EN1740 Computer Aided Visualization and Design

Spring 2012

3/13/2012

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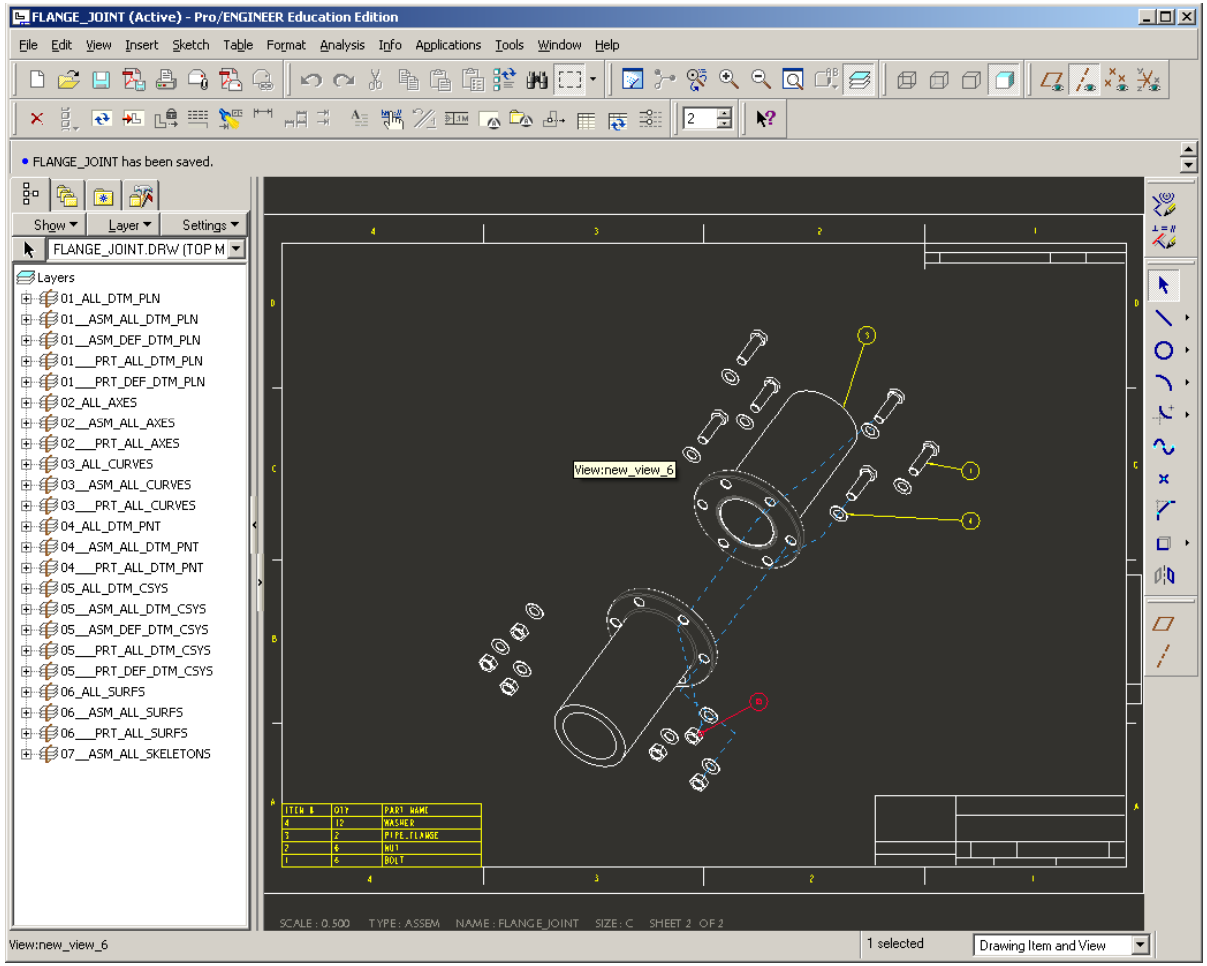
Last Time:

- Introduction to Assemblies
- Exploded Views

Tonight:

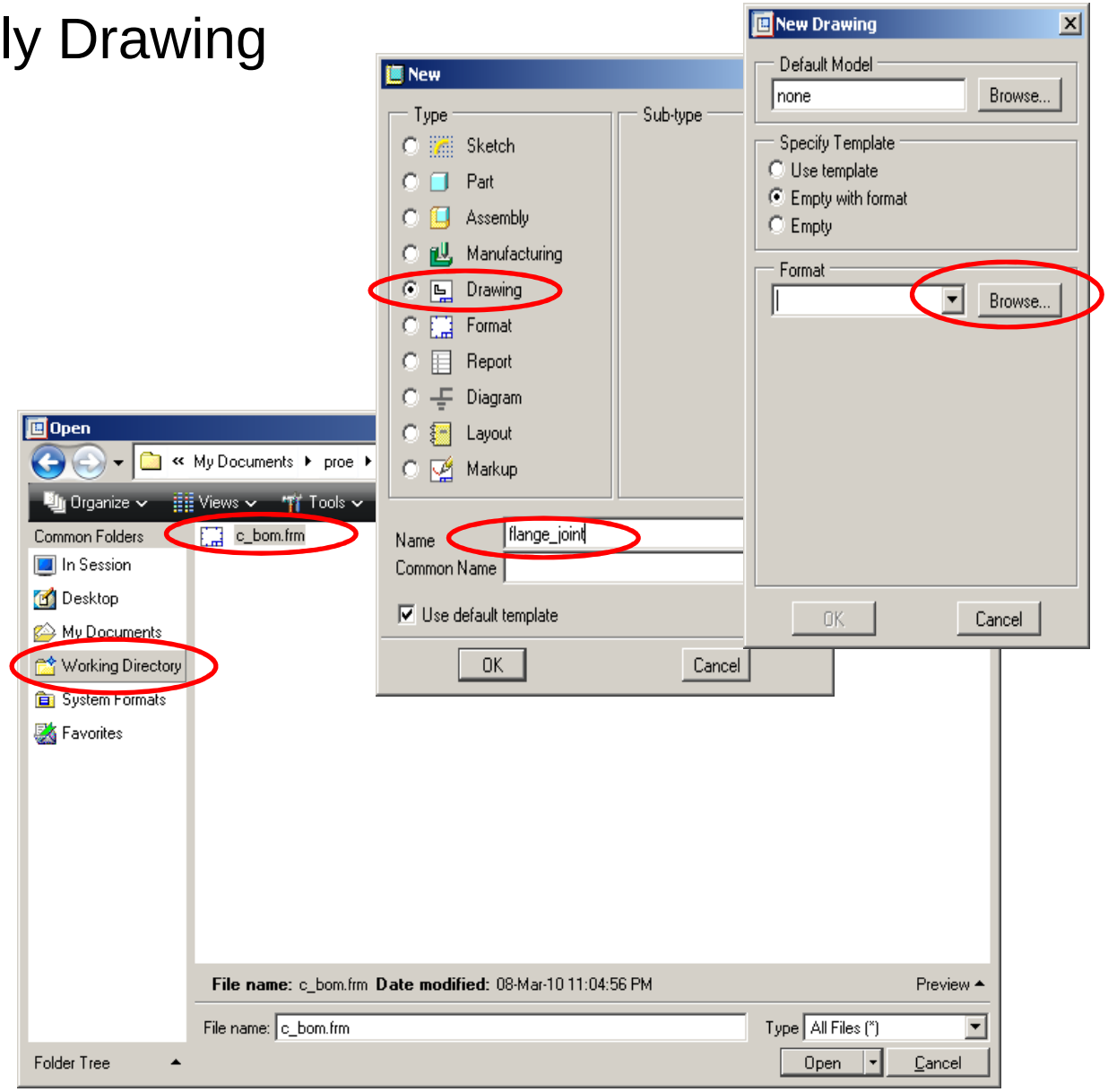
- Assembly drawings
    - X-sec
    - Exploded
    - Tables
        - BOM
        - Inclusions
- Simplified Reps
- Notes on Critical to Function Drawings
- Modeling text
- Color and Appearance Texture

Assembly Drawing



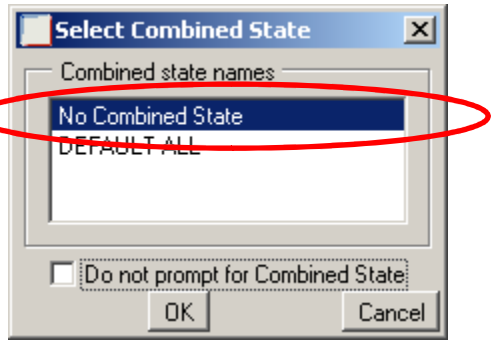
EXERCISE - Assembly Drawing

- Create an assembly drawing for the pipe flange assembly
  - Begins in same way as for components
  - Be sure to use same name as Assembly
- For Format, use c_bom.frm that came with the files for tonight's lecture (should be in working directory)

