

Lecture 3

Introduction to ANSYS DesignModeler

14.0 Release

Fluid Dynamics

Structural Mechanics

Electromagnetics

Systems and Multiphysics

Introduction to ANSYS DesignModeler

DesignModeler

What will you learn from this presentation

- **Direct Modeling Vs History based modeling**
- **Process for preprocessing using ANSYS tools**
- **What is ANSYS DesignModeler**
- **How to launch DesignModeler?**
- **DesignModeler interface**

Modeling Methods

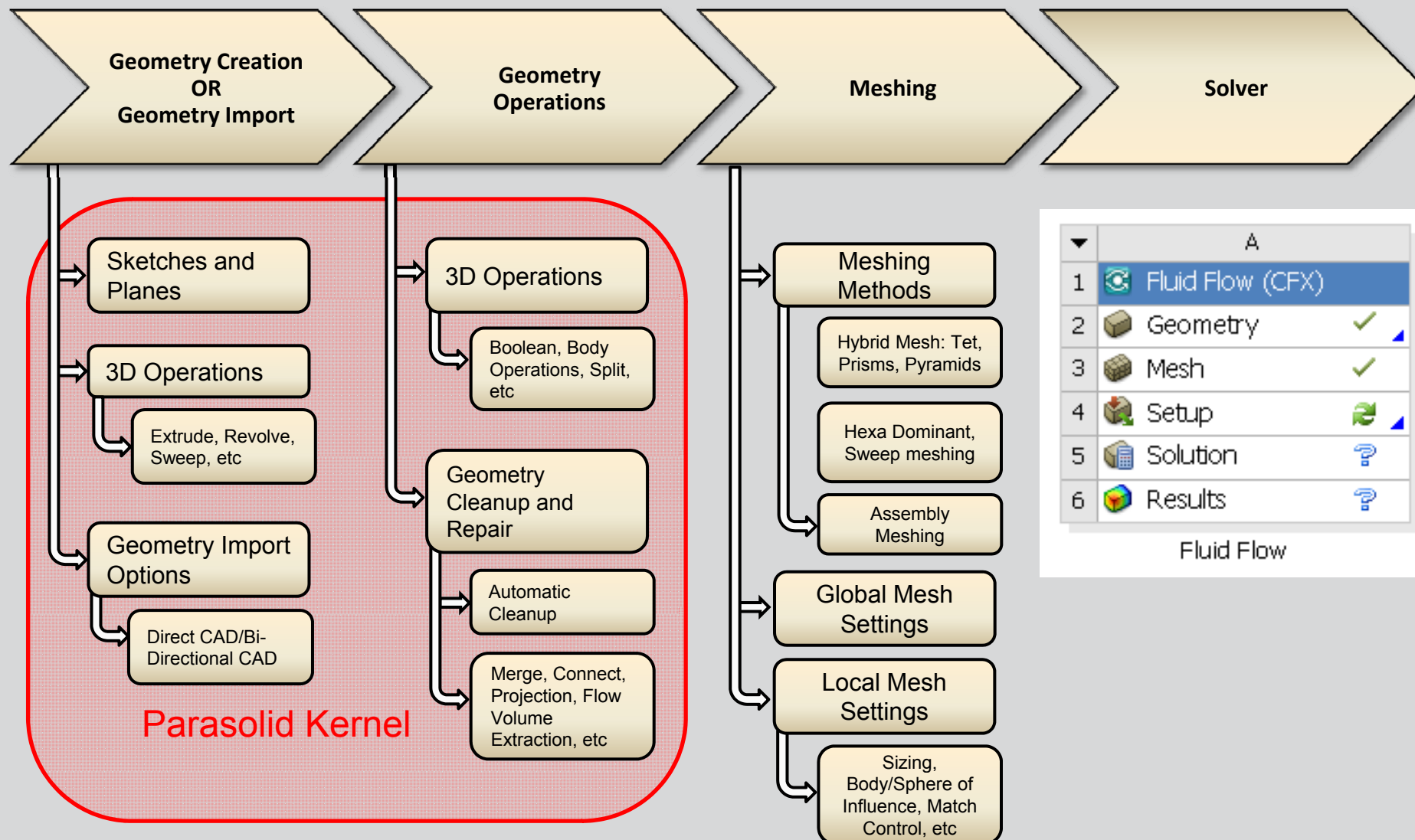
Feature/History based Modeling

- ☐ CAD like approach to create new models with sketch-to-3D operations
- ☐ OR
- ☐ Import models from CAD and perform various geometric operations to prepare it for meshing
- ☐ Fully parametric
 - Captures engineering intent
 - Supports native CAD parameters
 - Drives changes by changing a few parameters in an automated way
- ☐ Feature tree
 - Maintains history of all features
- ☐ Analysis focused
 - Custom tools to repair, prepare and optimize models for analysis
- ☐ ANSYS DesignModeler

