EN1740 Computer Aided Visualization and Design

Spring 2012

3/22/2012

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Last Time:

- Intro to Top-Down Design
  - Fundamentals
  - Skeletons

Tonight:

- Finish Top-Down Design
- Project Questions

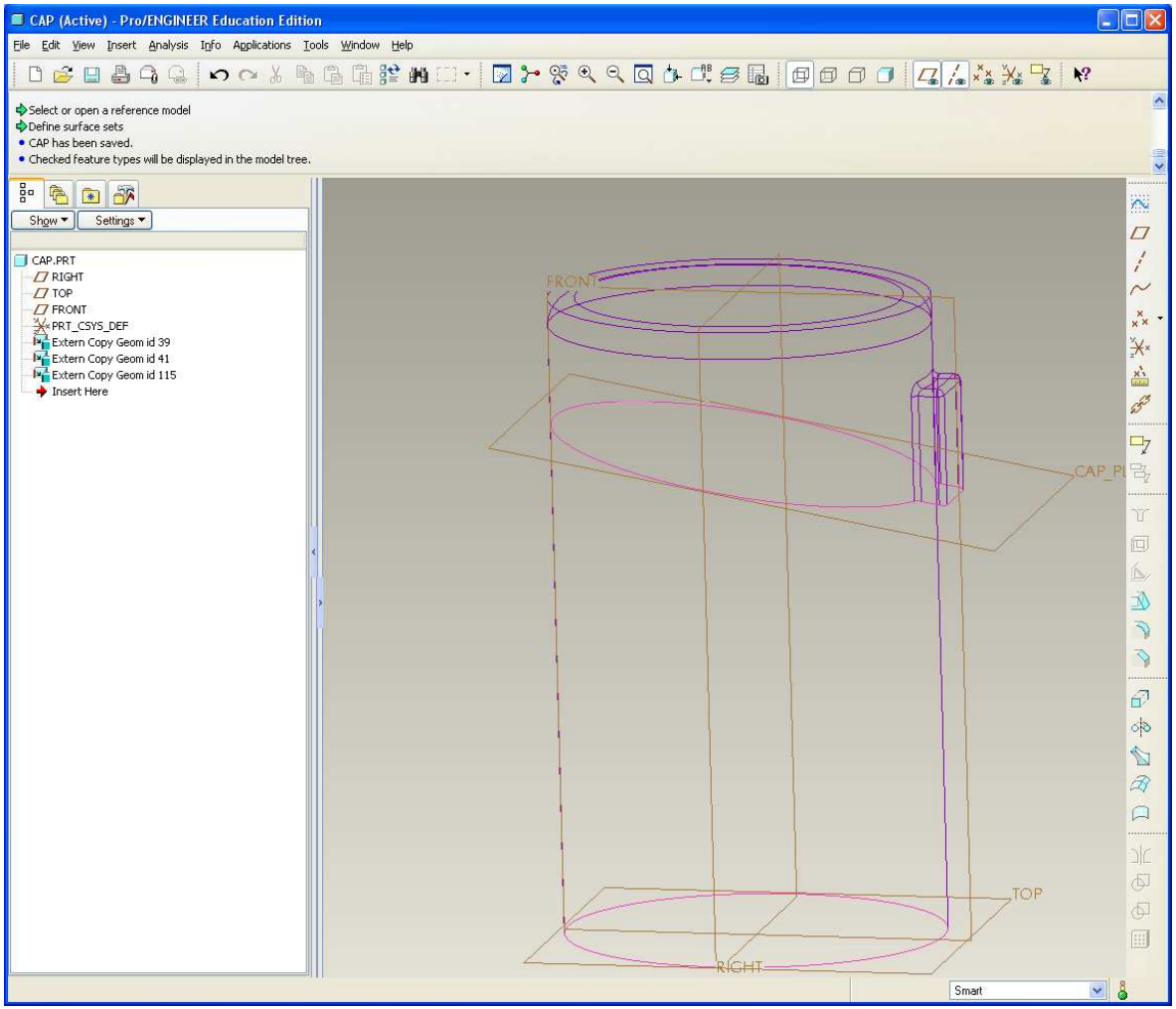
AutoCAD Next Up

- We're going to tackle an introduction to AutoCAD in the next few lectures
- Please go to Autodesk's educational community site and register
  - **www.Autodesk.com/edcommunity**
- Once registered you'll be able to download AutoCAD 2012
  - Please do so in anticipation of the lectures to come

EXERCISE – Top-Down Design Tools

Create a model for the CAP

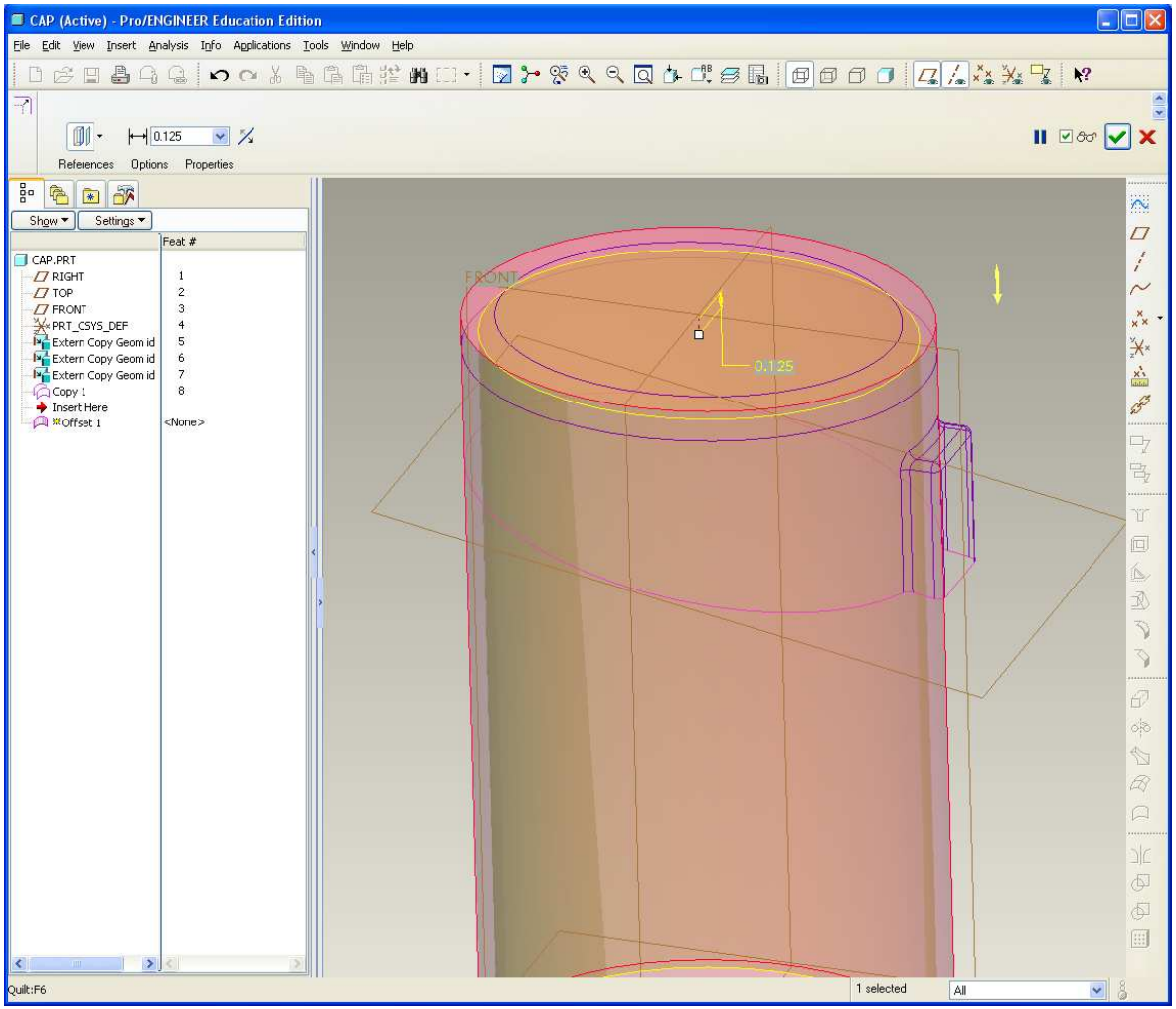
- File > New > cap.prt
- Insert > Shared Data > Copy geometry…
  - Copy the CAP_PLANE from the skeleton
  - Cap surface from ID model
  - Copy of side surface from ID model



EXERCISE – Top-Down Design Tools

Create a model for the CAP

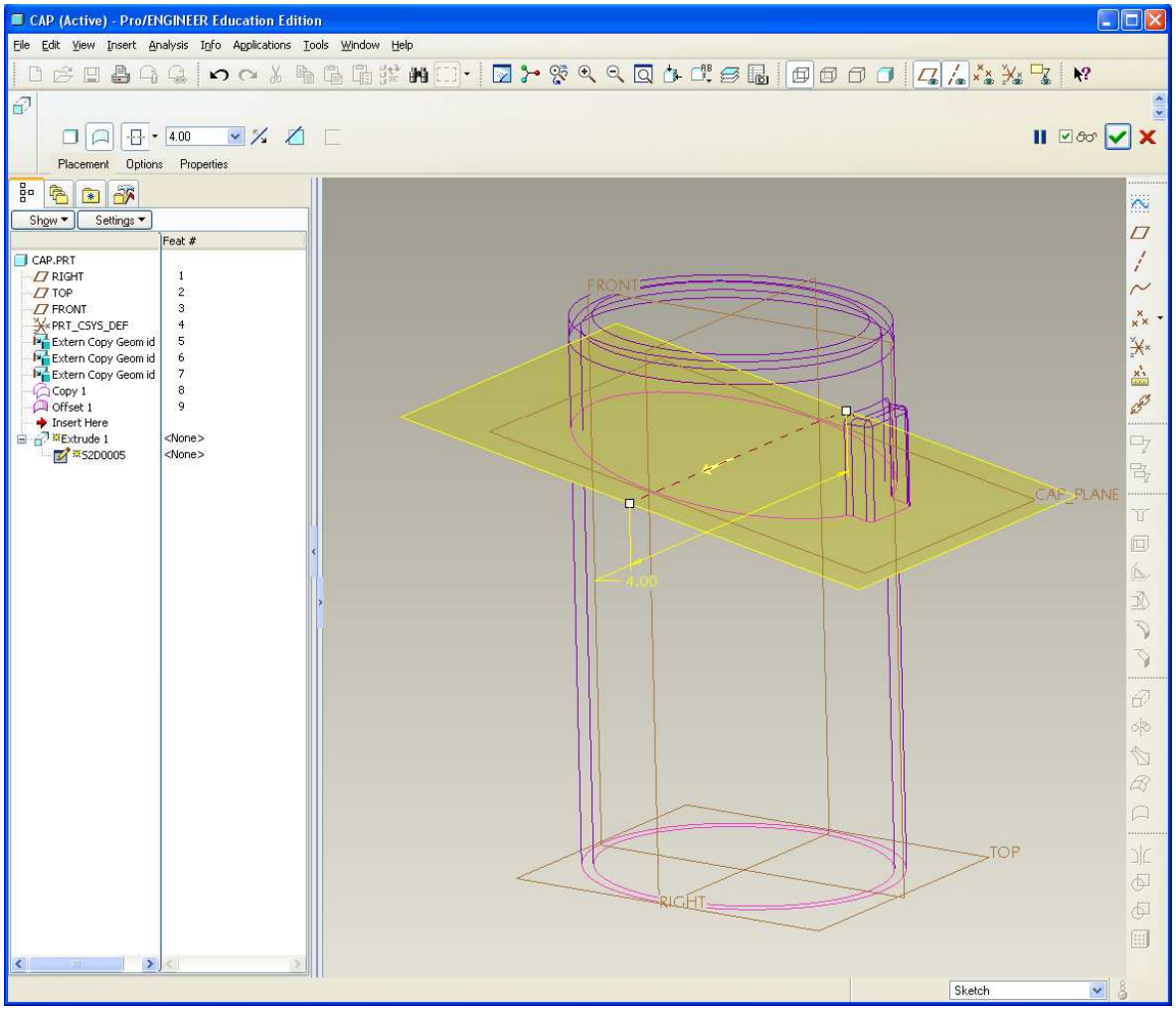
- Create a copy of the side surface
- Offset copy .125in



