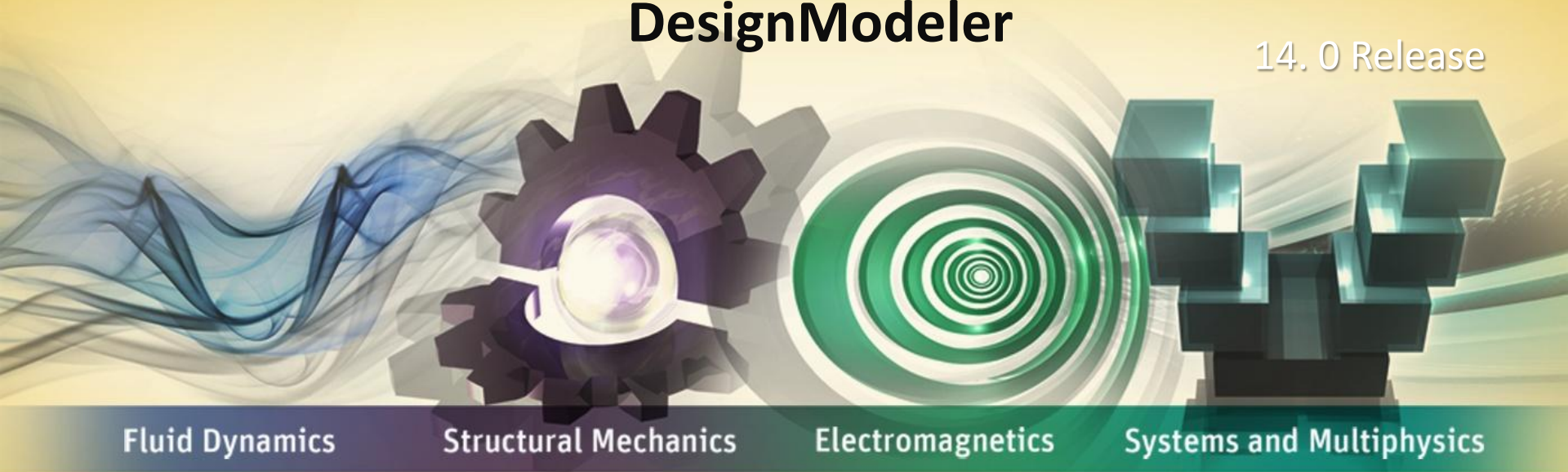


Lecture 3

Introduction to ANSYS DesignModeler

14.0 Release

A horizontal banner with a yellow-to-orange gradient background. It features four distinct 3D visualizations: blue fluid flow lines on the left, a purple gear with a glowing center, a green concentric circle pattern, and a stack of teal cubes on the right. Below these images is a dark teal bar containing four white text labels.