Direct Modeling

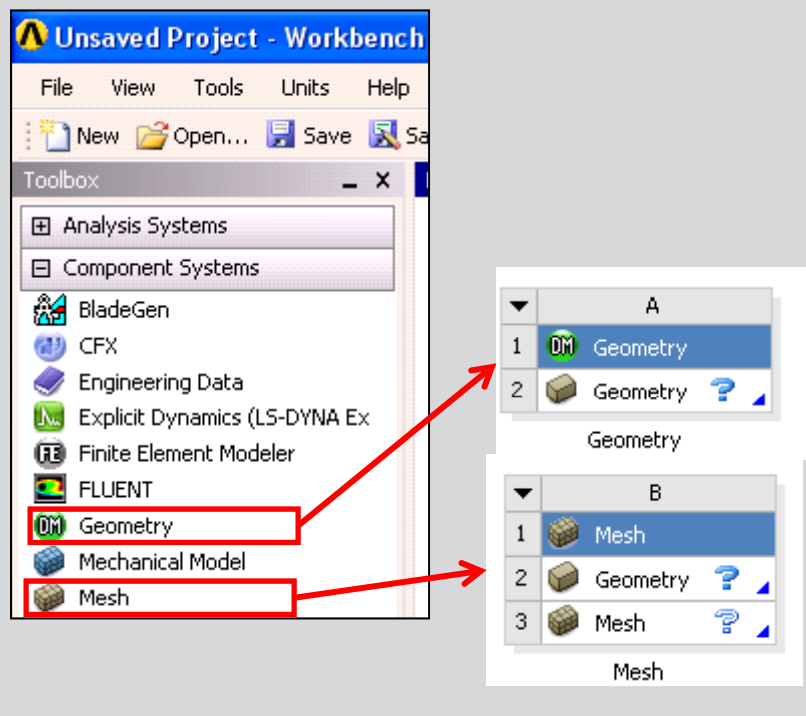
- ☐ Import models from CAD and perform various geometric operations to prepare it for meshing
- ☐ Locally parametric
- ☐ More flexibility to make unplanned and local changes
 - No features + no constraints = no regeneration failures
 - Easy to edit “dumb” neutral files
 - Easy to repair, prepare and optimize models for analysis
- ☐ Analysis focused
 - Custom tools to repair, prepare and optimize models for analysis
- ☐ GAMBIT (legacy ANSYS product), ANSYS SCDM

Preprocessing Workflow



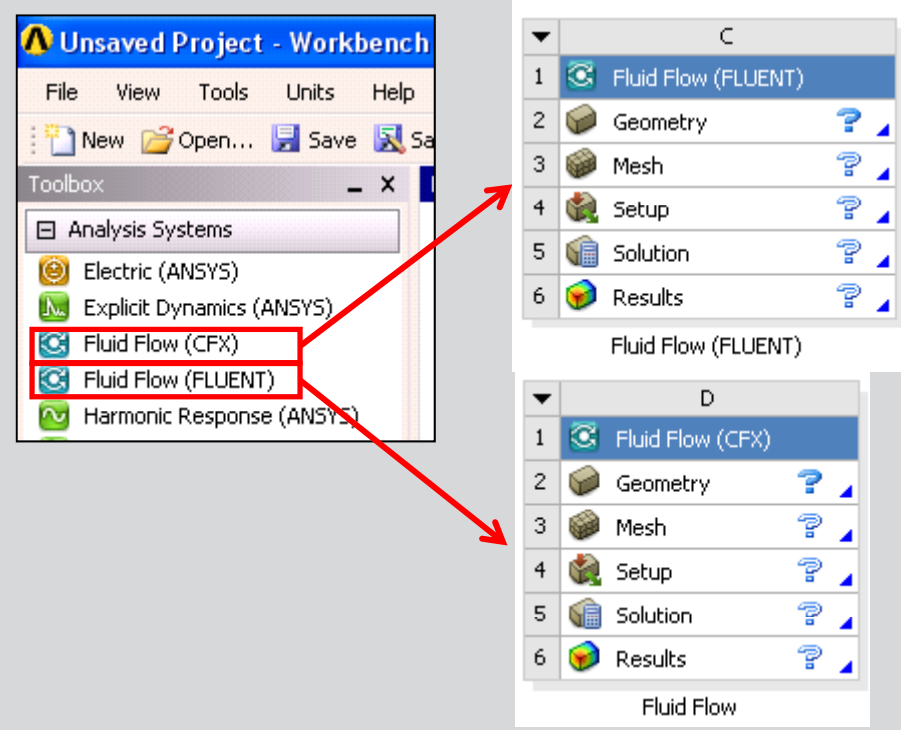
From Component Systems

Ex: Geometry, Mesh



From Analysis Systems

Ex: Fluid Flow (Fluent), Fluid Flow (CFX)



DesignModeler cannot be launched in a standalone mode, it can be only launched within Workbench as shown in the above example

