



Chapter 2

ANSYS DesignModeler

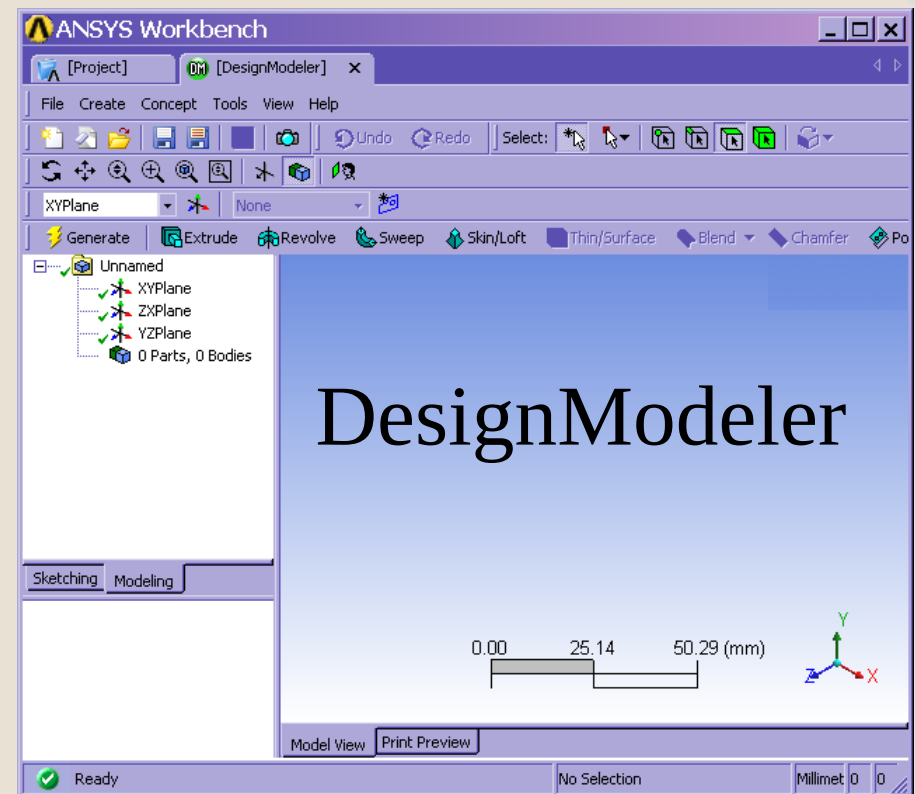
User Interface

DesignModeler Overview



Training Manual

- *DesignModeler* (DM) is a component of ANSYS Workbench.
- A CAD-like modeler with analysis modeling goals:
 - Performs unique geometry modification capabilities for simulation:
 - Feature Simplification
 - Enclosure Operation
 - Fill Operation
 - Spot Welds
 - Split Surfaces
 - Surface Model Extraction
 - Planar Body Extraction
 - Beam Modeling

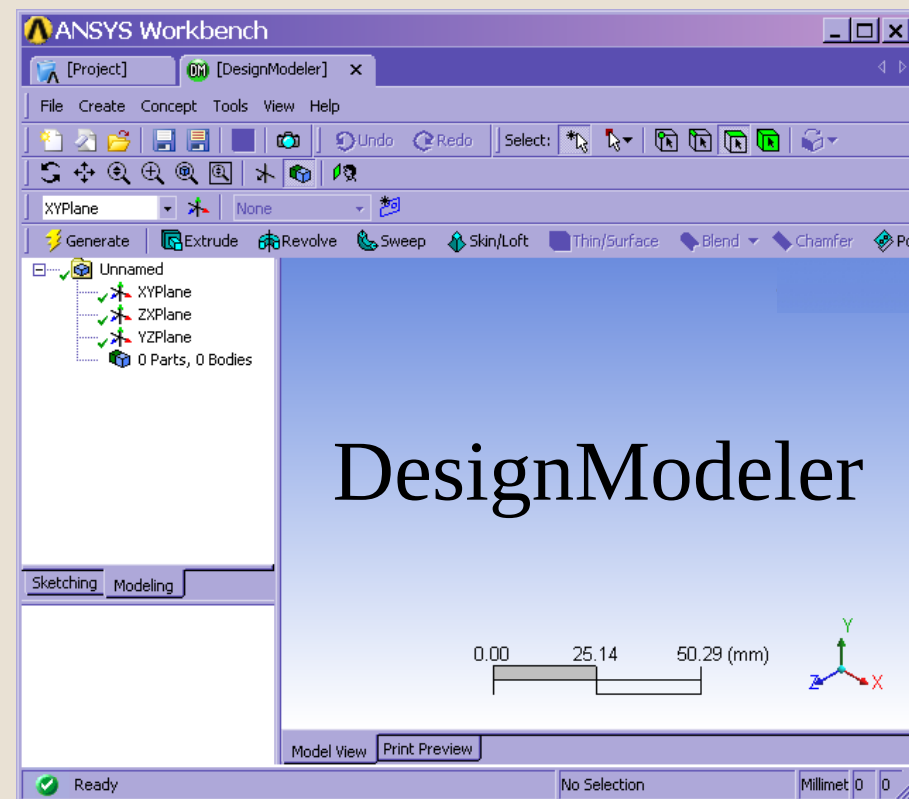


DesignModeler Overview



Training Manual

- Contains parametric modeling capability:
 - 2D Sketcher with Dimensions and Constraints
- Integrates directly with Ansys Workbench modules
 - *Simulation*
 - *Meshing*
 - *Advanced Meshing (ICEM)*
 - *DesignXplorer*
 - *BladeModeler*

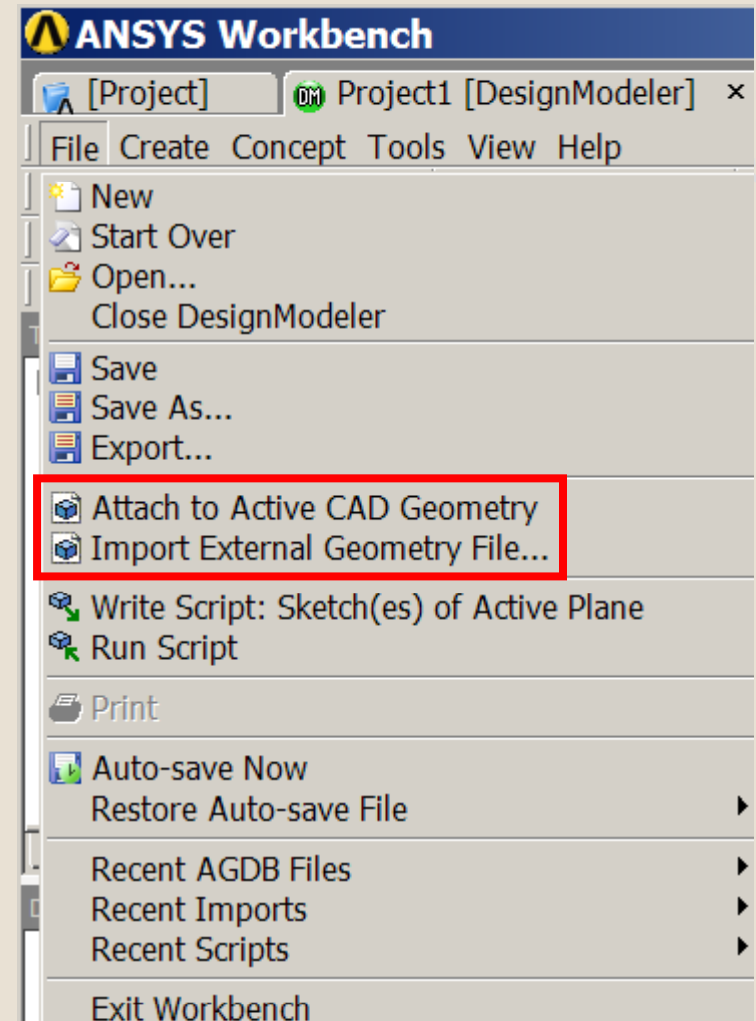


DesignModeler and CAD Files



Training Manual

- A DesignModeler session can begin with CAD geometry:
 - File > Attach to Active CAD Geometry:
 - Detects and imports current CAD model from open CAD system
 - *Plug-in* mode (Bi-directional)
 - File > Import External Geometry File . . .
 - Browse to and open neutral geometry files (Parasolid, SAT, etc.)
 - *Reader* mode
 - Import options include:
 - Body type (solid, surface, all)
 - Simplification
 - Geometry: turns NURBs into analytic geometry if possible
 - Topology: merges duplicate entities
 - Clean/Heal: attempts to repair incomplete or poorly defined geometry

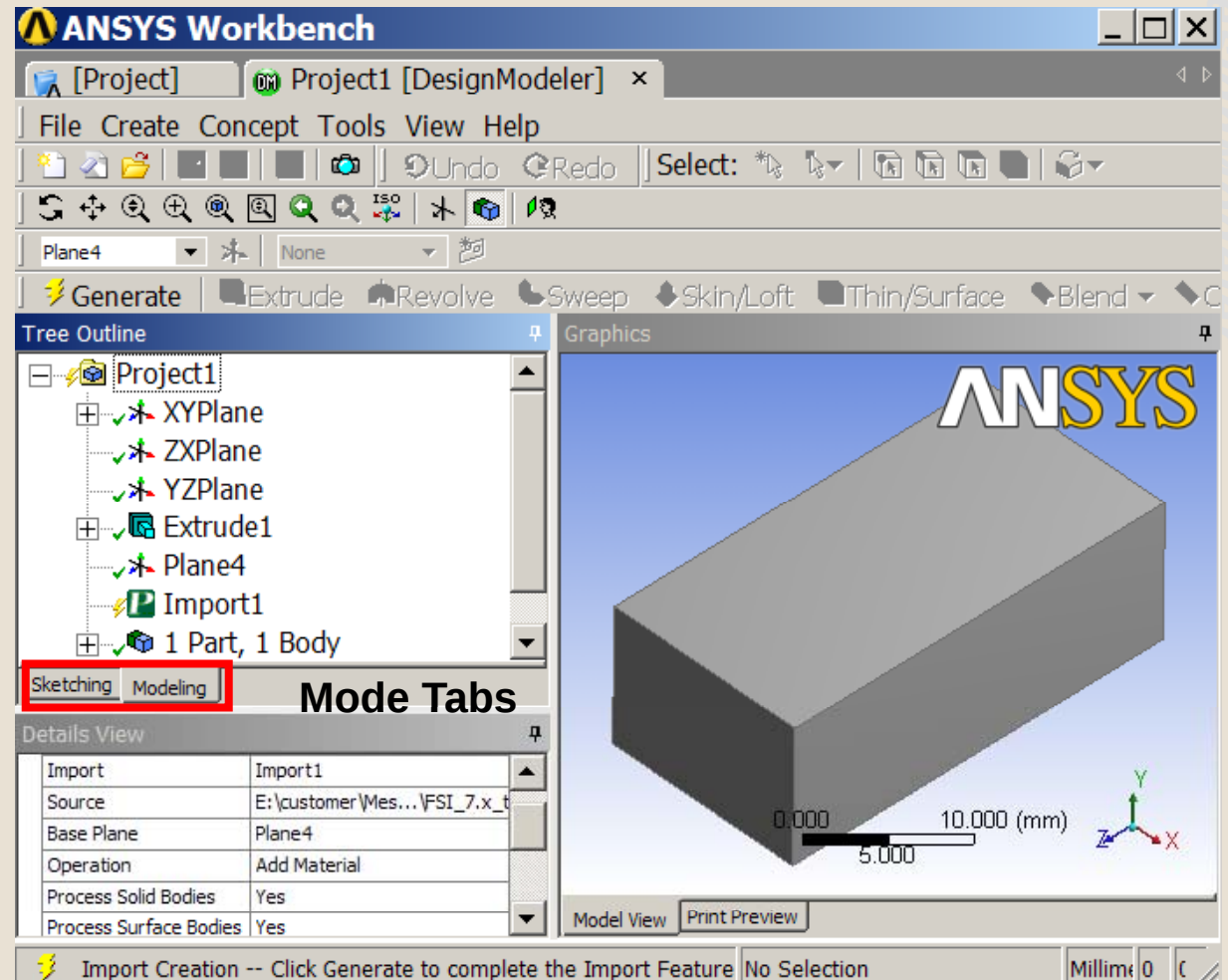


DesignModeler GUI Overview



Training Manual

- GUI Layout:
 - The menus and toolbars accept user input and commands
 - Tool bars can be “docked” and re-sized to meet user’s preference
- Two Basic Modes of Operation
 - Sketching tab (2D)
 - Modeling tab (3D)