Fluid Dynamics

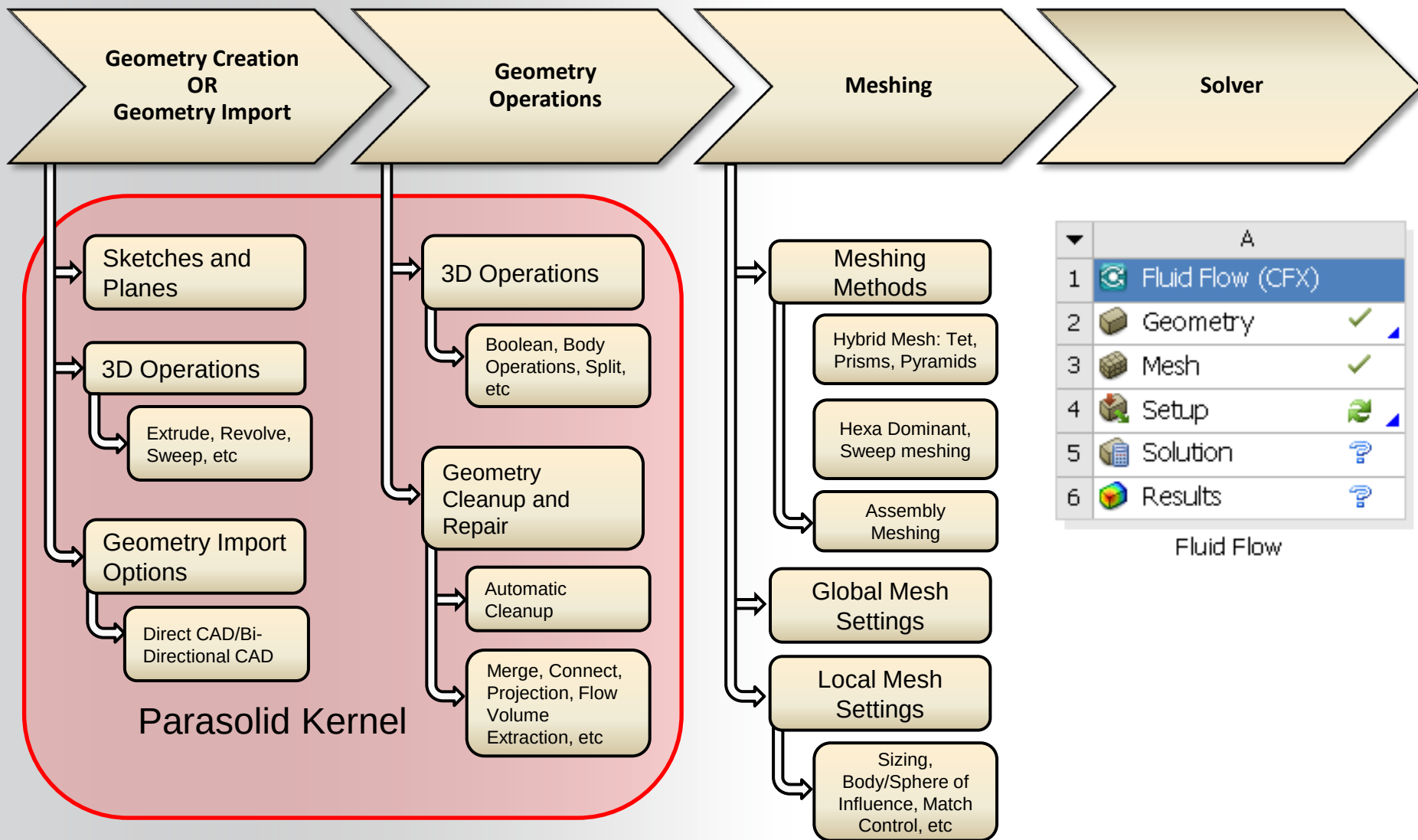
Structural Mechanics

Electromagnetics

Systems and Multiphysics

Introduction to ANSYS DesignModeler

Preprocessing Workflow



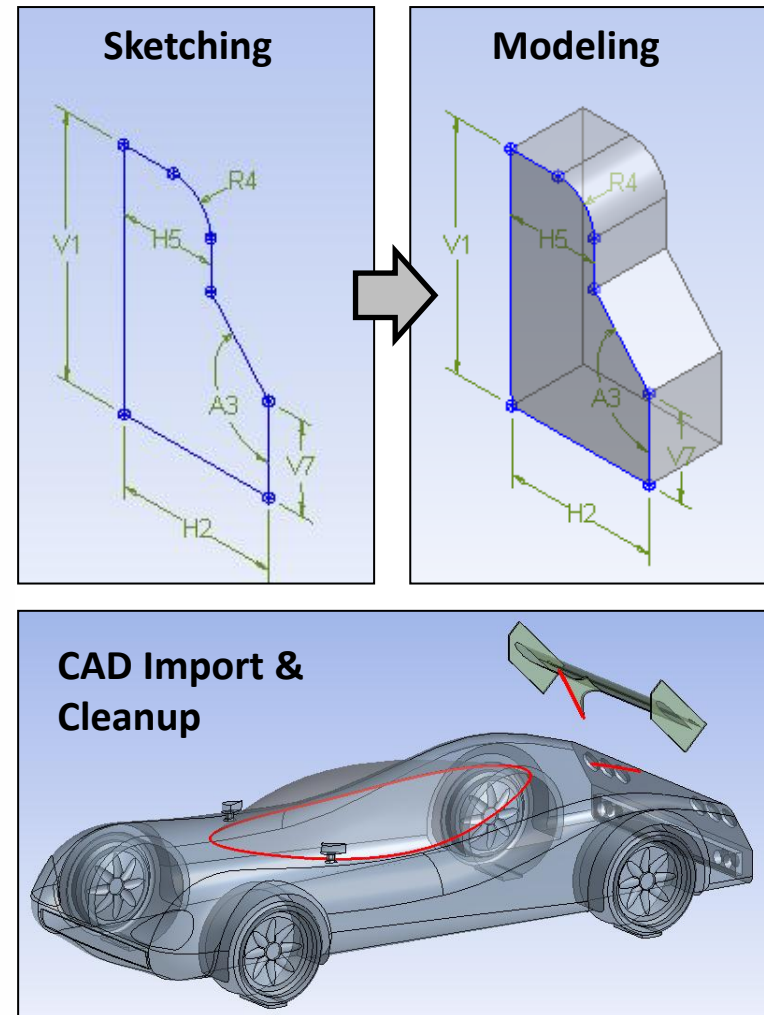
What is DesignModeler?

Overview

- DesignModeler is a parametric feature-based solid modeler
- Designed so that you can intuitively and quickly begin drawing 2D sketches, modeling 3D parts, or importing CAD models for engineering analysis preprocessing.

Application Fundamentals

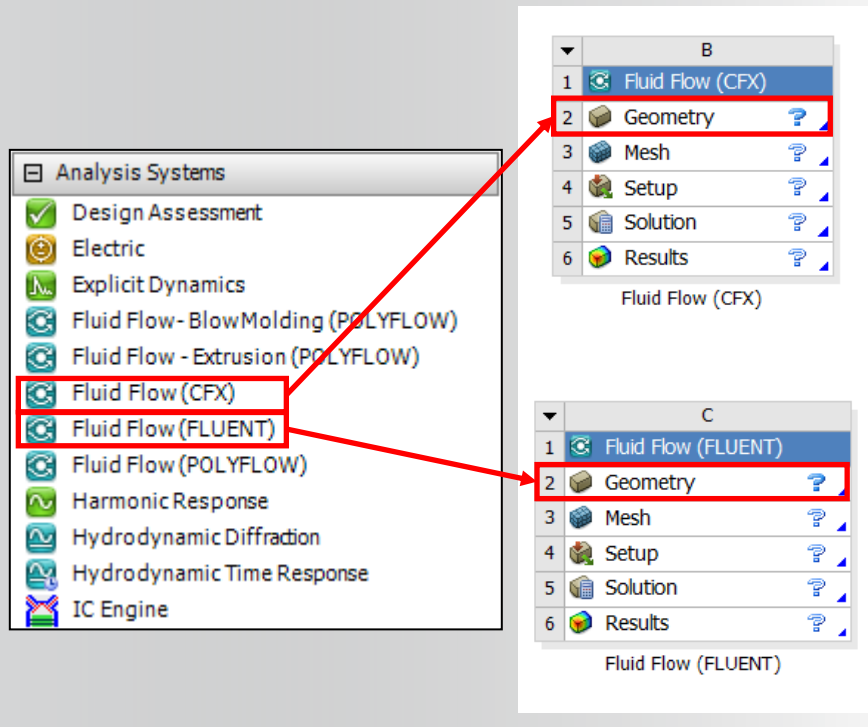
- Two basic modes of operation for geometry creation.
 - 2D Sketching
 - 3D Modeling
- Dedicated tools for import & clean-up.