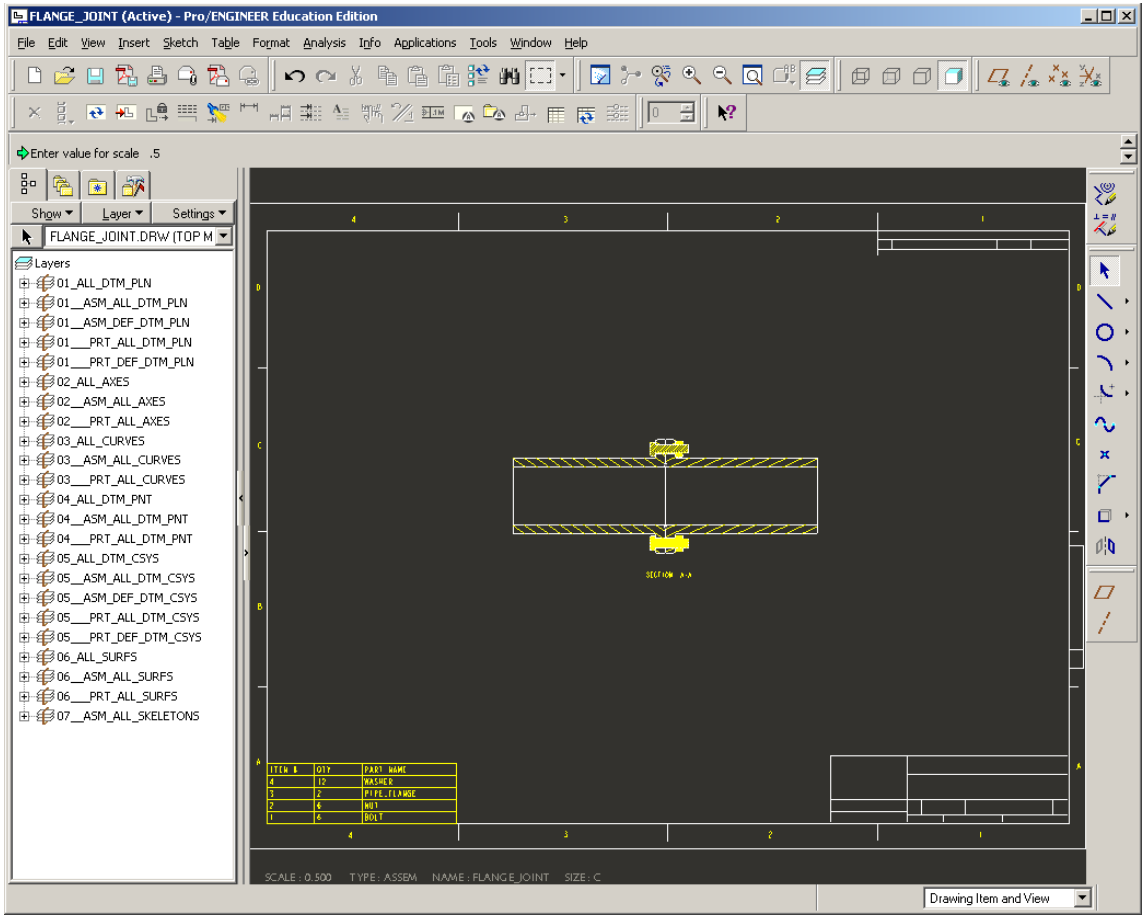


EXERCISE - Assembly Drawing

- When prompted select No Combined State

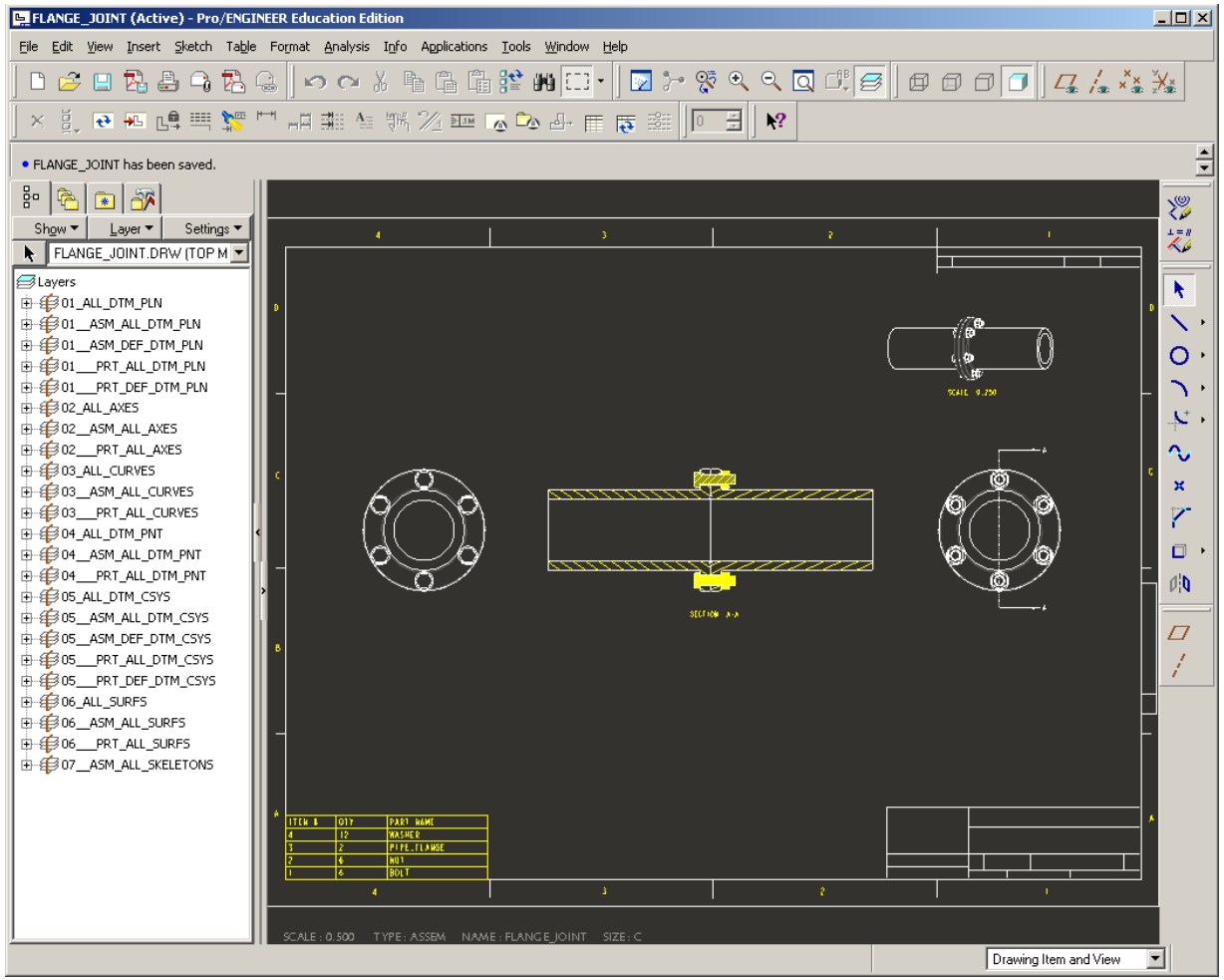


- Use FRONT orientation
- Set View Display to No Hidden, Tan-Dimmed
- Turn on Section A-A
- Change default scale to .5



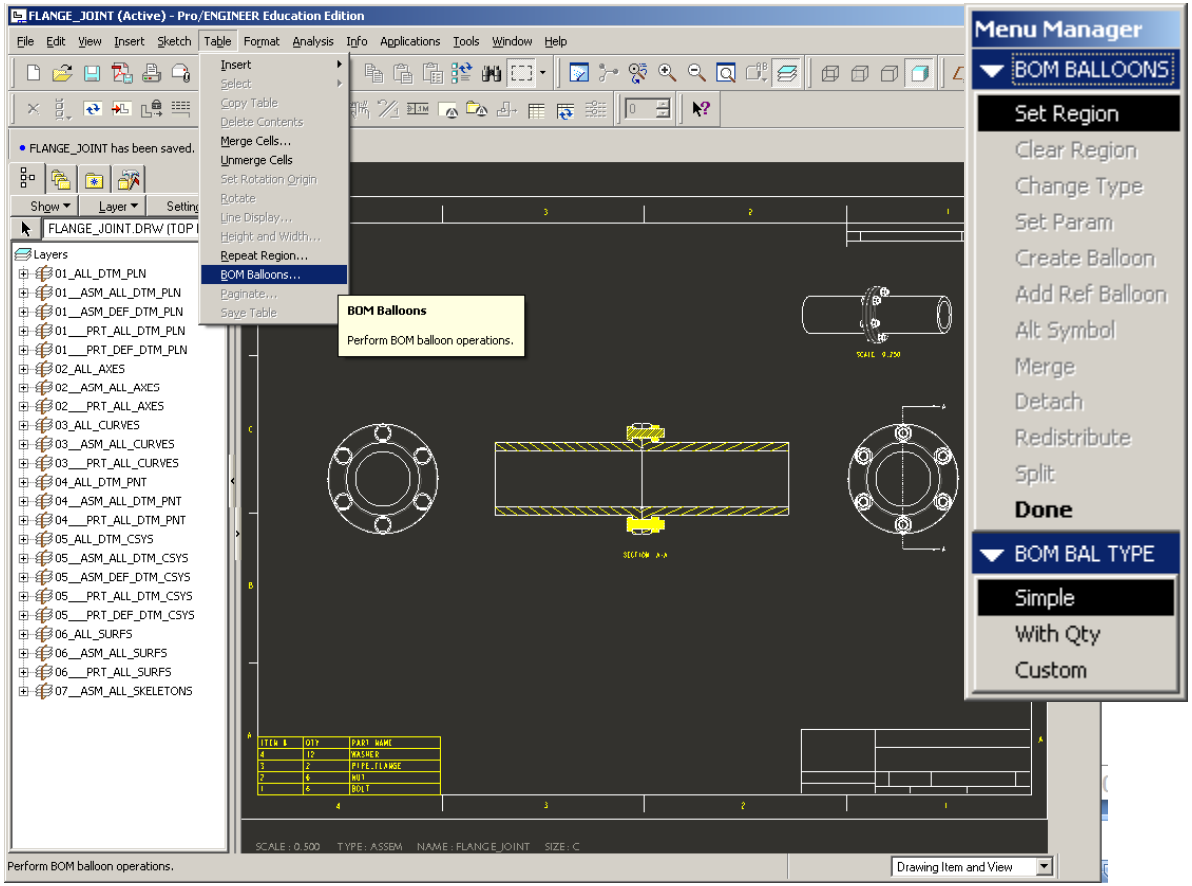
EXERCISE - Assembly Drawing

- Add two projection views
- Add section arrow to one of them
- Add a general view to aid in visualization in upper right



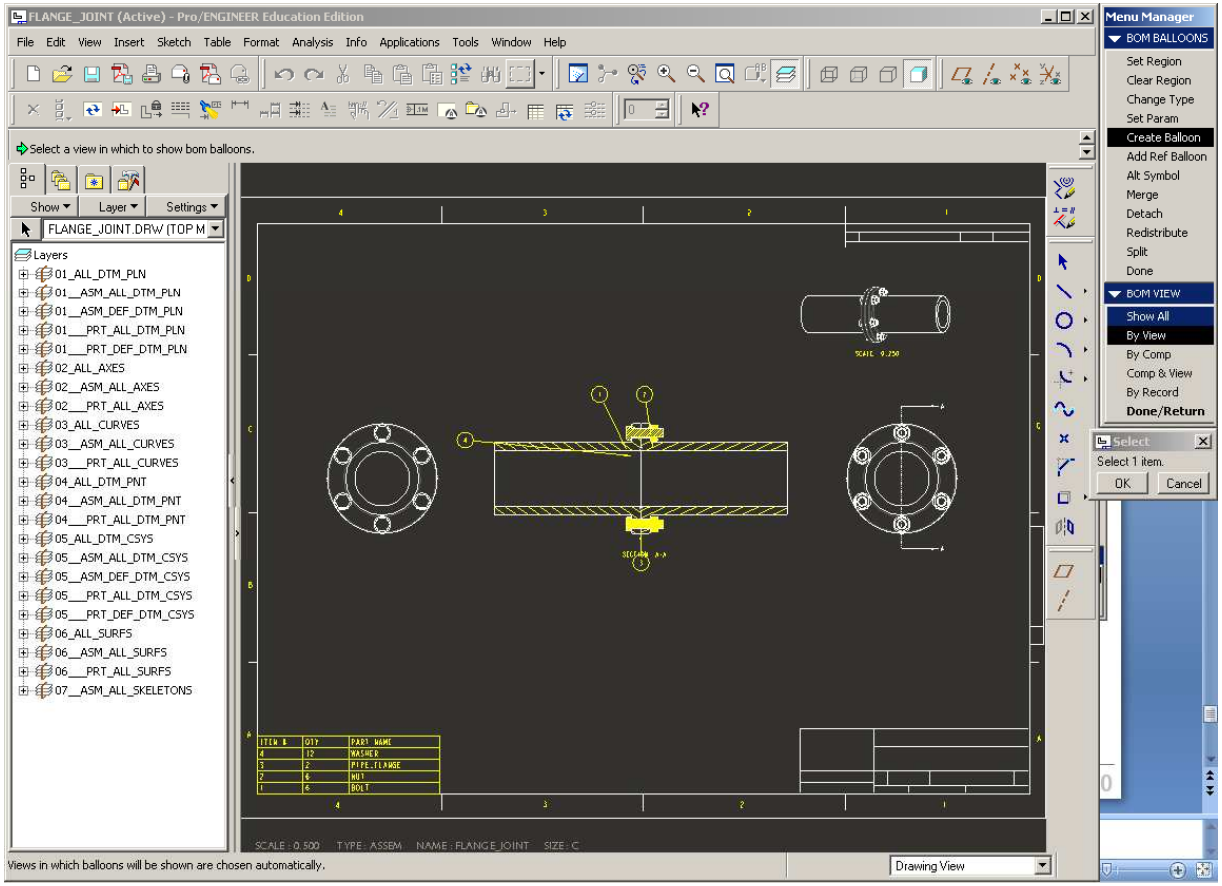
EXERCISE - Assembly Drawing

- Add Bill of Materials balloons
  - Table > BOM Balloons
  - Click on BOM table in lower left



EXERCISE - Assembly Drawing

- Add Bill of Materials balloons (cont.)
  - Create Balloons
  - Show All
- Arrange balloons so they make sense
  - Edit Attachment
  - Re-arrange

