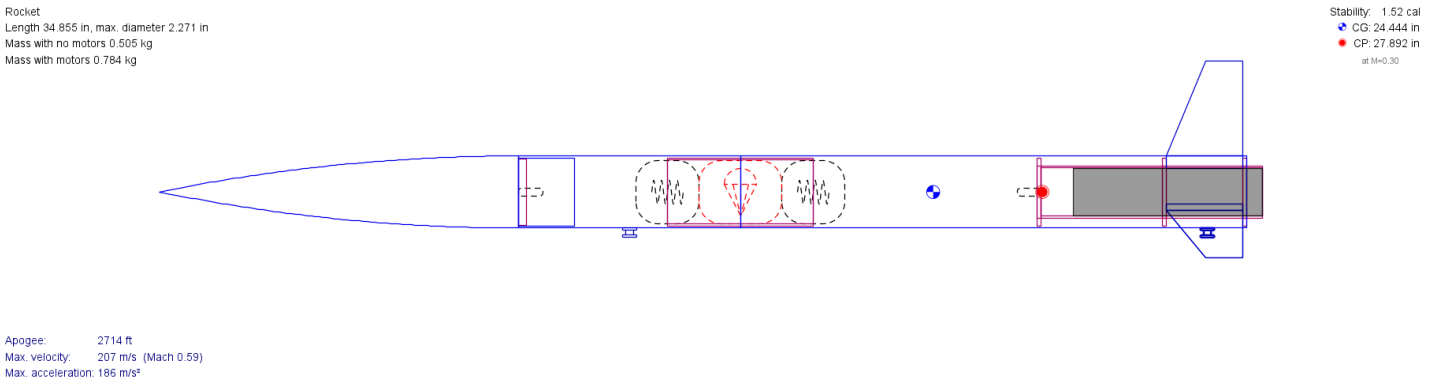
Airframe Project Components

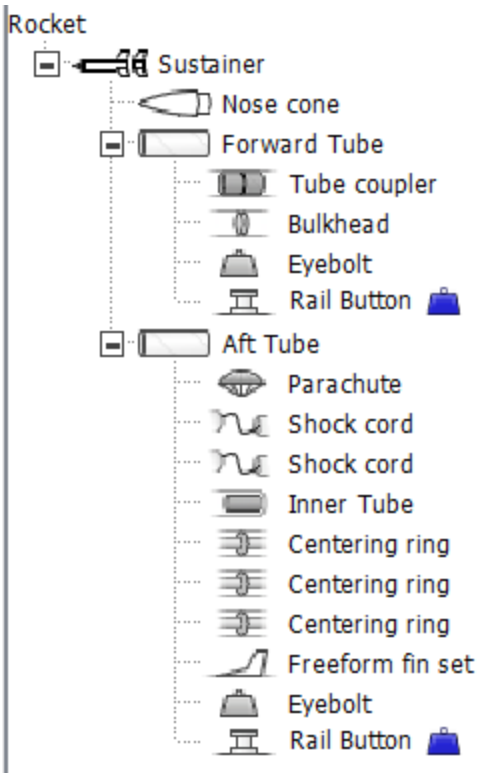
The Goal

At the end you should have a rocket that looks like this:

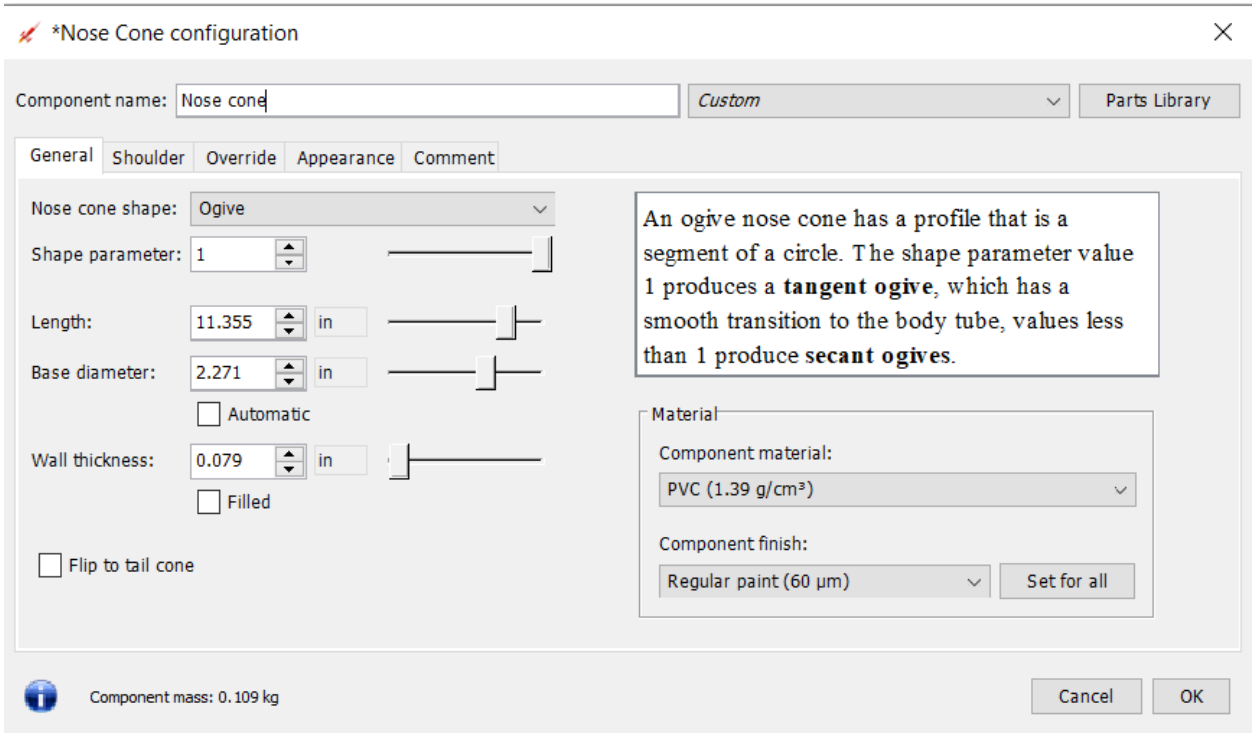


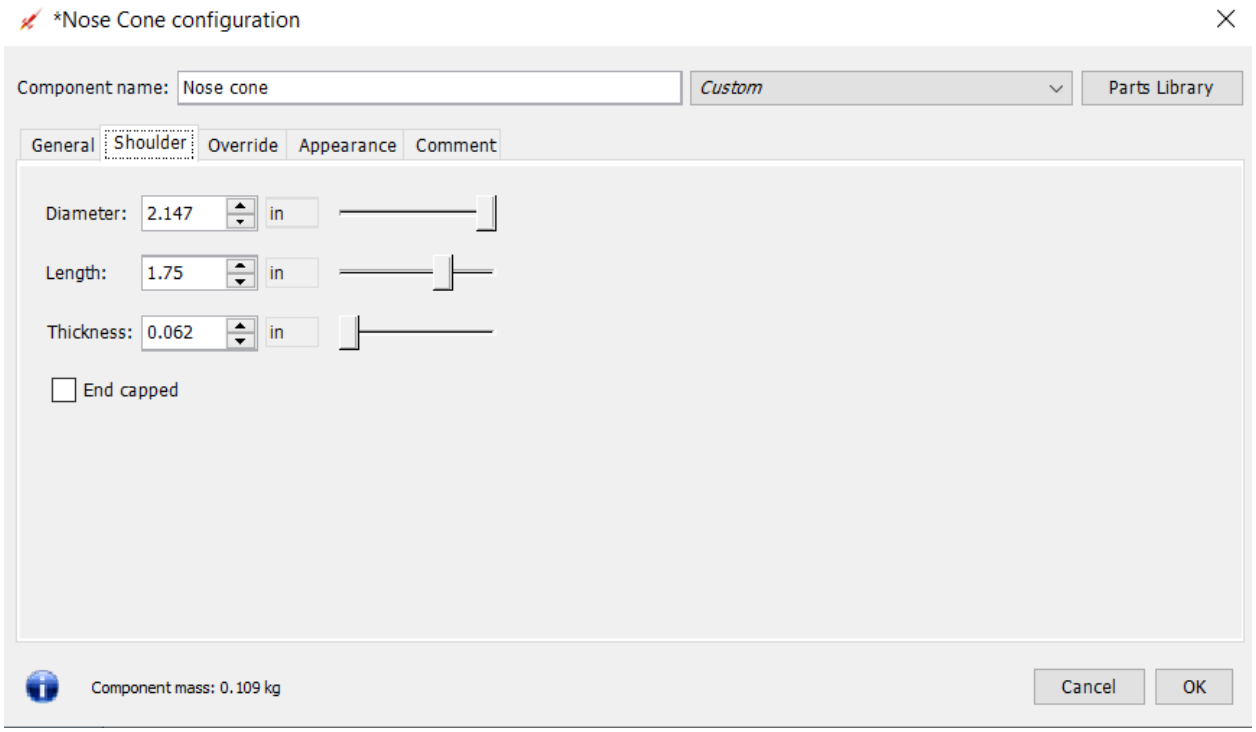
Components

Complete list:

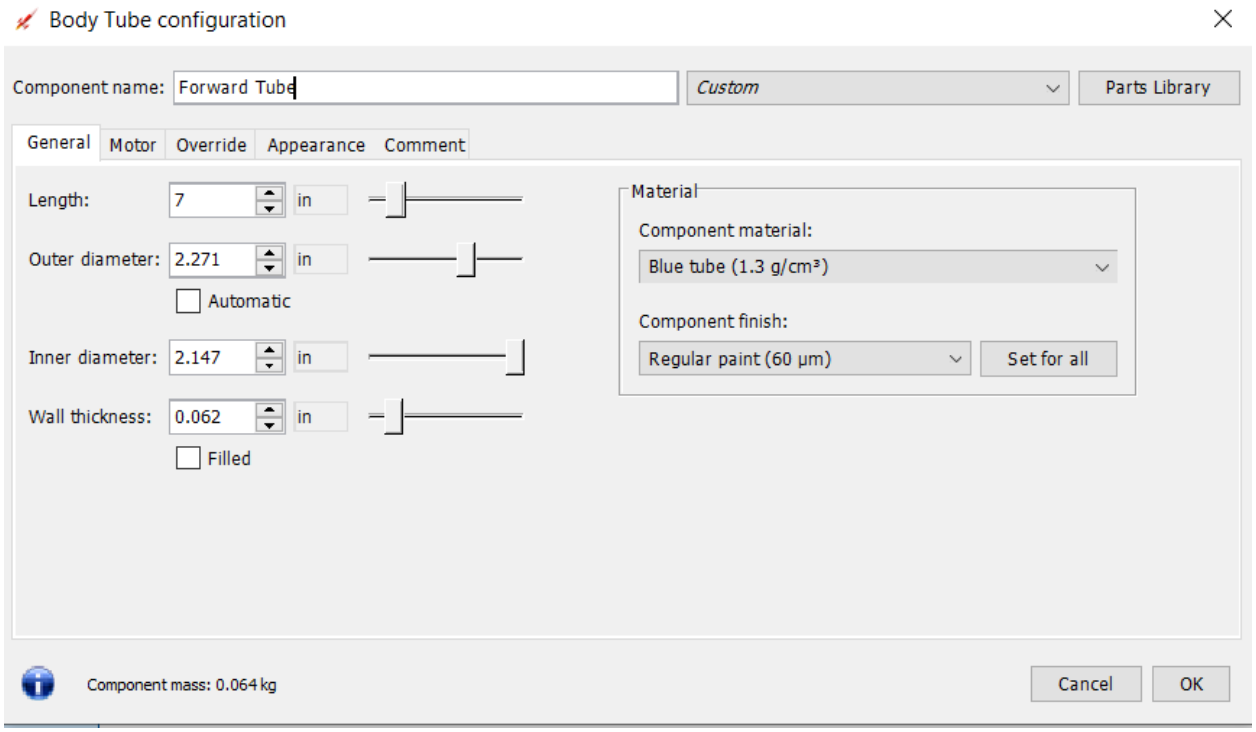


Nose Cone:

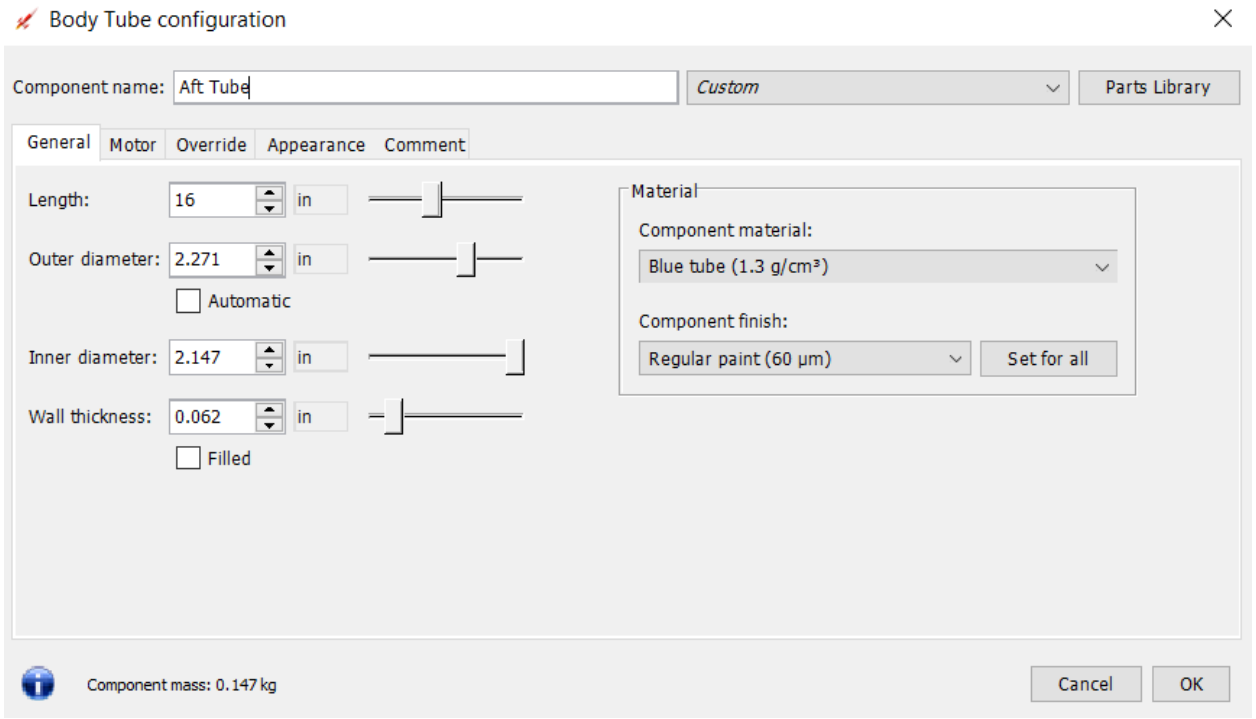

*Nose Cone configuration
Component name: Nose cone
Custom
Parts Library
General
Shoulder
Override
Appearance
Comment
Nose cone shape: Ogive
Shape parameter: 1
Length: 11.355 in
Base diameter: 2.271 in
Automatic
Wall thickness: 0.079 in
Filled
Flip to tail cone
An ogive nose cone has a profile that is a segment of a circle. The shape parameter value 1 produces a tangent ogive, which has a smooth transition to the body tube, values less than 1 produce secant ogives.
Material
Component material:
PVC (1.39 g/cm³)
Component finish:
Regular paint (60 µm)
Set for all
Component mass: 0.109 kg
Cancel
OK


*Nose Cone configuration
Component name: Nose cone
Custom
Parts Library
General
Shoulder
Override
Appearance
Comment
Diameter: 2.147 in
Length: 1.75 in
Thickness: 0.062 in
End capped
Component mass: 0.109 kg
Cancel
OK

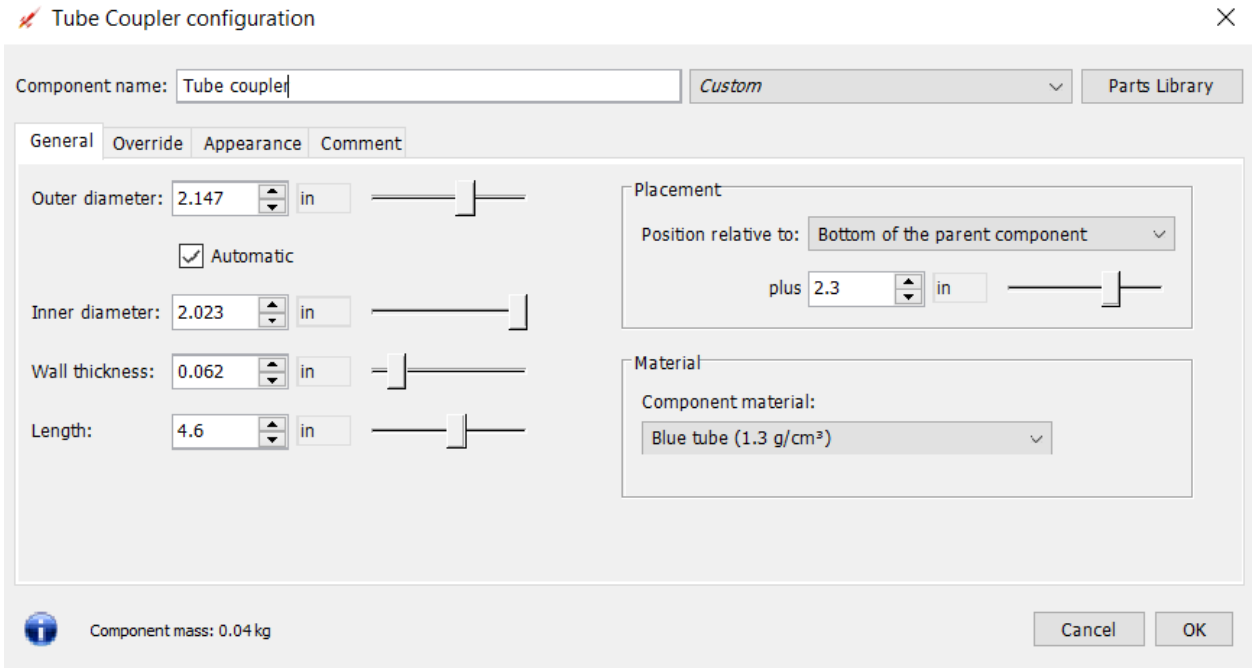
Forward Tube:



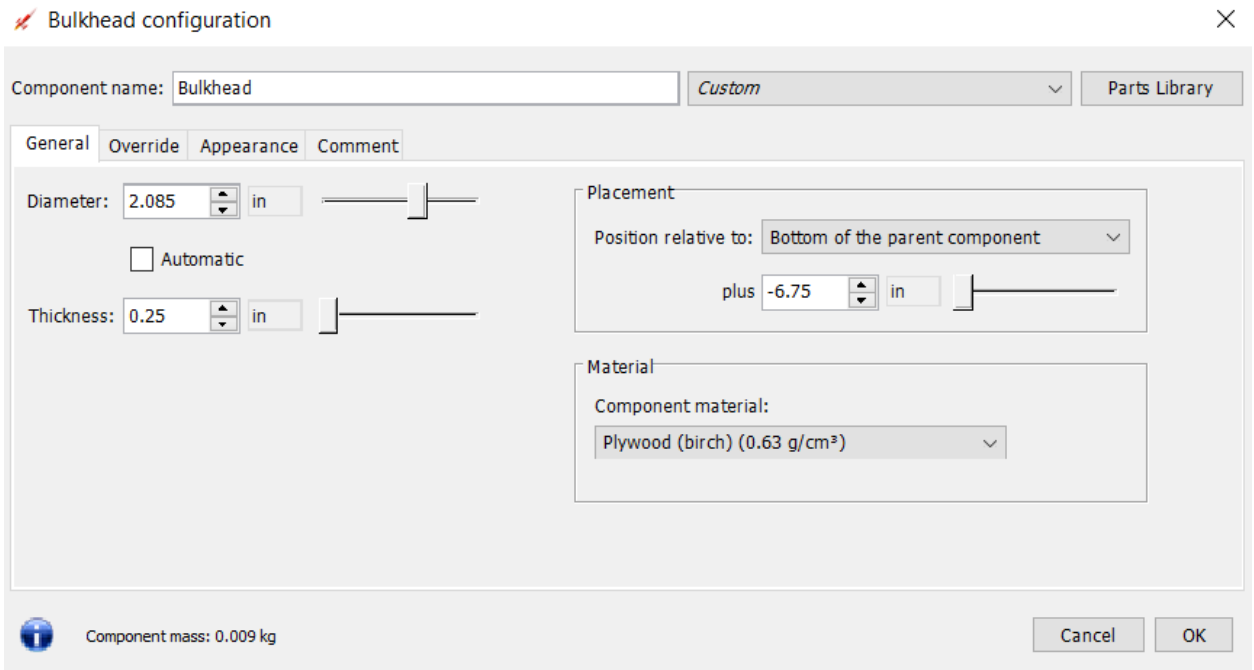
Aft Tube:



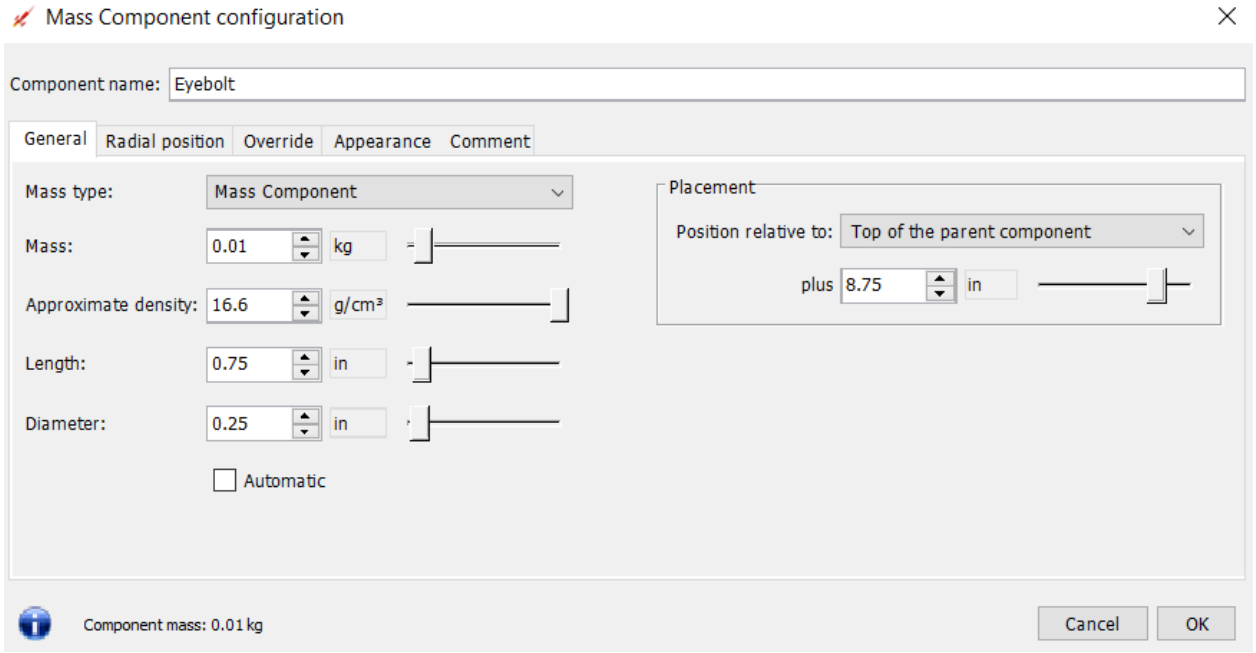
Coupler:

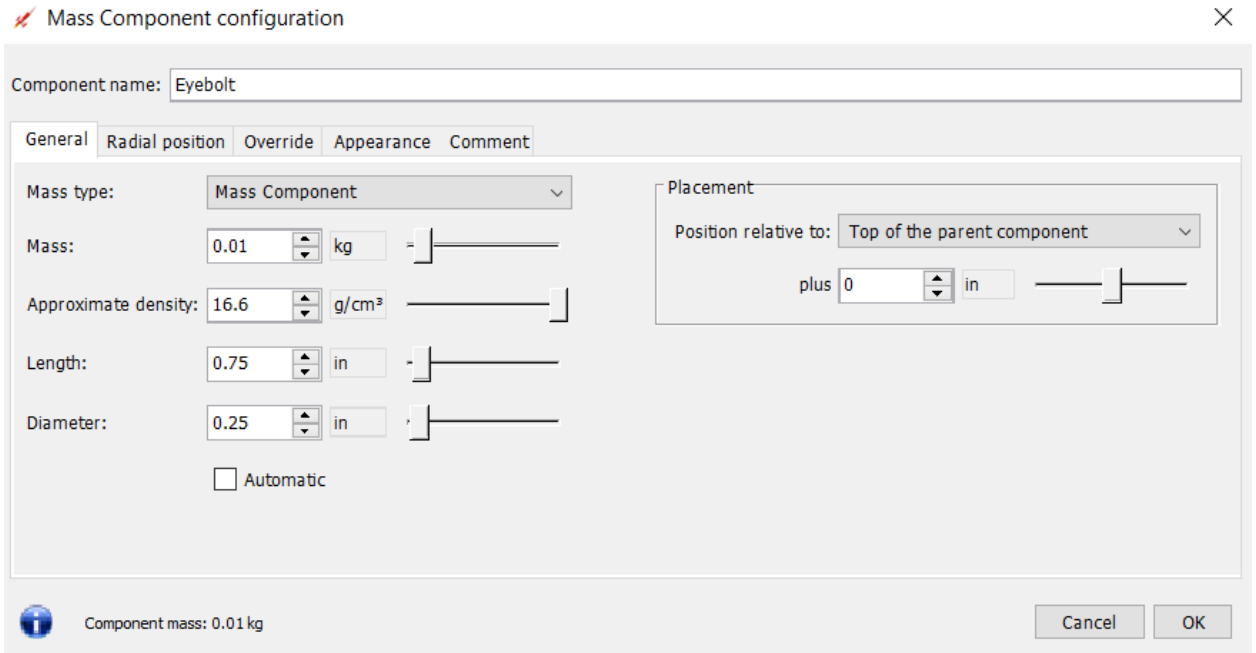


Bulkhead:

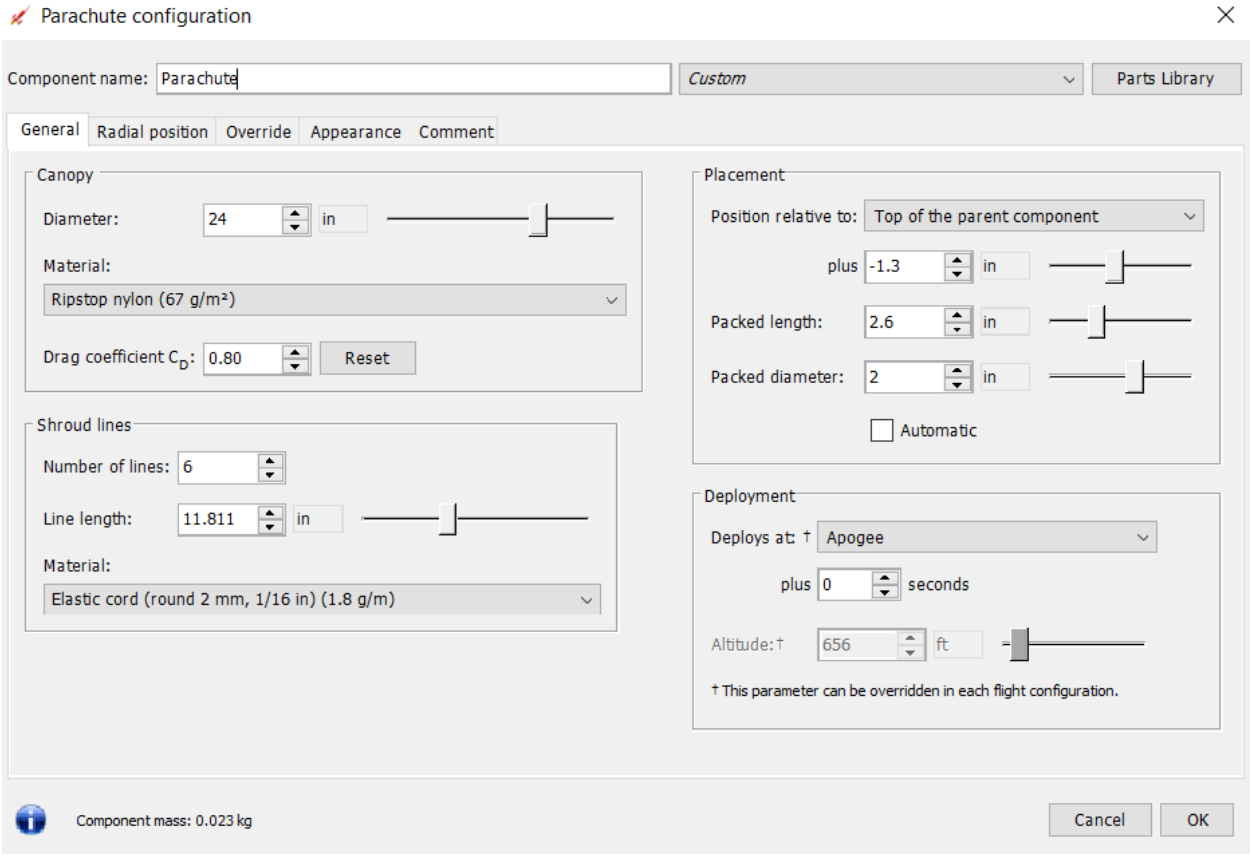


Eyebolts:

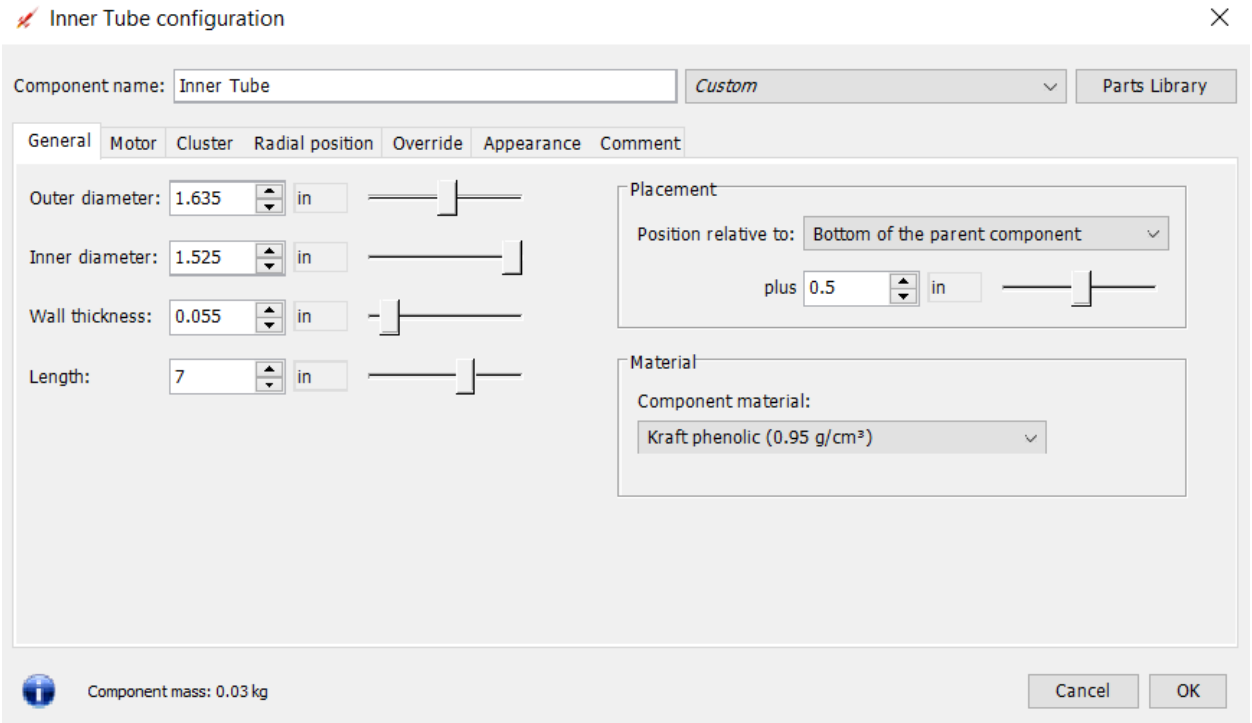

Mass Component configuration
Component name: Eyebolt
General
Radial position
Override
Appearance
Comment
Mass type:
Mass Component
Mass:
0.01
kg
Approximate density:
16.6
g/cm³
Length:
0.75
in
Diameter:
0.25
in
Automatic
Placement
Position relative to:
Top of the parent component
plus
8.75
in
Component mass: 0.01 kg
Cancel
OK


Mass Component configuration
Component name: Eyebolt
General
Radial position
Override
Appearance
Comment
Mass type:
Mass Component
Mass:
0.01
kg
Approximate density:
16.6
g/cm³
Length:
0.75
in
Diameter:
0.25
in
Automatic
Placement
Position relative to:
Top of the parent component
plus
0
in
Component mass: 0.01 kg
Cancel
OK

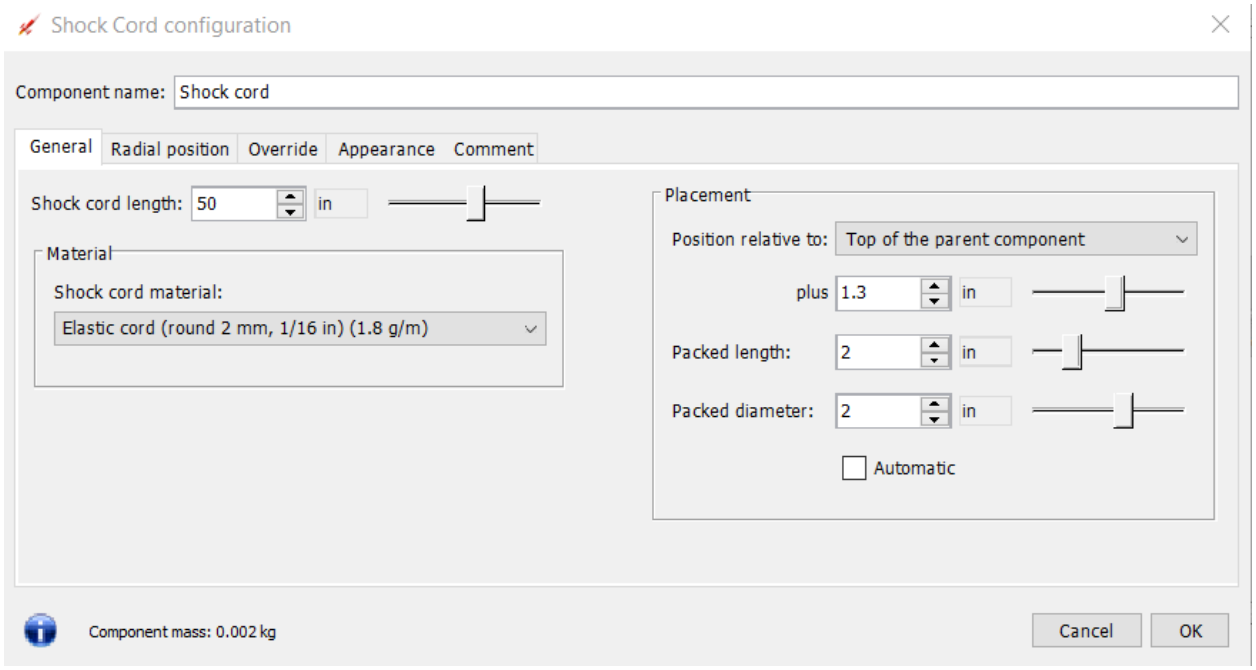
Parachute:

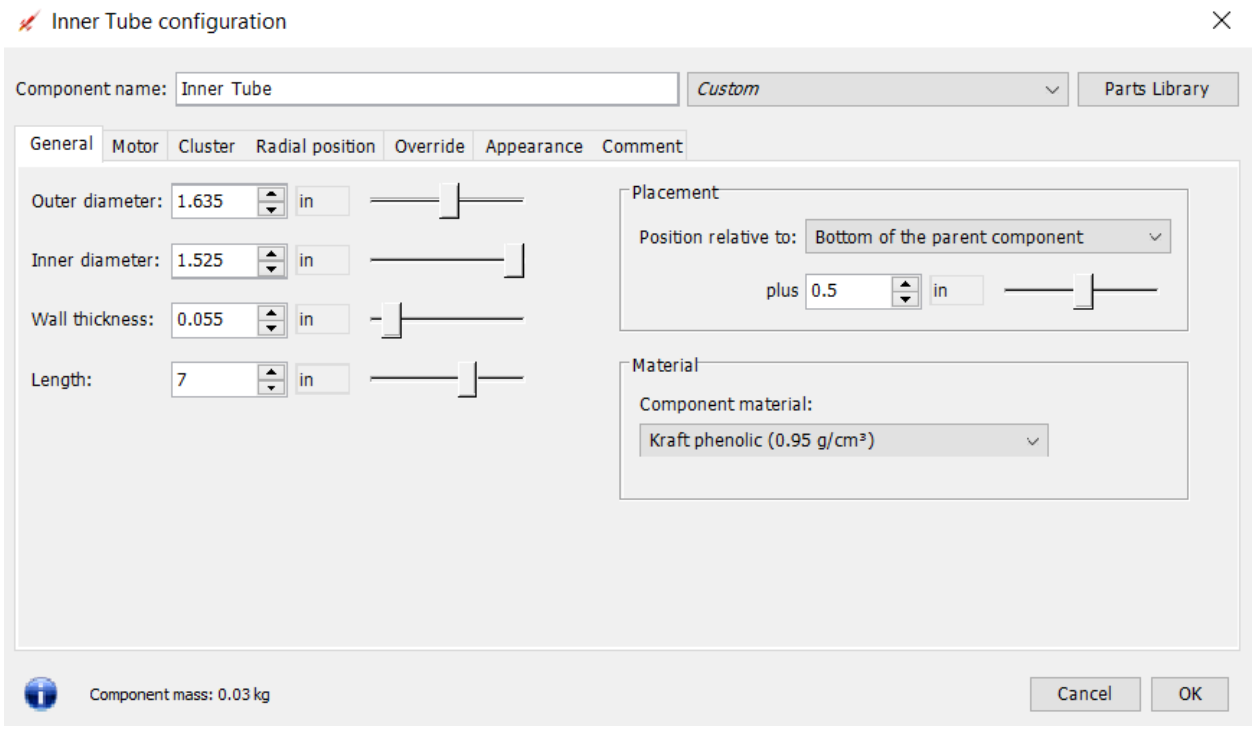


Inner Tube:

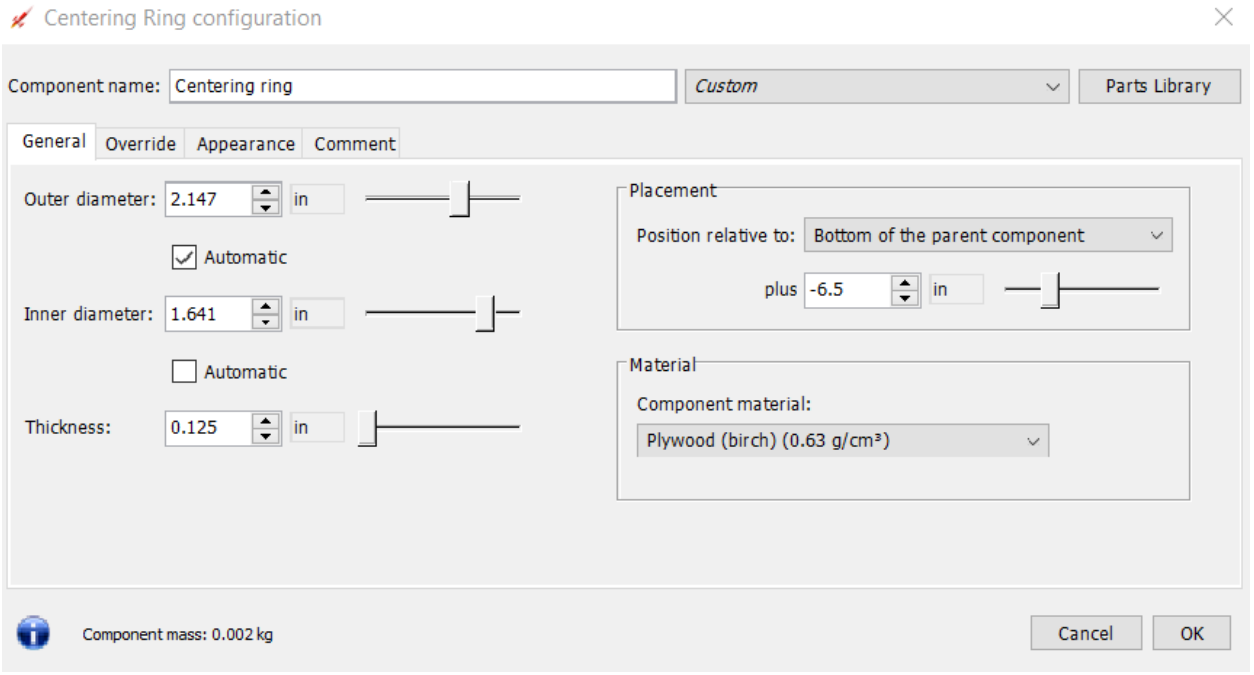


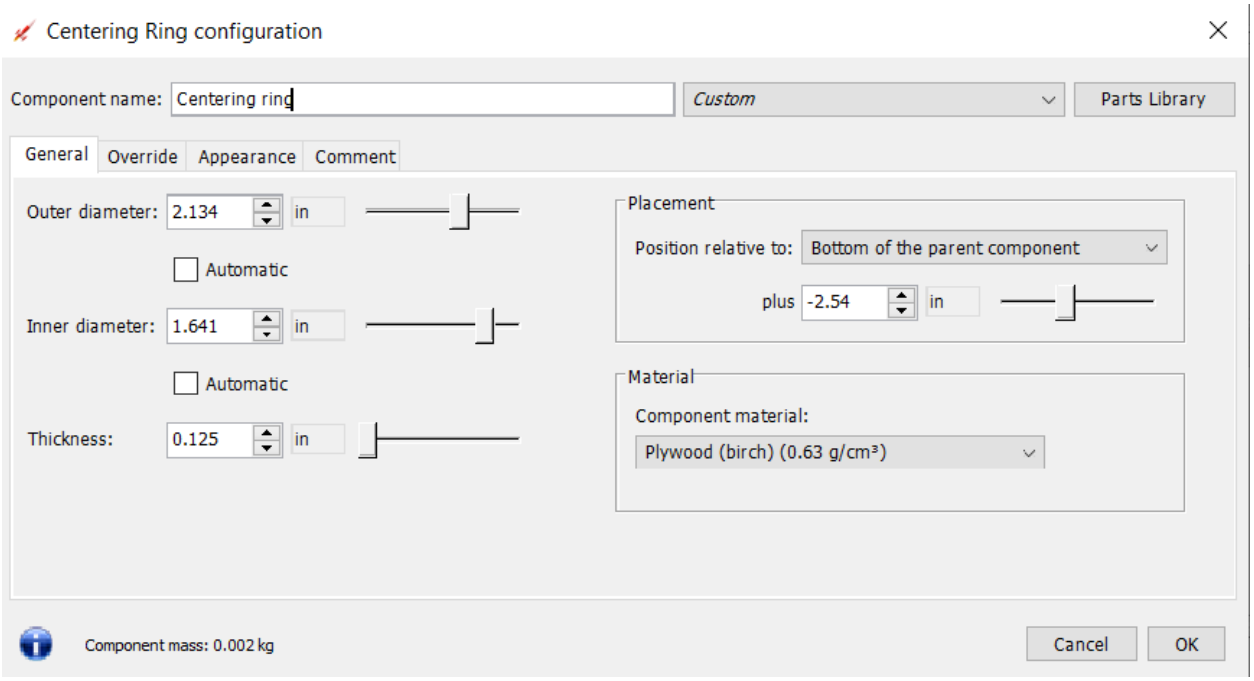
Shock Cords:

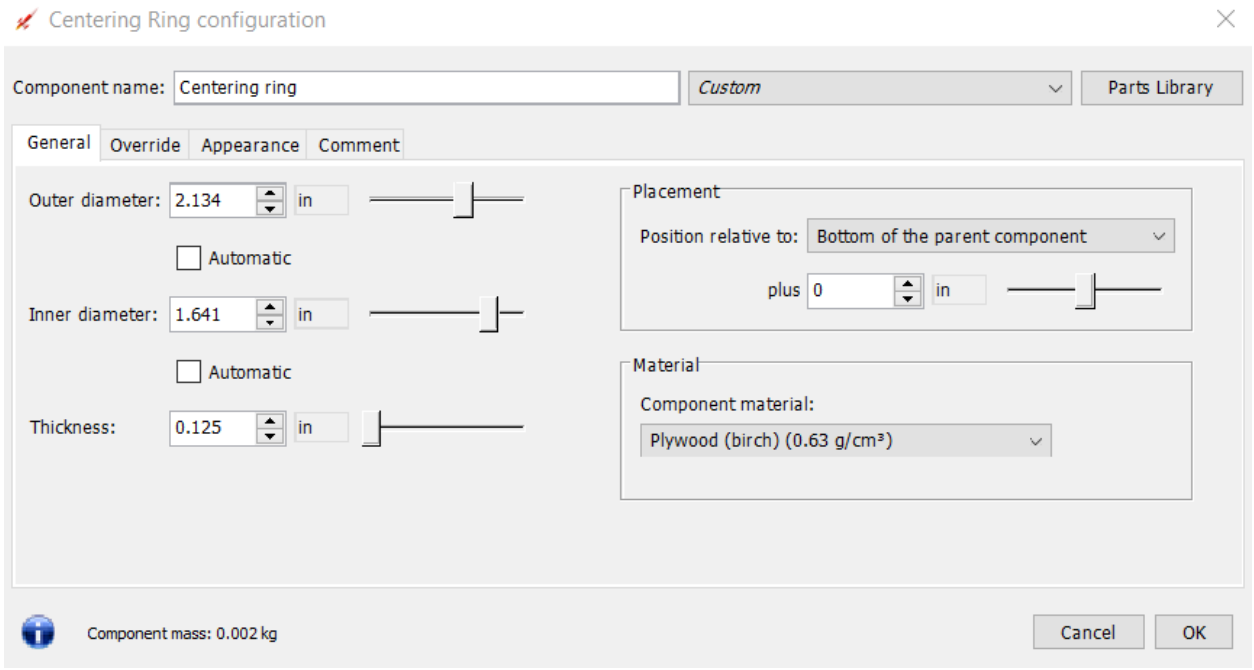

Shock Cord configuration
Component name: Shock cord
General
Radial position
Override
Appearance
Comment
Shock cord length: 50 in
Material
Shock cord material:
Elastic cord (round 2 mm, 1/16 in) (1.8 g/m)
Placement
Position relative to: Top of the parent component
plus 1.3 in
Packed length: 2 in
Packed diameter: 2 in
Automatic
Component mass: 0.002 kg
Cancel
OK


