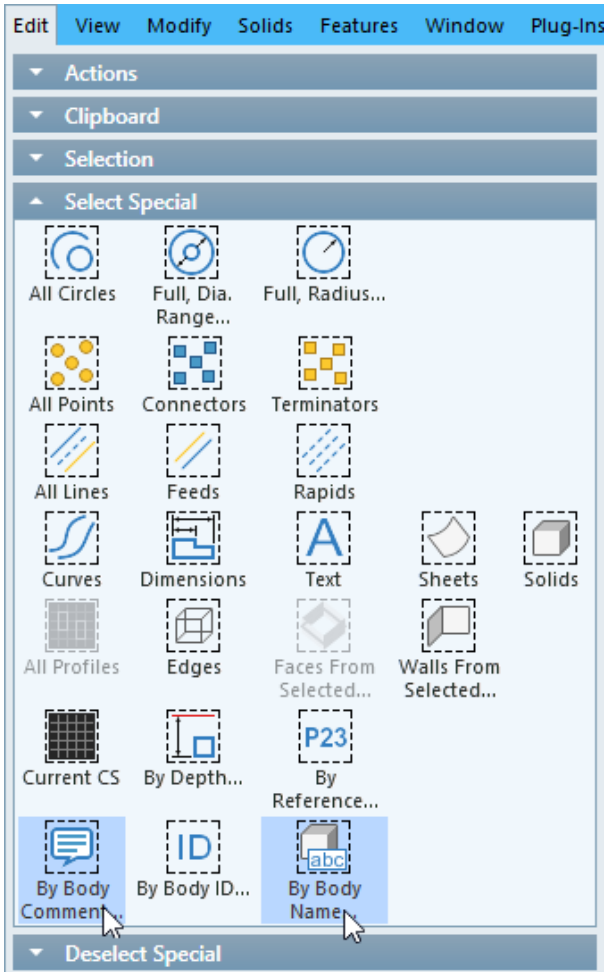
Body Menu Items

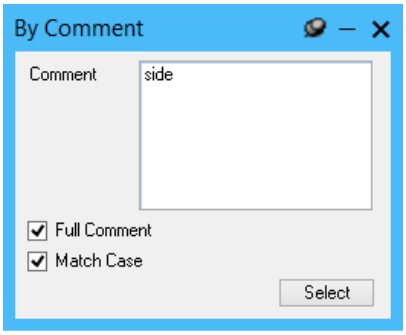
- Edit on page 9
- Modify on page 10

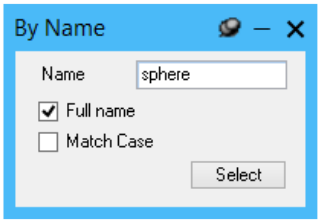
Edit

Select Special

The Select Special sub-menu contains items that enable you to limit your selections to only certain items. The Walls From Selected command selects all faces that are tangent to the selected edges and perpendicular to the current CS. By Body Name and By Body Comment allow selection of bodies by name or comment in their respective dialogs.





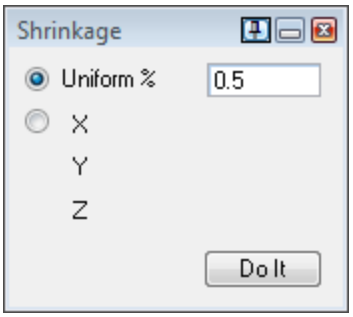


Deselect Special

The Deselect Special menu contains similar items to the Select menu but acts by deselecting (instead of selecting) entities.

Modify

Shrinkage:



Shrinkage compensates for the rate at which an injection substance shrinks in a mold cavity. It performs a uniform or axial reduction or enlargements on selected solids. The range of shrinkage is -10% to 10%. Shrinkage can also be applied differently in each axis.

```
FINAL SIZE = (100 - SHRINKAGE%) * START SIZE /100
```

Toggle Sheet Side:

This item is useful when solidifying sheets into solids using the Offset solidify option. When sheets are converted into solids by offsetting, the offset must be calculated

from one side of the sheet or the other. The Max and Min offset values are referenced from one side of the sheet. To offset the sheet from the other side, select the sheet and then select the Toggle Sheet Side item.

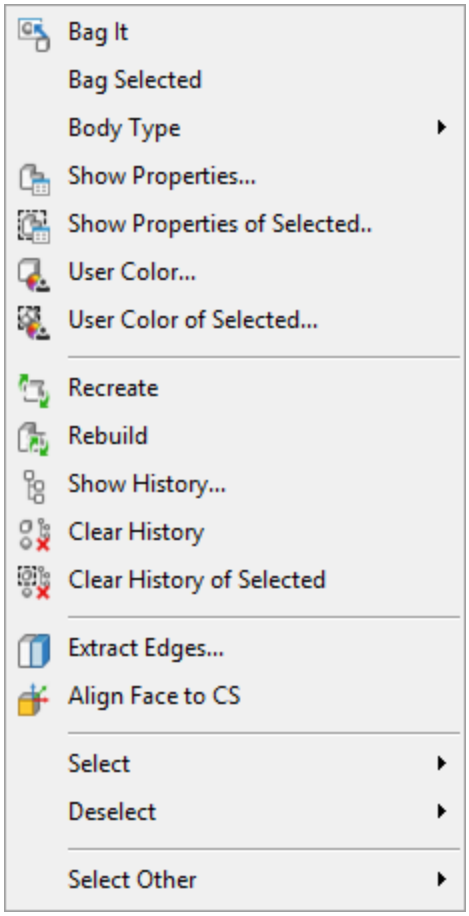
Context Menus

You can access context menus by right-clicking on a body or edge.