EXERCISE – Top-Down Design Tools

Create a model for the CAP

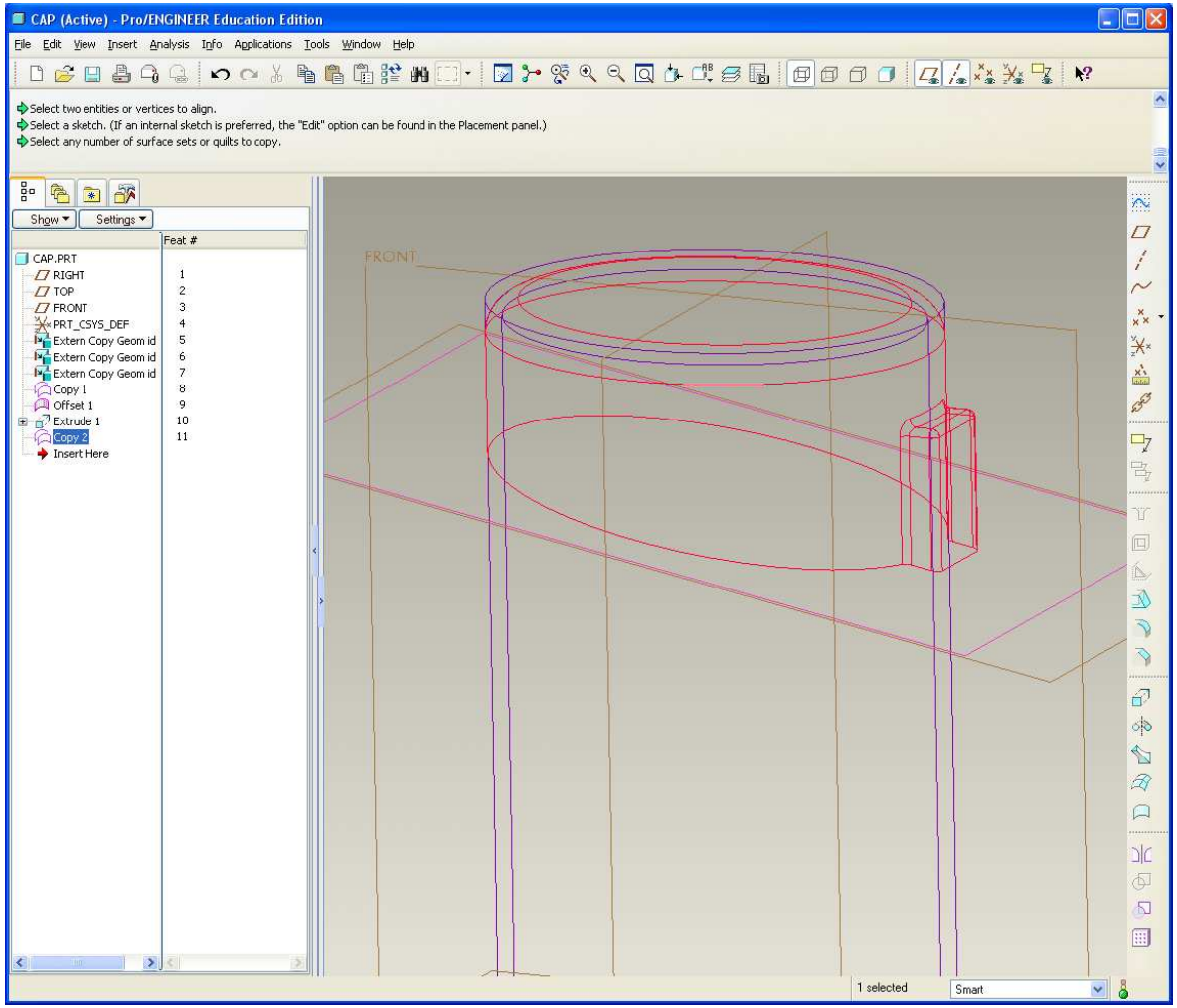
- Extrude a surface both sides 4in along CAP_PLANE datum



EXERCISE – Top-Down Design Tools

Create a model for the CAP

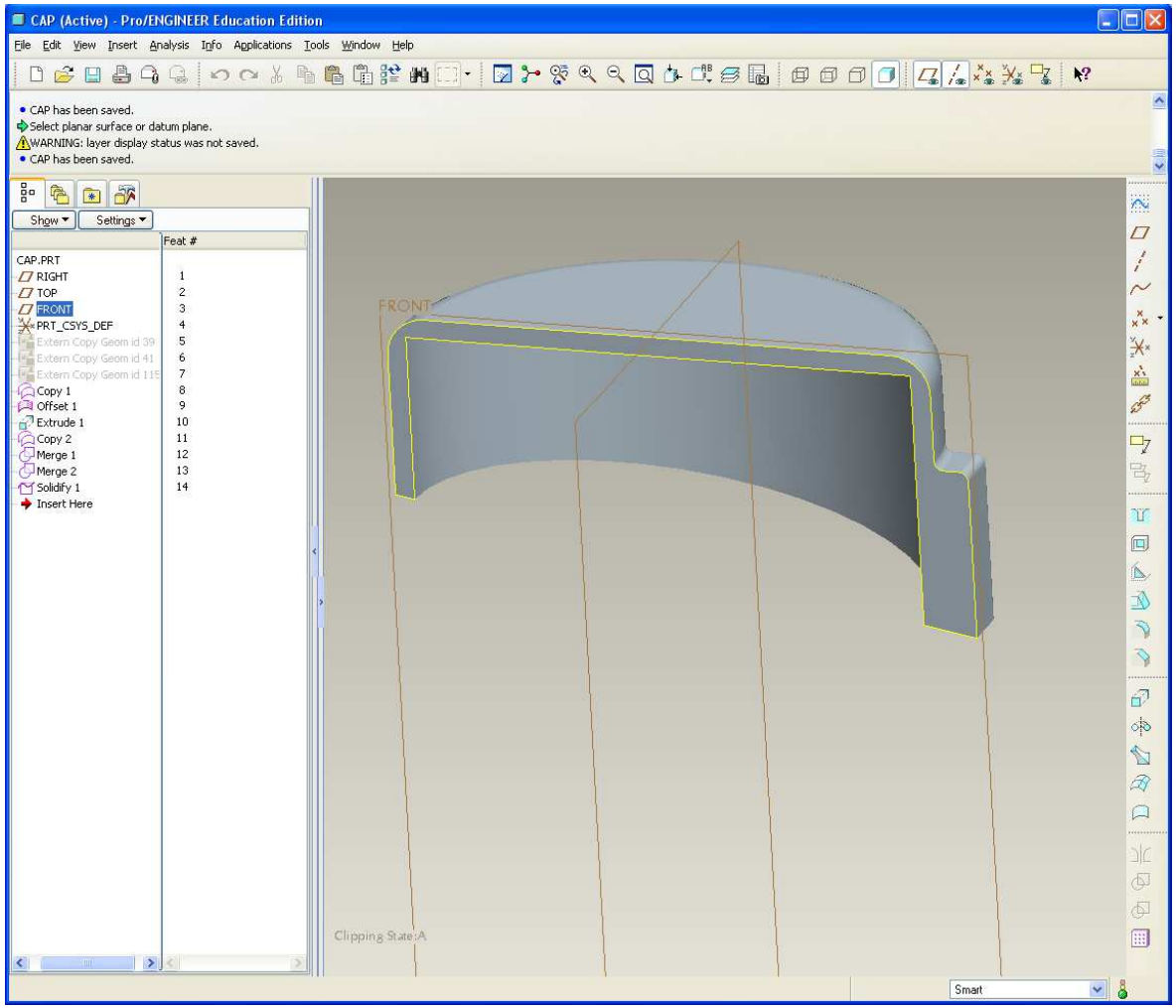
- Create a copy of the exterior cap surface



EXERCISE – Top-Down Design Tools

Create a model for the CAP

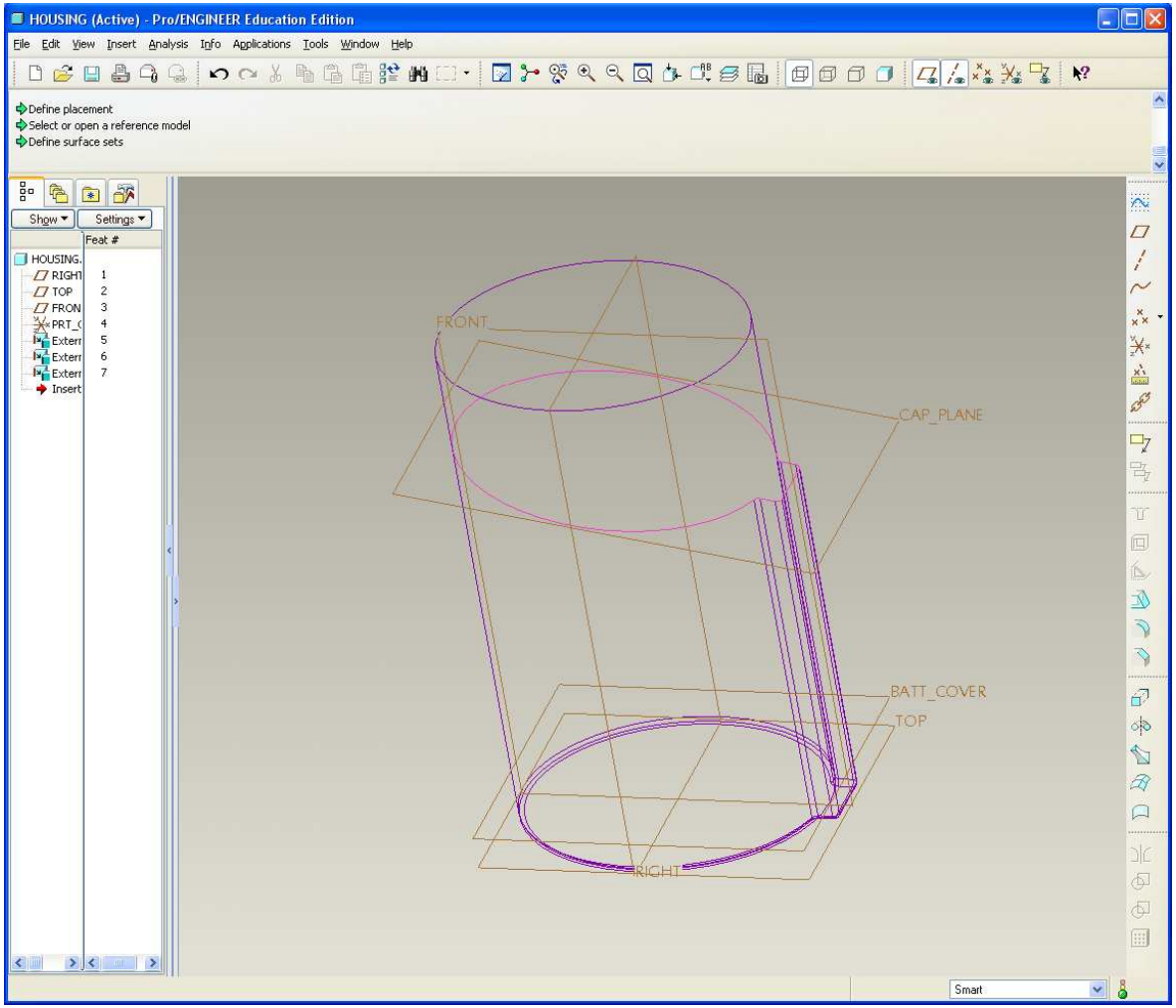
- Merge together the outside, inside and extruded plane
- Solidify
- We've got a solid part!!



EXERCISE – Top-Down Design Tools

Create a model for the Housing

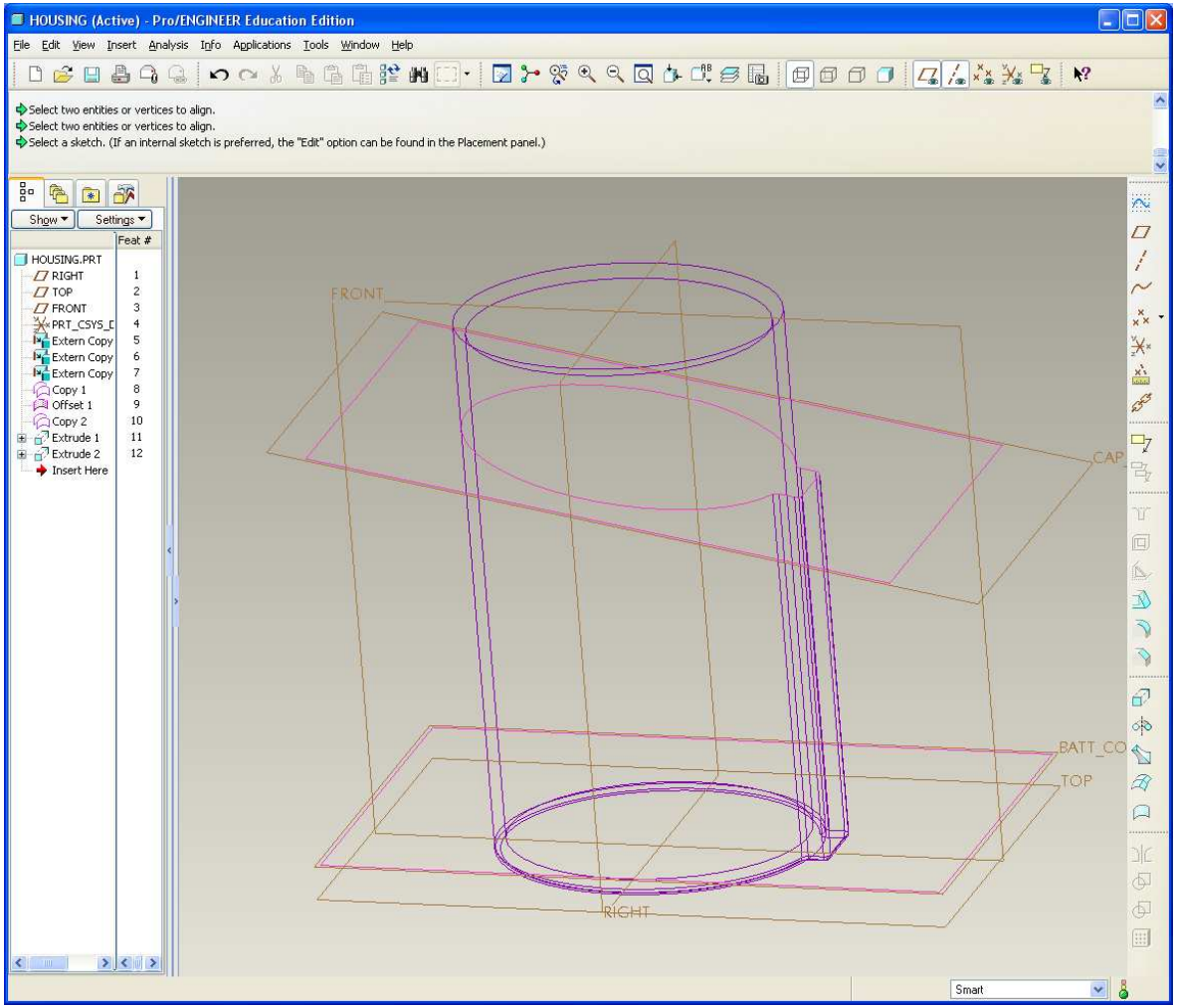
- File > New > housing.prt
- Insert > Shared Data > Copy geometry…
  - Copy the CAP_PLANE and BATT_COVER from the skeleton
  - Housing surface from ID model
  - Copy of side surface from ID model