Inner Tube configuration
Component name: Inner Tube
Custom
Parts Library
General
Motor
Cluster
Radial position
Override
Appearance
Comment
Outer diameter: 1.635 in
Inner diameter: 1.525 in
Wall thickness: 0.055 in
Length: 7 in
Placement
Position relative to: Bottom of the parent component
plus 0.5 in
Material
Component material:
Kraft phenolic (0.95 g/cm³)
Component mass: 0.03 kg
Cancel
OK

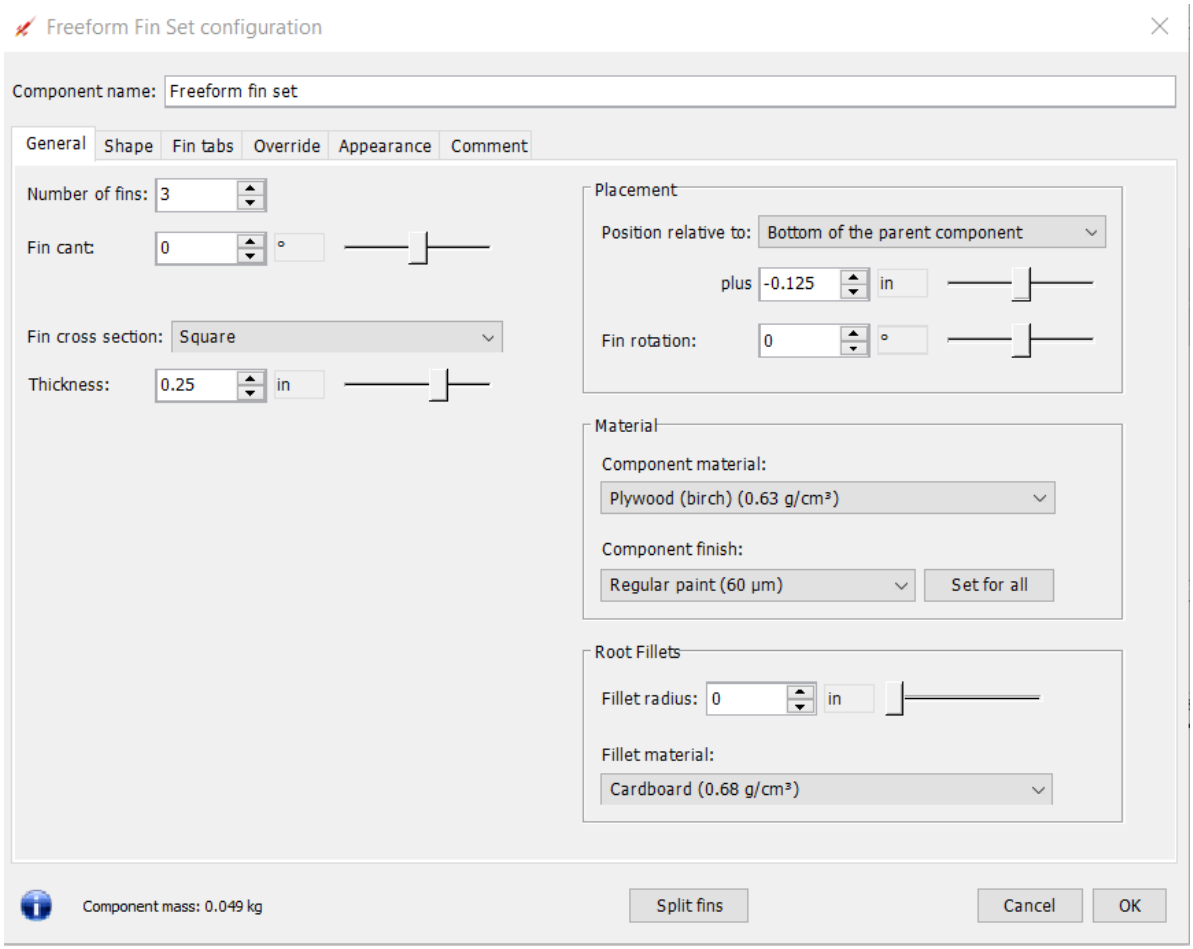
Centering Rings:

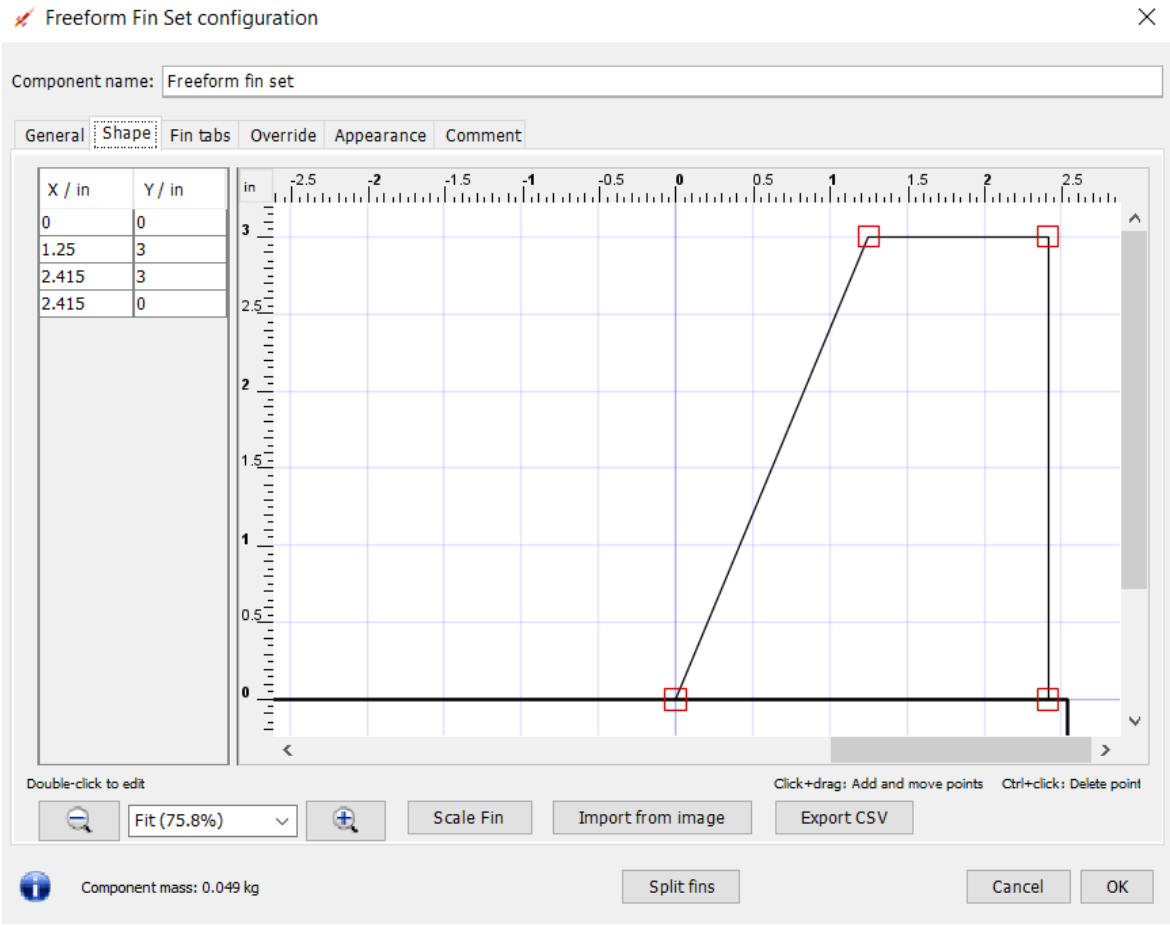


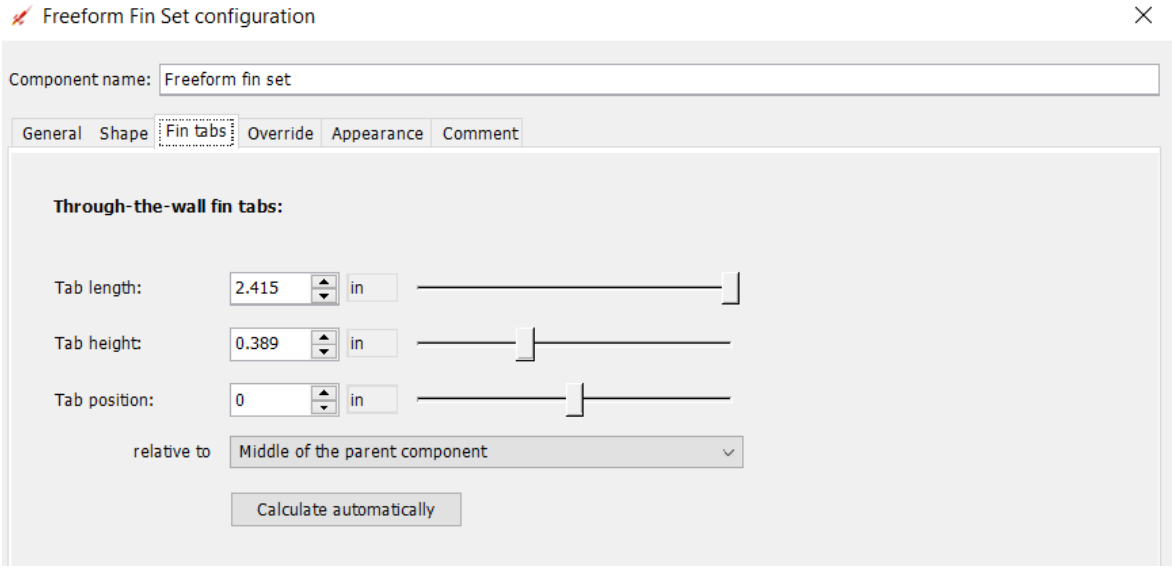



Centering Ring configuration
Component name: Centering ring
Custom
Parts Library
General
Override
Appearance
Comment
Outer diameter: 2.134 in
Automatic
Inner diameter: 1.641 in
Automatic
Thickness: 0.125 in
Placement
Position relative to: Bottom of the parent component
plus 0 in
Material
Component material:
Plywood (birch) (0.63 g/cm³)
Component mass: 0.002 kg
Cancel
OK

