

# EN1740 Computer Aided Visualization and Design

Spring 2012

3/15/2012

Brian C. P. Burke

# Brown University

#### Last Time:

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

#### Tonight:

- Shared data
  - Copied Geometry
  - Component Operations
- Family Tables



#### Shared Data - Copied Geometry

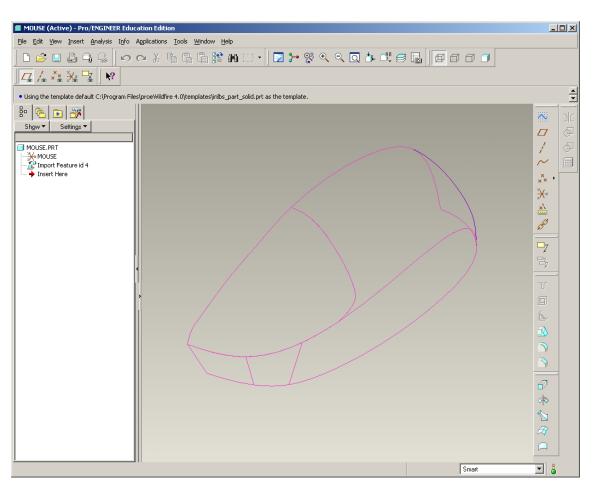
#### Component and assembly data can be shared among various files

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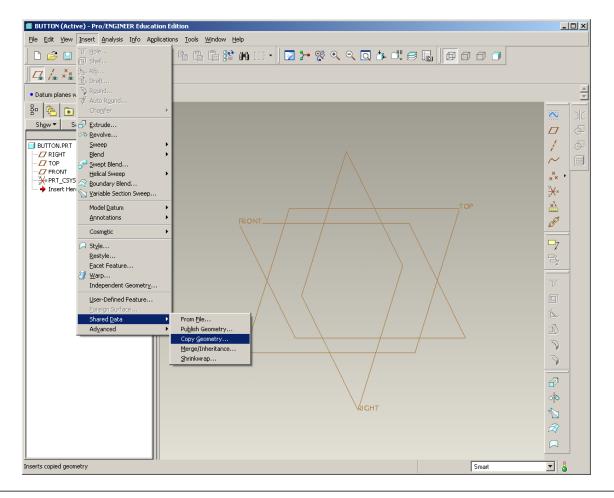


- File > Open
- Select .stp file type
- Select mouse.stp
- File > New > Part > button





