

Plastic Part Design Using SolidWorks 2010

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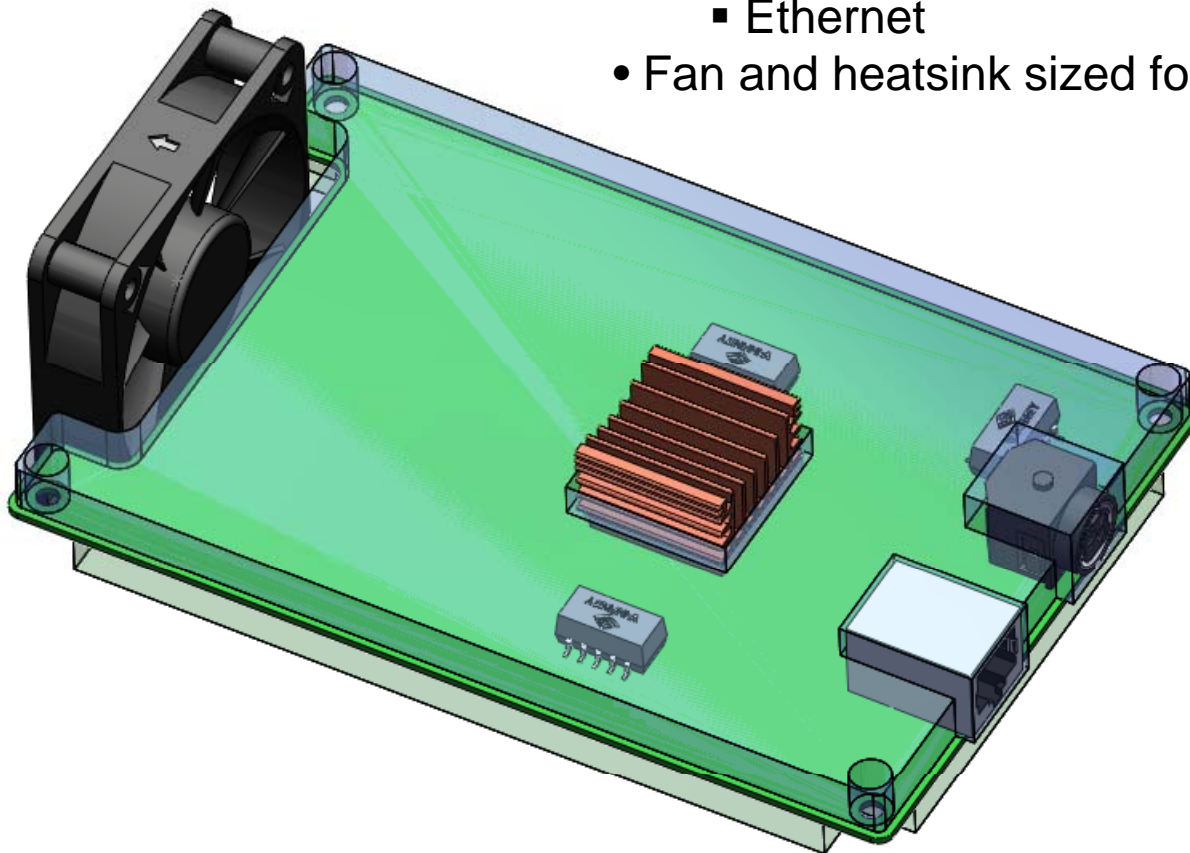
Agenda

Plastic Part Design Using SolidWorks

- Master Model Technique
- Draft
- Shell
- Ribs
- Fastening Features
 - Vents
 - Lips and grooves
 - Mounting bosses
 - Snaps

Task: Design a plastic enclosure for existing electronics

- Existing PCBA with 2 external connectors
 - DC power
 - Ethernet
- Fan and heatsink sized for cooling requirements



Models acquired from 3D Content Central

<http://www.3dcontentcentral.com>

The screenshot shows a web browser window displaying search results for 'fan' on the 3D Content Central website. The browser's address bar shows 'Search Results: fan'. The website header includes the user's name 'Julie Napolitan | Julie Test Company' and navigation links like 'Home', 'Find Content', 'Request Content', and 'Upload Content'. A search bar contains the term 'fan' with a search button and links to 'Advanced Search' and 'Search Within Results'. Below the header, there are view options for 'List View' and 'Gallery View (Preview!)'. The main content area shows 'Results 11-20 of 97 for fan'. On the left, there are filter sections for 'Selected Filters' (Fans), 'Filter By' (Supplier, Category, Tag), and a list of suppliers and categories with their respective counts. The main results area displays two items. The first item is a 120 mm Irwin fan, with a 3D model image, a detailed description, and a star rating of 4.8. The second item is a fan-40x40x15 by Dr. Johann Elges, with a part number of 1. The browser's status bar at the bottom indicates 'Internet | Protected Mode: Off' and a zoom level of 150%.