EXERCISE – Top-Down Design Tools

Create a model for the Housing

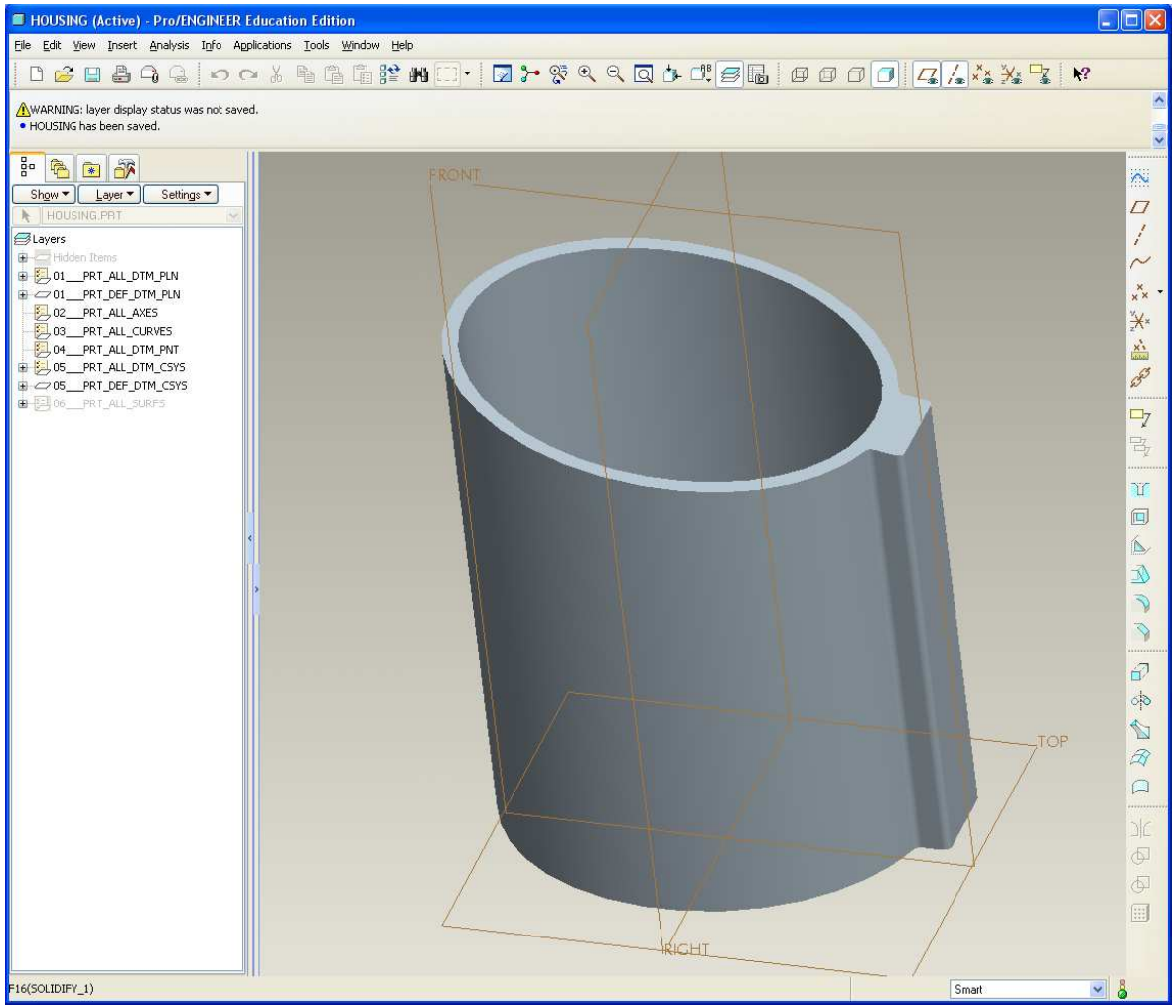
- Just like for the cap, copy the outside form and create an offset for the inside
- Extrude a surface along the CAP_PLANE and the BATT_COVER planes



EXERCISE – Top-Down Design Tools

Create a model for the Housing

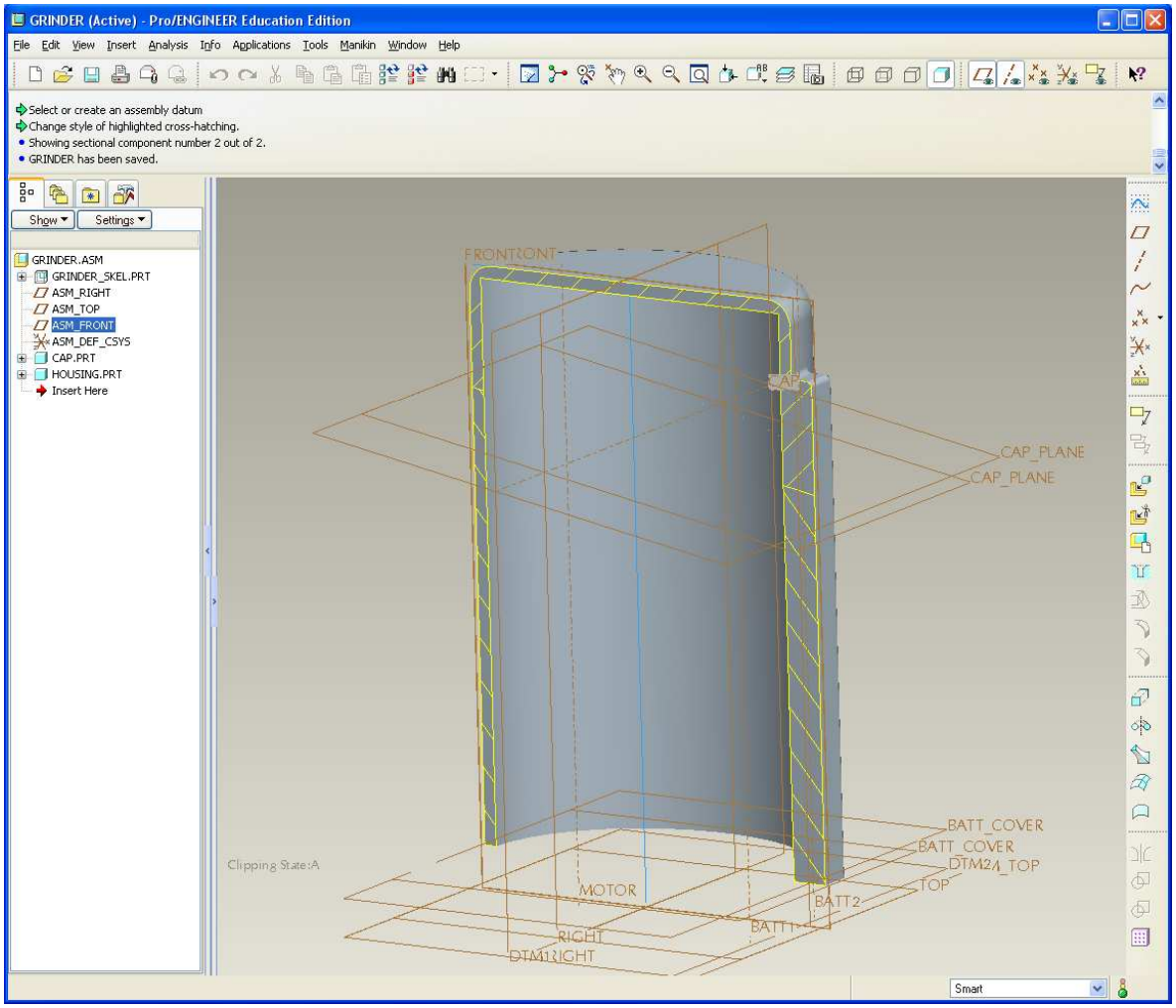
- Merge the outside, inside and extrudes together
- Solidify
- Another solid part!



EXERCISE – Top-Down Design Tools

Assemble Housing and Cap into Top Level

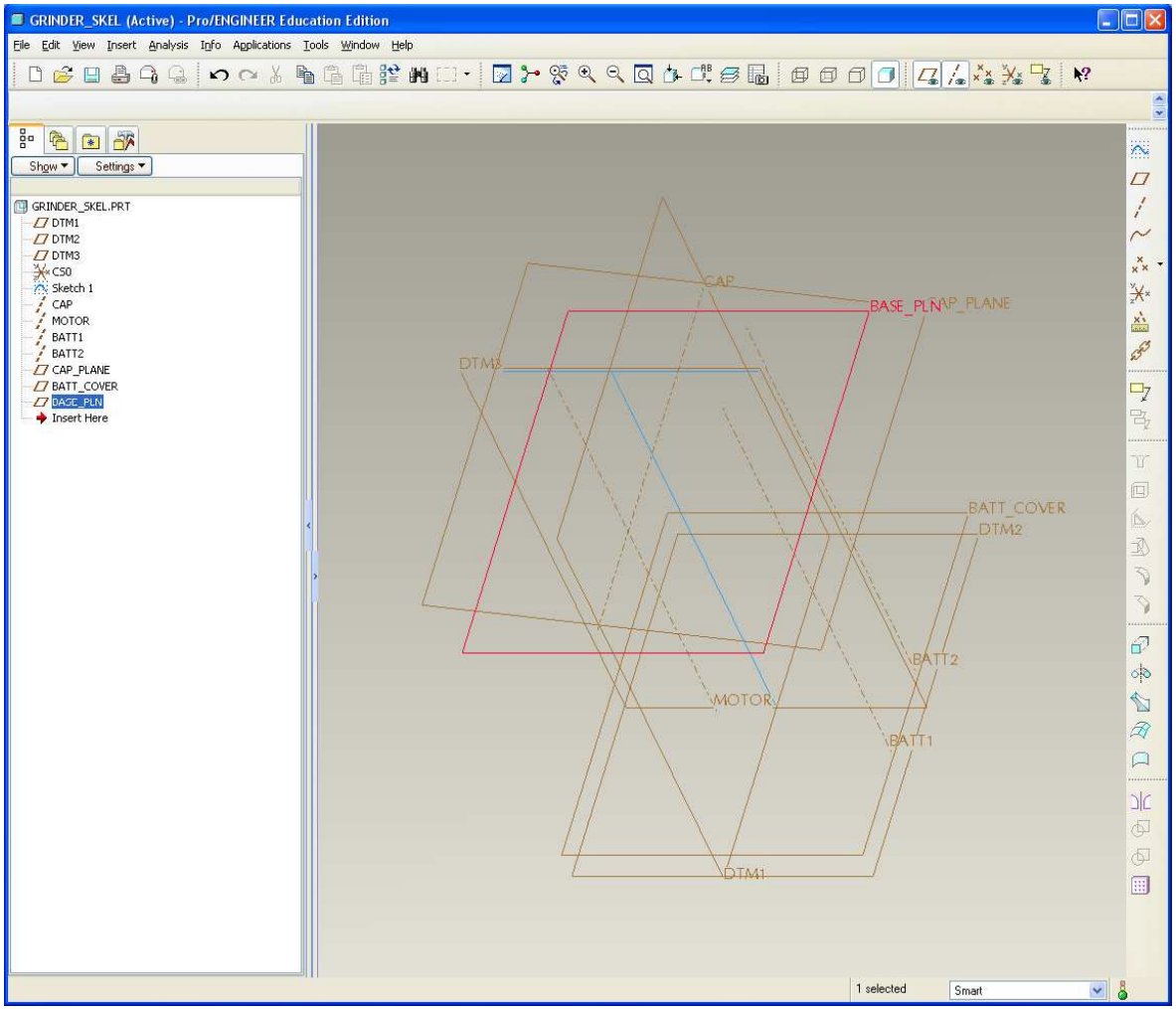
- Use ASM_FRONT, ASM_RIGHT and CAP_PLANE to assemble
- ***We're missing a way to hold these together!!***



