

# SOLIDWORKS WORLD 2016

## SolidWorks Tips and Tricks 2016 (Advanced Essentials)

Phil Sluder  
Mechanical Engineer  
TriAxial Design and Analysis, Inc.

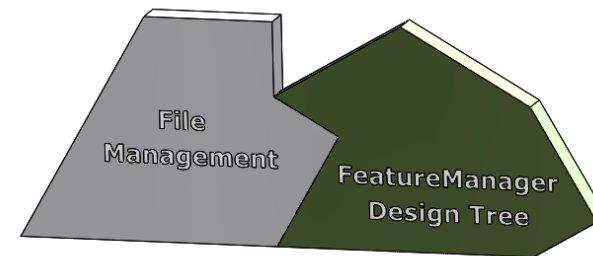
# Advanced Essentials

- File Management



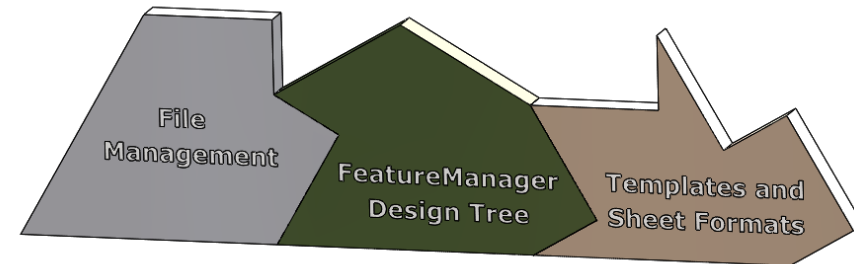
# Advanced Essentials

- File Management
- FeatureManager Design Tree



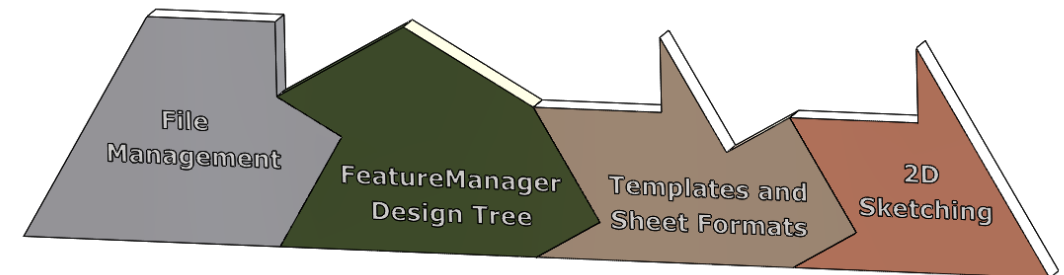
# Advanced Essentials

- File Management
- FeatureManager Design Tree
- Templates (and Sheet Formats)



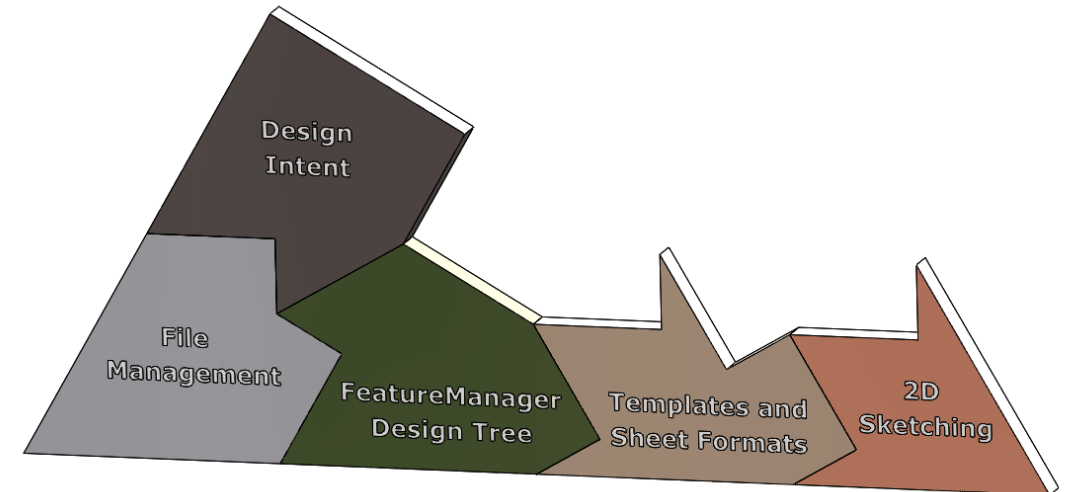
# Advanced Essentials

- File Management
- FeatureManager Design Tree
- Templates (and Sheet Formats)
- Two Dimensional Sketching



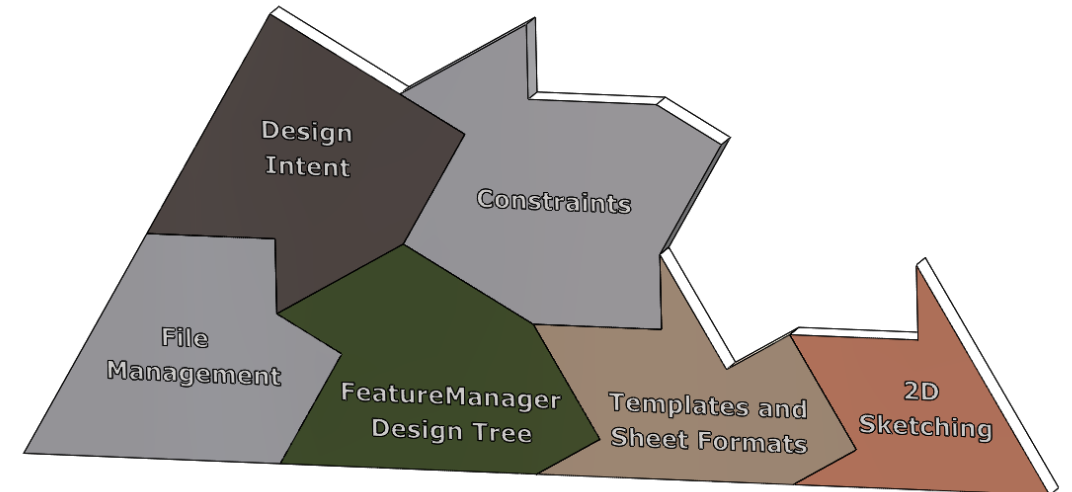
# Advanced Essentials

- File Management
- FeatureManager Design Tree
- Templates (and Sheet Formats)
- Two Dimensional Sketching
- Design Intent



# Advanced Essentials

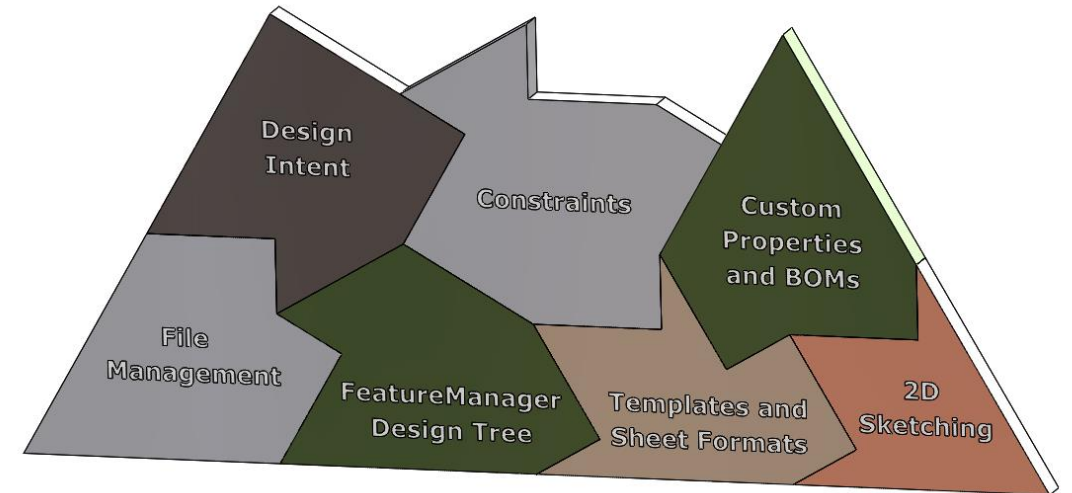
- File Management
- FeatureManager Design Tree
- Templates (and Sheet Formats)
- Two Dimensional Sketching
- Design Intent
- Constraints (Relations and Mates)





# Advanced Essentials

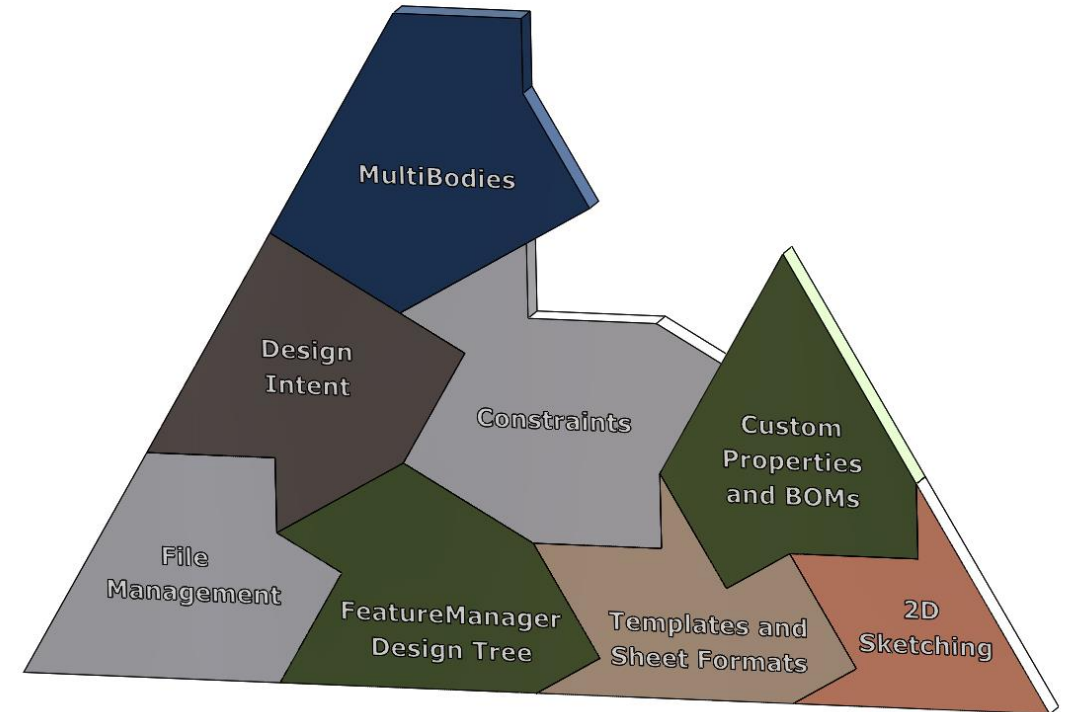
- File Management
- FeatureManager Design Tree
- Templates (and Sheet Formats)
- Two Dimensional Sketching
- Design Intent
- Constraints (Relations and Mates)
- Custom Properties and BOMs





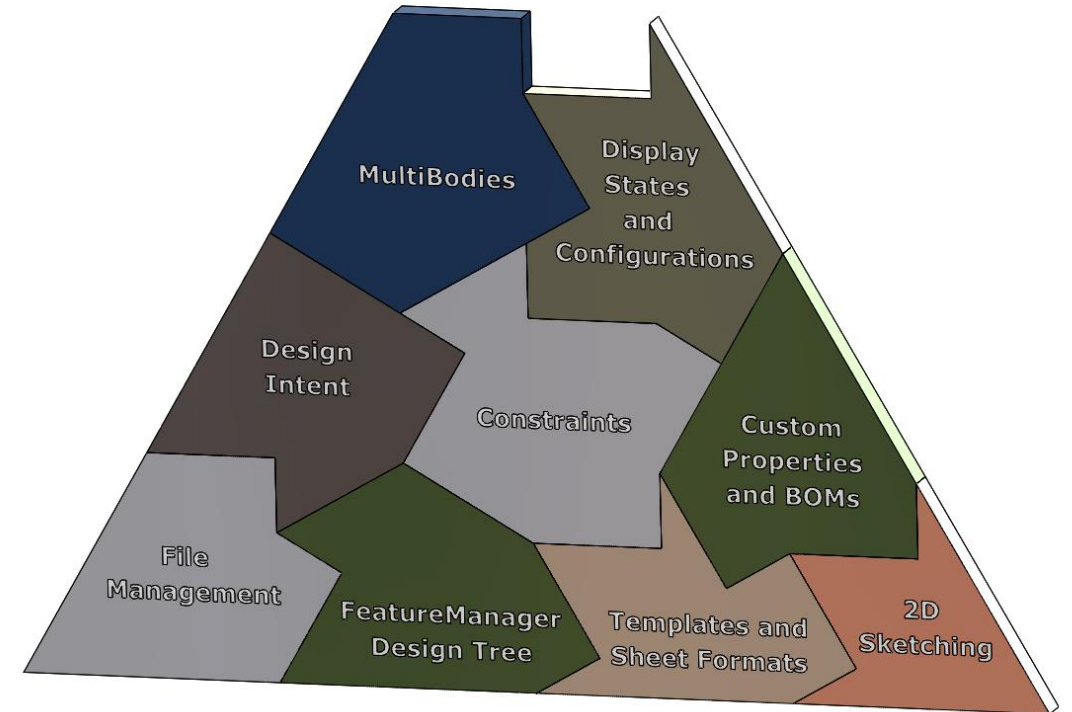
# Advanced Essentials

- File Management
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- Two Dimensional Sketching
- Design Intent
- Constraints (Relations and Mates)
- Custom Properties and BOMs
- Multiple Body Parts



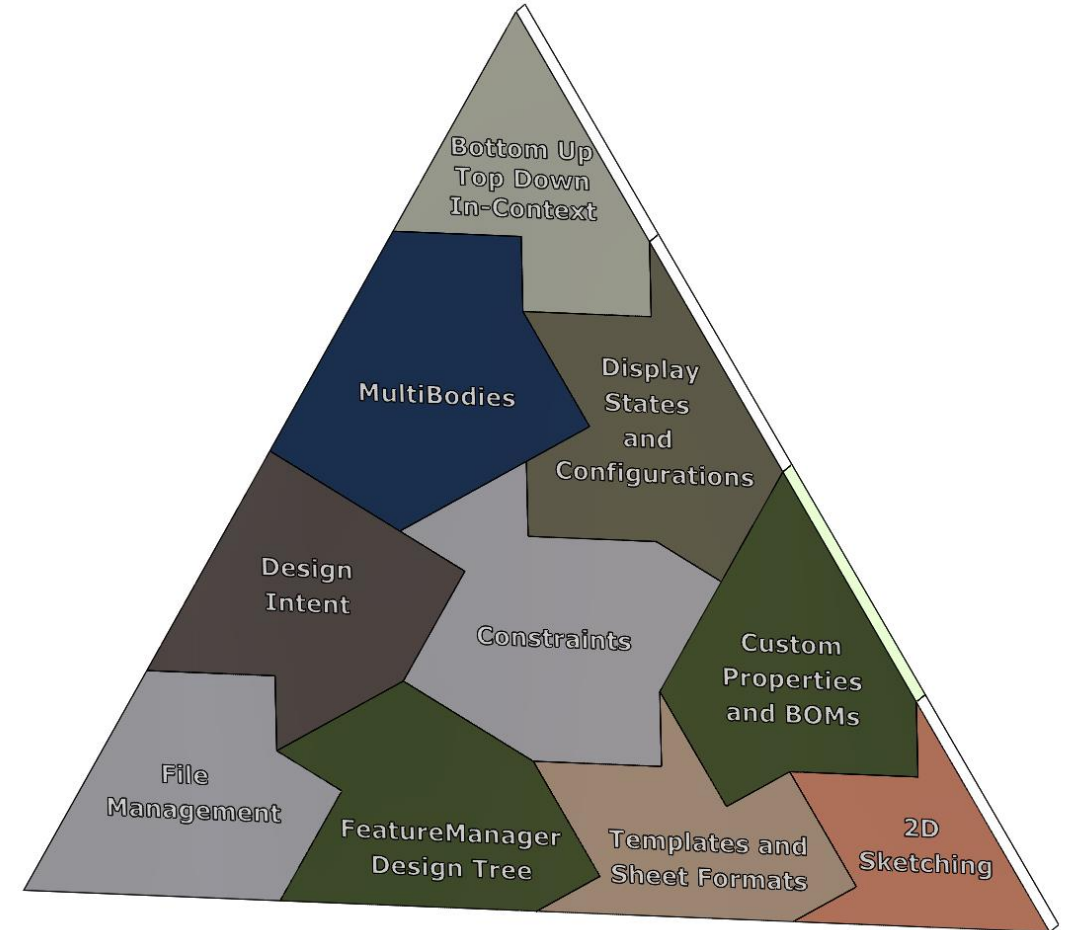
## Advanced Essentials

- File Management
- FeatureManager Design Tree
- Templates (and Sheet Formats)
- Two Dimensional Sketching
- Design Intent
- Constraints (Relations and Mates)
- Custom Properties and BOMs
- Multiple Body Parts
- Display States / Configurations

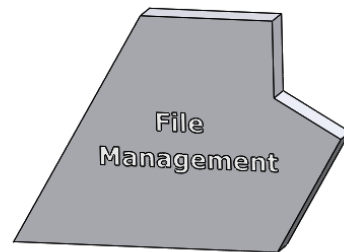


## Advanced Essentials

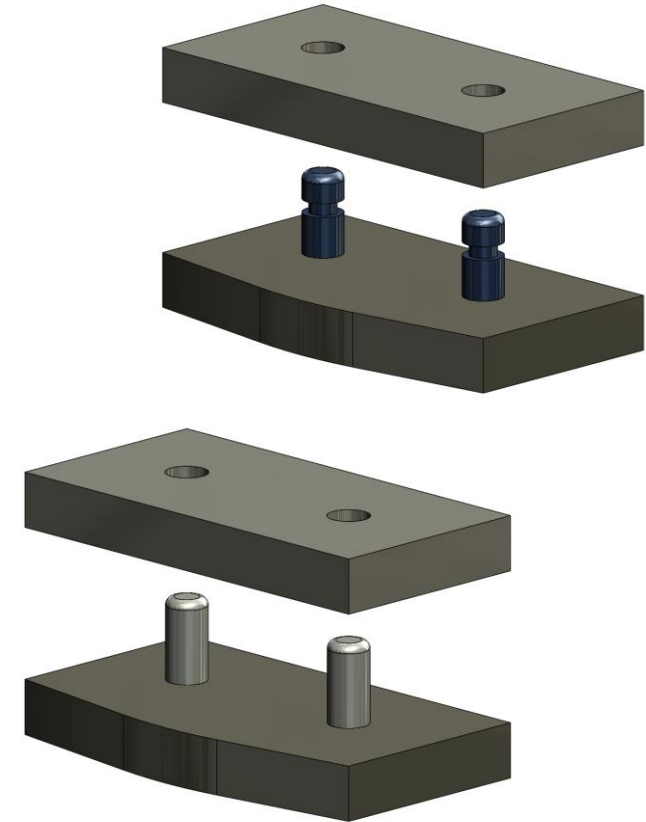
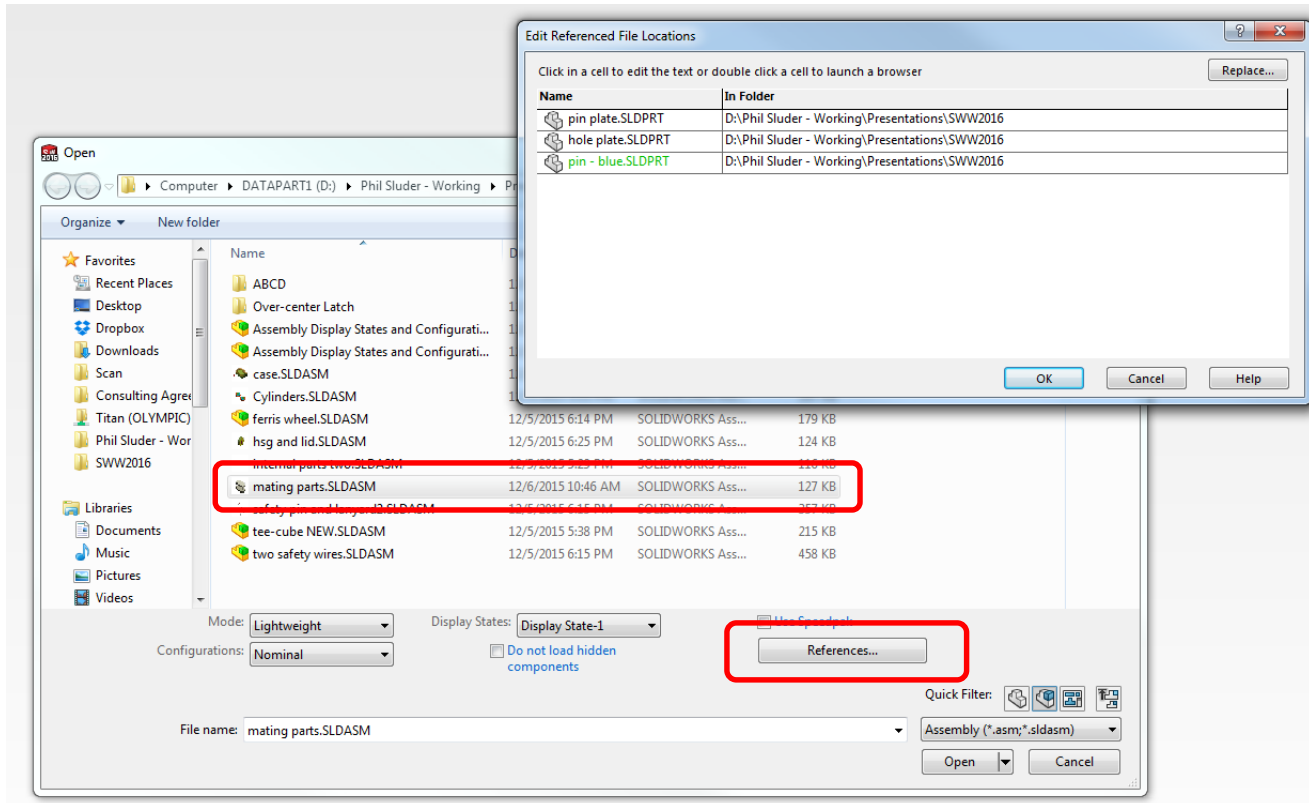
- File Management
- FeatureManager Design Tree
- Templates (and Sheet Formats)
- Two Dimensional Sketching
- Design Intent
- Constraints (Relations and Mates)
- Custom Properties and BOMs
- Multiple Body Parts
- Display States / Configurations
- Up / Top Down, and In-Context Features.