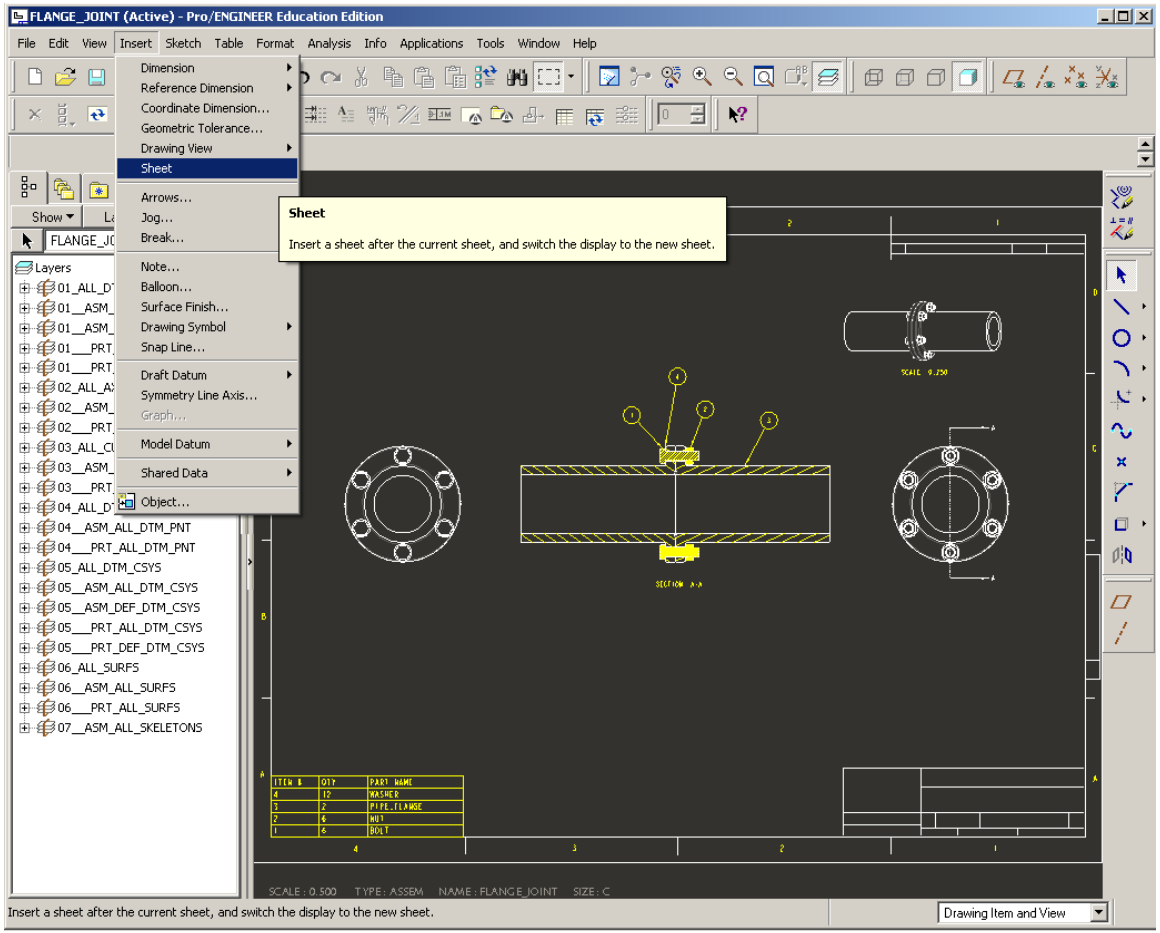


EXERCISE - Assembly Drawing

- Create a second sheet

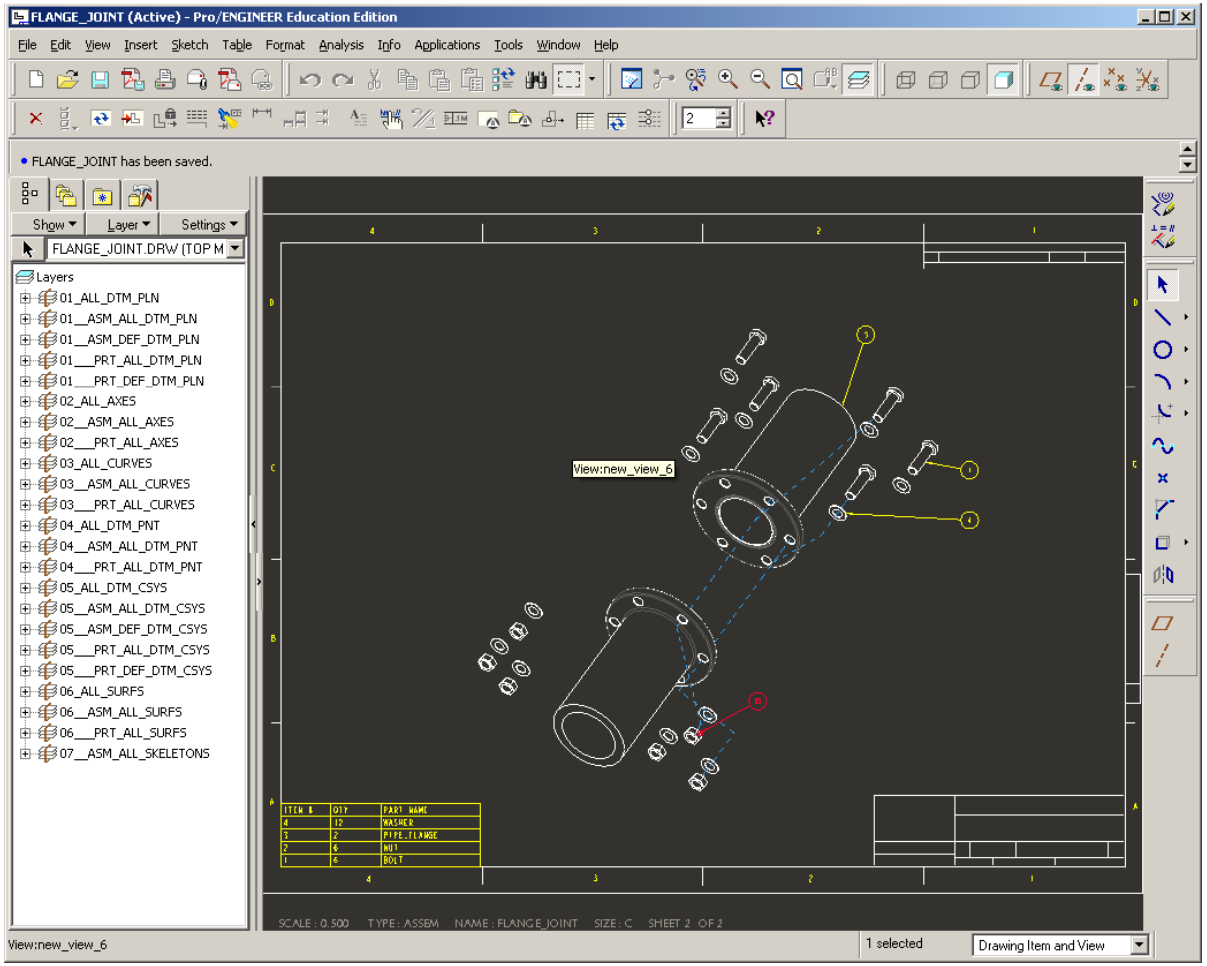
for the exploded view

  - Insert > Sheet



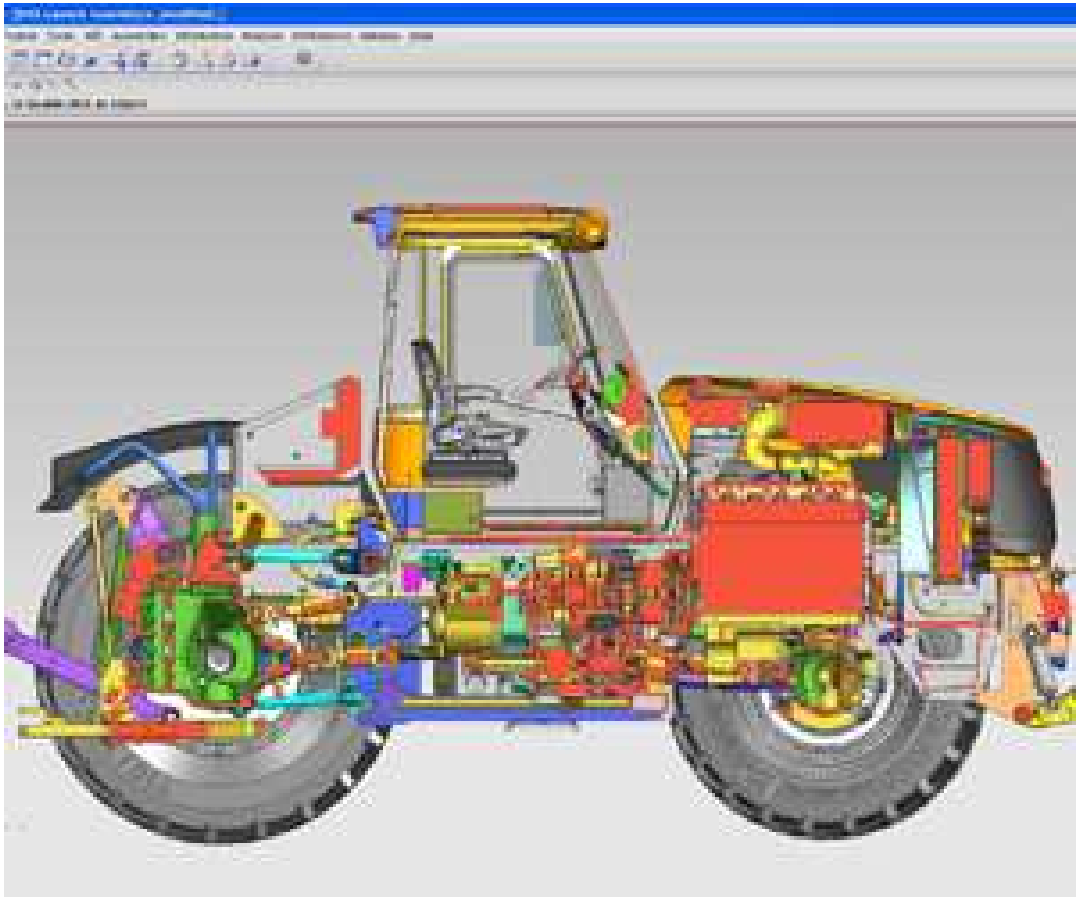
EXERCISE - Assembly Drawing

- Set View Display and show BOM balloons



Simplified Representations

- Simplified Reps allow for the management of large assemblies
- Components can either be included, excluded or reduced in the amount of information they contain

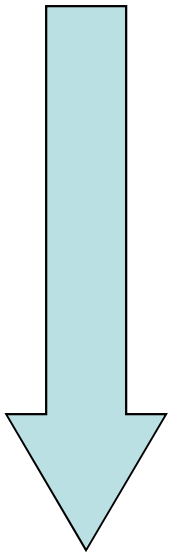


http://www.designnews.com/photo/48/48453-CA6432043_A.jpg

Simplified Representations

Types of Simplified Representations

More System Resources



Less System Resources

- Master Rep – Fully featured and detailed parts
- Geometry Rep – Will show modifications to assembly features, but not part features
- Graphics Rep – No changes reflected, basically just a place holder
- Symbolic Rep – Just a point

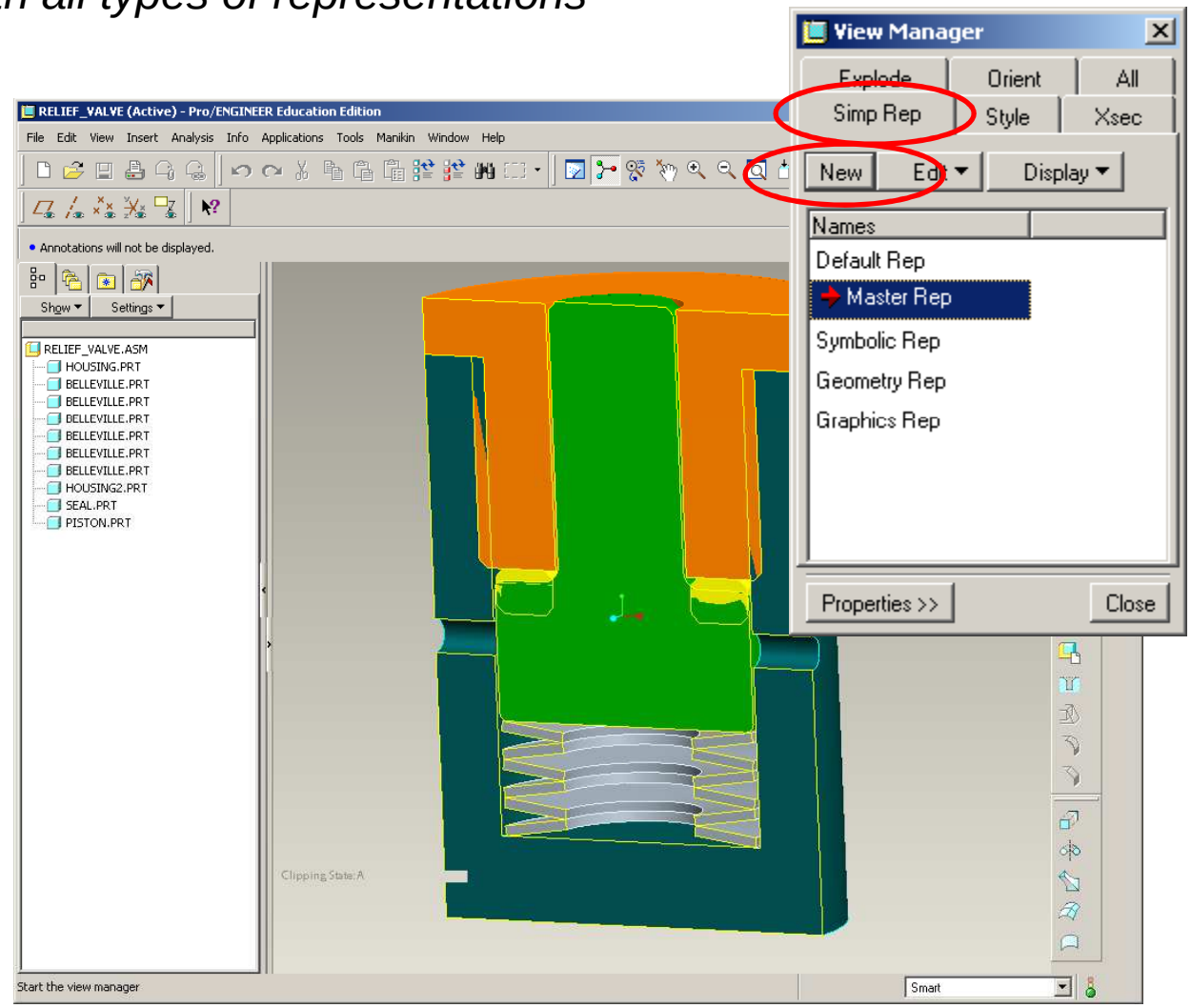
Representations can be applied to the whole model or to individual components