EXERCISE – Top-Down Design Tools

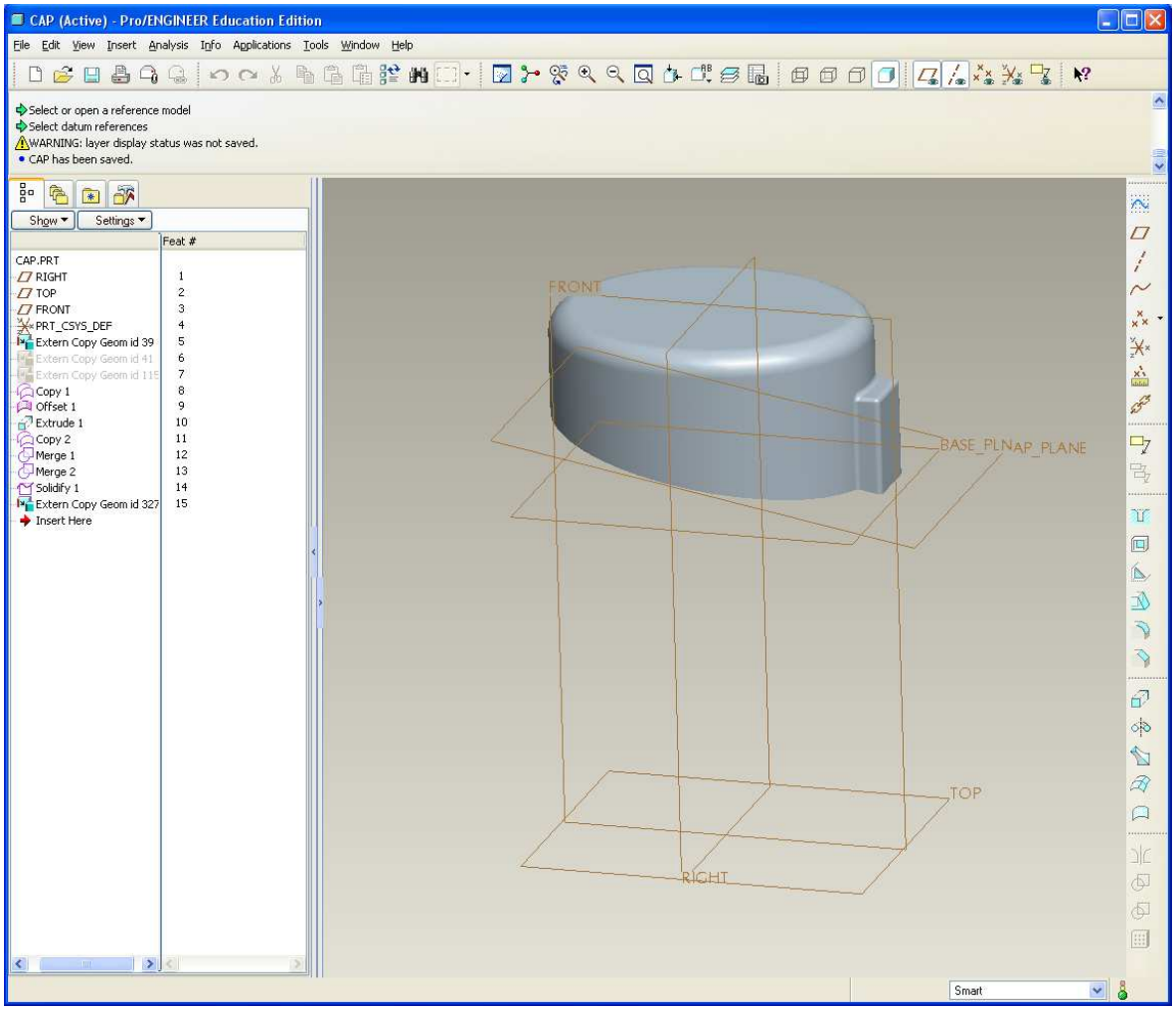
Create another plane in the skeleton

- Offset a plane 4.00in from the DTM2
- Rename this plane BASE_PLN



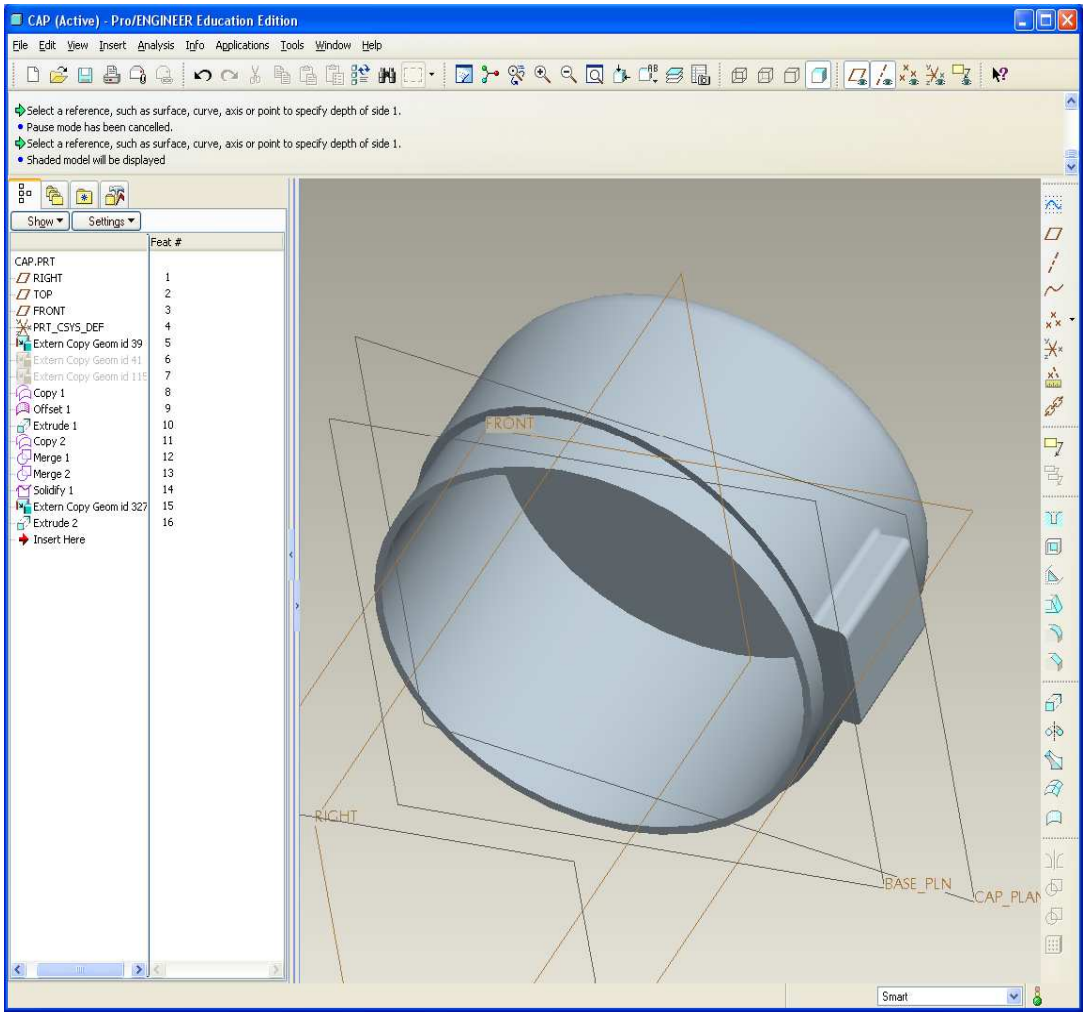
EXERCISE – Top-Down Design Tools

- Copy this new plane into the CAP model



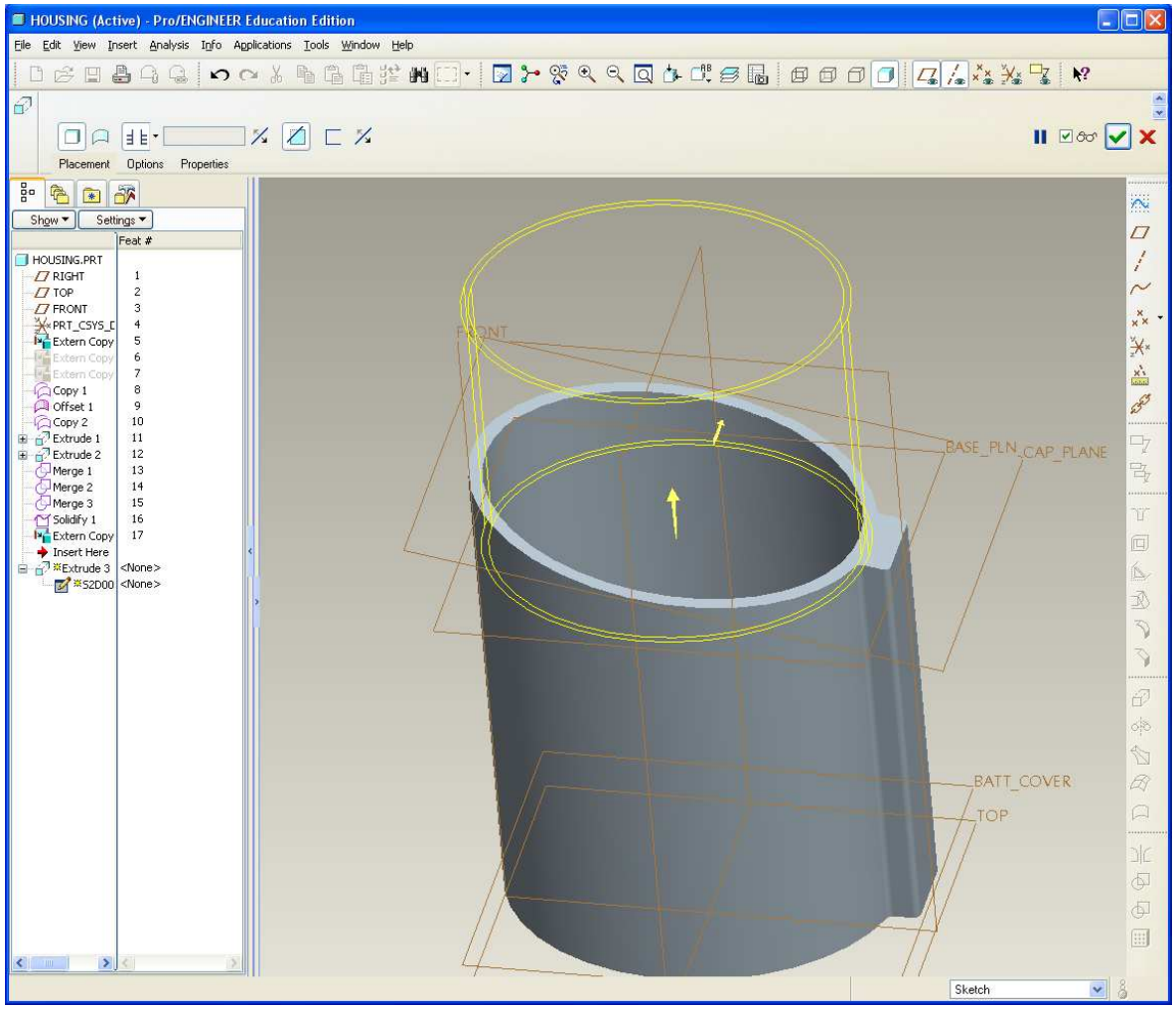
EXERCISE – Top-Down Design Tools

- Extrude a solid feature from the BASE_PLN to the bottom of the part
  - *Sketch on the BASE_PLN*
  - *The USE EDGE tool will give the inside curve*
  - *OFFSET EDGE for outside edge of feature*