# File Management

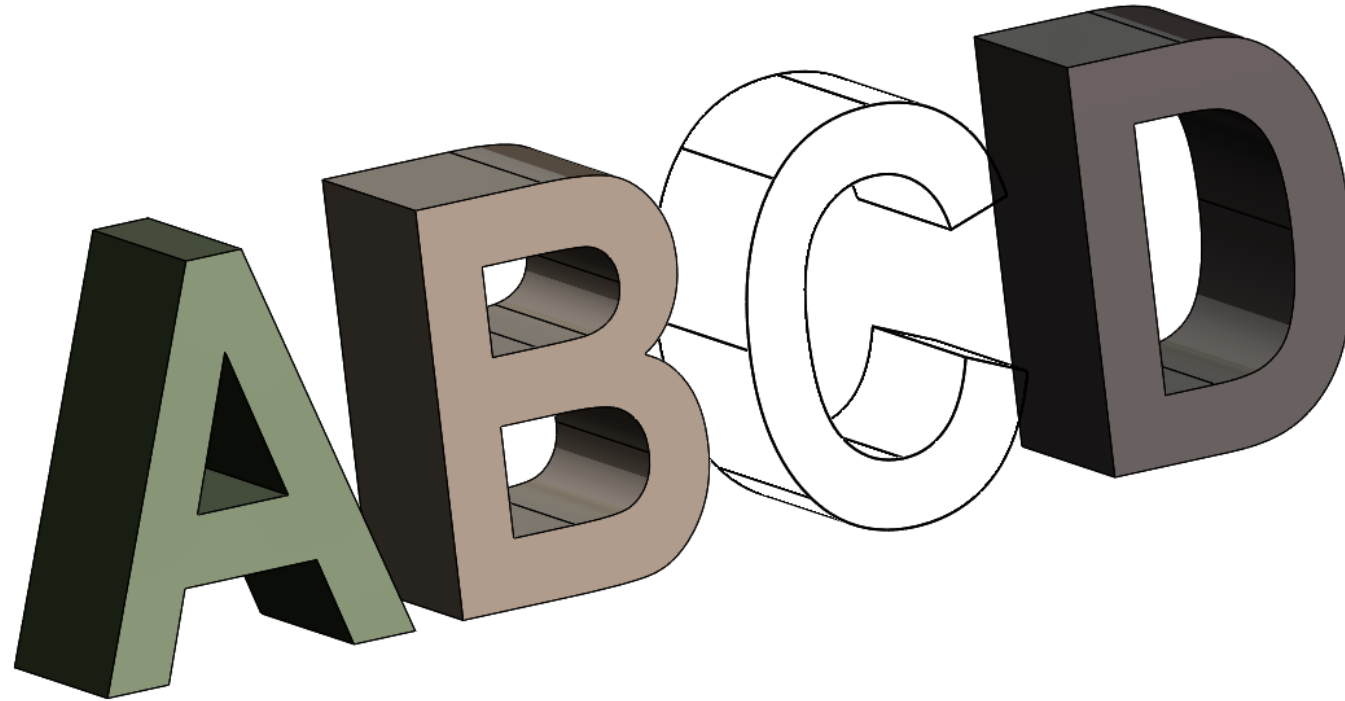


# References Button – Replace Component

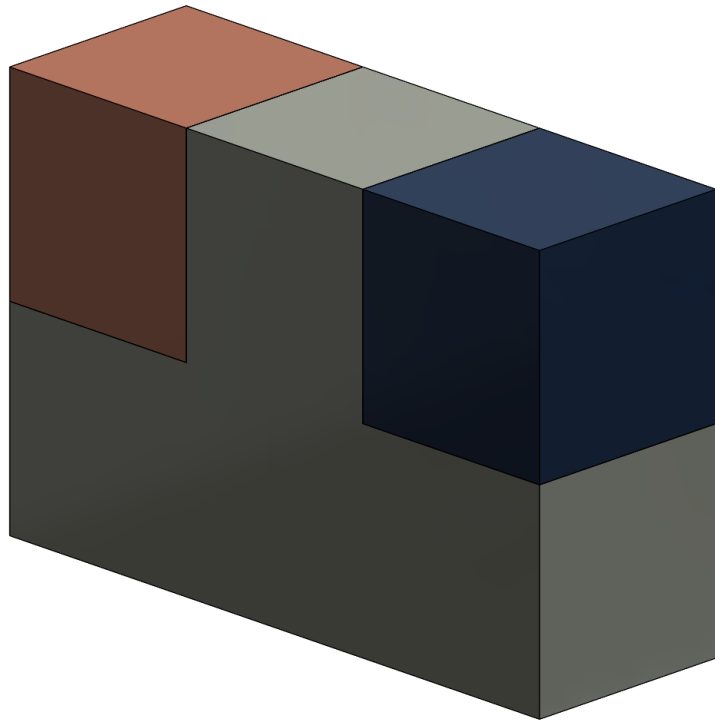


mating parts.sldasm

# Purging Unused Files in a Folder



# Save As Assembly with References (Ugh!) and Update Holders



Save As with References

Double click a cell to edit  Include virtual components  Include Toolbox parts  Include b...

Name	Folder
tee-cube RENAME.SLDASM	D:\Phil Sluder - Working\Presentations\SWW2016
tee.SLDPRT	D:\Phil Sluder - Working\Presentations\SWW2016
cube.SLDPRT	D:\Phil Sluder - Working\Presentations\SWW2016
cube in-context RENAME.sldprt	D:\Phil Sluder - Working\Presentations\SWW2016

Specify folder for selected items:  
D:\Phil Sluder - Working\Presentations\SWW2016

Save all as copy (opened documents remain unaffected)

Modify selected names:  
 Add prefix     
 Add suffix

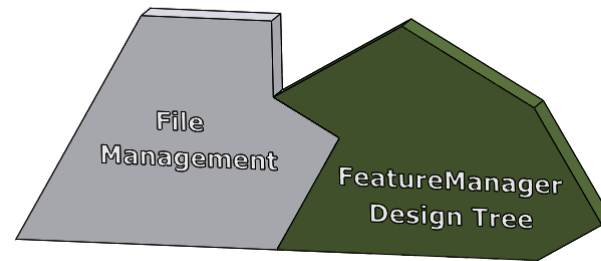
File name: tee-cube RENAME.SLDASM  
Save as type: Assembly (\*.asm;\*.sldasm)  
Description: Add a description

Save as  
 Save as copy and continue  
 Save as copy and open  
 Hide Folders

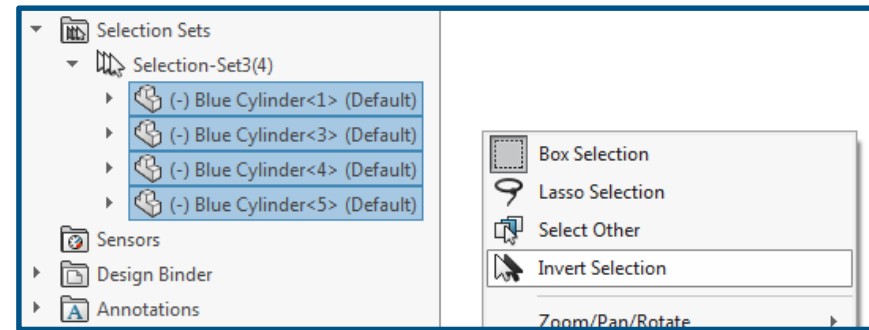
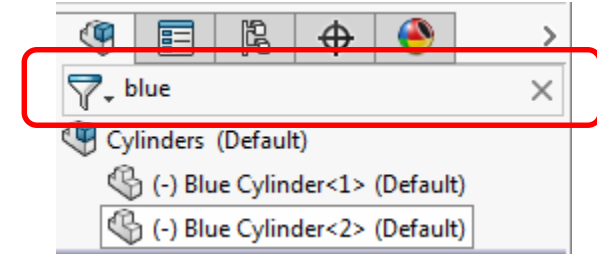
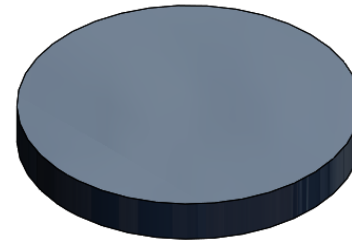
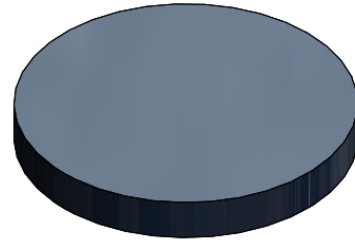
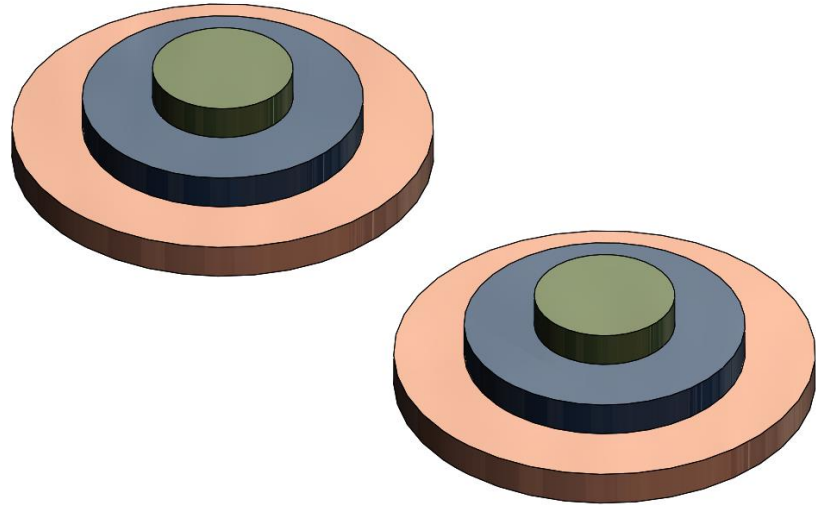
Include all referenced components  
 Add prefix    
 Add suffix



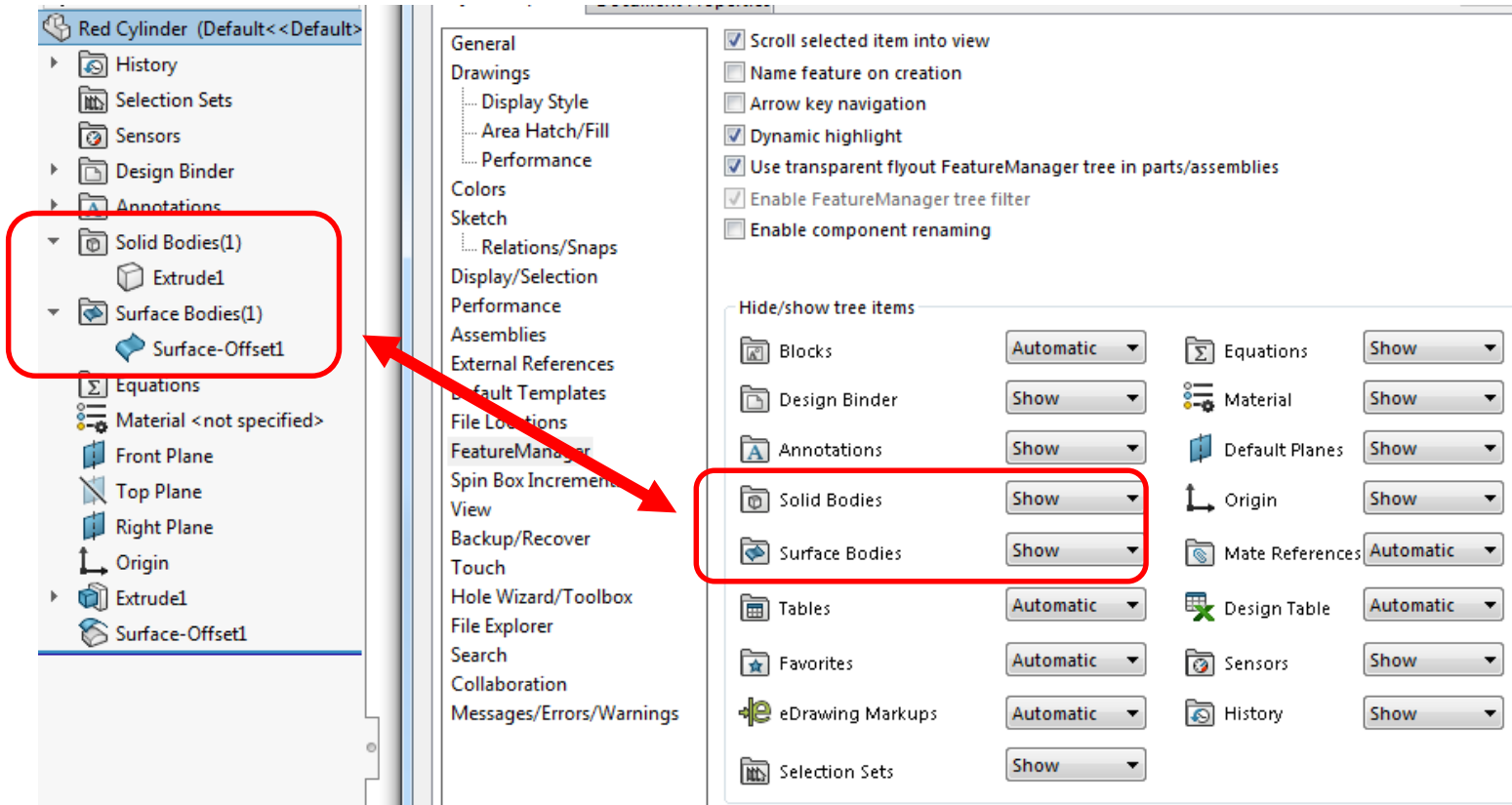
# FeatureManager Design Tree



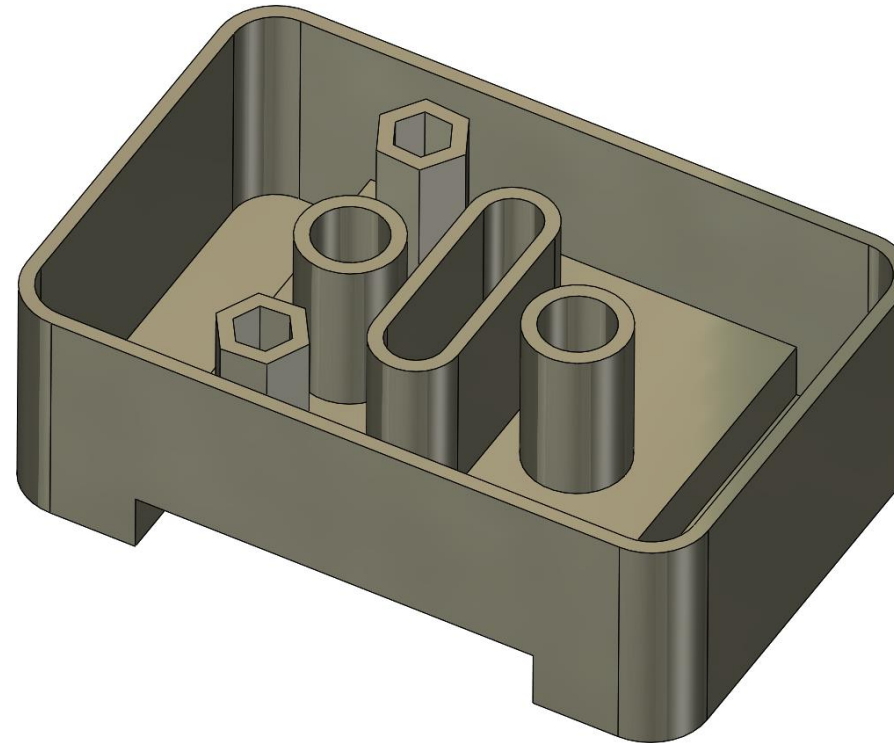
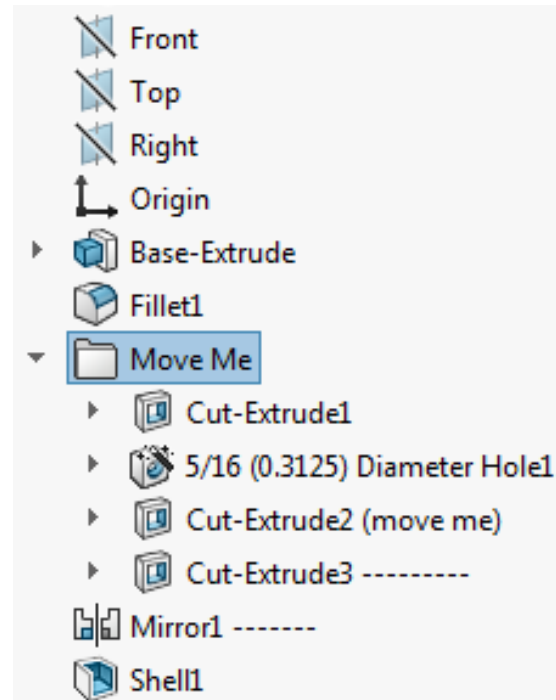
# FeatureManager Design Tree Filter / Selection Set



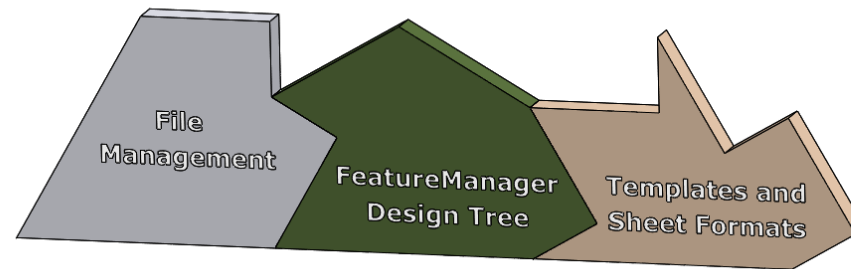
# Show Solid Body and Surface Body Folders



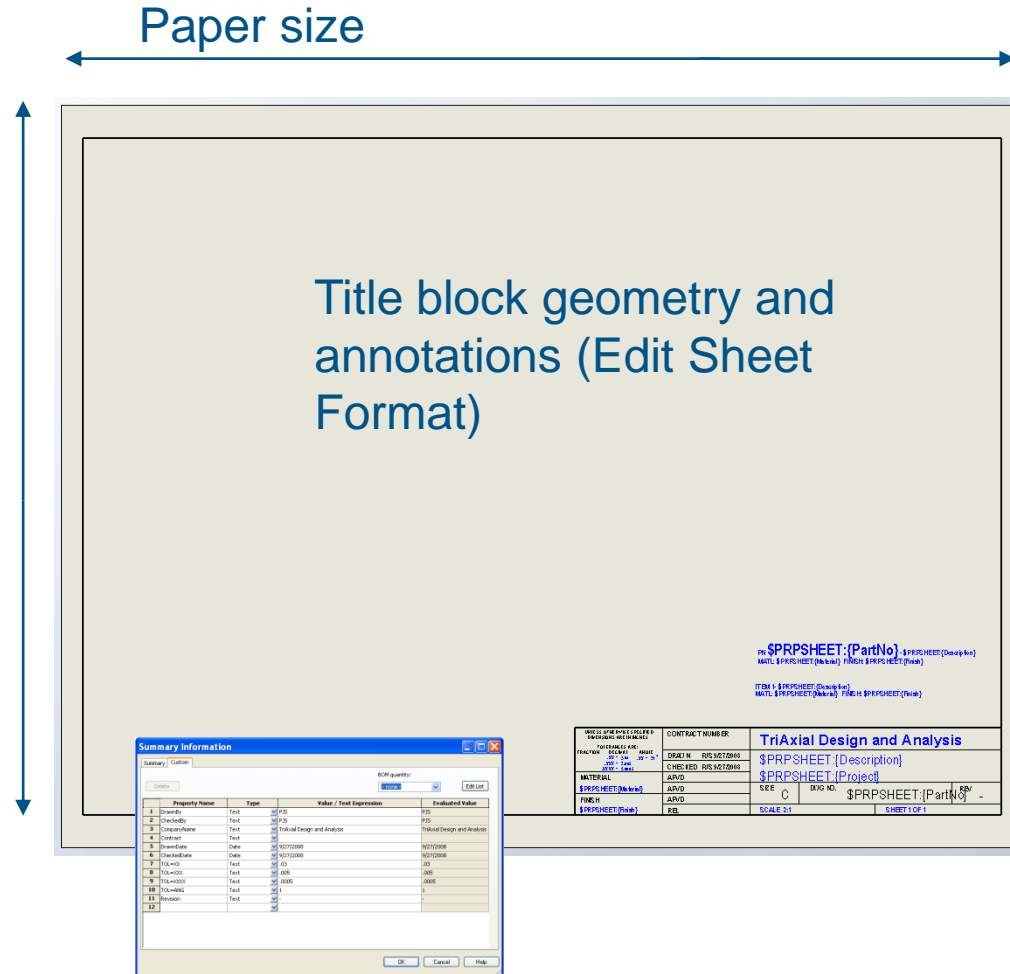
# Move Multiple Features Using a Folder (and one great Ed Eaton Trick)