Launching DesignModeler

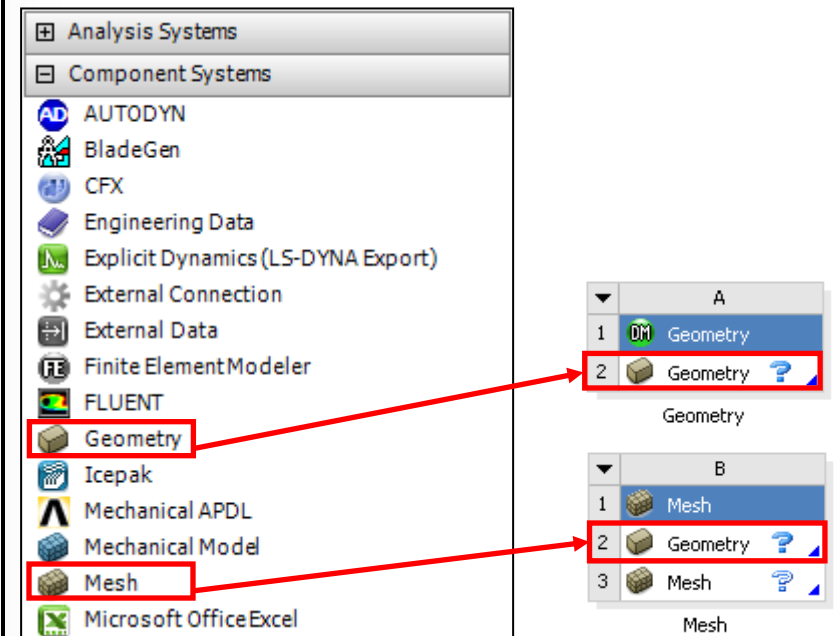
From Analysis Systems

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



From Component Systems

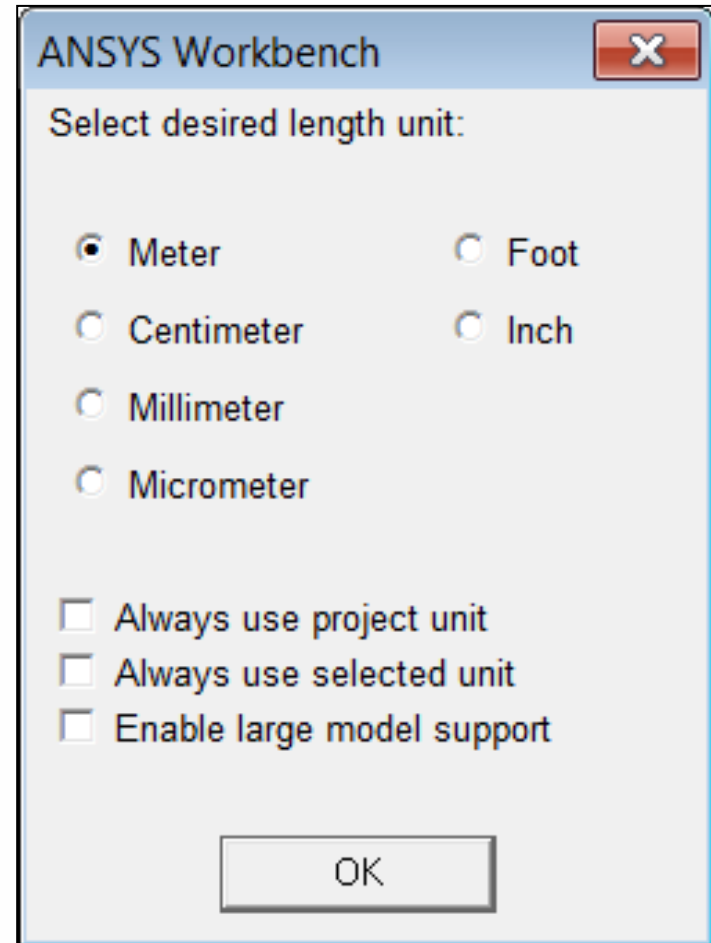
Eg: Geometry, Mesh



- ANSYS DesignModeler is launched within Workbench
- Double click Geometry in the System or right click and select Edit

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.
- **Units cannot be changed mid-session.**



DesignModeler Interface

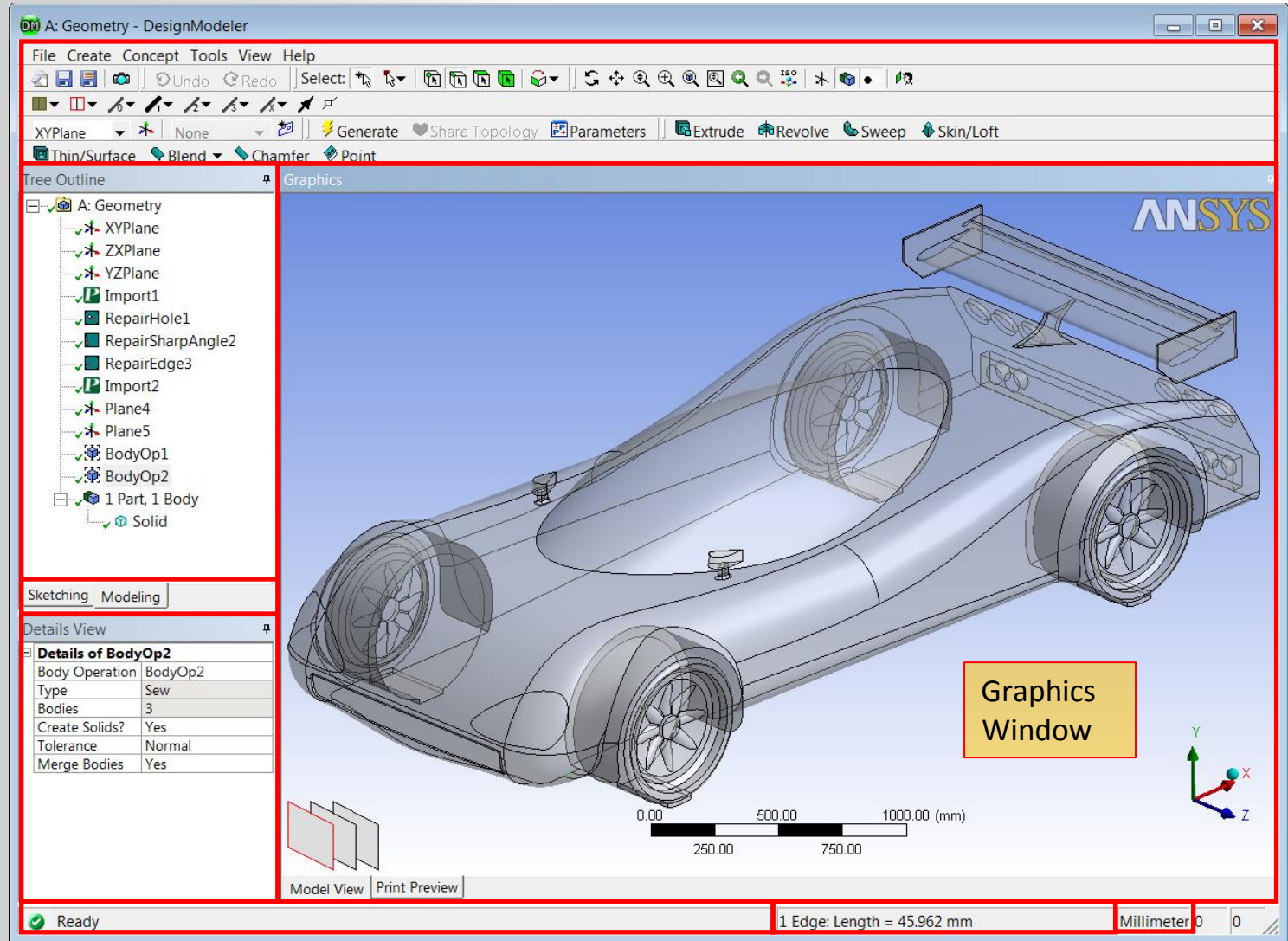
Toolbars

Tree Outline

Mode Tabs

Details View

Status/Info Bar



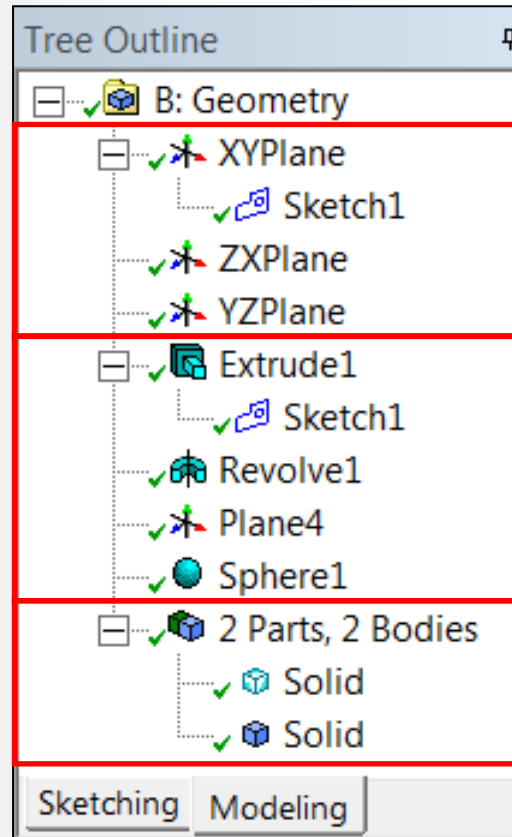
Graphics Window

Entity Details Bar

Units Display Bar

Working with the Tree Outline

- Starts with three default Planes
 - XY, ZX & YZ
 - Sketches created on Planes
- Modeling Operations listed sequentially (Feature History)
- Bodies/Parts listed beneath Modeling Operations
- The Tree Outline can be used to access, modify or delete modeling operations or sketches created at any point in the model history.