See help file for more details on each Rep type

EXERCISE - Simplified Representations

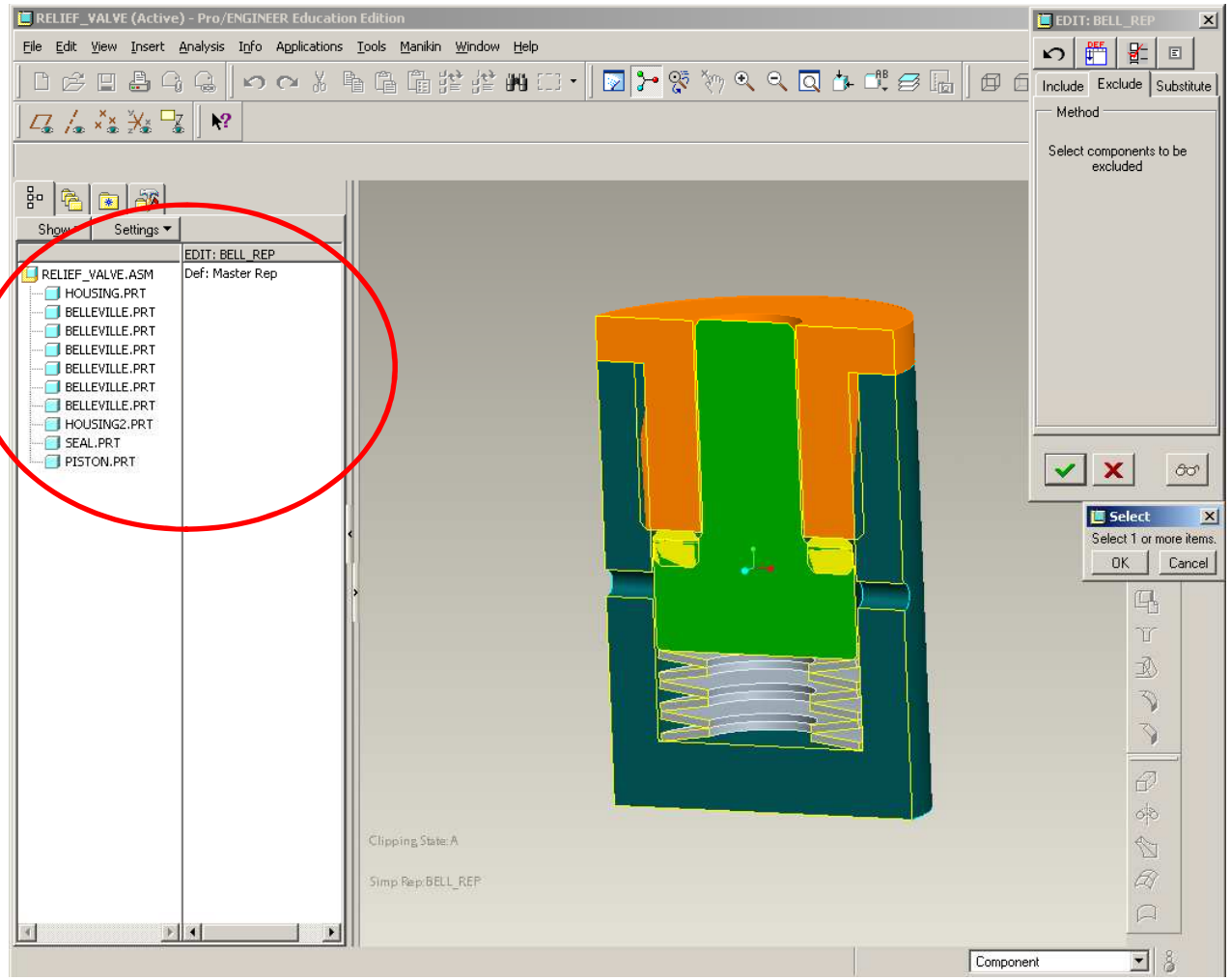
Create a Simplified Rep with all types of representations

- Click View Manager
- Click Simp Rep tab
- Click New button
- Name the new rep, "bell_rep"



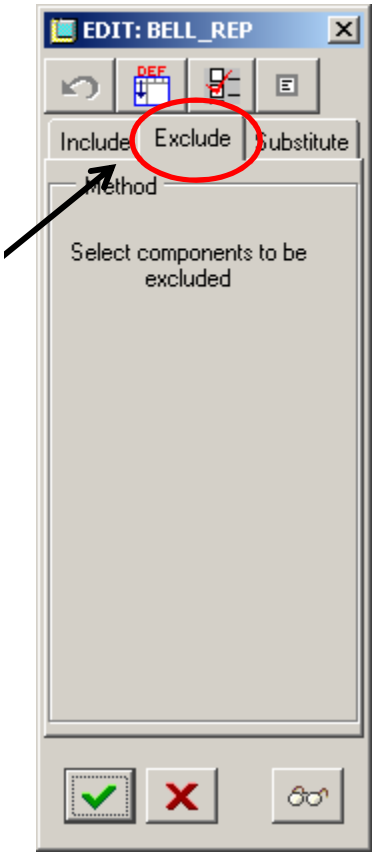
EXERCISE - Simplified Representations

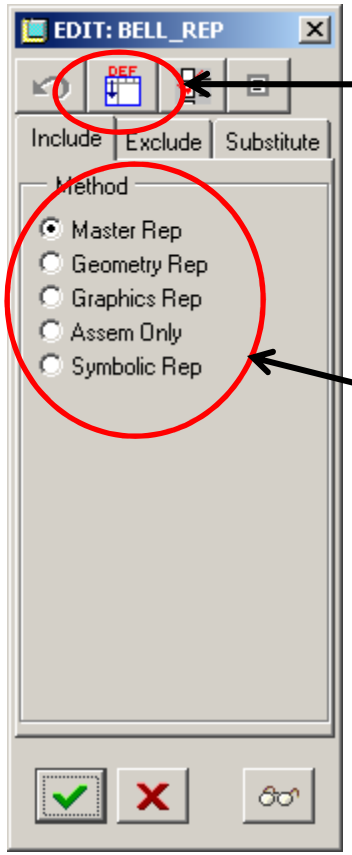
- Once the new name is entered the edit dialog will launch
- Current rep status of the components in the assembly is listed in the left



EXERCISE - Simplified Representations

• From the Exclude tab components can be eliminated from the Rep



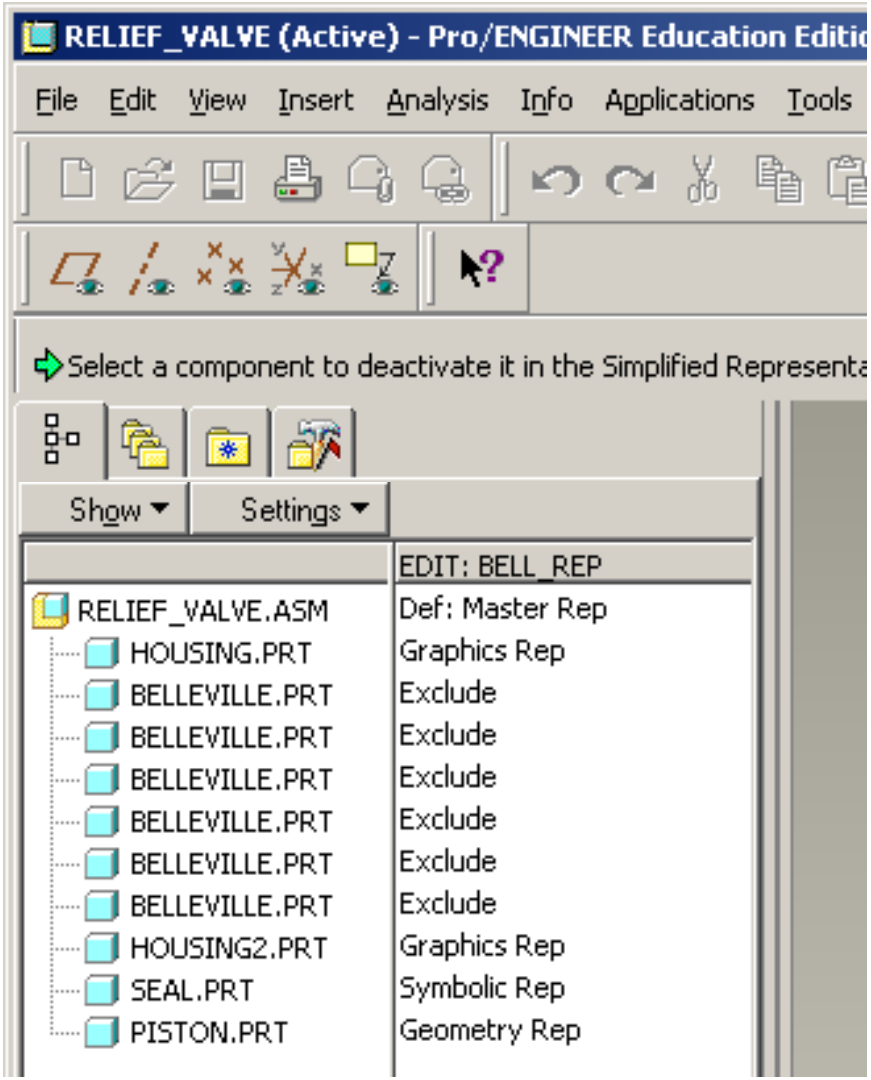


• The DEF button will Reset the definition of any components in the representation

• Select the desired definition here and then select component

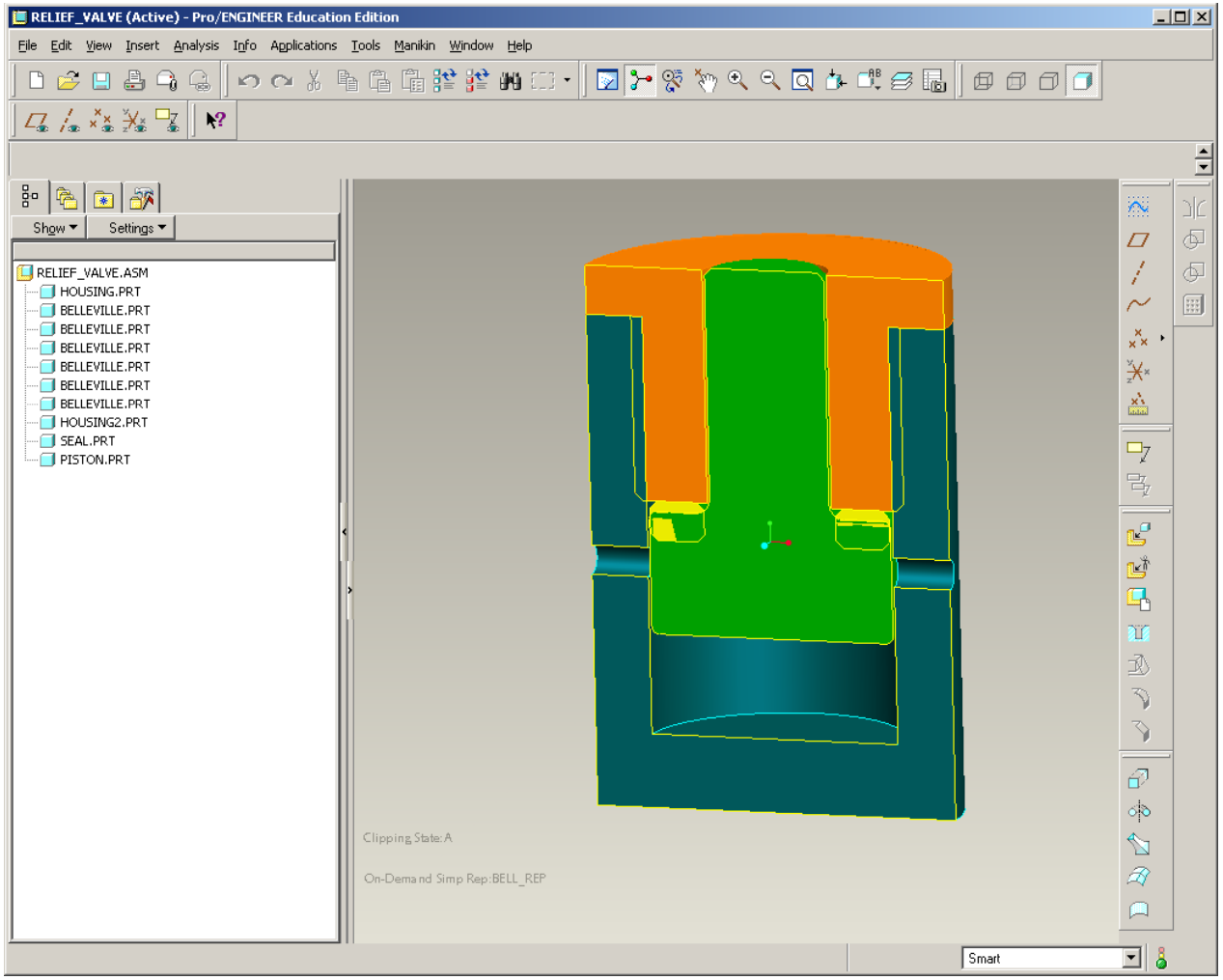
EXERCISE - Simplified Representations

- Create a rep that:
  - Excludes the Bellevilles
  - Set piston to Geometry
  - Set housings Graphics
  - Set the seal to Symbolic