Fins:


Freeform Fin Set configuration
Component name: Freeform fin set
General
Shape
Fin tabs
Override
Appearance
Comment
Number of fins: 3
Fin cant: 0 °
Fin cross section: Square
Thickness: 0.25 in
Placement
Position relative to: Bottom of the parent component
plus -0.125 in
Fin rotation: 0 °
Material
Component material:
Plywood (birch) (0.63 g/cm³)
Component finish:
Regular paint (60 µm)
Set for all
Root Fillets
Fillet radius: 0 in
Fillet material:
Cardboard (0.68 g/cm³)
Component mass: 0.049 kg
Split fins
Cancel
OK


Freeform Fin Set configuration
Component name: Freeform fin set
General
Shape
Fin tabs
Override
Appearance
Comment
X / in
Y / in
0
0
1.25
3
2.415
3
2.415
0
Double-click to edit
Click+drag: Add and move points
Ctrl+click: Delete point
Fit (75.8%)
Scale Fin
Import from image
Export CSV
Component mass: 0.049 kg
Split fins
Cancel
OK


Freeform Fin Set configuration
Component name: Freeform fin set
General
Shape
Fin tabs
Override
Appearance
Comment
Through-the-wall fin tabs:
Tab length:
2.415
in
Tab height:
0.389
in
Tab position:
0
in
relative to
Middle of the parent component
Calculate automatically

Motor:

Motor configurations

Configuration	Inner Tube
[H123-0]	H123-0 Automatic

Rail Buttons:

Choose component preset

Filter by text:

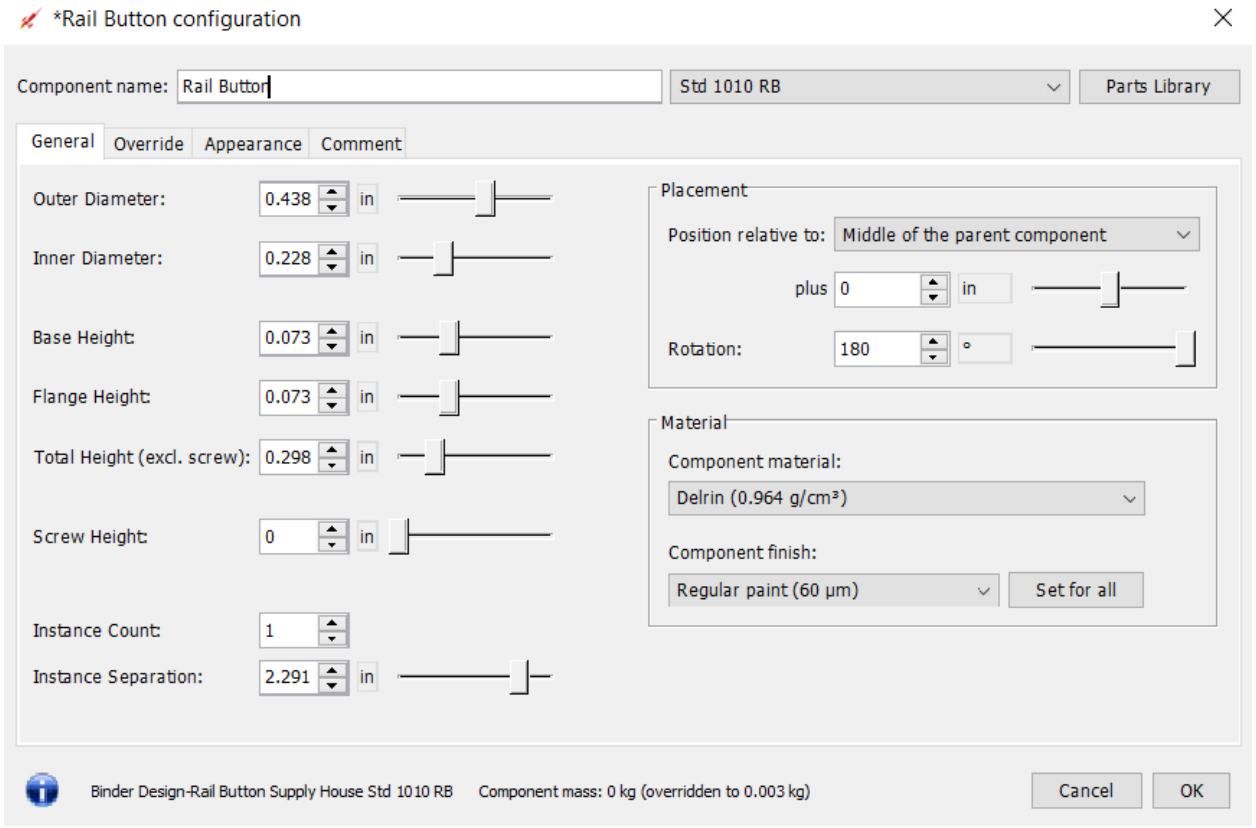
Show Legacy Database

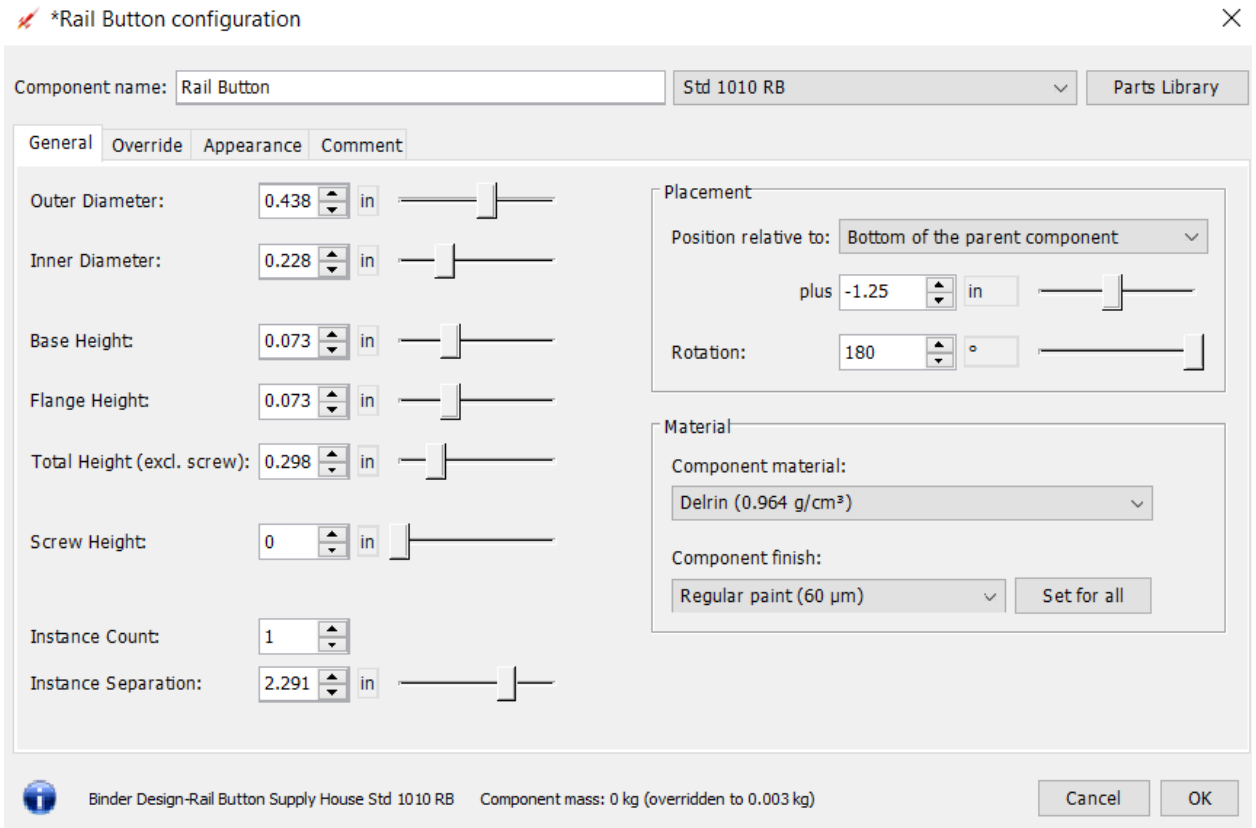
...	Manufacturer	Part Num...	Description	Outer ...	Inner ...	Base ...	Flang...	Screw...	Mass	Screw...	Nut M...
☑	Binder Design-Rail ...	Std 1010 RB	Standard 1010 Rail ...	0.438 in	0.228 in	0.073 in	0.073 in	0 in	0 kg	0.001 kg	0.001 kg
☐	Binder Design-Rail ...	Std 1515 RB	Standard 1515 Rail ...	0.62 in	0.3 in	0.125 in	0.125 in	0 in	0.001 kg	0.003 kg	0.003 kg
☐	Rail-Buttons.com	1P1010DLX	1 Piece 1010 Rail B...	0.372 in	0.248 in	0.078 in	0.078 in	0 in	0 kg	0.001 kg	0 kg
☐	Rail-Buttons.com	1PMB	1 Piece Mini Rail But...	0.249 in	0.193 in	0.038 in	0.038 in	0 in	0 kg	0 kg	0 kg
☐	Rail-Buttons.com	RB-10-D	3 Piece 1010 Rail B...	0.278 in	0.154 in	0.06 in	0.06 in	0.115 in	0 kg	0.002 kg	0 kg
☐	Rail-Buttons.com	RB-Micro	2 Piece Micro Rail B...	0.165 in	0.12 in	0.041 in	0 in	0.047 in	0 kg	0 kg	0 kg
☐	Rail-Buttons.com	RB1515S	1 Piece 1515 Rail B...	0.49 in	0.29 in	0.187 in	0.187 in	0 in	0.001 kg	0.003 kg	0 kg
☐	Wildman Rocketry	2052-LG	1 Piece 1515 Rail B...	0.621 in	0.308 in	0.338 in	0.168 in	0 in	0.003 kg	0.004 kg	0.002 kg

↑ Check to add preset to the preset drop-down menu in the component edit dialog
Directly apply a preset by double-clicking it or by selecting it and closing this window.