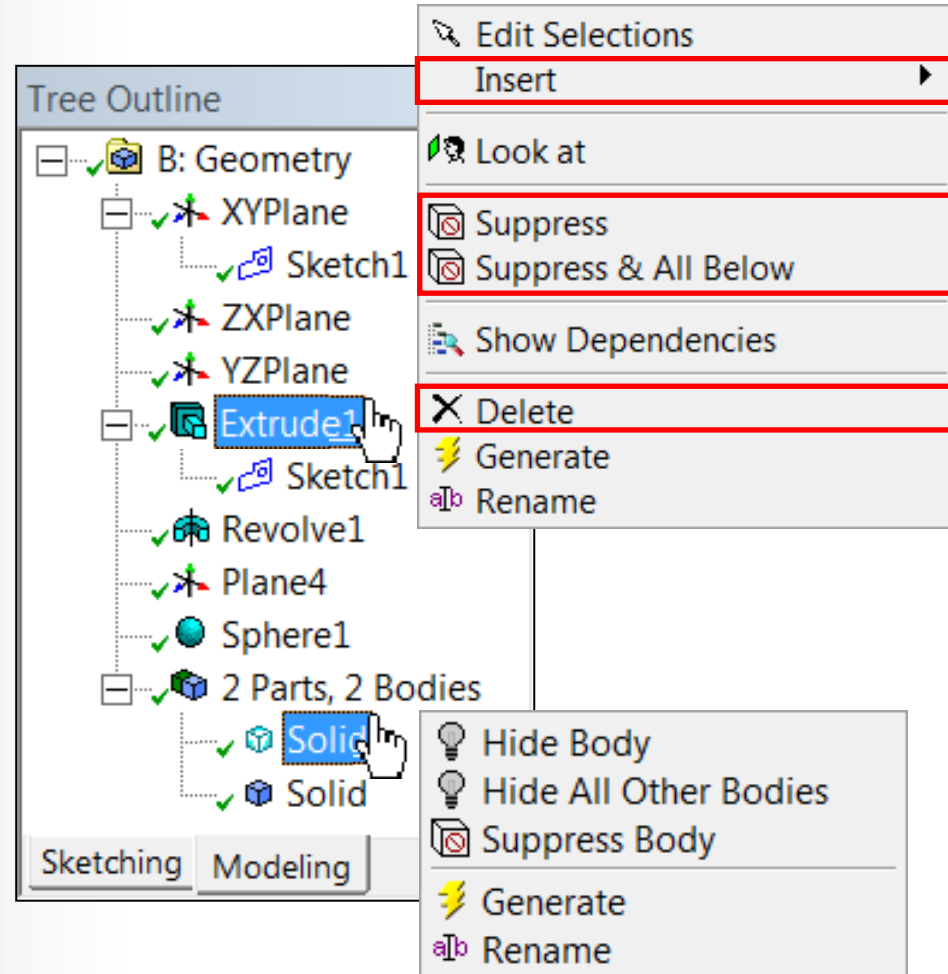
Default Planes

Sequential list of Modeling Operations

List of bodies/parts created

Context Menus

- Right clicking on any feature in the Tree Outline opens context sensitive menus.
- Examples;
 - Insert can be used to add operations anywhere in the tree
 - Suppress can be used to deactivate a selected operation (can be reactivated)
 - Delete can be used to delete a selected operation (cannot be reactivated)



Working with the Details View

- Feature inputs are listed in the Details View
- The second column contains user input values or selections.
- Activate each box by clicking
- Boxes requiring entity selection (Sketch, Geometry etc) will display Apply/Cancel when activated
- Yellow boxes indicate that input is required (numeric or selection input).

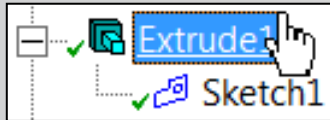
Geometry	Apply	Cancel
----------	-------	--------

Geometry	Not selected
----------	--------------

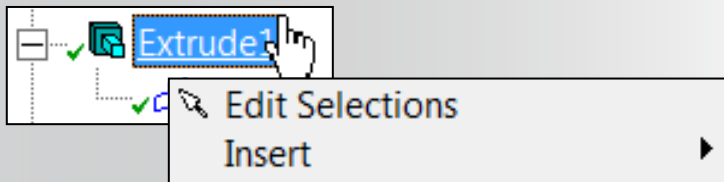
Details View	
[-] Details of Extrude1	
Extrude	Extrude1
Geometry	Sketch1
Operation	Add Material
Direction Vector	None (Normal)
Direction	Normal
Extent Type	Fixed
☐ FD1, Depth (>0)	1 m
As Thin/Surface?	No
Merge Topology?	Yes
[-] Geometry Selection: 1	
Sketch	Sketch1

Working with the Details View

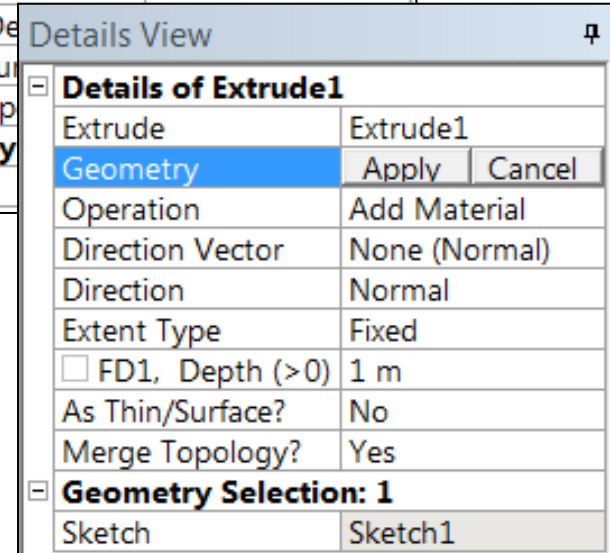
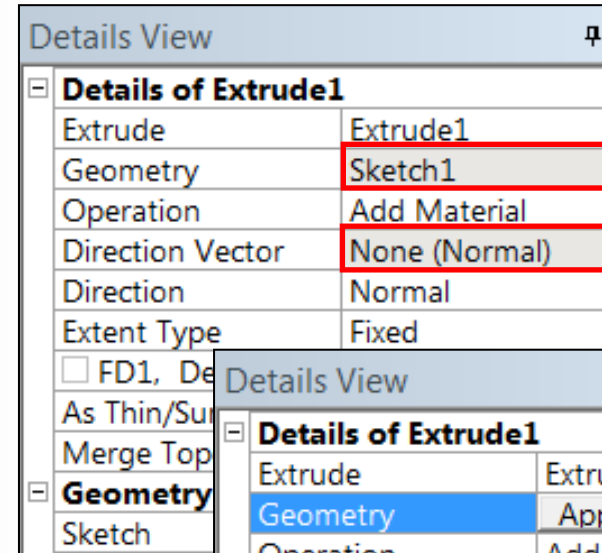
- Select an existing feature to edit its details