- "Body Context Menu " on page 11
- "Edge Context Menu " on page 14

Body Context Menu

To access the body context menu, right-click on a body or history entry.



Bag It/Un-Bag It:
Bag It places a selected body into the Body Bag. If the body is in the Body Bag, Un-Bag It item places it in the workspace. This function does not apply to multiple selections. For multiple selection functions, see "Multiple Body Properties" on page 17.

Bag/Un-Bag Selected:

Moves all selected bodies into or out of the Body Bag.

Body Type

Designate the selected solid as Part, Stock, Fixture, Stock - Display Only, Fixture - Display Only. For more detail on these selections, see "Multiple Body Properties" on page 17.

Show Properties:

Opens the Properties dialog for a solid or sheet. For more information, see "Properties" on page 15.

Show Properties of Selected:

Shows the properties of all currently selected bodies. See "Properties" on page 15 and "Multiple Body Properties" on page 17.

User Color:

Enables custom color display of individual edges or faces. See "Properties" on page 15 and "Multiple Body Properties" on page 17.

User color of Selected:

Change the color of all currently selected faces or bodies. See "Properties" on page 15 and "Multiple Body Properties" on page 17.

Recreate:

The Recreate mode takes the selected body back to its creation action to be modified. The selected body is drawn in red and any changes made will permanently replace the selected body. To cancel Recreate mode, `right-click` a body and choose Exit Recreate or click the red body.

Rebuild:

Reprocesses the History list and incorporates any changes made using Recreate, Swap, or Replace into a new final part model. The Rebuild function is limited in that models cannot be rebuilt if the changes require a significant alteration to the topology. For example, if the change created any new edges, the final model cannot be rebuilt.

Show History:

The History list displays the creation process of the selected body. All bodies used to create the selected body appear in the History list. To restore a dormant body in the History list to the Workspace, double-click the icon in the History list.

Clear History:

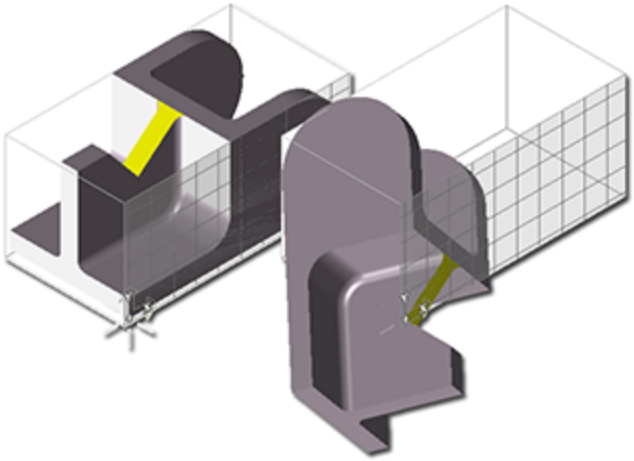
Clears the history of the selected body, essentially turning the solid into an atomic body. You cannot undo this action.

Extract Edges:

Extracts the selected edges and creates geometry from them. Please note this may take some time depending on the amount of geometry selected.

Align Face To CS:

When Face Selection is active, you can choose a face and align it to the current CS. Right-click a face to select this command. Choosing this command orients the part to the CS as if the following steps were taken.



a. Create a new CS from the target CS, that is, the CS you want to align to.

b. Select a planar, cylindrical, or complex face.

c. Select Align Plane Through & Move (right mouse menu choice) or Alt-click the Align CS button. For a cylinder, use Align CS Normal & Move.

d. Apply the Modify CS (XYZ) command to the solid to assign it to the new CS.

e. Select the target CS.

f. Apply the Modify CS (HVD) command to the solid to assign it to the target CS and move it.

g. Delete new CS.

Face Selection Mode Options

The following items for selecting and deselecting faces are only available when the system is in Face Selection mode. These options are useful when multiple faces must be selected for modeling or machining functions, and frees you from having to select one face at a time.

Tangent Faces:

Selects or deselects the target face and all of the faces reachable by a tangency.

Faces Above:

Select/deselect neighboring faces if they have an upper boundary that lies above the upper boundary of the target face. Next it will branch out to the adjoining faces of the neighboring faces and repeat the selection/deselection using the neighbors upper boundary as the condition (rather than the target face). A special condition exists for flat faces that neighbor the target face. They are selected/deselected based on the lower boundary of the target face.

Faces Below:

Select/deselected neighboring faces if they have an lower boundary that lies below the lower boundary of the target face. Then, it will use the adjoining faces boundary and repeat the

selection/deselection. However, adjoining flat faces are selected/deselected based on the upper boundary of the target face.

Floor Faces:

Select/seselect all floor faces connected to the target face. A floor face is approximately normal to the depth axis of the current CS; the approximation is set by the Floor/Wall Angle Tolerance value set in File > Preferences > Interface > Selection.

Wall Faces:

Select or deselect the target face and any connected face that is parallel to the depth of the current CS. Angled walls that fall within the Floor/Wall Angle Tolerance value set in File > Preferences > Interface > Selection are also selected.

3D Faces:

Select/deselect faces connected to the target face that are not defined as a floor or wall. Next it will branch out to the adjoining faces and select/deselect them using the same logic.