Search Results: fan

Welcome Julie Napolitan | Julie Test Company [Logout | Personal Profile]

3D ContentCentral®

fan Search Advanced Search Search Within Results

Home | Find Content | Request Content | Upload Content My 3D ContentCentral | Supplier Services

List View Gallery View (Preview!)

Selected Filters
Fans X

Filter By ▾

Supplier View by: A-Z
User Library (86)
Oriental Motor U.S.A. Corp. (10)
Printed Motor Works Limited (1)



Category View by: A-Z
Electrical Components (86)
Motors - General (1)
Motors - Rotary (1)

Tag
fan (12)
grille (4)
ventilateur (4)
fanquard (3)

Results 11-20 of 97 for fan

Files from: Suppliers Individual Contributors (supplier related) Individual Contributors (no supplier given)

Results per page: 10 Sort by: Best Match < 1 2 3 4 5 ... 10 >

 Name **120 mm Irwin** Configurations? **No**
Description **120 mm x 120 mm square fan is based on a U.S. Toyo Fan Corp DC Brushless Fan** Downloads **53155**
This 120 mm x 120 mm square fan is based on a U.S. Toyo Fan Corp DC Brushless Fan used in several of our products. I modeled it as a single part so it could be easily added to existing assemblies. Added on 28 Jun, 2002
Average rating  (48 Ratings)