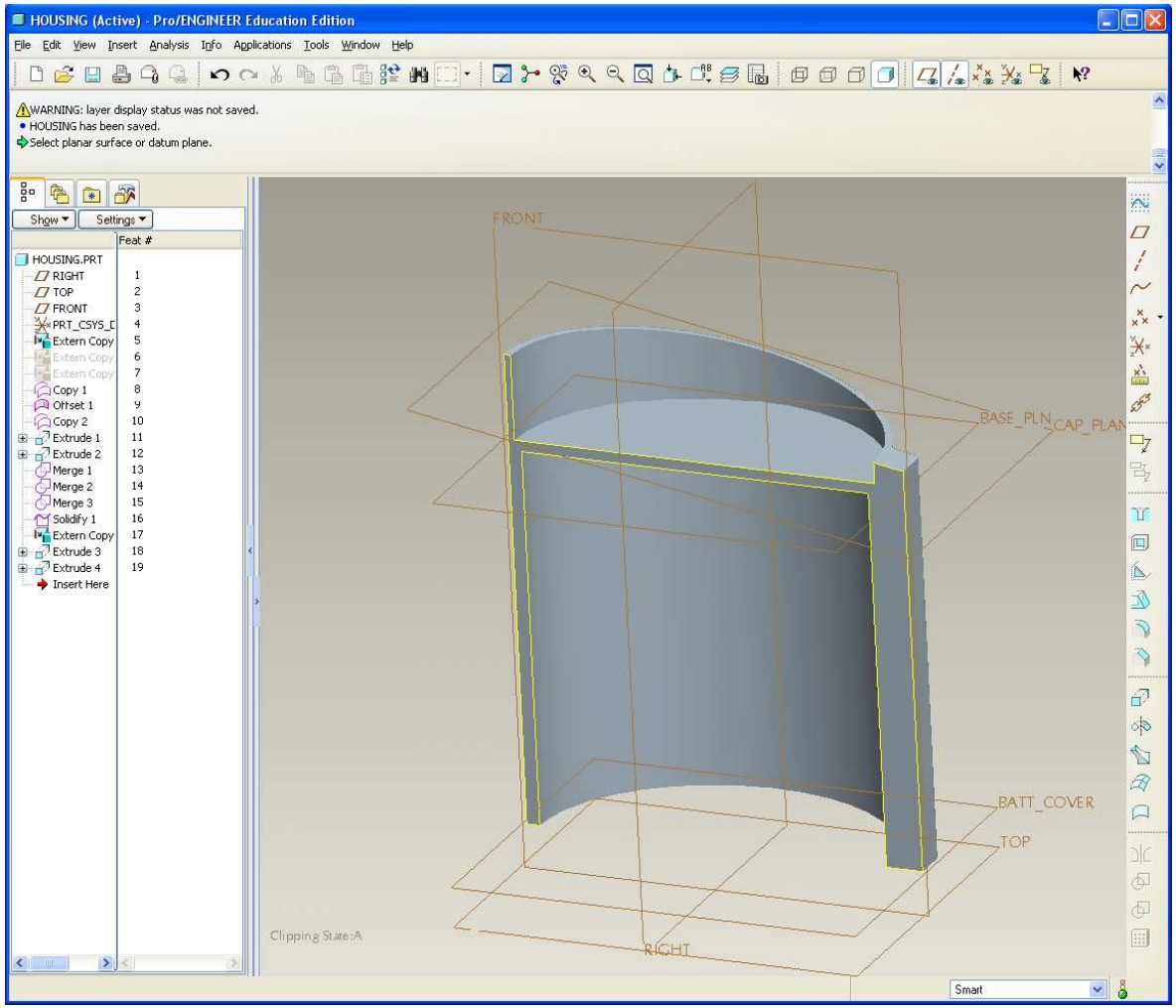
EXERCISE – Top-Down Design Tools

- Basically repeat steps down for CAP
  - Copy BASE_PLN
  - Extrude solid feature from it
- This time:
  - Cut from the solid
  - Offset .065



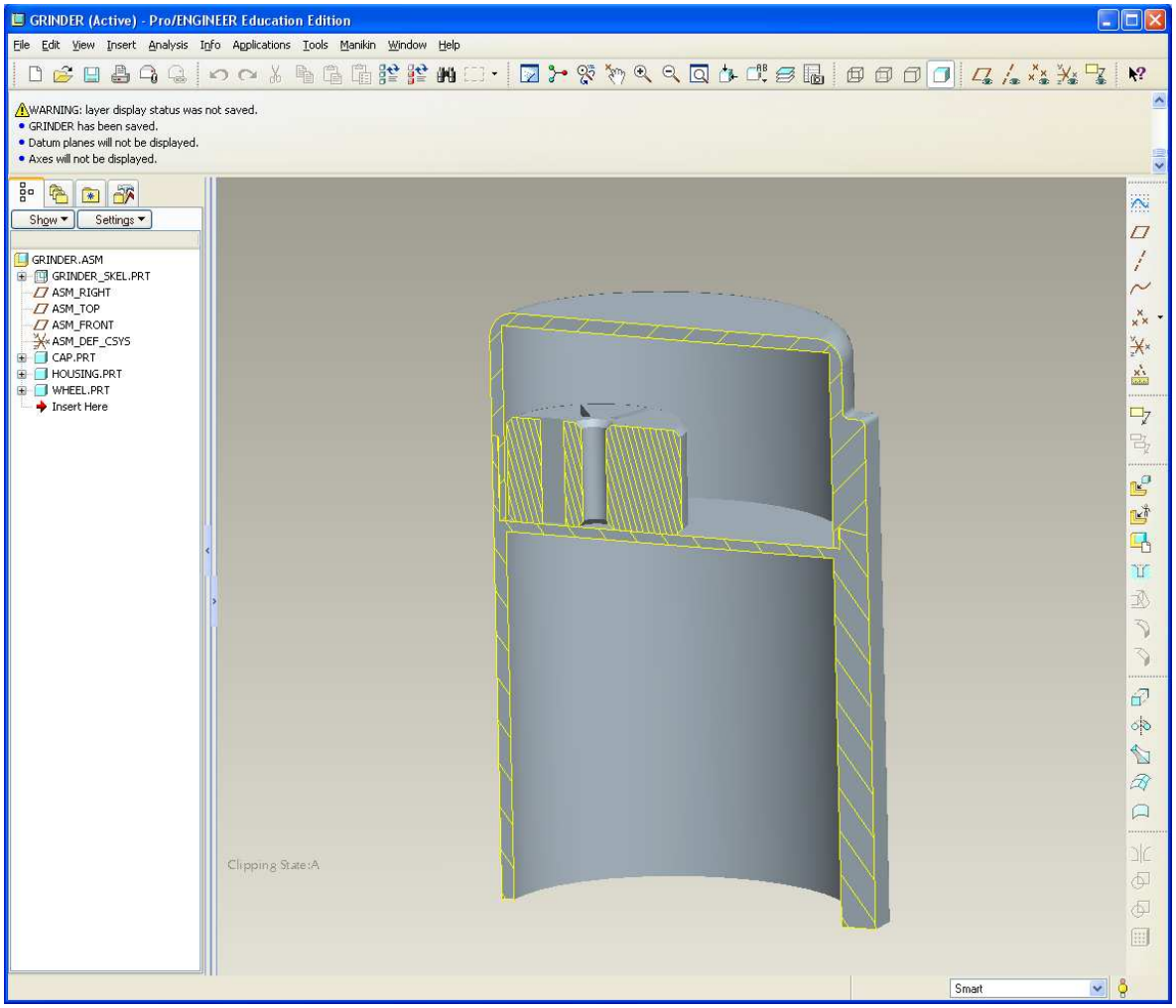
EXERCISE – Top-Down Design Tools

- Extrude a partition between where the coffee will be ground and where the electronics will live
    - Web thickness is .100in



EXERCISE – Top-Down Design Tools

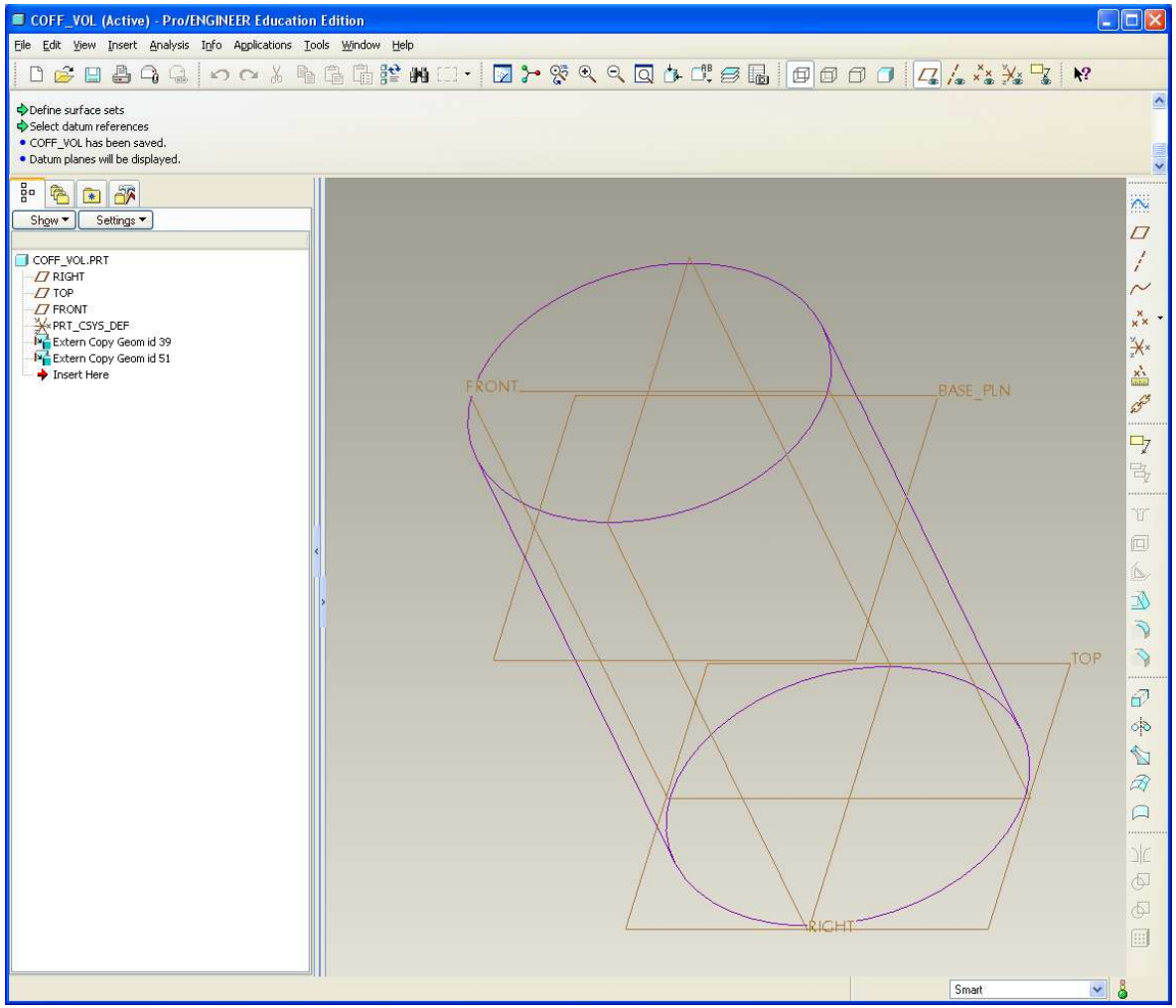
- Back to the assembly, insert the WHEEL component
- ***How much coffee can we fit in the space allotted for grinding?***



EXERCISE – Top-Down Design Tools

Create a new model to measure the coffee volume

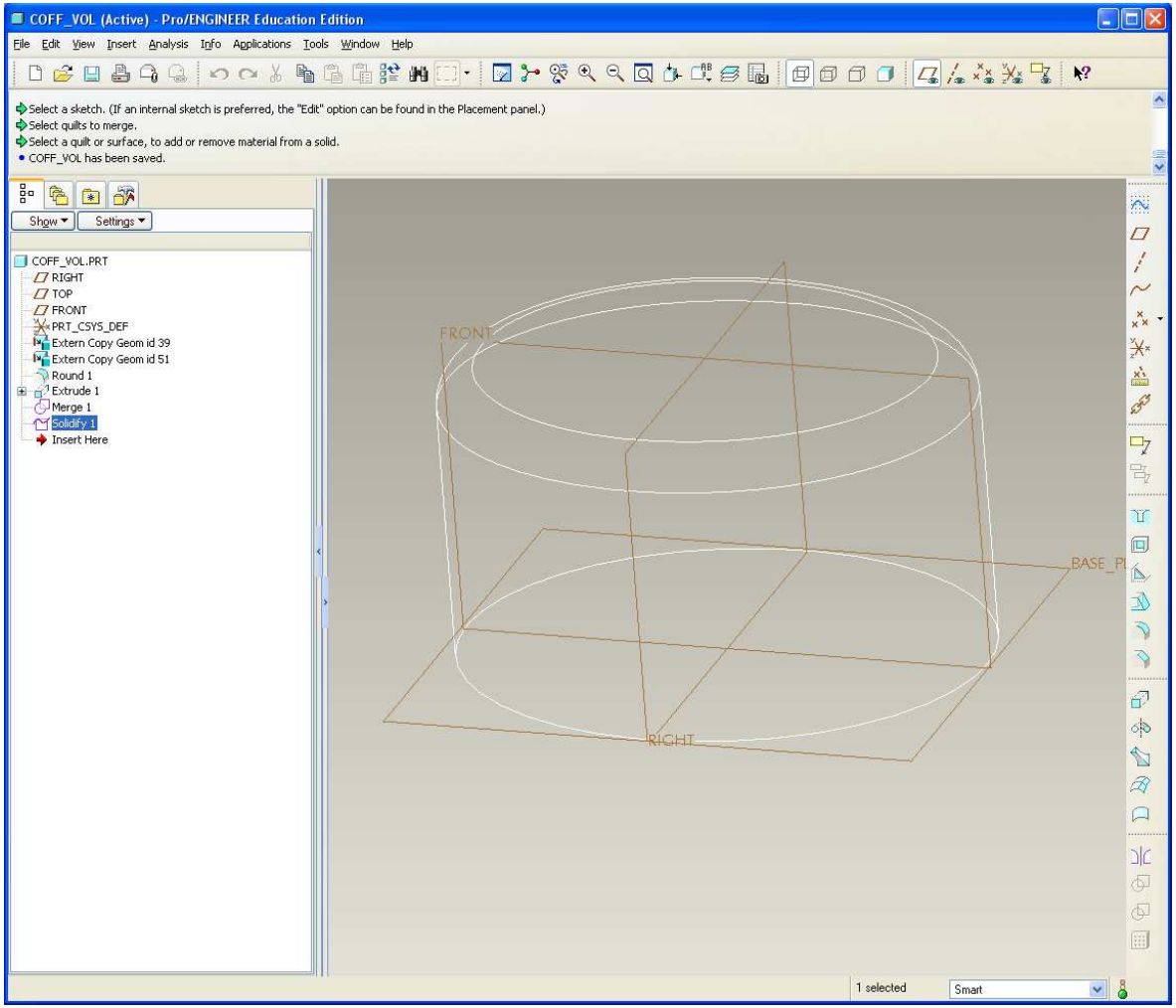
- File > New > coff_vol.prt
- Copy outer surface from ID model
- Copy BASE_PLN from skeleton