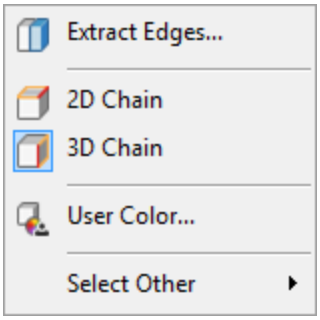
Transition Faces:

Select/deselect all transition faces connected to the target face. A transition face is a smooth blend that is connected to a wall and floor face.

Fillets:

Select/deselect all constant radius fillet faces that are connected to the target face. The target face is also selected. The system only selects fillets that have the same constant radius as the target face if the target face is a fillet.

Edge Context Menu



Right-click a selected edge to access options that affect edge selection. When you double-click an edge, the system tries to build a closed loop of edges starting with the selected edge. The 2D Chain and 3D Chain options affect how the system chooses the next edge to be connected at each vertex.

2D Chain:

When you select this option, double-clicking an edge attempts to select a loop of edges that are planar to the current CS (or those closest to it), resulting in a 2D loop. If there is more than one possible choice for an edge at a vertex, the system chooses the one that is closest to the same direction.

3D Chain:

When you select this option, double-clicking an edge attempts to select a loop of edges that are normal to the current CS (or those closest to it), resulting in a 3D loop.

User Color:

This allows you to assign colors to individual edges.

Select Other:

This displays a list of edges that intersect with the selected. Scroll list to choose. You can also choose the entire solid.

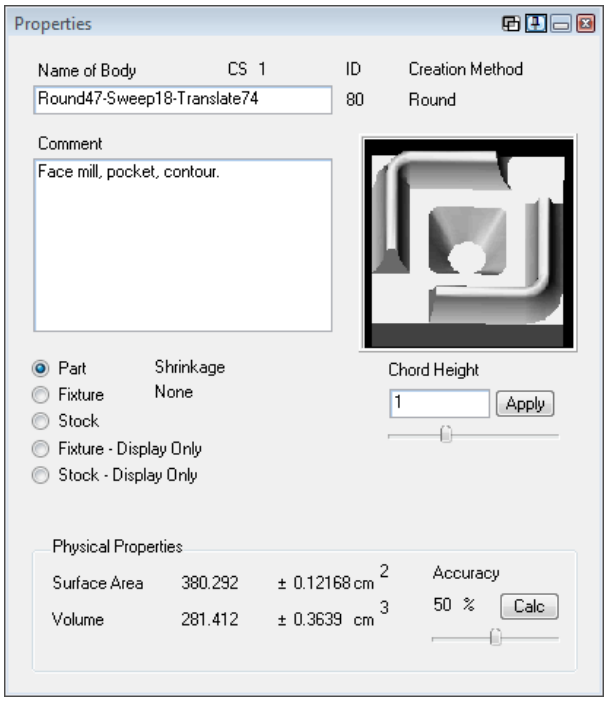
Properties

Body Information

You access the Properties dialog from the body context menu. For more information, see Body Context Menu .

The Properties dialog contains items that apply to the selected body. You can change the name of the solid or sheet and enter a comment. The coordinate system that was last modified for the selected solid or sheet appears at the top of the dialog. The ID is a system-assigned positive integer that uniquely identifies each body. The Creation Method lists the action that was used to create the current body, such as Import, Sphere, Extrude, and so forth.

When the Properties dialog is open, you can select different bodies and the Properties dialog updates to reflect the body selected. You can select bodies in the History dialog to view in the Properties dialog by selecting the cube icon in the History list.



Part, Fixture, or Stock

Solids and sheets can be designated as Part, Fixture, or Stock. Additionally there are the Fixture - Display Only and Stock - Display Only options. When solids and sheets are created, they are designated as a Part by default unless the setting is changed in this dialog. Solids or sheets

designated as a Fixture are rendered in red and are used as constraints when creating machining operations. Solids and sheets designated as Stock are rendered in dark blue and are used as the initial stock condition when creating machining operations.

Fixture-Display Only and Stock-Display Only display a body as a fixture or stock, and are used in rendering, but are not used in the toolpath generation calculation. When any stock or fixture bodies are present, the system may attempt to use 3D toolpath rather than 2D in some cases. The need to account for potentially hundreds of fixture bodies when generating toolpath can slow down system performance. Using Display Only stock and fixtures settings can greatly improve system performance, making this feature very important for TMS.

Chord Height

Chord Height sets the degree of render faceting for the selected solid or sheet. To change the chord height, enter a value and click the Apply button. This value only applies to the selected solid or sheet. For more information, see Render Faceting.

Physical Properties

The Physical Properties section provides surface area calculations for solids and sheets, volume calculations for bodies, and surface periphery calculations for sheets. The Physical Properties section includes an Accuracy slide bar and a Calculate button. The Accuracy slide bar designates the amount of processing time and effort to allocate for the calculations. With the slide bar closer to the negative end of the spectrum, the calculations are less accurate and vice versa. Note that all calculations fall within a certain set range of accuracy, regardless of the setting of the accuracy slide bar.

The percentage values do not directly correlate to the calculation, in that a 0% accuracy still provides a reasonably accurate calculation. The Accuracy setting affects the calculation processing time. As bodies become more complex, the calculation time increases. In those cases, it may be desirable to designate a lower accuracy in order to speed up the process. The system always provides the +/- accuracy tolerance so that you can monitor the accuracy of calculations.

The following are conversion values for taking the volume in cubic inches, as shown in the Properties dialog, to measurements in ounces and liters.

1 cubic inch = 0.55409 oz.