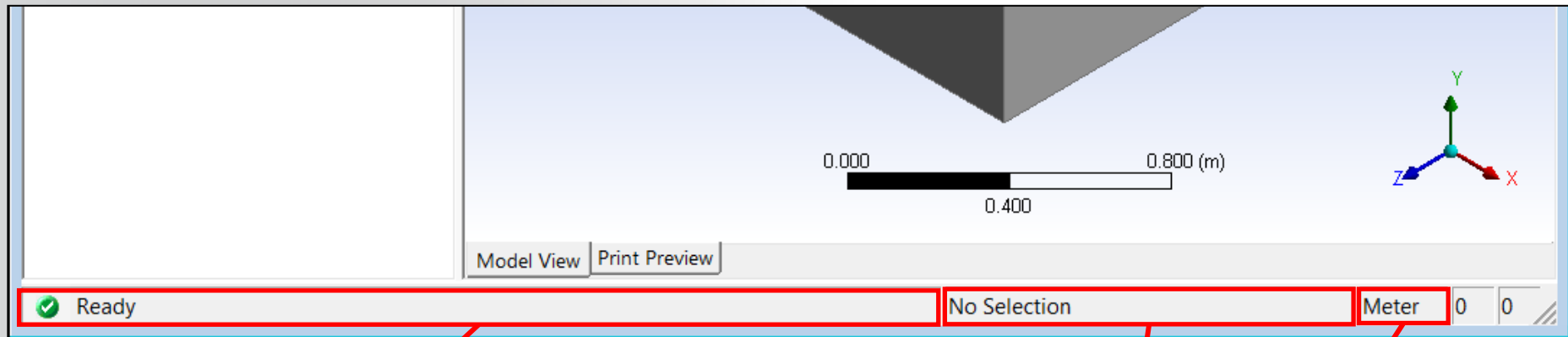


- Gray colored details of previously created feature cannot be modified
- To enable editing of all details right click on the feature in the Tree Outline and select Edit Selections.



- All details of previously created feature can be modified





Status/Info Bar

- Displays Status of geometry model
- Displays dynamic instructions
- Eg:  Ready

 Box Creation -- Select a point and diagonal or two points to define the box

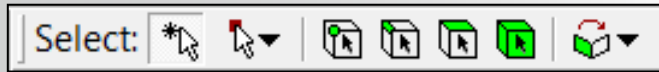
Units Display Bar

- Displays Unit used in current project

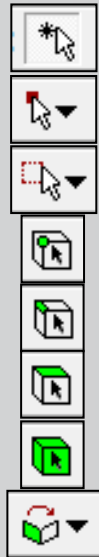
Entity Details Bar

- Displays details of entity selected in Graphics Window or Tree Outline.
- Eg:  1 Edge: Length = 1 m

Toolbars: Selection Modes



Entity Selection Mode

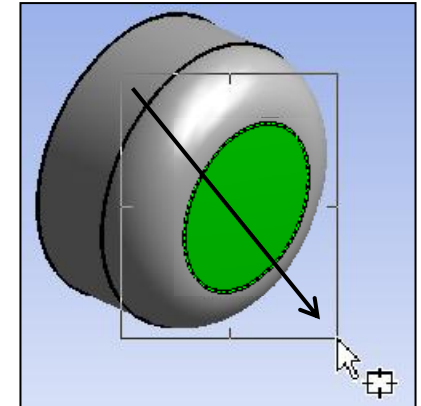
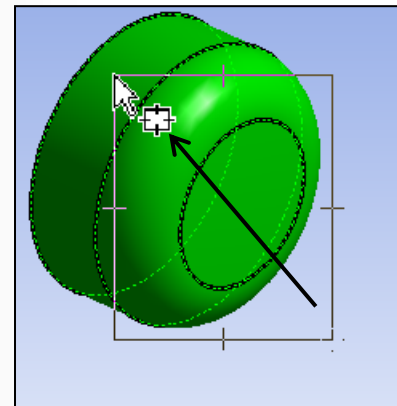


- New Selection
- Single Select
- Box Select
- Select Points
- Select Edges
- Select Faces
- Select Bodies
- Extend Selection for multiple entities –

- Extend to Adjacent
- Extend to Limits
- Flood Blends
- Flood Area
- Extend to Instances

Example – Box Select

- 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



Toolbars: View Controls

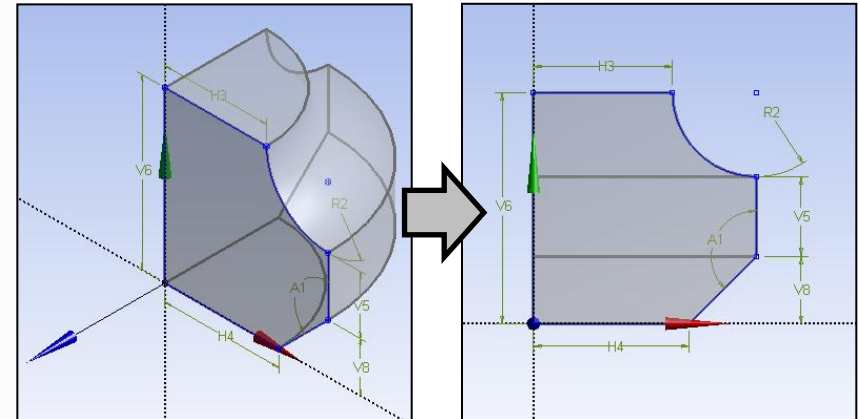


View Options

-  • Rotate
-  • Pan
-  • Zoom
-  • Box Zoom
-  • Fit Model to Screen
-  • Magnifier Window
-  • Flip View Back/Forwards
-  • Set Iso View
-  • Display Plane
-  • Display Model
-  • Display Points
-  • Look At