EXERCISE – Top-Down Design Tools

Create a new model to measure the coffee volume

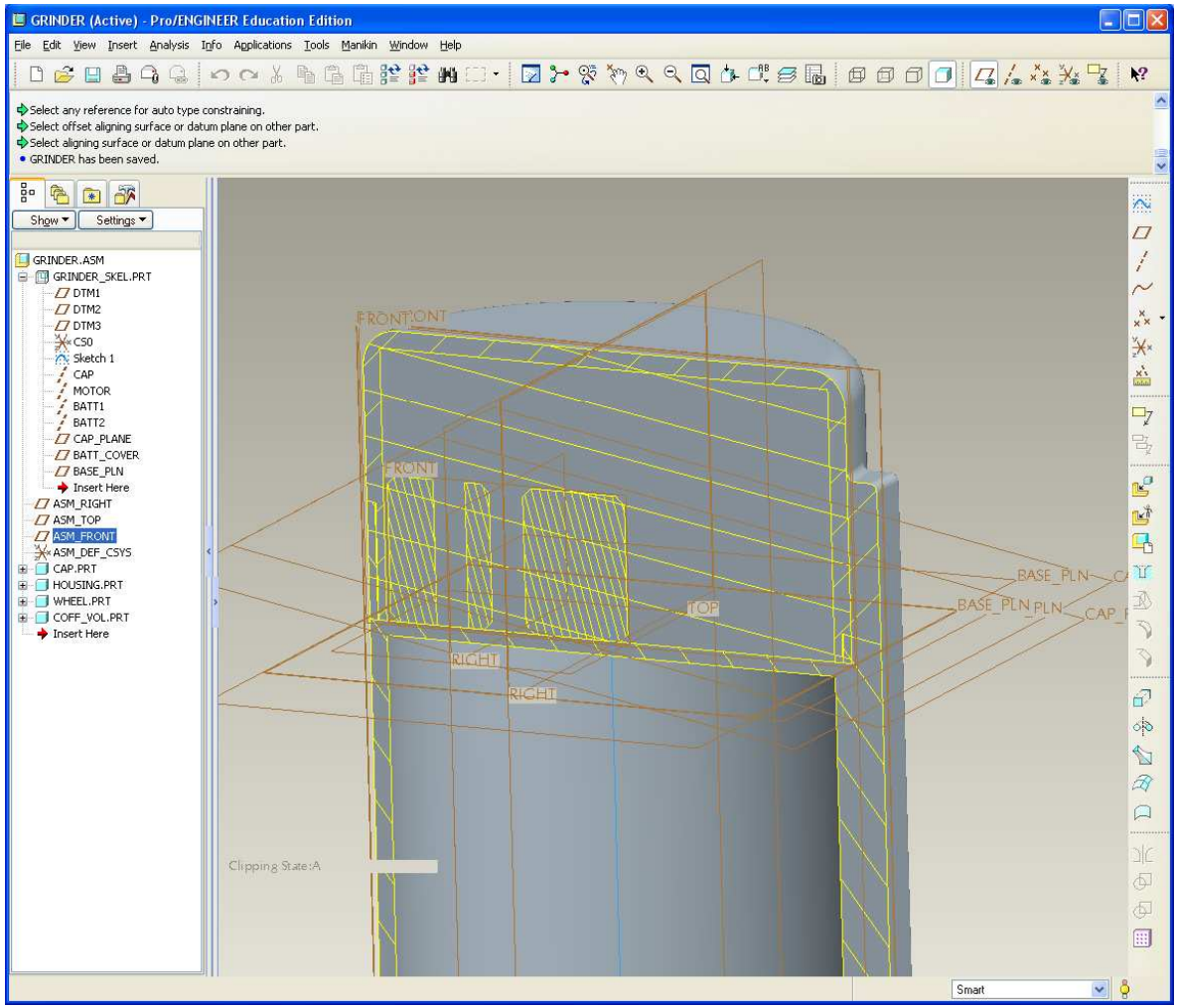
- Add R.250 round to top
- Trim solid at BASE_PLN



EXERCISE – Top-Down Design Tools

Create a new model to measure the coffee volume

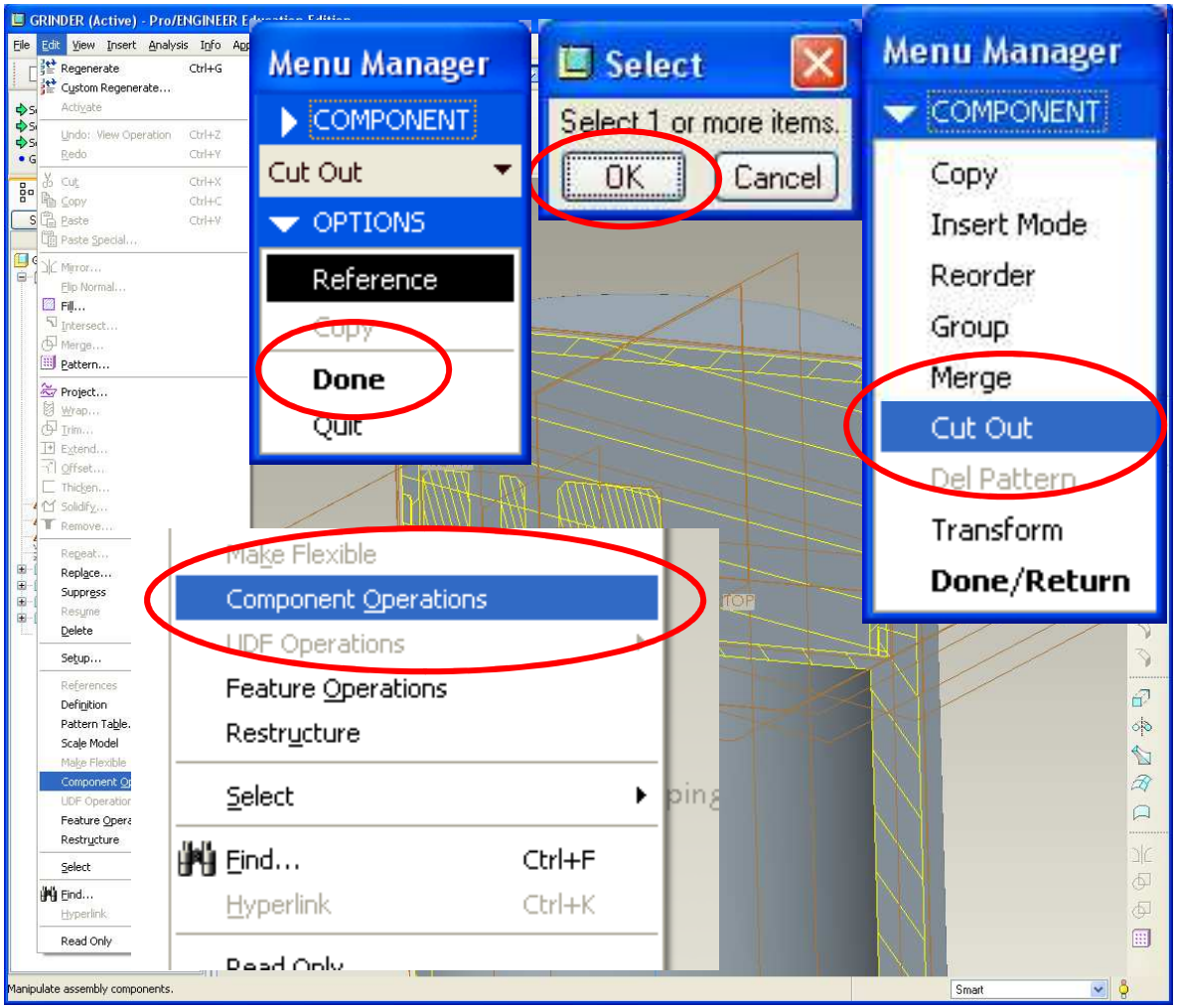
- Assemble coffee volume part into top level assembly



EXERCISE – Top-Down Design Tools

Use Component Operations to determine volume

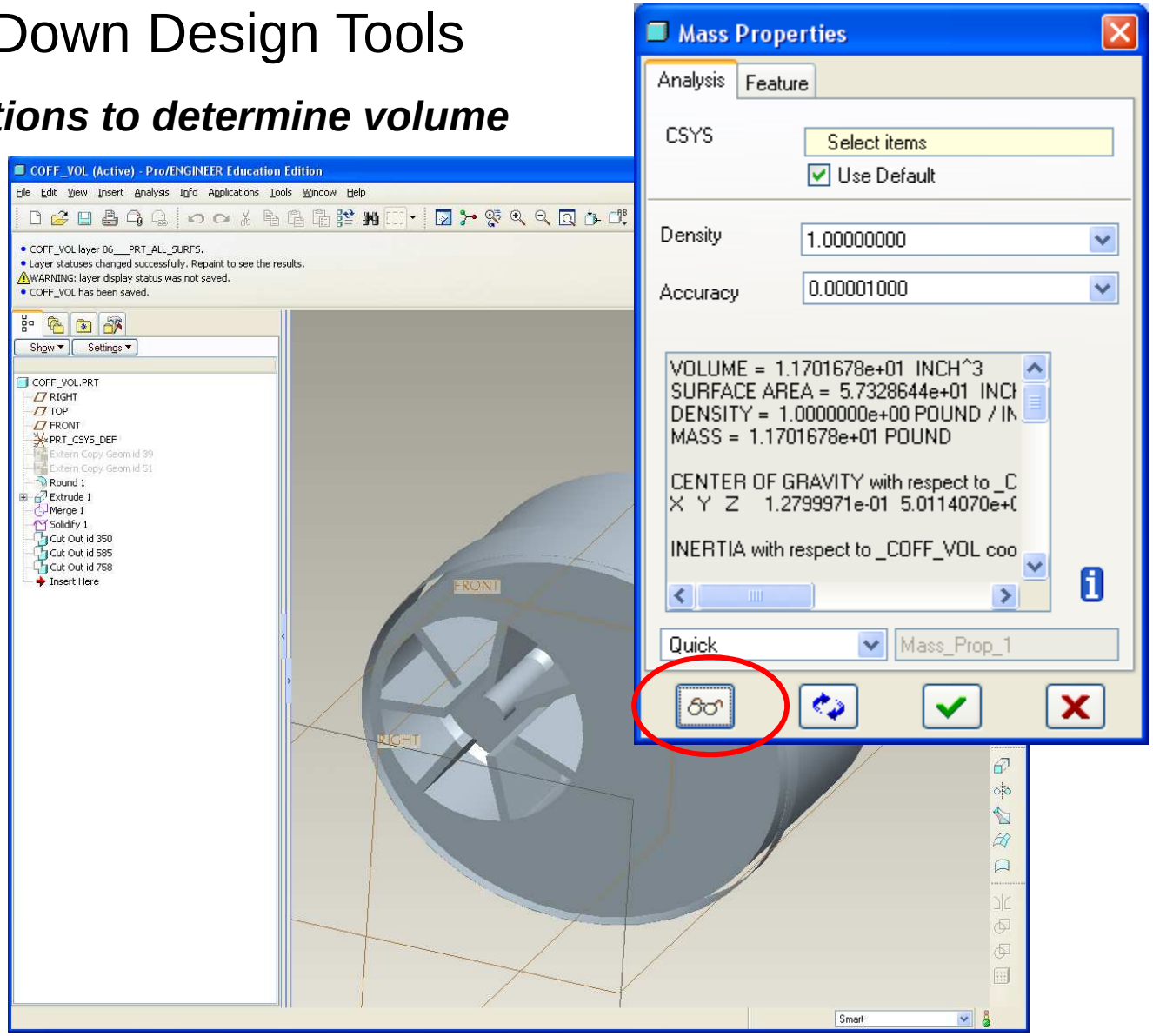
- Edit > Component Operations
- Cut Out
- Select volume model > OK
- Select cap part > OK
- Done
- Done/Return
- ***Repeat with Housing and Wheel***



EXERCISE – Top-Down Design Tools

Use Component Operations to determine volume

- Go back to volume model
- Analysis > Model > Mass Properties
- Click the goggles