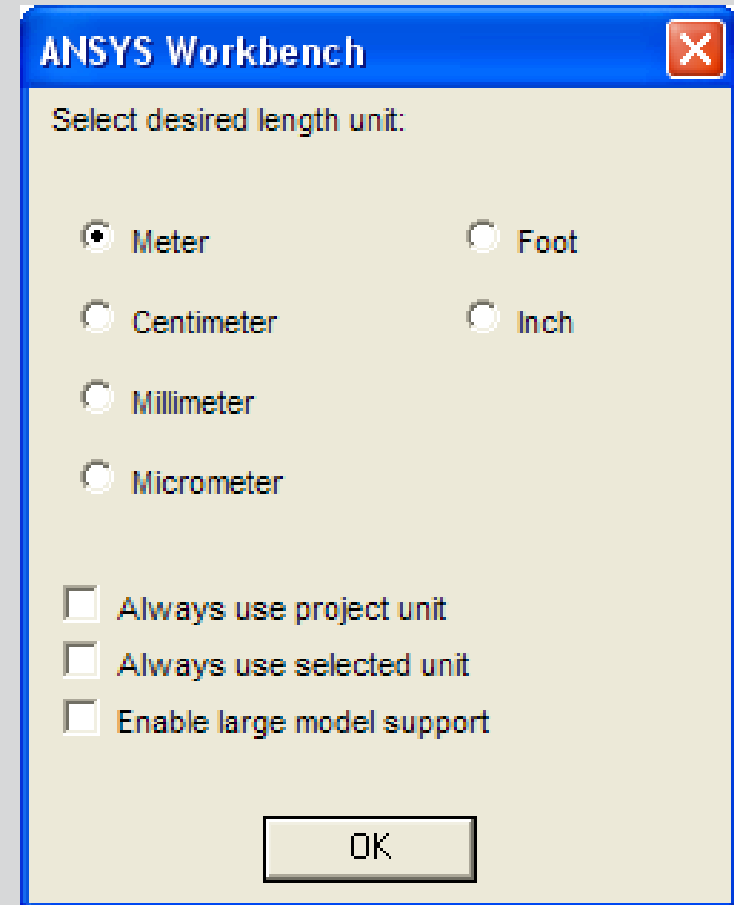
ANSYS® Set up Working Units

Unit selection menu pops up immediately after DM launches

Always use project unit : Project units set in Workbench will be used

Always use selected unit : Unit selected from the panel will be used

Enable large model support : enable this to create large models within a bounding box of 1000 cubic km.



DM will no longer show the Units pop up panel in subsequent DM sessions if 'Always use project unit' or 'Always use selected unit' is chosen.