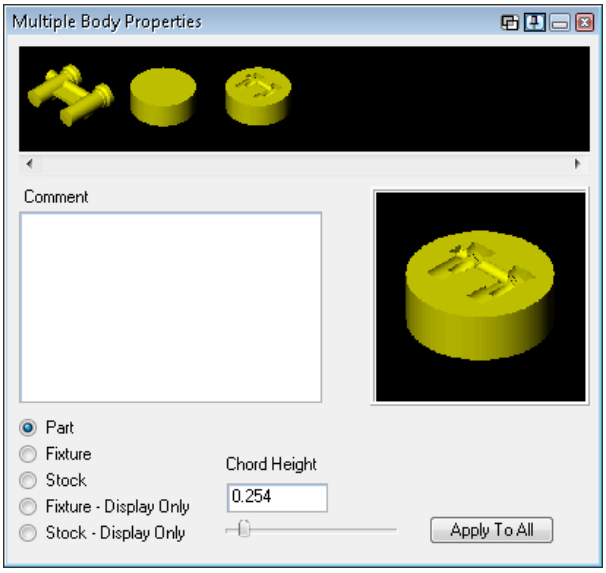
1 oz. = 29.57353 ml

Solid Properties measurements

Multiple Body Properties

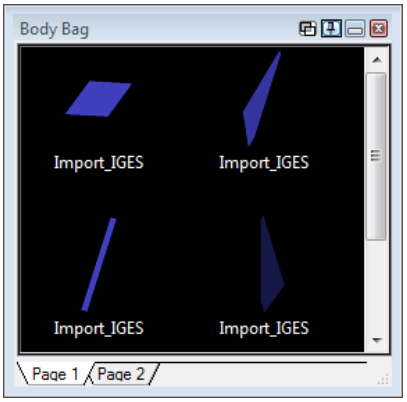
The Multiple Body Properties dialog appears when you select more than one body and then select the Properties command. You use this dialog to assign properties to many bodies at once.

Add or change bodies in the dialog by changing the selection. Quickly set all bodies in the dialog as a Part, Fixture, or Stock type. You can also set the Chord Height and add a Comment. Click Apply To All to apply the new settings to all the bodies in the dialog.



Body Bag

To open the Body Bag window, from the Main palette, click Body Bag. You use the Body Bag to organize the Workspace by storing bodies during part creation. Double-click a body to move it from the Workspace to the Body Bag. To move bodies between the Workspace and the Body Bag, you can also use the Bag It/Un-Bag It and Bag/Un-Bag Selected items. See the “Body Context Menu ” on page 11 and “Body Bag Context Menu” on page 19. Items in the Body Bag are active when the Body Bag is open. For example, you can select, modify, and machine items in the Body Bag. Bodies in the Body Bag appear as icons that you can select, move, and resize.



Resized Icons in the Body Bag

To arrange items in the Body Bag, you can drag the items. To display items in the Body Bag as small icons, large icons, tiles, or as a detailed list, you use the View items. See "Body Bag Context Menu" on page 19. You can also select the information you want to display for the items, such as Solid ID and Solid Creation Method.

About the Body Bag

Items displayed in the Body Bag are icons that include a snapshot of the body when it was moved into the Bag. Moving or resizing the icons does not effect the corresponding bodies. Icons are unaffected by Floating Toolbar buttons such as Show Solids, Render/Wireframe, Indicate Sheet Side, and color modes.

To move a body into the Body Bag:

Double-click the body in the Workspace or right-click the body and choose Bag It from the context menu. The object moves to a Body Bag page. The Body Bag page that the object moves to depends on whether the object previously resided in the Body Bag:

- If the object previously resided in the Body Bag, it moves to the Body Bag page that last contained it, and that page displays.
- If the object did not previously reside in the Body Bag, it moves to the Body Bag page most recently displayed.

To increase or decrease the size of icons in the Body Bag:

Click in the Body Bag and select `CTRL+mousewheel`. The size of icons increases or decreases on all Body Bag pages that are set to display bodies as Large Icons or Tiles. See "Viewing Body Bag Pages " on page 21.

To move an object from the Body Bag to the Workspace:

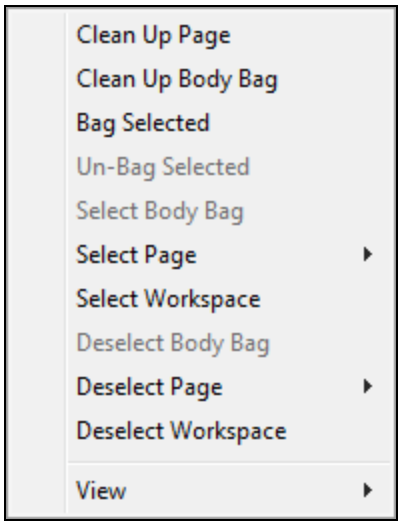
Double-click the object on the Body Bag page. The object displays in the Workspace.

Body Bag Context Menus

You can access the following context menus when working with the Body Bag:

- "Body Bag Context Menu" on page 19
- "Body Bag Page Context Menu" on page 20

Body Bag Context Menu



To access the Body bag context menu, right-click anywhere in the Body bag title area. The Body Bag context menu contains the following items.

Clean Up Page:
Arranges the Body Bag icons on the selected Page so that you can view all icons and none overlap.

Clean Up Body Bag:
Reorganizes the Body Bag icons so that you can view all icons and none overlap.

Bag Selected:
Places any solids or sheets that are selected in the drawing window into the Body Bag.