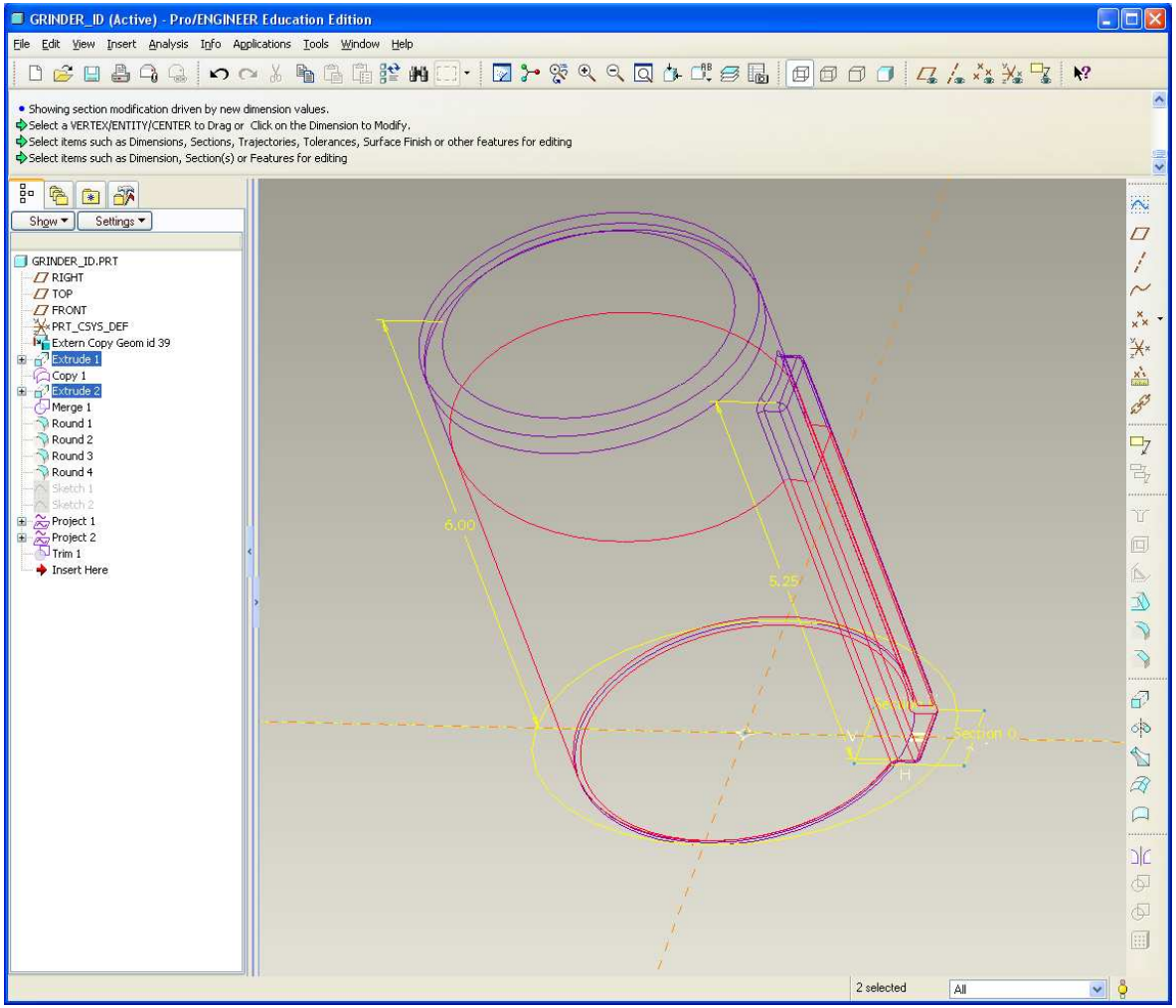
EXERCISE – Top-Down Design Tools

Fast forward…..built the model and customer feedback is in

- As a result of focus group study we have to change the model:
  - Ellipse cross section isn't "*ellipsey*" enough
  - Not enough volume of coffee in grinder
  - Straight curve interface has been done, need a new look
- ***Back to ID model***

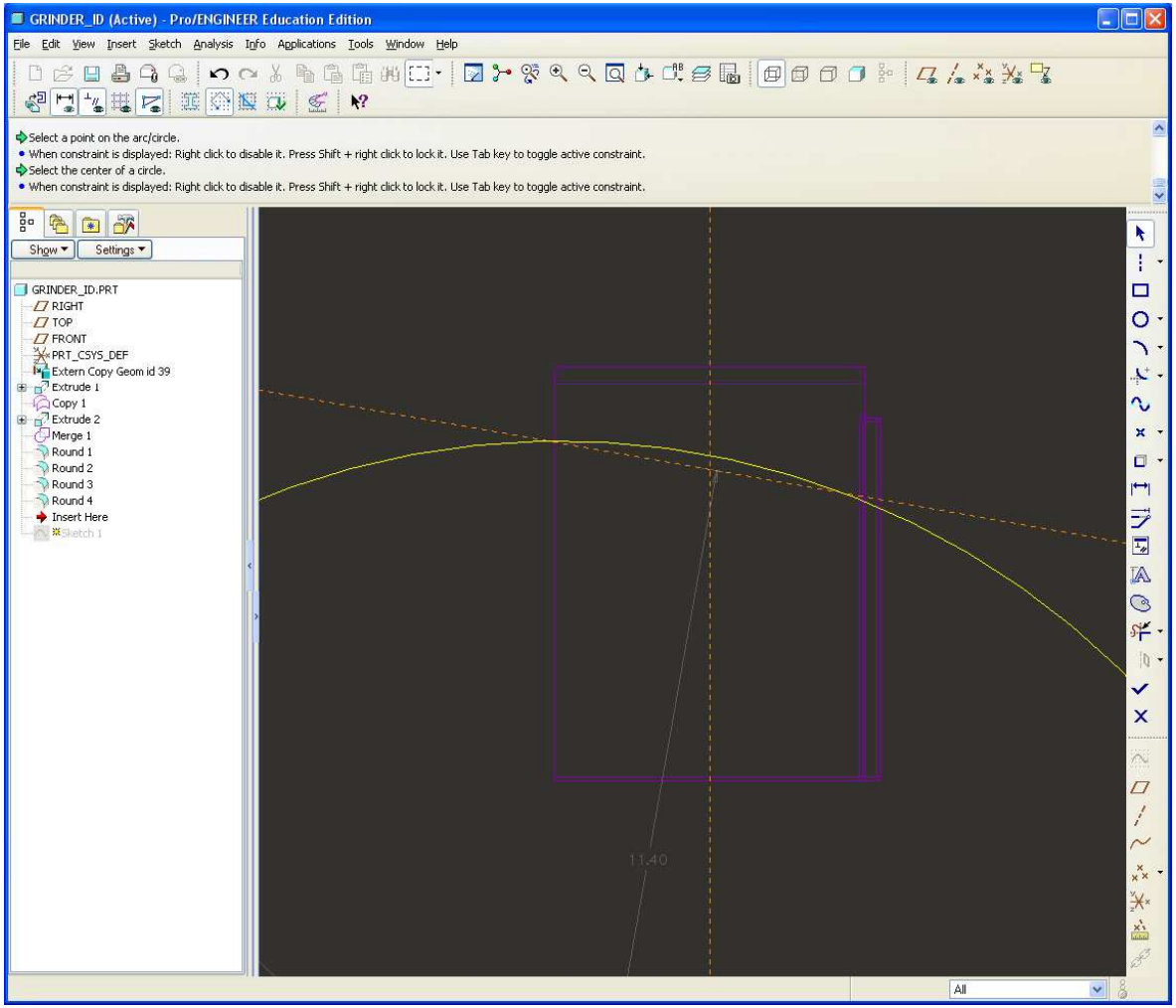
EXERCISE – Top-Down Design Tools

- Edit ellipse on base feature
  - Modify Rx to 2.25
- Modify spine feature
  - Should extend 2.47 from RIGHT
- Regen



EXERCISE – Top-Down Design Tools

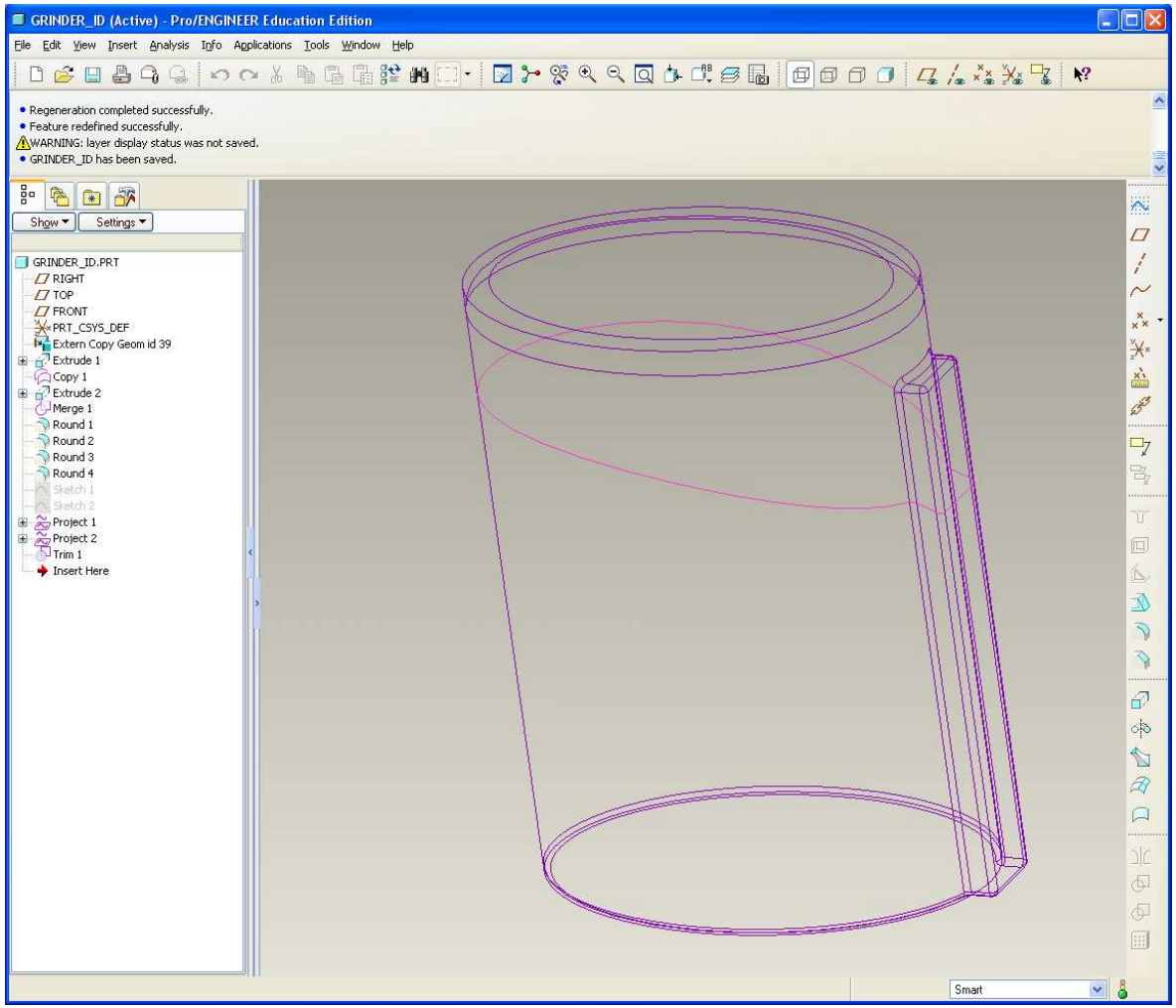
- Replace straight sketch with circular section