Units cannot be changed mid-session

Toolbars

Tree Outline

Mode Tabs

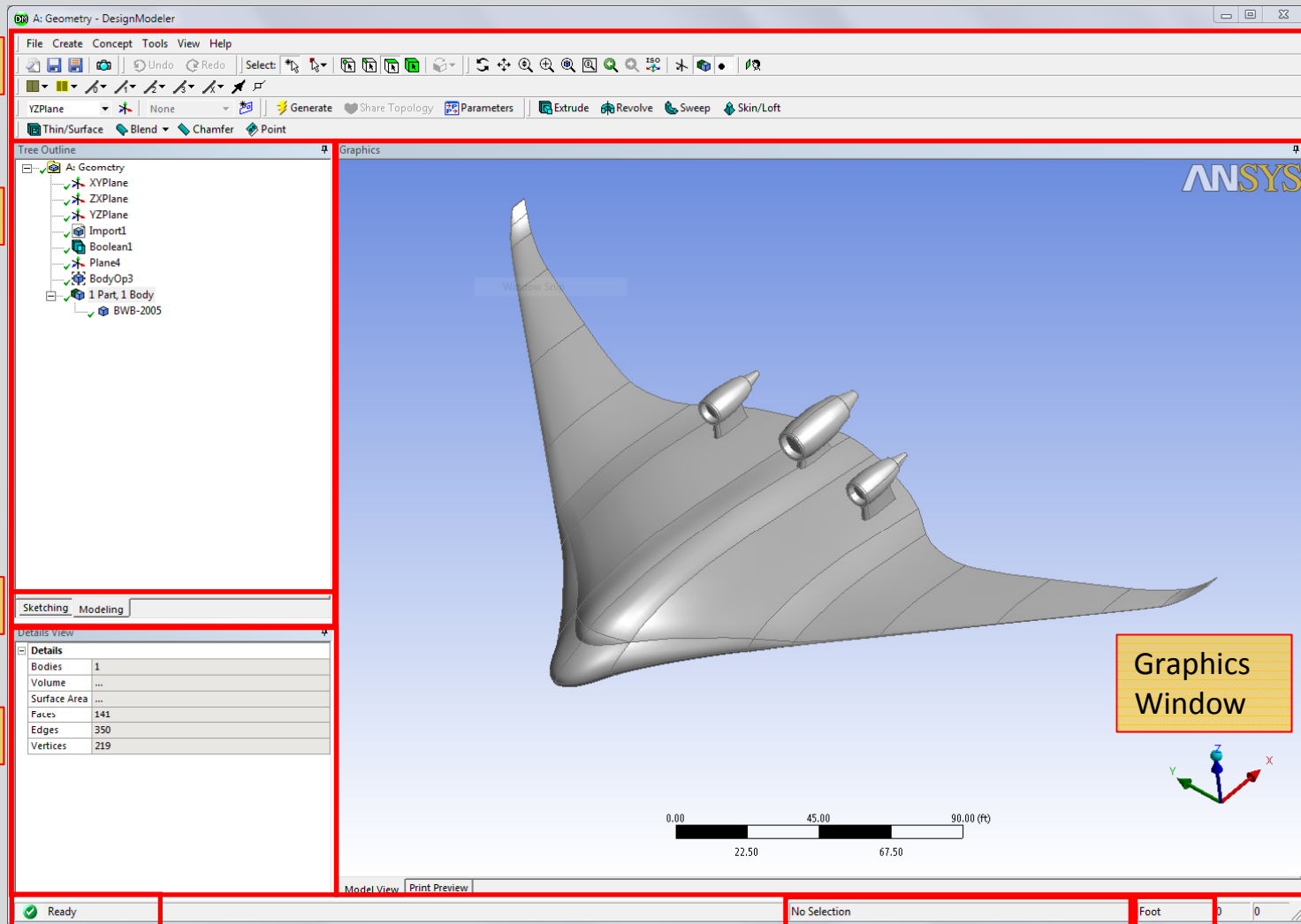
Details View

Graphics Window

Status/Info Bar

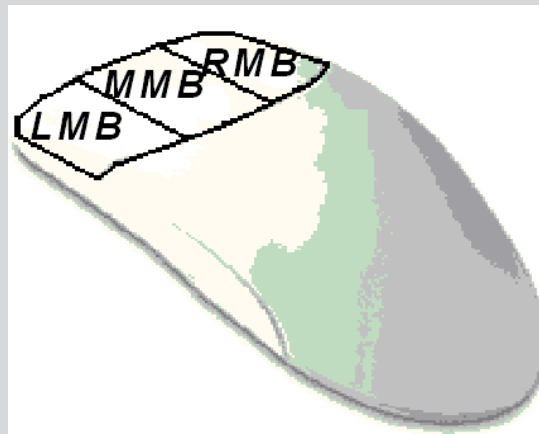
Entity Details Bar

Units Display Bar



Basic Mouse Controls

- LMB
 - Geometry selection
 - <CTRL> + LMB adds/removes selected entities
 - Hold LMB and sweep cursor = continuous selection
- MMB
 - **Rotate**
 - **Shift + MMB** : Zoom
 - **Ctrl + MMB** : Pan
- RMB
 - Box Zoom
 - Opens context menus





Select Mode –



Select single entity



Select multiple entities



Select Points



Select Edges



Select Faces



Select Bodies

**Selection
Filters**



Extend Selection for multiple
entities –



Extend to Adjacent



Extend to Limits



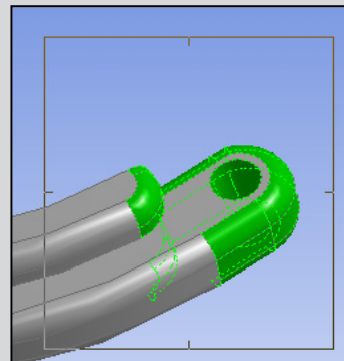
Flood Blends



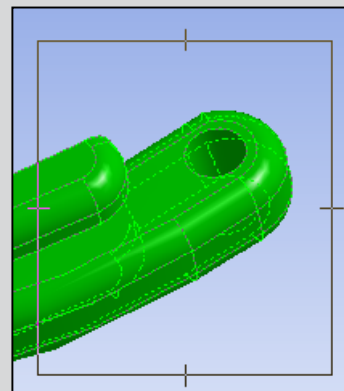
Flood Area

‘Box Select’

- To use Box Selection select ‘Box Select’ from the toolbar
- To select multiple entities, drag the mouse to create a box enclosing the entities



Drag from **left to right** to
select the entities, completely
enclosed in the box



Drag from **right to left** to
select the entities, completely
and partially enclosed in the
box

View Toolbar & Hot Keys



- **View Toolbar: Various View Manipulation options are available in View Toolbar**
 - Rotate, Pan, Zoom
 - Box Zoom, Fit Model to Screen, Magnifier Window
 - Previous View, Next View, Set Iso View
 - Display Plane, Display Model, Display Points, Look at
- **Hot Keys: Hot Keys or Shortcut Keys can help in performing several operations quickly**
 - Ctrl-Z: Undo (sketching mode only)
 - Ctrl-Y: Redo (sketching mode only)
 - Ctrl-A: Select All
 - Ctrl-C: Copy (sketching mode only)
 - Ctrl-X: Cut (sketching mode only)
 - Ctrl-V: Paste (sketching mode only)
 - Ctrl-P: Toggle Point selection filter
 - Ctrl-E: Toggle Edge selection filter
 - Ctrl-F: Toggle Face selection filter
 - Ctrl-B: Toggle Body selection filter
 - F3: Apply
 - F4: Cancel
 - F6: Toggle display (shaded+edges/shaded/wireframe)
 - F7: Zoom to Fit