- In button.prt
  - Insert > Shared Data
  - > Copy Geometry

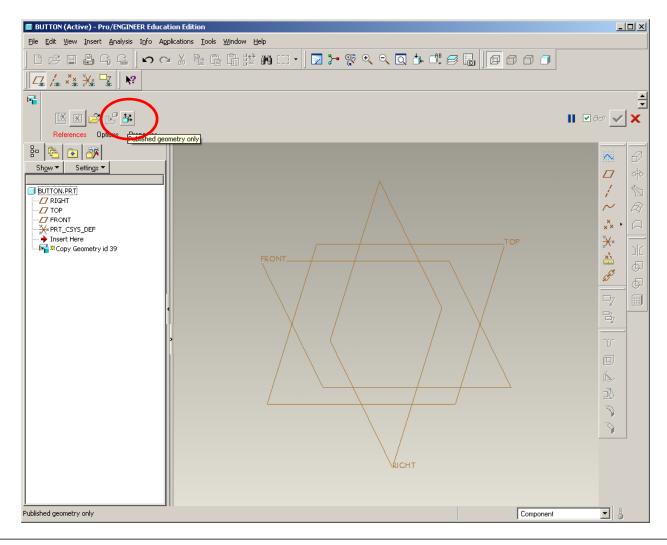


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• Uncheck Published

#### Geometry only



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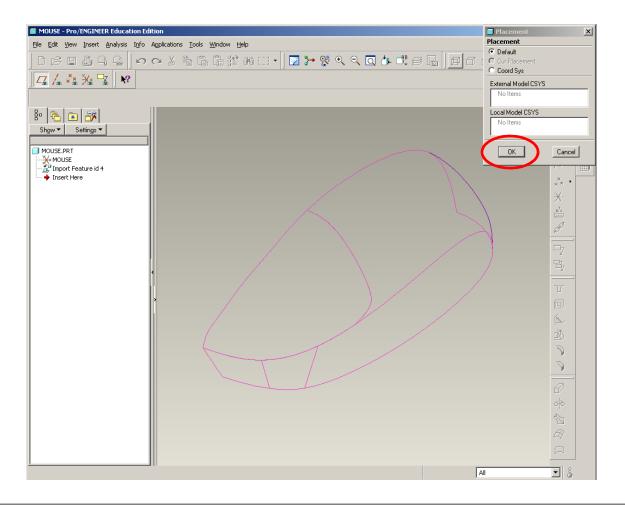


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- From the taskbar, select the Pro/E window with the mouse surface.....

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- ...Click on the outer surface
- Click OK for Default CSYS

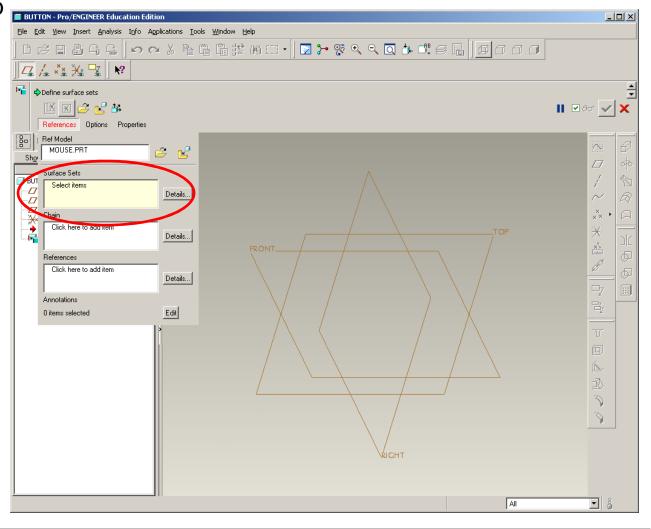




• You'll be directed back to

button.prt

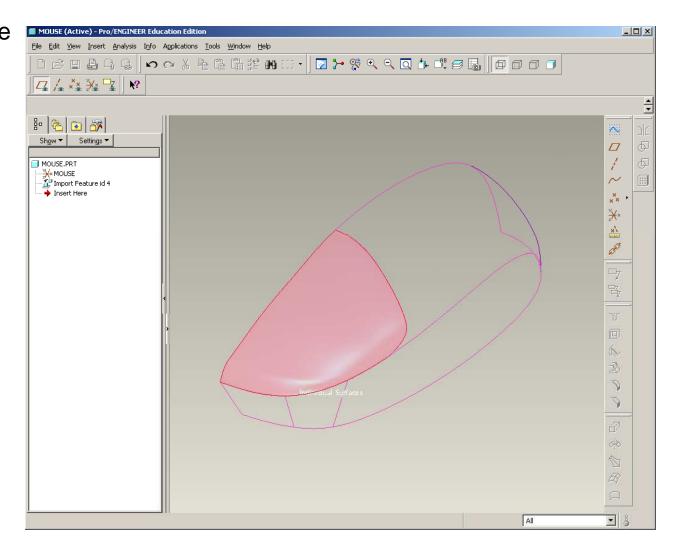
• Select Surface Sets



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- In mouse.prt, select the surface defining the button
- MMB when done



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- This file now is linked to previous file
- Try creating part files
   for the top and bottom of
   the body as well

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# **Family Tables**

- In many cases mechanical components have very similar constructions
- Family Tables can create multiple "instances" of components sharing common features