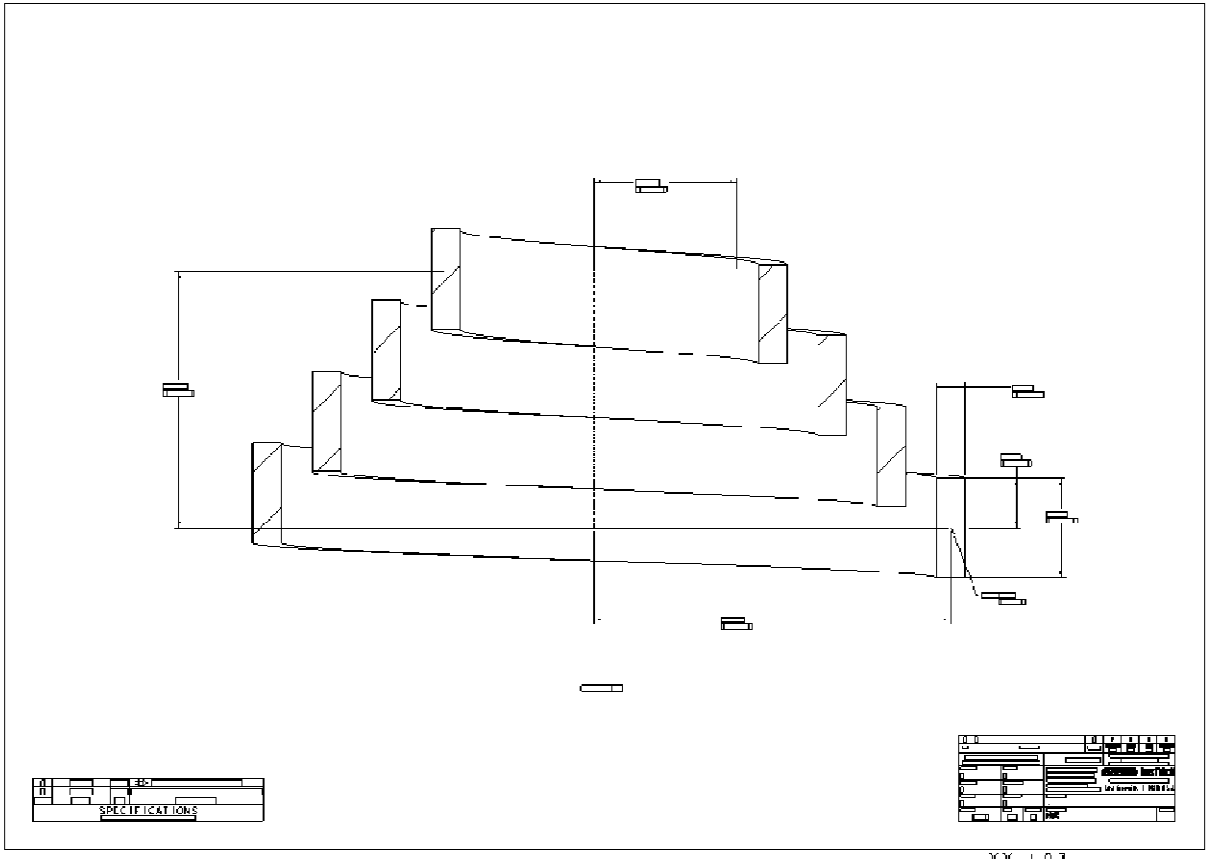
EXERCISE - Simplified Representations

- Done



Critical To Function Dimensioning (CTFD)

The drawings we've encountered in class have been relatively simple….



Critical To Function Dimensioning (CTFD)

…but what if you had to dimension this?

Critical To Function Dimensioning (CTFD)

CTFD style allows the 3D CAD model plus the 2D drawing to completely define geometry

Advantages:

- Simplifies 2D drawings
- Reduces amount of time produce documentation
- Draws out immediately what's important

Disadvantages:

- Something becomes critical later, that wasn't immediately noticed
- Discrepancy between 2D and 3D geometry can cause confusion
- Interpreting tolerances can sometimes lead to misinterpretations

Critical To Function Dimensioning (CTFD)

What needs to be called out as "Critical To Function"?

- Any dimension involved in a tolerance stack-up
  - Need for tolerance stack is based on function of component, sub-assebmly and top level assembly
  - Typically formalized for stacks involving 3 or more dimensions
  - Six dimensions or greater are analyzed statistically
- Dimensions for features that mate with another part
- Any dimension requiring a tolerance that exceeds title-block tolerance
- Process control dimensions
- Dimensions that should be inspected for qualification

This does require some experience, but is a big time saver in the end.

Critical To Function Dimensioning (CTFD)

Required information to use CTFD dimensioning

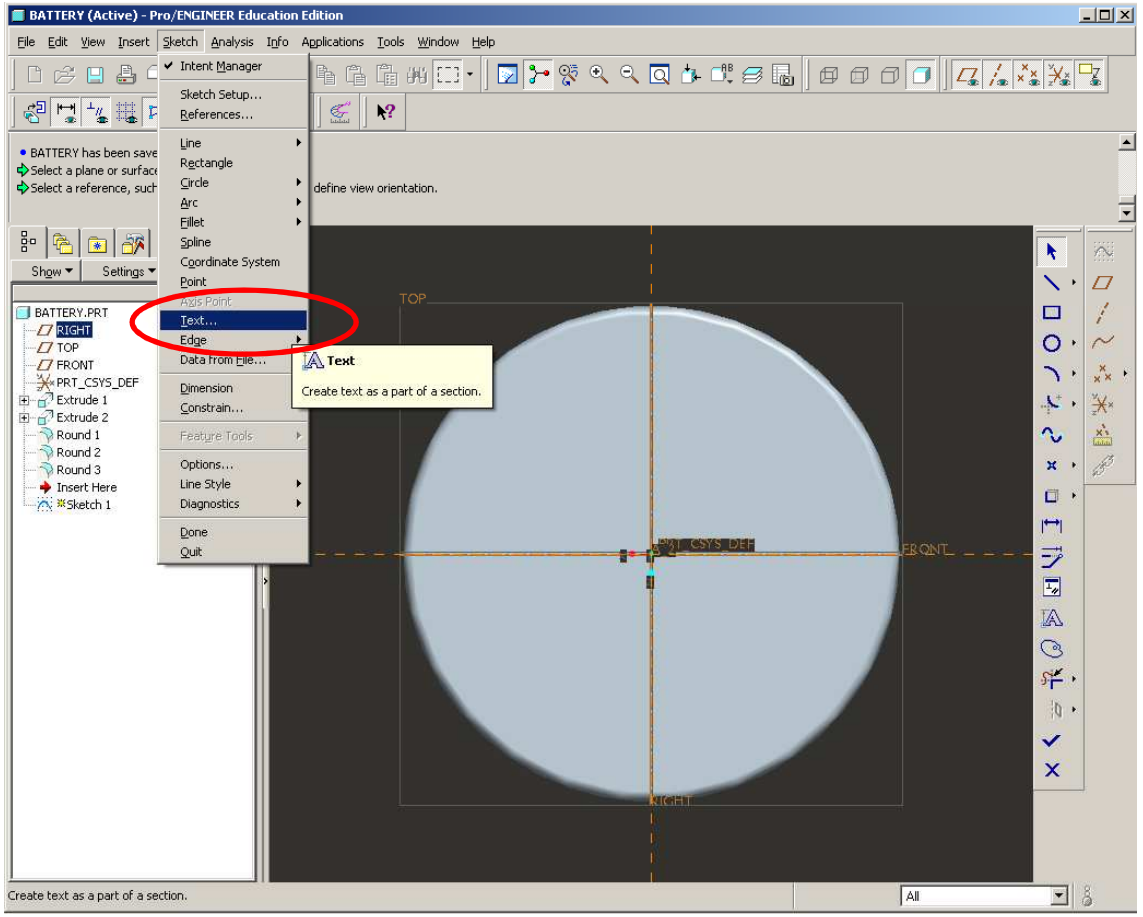
- Statement indicating 3D and 2D completely define geometry
    - Should also specify tie-break (usually CAD wins)
- Default tolerances
    - Premium tol's are those shown on print
    - Dimensions shown without tol's adhere to title block tolerance guide
    - Industry standard for everything else
    - There are a few variations to this theme

Text

- There are a number of situations where text needs to modeled directly onto a component
  - Safety warning
  - Patent ID
  - Model number
  - Government Certification (e.g. REACH)

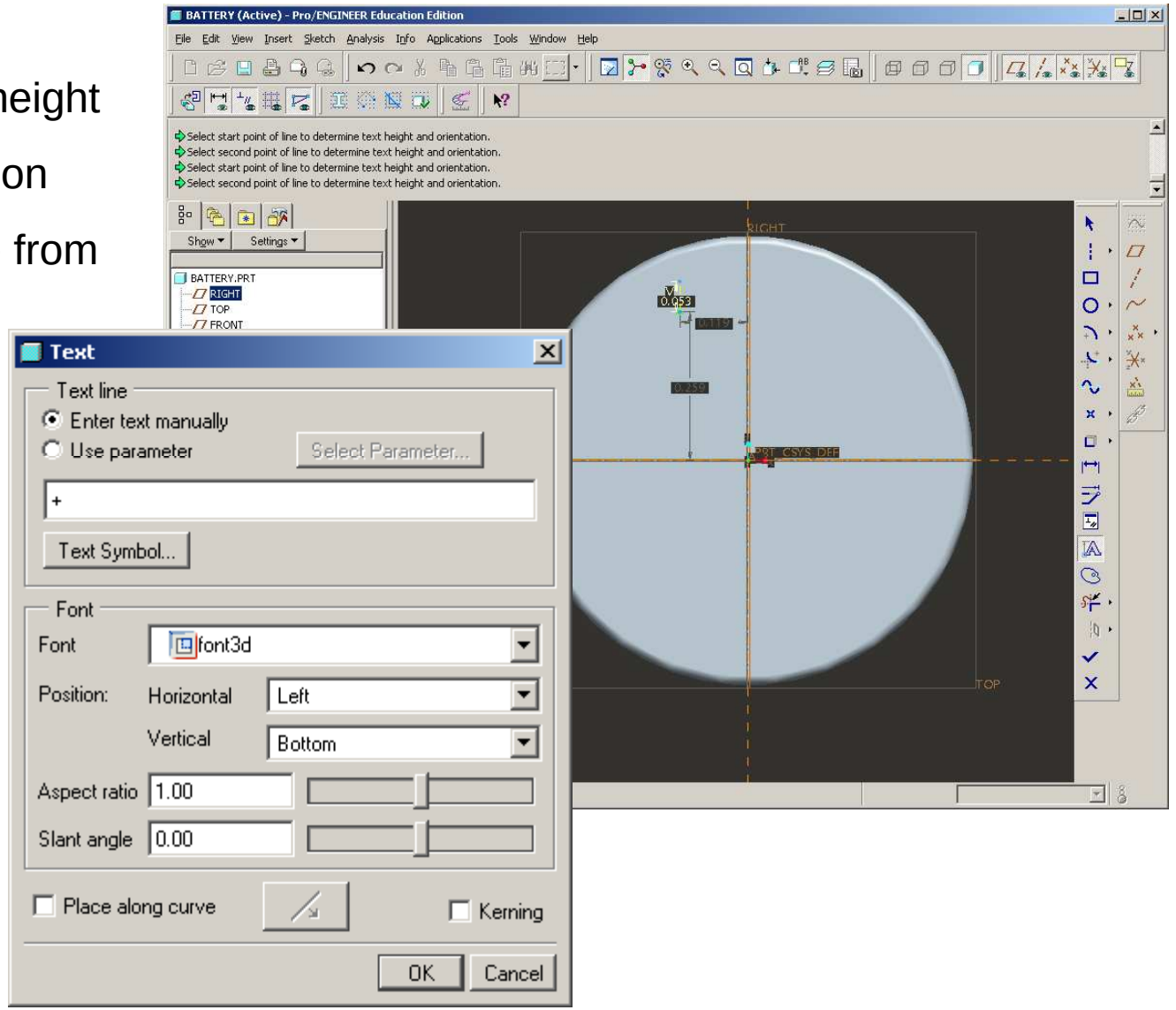
EXERCISE - Text

- Get battery.prt from Supporting Materials page and open
- Create a new Sketch feature on the TOP datum
- Sketch > Text…