Graphics Option Toolbar



Edge Coloring -

 By Body Color

 By Connection

 Black



Free Edges - 0 face - Blue



Single Edges - 1 face - Red



Double Edges - 2 faces - Black



Triple Edges - 3 faces - Pink

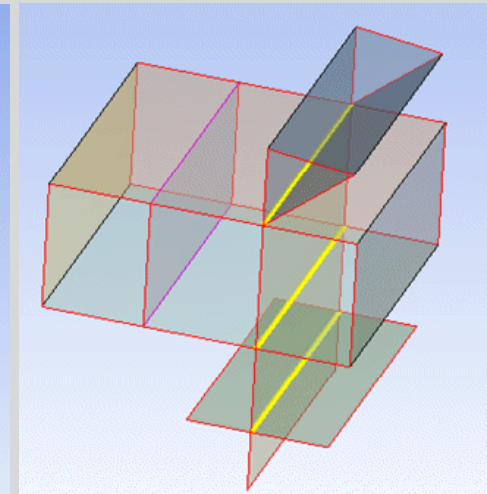
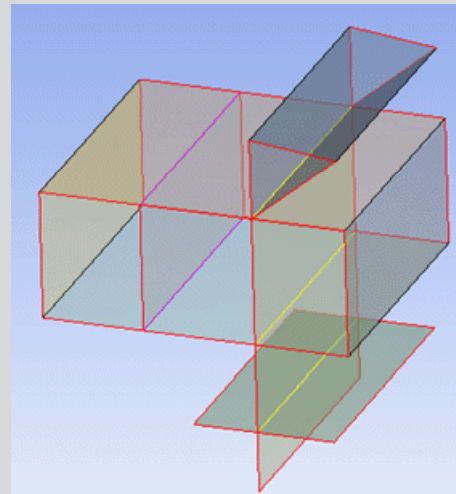


Multiple Edges - 4 faces or more - Yellow

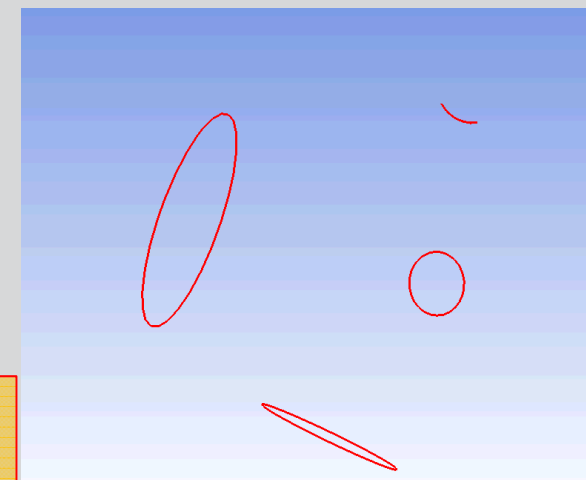
 Hide Multiple

 Show Multiple

 Thick Multiple

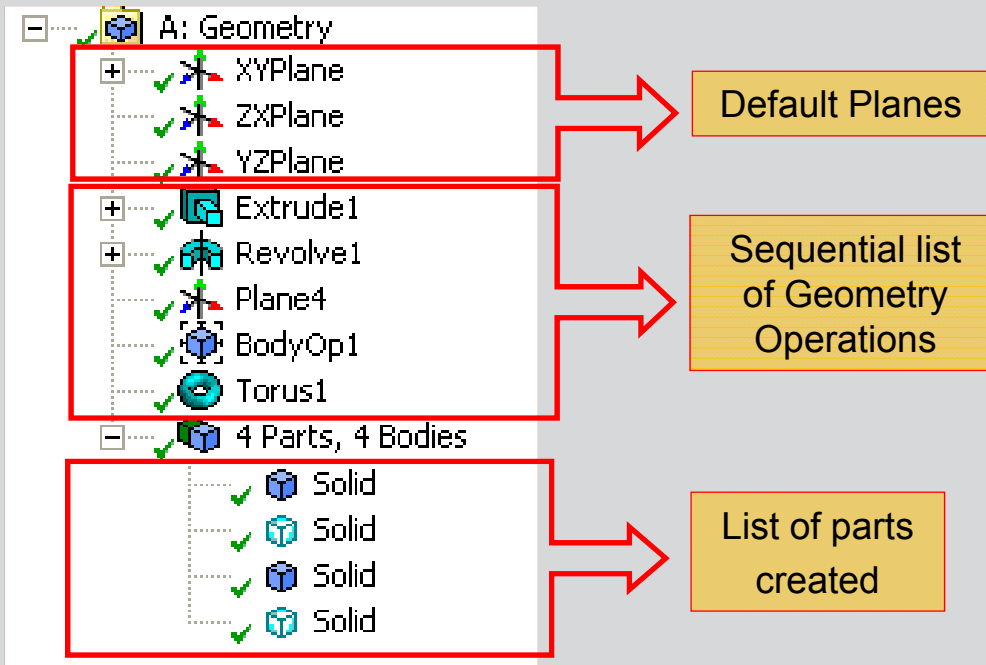


Thick Multiple

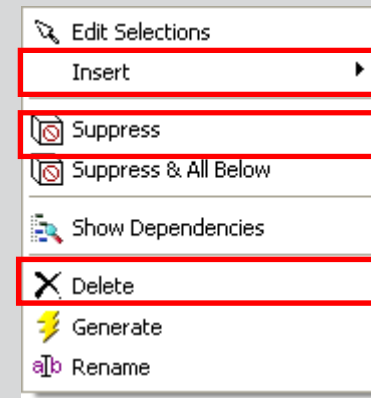
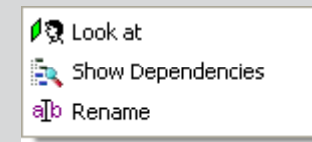


Hide all but Single Edges

Tree Outline



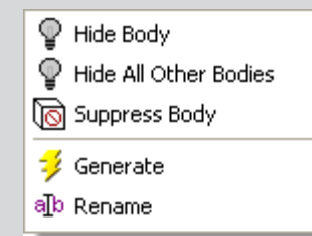
Contextual menu upon RMB click



Insert can be used to add operations anywhere in the tree

Suppress can be used to deactivate a selected operation

Delete can be used to delete a selected operation



It is recommended to suppress an operation instead of deleting it. It helps the user with the option of unsuppressing it if needed in the future.