DesignModeler GUI Overview



Training Manual

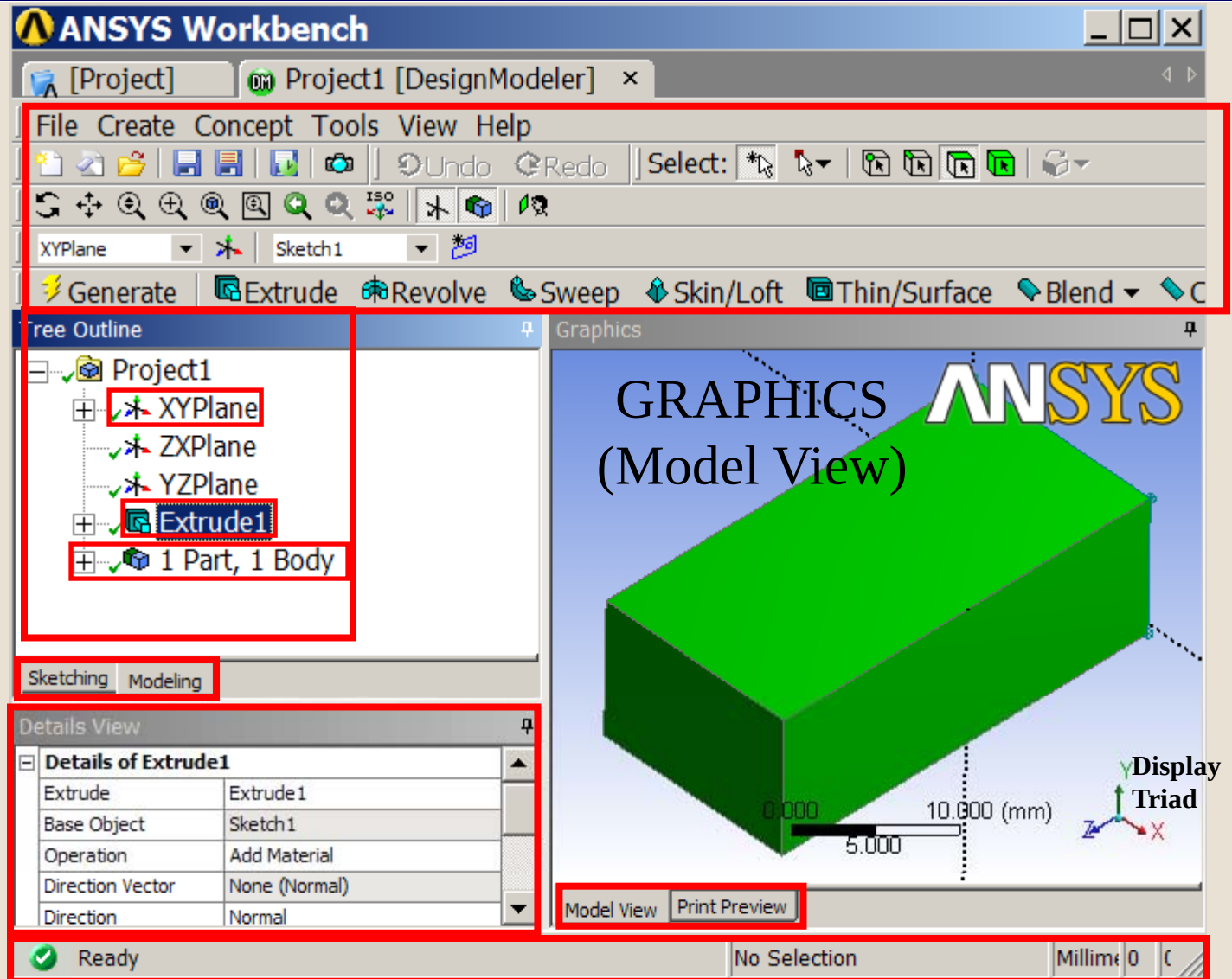
Menus,
Toolbars,
Pull-down
Lists

Tree Pane
(includes
planes,
features,
operations,
bodies, etc.)

Mode Tabs

Details
Pane

Status/Info Bar

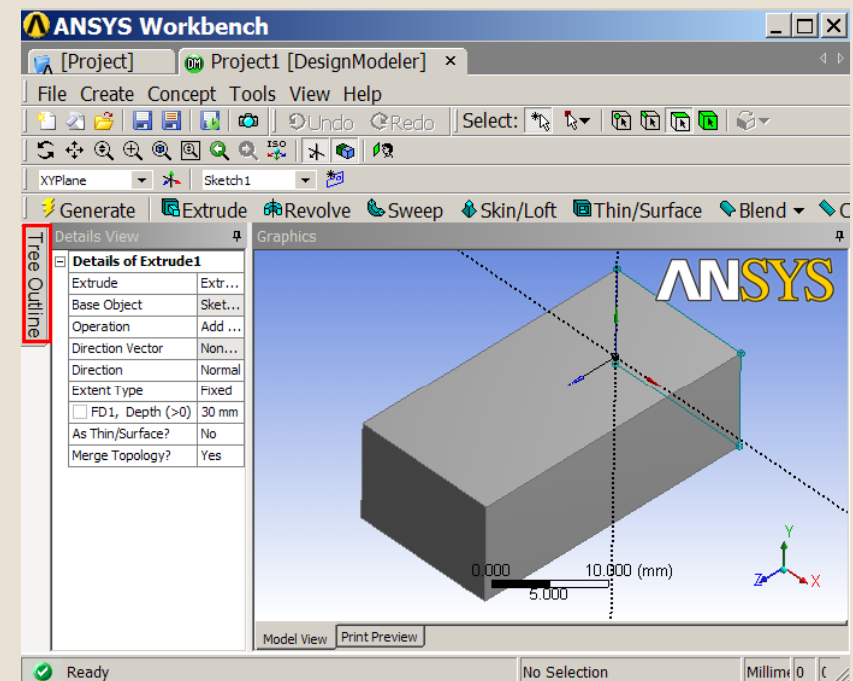
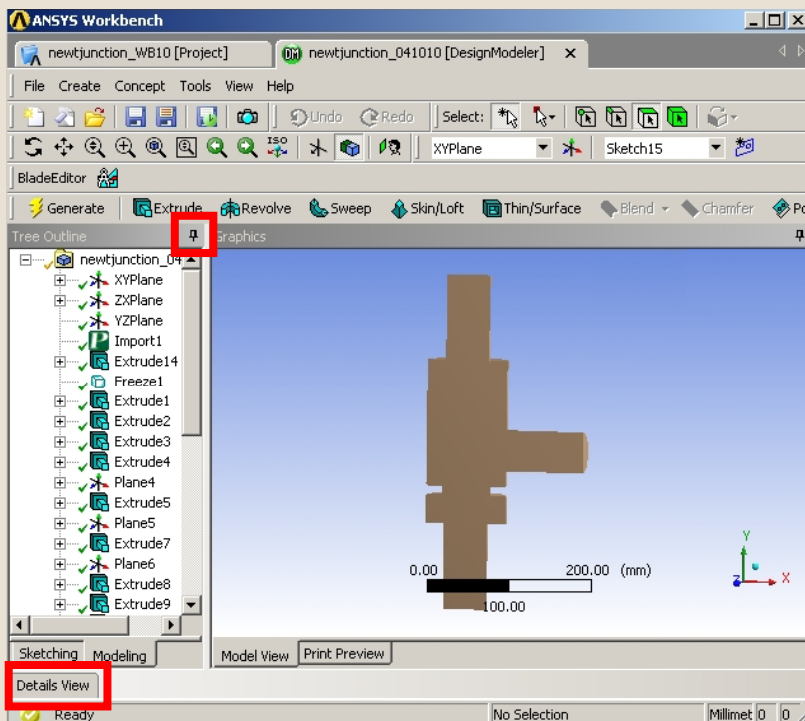


Workbench Window Manager



Training Manual

- Allows users to configure the individual panes as required
 - Move and resize panes
 - Tab Docking
 - Auto Hiding
- Auto Hiding
 - Panes are either *pinned*  or *unpinned* 
 - An unpinned tab collapses when inactive

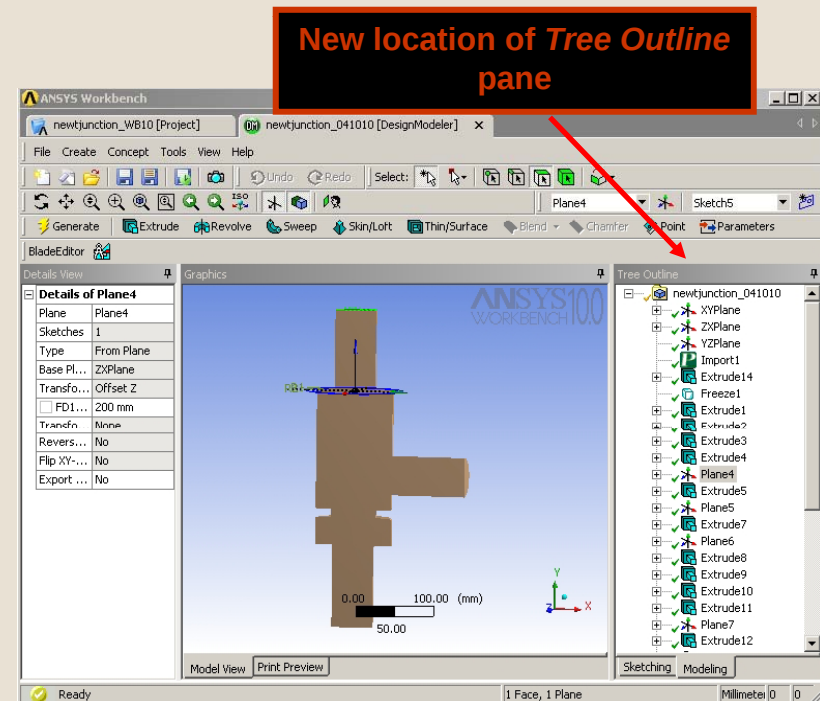
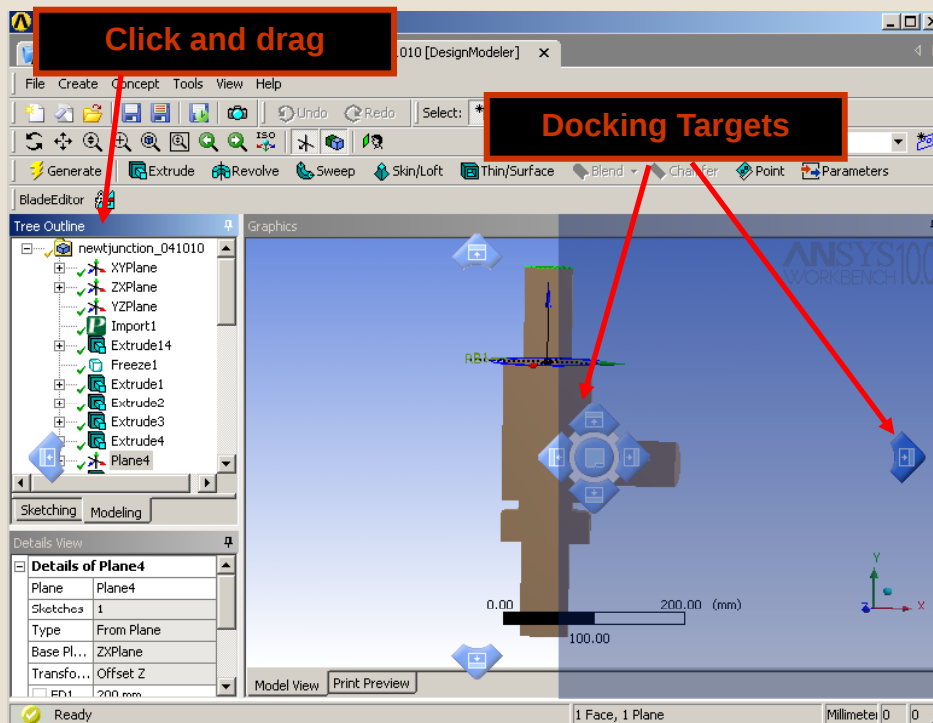


Workbench Window Manager



Training Manual

- Moving and Docking
 - Drag a title bar to move a pane (select with left mouse button and drag)
 - Drag a tab to 'undock' a pane
 - Use the docking targets to preview the resulting location of the pane
 - Release the mouse button over a target to place or dock a pane

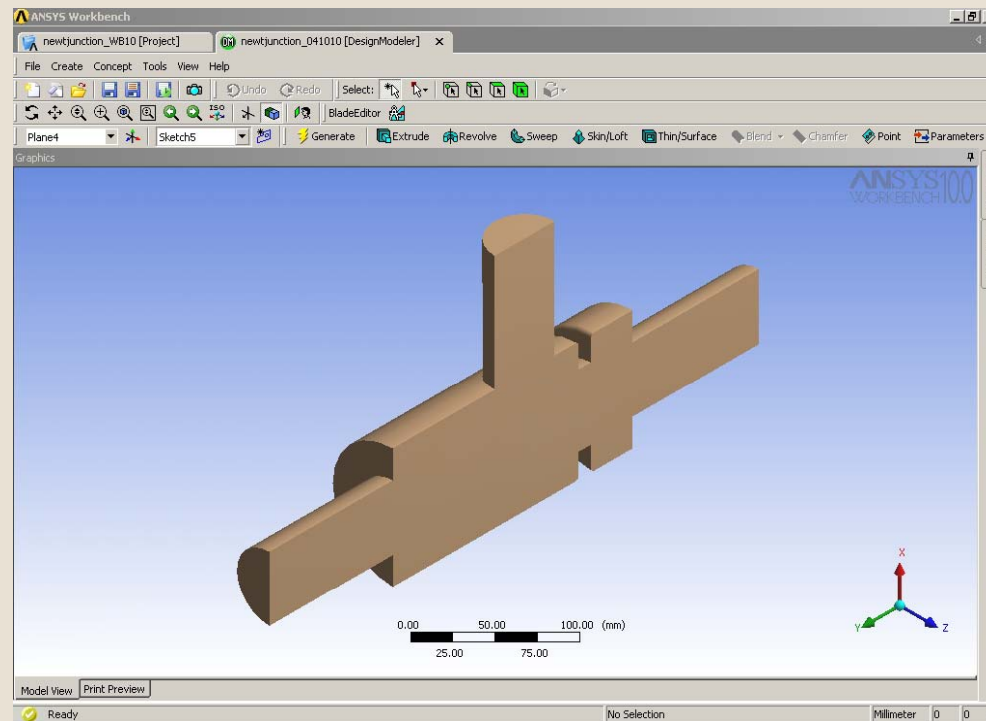


Workbench Window Manager



Training Manual

- Restoring Original Layout
 - Use the “*Windows>Reset Layout*” from the *View* menu
- ‘Window Management’ available in *Simulation* and *Meshing*
- Efficient use of the workspace
- Enables ease of use and intuitive operation