# Templates (and Sheet Formats)

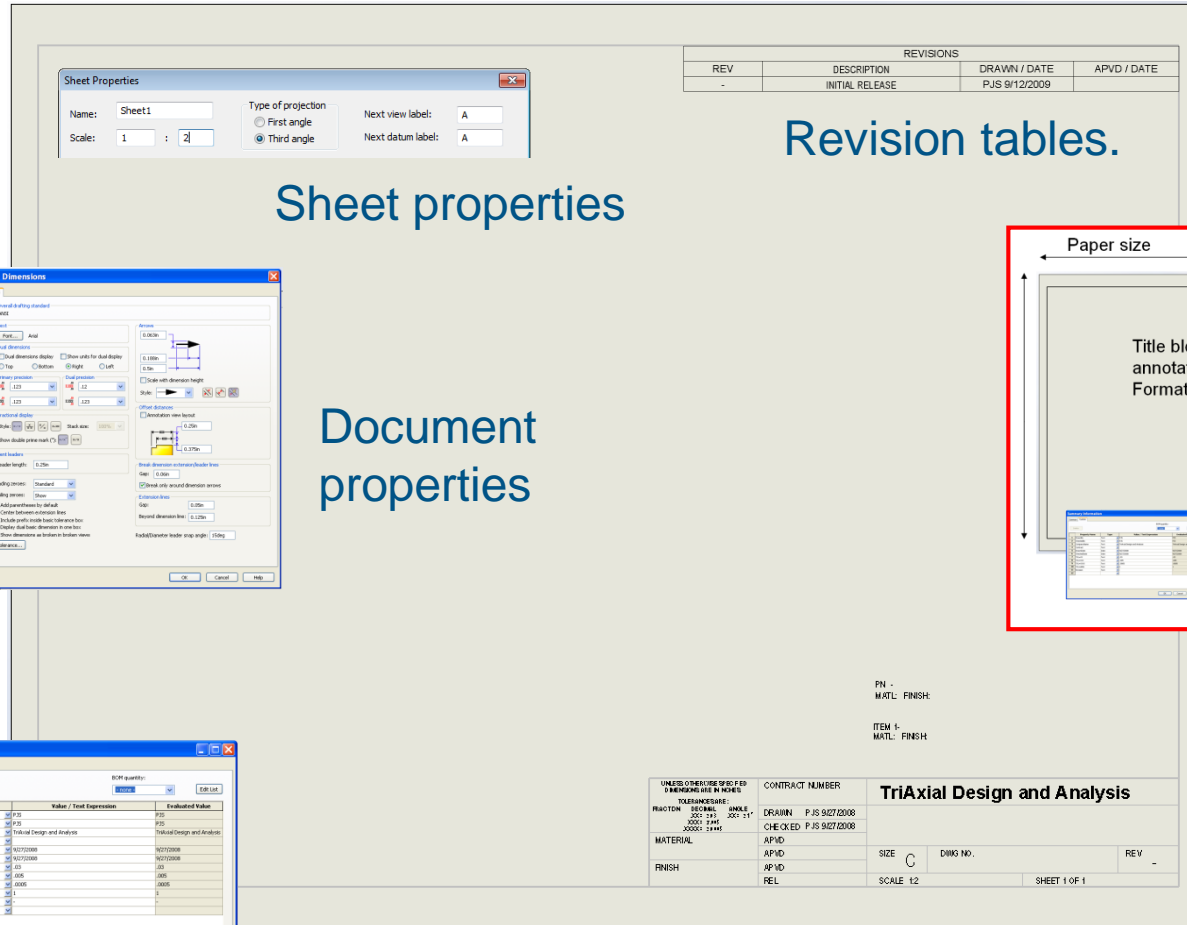


# Sheet Format (\*.slddrt)



Custom properties linked from annotations.

# Drawing Template (\*.drwdot)



Sheet properties

Revision tables.

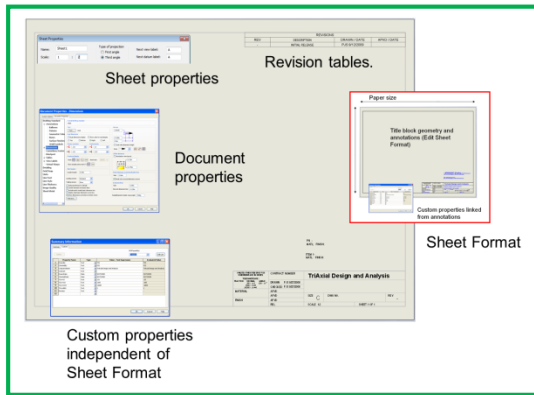
Document properties

Sheet Format

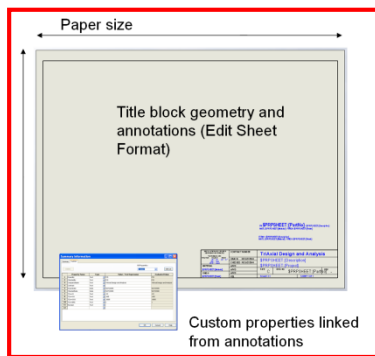
Custom properties independent of Sheet Format



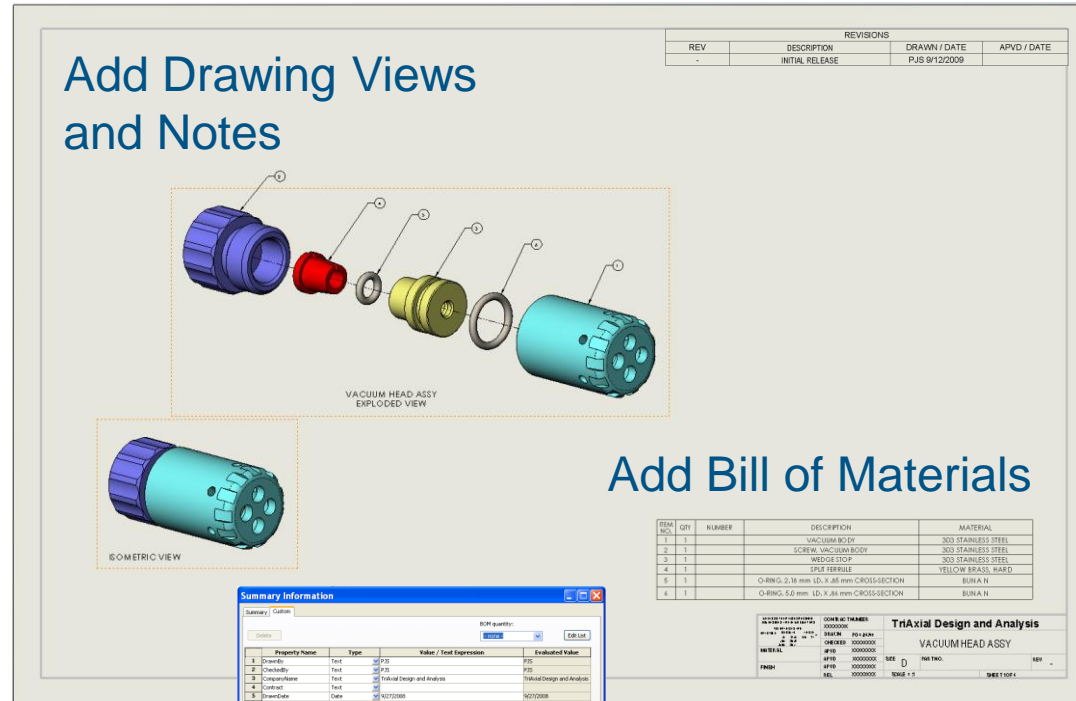
# Drawing File (\*.slddrw)



Choose Drawing Template



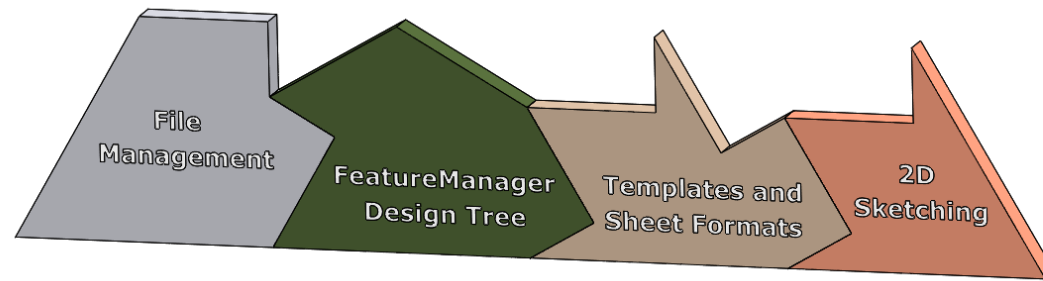
Subsequently you may change to a different Sheet Format.