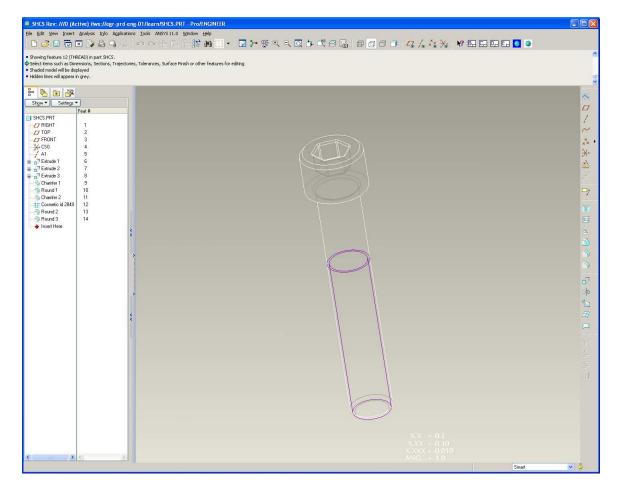
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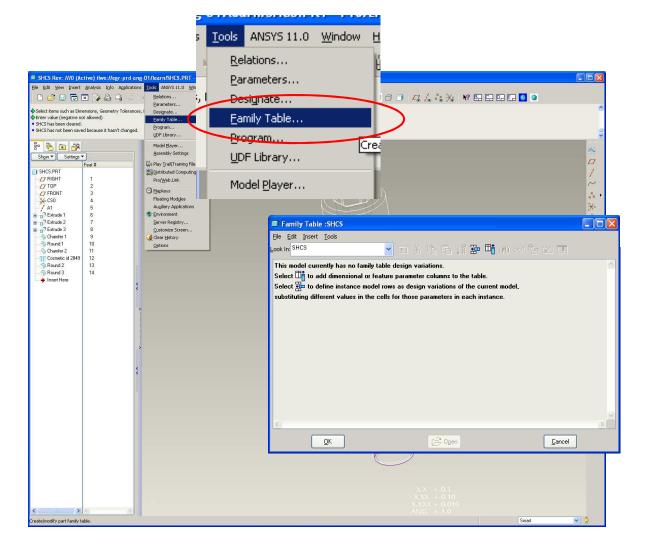


- From the Supporting Materials page download stuff for tonight
- File > Open > shcs.prt





- Tools > Family Table...
- This will launch the Family Table definition dialog





- We will build a table in this dialog that defines the family of components
  - The columns of the table are comprised of the parameters that define the components
  - Each row will be a separate instance of the family, defining a specific set of parameter values

Family Table :SHCS		
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substituting different values in the cells for	those parameters in ea	ich instance.
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# **EXERCISE** - Family Tables

- Select the "Add/Delete the Table Columns" button on the Family Table dialog box
- Another dialog will launch to select the dimensions we are concerned with

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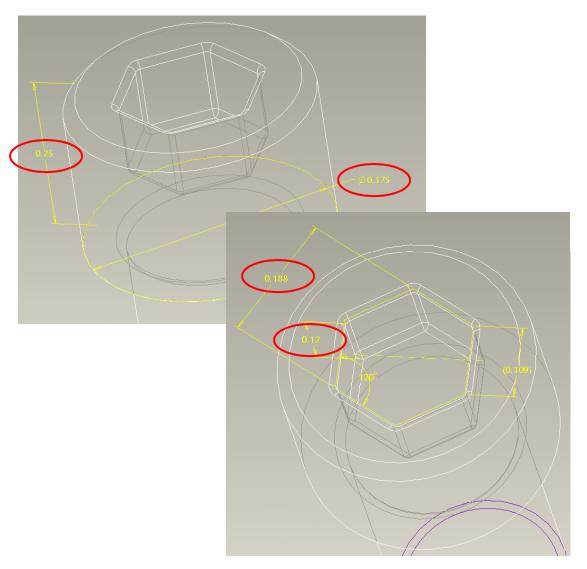
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# **EXERCISE** - Family Tables