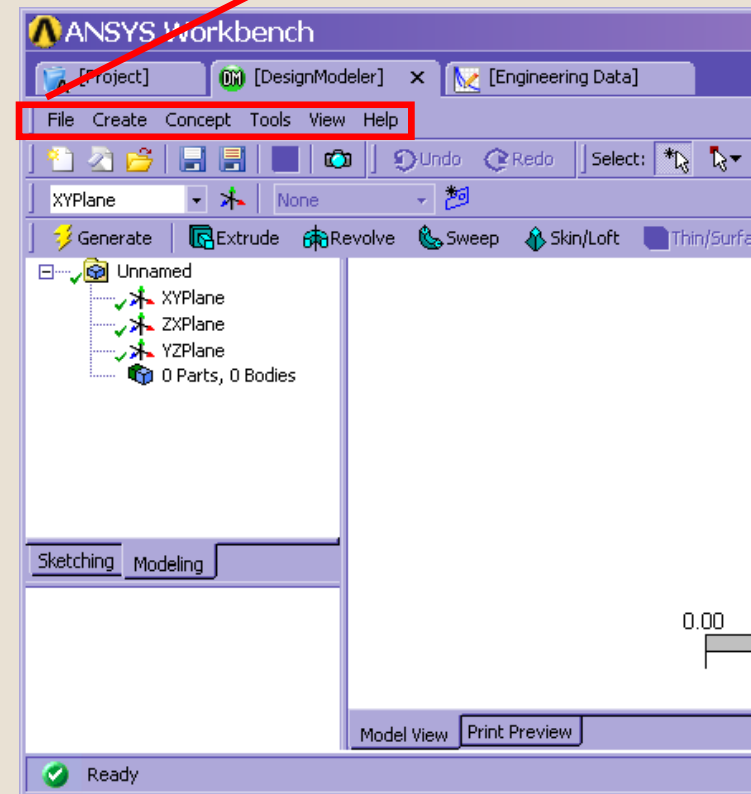


DesignModeler Main Menu



Training Manual

- Main menu:
 - File: basic file operations
 - Create: 3D creation and modification tools
 - Concept: Tools to create line and surface bodies
 - Tools: global modeling operations, parameter management, program customization
 - View: modify display settings.
 - Help: access documentation

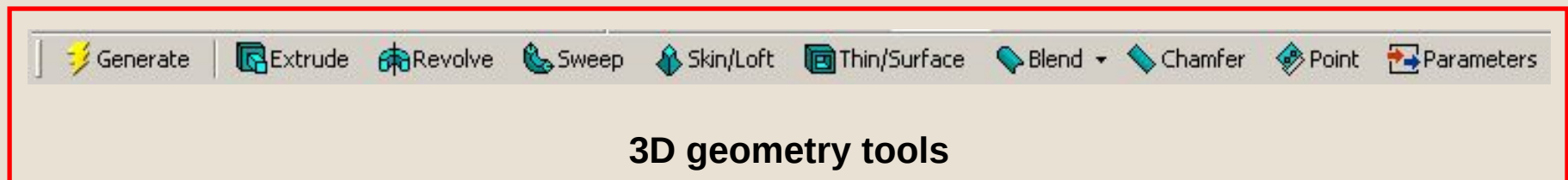
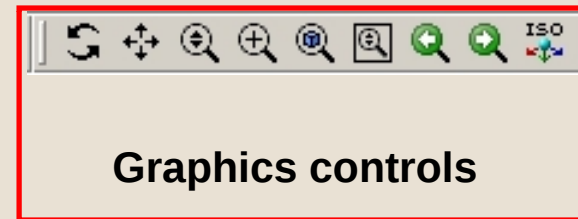
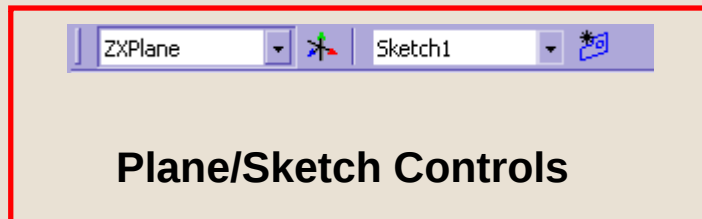
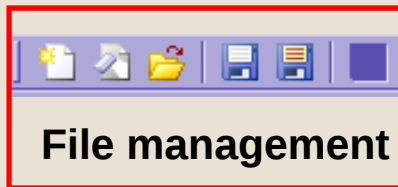


Details for each topic are covered in later sections

DesignModeler Toolbars



Training Manual



Details for each topic are covered in later sections

DesignModeler Documentation



Training Manual

- On-Line Help
- Copyright and Support Info

The screenshot displays the ANSYS DesignModeler 11.0 documentation interface. A red arrow points from the 'Help' menu item in the top right corner to the 'Release 11.0 Documentation for ANSYS Workbench' window. Another red arrow points from the 'About ANSYS DesignModeler™ 11.0' window to the 'Help' menu item. The 'Release 11.0 Documentation for ANSYS Workbench' window shows a table of contents with links to various help topics. The 'About ANSYS DesignModeler™ 11.0' window displays copyright information and software build details.

Help

- ANSYS DesignModeler Help
- Expert Search
- Installation and Licensing Help
- About ANSYS DesignModeler

Release 11.0 Documentation for ANSYS Workbench

Hide Back Print Options

Contents Index Search Favorites

- Release 11.0 Documentation for ANSYS Workbench
 - Release Notes
 - Getting Started with ANSYS Workbench
 - DesignModeler Help**
 - BladeModeler Help
 - Meshing Help
 - CFX-Mesh Help
 - Simulation Help
 - Engineering Data Help
 - FE Modeler Help
 - ANSYS AUTODYN Help
 - DesignXplorer Help
 - Verification Manual
 - Installation and Licensing Documentation

ANSYS Release 11.0 Documentation for ANSYS Workbench

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About ANSYS DesignModeler™ 11.0

DM ANSYS DesignModeler™ 11.0

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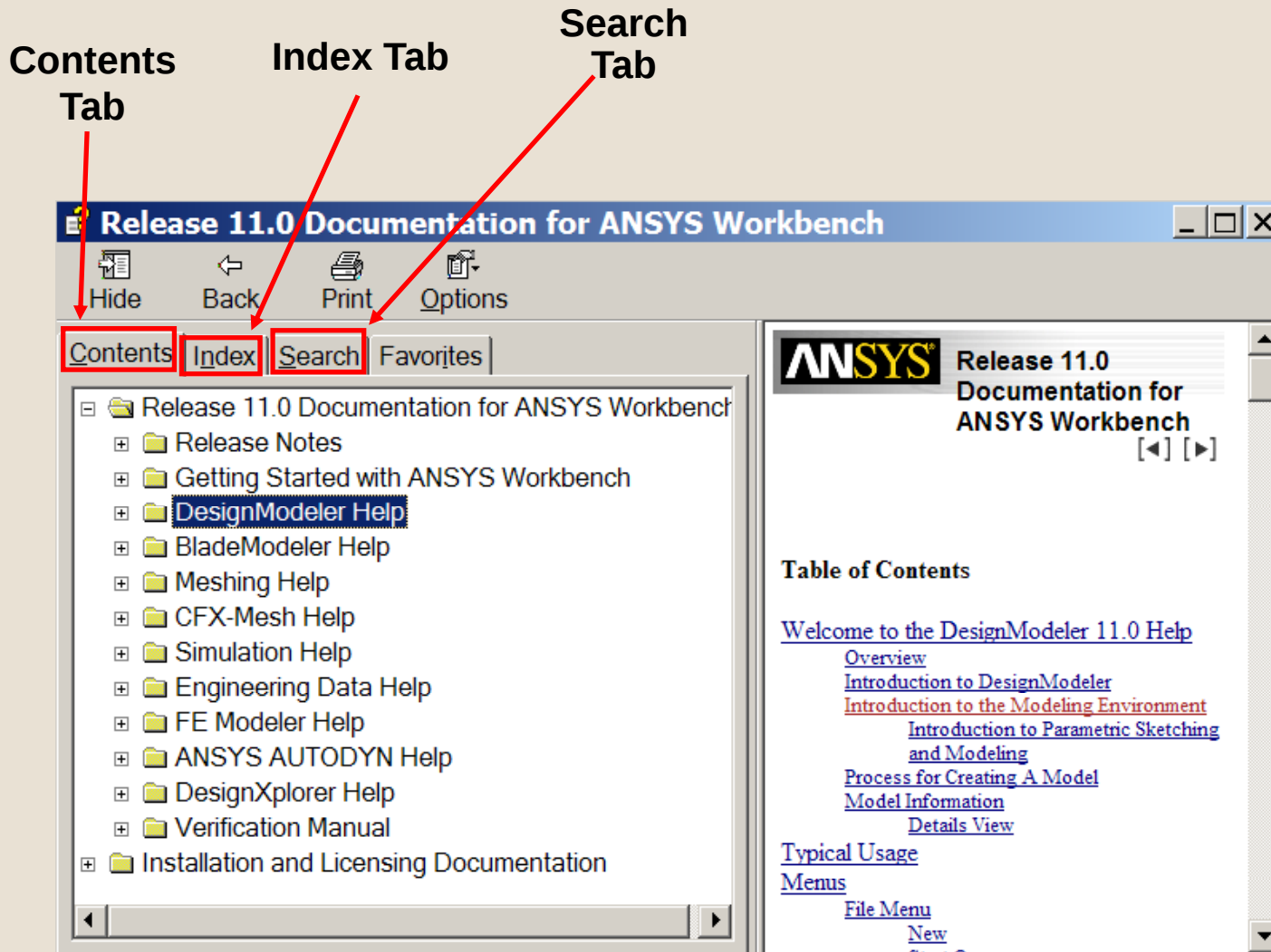
Software build date: Wednesday, November 15, 2006 2:42:29 AM
Service pack version: --

OK Cancel

Accessing Help Topics



Training Manual

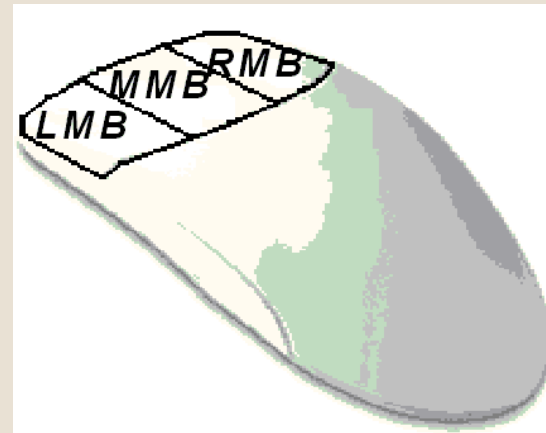


Basic Mouse Functionality



Training Manual

- Basic mouse control (3 button mouse assumed):
 - LMB
 - Geometry selection
 - <CTRL> + LMB adds/removes selected entities
 - Hold LMB and sweep cursor = continuous selection
 - MMB
 - Free Rotation (shortcut)
 - RMB
 - Box Zoom (shortcut)
 - Open context menus



DesignModeler

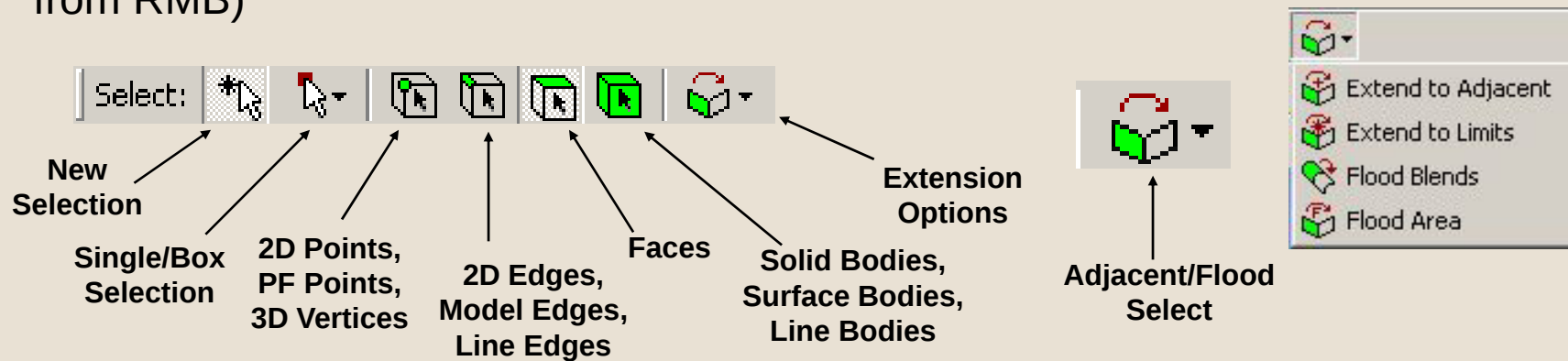
Selection Filters



Training Manual

DesignModeler

- Model features are identified by graphically picking them (selecting) using the left mouse button
- Feature selection is done by activating one of the selection filters (also from RMB)



- In select mode the cursor changes to reflect current selection filter (it will match the icon).
- Adjacent Select, selects surfaces or edges adjacent to the current selection. Adjacent Select will pick all model surfaces within a tangent tolerance of that surface or edge.