Details View

- Details of Feature operations selected in Tree outline are displayed
- Input the details for new Feature operations to be performed
- Edit details of existing Feature operations if needed

Details View of new Feature to be performed

Details View	
Details of Extrude1	
Extrude	Extrude1
Base Object	Sketch1
Operation	Add Material
Direction Vector	None (Normal)
Direction	Normal
Extent Type	Fixed
☐ FD1, Depth (>0)	1 m
As Thin/Surface?	No
Merge Topology?	Yes

Specify details for feature creation

Details View of existing Feature

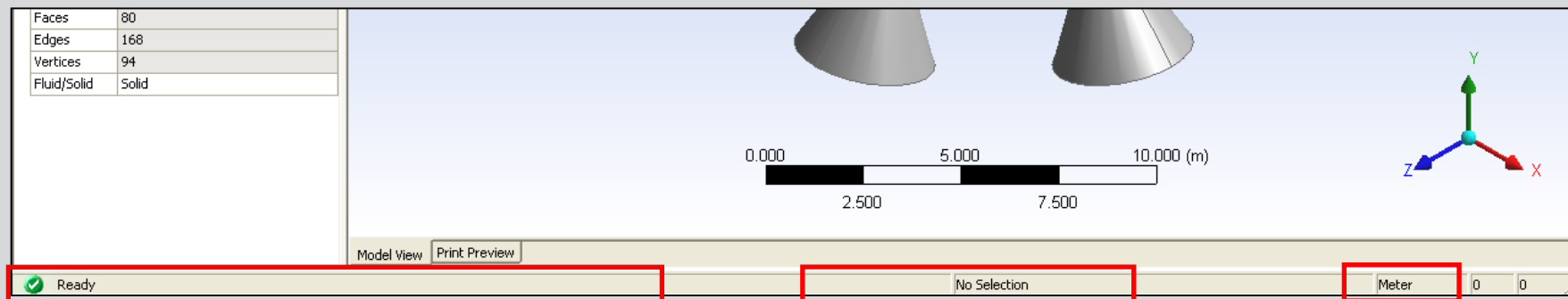
Details View	
Details of Extrude1	
Extrude	Extrude1
Base Object	Sketch1
Operation	Add Material
Direction Vector	None (Normal)
Direction	Normal
Extent Type	Fixed
☐ FD1, Depth (>0)	1 m
As Thin/Surface?	No
Merge Topology?	Yes

Gray colored details of previously created feature cannot be modified

Details View of existing Feature through Edit Selections option

Details View	
Details of Extrude1	
Extrude	Extrude1
Base Object	Apply
Operation	Add Material
Direction Vector	None (Normal)
Direction	Normal
Extent Type	Fixed
☐ FD1, Depth (>0)	1 m
As Thin/Surface?	No
Merge Topology?	Yes

All details of previously created feature can be modified



Status/Info Bar

- Displays Status of geometry model
- Displays dynamic instructions

- Ex:  Ready

 Extrude Creation -- Click the Generate button to complete the extrude

Units Display Bar

- Displays Unit used in current project

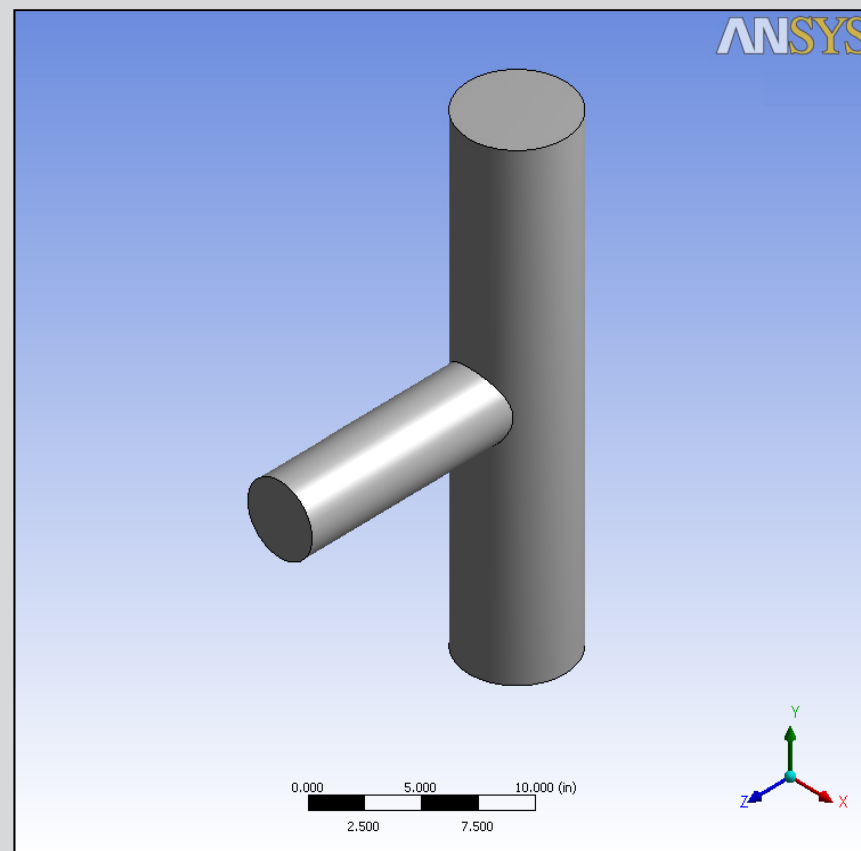
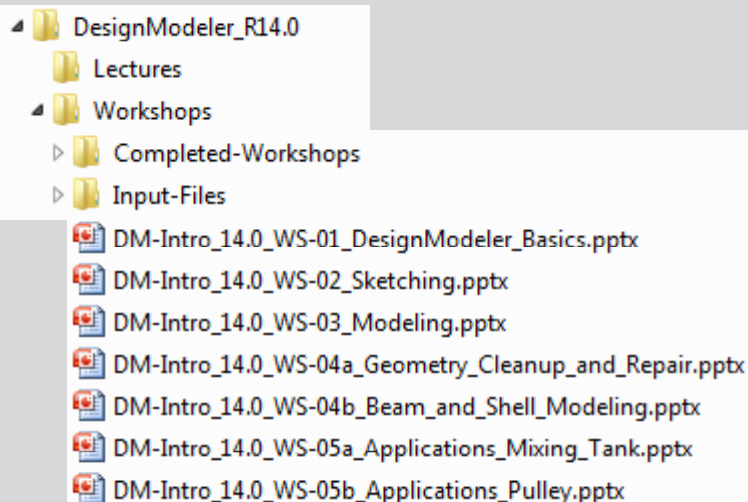
Entity Details Bar

