Feature-Based Modeling

Part Editing
Feature-Based Modeling

- Break down into Features
- Series of Steps
  - 1st Step: Base Feature
- Adding / Subtracting Material
- Edge Features
Objects can be thought of in terms of features:
- Shapes
- Holes
- Rounds
- Etc.

Determines design strategy.
Example Construction 1

We can think of the block in terms of 2 “L” shapes and then cut out the hole.
We can think of the block in terms of a “C” shape and then add the plank with a hole.
Example Construction 3

Finally, we could draw the overall shape from the top view and remove unwanted material.
Series of Steps

• Base Feature
  • First Extrusion or Revolve
  • Reduce Steps of Construction

• Features
  • Additions or subtractions from original base feature
Edge Features

Fillets create rounded edges

Chamfers create slanted edges
SolidWorks Example: Piston Head

How would you break this down into features? Where would you start?
SolidWorks: Base Feature

There are a couple ways to effectively model this piston head but for these slides we will start with a simple extrusion of a circle to create a cylinder.
SolidWorks: Extruded Cut

The volume will be removed using an extruded cut offset from the top surface.
SolidWorks: Revolved Cut

The piston rings will be cut out using a revolved cut.
Is there any other way that we could have reached this point and how many steps would it have involved? Would it be easier?
The pin hole and groove will be removed using an extruded cut.
SolidWorks: Chamfer

The top slanted edge will be added using a chamfer.

Rev: 20140122, AJP
And finally the bottom edge of the head will be smoothed out using a Fillet (under the features menu)
SolidWorks: Finished Part

This finished product can now be used in an assembly with other components shown here.
SolidWorks: Design Tree

The design tree on the left of the screen catalogs all the steps of creating this part and records the steps from top to bottom.

Sketches are absorbed into features but can be accessed by clicking the plus sign next to each feature.
SolidWorks: Part Editing

The design tree can be “rolled back” by clicking and dragging the blue bar at the bottom up and the features are no longer shown.

New features can be added to this model in the middle of the design tree while other items are still “rolled back”.

Rev: 20140122, AJP
SolidWorks: Altered Final Part

These changes will also carry over to the assembly that contains the part.

When the design tree is restored then all the features return as long as changes do not interfere with previous features.
Feature Based Modeling Wrap Up

- Recognize Features of Object
- Start with Base Feature
- Add or Remove Material in a series of steps
- Features to add last:
  - Fillets: Rounded edges
  - Chamfers: Slanted edges
- Editing Features with Model Tree

Homework
Problem 6.4 (nn)
In-Class Problems

Problem 6.4 (p) & (u)

Create the following shape according to the features and dimensions. (Hint: Add Fillets last)