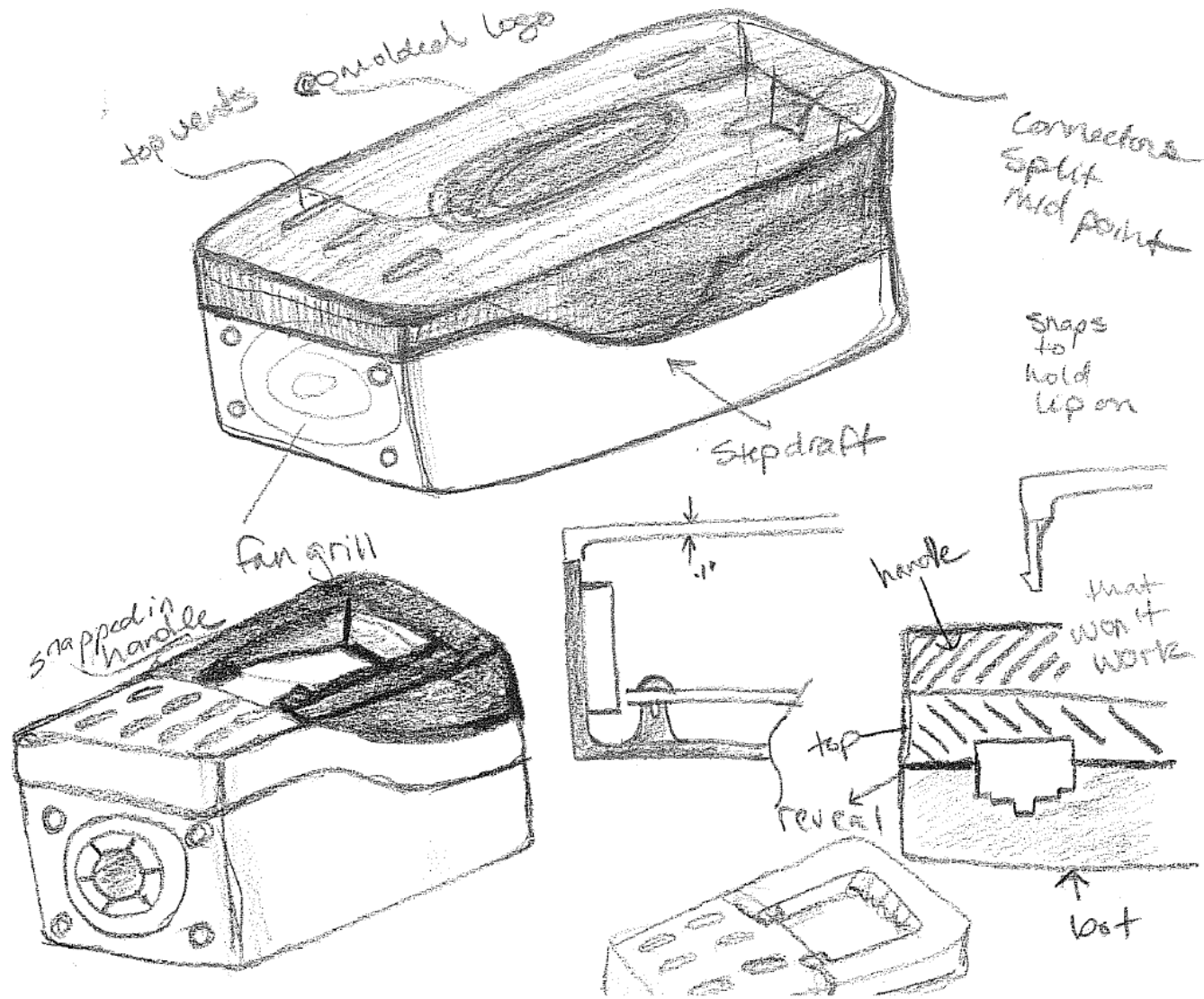
Category Electrical Components, Fans

Contributed by J. Wes Irwin

Dr. Johann Elges Name **fan-40x40x15** Configurations? **No**
Part Number 1 Downloads **2671**

Done Internet | Protected Mode: Off 150%

Initial Design Sketches



Master Modeling Techniques

- **Base part**
- Split part
- Multibody



For more information on master models please see the SolidWorks tutorial *Molded Product Design - Advanced*

Master model technique

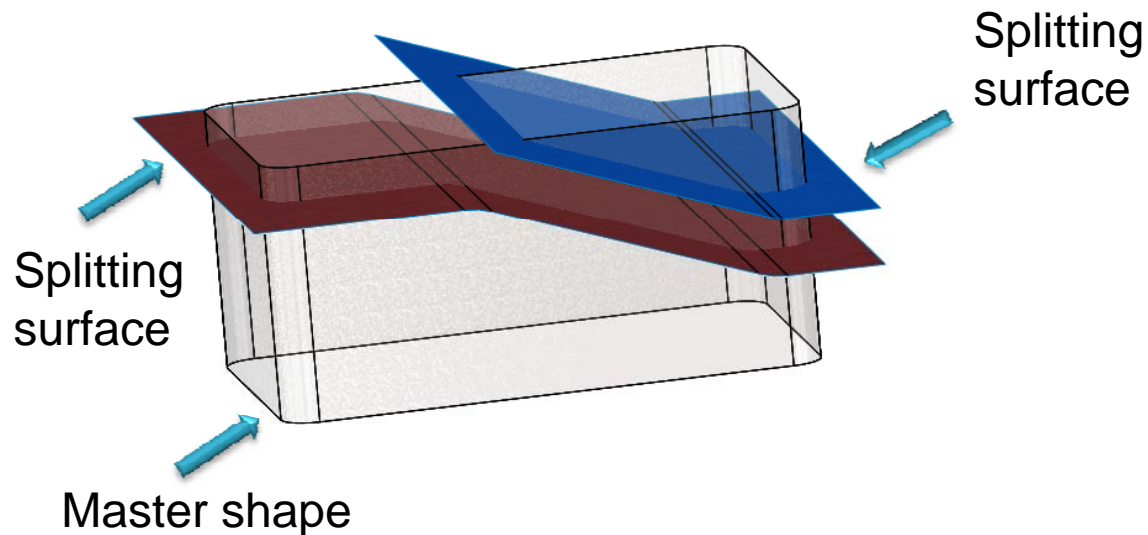
Base part method

Why

Parts fit together and use common references. Changing the master model will update all models that reference the master.

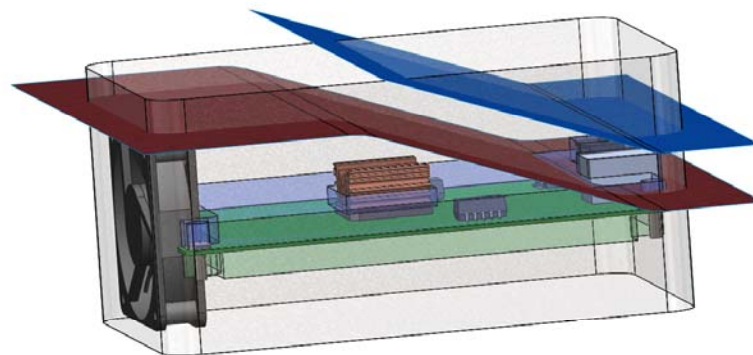
How

- Create a master model that contains all common references.
- Use **Insert Part** as the first feature in all parts that reference the master model.
Cut With Surface to remove the material that belongs to other parts.