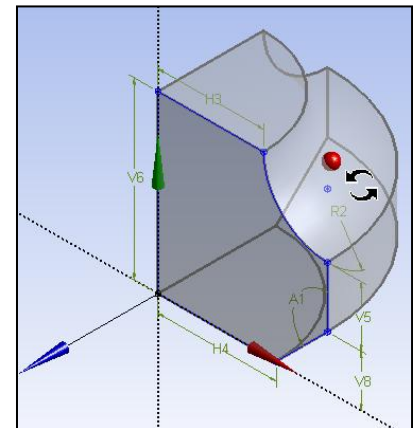
Example – Look At

- Snaps view to active plane normal



Example – Rotate

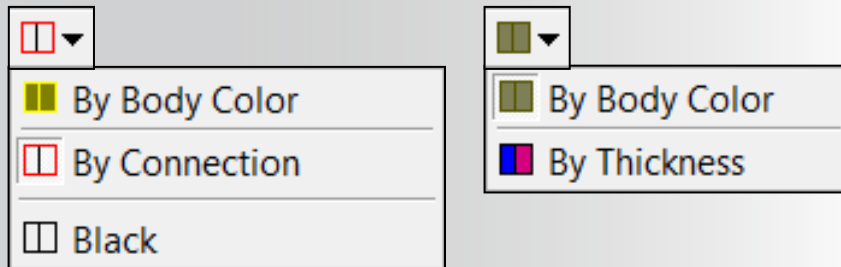
- In Rotate, Pan or Zoom mode left click on geometry to set rotation origin (red dot)



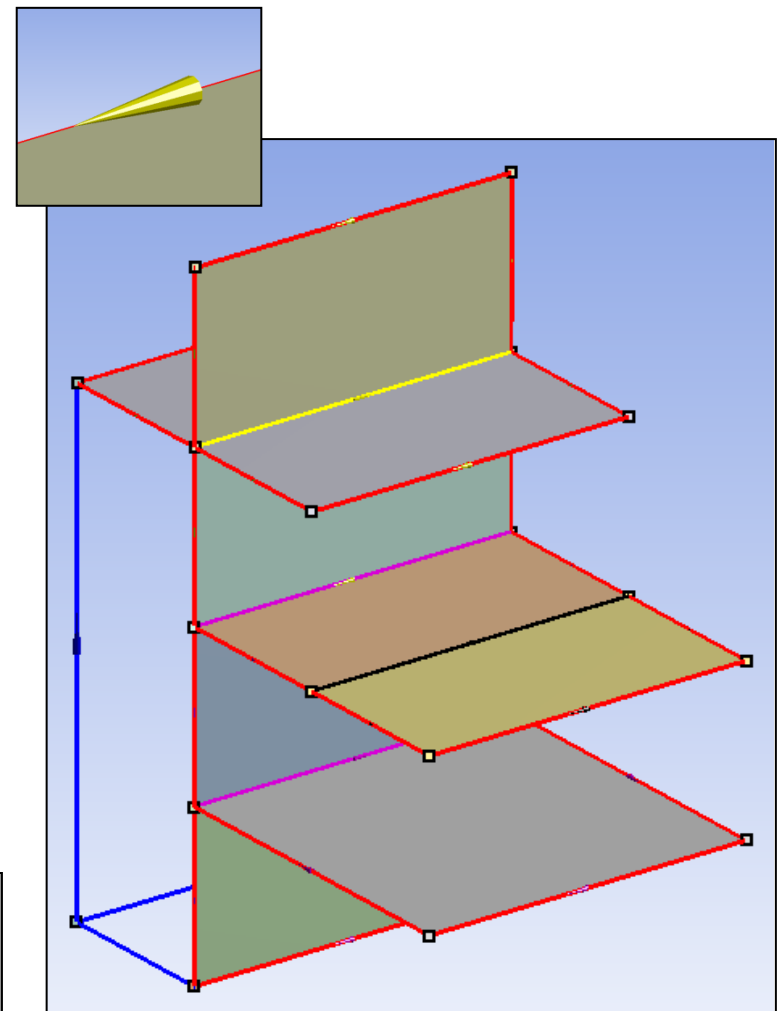
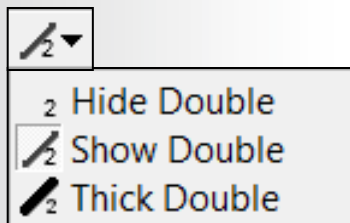
Toolbars: Display Controls



Edge Display Options



-  • Free Edges - 0 face - **Blue**
-  • Single Edges - 1 face - **Red**
-  • Double Edges - 2 faces - **Black**
-  • Triple Edges - 3 faces - **Pink**
-  • Multiple Edges (>3) - **Yellow**
-  • Display Edge Direction
-  • Display Vertices



Left Mouse Button (LMB)

- **Geometry selection**

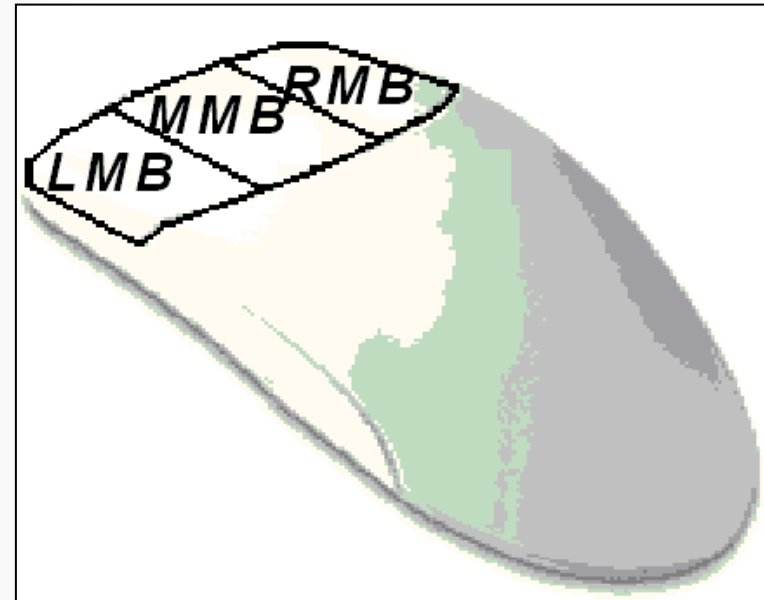
- <CTRL> + LMB adds/removes selected entities
- Hold LMB and sweep cursor = continuous selection

- **Middle Mouse Button (MMB)**

- Rotate
- Shift + MMB : Zoom
- Ctrl + MMB : Pan

- **Right Mouse Button (RMB)**

- Box Zoom
- Opens context menus



- **Hot Keys: Hot Keys can help in performing operations quickly**
 - **Ctrl-Z/Y:** Undo/Redo (sketching mode only)
 - **Ctrl-A:** Select All
 - **Ctrl-C/X/V:** Copy/Cut/Paste (sketching mode only)
 - **Ctrl-P/E/F/B:** Toggle Point/Edge/Face/Body selection filter
 - **F3:** Apply
 - **F5:** Generate
 - **F6:** Display (Shaded/Shaded+Edges/Wireframe)
- **Full list in Appendix**

Workshop 1 – DesignModeler Basics

- Workshops are contained within the DesignModeler_R14.0 folder supplied.
- Some Workshops require supporting files (found in the Input-Files Folder).
- Pre-completed Workshops are supplied in the Completed-Workshops folder for your convenience.