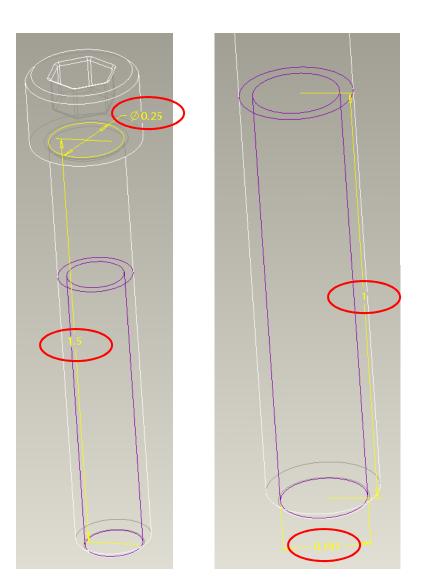
• Select the following dimensions:

- Head height (.250)
- Head diameter (.375)
- Hex width (.188)
- Hex depth (.120)



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- Select the following dimensions:
  - Thread major dia. (.250)
  - Shaft length (1.500)
  - Thread length (1.000)
  - Thread minor dia. (.191)







- Click on OK on the selection dialog
- Take a look at the Family Table dialog to see the dimensions that available

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- Click on the "Insert a new instant at the selected row" button
- Note that a new row is created with blank values
- Name the new instance "P250-20\_X\_1P500"
  - Be careful that the name is accepted
  - The instance naming standard is very restrictive

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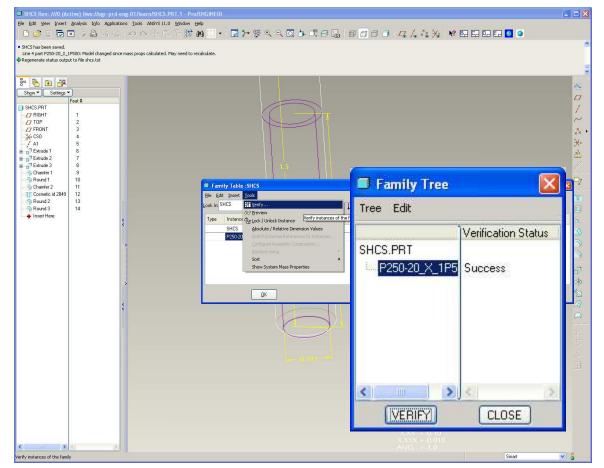


- Click on the "Insert a new instant at the selected row" button
- Note that a new row is created with blank values
- Name the new instance "P250-20\_X\_1P500"
  - Be careful that the name is accepted
  - The instance naming standard is very restrictive
- Copy all the values from the previous row into the new row

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	P250-20_X_1P500	0.250	0.375	0.188	0.120	0.250	1.50	1.00	0.191	

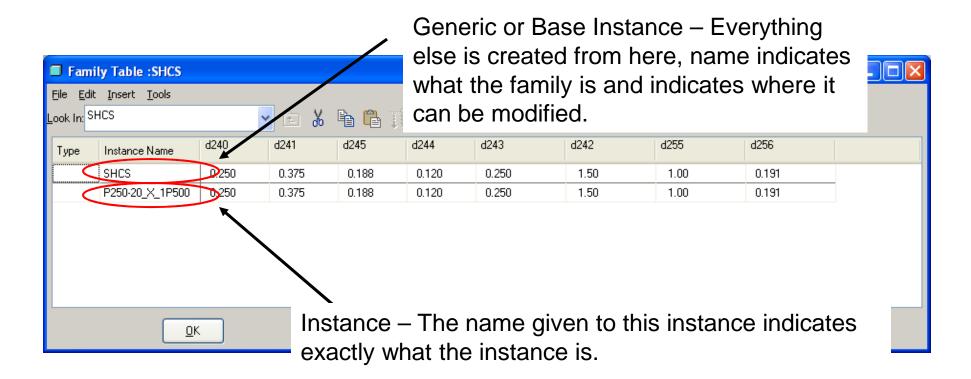


- In Family Table dialog, Tools > Verify
- In Family Tree dialog, Click VERIFY button
  - This step verifies that the model we've just created will regenerate correctly
- Verification Status should appear as "Success"





#### Why did we just create the same thing again?



NOTE: This isn't necessary, but is a good practice the adds to the clarity of the family



#### These column headings are not particularly helpful...

- Already there are too many columns to keep track of
- Let's add some clarity to make this more efficient going forward.....