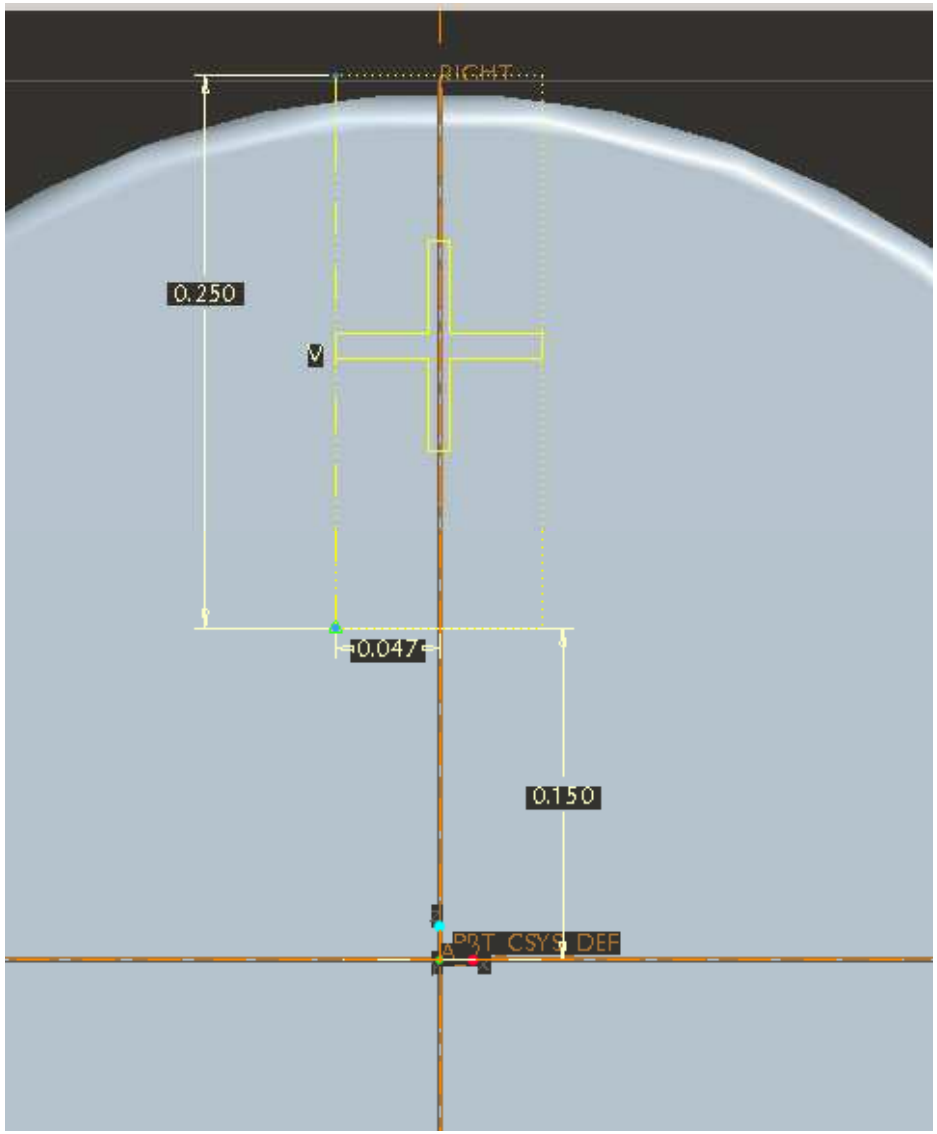
EXERCISE - Text

- Draw a line indicating height of text and relative position
    - NOTE: Create line from bottom to top
- Text dialog will launch
- Enter a “+” sign
- Click OK
- MMB to finish



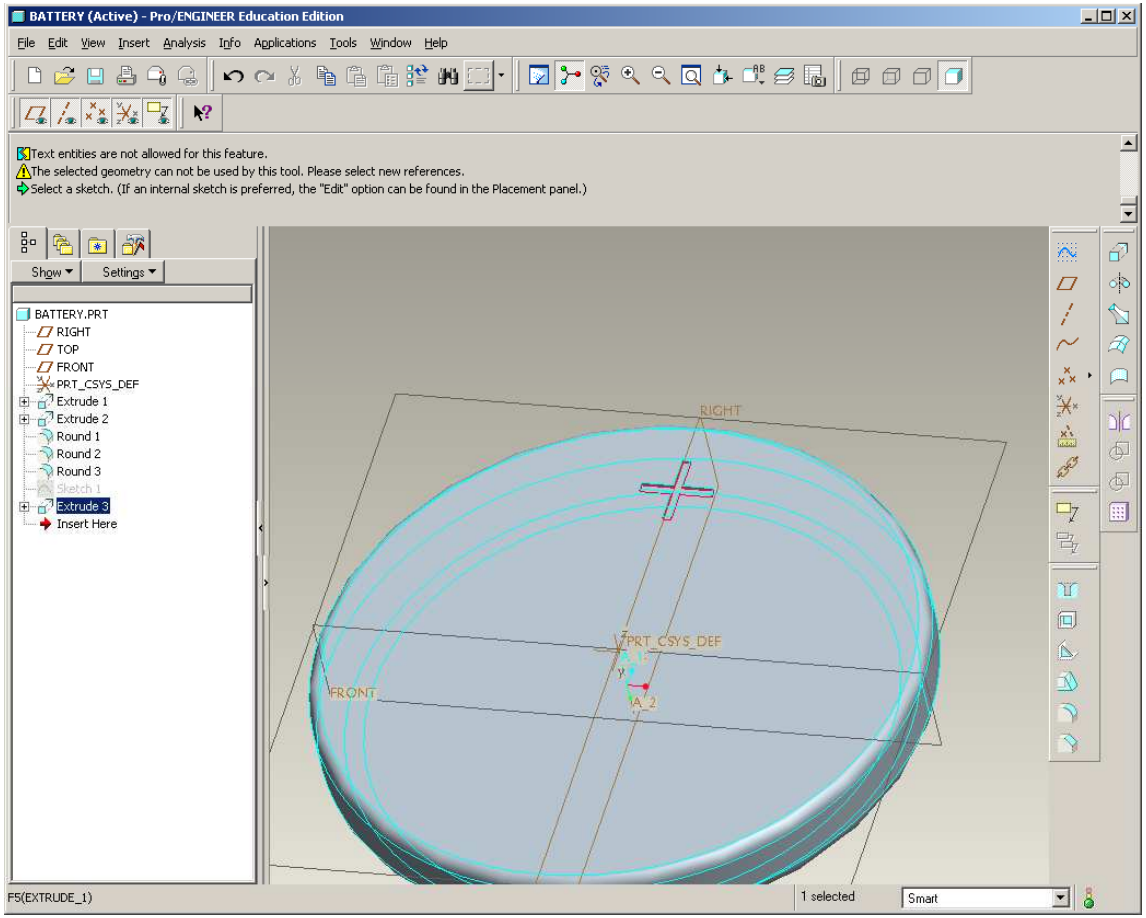
EXERCISE - Text

- Re-size plus sign
  - .250 text size
  - .047 over from center
  - .150 up
- Click Done



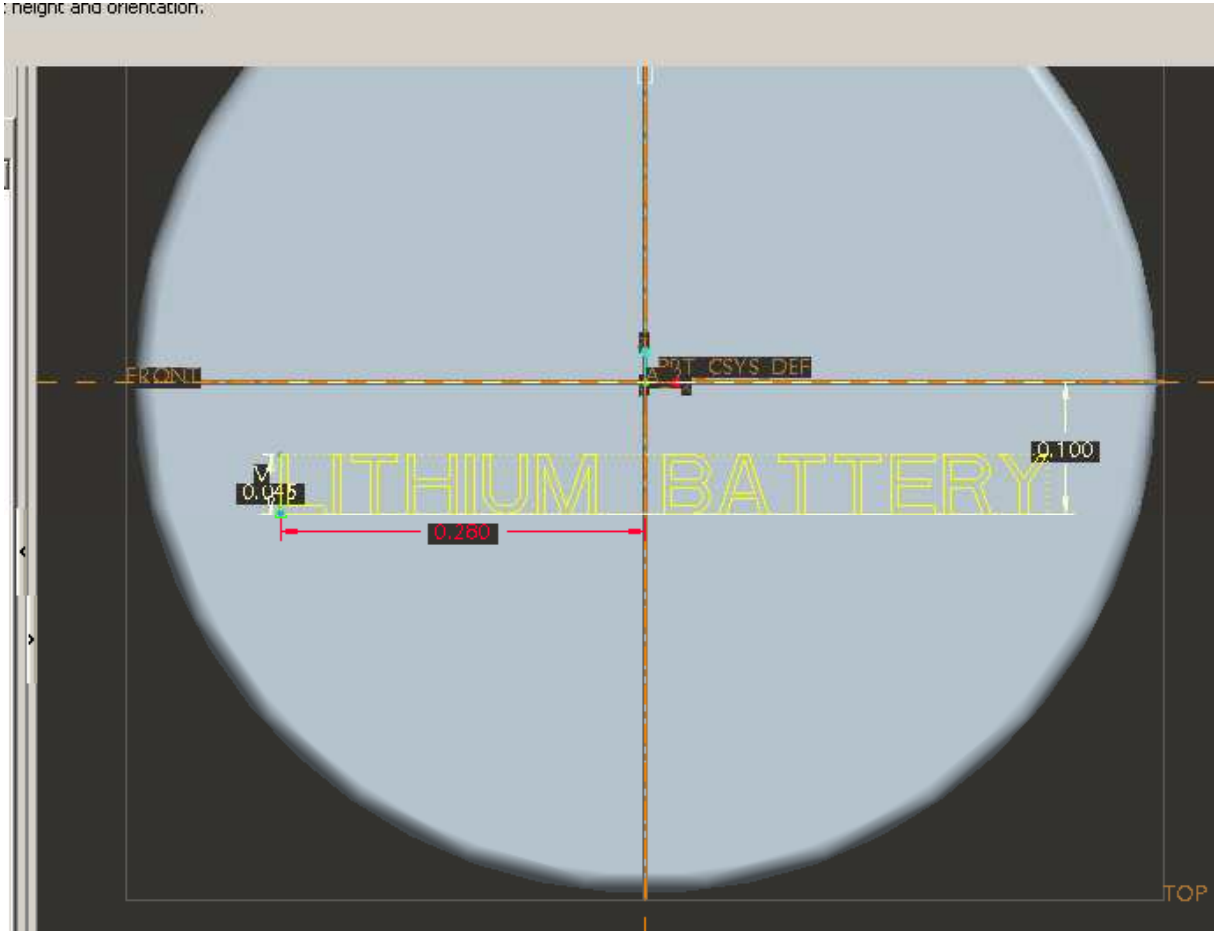
EXERCISE - Text

- Use the Text sketch to create an .005 deep cut



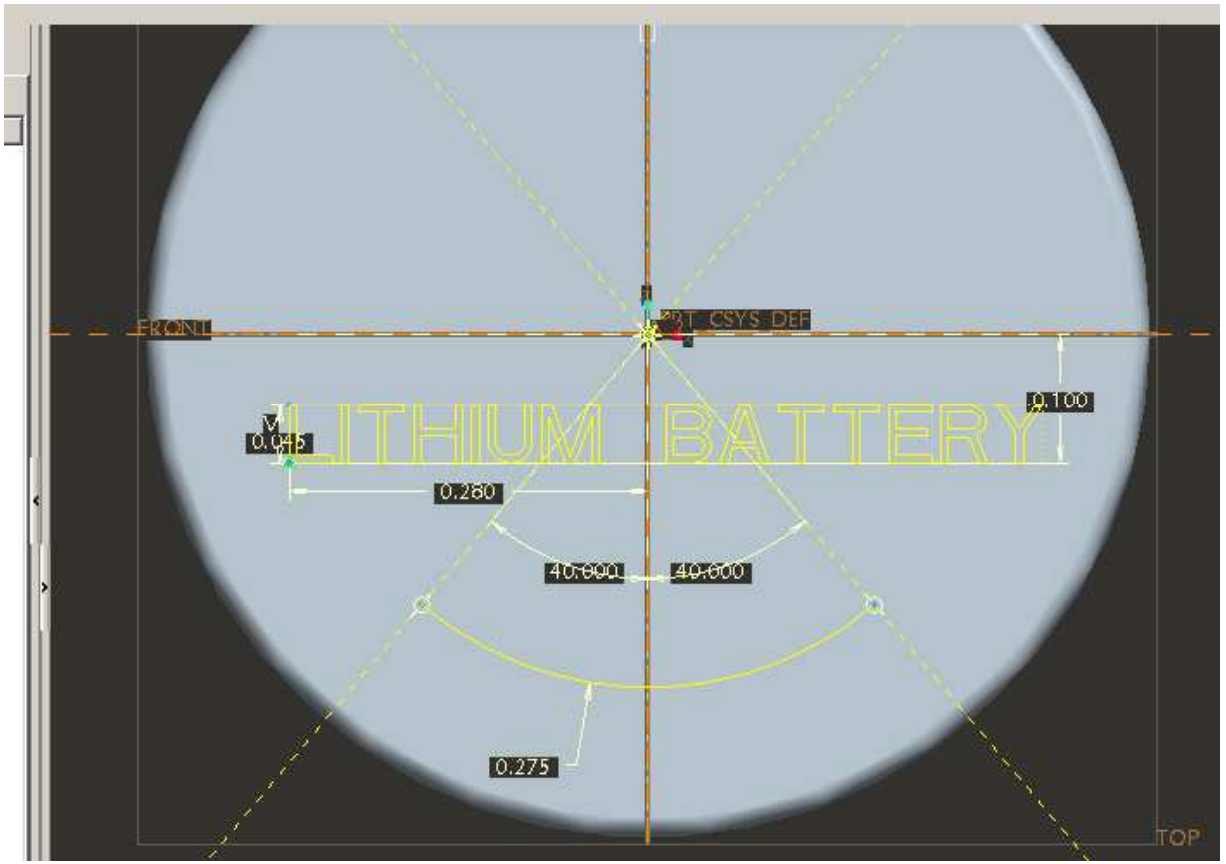
EXERCISE - Text

- Repeat the process to create the “LITHIUM BATTERY” label
  - Text height .045
  - .100 from center to bottom of text
  - .280 over from center
- *What if the text weren’t straight?*