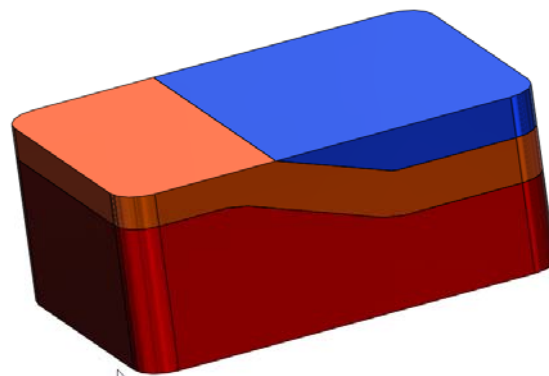


Master model technique

Base part method



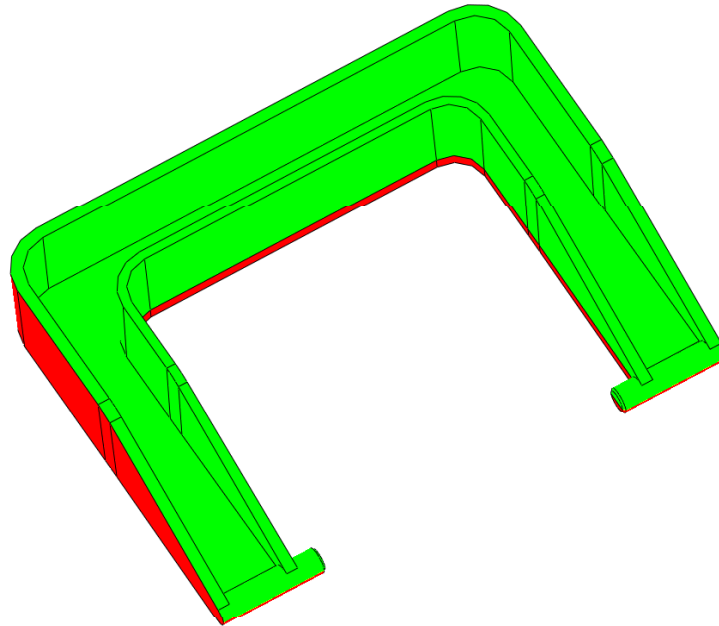
Adjust split locations in main assembly



Assembly with separate parts

Draft

- Use neutral plane draft to draft from one surface
- Use parting line draft to draft from a more complex edge
- Evaluate draft with the draft analysis tool—this can be left on while you are making changes to the geometry.

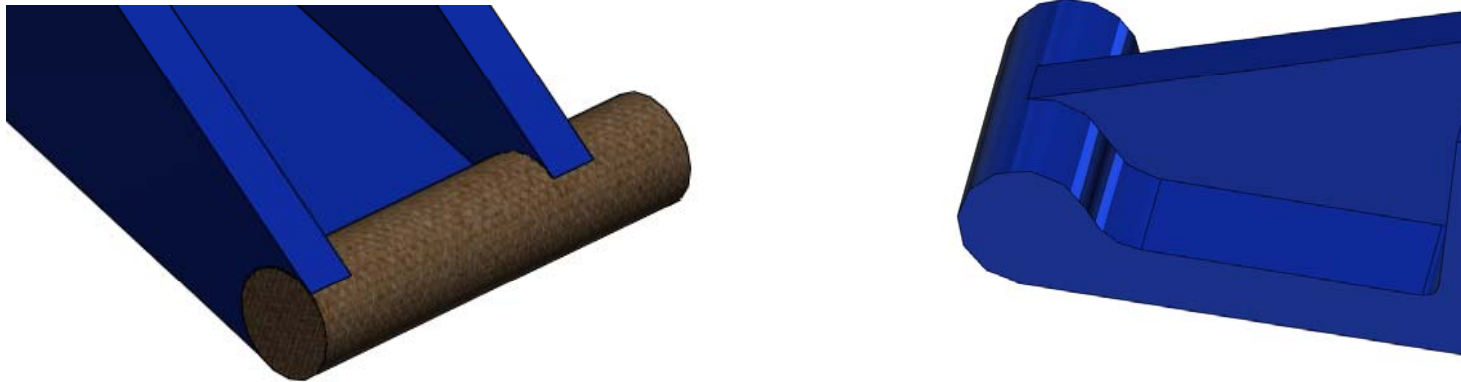


Shell

Shelling

You can place your Shell feature after a Draft feature to quickly get draft on the inside and outside of a part