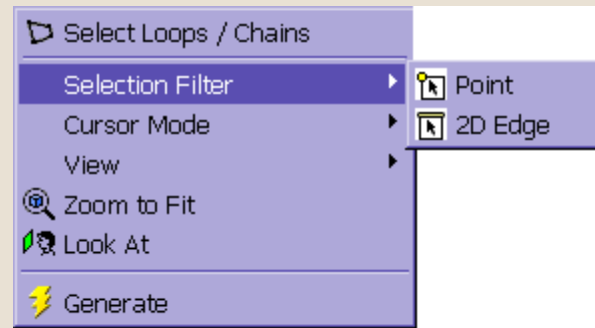
Selection Filters



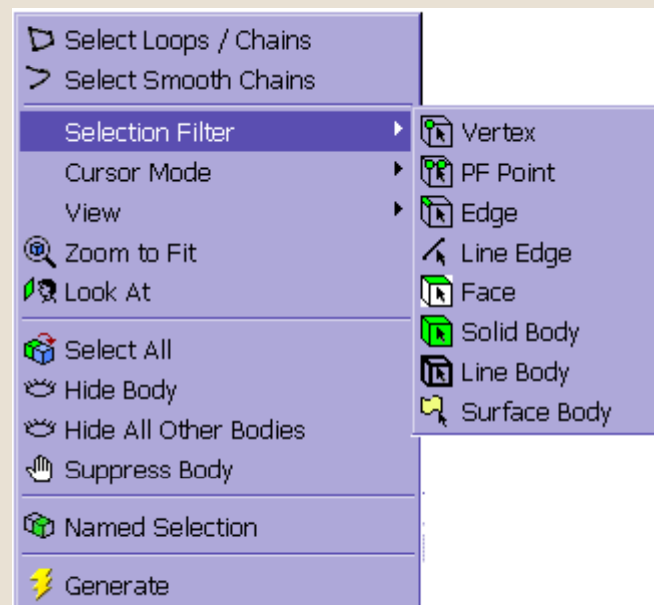
Training Manual

- Selection filters can also be set via RMB on the Model View:

– In Sketching Mode:



– In Modeling Mode:



Mouse Selection



Training Manual

DesignModeler



Ctrl

- Add to or remove from current selection set
 - Depends on current selection filter (lines, surfaces, etc.)



Hold

- “Paint Select” - hold left mouse button then move (“paint”) mouse over entities to be selected
 - Depends on current selection filter (lines, surfaces, etc.)

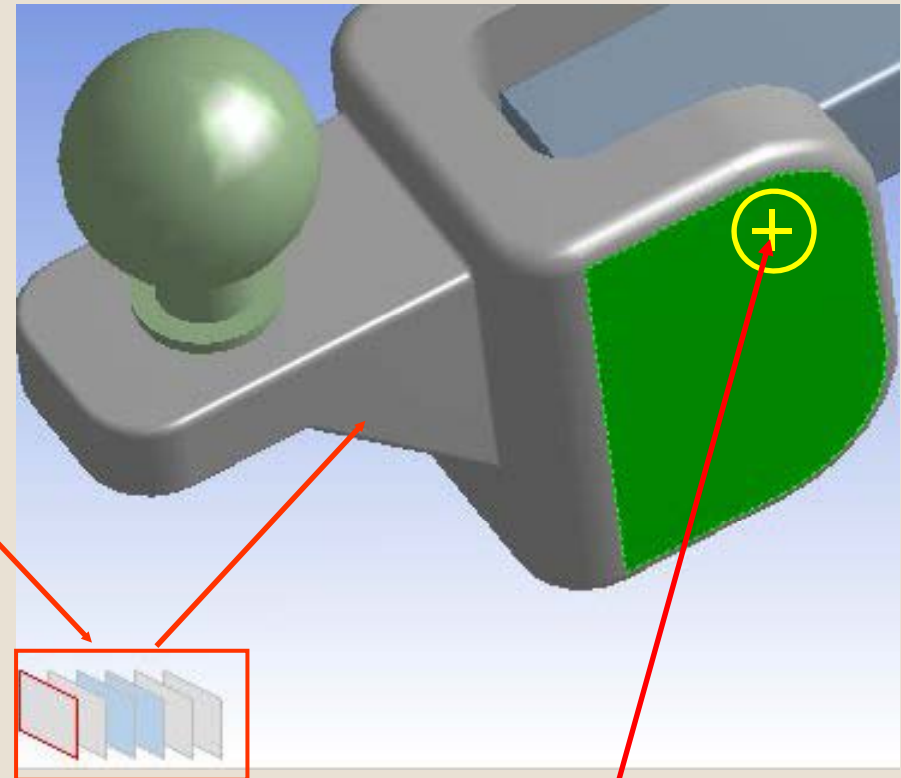
Note: To un-select all, click once in a blank area of the geometry window

Selection Panes



Training Manual

- “Selection Panes” allow selecting hidden geometry (lines, surfaces, etc.) after initial pick
 - Panes are color coded to match part colors (for assemblies)
 - Multi-select techniques apply to selection panes as well



Initial mouse click

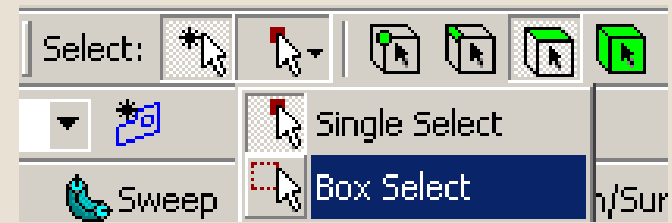
Note, each pane represents an entity (surface, edge, etc) that an imaginary line would pass through starting from the initial mouse click location and proceeding into the screen in the normal viewing direction.

Box Selection

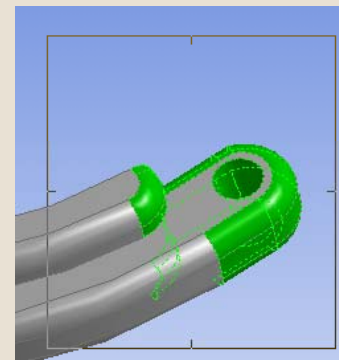


Training Manual

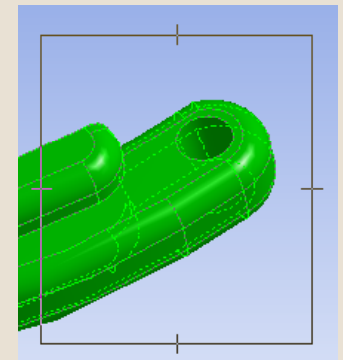
- The Selection Toolbar includes a “Select Mode” button allowing users to select items via Single Select or Box Select
 - Selection based on currently active filter
 - Type of selection based on dragging direction:
 - Drag from left to right: items completely enclosed in the box are selected
 - Drag from right to left: items completely and partially enclosed in the box are selected
 - Note the difference in the hash marks along the edges of the box to help you determine which box selection type will be performed.



Left to Right



Right to Left



Graphics Controls

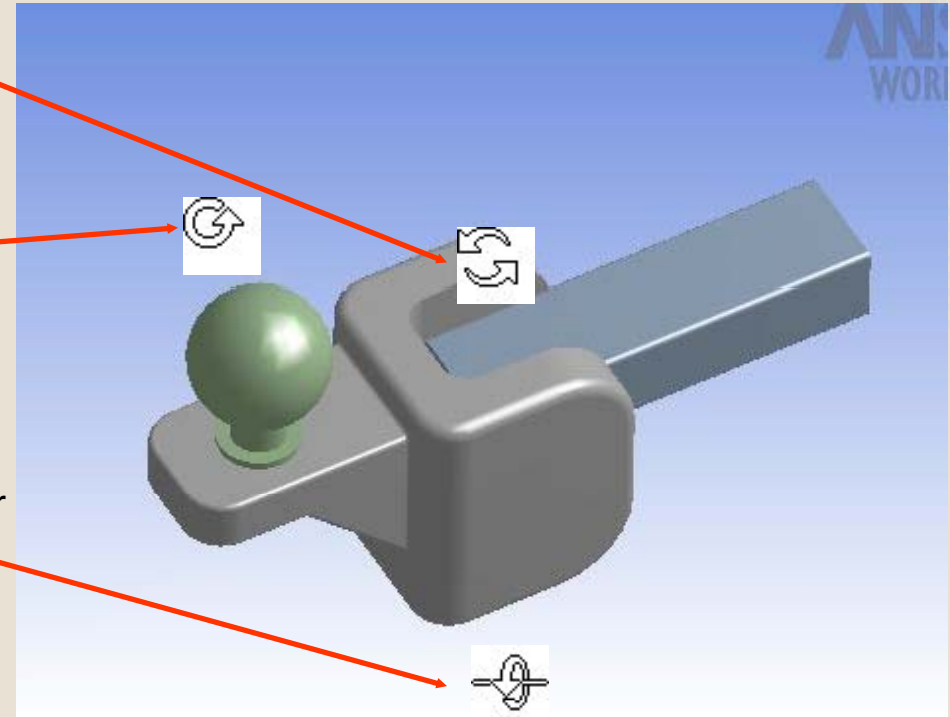


Training Manual

- Rotate Behavior (LMB):



- Cursor near center of graphics screen = free rotations.
- Cursor outside center = rotation about Z view.
- Cursor near top or side edge of graphics screen = rotations about X (top/bottom) or Y (left/right) axes.



Note: the cursor will change style depending on window location/action

...Graphics Controls



Training Manual

DesignModeler



– Panning



– Zoom in/out



– Box Zoom



– Fit model to graphics screen



– Look At: select model feature (surface, line, etc.) then “Look At”. Model automatically orients normal to feature, centered at pick point.



– Magnifier Window



– Next / Previous views

- Additional Mouse Controls

- While in select mode:

- Center mouse button = free rotations.
 - Right mouse button = box zoom.
 - Shift + Center mouse button = zoom.
 - Ctrl + Center mouse button = pan.

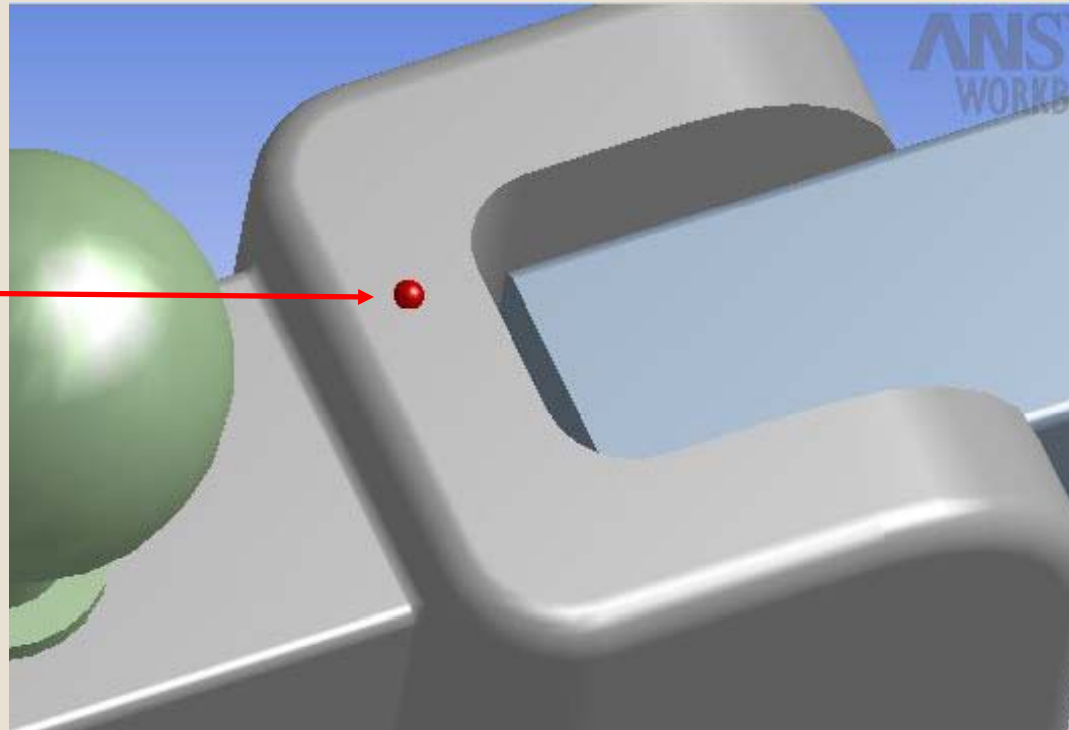
...Graphics Controls



Training Manual

- While in Rotate, Pan, or Zoom mode:
 - Left click on model temporarily resets center of view and rotation at cursor location (identified by red dot).
 - Left click in open area re-centers model and rotation center to centroid.