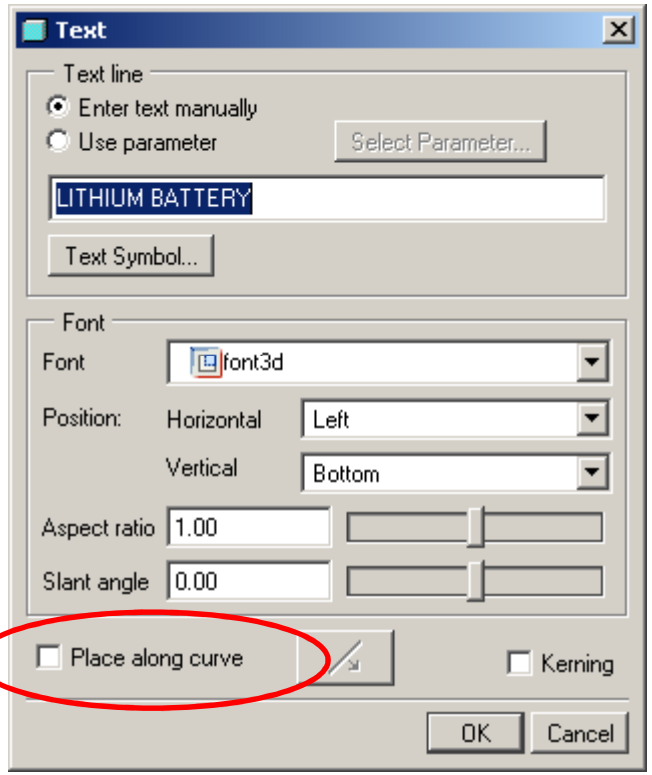
EXERCISE - Text

- Sketch the following arc section
  - 80deg angle symmetric about center
  - R.275



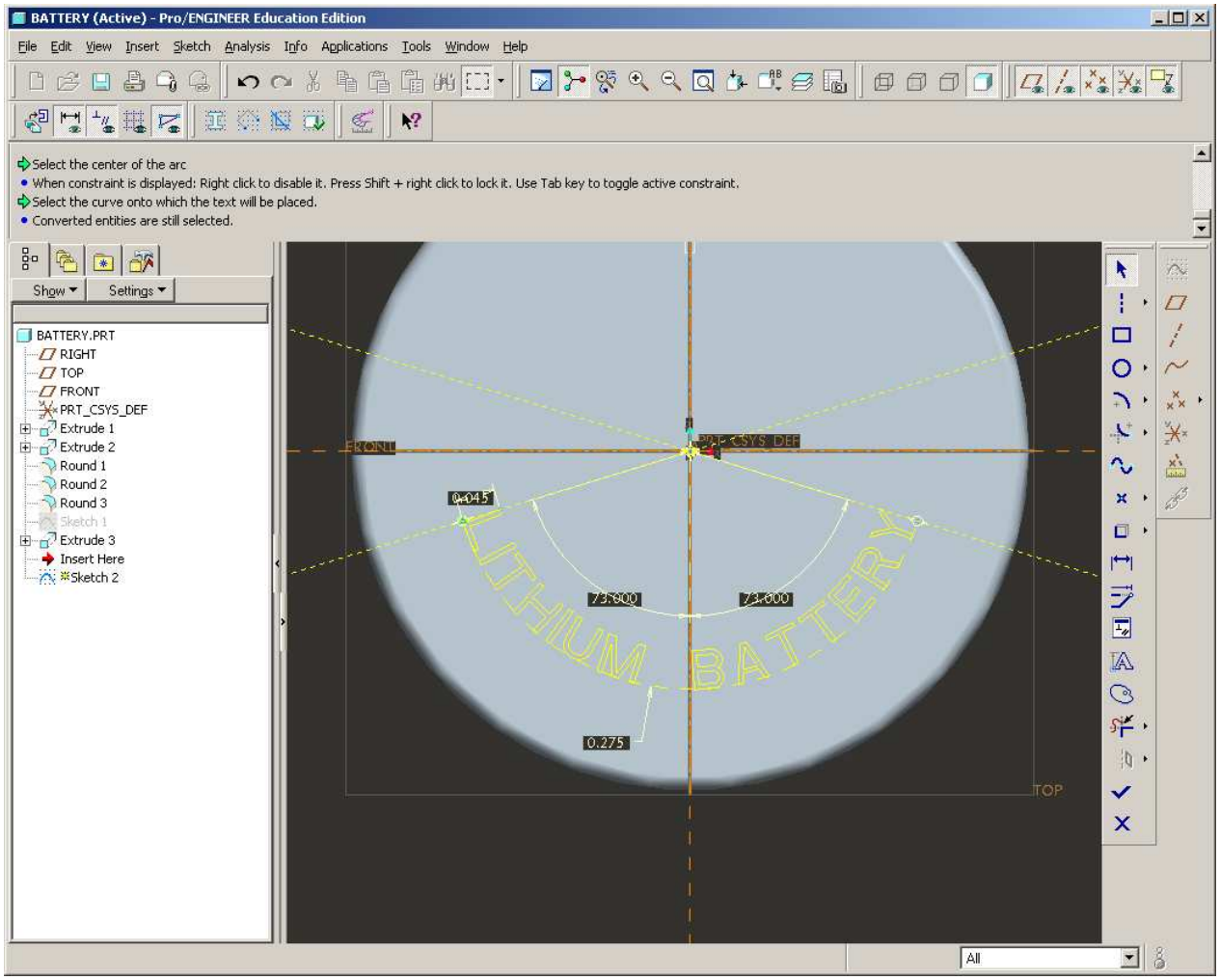
EXERCISE - Text

- Double click on text label to bring up Text dialog
- Check “Place along curve” box
- Select arc segment we just created
- Click OK on dialog



EXERCISE - Text

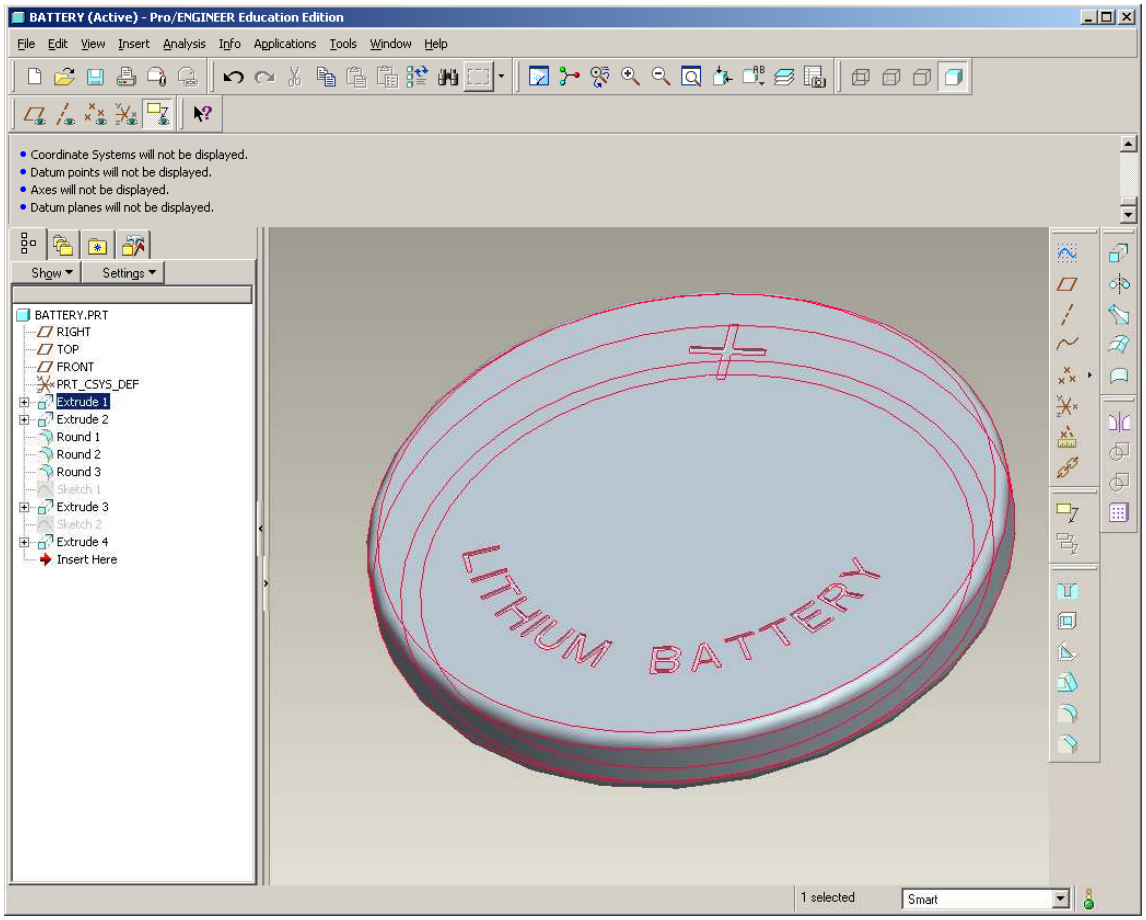
- Adjust angles to be 73degs. Each (156deg total)
- *CHANGE ARC SEGMENT TO CONSTRUCTION*
- Click Done