Use multiple bodies to better control your shell feature if you have areas you don't want shelled out



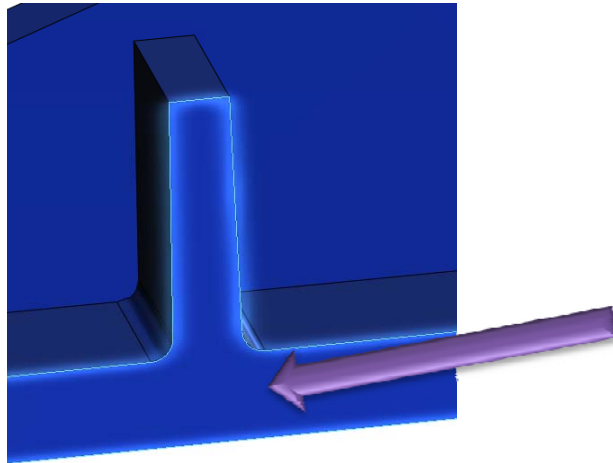
Separate bodies recombined after Shell feature

Ribs

General rules:

Rib thickness should be around $\frac{2}{3}$ of the nominal thickness of the part

Why? To prevent sink marks

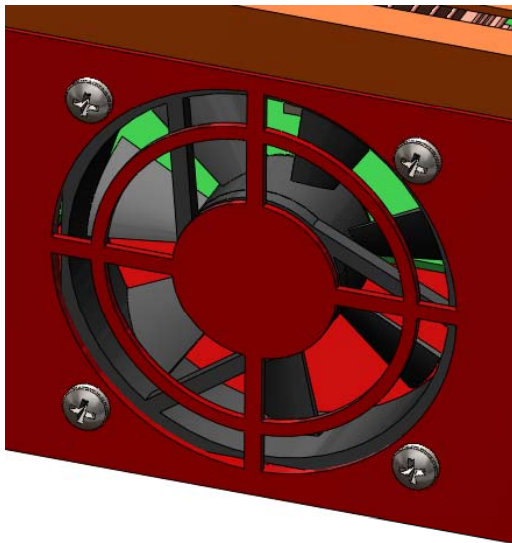


If a rib is too thick there will be a lot of material at the wall intersection. When the plastic cools this area will contract more than the surrounding plastic causing unsightly “sink” marks

Try to keep the height of the rib less than 3 times nominal wall thickness.
Use more ribs to add stiffness.

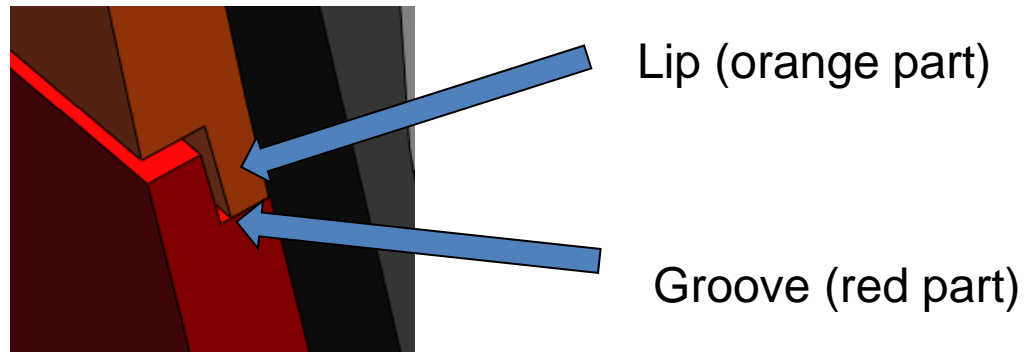
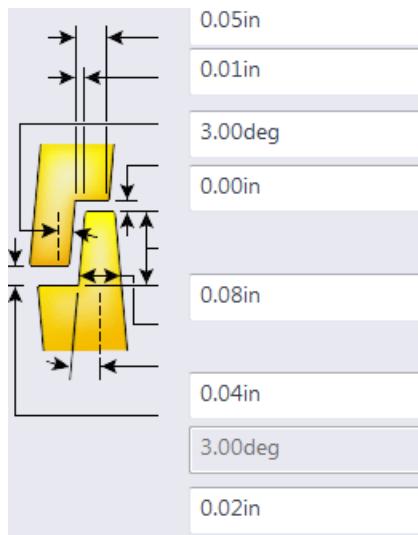
Vents