**Temporary
rotational
center**

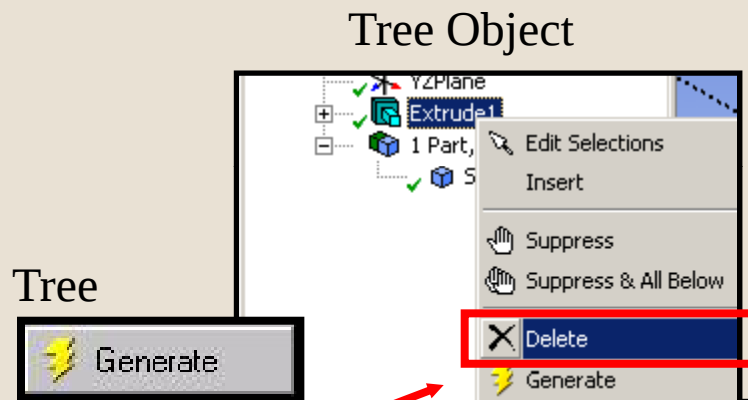


Context Menu's



Training Manual

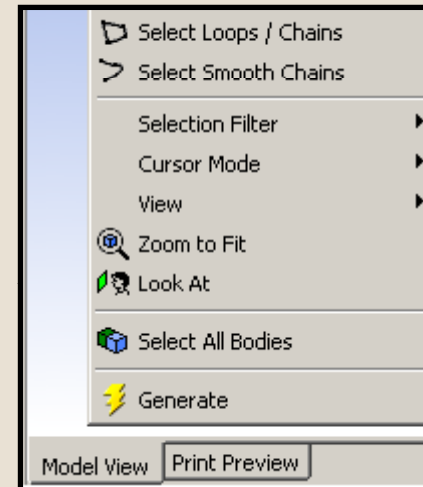
- RMB
 - Context Sensitive Menus appear:



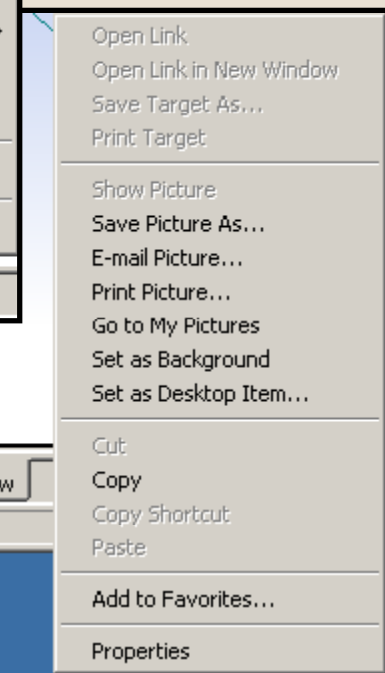
Note: to delete a feature: highlight it on Tree, RMB >Delete, or <Delete> using keyboard

Sketch
Dimensioning

Model View



Print Preview



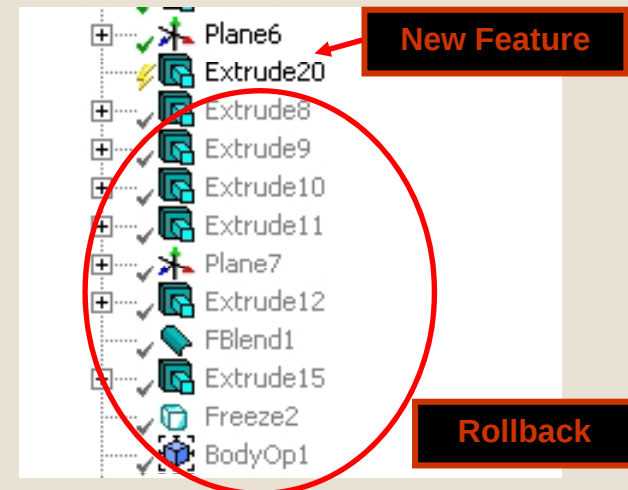
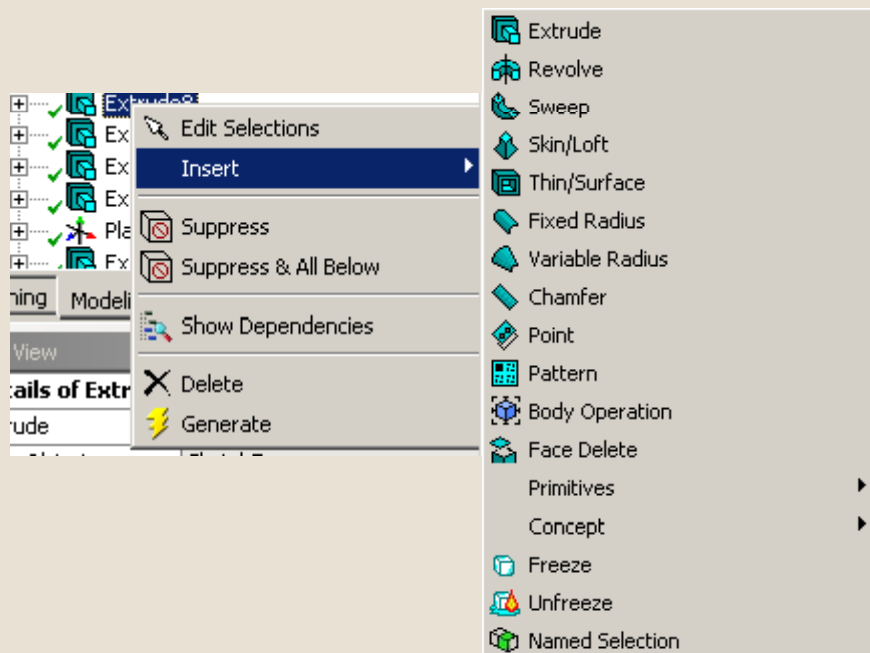
Context Menu's



Training Manual

- Feature Insert:
 - Right click on any feature in the Tree Outline and select *Insert*
 - Allows you to insert a new feature before a selected feature in the *Tree Outline*
 - Insert Feature will roll back the model to its status before the selected feature in the *Tree Outline*
 - Features below the Insert will remain inactive until the model is regenerated

DesignModeler

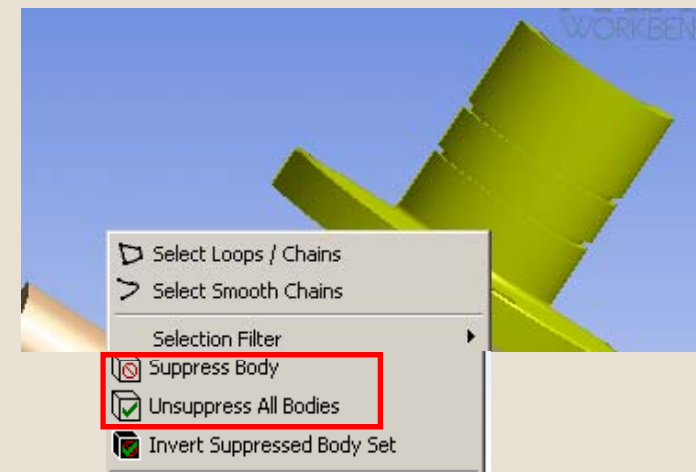
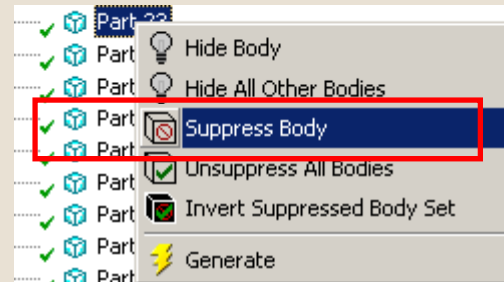
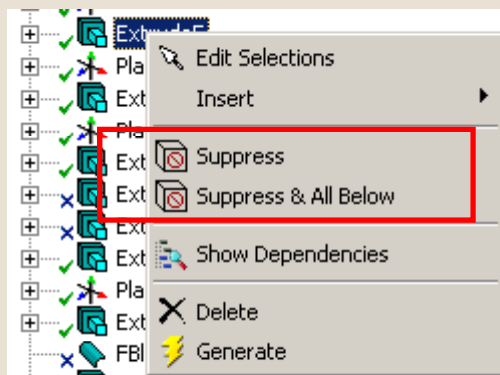


Context Menu's



Training Manual

- Feature / Part Suppression: RMB
 - Parts and Bodies can be *Suppressed* from the *Tree Outline* or the *Model View*
 - A suppressed part or body remains hidden and is *NOT* exported to *CFX-Mesh* or *Simulation*.
 - Example: Suppress the solid part and only take the body that represents the fluid part to CFX Mesh
 - Features can be suppressed from the *Tree Outline*
 - When a feature is suppressed, any feature that is dependent on it is also suppressed

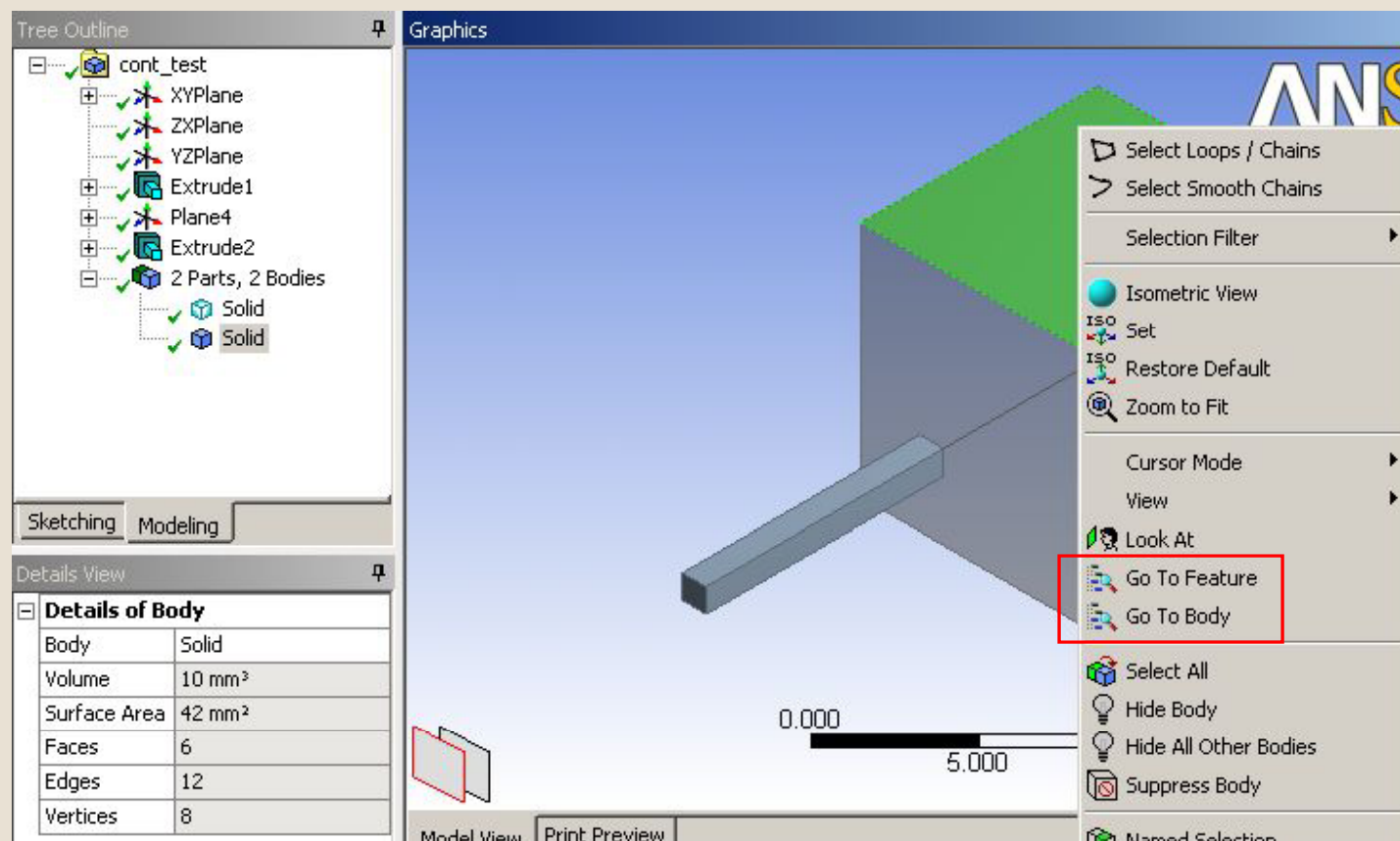


Context Menu's



Training Manual

- The “Go To” feature allow quick navigation from the graphics window back to the tree.
- Choose to go to the “Feature” or the “Body” in the tree.