DesignModeler_R14.0

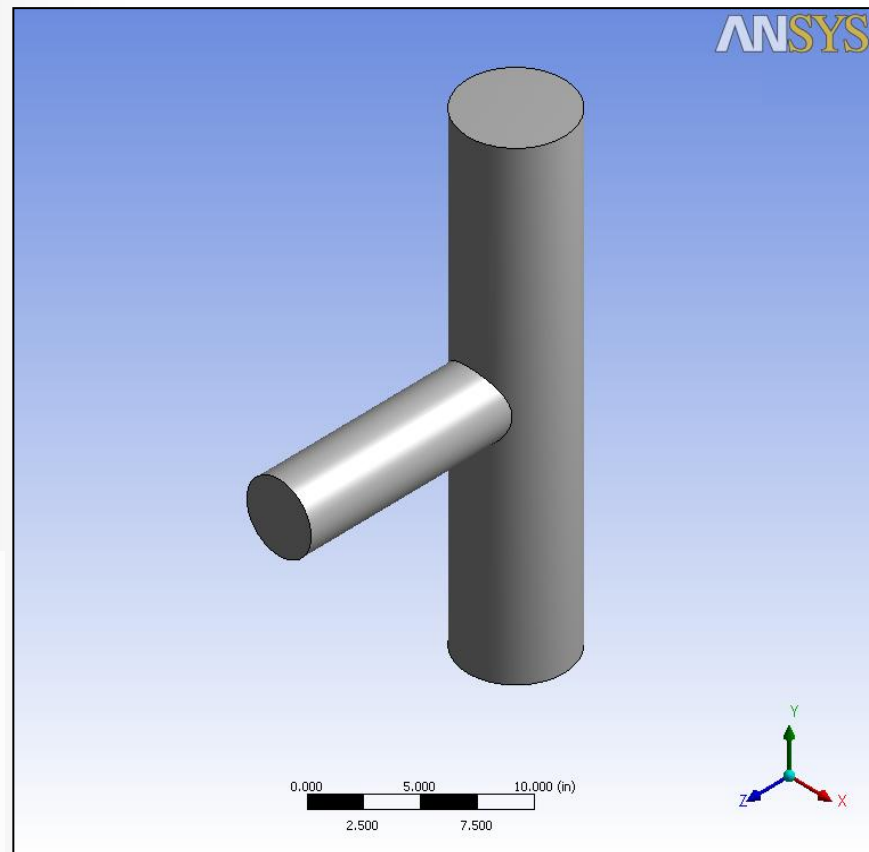
Lectures

Workshops

Completed-Workshops

Input-Files

- DM-Intro_14.0_WS-01_DesignModeler_Basics.pdf
- DM-Intro_14.0_WS-02_Sketching.pdf
- DM-Intro_14.0_WS-03_Modeling.pdf
- DM-Intro_14.0_WS-04a_Geometry_Cleanup_and_Repair.pdf
- DM-Intro_14.0_WS-04b_Beam_and_Shell_Modeling.pdf
- DM-Intro_14.0_WS-05a_Applications_Mixing_Tank.pdf
- DM-Intro_14.0_WS-05b_Applications_Auto_Aero.pdf
- DM-Intro_14.0_WS-05c_Applications_Chamber.pdf
- DM-Intro_14.0_WS-05d_Applications_Bracket.pdf
- DM-Intro_14.0_WS-05e_Applications_Pulley.pdf



Contents

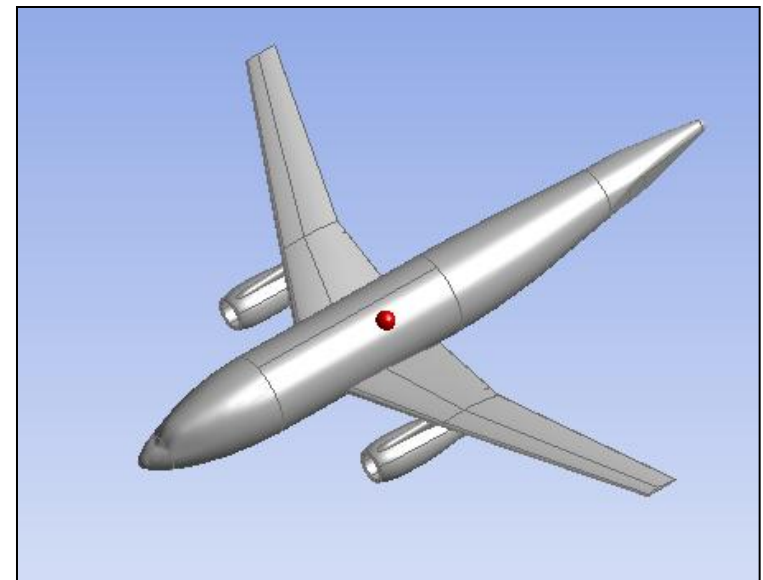
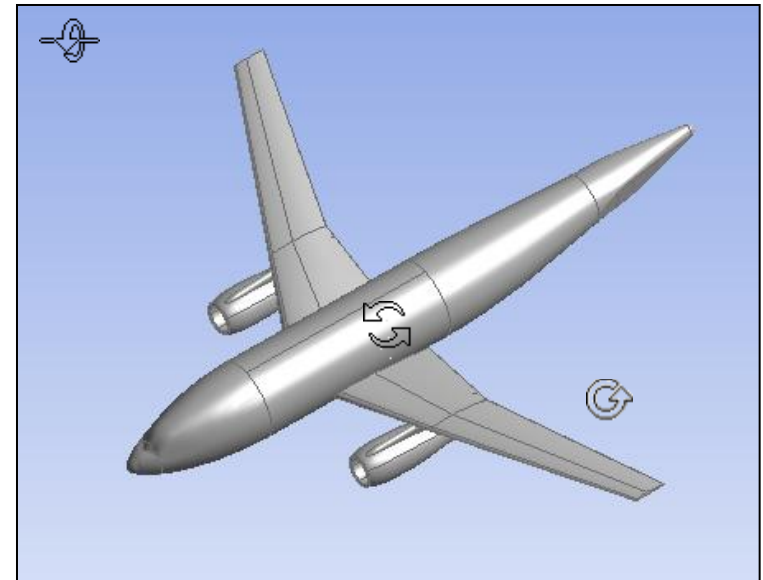
- Hot Keys
- Mouse Control
- Menu Toolbar
- Feature Operation Toolbar