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Change the name of the key feature dimensions

- Edit the first solid feature (Extrude1)
- Info > Switch Dimensions

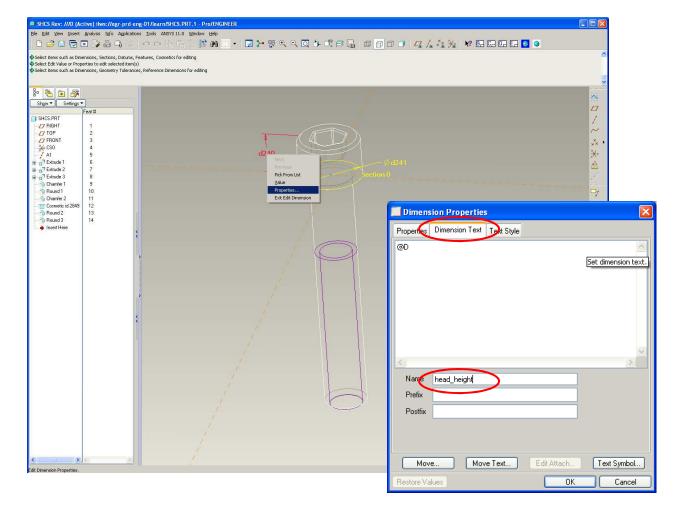
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#### Change the name of the key feature dimensions

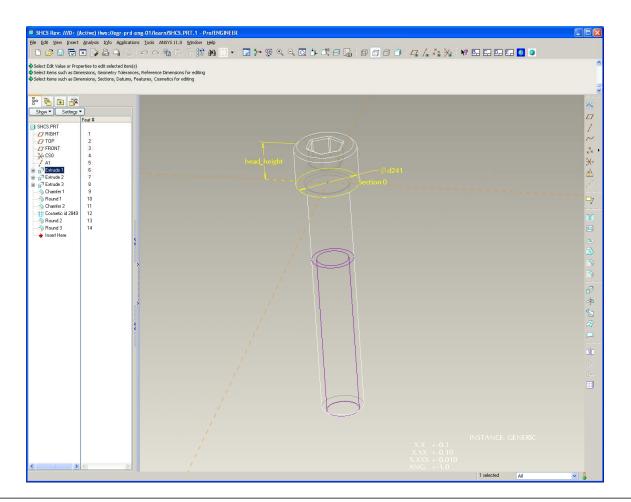
- RMB on head height
- Properties...
- Click Dimension Text tab
- Enter "head\_height" in the Name box
- Click OK







- Notice the name of the dimension
- Repeat this process for
  - head\_diameter
  - hex\_width
  - hex\_depth
  - thread\_major\_dia
  - shaft\_length
  - thread\_length
  - thread\_minor\_dia







• Go back and examine the Family Table column headers (much better)