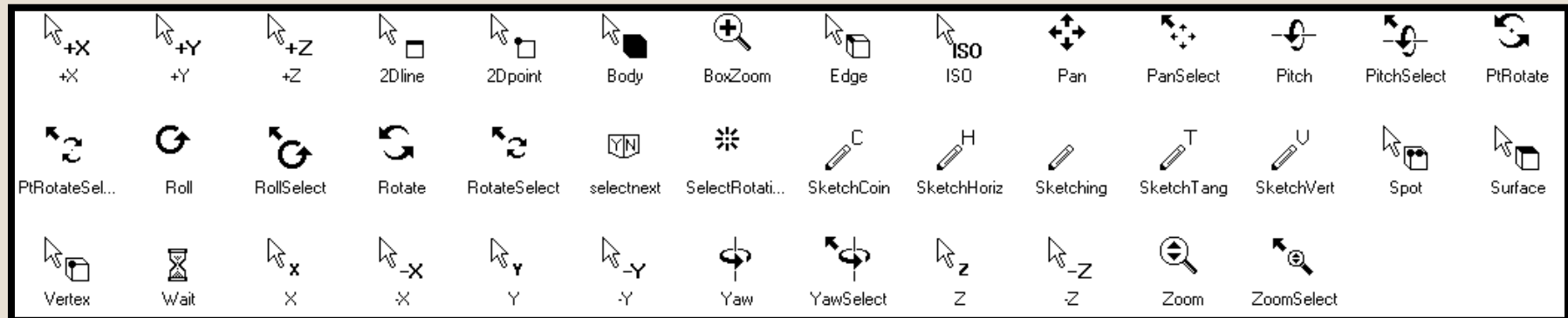


Cursor Modes



Training Manual

- Mouse Cursor is context sensitive
 - Indicates chosen operation
 - Viewing, Rotation...
 - Selecting
 - Sketch AutoConstraints
 - System Status “busy, wait”





GUI Navigation

Workshop 2-1

Workshop 2-1, GUI Navigation



Training Manual

DesignModeler

- Goals:
 - Start DesignModeler and open an existing database (agdb).
 - Navigate through several of the GUI viewing controls.
 - Create a new plane from an existing face.
 - Create and dimension a sketch on the new plane.
 - Extrude the sketch to modify the existing geometry.

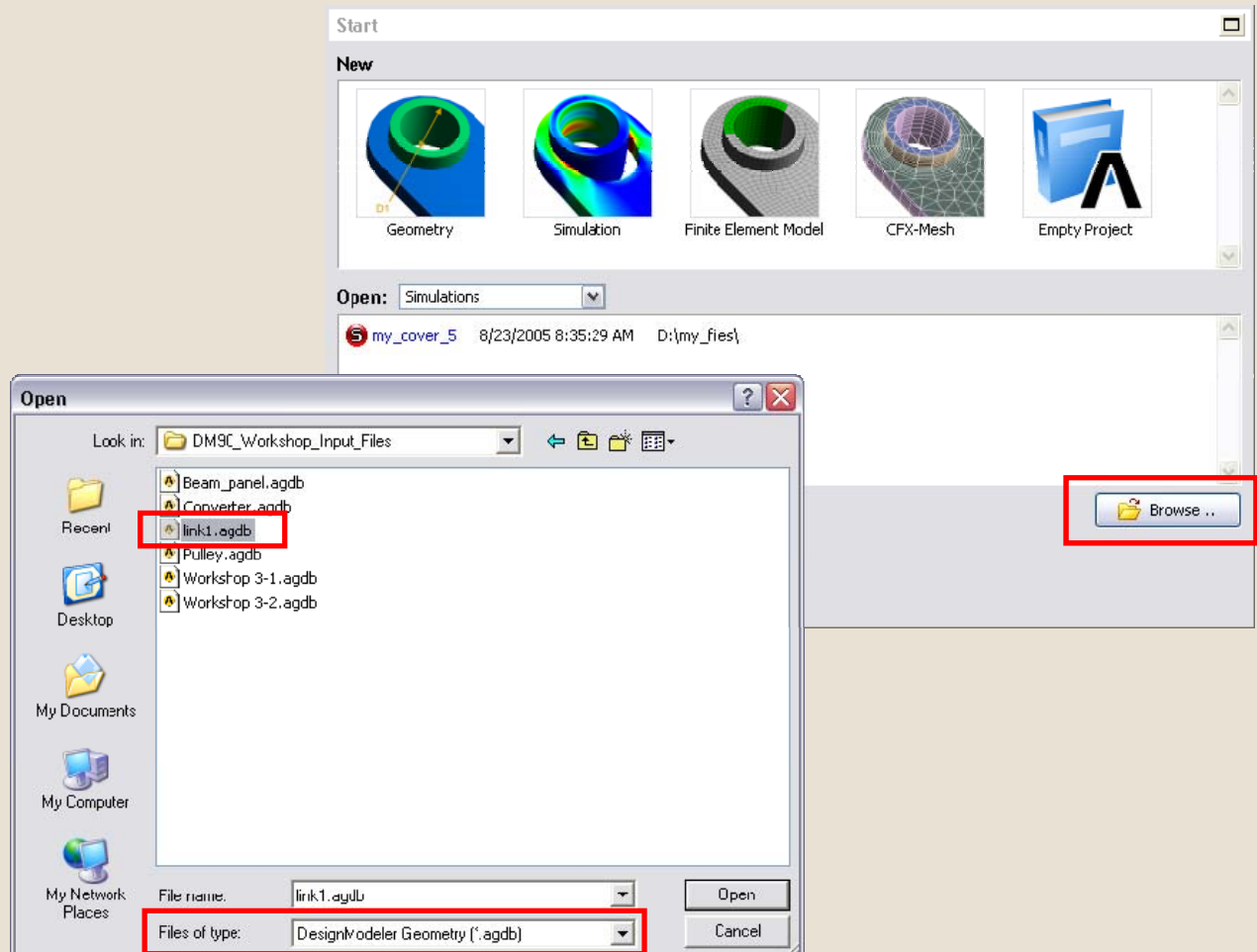
Workshop 2-1, GUI Navigation



Training Manual

Start Page Setup:

1. Open the ANSYS Start Page click on Browse
2. From the Drop down menu "Files of type.." choose Design Modeler Geometry (*.agdb)
3. Click on link1.agdb and open



Workshop 2-1, GUI Navigation

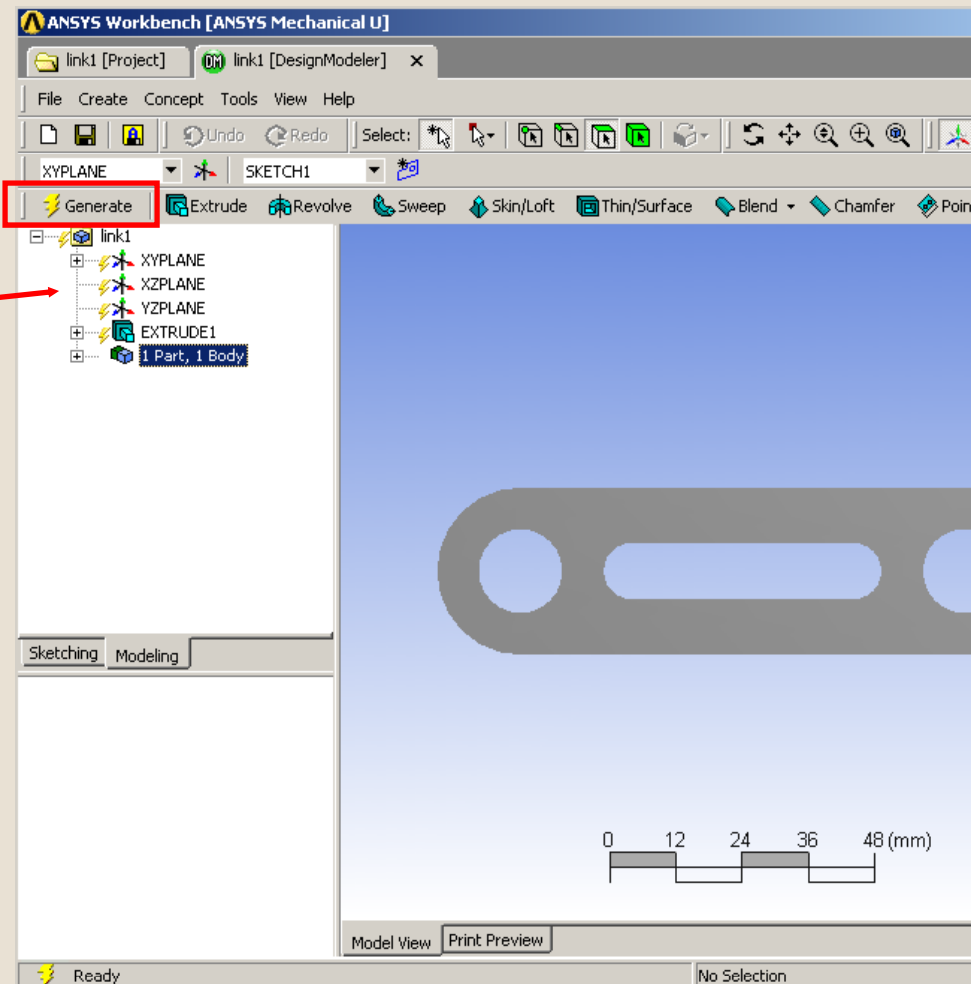
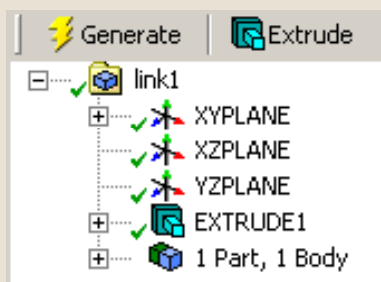


Training Manual

When a DM database is first opened you must “Generate” it before you can work with it.

This is indicated by the lightening bolt icon next to all branches in the tree.

“Generate” the model.

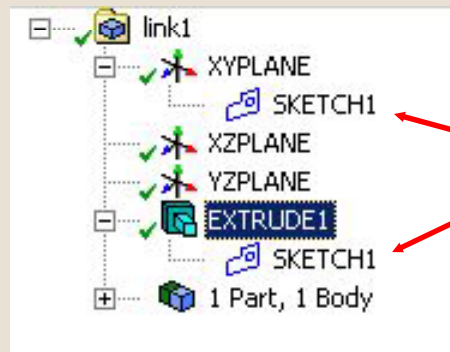
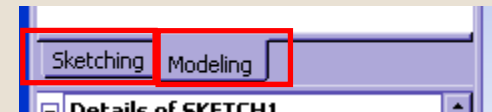


Workshop 2-1, GUI Navigation



Training Manual

- Click the “+” next to “XYPlane” in the tree then highlight “SKETCH1”.
 - [Modeling]: *Link1* > *XYPlane* > *SKETCH1*
 - Observe that the base sketch is now displayed in yellow.
 - Click on the Sketching tab and observe that the dimensions are now displayed.
 - Click on the Modeling tab.
- Click the “+” next to “Extrude1” to expand the branch.
 - [Modeling]: *Extrude1* > *SKETCH1*
 - Observe that “SKETCH1” is associated with the XYPlane as well as Extrude1.



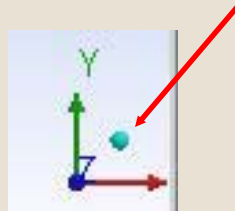
SKETCH1

Workshop 2-1, GUI Navigation



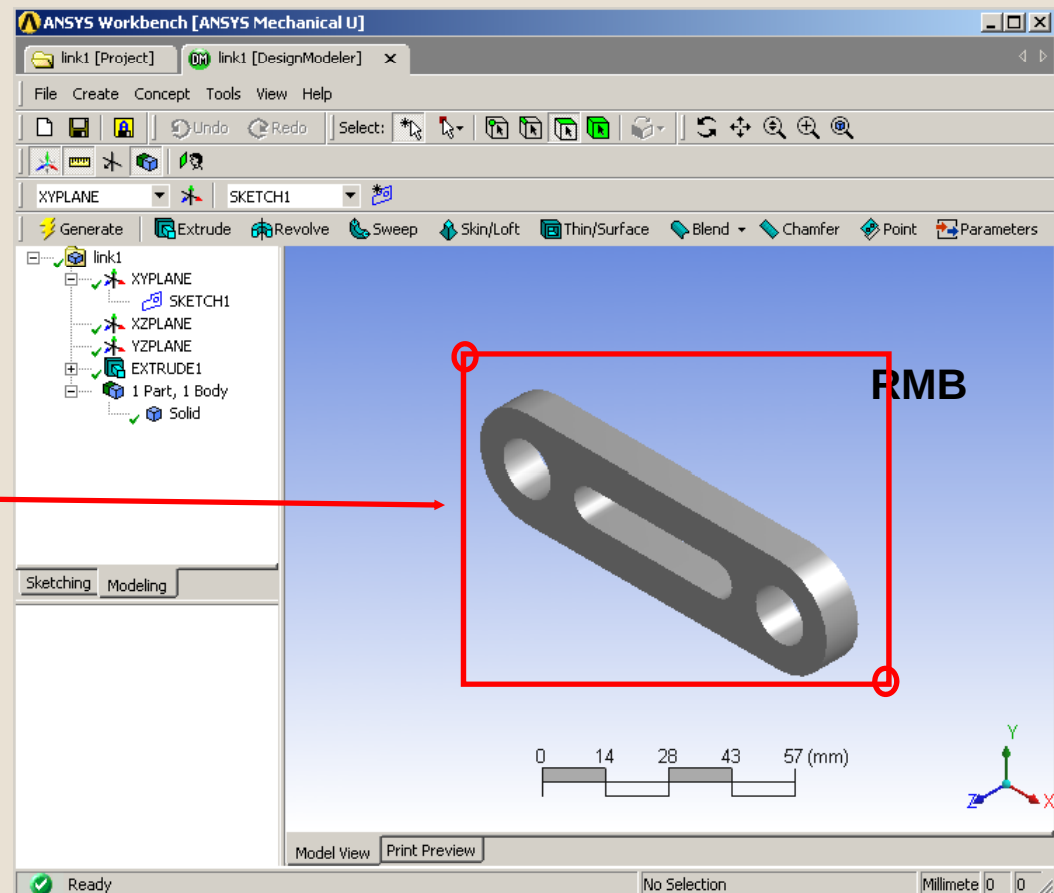
Training Manual

Click the blue “Iso” ball in the triad in the graphics window.