☑ Always open this dialog when creating a new Rail Button

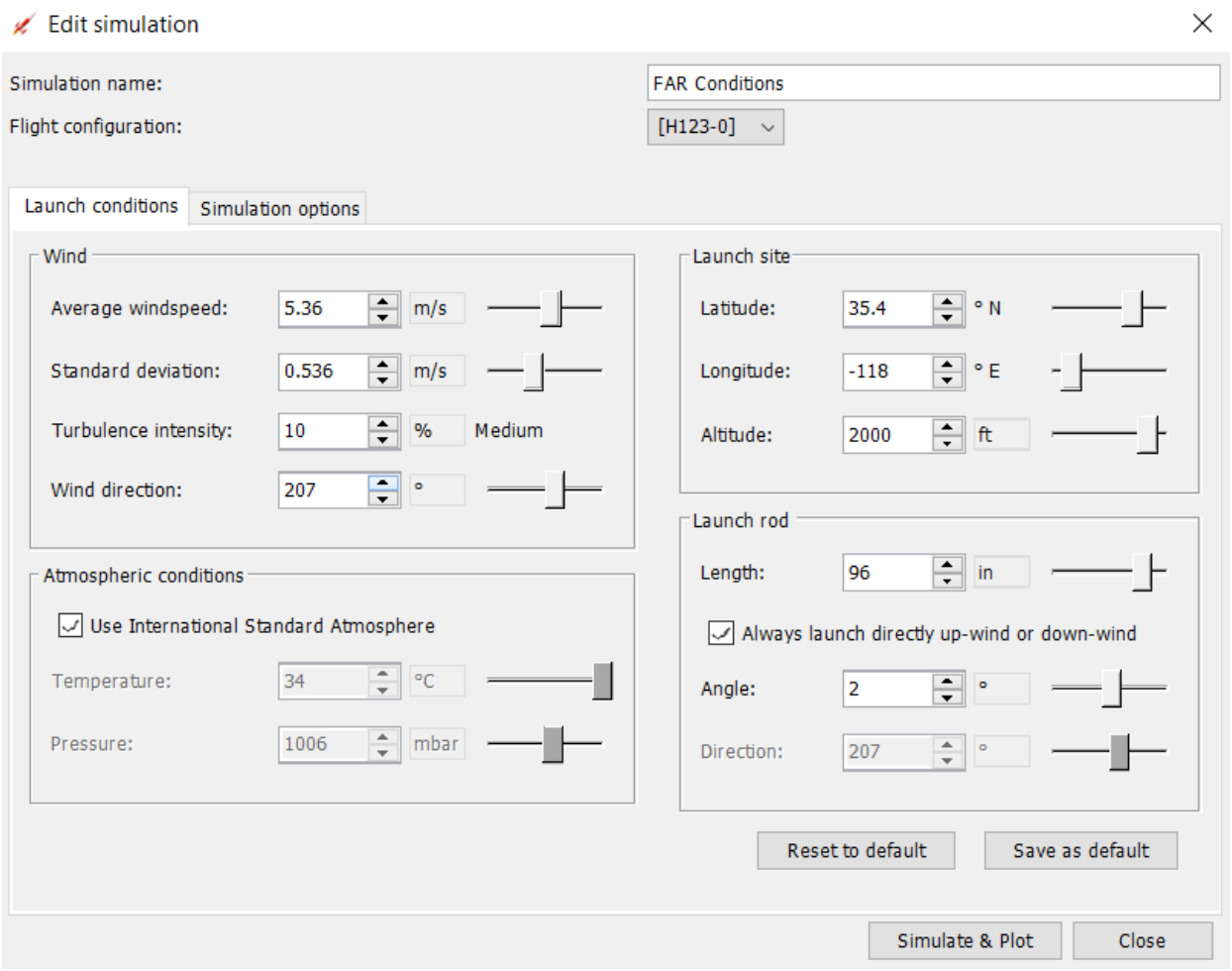
Close


*Rail Button configuration
Component name: Rail Button
Std 1010 RB
Parts Library
General
Override
Appearance
Comment
Outer Diameter: 0.438 in
Inner Diameter: 0.228 in
Base Height: 0.073 in
Flange Height: 0.073 in
Total Height (excl. screw): 0.298 in
Screw Height: 0 in
Instance Count: 1
Instance Separation: 2.291 in
Placement
Position relative to: Middle of the parent component
plus 0 in
Rotation: 180 °
Material
Component material:
Delrin (0.964 g/cm³)
Component finish:
Regular paint (60 µm)
Set for all
Binder Design-Rail Button Supply House Std 1010 RB
Component mass: 0 kg (overridden to 0.003 kg)
Cancel
OK

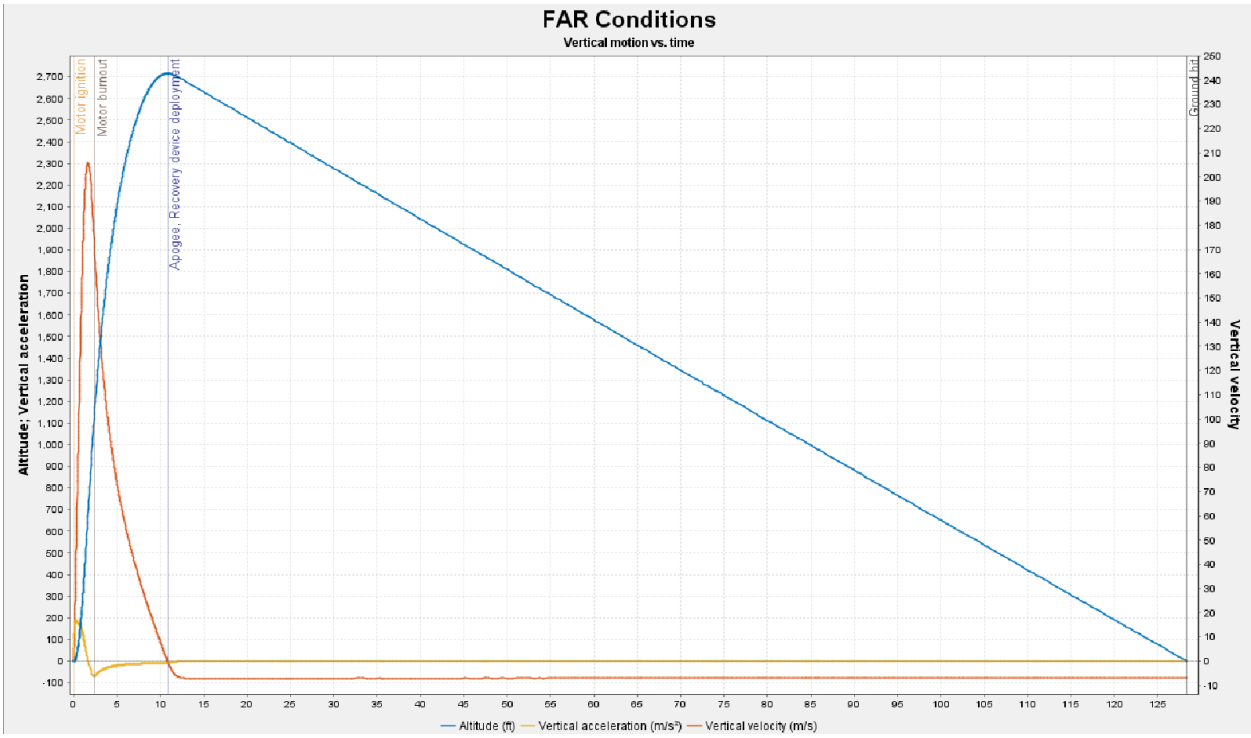

*Rail Button configuration
Component name: Rail Button
Std 1010 RB
Parts Library
General
Override
Appearance
Comment
Outer Diameter: 0.438 in
Inner Diameter: 0.228 in
Base Height: 0.073 in
Flange Height: 0.073 in
Total Height (excl. screw): 0.298 in
Screw Height: 0 in
Instance Count: 1
Instance Separation: 2.291 in
Placement
Position relative to: Bottom of the parent component
plus -1.25 in
Rotation: 180 °
Material
Component material:
Delrin (0.964 g/cm³)
Component finish:
Regular paint (60 µm)
Set for all
Binder Design-Rail Button Supply House Std 1010 RB
Component mass: 0 kg (overridden to 0.003 kg)
Cancel
OK

Simulation

Conditions:



Plot:


FAR Conditions
Vertical motion vs. time
Motor ignition
Motor burnout
Apogee, Recovery device deployment
Ground hit
Altitude; Vertical acceleration
Vertical velocity
Altitude (ft)
Vertical acceleration (m/s²)
Vertical velocity (m/s)