- Displays details of entity selected in Graphics Window or Tree Outline.

- Ex: 

Workshop 1 – DesignModeler Basics

- Workshops are contained within the DesignModeler_R14.0 folder supplied.
- Several Workshops require supporting files which can be found in the Input-Files Folder.
- Pre-completed projects for each Workshop are supplied in the Completed-Workshops folder for your convenience.



Appendix

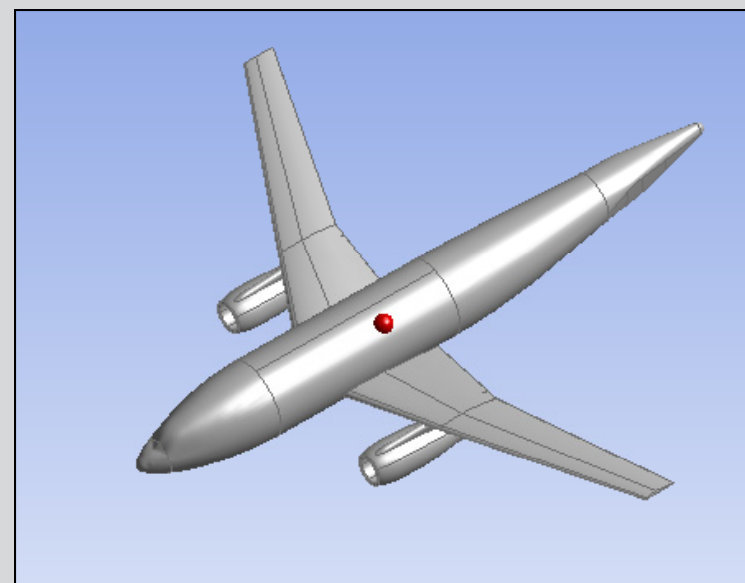
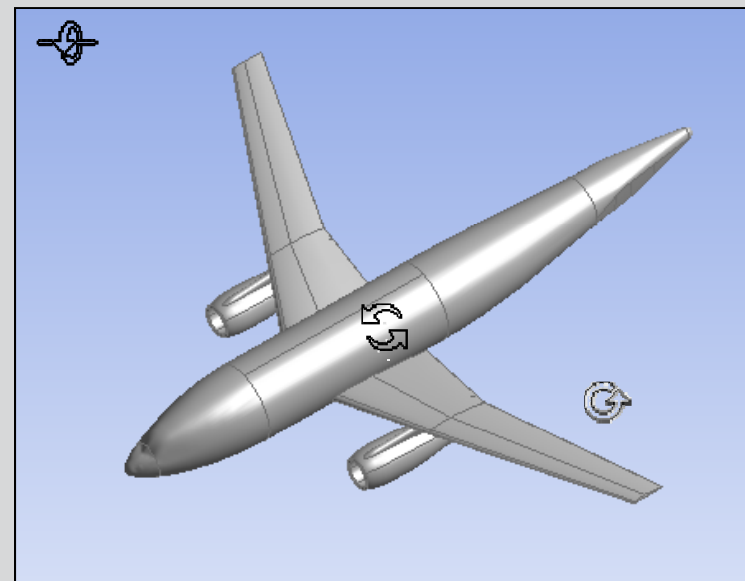
Contents