- Create a sketch to define vent boundary and crossmembers
- Select face to add vent
- Select sketch elements to use as ribs and spars
- SolidWorks will automatically calculate the flow area



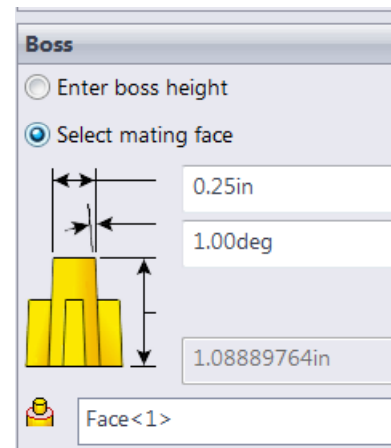
Lips and Grooves

- Works on separate parts or multiple bodies
- Automatic show/hide of parts makes selection easy
- Lip and Groove update to fit each other; if the Lip is changed on one part the Groove on the matching part automatically changes as well.



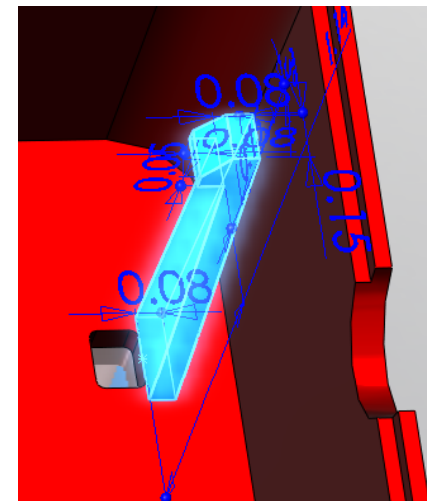
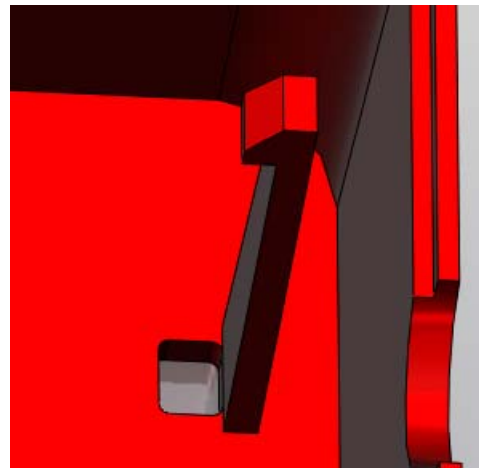
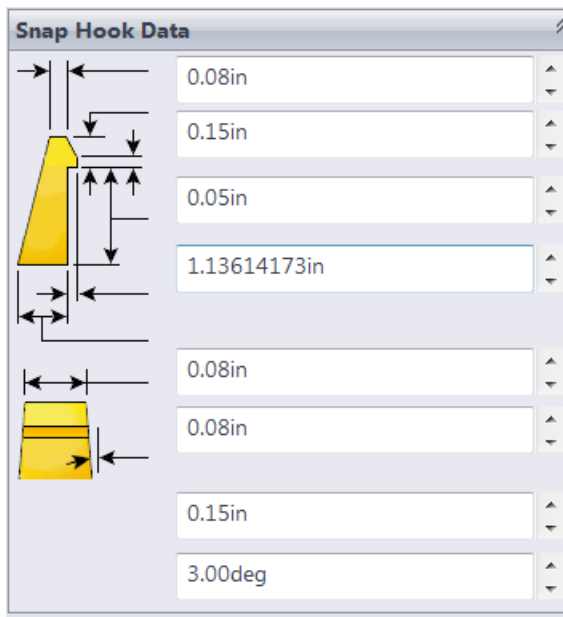
Mounting Bosses

- Automatically define the height of a boss or pin by selecting the mating face.
- Automatically define the location of a boss or pin by selecting a cylindrical face.
- Add fins to the boss for support if desired.



Snaps and Snap Grooves

- Automatically define the height of a Snap by selecting the mating face.
- Once a Snap has been created define a Groove feature based on the Snap geometry. These pieces will update together.



(Mostly) Finished



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Consulting Visits: These visits are more in depth and last 2-5 days depending on your availability. **We'll do your work for free** if you'd like. We just want to learn your process and actually doing your work is the best way to learn.

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