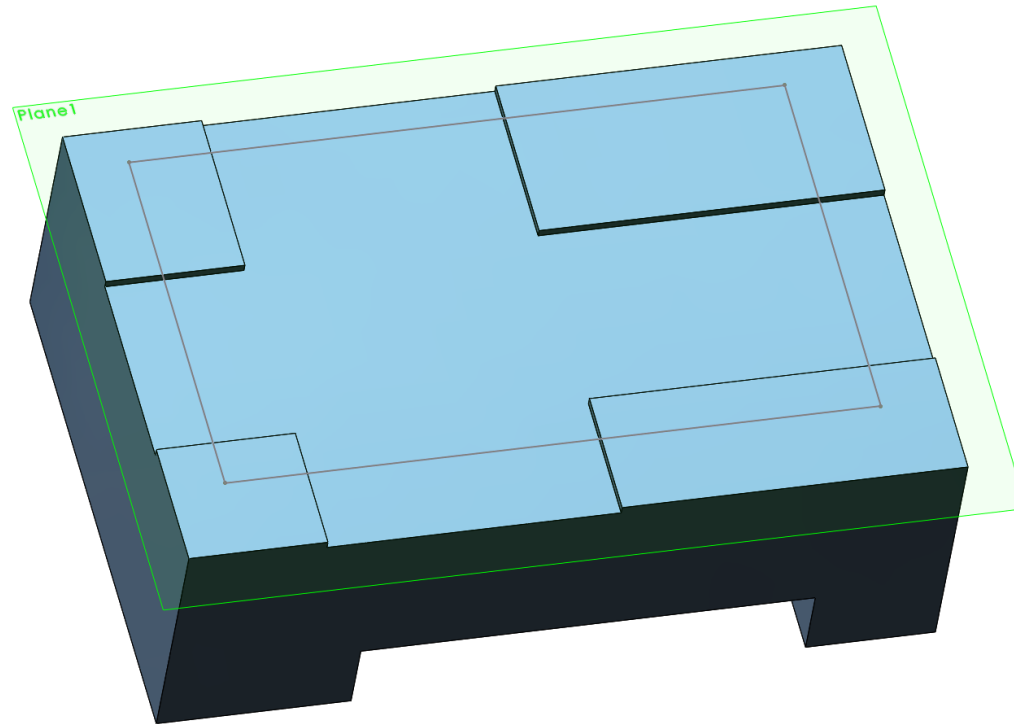
Add Bill of Materials

Add Custom Properties specific to Drawing Document

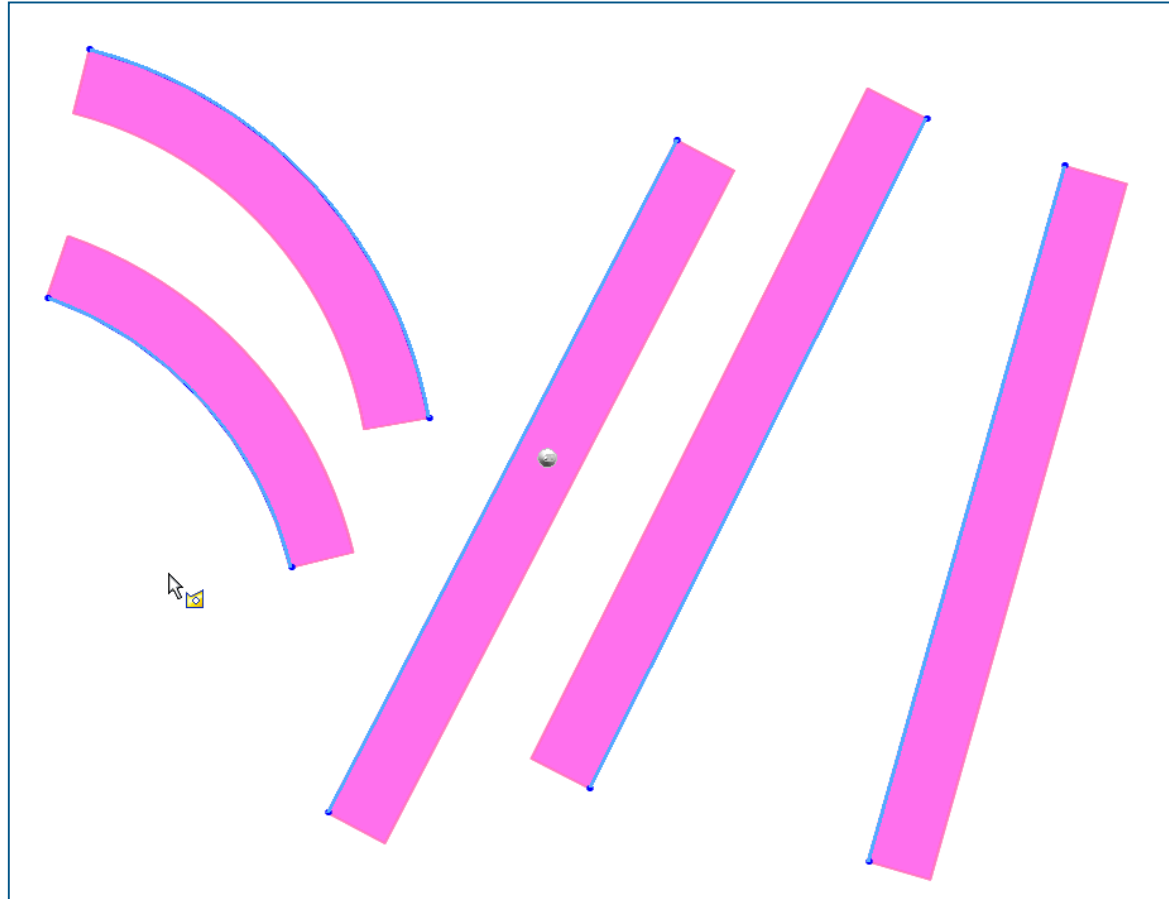
# Two Dimensional Sketching



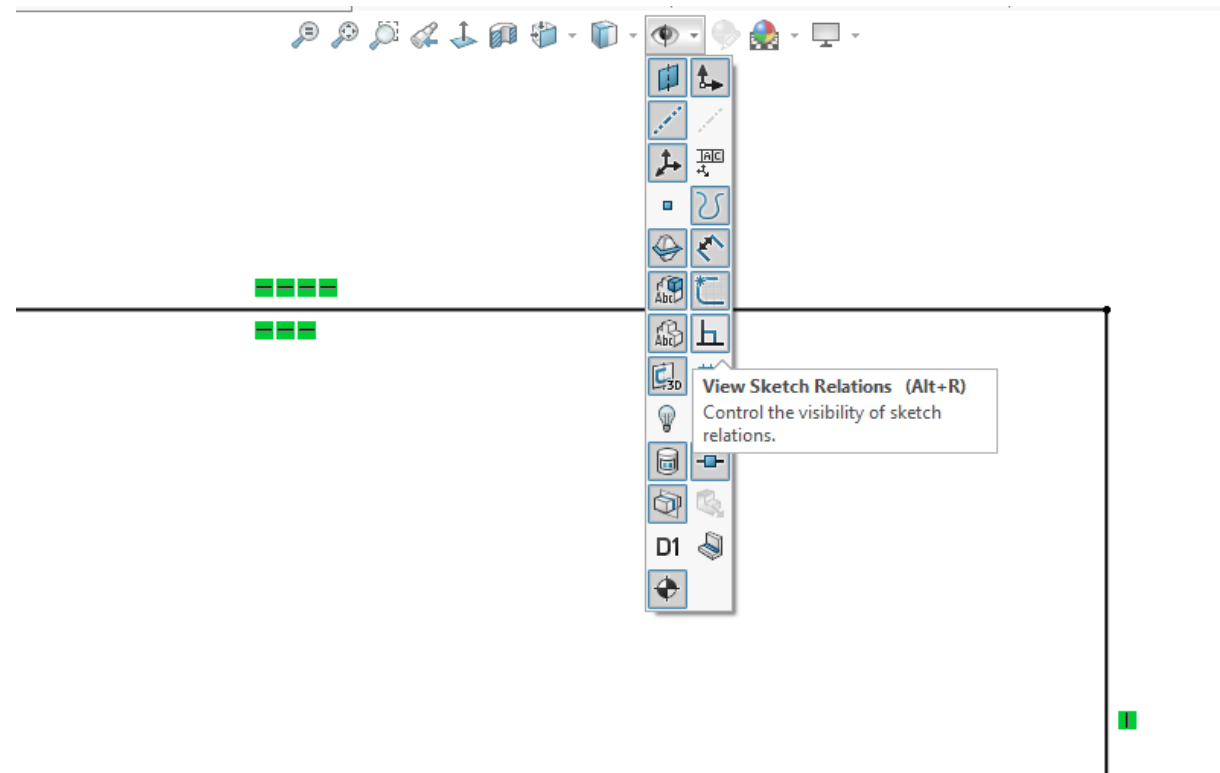
# Contour Selection and Sketch Plane



# Thin Extrude - One-Direction Multiple Contours

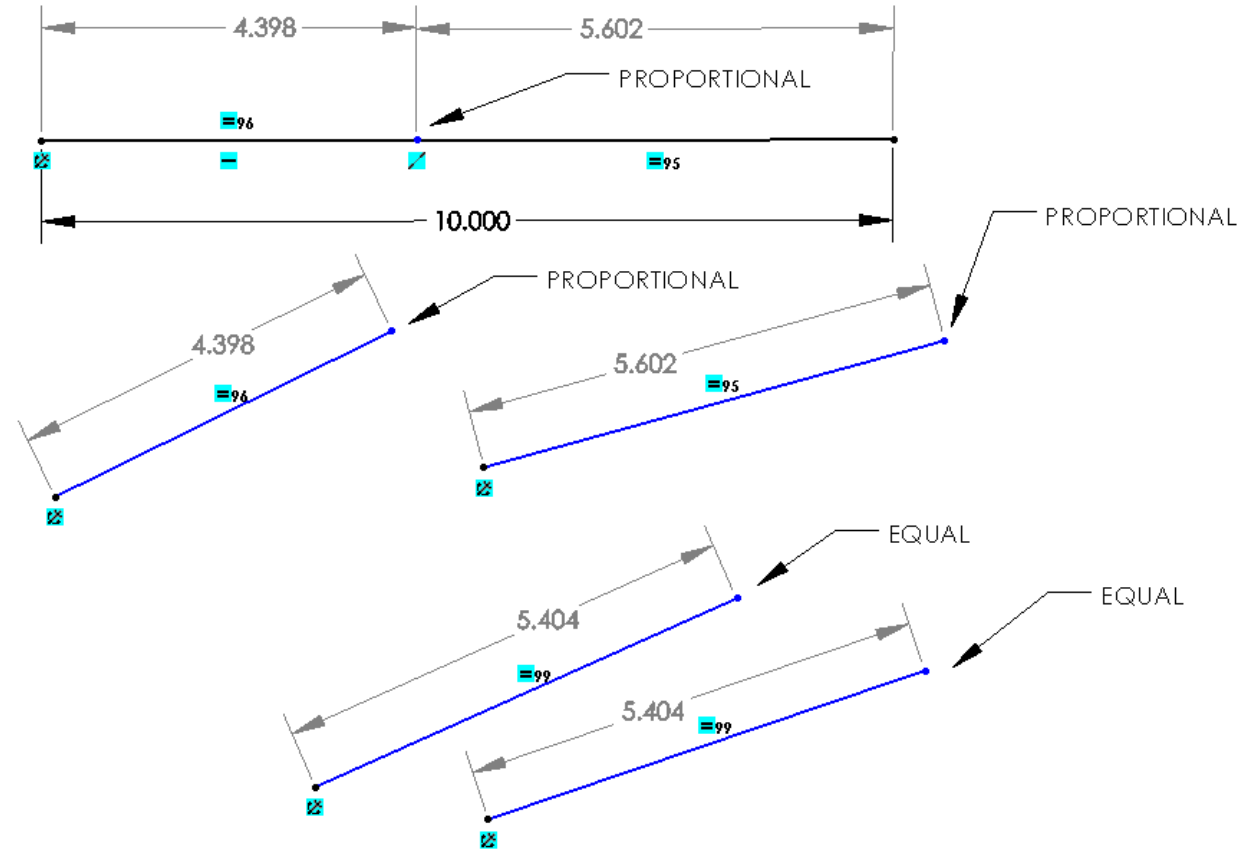


# Show Sketch Relations for Troubleshooting (New Location)

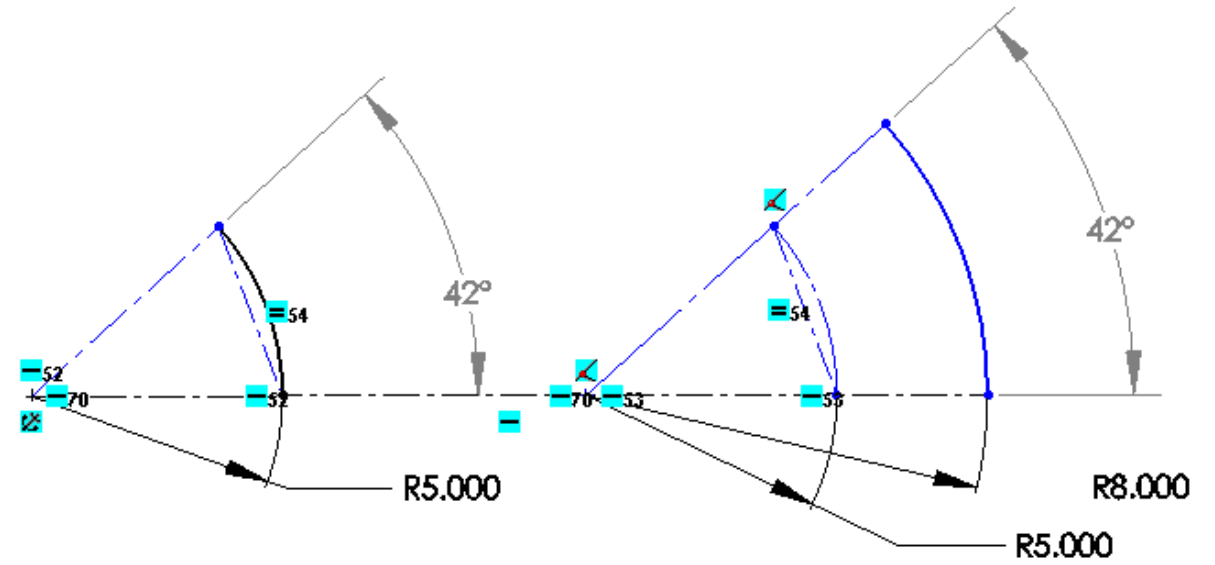
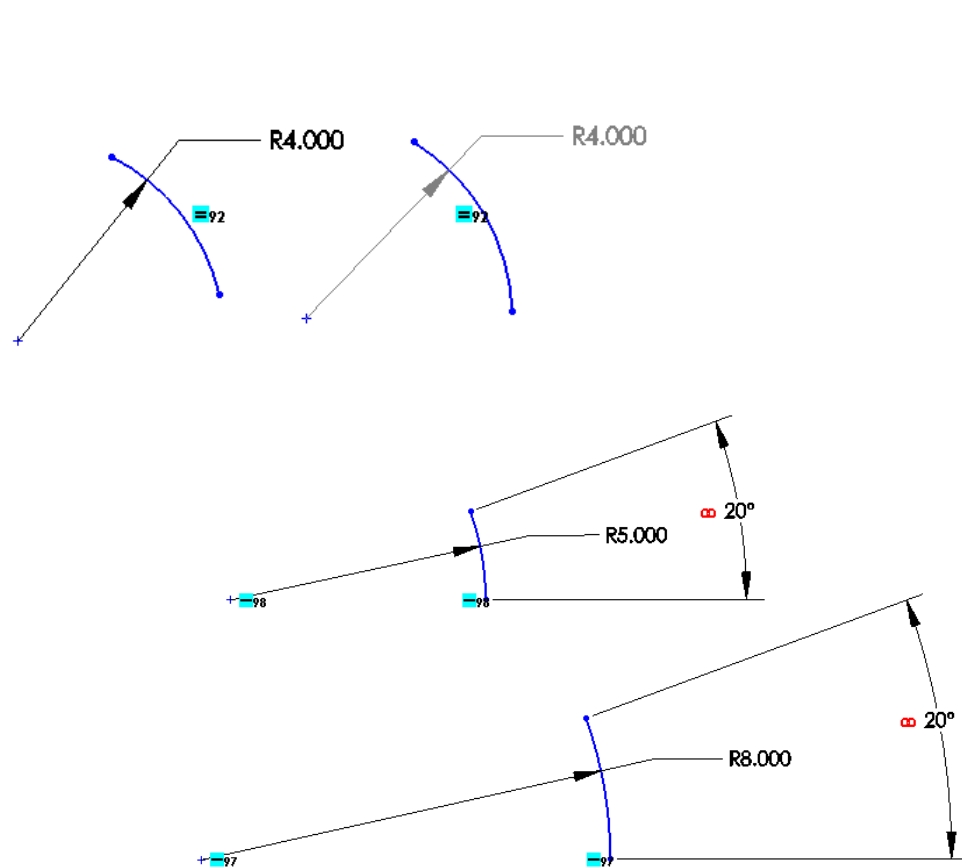


# Geometric Sketch Relations Moves In “Real Time”

## Lengths and Proportional Lengths

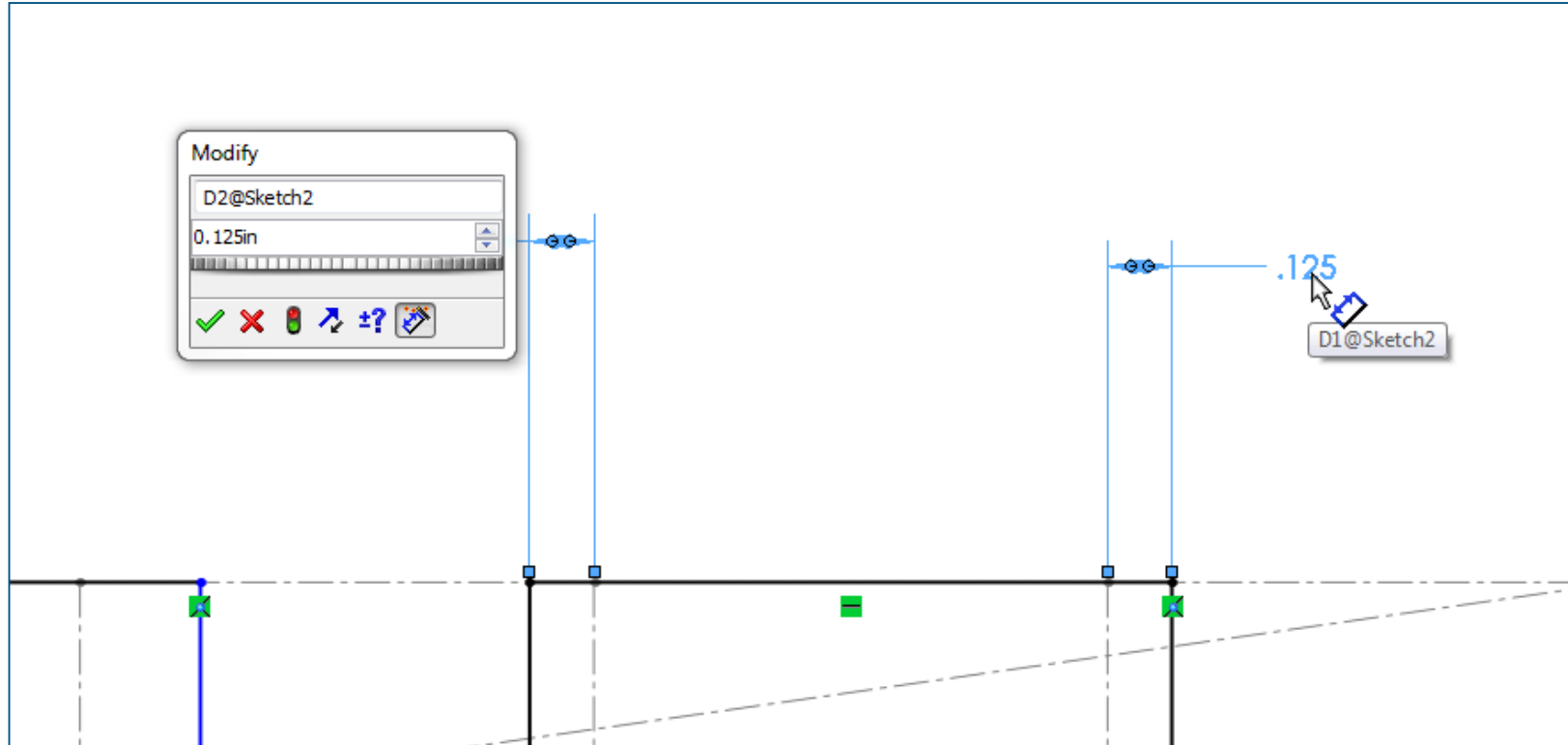


# Geometric Sketch Relations Moves In “Real Time”

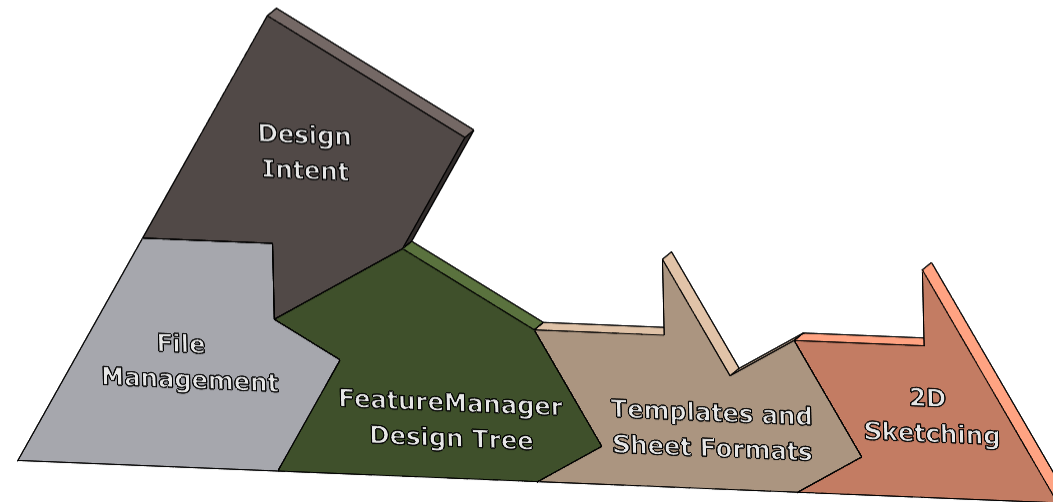




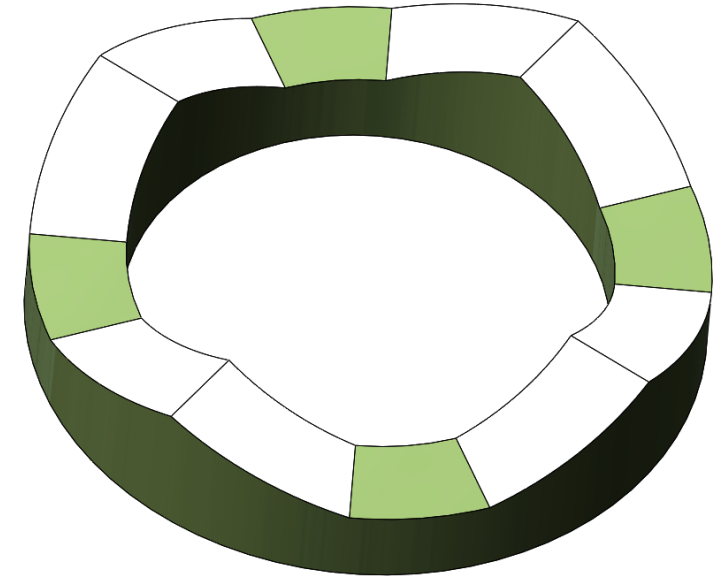
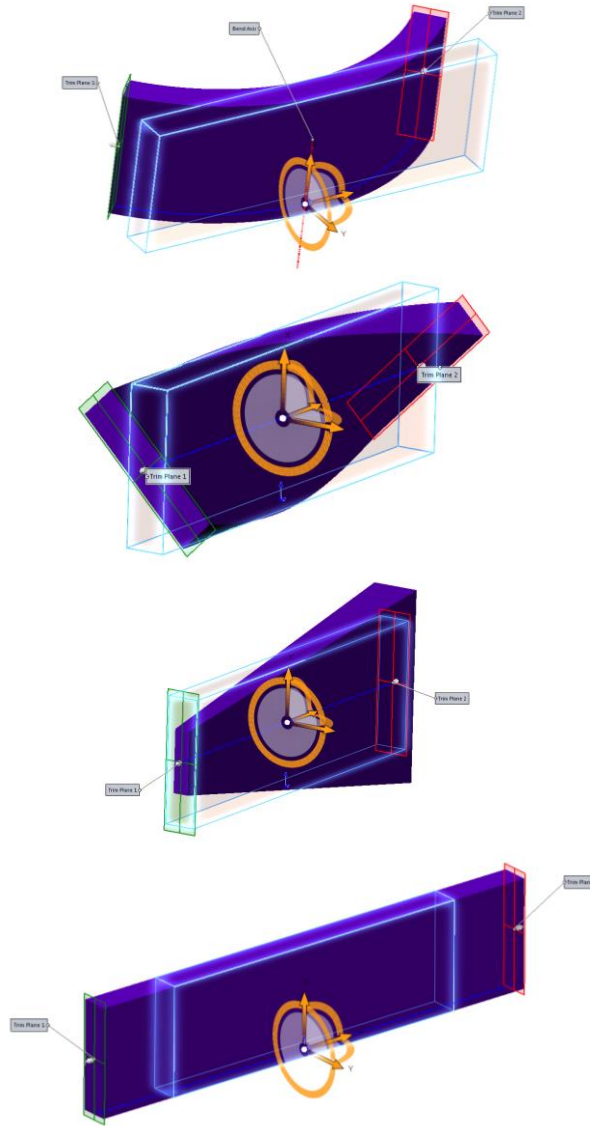
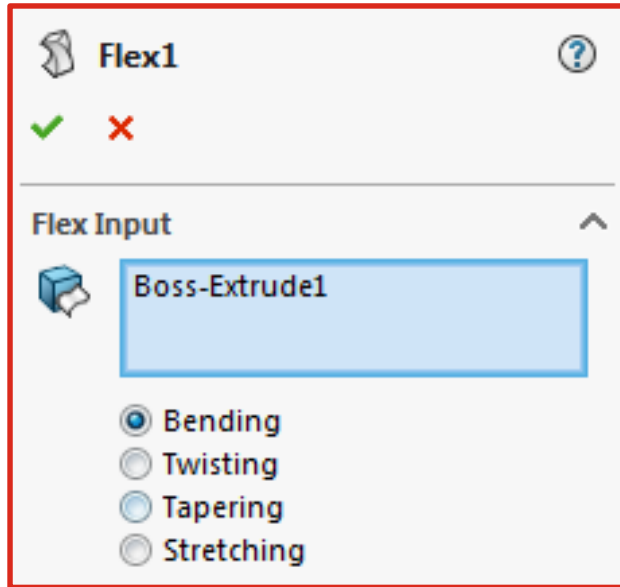
# Modify Dimension Value to Existing Dimension



# Design Intent

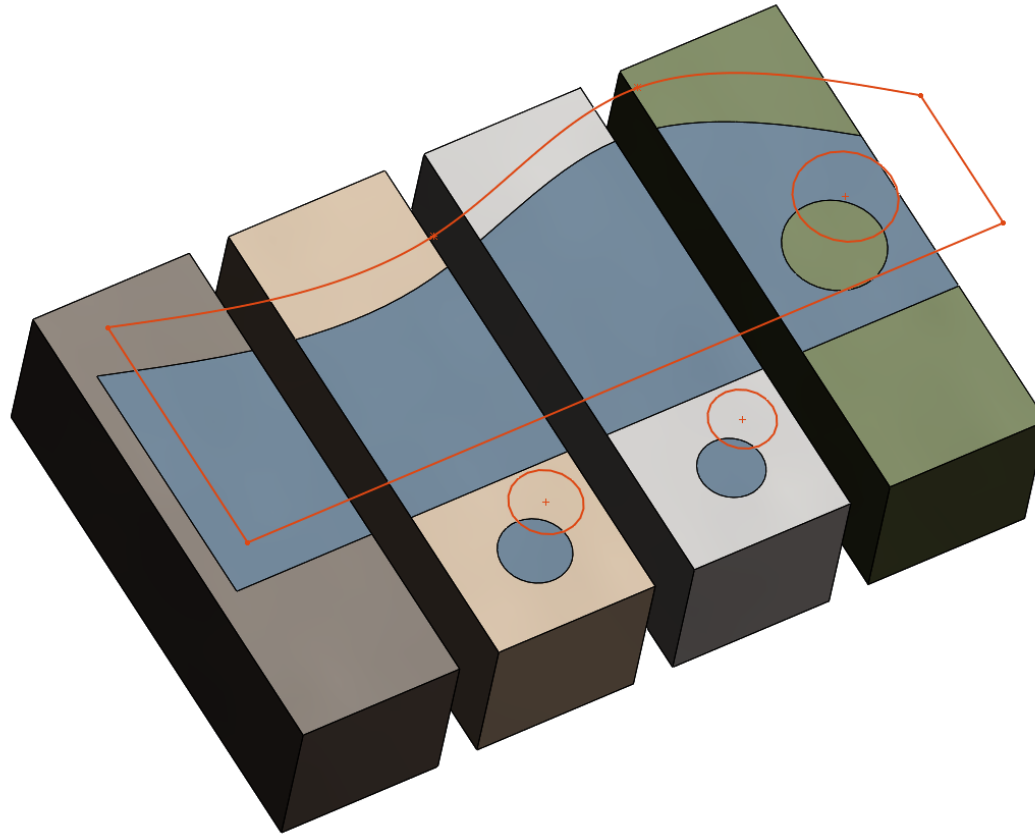


# Flex... Really?



# Split Line Across Multiple Bodies

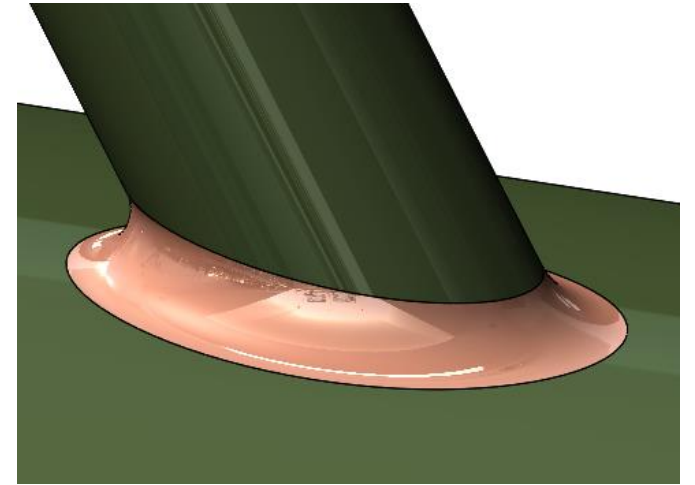
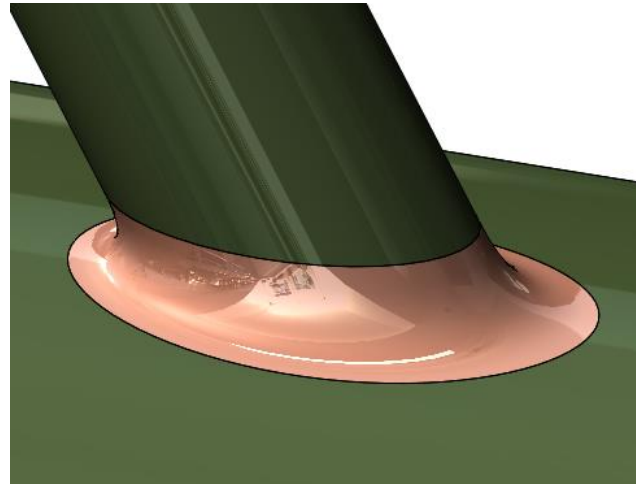
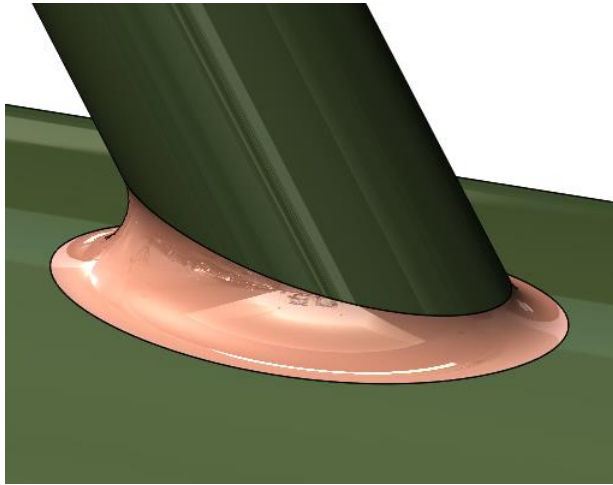
(Wait... did he split surface and solid bodies in the same feature?)