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Туре	Instance Name	d240 HEAD_HEIGHT	d241 HEAD_DIAMETER	d245 HEX_WIDTH	d244 HEX_DEPTH	d243 THREAD_MAJOR_DIA	d242 SHAFT_LENGTH	d255 THREAD_LENGTH	d256 THREAD_MINOR_DIA	
	SHCS	0.250	0.375	0.188	0.120	0.250	1.50	1.00	0.191	
	P250-20_X_1P500	0.250	0.375	0.188	0.120	0.250	1.50	1.00	0.191	
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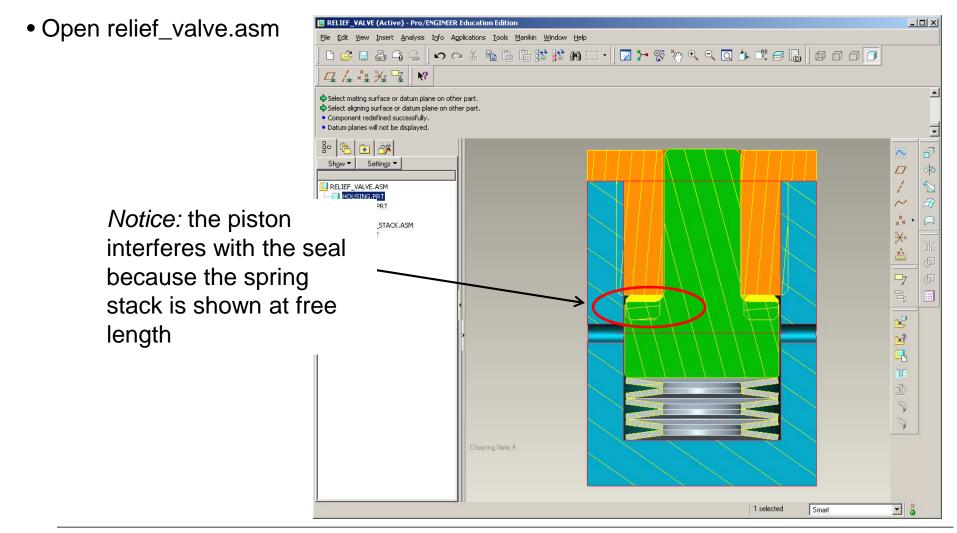


- Create a new instance that has a 1.000 shaft\_length and .750 thread\_length
- Verify the instance
- Save the model
- Open the new instance

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Туре	Instance Name	HEAD_HEI				THREAD_MAJO		THREAD_LENG		
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	P250-20_X_1P500	0.250	0.375	0.188	0.120	0.250	1.50	1.00	0.191	
	P250-20_X_1P	0.250	0.375	0.188	0.120	0.250	1.00	0.75	0.191	



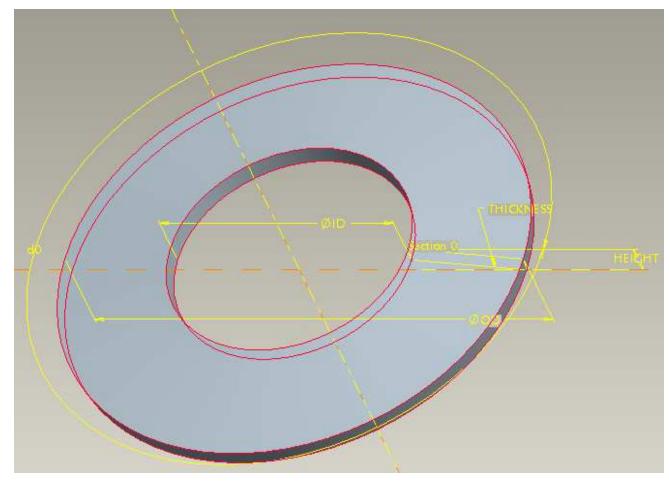
Create a Family Table to show a spring in free, installed and compressed lengths



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- Open belleville.prt
- Rename the following dimensions as we did previously
  - ID
  - OD
  - THICKNESS
  - HEIGHT