EXERCISE – Top-Down Design Tools

ID model is updated

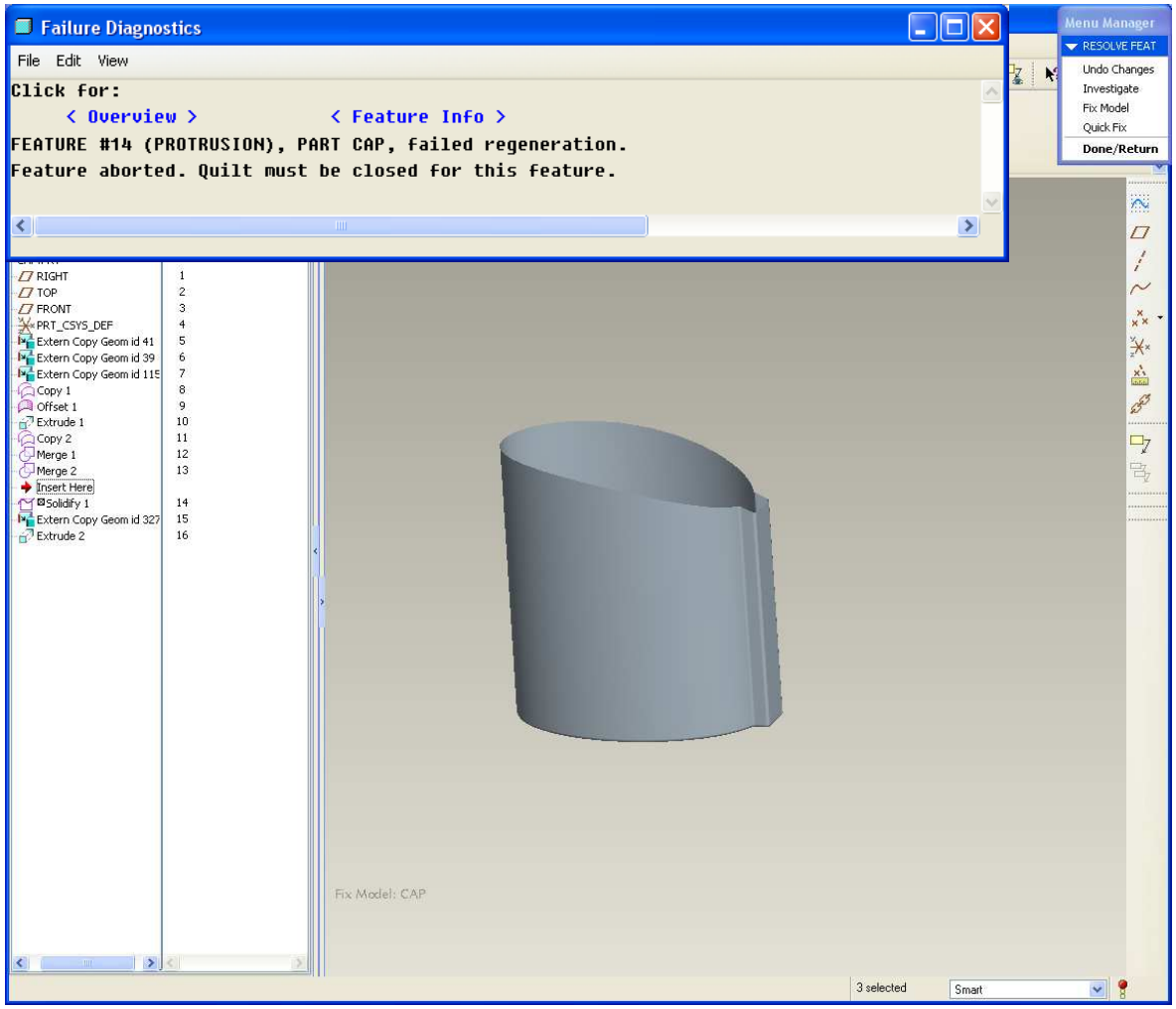
- Move on to the parts



EXERCISE – Top-Down Design Tools

Part update

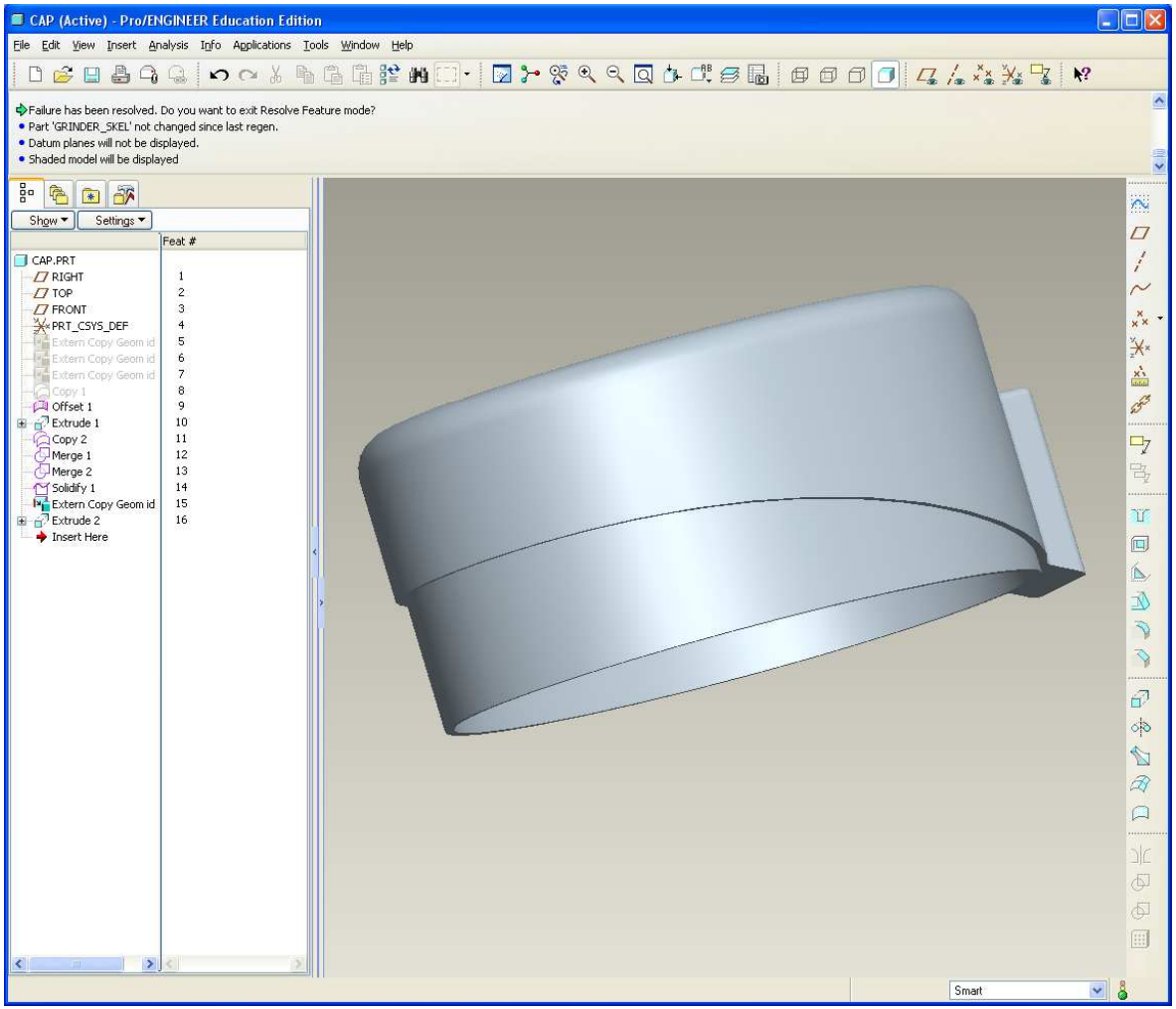
- Regenerate the Cap
  - Failure mode
- Clip suppress



EXERCISE – Top-Down Design Tools

Part update

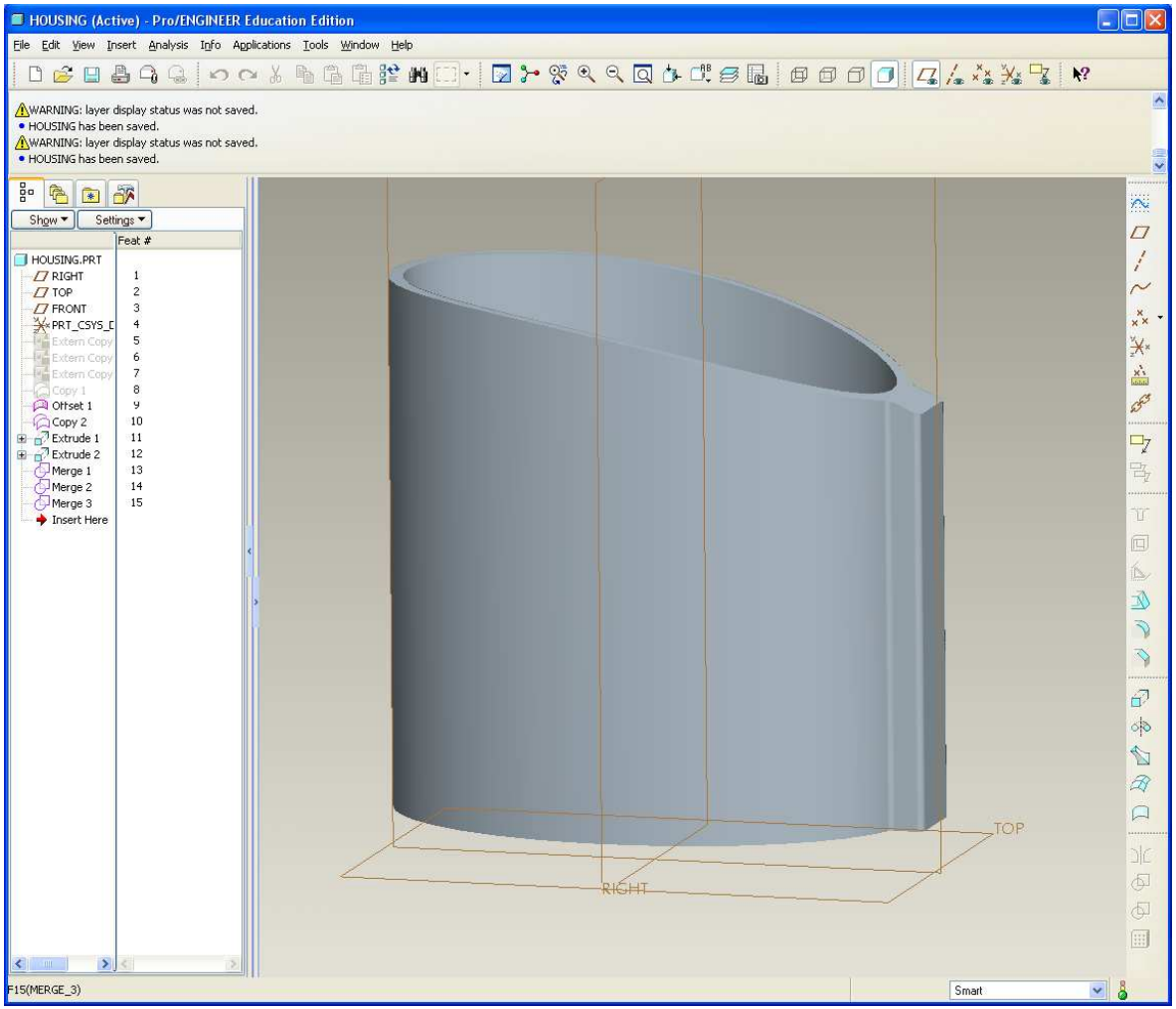
- Need to update some references
    - It's faster to go through Failure Mode than start over!!
- Here we are



EXERCISE – Top-Down Design Tools

Part update

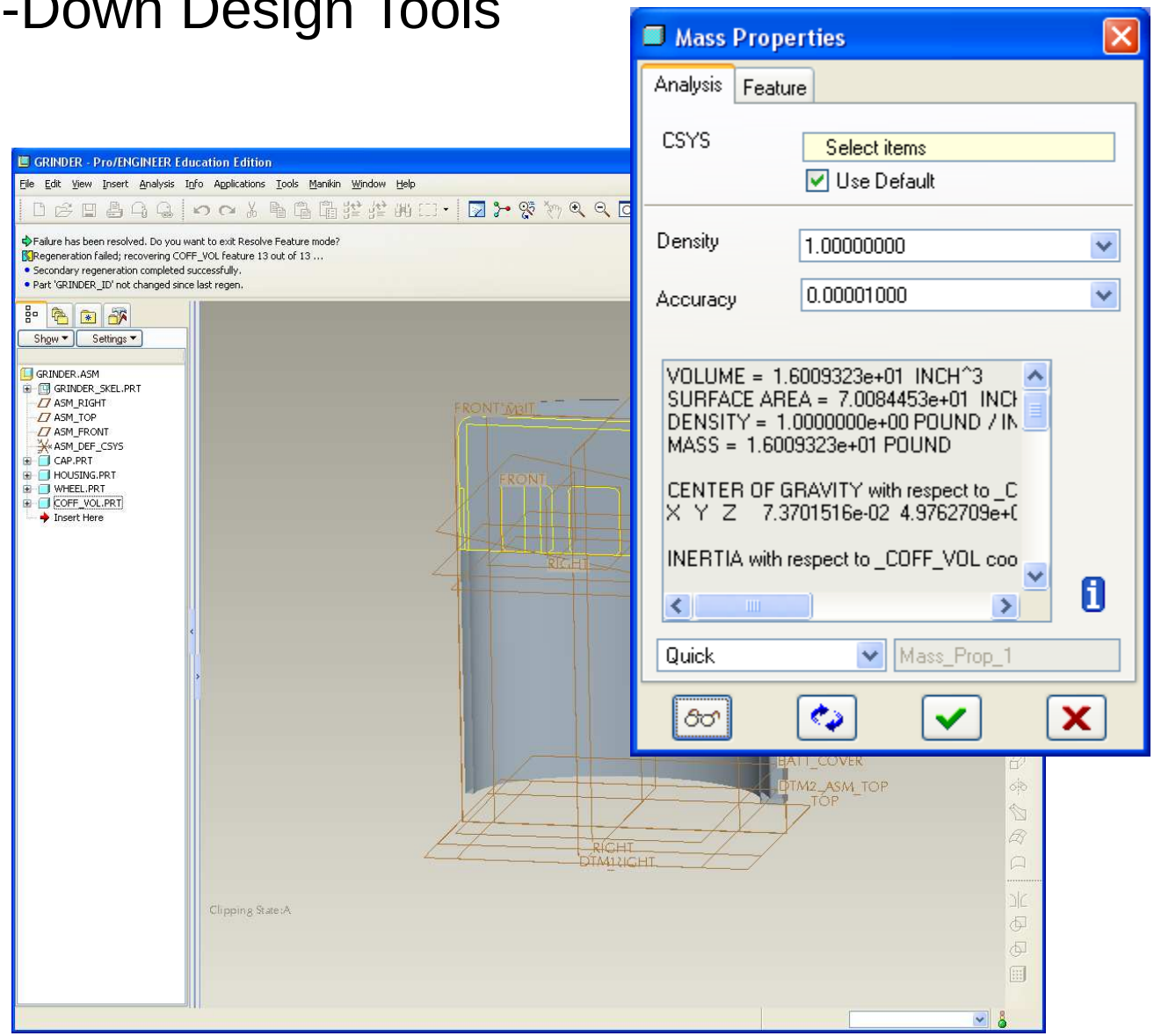
- Same steps with the Housing



EXERCISE – Top-Down Design Tools

Assembly update

- May need to redefine a few things here and there, but the volume number comes back out.



EXERCISE – Top-Down Design Tools

Summary – Where did we use Top-Down tools

- Skeletons
    - Provide a layout for entire product and position of primary systems
- Shared Geometry
    - Allows for single-source, product-level geometry specification
- Component Operations
    - Use product components to garner other information