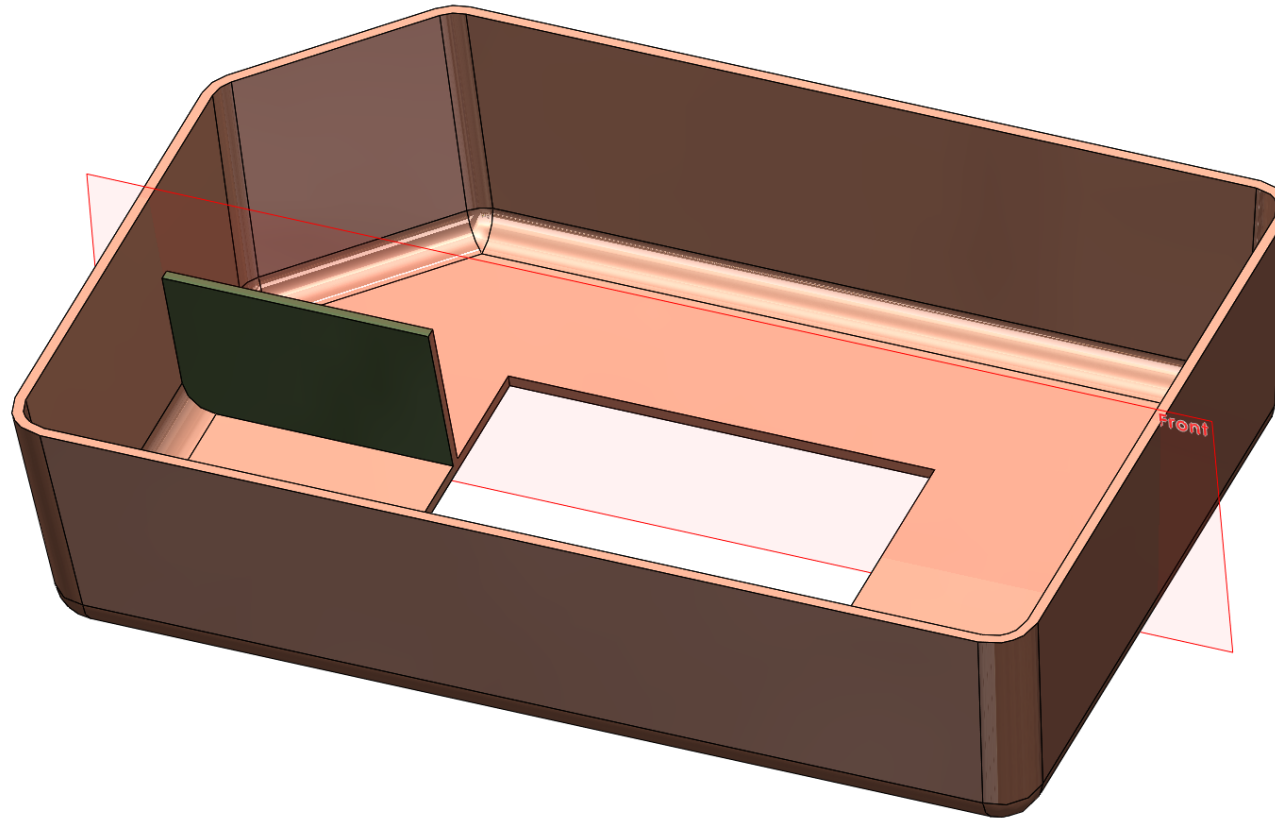
# Scribe Instead of Split Line



# Radii; Circular, CC, Chord Width, Hold Line

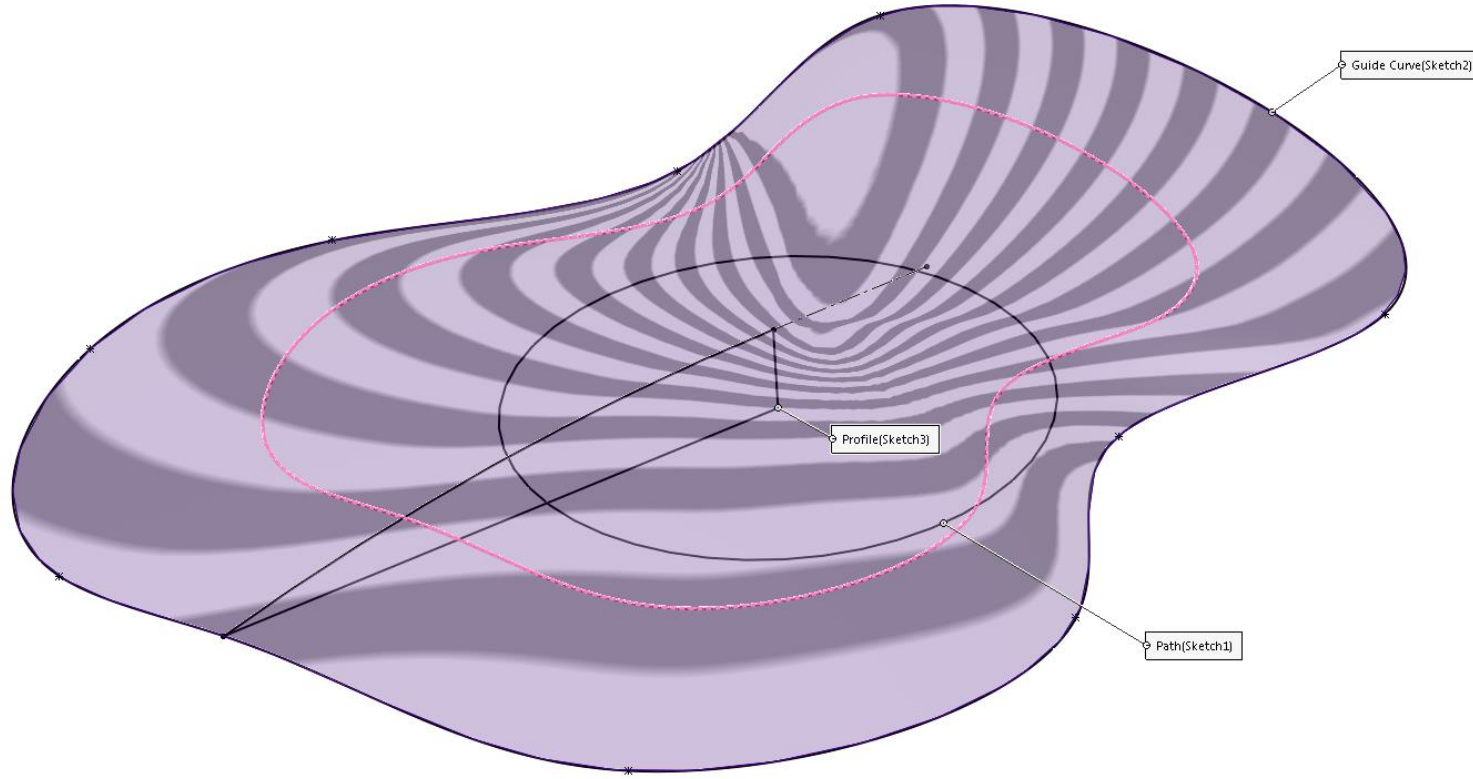


# Ribs Across an Opening

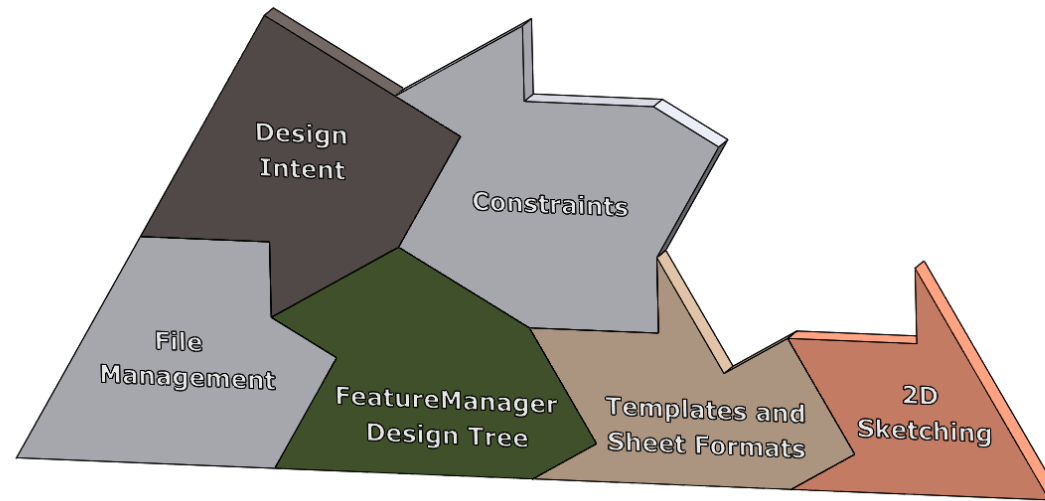




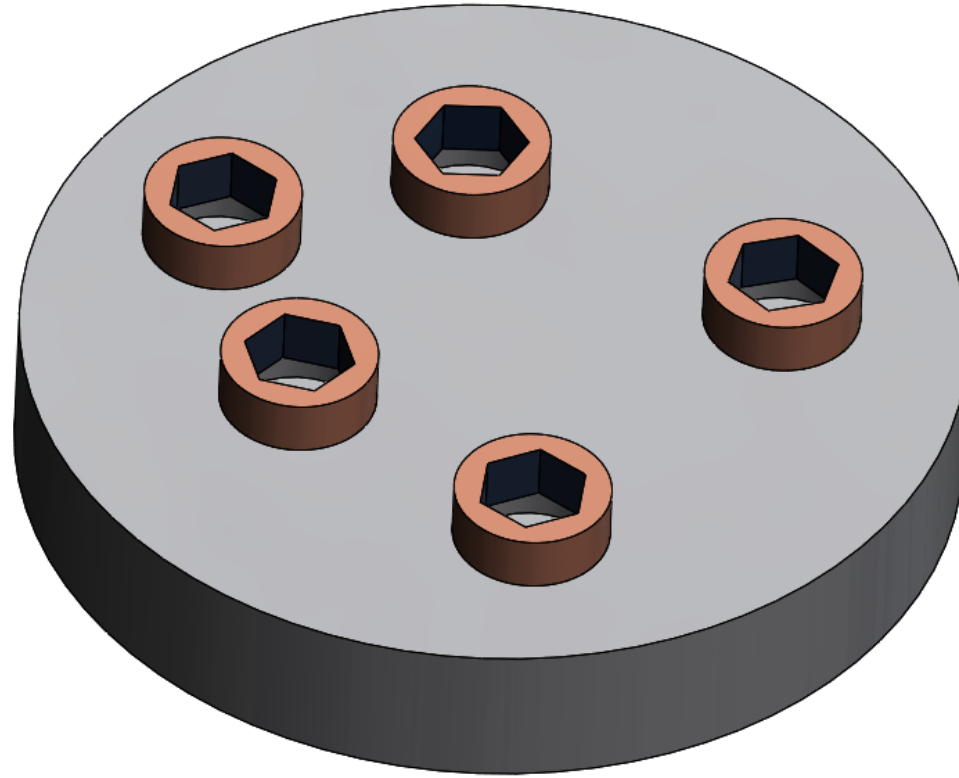
# Revolve with Guide Curve



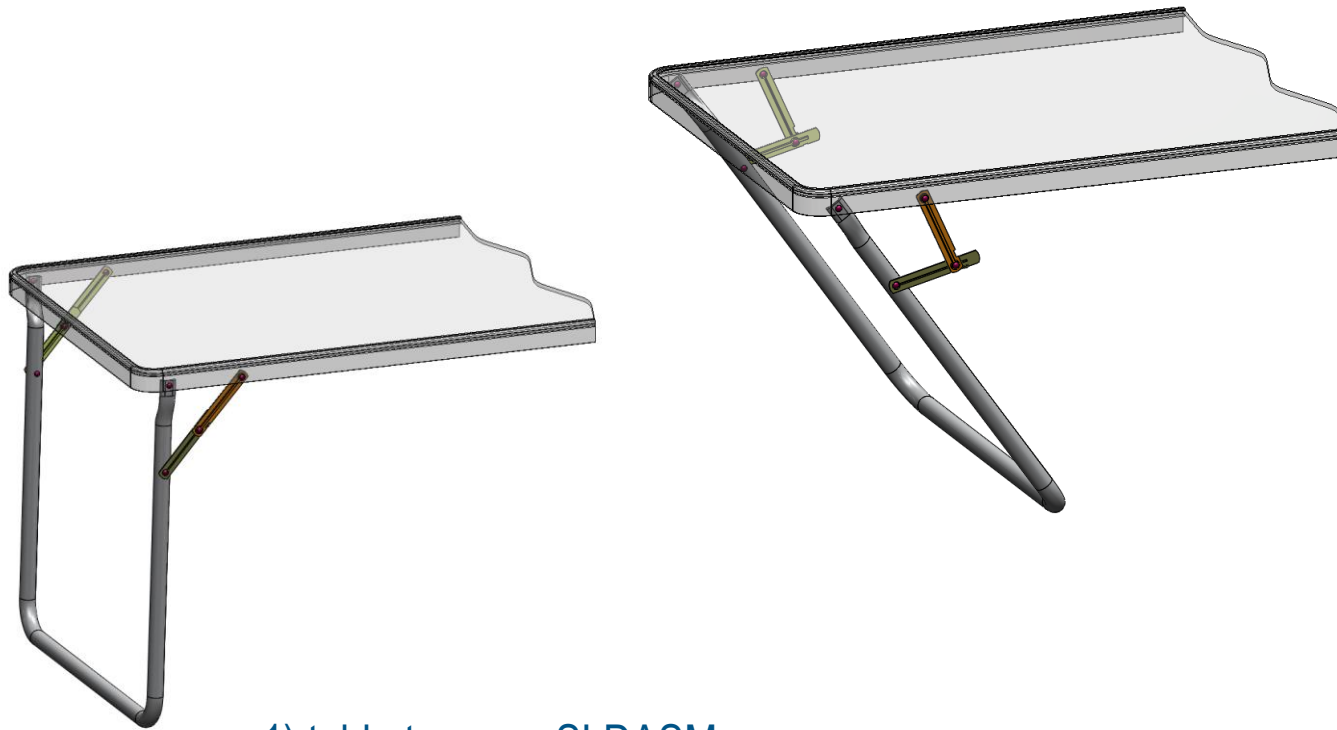
# Constraints (Relations and Mates)



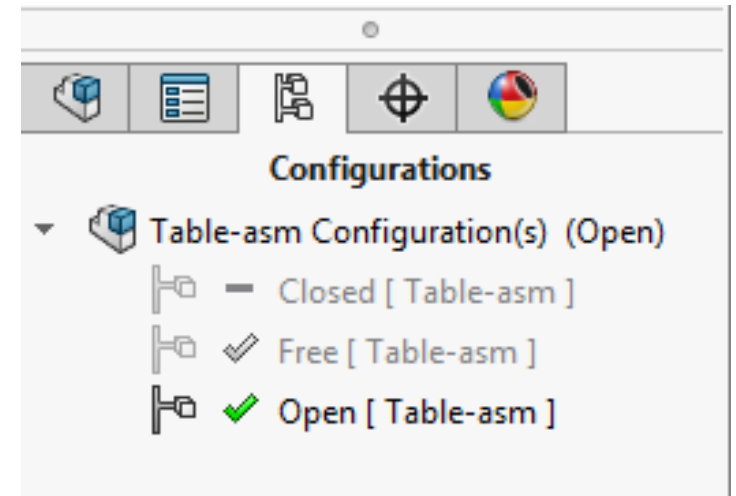
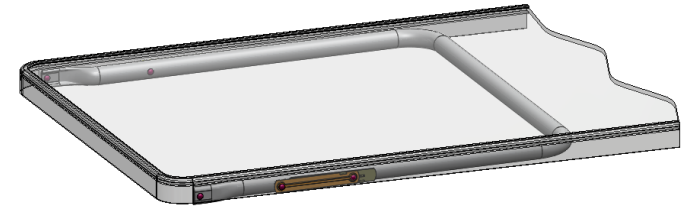
# Ferris Wheel Effect, Smart Mate



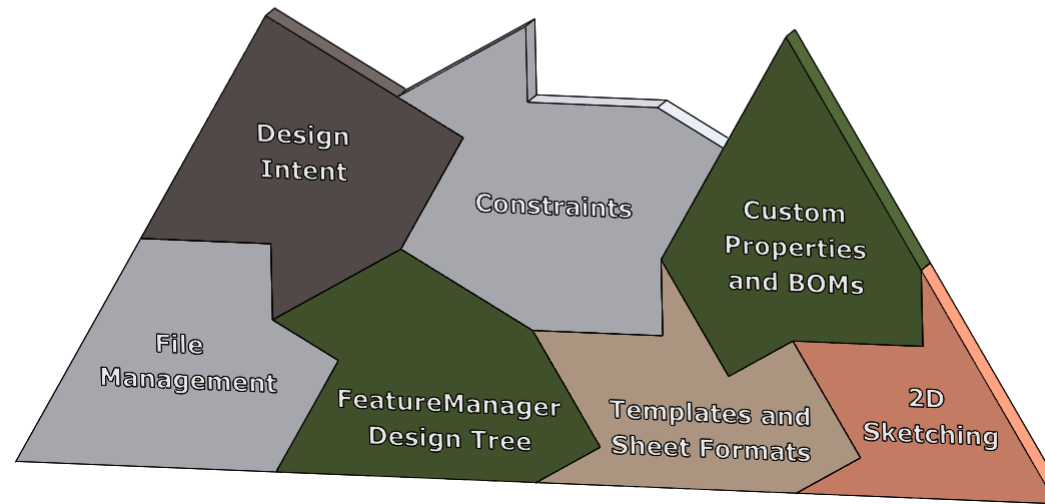
# Over-Center Latch



- 1) table top asm.SLDASM
- 2) table-asm.SLDASM



# Custom Properties and BOMs



# Two Configurations – One BOM Item

# Two Configurations – Separate BOM Items

**Configuration Properties**

Configuration name:

Description:

Use in bill of materials

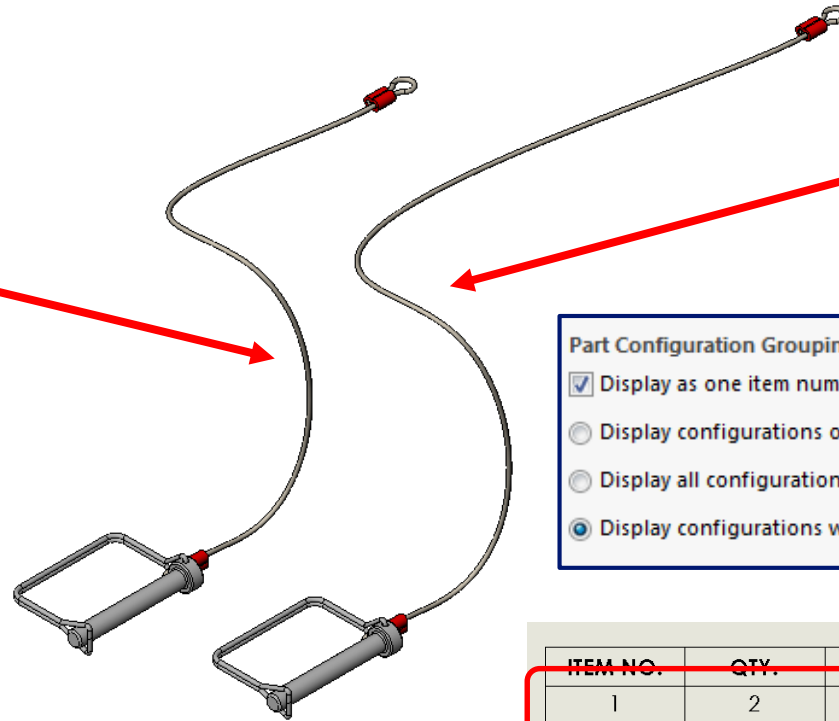
Comment:

Custom Properties...

**Bill of Materials Options**

Part number displayed when used in a bill of materials:

User Specified Name



**Part Configuration Grouping**

Display as one item number

Display configurations of the same part as separate items

Display all configurations of the same part as one item

Display configurations with the same name as one item

**Configuration Properties**

Configuration name:

Description:

Use in bill of materials

Comment:

Custom Properties...