- Create a family table
- Selec

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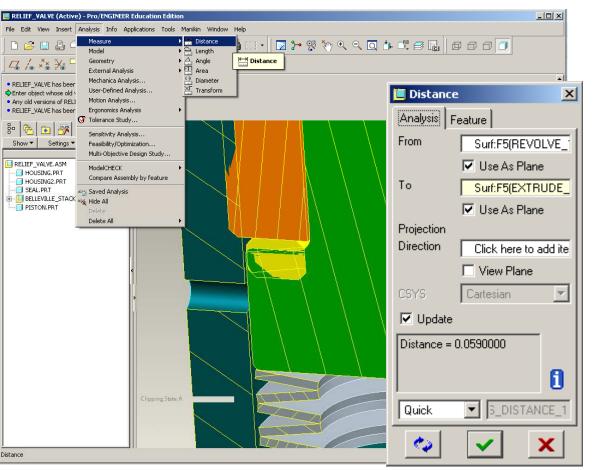
- Go back to the relief\_valve.asm
   assembly
- Measure the interference

between the piston and the seal

Analysis > Measure >

Distance

- Select plane on piston
- Select plane on seal
- Note the total interference is .059in



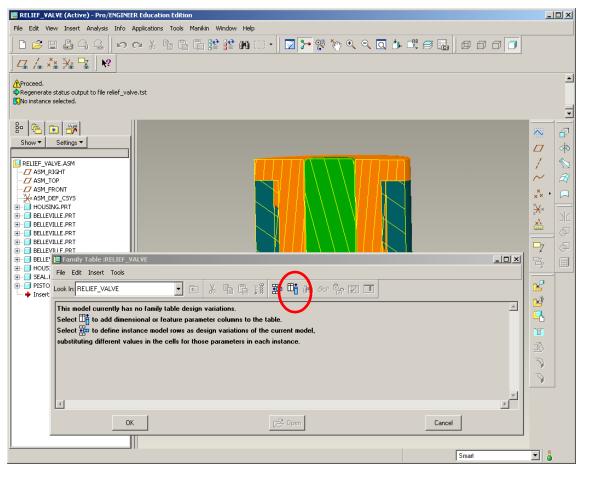


- From the measurement, we need to lower the height of the Bellevilles from .034 to .0242
  - Create a new instance "BLLV\_INSTLL"
  - Copy all dimensions, except for the height
  - Change height to .0242
- Verify instance and save part

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BLLV_INSTLL	belleville.prt_INST	.255	.018	.0242	.5	
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- Return to the assembly
- Create a Family Table (Tools > Family Table...)
- Begin by adding columns



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- This time in the selection dialog box, check the Component radio button
- Select each Belleville washer
  - When prompted select Single
- Continue until all 6
   Bellevilles are selected

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Family Items, Generic : RELIEF\_VALVE

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• Create a new instance with the add row button

E Family Table :RELIEF_VALVE									
<u>File Edit Insert T</u> ools									
Туре	Instance Name	Common Name	M439 BELLEVILLE	M420 BELLEVILLE	M401 BELLEVILLE	M382 BELLEVILLE	M381 BELLEVILLE	M362 BELLEVILLE	
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- Select cell for the first Belleville instance
- Tools > Replace Using > Related model...
- Select the Belleville instance with the reduced height
- Repeat these steps for all 6 Bellevilles