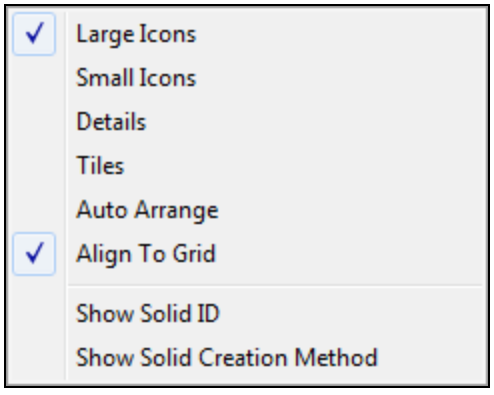
Un-Bag Selected:
Take any selected Body Bag icons and place the solids/sheets back into the drawing window from the Body Bag.

Select/Deselect Body Bag:
Selects or deselects all of the bodies in the Body Bag. You can use this item to isolate problem areas by analyzing surface files.

Select/Deselect Page:
Selects or deselects all the of the bodies on the Page.

Select/Deselect Workspace:
Selects or deselects all entities (including bodies and geometry) in the Workspace. You can use this item to isolate problem areas by analyzing surface files.

View:
Click View to display the following items.



Large Icons:
Display large Body Bag icons.

Small Icons:
Display large Body Bag icons.

Detail:
Display detail list of Body Bag icons.

Tiles:
Arrange Body Bag icons as tiles with Solid or Sheet type, creation method, solid ID, chord height and current CS.

Auto Arrange:
Automatically arrange Body Bag icons so that you can view all icons and none overlap.

Align to Grid:
Align Body Bag icons to a grid.

Show Solid ID:
Show solid ID for Body Bag icons.
Show Solid Creation Method:
Show solid creation method for Body Bag icons.

Body Bag Page Context Menu

To access the Body Bag Page context menu, right-click a Page tab at the bottom of the Body Bag window. See "Body Bag" on page 17. With this menu you can insert delete or rename pages.

Body Bag Color Display

Objects in the Body Bag display in the following colors:

Color	Body Type	Selected or Unselected
Gray	Solid	Unselected.
Light blue	Sheet	Unselected.
Dark blue	Stock	Unselected.
Red	Fixture	Unselected.
Red	Body in "Recreate" mode	Selected.
Yellow	Part (solid or sheet)	Selected.
Striped red/yellow	Fixture	Selected.
Striped gray/black	Stock	Selected.

Note: Regardless of the color preferences you set, objects in the Body Bag display in the colors listed in the table above.

Body Bag Pages

You can add pages to a Body Bag to organize and categorize items in the Body Bag. To access a page, click the tab for that page. To add, delete, and rename pages, you use the "Body Bag Page Context Menu" on page 20. To reorder pages, click and hold a page tab, then drag the tab to the new position.

You can create multiple pages within the Body Bag. Each page maintains its own view settings. When you create a new page, its view settings initially match those of the last-viewed page.

You can move objects from one Body Bag page to another by selecting and dragging to another tab; as the cursor passes over the tab, a preview of the page displays. You can create a new Body Bag page on the fly by dragging a Body Bag selection to an empty area to the right of the rightmost tab.

To insert, delete, or rename a Body Bag page, right-click the corresponding tab. A tab name in gray indicates an empty page. Only empty pages can be deleted.

You can select Clean Up Page from the context menu to perform a one-time Auto-Arrange on the current page without modifying view settings. You can select Clean Up Body Bag from the context menu to delete all empty pages and perform a Clean Up Page on all pages that remain.

Viewing Body Bag Pages

To display or modify the view settings of a page in the Body Bag:

1. Display the page
2. Right-click the Body Bag title bar, and select View.
3. Select the option you want. Refer to the table below to select the appearance you want.

Select	Result
Large Icons or Small Icons	Page displays each body's icon and name only.
Details or Tiles	Page displays each body's icon, name, type (Part, Stock, or Fixture), resolution (chord height), and CS (coordinate system).
Align to Grid	Icons or tiles are prevented from overlapping.
Auto-Arrange	Overlapping and empty slots are prevented. An icon or tile's location on the page depends on the Body Bag window size: Icons move to fill the top row from left to right, then the next row, if necessary, and so forth.

Selecting Body Bag Objects

Selection sets can include bodies in one, some, or all Body Bag pages, and can include or exclude Workspace items.

To select a body and deselect all others, click the body.

To add or remove a body in the selection set, `Ctrl+click` the body.

To select all objects in the Workspace and the currently displayed Body Bag page, from the Edit menu, click Select All.

• Edit > Select menu items (and Ctrl+A) operate on bodies in the Workspace and the currently displayed Body Bag page only.

• Edit > Deselect menu items and Edit > Invert Selection operate on all bodies, that is, the Workspace and all Body Bag pages combined.

To select or deselect objects in all pages, right-click the Body Bag title bar and use context menu items Select Body Bag or Deselect Body Bag.

To add all of a bodies on a page to a selection set, from the Body Bag context menu, click Select Page to specify the page. To remove all of a page's bodies from a selection set, use context menu Deselect Page to specify the page. You cannot select or deselect empty pages.

Context menu items such as Bag Selected or Show Properties of Selected or User Color of Selected operate on all objects in the selection set.

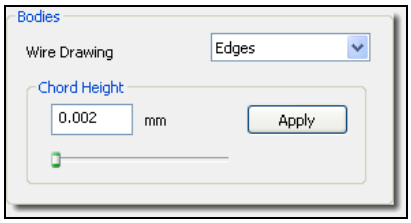
Preferences

To access GibbsCAM preferences:

From the File menu, select Preferences.