**Bill of Materials Options**

Part number displayed when used in a bill of materials:

User Specified Name

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	2	2468-01	Safety Pin and Lanyard
2	1	1234-01	Washer, Small
3	1	1234-02	Washer, Large

# Part Number Used in BOM “observation”

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	XXXXX	BOM Description
2	2	XXXXX	BOM Description
3	1	XXXXX	BOM Description

## Part Configuration Grouping

- Display as one item number
- Display configurations of the same part as separate items
- Display all configurations of the same part as one item
- Display configurations with the same name as one item

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	4	XXXXX	BOM Description

# BOM from Virtual Parts (Internal Parts)

ITEM NO.	QTY.	PART NUMBER	DESCRIPTION
1	1	1234	SCOTCH TAPE
2	1	2468	MISC ASSY
	1	3579	LOCTITE
	AR	1122	GREASE

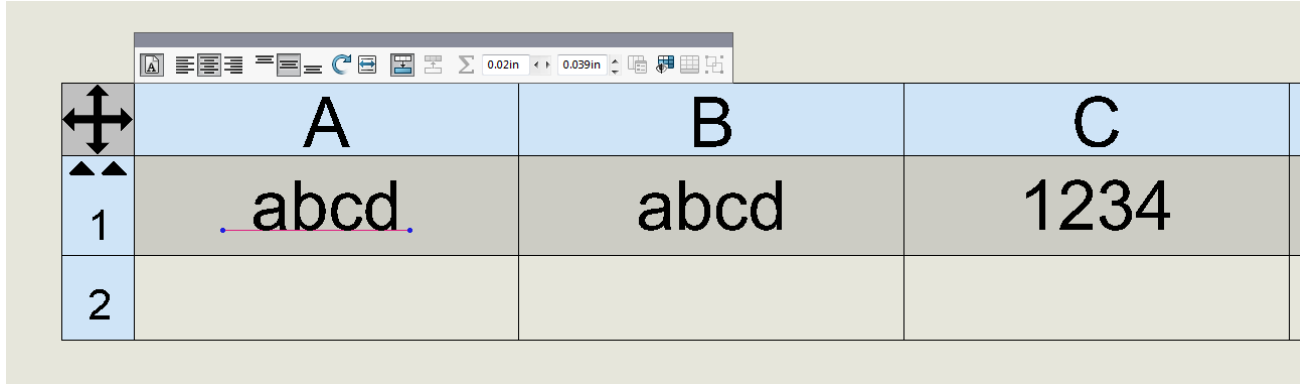
PART NUMBER LOG				
PARTNO	DESCRIPTION	MATERIAL	FINISH	PROJECT
121500	TOP ASSY	NA	NA	TOUGHBOOK
121501	PLATE, CHASSIS	6061 AL	BLACK ANODIZE	TOUGHBOOK
121502	PAN, CHASSIS	6061 AL	BLACK ANODIZE	TOUGHBOOK
121503	BOSS, CHASSIS	6061 AL	BLACK ANODIZE	TOUGHBOOK
121504	SHEET METAL, DVD SIDE	.036 #304 SST	NONE	TOUGHBOOK
121505	SHEET MEATAL, BOSS SIDE	.036 #304 SST	NONE	TOUGHBOOK

<b>PARTNO</b>	TEXT	121501
<b>DESCRIPTION</b>	TEXT	PLATE, CHASSIS
<b>MATERIAL</b>	TEXT	6061 AL
<b>FINISH</b>	TEXT	BLACK ANODIZE
<b>PROJECT</b>	TEXT	TOUGHBOOK

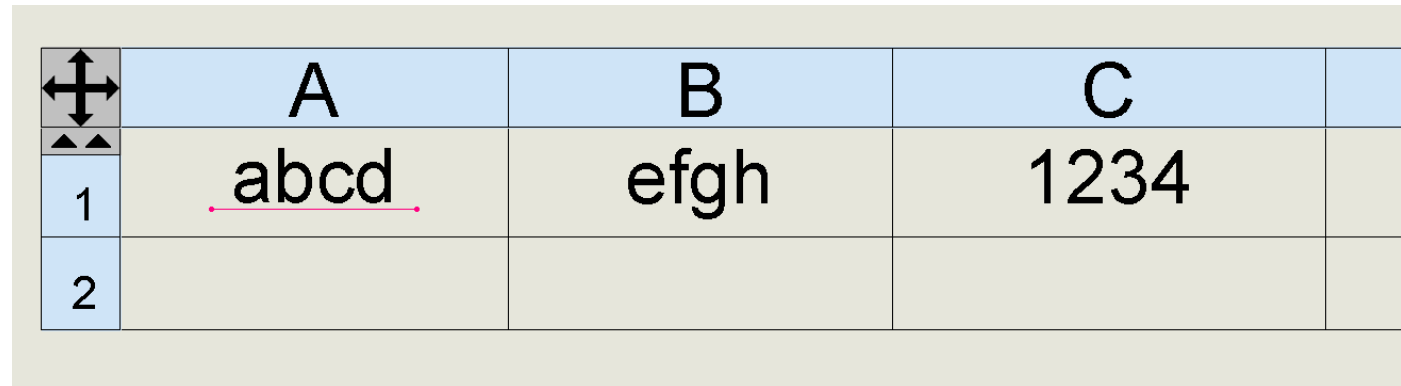


# Two General Table Party Tricks



A screenshot of a SolidWorks table with three columns labeled A, B, and C. The first row contains the text 'abcd' in column A, 'abcd' in column B, and '1234' in column C. A text cursor is positioned at the end of the text in cell A1. A mouse cursor is visible over the top-left corner of the table, and a small toolbar is visible above the table.

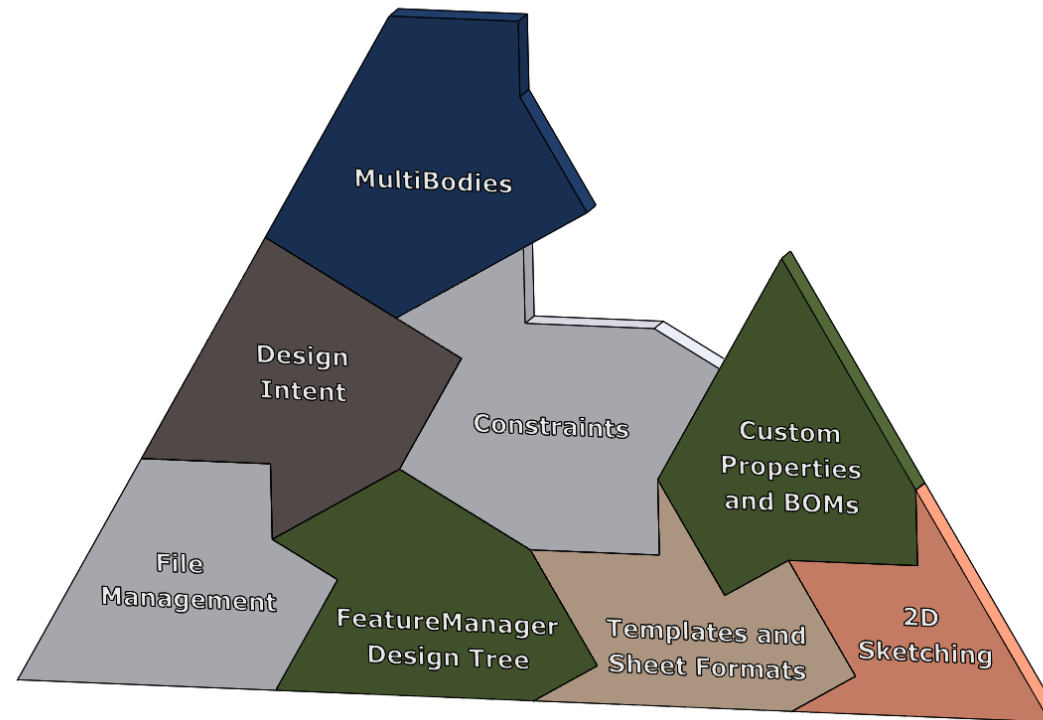
	A	B	C
1	abcd	abcd	1234
2			



A screenshot of a SolidWorks table with three columns labeled A, B, and C. The first row contains the text 'abcd' in column A, 'efgh' in column B, and '1234' in column C. A text cursor is positioned at the end of the text in cell A1.

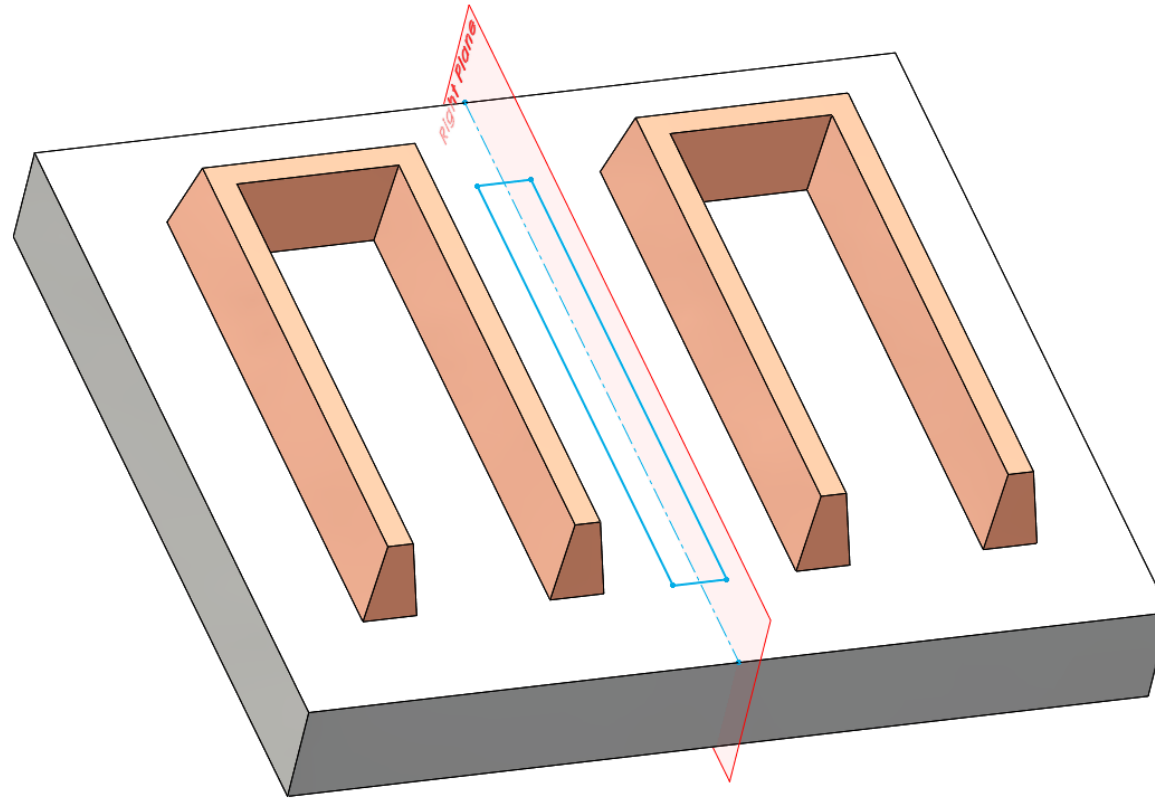
	A	B	C
1	abcd	efgh	1234
2			

# Multiple Body Parts

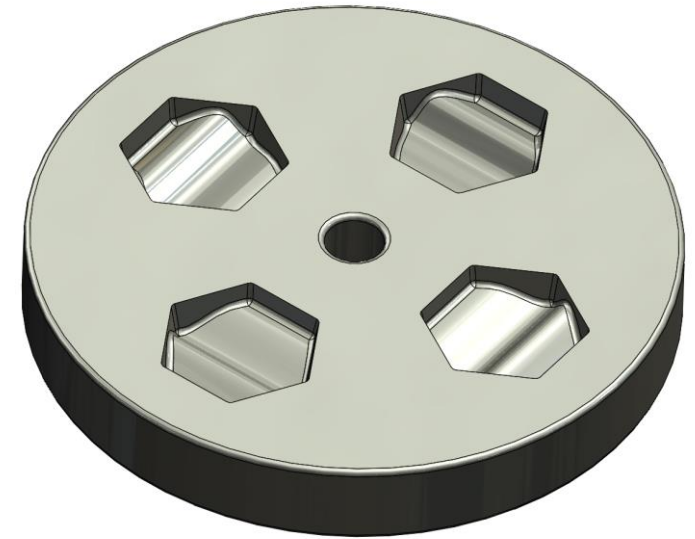
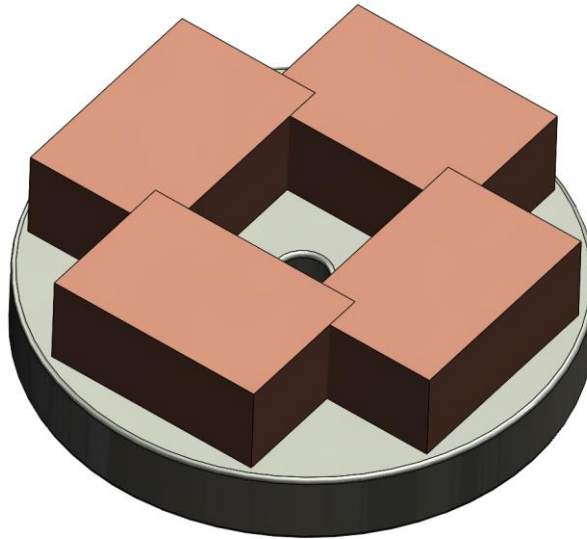
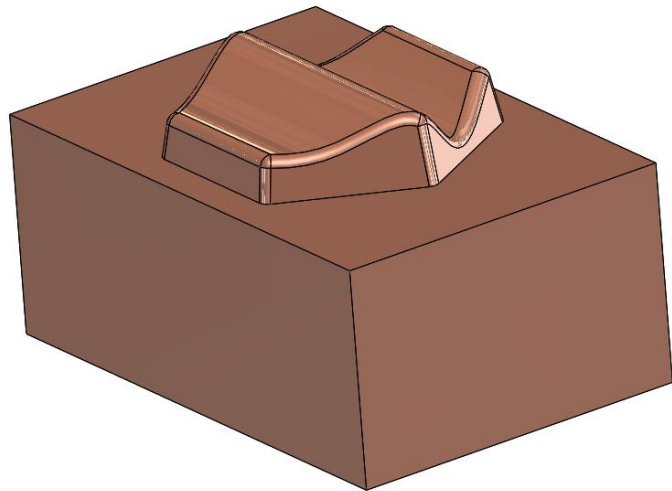


# Merge result and select bodies in Feature Scope

5:01pm



# Multiple Bodies – Insert Part into Part



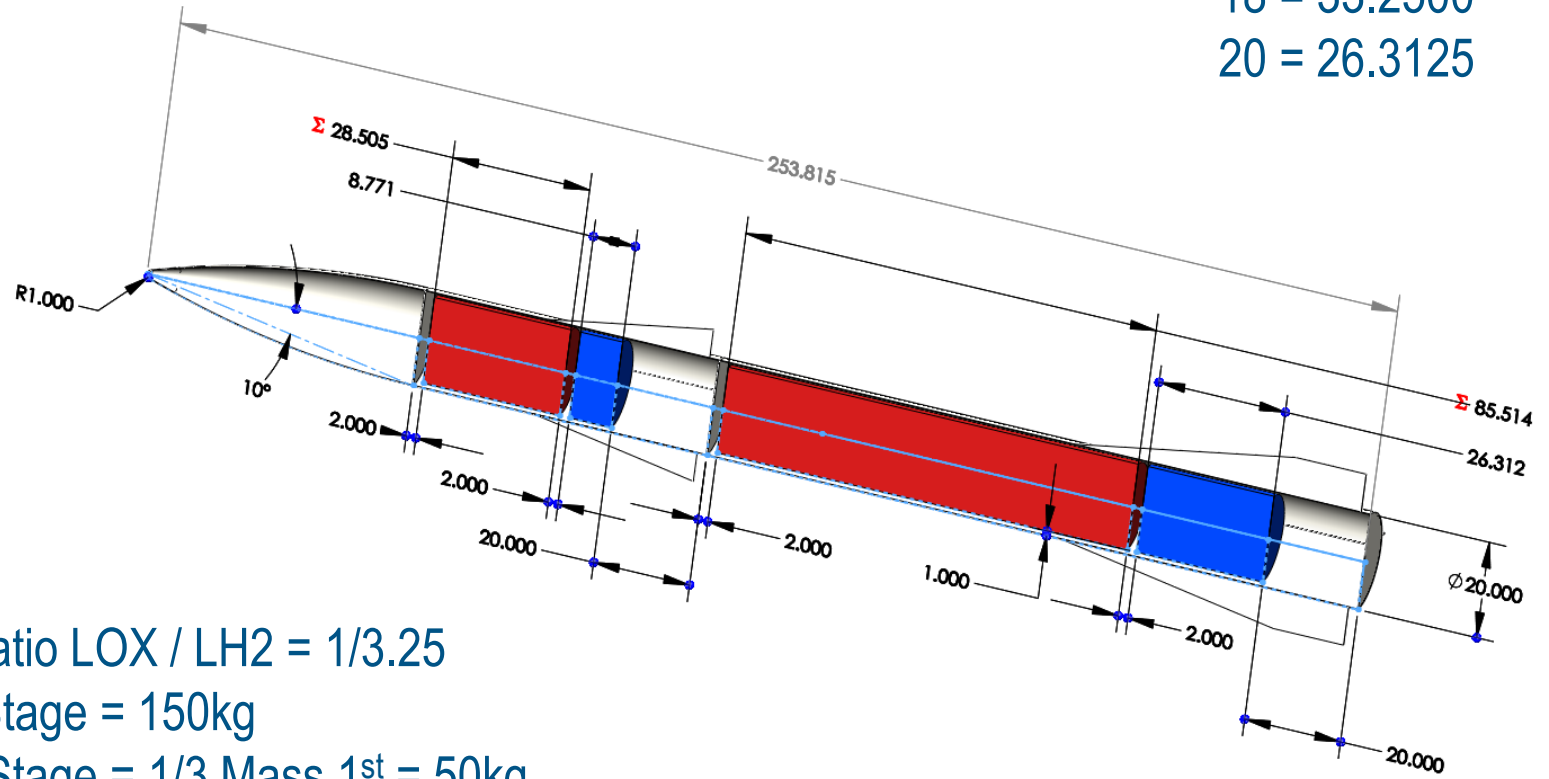
# Rocket Surgery

18 = 33.2500  
20 = 26.3125

3DS.COM/SOLIDWORKS © Dassault Systèmes | Confidential Information | 9/7/2016 | ref.: 3DS\_Document\_2014

rocket science (Default)

- History
- Selection Sets
- Design Binder
- Annotations
- Equations
  - "L over D"=12.6907in
- Sensors
  - 1st Stage Mass (150.043518 kg)
  - 2nd Stage Mass (50.0154563 kg)
- Solid Bodies(15)
  - 1st Stage LOX
    - LOX
  - 1st Stage LH2
    - LH2
  - 2nd Stage LOX
    - LOX
  - 2nd Stage LH2
    - LH2

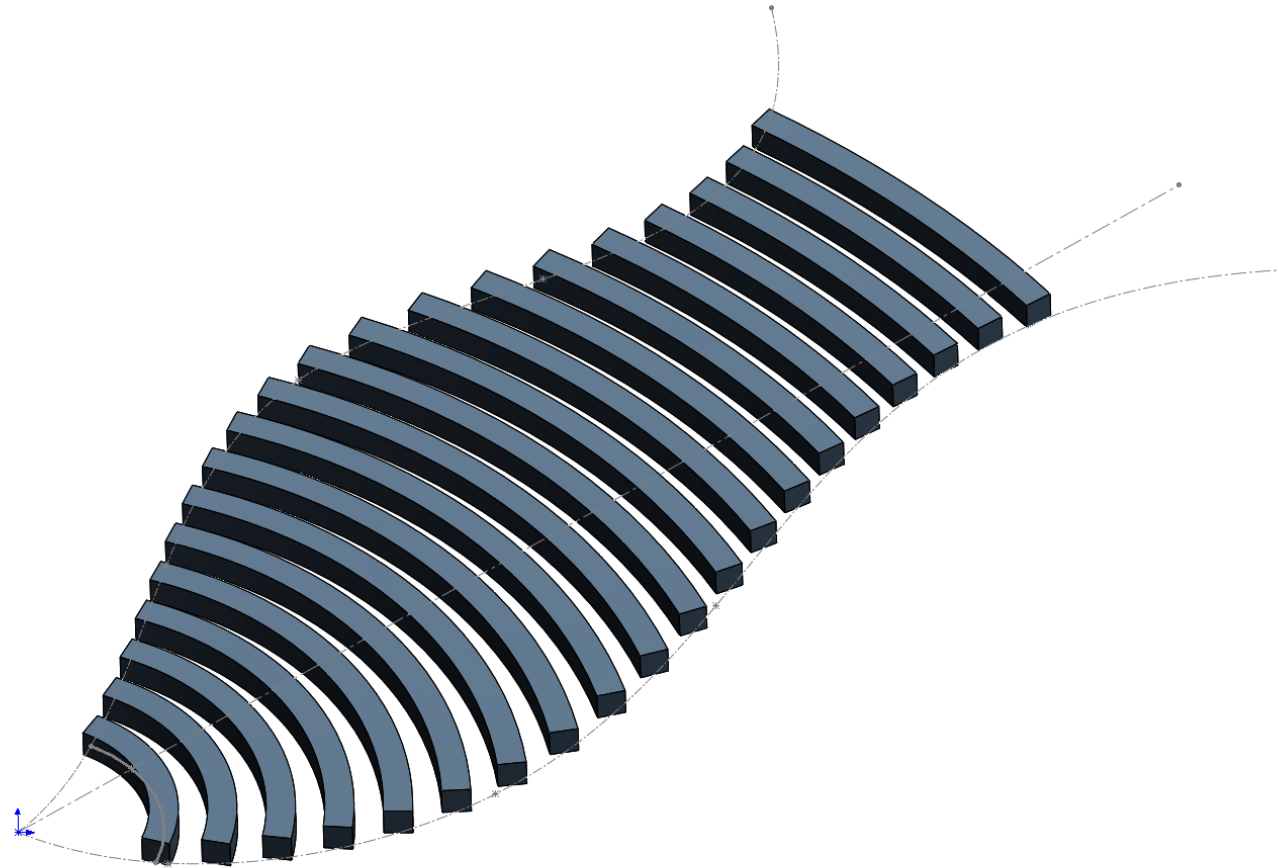


Volume Ratio LOX / LH2 = 1/3.25  
 Mass 1<sup>st</sup> Stage = 150kg  
 Mass 2<sup>nd</sup> Stage = 1/3 Mass 1<sup>st</sup> = 50kg  
 L / D = 10 to 15