Family Table :RELIEF_VALVE		
Eile       Edit       Insert       Iools         Look In:       RELIEF_VA       Yerify         Type       Instance       Lock / Unlock Instance         Absolute / Relative Dimension Values       Switch External References to Instances	M439 BELLEVILLE BELLEVILLE Common Folders be	ocuments ▶ proe ▶ inclass ▶ family_table
RELIEF       Configure Assembly Components         Replace Using       Sort         Sort       Sort         Show System Mass Properties	Image: Second product of the second product of th	elevile_s ousing2_s ison.prt elef_valv elef_valv eat.pt fss.pt ison.prt ison.prt ison.prt ison.prt ison.prt ison.prt ison.prt
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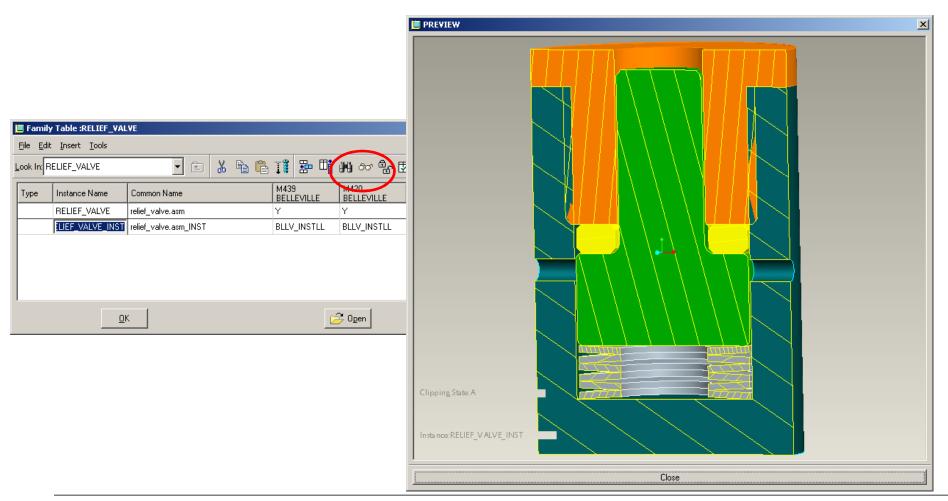


• Once all the Bellevilles are swapped out, Verify the model

E Family Table :RELIEF_VALVE							
<u>File E</u> dit Insert Tools		📒 Family Tree		×			
Look In: RELIEF_VA		Tree Edit					
<b>A</b>	M439 BELLEVII Y BLLV_IN	RELIEF_VALVE.ASN			M382 BELLEVILLE Y BLLV_INSTLL	M381 BELLEVILLE Y BLLV_INSTLL	M362 BELLEVILLE Y BLLV_INSTLL
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• After verifying the model, select Preview and make sure the interference is gone



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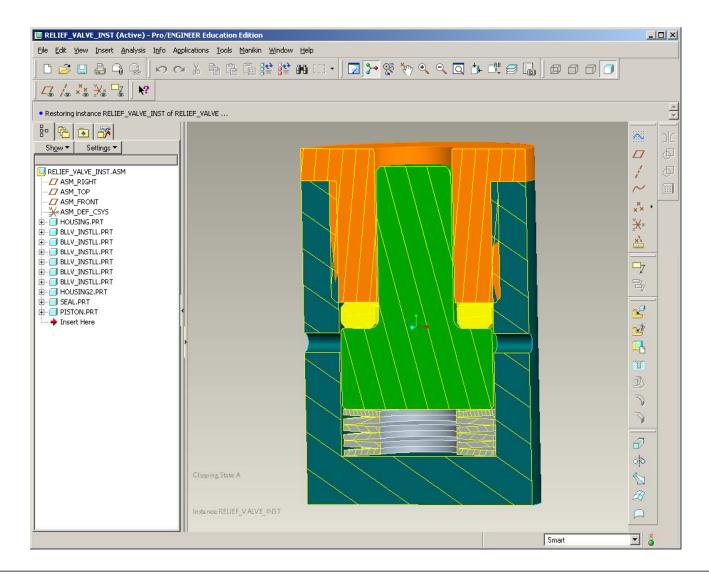
• Save the generic and then open the instance

🧱 File Open						
🕘 🕤 🕶 🖾 «	My Documents 🕨 proe 🕨 inclass 🕨 fami					
🧤 Organize 🗸 📲	Views 🗸 🎢 Tools 🗸					
Common Folders	🗐 belleville.prt					
📃 In Session	bllv_instll <belleville>.prt</belleville>					
🗹 Desktop	🛄 belleville_stack.asm					
📥 🖄 My Documents	housing.prt					
🖄 Working Directory	housing2.prt piston.prt					
💼 System Formats	🛄 relief_valve.asm					
💼 Manikin Library	🛄 relief_valve_inst <relief_valve>.asm</relief_valve>					
🛃 Favorites	🗐 seal.prt					
	🗐 shos.prt					

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• Done



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