This orients the model to an isometric view.

Use the right mouse button and drag a zoom window around the top surface of the model. Note this is a shortcut for zoom operations.



Workshop 2-1, GUI Navigation



Training Manual

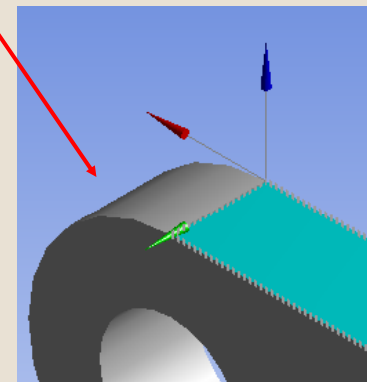
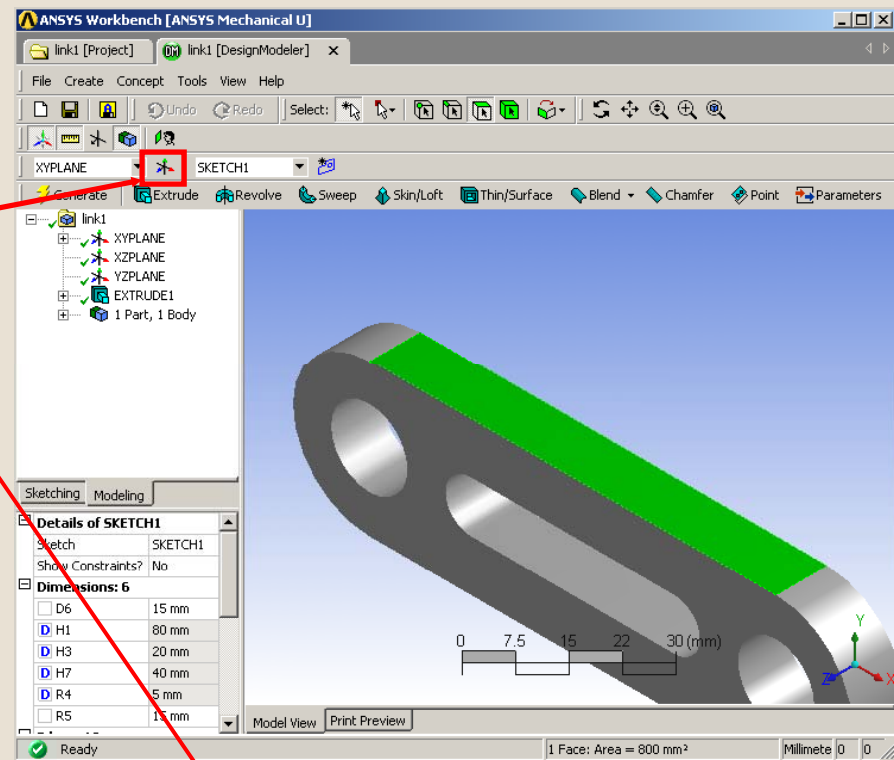
Using the left mouse button click on the top surface to select it.

Click on the “new plane” icon to create a plane. A preview of the plane is displayed with a triad at the plane origin (RGB = XYZ).

Note: by pre-selecting the surface then creating the plane the details indicate the plane will be a “From Face” type.

Leave the default settings in the plane details and “Generate” the plane.

Details View	
Details of Plane4	
Plane	Plane4
Type	From Face
Subtype	Outline Plane
Base Face	Selected
Use Arc Centers for Origin?	Yes
Transform 1 (RMB)	None
Reverse Normal/Z-Axis?	No
Flip XY-Axes?	No



Workshop 2-1, GUI Navigation



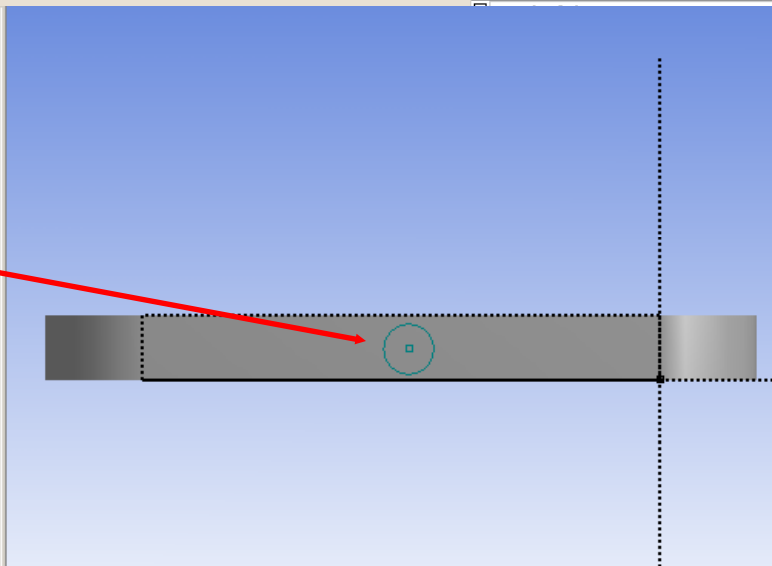
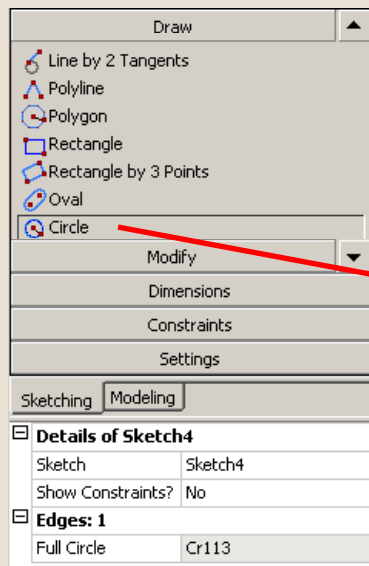
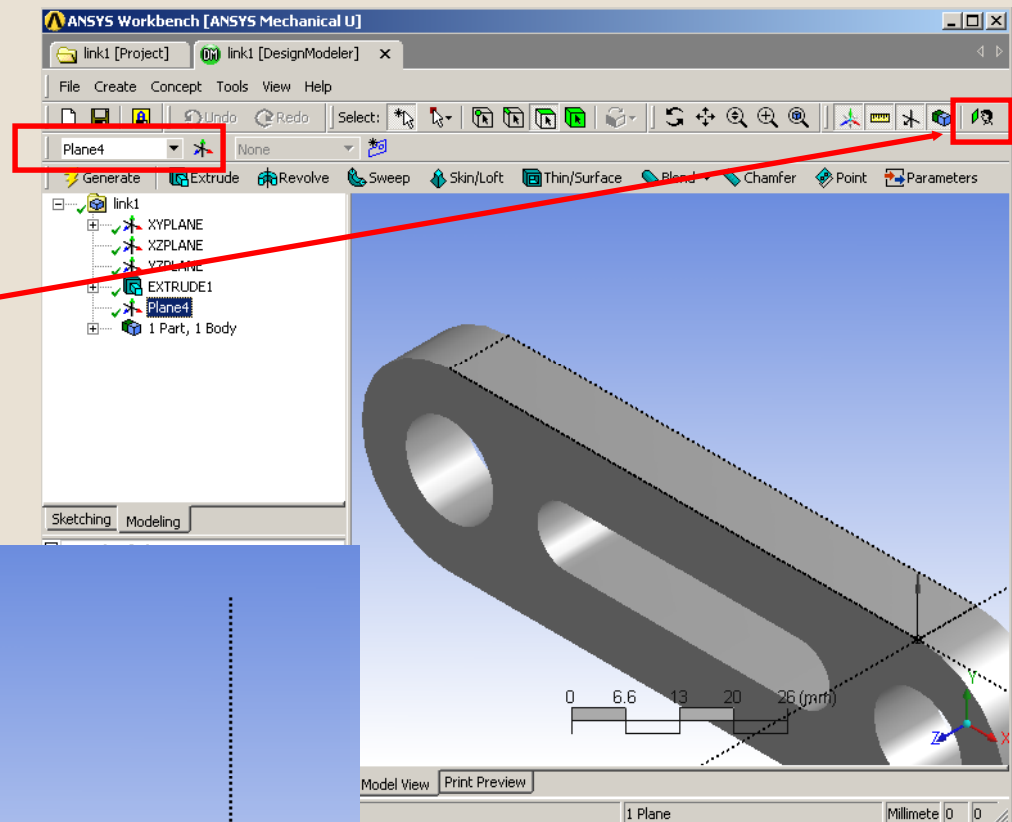
Training Manual

Notice that “Plane4” is created and becomes the active plane.

Click on the “Look At” icon to orient Plane4 to a normal view.

Go to the “Sketching” tab and draw a circle near the center of the plane.

[Sketching] > Draw > Circle



Workshop 2-1, GUI Navigation



Training Manual

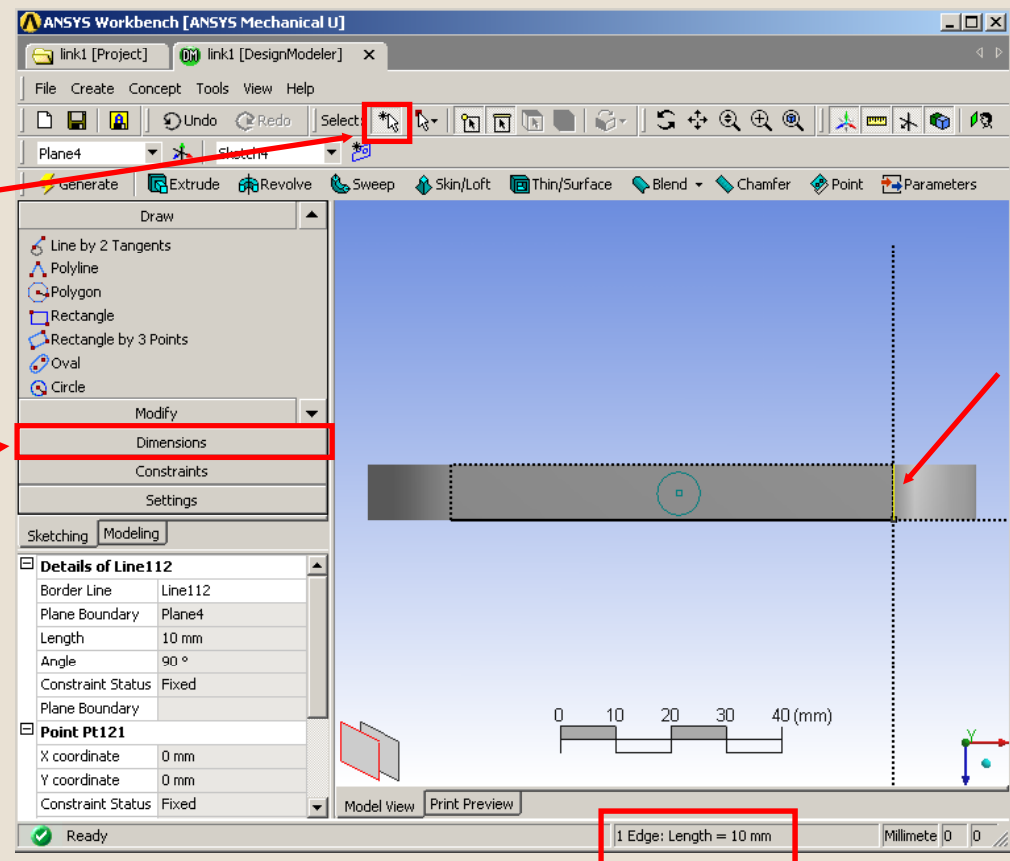
Before dimensioning the sketch we'll verify some of the sizes of the original part.

Click the "Select" icon and highlight the right edge of the sketch plane. Notice the status bar indicates the length is 10mm.

Repeat the above to verify the length of a horizontal edge is 80mm.

Go to the dimensions toolbox and leave General as the default choice.