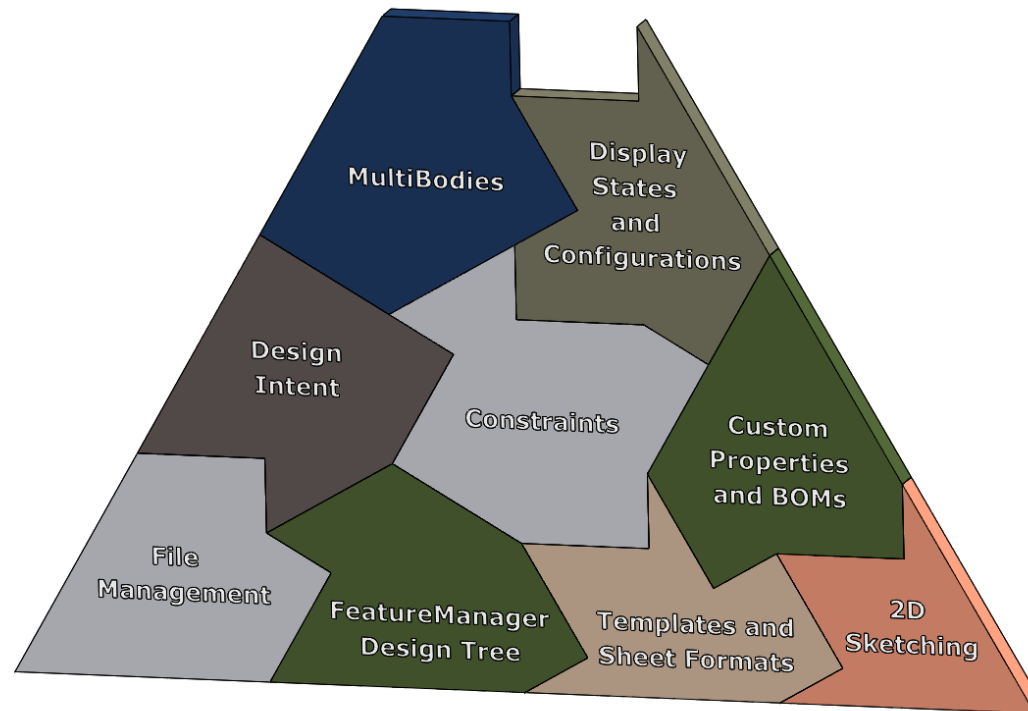
	Name	Value / Equation	Evaluates to
1	"L over D"	= "D14@Sketch1" / "D2@Sketch1"	12.691in
2	"D6@Sketch1"	= "D4@Sketch1" * 3.25	85.514in
3	"D12@Sketch1"	= "D11@Sketch1" * 3.25	28.505in

LOX = 1141 kg/m<sup>3</sup>  
 LH2 = 70.8 kg/m<sup>3</sup>

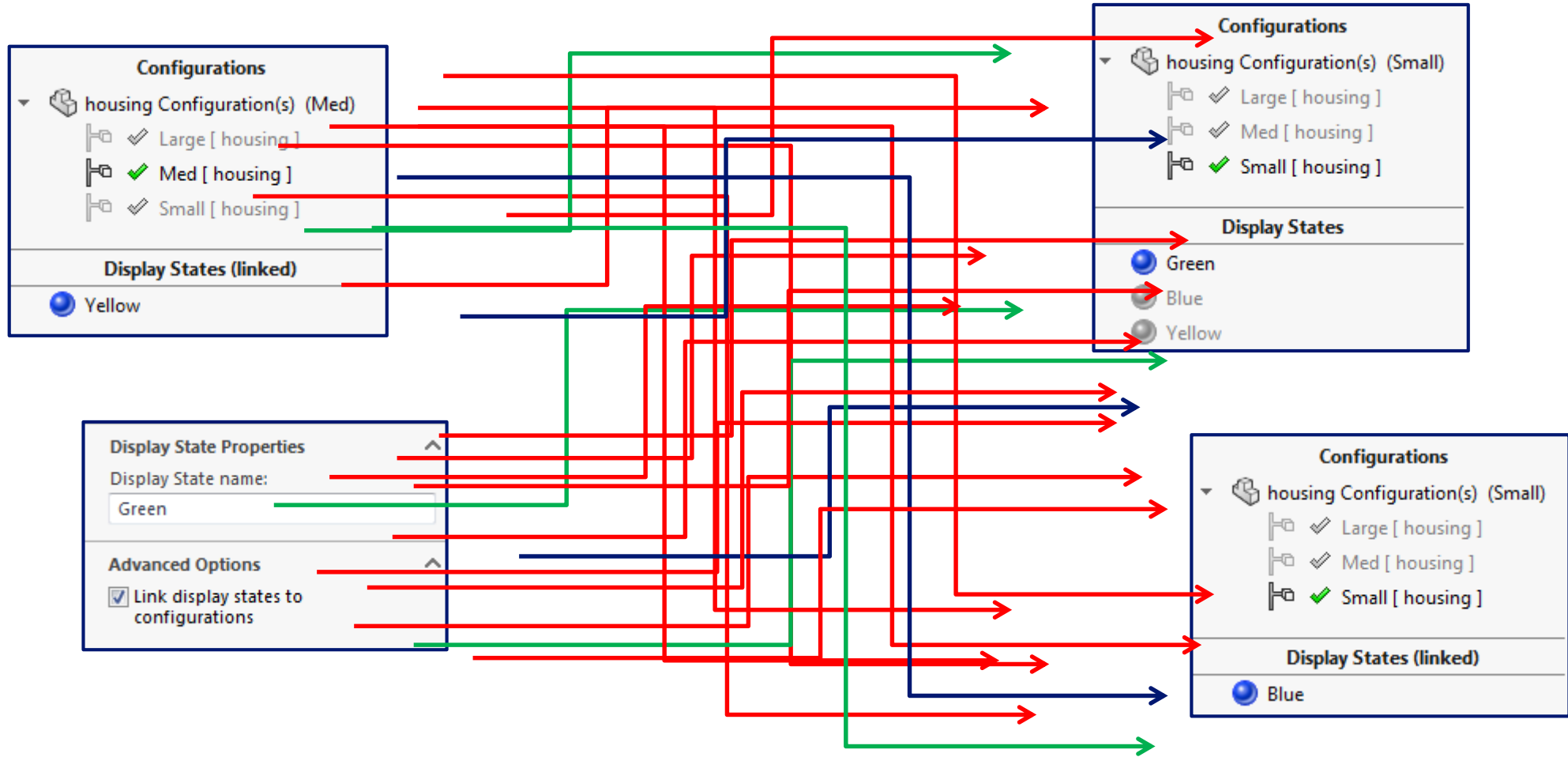
# Linear Pattern - Vary Sketch - Body



# Display States / Configurations



# Link Part Display States to Configurations





# Display States and Configurations

**Configurations**

- housing Configuration(s) (Small)
  - Large [ housing ]
  - Med [ housing ]
  - Small [ housing ]

**Display States (linked)**

- Blue

**Configurations**

- housing Configuration(s) (Med)
  - Large [ housing ]
  - Med [ housing ]
  - Small [ housing ]

**Display States (linked)**

- Yellow

**Configurations**

- housing Configuration(s) (Large)
  - Large [ housing ]
  - Med [ housing ]
  - Small [ housing ]

**Display States (linked)**

- Green

**Display States**

- Green
- Blue
- Yellow

- Copy
- Add Display State
- Burge Redundant
- Properties...**
- Go To...
- Hide/Show Tree Items...
- Collapse Items
- Customize Menu

**Display State Properties**

Display State name:  
Green

**Advanced Options**

Link display states to configurations

Checked

Un-Checked

**Display State Properties**

Display State name:  
Green

**Advanced Options**

Link display states to configurations

**Configurations**

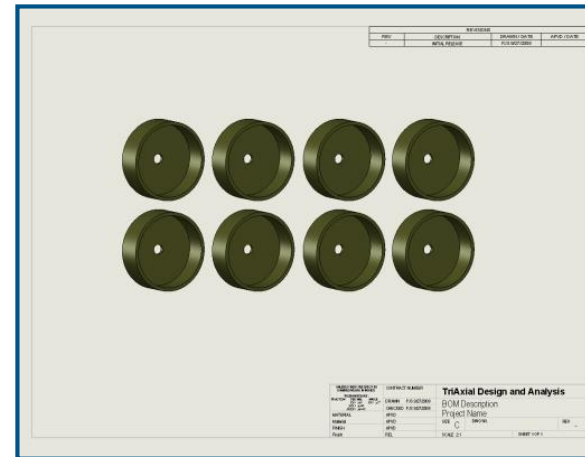
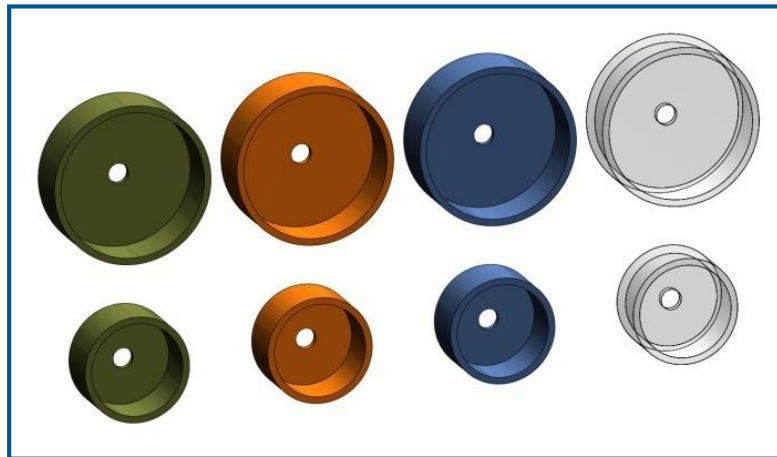
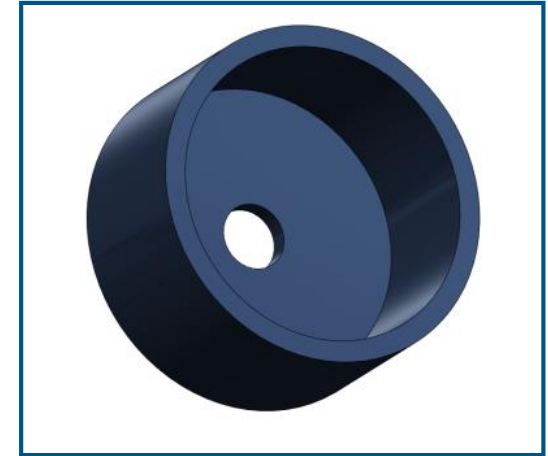
- housing Configuration(s) (Small)
  - Large [ housing ]
  - Med [ housing ]
  - Small [ housing ]

**Display States**

- Green
- Blue
- Yellow

# Part Display States and Configurations

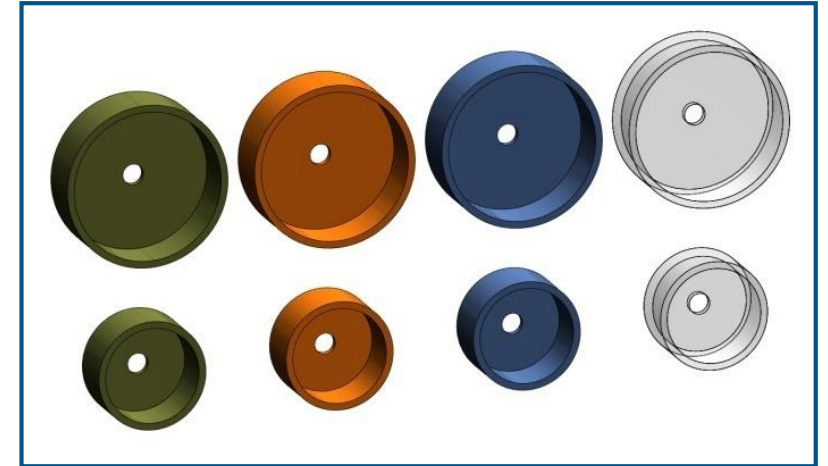
- What is a Part Configuration?
- What is a Part Display State?
- Assembly Component Properties
- Drawing View Properties.



# Assembly Display States and Configurations

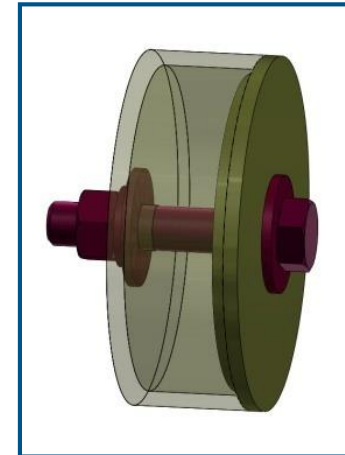
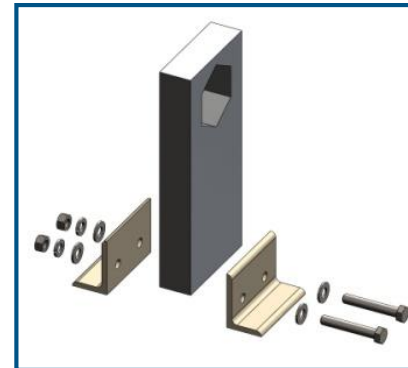
- **What is an Assembly Configuration?**

1. Configurations of Components
2. Resolved / Suppressed Mates
3. Alternate / Resolved / Suppressed Components
4. Vary Distance and Angle Mate Values
5. Resolved / Suppressed Assembly Features
6. Multiple Exploded Views (ref Drawing View Properties)



- **What is an Assembly Display States?**

1. Display States of Components
2. Component Instance Hide/Show, Display Mode, Appearance, Transparency
3. Sequence of Component Assembly.



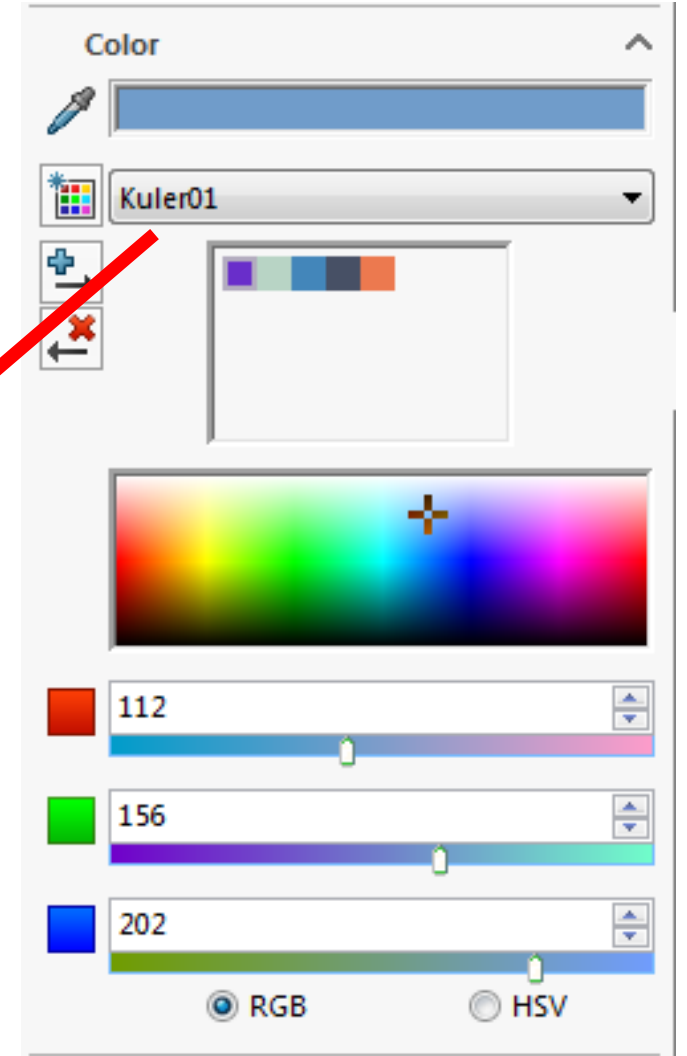
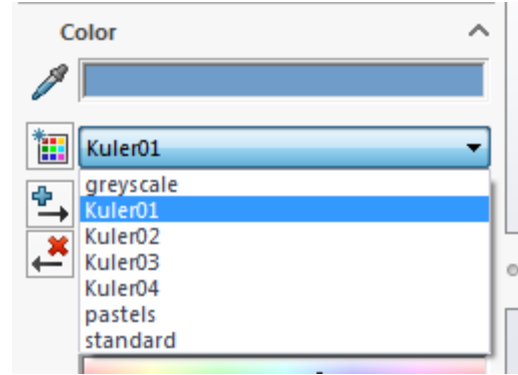
~~Colors~~