- **Escape:** equivalent to New Selection (if button is not grayed out; also accessible via the Selection Toolbar)
- **Ctrl+A:** selects three Body Types: Solid, Surface, and Line
- **Ctrl+B:** equivalent to Selection Filter: Bodies (also accessible via the Selection Toolbar)
- **Ctrl+C:** equivalent to Copy (Sketching mode only; also accessible via the Modify Toolbox)
- **Ctrl+E:** equivalent to Selection Filter: Edges (also accessible via the Selection Toolbar)
- **Ctrl+F:** equivalent to Selection Filter: Faces (also accessible via the Selection Toolbar)
- **Ctrl+N:** equivalent to Start Over option (also accessible via the File Menu)
- **Ctrl+O:** equivalent to Load DesignModeler Database option (also accessible via the File Menu)
- **Ctrl+P:** equivalent to Selection Filter: Points (also accessible via the Selection Toolbar)
- **Ctrl+S:** equivalent to Save Project option (also accessible via the File Menu)
- **Ctrl+V:** equivalent to Paste (Sketching Mode only; also accessible via the Modify Toolbox)
- **Ctrl+X:** equivalent to Cut (Sketching Mode only; also accessible via the Modify Toolbox)
- **Ctrl+Y:** equivalent to Redo (Sketching Mode only; also accessible via the toolbar)
- **Ctrl+Z:** equivalent to Undo (Sketching Mode only; also accessible via the toolbar)
- **F1:** ANSYS Inc. online help with DesignModeler highlighted; for more information, see Help Menu
- **F2:** Install help
- **F3:** Apply (during feature creation; for more information, see Apply/Cancel in Plane)
- **F4:** Cancel (during feature creation; for more information, see Apply/Cancel in Plane)
- **F5:** equivalent to Generate (also accessible via the 3D Features toolbar)
- **F6:** equivalent to Shaded Exterior and Edges, Shaded Exterior, and Wireframe model appearance controls (toggle between three; also accessible via the View Menu)
- **F7:** equivalent to Zoom to Fit (also accessible via the Rotation Modes Toolbar toolbar)

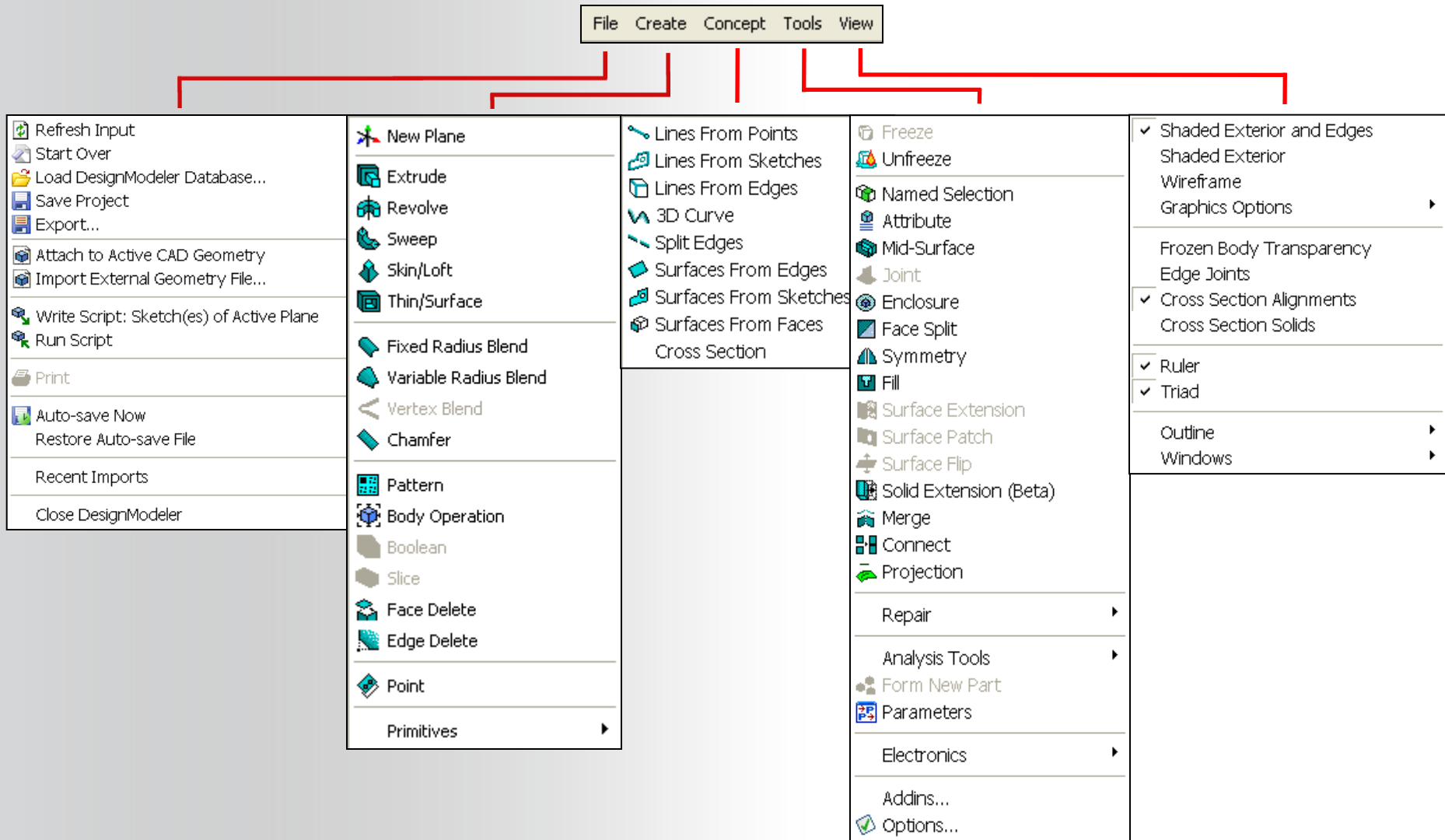
Details on Mouse Control

Rotate Behavior (LMB):

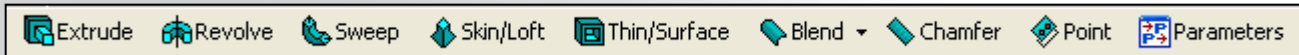
- Cursor outside center : 
Rotation about Z view
- Cursor near center of graphics screen : 
Free rotations
- Cursor near edge of graphics screen : 
Rotations about X (top/bottom) or Y (left/right) axes
- While in Rotate, Pan, or Zoom mode:
 - Left click on model: resets center of view and rotation at cursor location (identified by **red dot**)
 - Left click in open area re-centers model and rotation center to Centroid



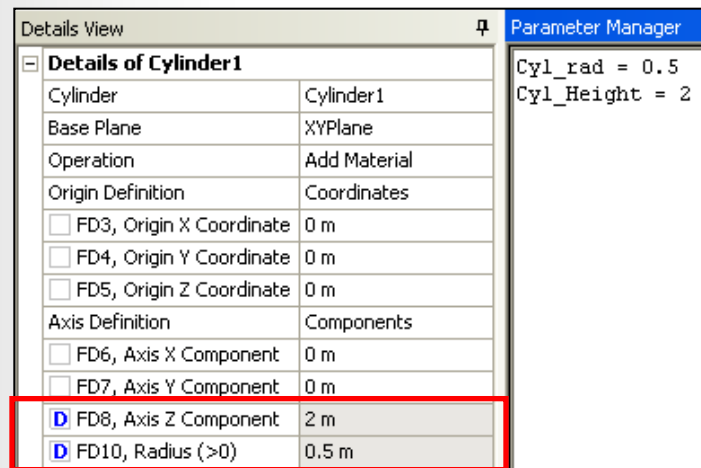
Menu Toolbar



Feature Operation Toolbar



- Add/modify solid bodies
- Option to parameterize



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