This topic describes items on the Display tab that affect the graphic display of solids and sheets. To view display preferences, click the Display tab. You can adjust the degree of faceting during render operations. See “Render Faceting” on page 23.

You can display bodies as rendered solid objects or as wireframe drawings. The Render/Wireframe button in the Floating toolbar determines whether solids and sheets are rendered as objects or wireframe drawings. The Wire Drawing setting defines whether it displays edges or facets of bodies. For more information about Preferences, see the *Common Reference* guide.

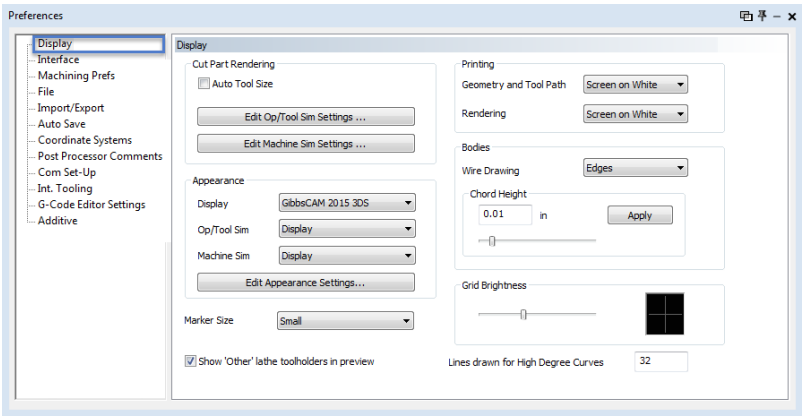


Display Preferences

To access GibbsCAM preferences:

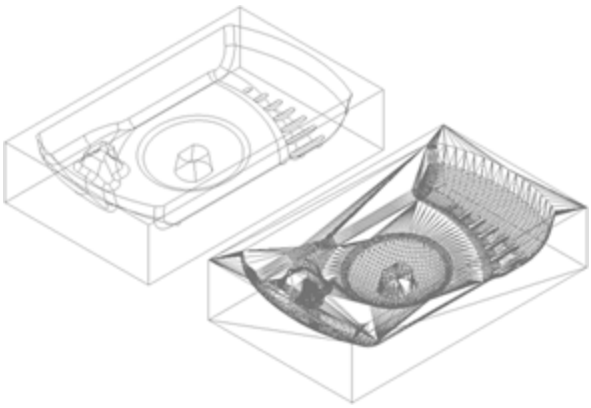
From the File menu, select Preferences.

This topic describes items on the Display tab that affect the graphic display of solids and sheets. For more information about Preferences, see the *Common Reference* guide.



Wire Drawing:

Solids and sheets can be displayed as rendered solid objects or as wireframe drawings. The Render/Wireframe button in the Floating Toolbar determines whether solids and sheets will be rendered objects or wireframe drawings. This setting lets you determine whether the system displays edges or facets of solids or sheets depending on the selection made in the Wire Drawing section.



Chord Height:

Enter the overall part chord height. The chord height determines the faceting resolution when solids and sheets are rendered. Click the Apply button to finalize the change to the faceting tolerance for selected bodies, as well as setting the value for new bodies to be created in the future. For more information on setting the Chord Height, see "Render Faceting" on page 23.

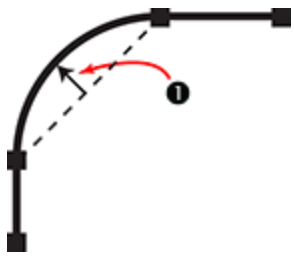
Render Faceting

Rendering is the process of displaying a picture of a model on the screen. When bodies are rendered, they are faceted. Facets are small planar surfaces that compose the rendered model. The more facets drawn, the closer the model resembles the actual mathematical model and the more time it takes for the system to render the model. Faceting affects the quality of the rendered bodies. It also affects overall system performance and speed. The faceting chord height should be set at a value that balances the quality of the model with system performance.

Note: The faceting tolerance does not affect on machining tolerances, only on the rendered image on the screen.

The tolerance used for surface machining is set locally in the Process dialogs Solids tab > Advanced Settings dialog and is labeled as the Cutting Tolerance and globally in the Document Control dialog as Use Global settings for Solids > Part Rough Tolerance. It is this specification which designates how closely the toolpath will follow the surface.

The number of facets used to render a model is determined by the chord height. A chord is a straight line that joins any two points on an arc or circle. The chord height is the distance from the chord to the arc or circle (see figure below). The smaller the chord height, the closer the facet will be to the arc or circle, resulting in a better rendered image of the solid or sheet (this is a 2D description of chord height; the system uses a 3D chord height for the faceting of solids and sheets, but the general idea is the same).



1. Chord Height

Chord Height

The system uses a global faceting chord height which is applied to the entire part model. The global chord height is applied to all solids and sheets that are created or imported.

To set the global chord height:

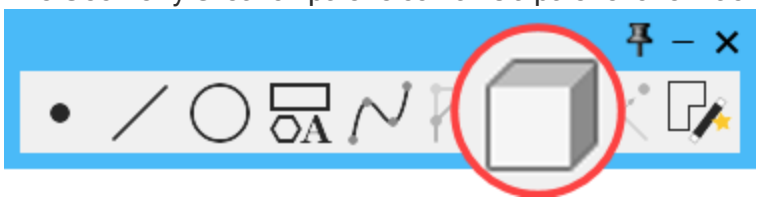
1. Click File > Preferences. The Preferences dialog appears.
2. Click the Display tab.
3. Under Chord Height, type a number in the text box or drag the slider to change the value.