Sketch Colors

Appearances

~~Appearance Swatches~~

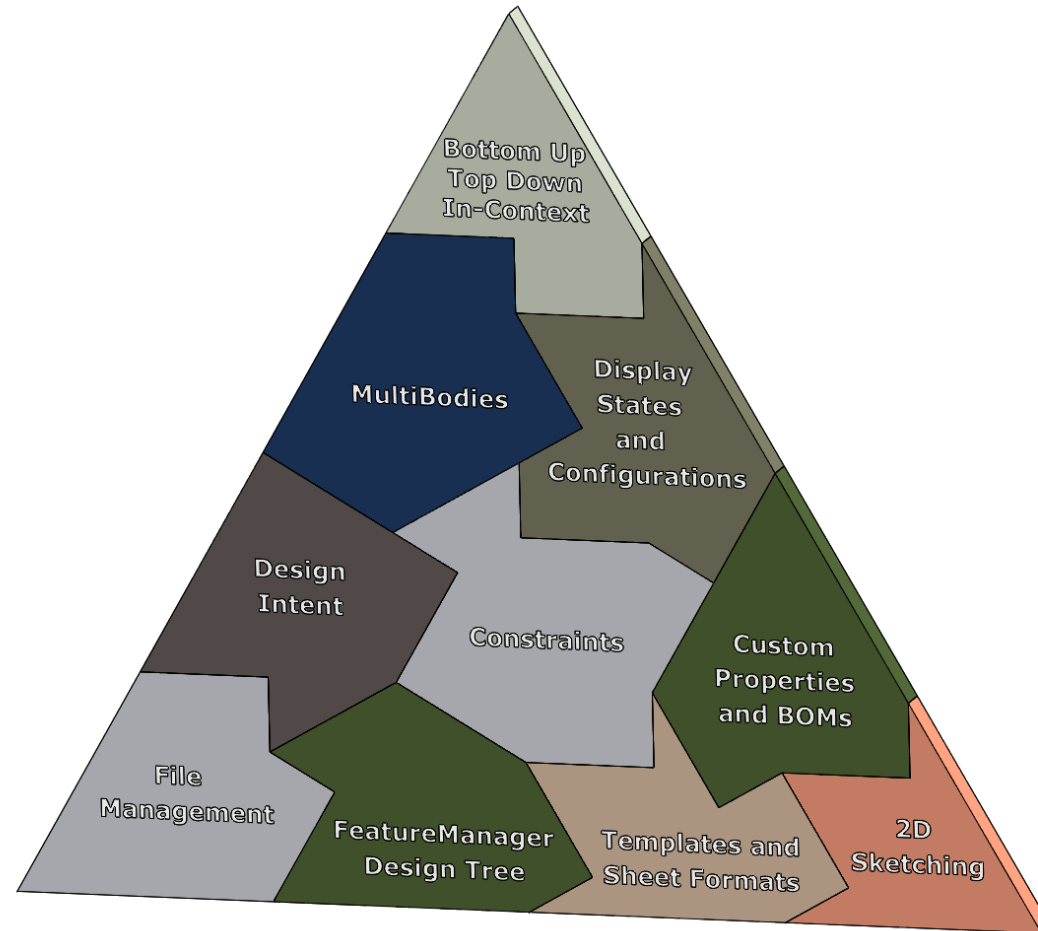
Color Swatches



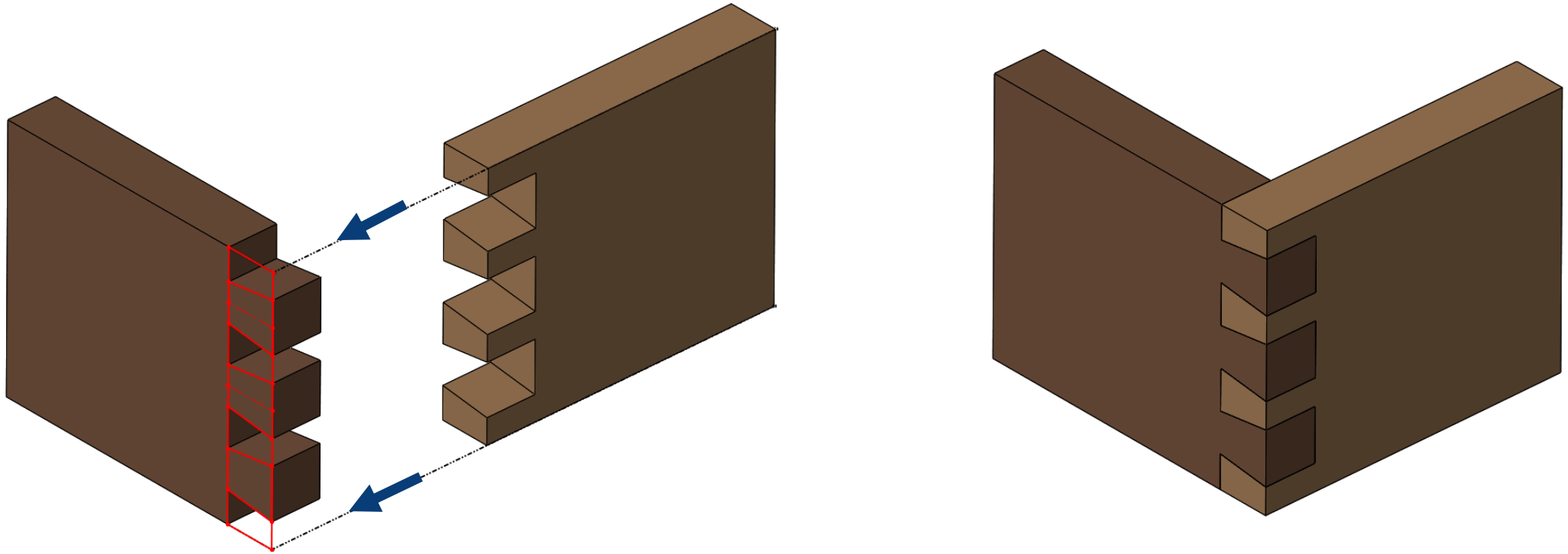
```

Kuler01.sldclr - Notepad
File Edit Format View Help
<?xml version="1.0"?>
<ColorSwatch xmlns="http://www.solidworks.com/sldcolorswatch" DisplayName="Kuler01" version="2009.01">
  <Color RGB="692eca"/>
  <Color RGB="b8d4c5"/>
  <Color RGB="4386ba"/>
  <Color RGB="475065"/>
  <Color RGB="ec794f"/>
</ColorSwatch>
  
```

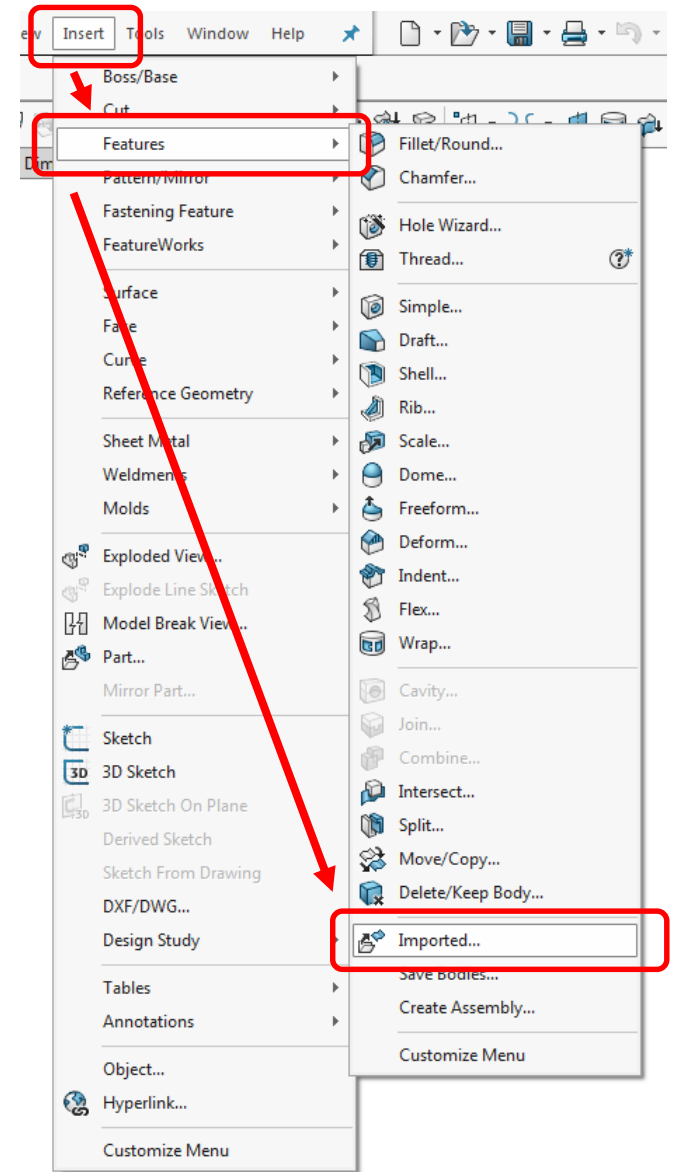
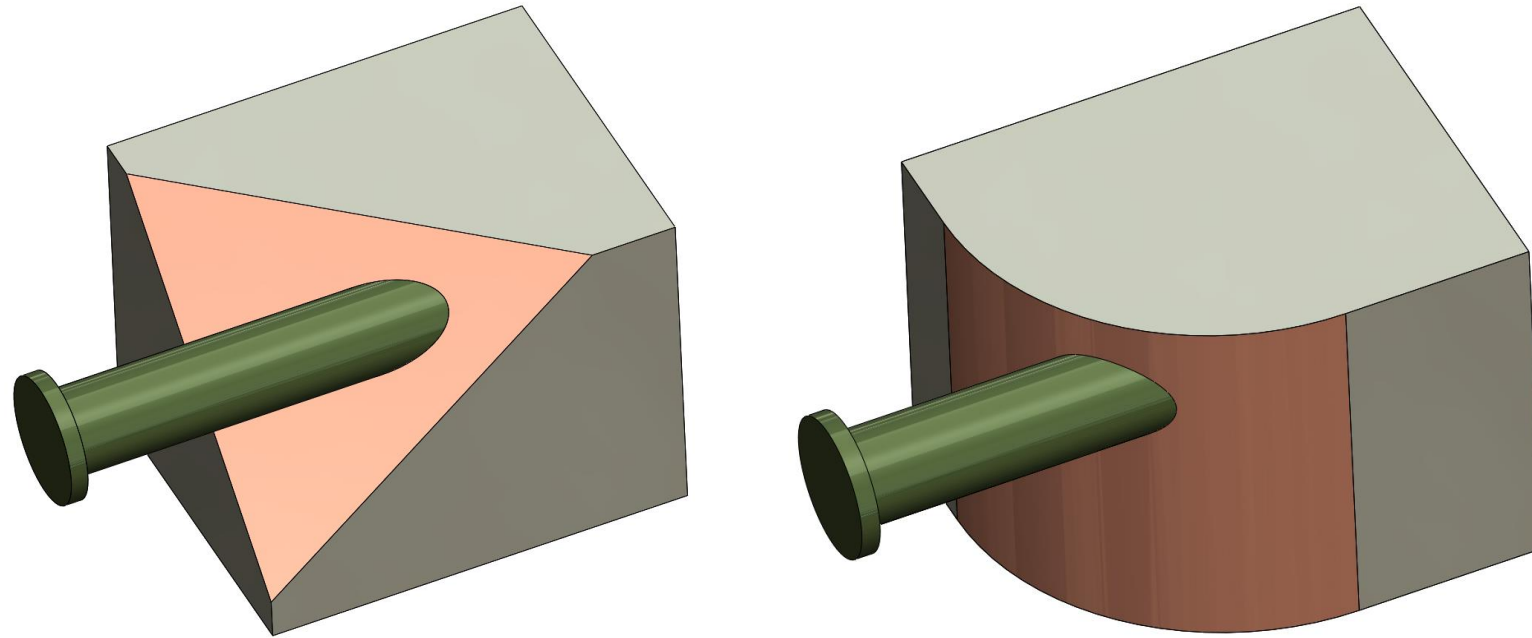
# Bottom Up / Top Down, and In-Context Features



# Dovetails; Derived Sketch in Assembly

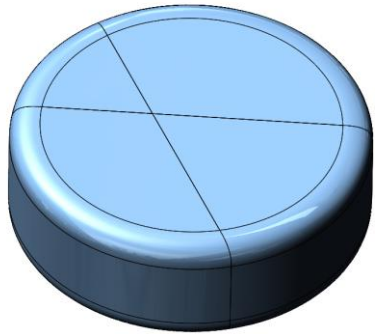


# Breaking In-Context Surfaces





# Master Model – Split, Save Bodies, Create Assembly

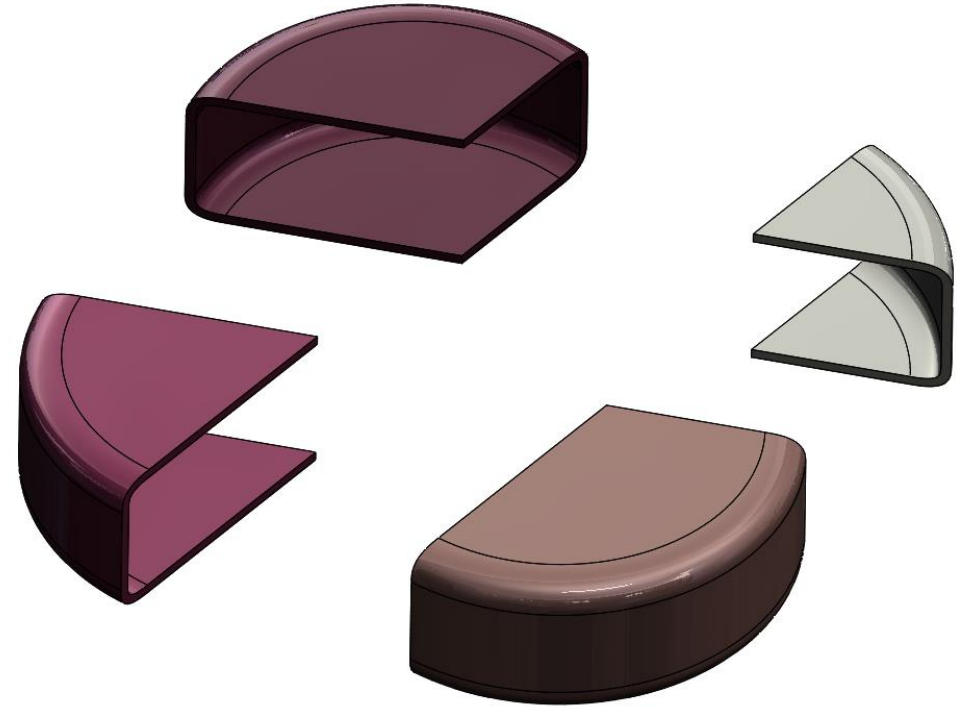


Resulting Parts

		File
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2	<input checked="" type="checkbox"/>	4444.sldprt
3	<input checked="" type="checkbox"/>	1111.sldprt
4	<input checked="" type="checkbox"/>	3333.sldprt

Create Assembly

D:\Phil Sluder - Working\Presentations\SWW2016\split puck.sldasm





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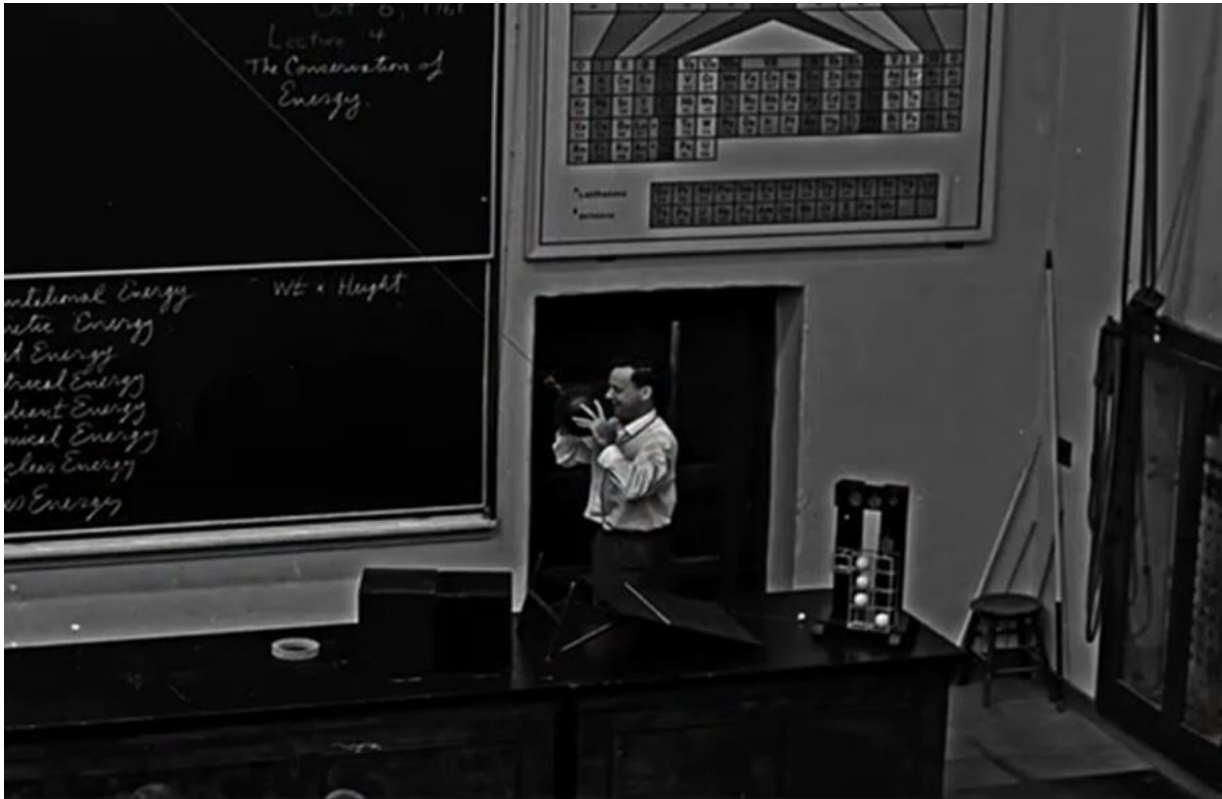
Phil Sluder  
Mechanical Engineer  
TriAxial Design and Analysis, Inc.  
[sluder@triaxialdesign.com](mailto:sluder@triaxialdesign.com)  
(619) 787-8725

# Favorite Physicist Story #1

There were 183 of us freshmen, and a bowling ball hanging from the three-story ceiling to just above the floor. Feynman walked in and, without a word, grabbed the ball and backed against the wall with the ball touching his nose. He let go, and the ball swung slowly 60 feet across the room and back — stopping naturally just short of crushing his face. Then he took the ball again, stepped forward, and said:

**"I wanted to show you that I believe in what I'm going to teach you over the next two years."**

**- Richard Feynman**





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Mechanical Engineer  
TriAxial Design and Analysis, Inc.

# Favorite Physicist Story #2

**For a successful technology, reality must take precedence over public relations, for nature cannot be fooled.**

**- Richard Feynman**

*Upon identifying the reason for the explosion of the space shuttle Challenger and his demonstration using immersion in iced water to show that O-rings grow brittle when cold.*





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# Favorite Physicist Story #3



**On the infrequent occasions when I have been called upon in a formal place to play the bongo drums, the introducer never seems to find it necessary to mention that I also do theoretical physics.**

**- Richard Feynman**

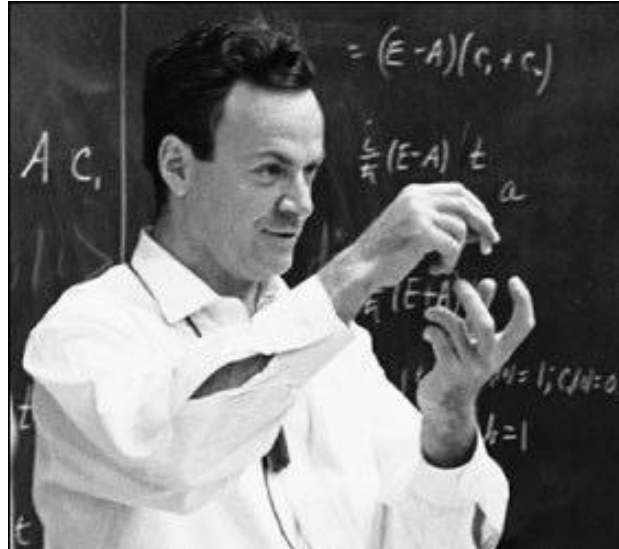
*Statement after an introduction mentioning that he played bongo drums; Messenger Lectures at Cornell University (1964-5).*



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Everything, well, not everything, but lots of stuff turns out to be useful.

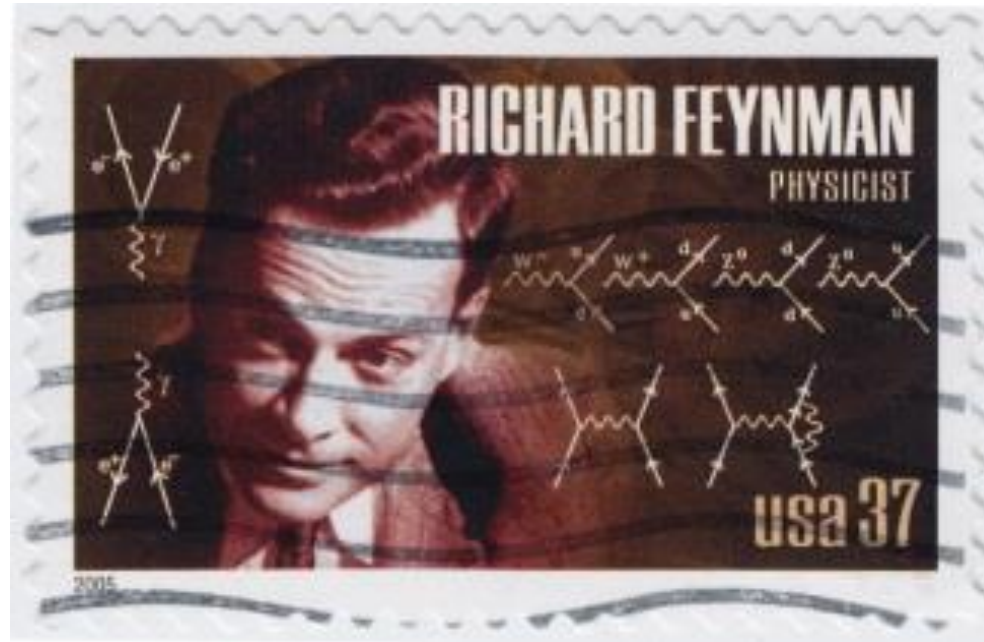
Richard Feynman



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It is impossible, by the way, by picking one example of anything, to avoid picking one which is atypical in some sense— that’s the wonder of the world.

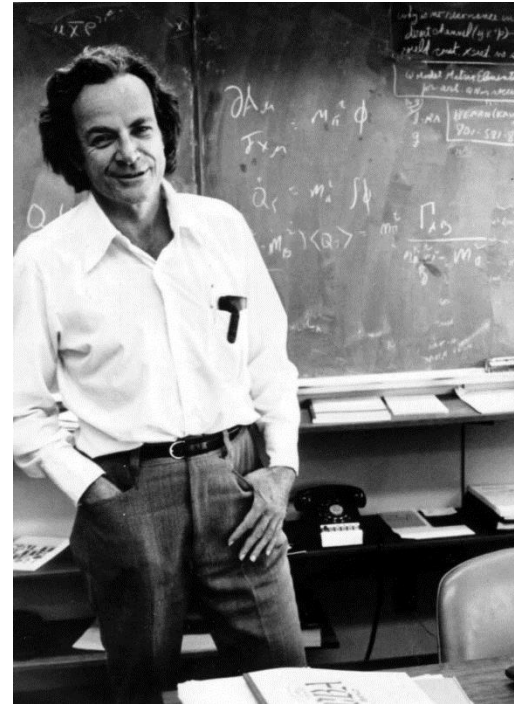
- Richard Feynman



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If an apple was magnified to the size of the Earth, then the atoms in the apple would be approximately the size of the original apple.

- Richard Feynman



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