EXERCISE - Text

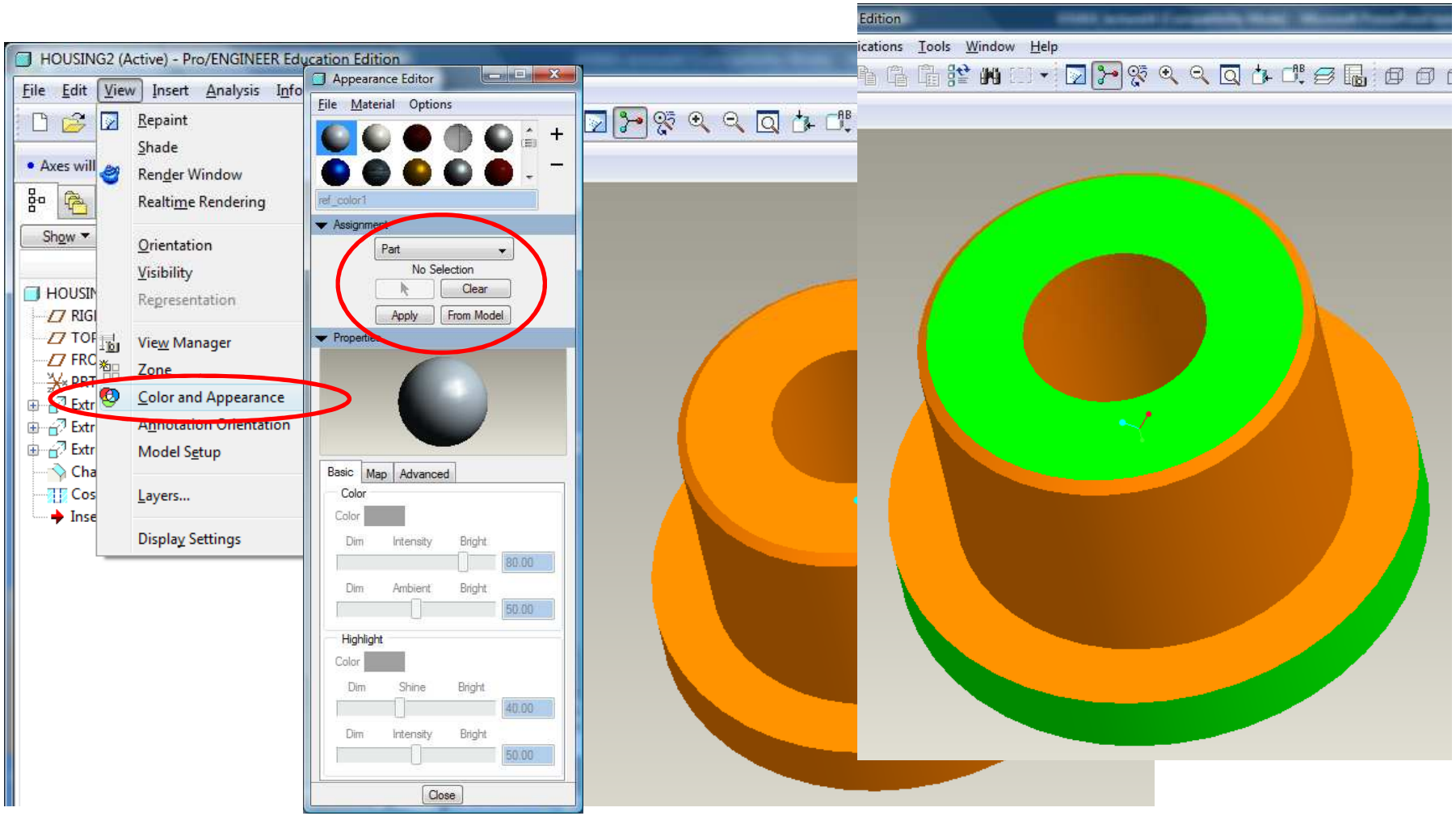
- Make a .005 extruded cut

with the Text sketch

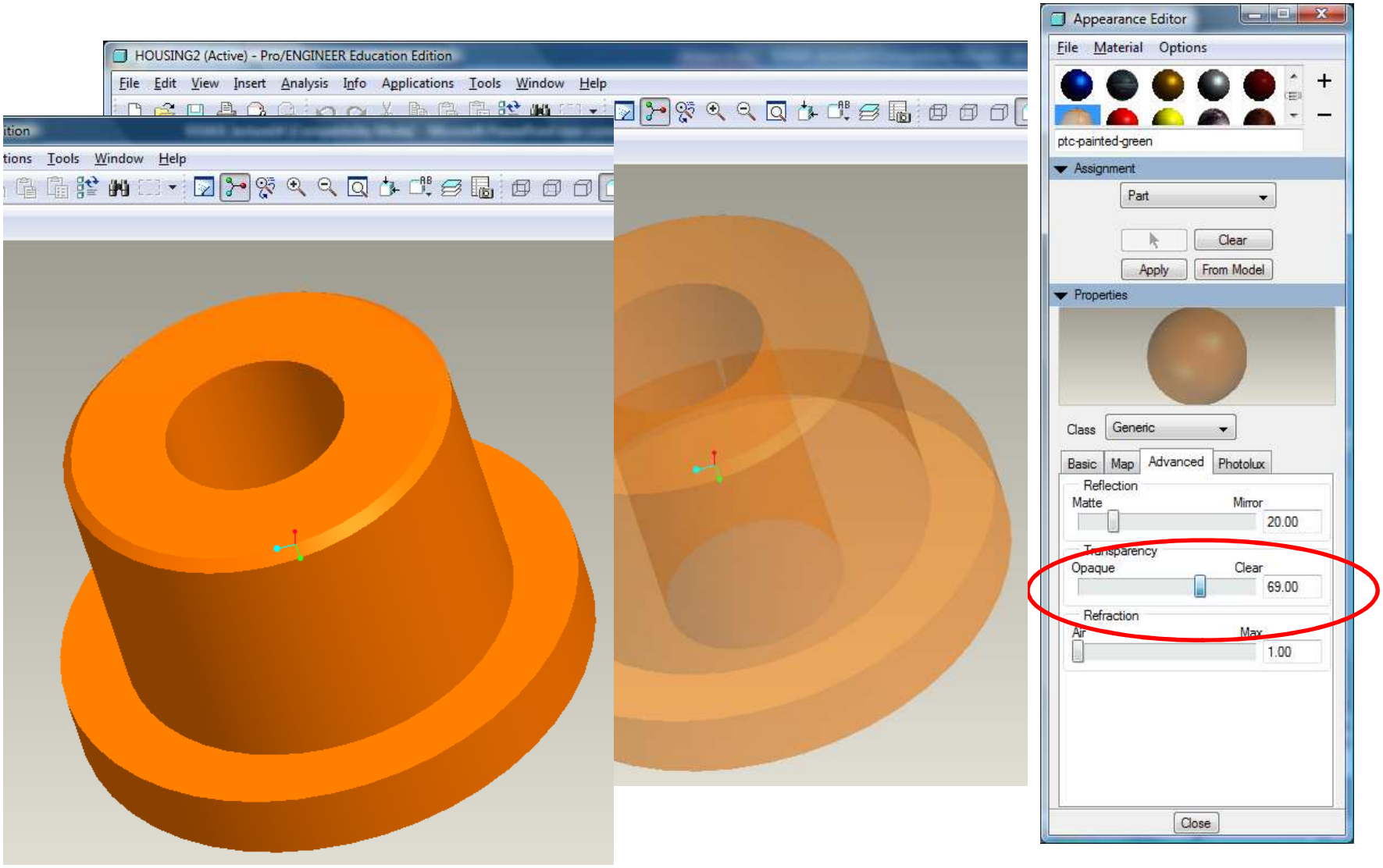


Color and Texture - Color

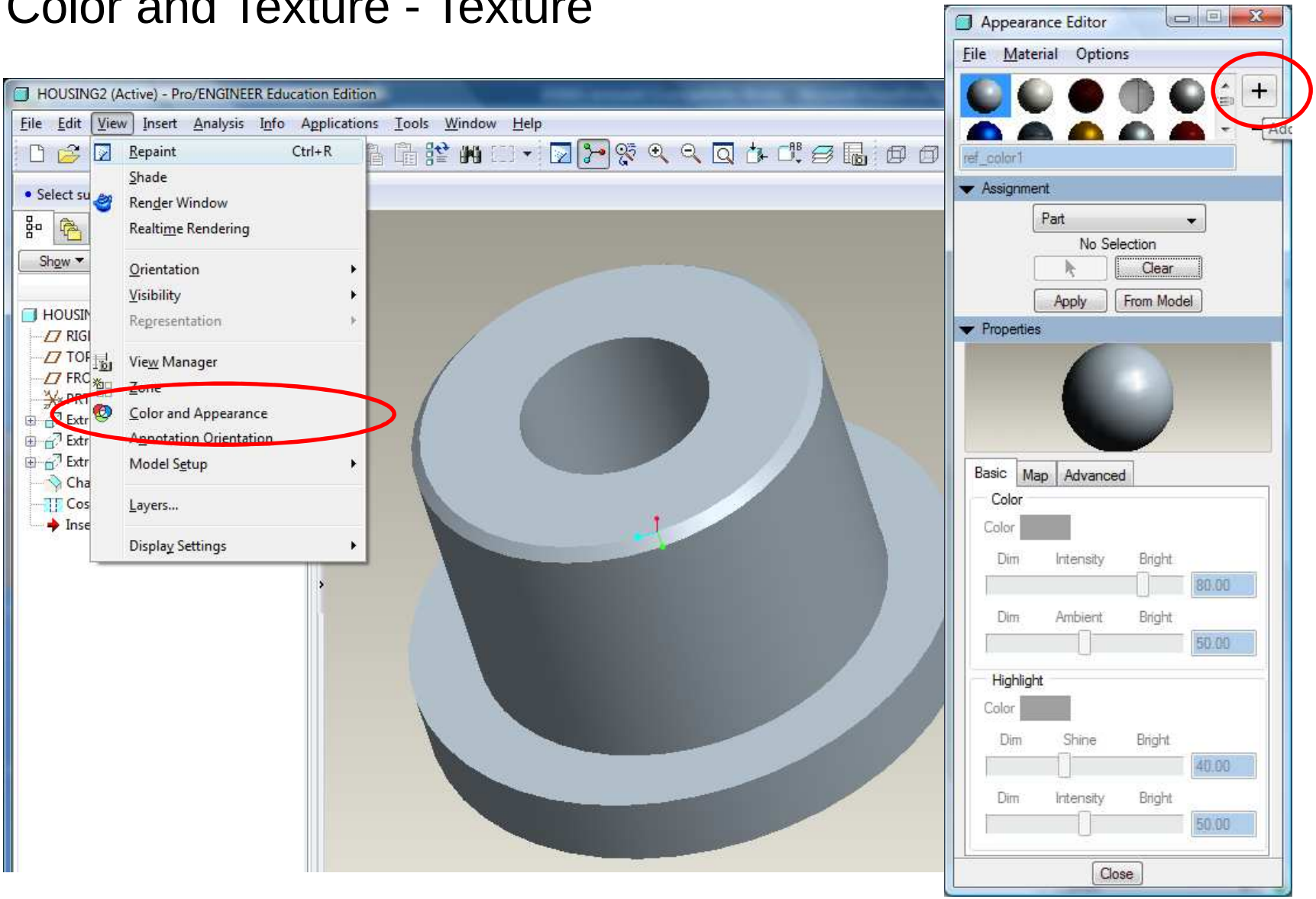
Color can be applied to entire component or surface



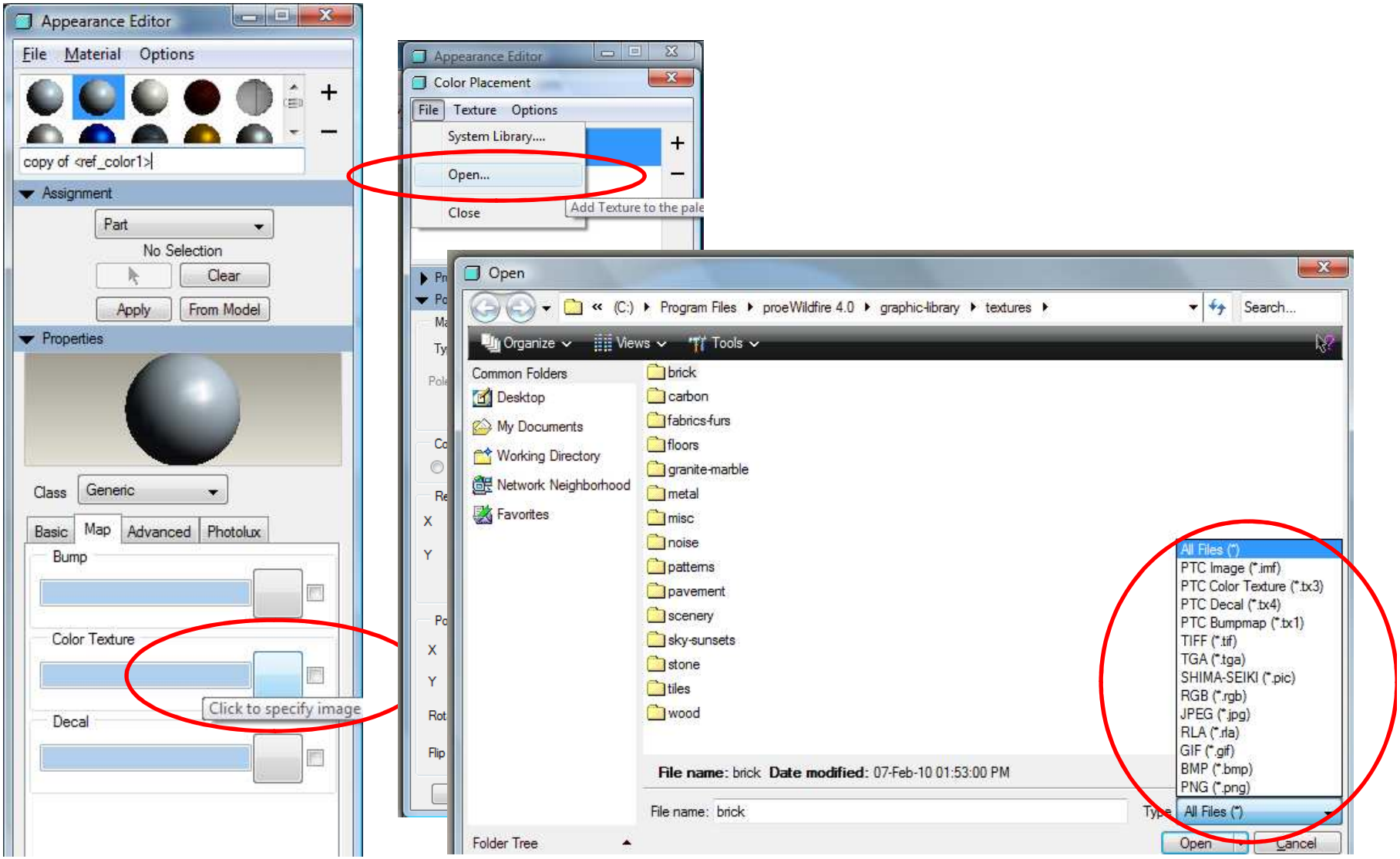
Color and Texture - Translucency



Color and Texture - Texture



Color and Texture - Texture



Color and Texture - Texture