You can set a different faceting chord height to individual solids and sheets. The Properties dialog, accessed by right-clicking on a solid or sheet, contains a chord height value which will only be used to facet the selected solid or sheet. For more information, see Properties.

Extracting Geometry from Solids

Geometry from Solids

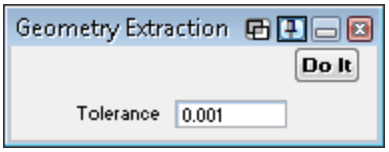
The Geometry Creation palette contains a palette for extracting edges and holes:



1. Geometry Extraction
2. Hole Extraction

Geometry Extraction

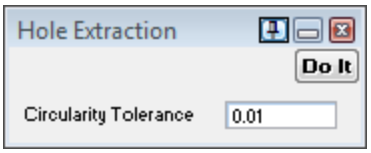
Extracting geometry from selected faces or edges of a body is based on a Tolerance. Connected shapes will be created if the selected edges create a closed loop. Click Do It in the Geometry Extraction dialog to create the geometry.



Tolerance

If a resulting spline can be converted to lines or circles within the tolerance, it will be converted. A large tolerance value will convert more of the edge splines to lines and circles, while a tight tolerance will keep the entities as they are defined in the part model. A tolerance of zero is recommended when extracting geometry that is definitely a circle or a line.

Hole Extraction



To create a circle from a hole in a body based on the Circularity Tolerance, select the inner face of the hole or select the entire model to extract all holes that can be defined in the current CS.

When using this function, either a solid or sheet can be selected and the system will scan the faces of the selection and find all holes. A hole must have walls which are perpendicular to the current CS. Additionally, the edge loop of the hole must be either a circle or a spline; it cannot be a polyline (line segments approximating a circle). When hole extraction is performed, the resulting geometry will all be circles. Any hole edge loops which are splines but fall within the Circularity Tolerance specified will be extracted as circles. Edge loops which are splines that do not approximate a circle within the given tolerance will not be extracted. The depth of the extracted geometry will be based on the bottom of the hole(s), making it easy for the user to determine the depth for the drilling operation.

Conventions

GibbsCAM documentation uses two special fonts to represent `screen text` and `keystrokes or mouse actions`. Other conventions in text and graphics are used to allow quick skimming, to suppress irrelevancy, or to indicate links.

Text

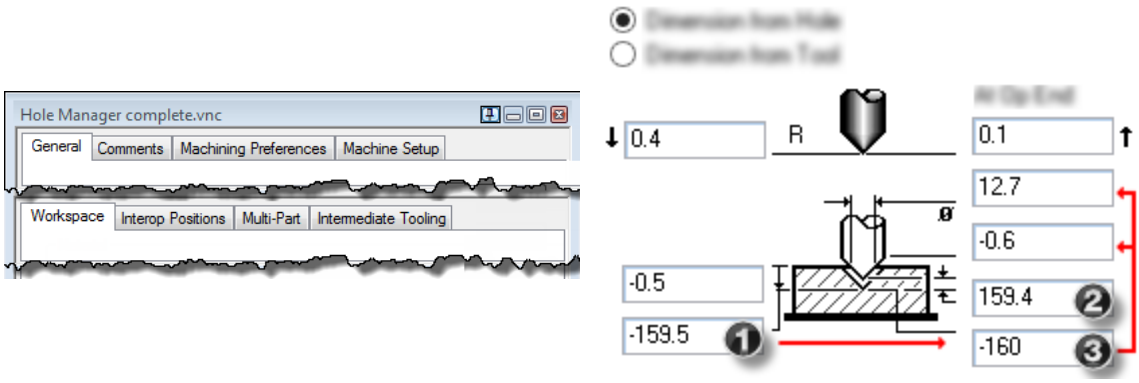
`Screen text`. Text with `this appearance` indicates text that appears in GibbsCAM or on your monitor. Typically this is a button or text for a dialog.

`Keystroke/Mouse`. Text with `this appearance` indicates a keystroke or mouse action, such as `Ctrl+C` or `right-click`.

`Code`. Text with `this appearance` indicates computer code, such as lines in a macro or a block of G-code.

Graphics

Some graphics are altered so as to de-emphasize irrelevant information. A “torn” edge signifies an intentional omission. Portions of a graphic might be blurred or dimmed to highlight the item being discussed. For example:



Annotations on a graphic are usually numbered callouts (as seen above), and sometimes include green circles, arrows, or tie-lines to focus attention on a particular portion of the graphic.

Faint green borders that outline areas within a graphic usually signify an image map. In online help or a PDF viewer, you can click a green-bordered area to follow the link.