[Sketching] > *Dimensions* > *General*



Workshop 2-1, GUI Navigation



Training Manual

DesignModeler

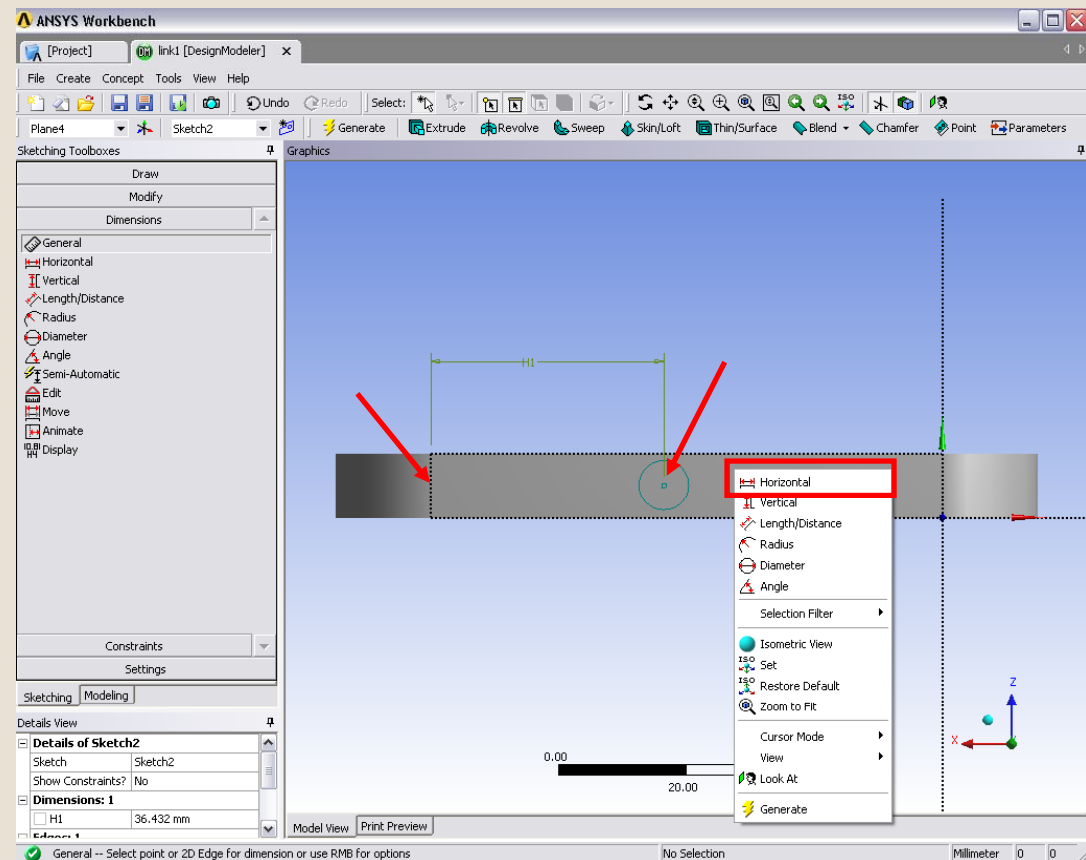
“General” dimensioning is controlled via a RMB in the graphics screen.

To place the first dimension RMB and choose “Horizontal”. Pick the circle center and the left edge of the sketch plane. Then place the dimension by clicking on a location.

Note the “From Face” plane allows us to use the bounds of the plane for dimensioning.

Repeat the above steps to place a vertical dimension from the circle center to one of the horizontal bounds of the plane.

Finally dimension the circle.



Workshop 2-1, GUI Navigation



Training Manual

After the dimensions have been placed use the Detail window to modify the 3 values.

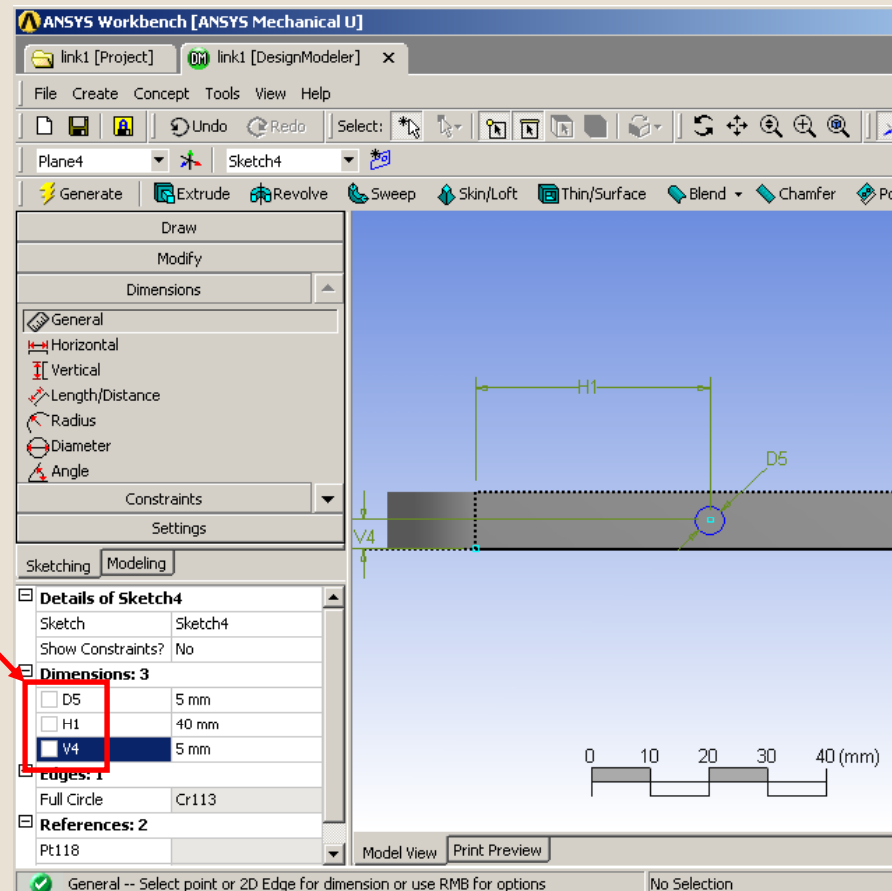
Use the following values to dimension the sketch:

Horizontal = 40mm

Vertical = 5mm

Diameter = 5mm

Note: the dimension names in your sketch may vary from those shown here.



Workshop 2-1, GUI Navigation



Training Manual

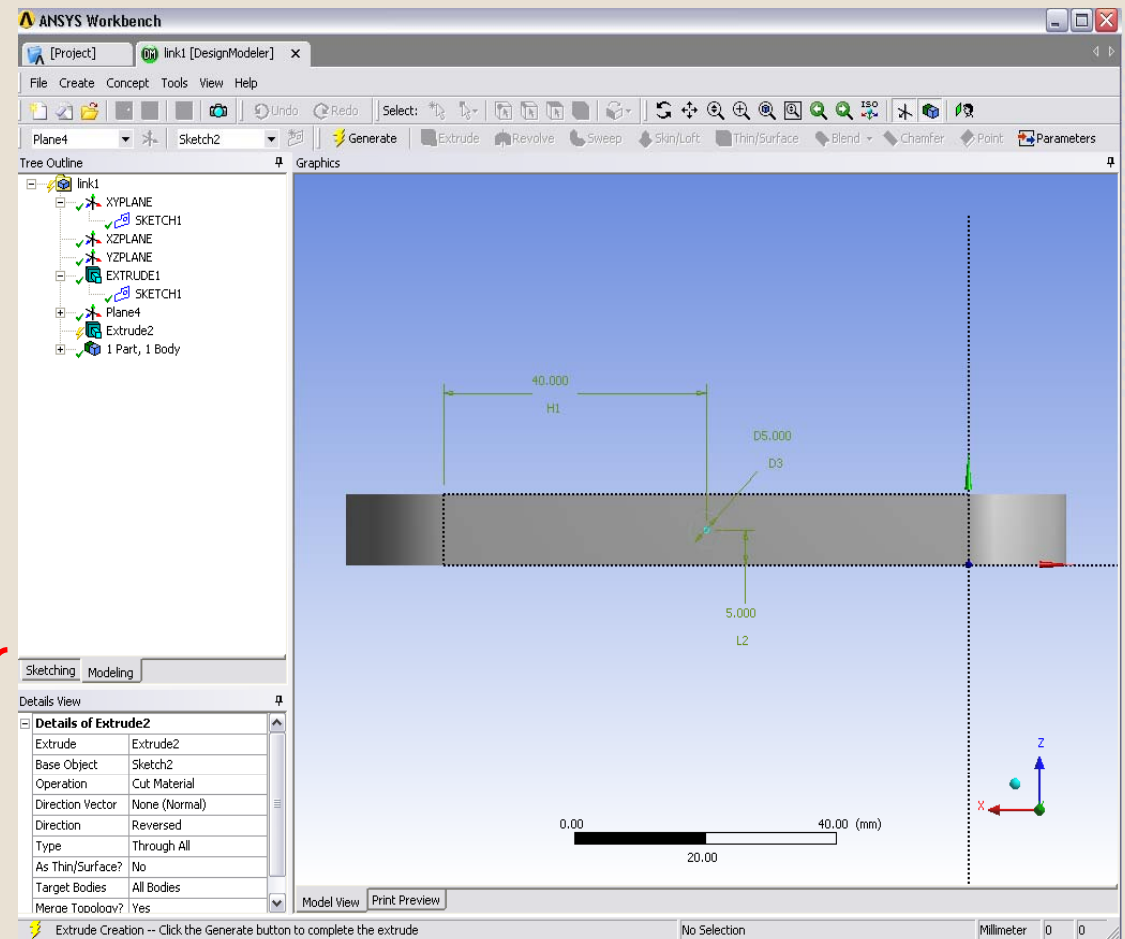
With the sketch fully defined we'll create an extrusion to place a hole in the geometry.

Pick the “Extrude” icon from the main menu.

Setup the extrude operation via the details window as follows:

“Generate” the extrusion.

Details View	
Details of Extrude2	
Extrude	Extrude2
Base Object	Sketch2
Operation	Cut Material
Direction Vector	None (Normal)
Direction	Reversed
Extent Type	Through All
As Thin/Surface?	No
Target Bodies	All Bodies
Merge Topology?	Yes



Note: We changed the operation to “Cut Material” to create a hole. Since the operation must take place into the plane (-Z direction), the detail automatically changed to a “Reversed” direction. “Through All” is specified to cause the extrusion to pass through the entire body.

Workshop 2-1, GUI Navigation



Training Manual

Click the “+” next to Plane4 in the tree and highlight Sketch2.

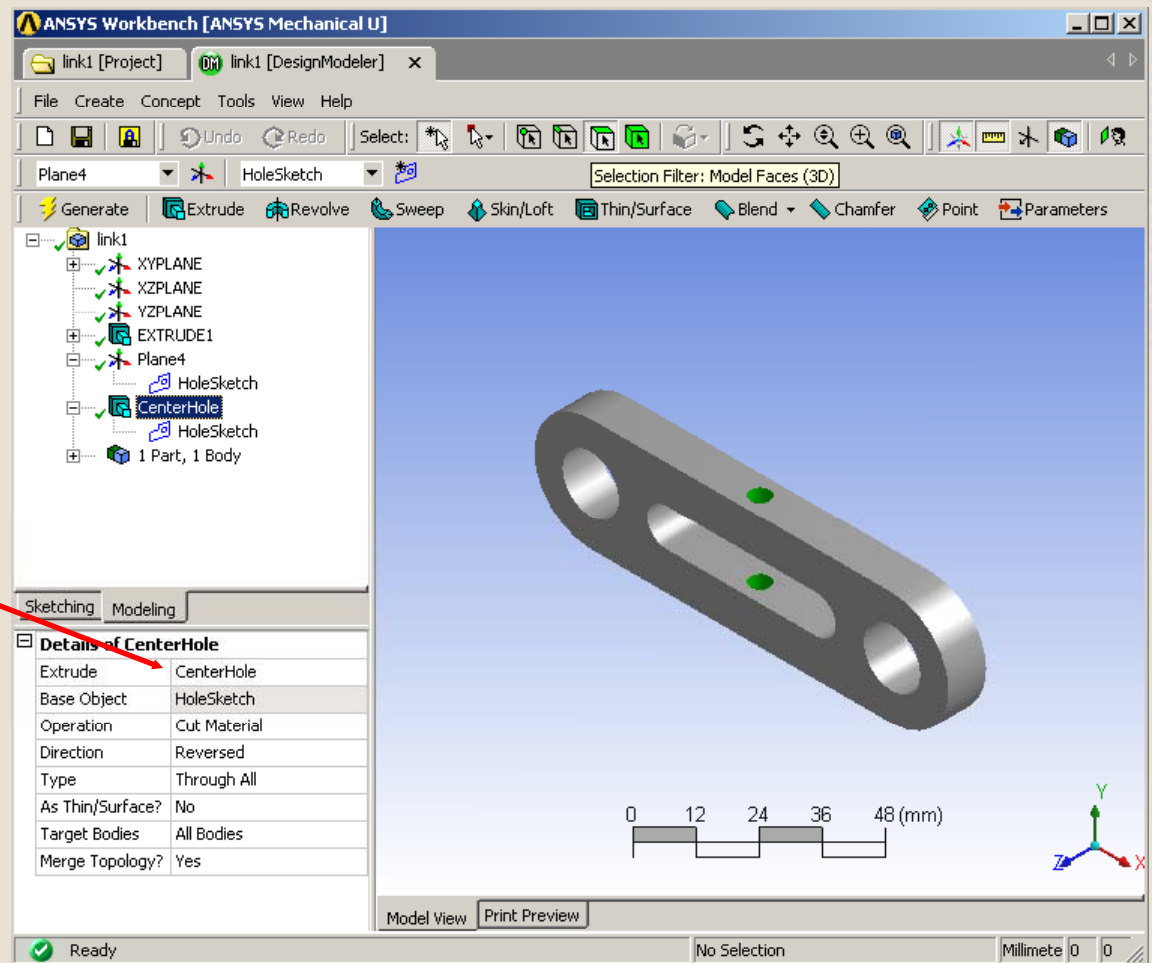
[Modeling] > Plane4 > Sketch2

In the Detail for Sketch2 change the Sketch name “Hole Sketch”.

Highlight “Extrude2” in the tree.

[Modeling] > Extrude2

In the Detail for Extrude2 change the Extrude name to “Center Hole”.



Note: spaces in names are removed:

Hole Sketch => HoleSketch

Use an underscore “_” as a spacer if desired:

Hole_Sketch => Hole_Sketch

Workshop 2-1, GUI Navigation



Training Manual

Use the middle mouse button to rotate the model and inspect the feature. Note this is a shortcut for model rotations.

Using the “View” menu toggle between the shaded and wireframe display modes.

Return to the Project page and save the project and all associated files.

File>Save

Exit DesignModeler

File > Exit