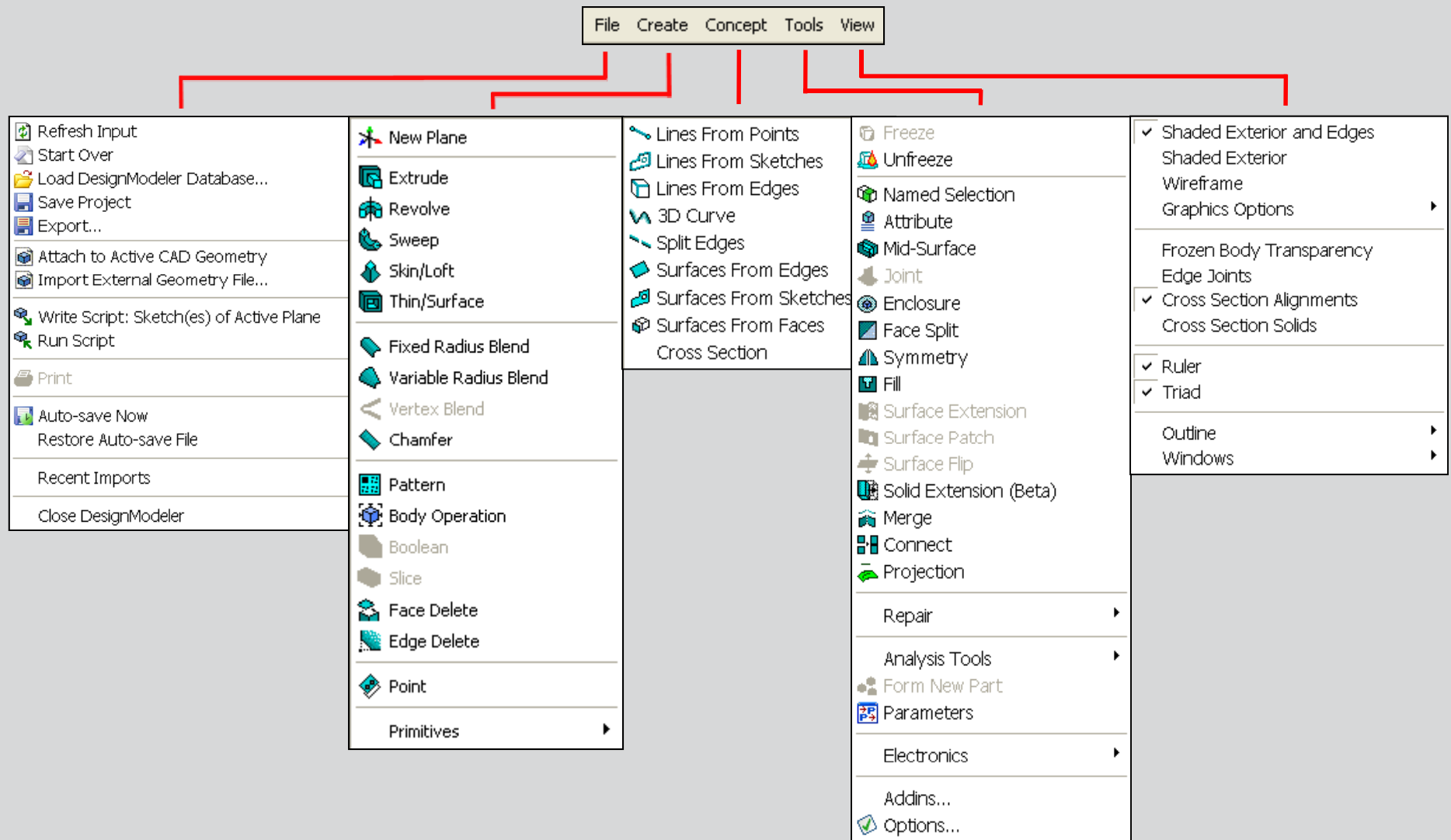
- **Mouse Control**
- **Menu Toolbar**
- **Feature Operation Toolbar**

Details on Mouse Control

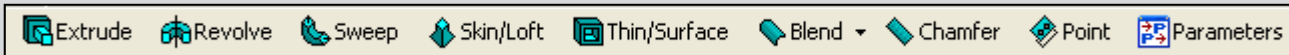
Rotate Behavior (LMB):

- Cursor outside center : 
Rotation about Z view
 - Cursor near center of graphics screen : 
Free rotations
 - Cursor near edge of graphics screen : 
Rotations about X (top/bottom) or Y (left/right) axes
-
- While in Rotate, Pan, or Zoom mode:
 - Left click on model: 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

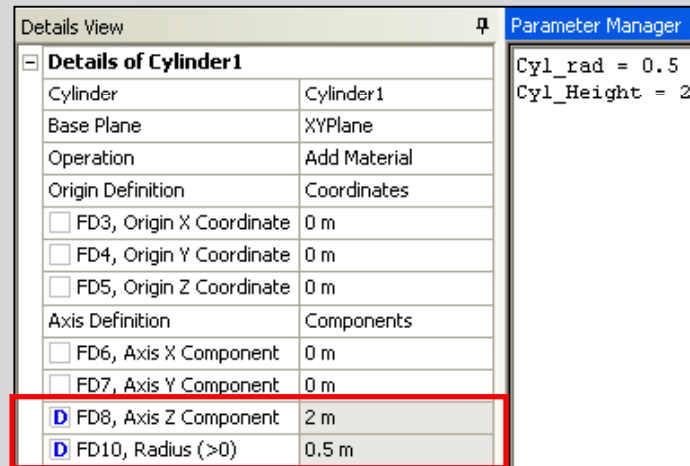




Feature Operation Toolbar



- Add/modify solid bodies
- Option to parameterize



- Plane Toolbar
 - Create new plane and new sketch
 - List of Planes and sketches