Links to Online Resources

Link	URL	Action / Description
Go	http://www.GibbsCAM.com	Opens the main website for GibbsCAM.
Go	https://online.gibbscam.com	Opens a restricted website containing materials available for download. Requires a GibbsCAM Online Services account; to set up an account, contact GibbsCAM Support.
Go	https://store.GibbsCAM.com	Opens the website for the GibbsCAM Student Store.
Go	https://macros.gibbscam.com	Opens a wiki containing documentation and examples of GibbsCAM macros. Requires a GibbsCAM account.
Go	http://kb01.GibbsCAM.com	Opens a Knowledge Base article, **Contour Operations Using Thread Mill Tools**, that explains in detail the correct way to program Contour processes using Thread Mill tools.
Go	mailto:Support@gibbscam.com	Runs your email client to create a new message addressed to the CAMBRIO Technical Support department for GibbsCAM.
Go	mailto:Registration@gibbscam.com	Runs your email client to create a new message addressed to the CAMBRIO Registration department for GibbsCAM.
Go	mailto:Sales@gibbscam.com	Runs your email client to create a new message addressed to the CAMBRIO Sales department for GibbsCAM.
Go	http://www.autodesk.com/inventor	Opens an external website that provides more information on Autodesk Inventor products.
Go	http://www.celeritive.com	Opens an external website that provides more information on VoluMill Ultra High-Performance Toolpath (UHPT) from Celeritive Technologies.
Go	http://www.predator-software.com	Opens an external website that provides more information on a CNC editor and a virtual CNC viewer from Predator Software, Inc.

Index

2

2D Chain 14

3

3D Chain 14-15

3D Faces, Body Select context item 14

A

Advanced Settings 23

Align Face To CS
- Body context menu 13

Align to Grid 19

Arranging items, Body Bag 18

Atomic Body 12

Auto Arrange 19

B

Bag It 17
- Body context item 11

Bag Selected 12, 17, 19

Bodies
- comments 15
- naming 15

Body 8
- definition of 5

Body Bag 7, 19
- arranging items 18
- button 8
- clean-up 20
- detailed list 18
- icons 18
- List 18
- pages 20
- selecting bodies 21
- Tiles 18

Body Bag context menu
- Bag Selected 21
- Deselect Page 21
- Select Page 21
- Show Properties of Selected 21
- User Color of Selected 21

Body Bag objects
- colors 20

Body Bag page
- context menu 20

Body Bag pages
- adding 20
- arranging objects 20
- clean-up 20
- deleting 20
- inserting 20
- moving objects 20
- renaming 20
- view settings 20-21

Body Type 12

Boundary 13

C

Chord height
- faceting 24

Chord Height 16-17, 23
- global setting 24

Circularity Tolerance 25

Clean Up Body Bag 19

Clear History 12

Colors
- Body Bag objects 20

Comments
- bodies 15

Coordinate Systems 7

D

Deselect 10
- Body Bag 19
- Tangent Faces 13
- Wall Faces 14
- Workspace 19

Detail 19

Display preferences 22
- setting 22
- viewing 22

Dormant Bodies in History 12

E

Edge 8
- definition of 5

Edge Drawing 23

Edge Loop 14, 25

Edge Selection
- 2D & 3D 14

Edit menu
- Deselect 21
- Invert Selection 21
- Select All 21

Enlarge Solid 10

F

Face 8
- definition of 5

Face Selection 13

Faces Above, Body Select context item 13

Faces Below, Body Select context item 13

Facet Drawing 23

Faceting
- chord height 24

Faceting Tolerance 23

Facets 23-24

Fillets, Body Select context item 14

Fixture
- Display Only 15

Fixtures
- designating body as 15, 17

Flat Face 13

Floor Faces, Select
- Body context menu 14

Floor/Wall Angle Tolerance 14

G

Geometry
- From Solids 24

Geometry Extraction 24

Graphics Preferences 22

H

History 12

History list 12

Hole Extraction 25

I

Icons, Body Bag 18

L

Large Icons 19

List, Body Bag 18

Loop
- definition of 5

Lower boundary 13

M

Main palette 8

Multi-lump bodies 9

Multiple properties dialog 17

N

Naming Bodies 15

Neighboring faces 13

O

Object colors
  Body Bag 20
Offset
  Solidifying 10

P

Page tab, Body Bag 20
Pages, Body Bag 20
Palettes
  Main (Top level) 8
Part, body definition 15
Part, designating body as a 17
Physical Properties of a solid 16
Preferences
  display 22
  setting 22
  viewing 22
Properties
  Body context menu 12
Properties dialog 15-16, 24

R

Rebuild Body 12
Recreate Body 12
Red Body 12
Reduce size of solid 10
Render Shaded Objects 8
Render/Wireframe button 22-23
Rendering of bodies 23

S

Select
  Body Bag 19
  Tangent Faces 13
  Wall Faces 14
  Workspace 19
Selecting
  By Body Comment 9
  By Body Name 9
  edges 14
  Walls From Selected Edges 9
Separate function 9
Sheet 8
  definition of 5, 7
  Toggle Side 10
Sheet Side 8
Show Properties of Selected 12-13
Show Solid Creation Method 20
Show Solid ID 20
Show Solids 8
Shrinkage 10
Slice function 9
Small Icons 19
Solid
  definition of 5
  Definition of 7
Solid Modeling 8
Solid Modeling palette 8
Solids Button 8
Splines 25
Stock
  designating body as 16
  Designating body as 15, 17
  Display Only 15
Surface
  Definition of 5
Surface Area, calculating 16
Surface Machining Tolerance 23
Surfaces button 8

T

Tab, Body Bag page 20
Tangent Faces
  Body Select context item 13
Target Face 13
Taskbar 7
Tiles 19

Tiles, Body Bag 18
Top Level palette 8
Transition Faces, Body Select context item 14

U

Un-Bag It 17
  Body context item 11
Un-Bag Selected 17, 19
Upper boundary 13
Use Global Settings for Solids 23

V

Vertex 14
  definition of 6
View 19
View items, Body Bag 18
Volume, calculating 16

W

Wall Faces, Body Select context item 14
Wire Drawing 23
Wireframe View 8
Workgroups 7
Workspace 7