Study Report

Analyzed File	quadcopter_frame
Version	Autodesk Fusion (2603.0.86)
Creation Date	2025-07-18, 11:56:12
Author	Wilson Heath

Report Properties

Title	Studies
Author	wilso

Simulation Model 1

Static Stress Test - Polycarbonate

Study Properties

Study Type	Static Stress
Last Modification Date	2025-07-18, 11:26:19

Settings

General

Contact Tolerance	0.10 mm
Remove Rigid Body Modes	No

Mesh

Average Element Size (% of model size)	
Solids	10
Scale Mesh Size Per Part	No
Average Element Size (absolute value)	-
Element Order	Parabolic
Create Curved Mesh Elements	Yes
Max. Turn Angle on Curves (Deg.)	60
Max. Adjacent Mesh Size Ratio	1.5
Max. Aspect Ratio	10
Minimum Element Size (% of average size)	20

Adaptive Mesh Refinement

Number of Refinement Steps	0
Results Convergence Tolerance (%)	20
Portion of Elements to Refine (%)	10
Results for Baseline Accuracy	von Mises Stress

Materials

Component	Material	Safety Factor
Body1	Polycarbonate, Bronze	Yield Strength

Polycarbonate, Bronze

Density	1.200E-06 kg / mm^3
Young's Modulus	2275.00 MPa
Poisson's Ratio	0.38
Yield Strength	62.01 MPa
Ultimate Tensile Strength	68.90 MPa
Thermal Conductivity	1.370E-04 W / (mm C)
Thermal Expansion Coefficient	6.750E-05 / C
Specific Heat	1256.10 J / (kg C)

Contacts

Mesh

Type	Nodes	Elements
Solids	7087	3287

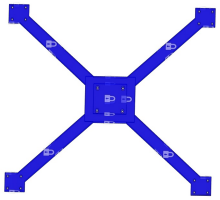
Load Case1

Constraints

Fixed1

Type	Fixed
Ux	Fixed
Uy	Fixed
Uz	Fixed

Selected Entities

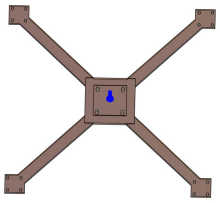


Loads

Gravity

Type	Gravity
Magnitude	9.807 m / s^2
X Value	0.00 m / s^2
Y Value	0.00 m / s^2
Z Value	-9.807 m / s^2

Selected Entities



Results

Result Summary

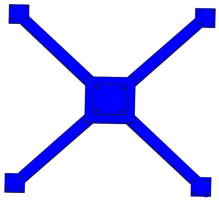
Name	Minimum	Maximum
Safety Factor		
Safety Factor (Per Body)	15.00	15.00
Stress		
von Mises	0.00 MPa	1.845E-05 MPa
1st Principal	-2.143E-05 MPa	3.634E-05 MPa
3rd Principal	-3.752E-05 MPa	1.975E-05 MPa
Normal XX	-2.236E-05 MPa	2.136E-05 MPa
Normal YY	-2.225E-05 MPa	2.117E-05 MPa
Normal ZZ	-3.644E-05 MPa	3.630E-05 MPa
Shear XY	-3.672E-06 MPa	3.430E-06 MPa
Shear YZ	-7.005E-06 MPa	5.329E-06 MPa
Shear ZX	-5.239E-06 MPa	6.527E-06 MPa
Displacement		
Total	0.00 mm	1.936E-08 mm
X	-3.832E-09 mm	4.187E-09 mm
Y	-3.689E-09 mm	4.308E-09 mm
Z	-1.936E-08 mm	0.00 mm
Reaction Force		
Total	0.00 N	4.285E-04 N
X	-3.417E-05 N	3.430E-05 N
Y	-3.522E-05 N	4.030E-05 N
Z	-3.371E-05 N	4.285E-04 N
Strain		
Equivalent	0.00	1.161E-08
1st Principal	0.00	1.308E-08
3rd Principal	-1.148E-08	0.00
Normal XX	-3.817E-09	4.183E-09
Normal YY	-4.456E-09	2.327E-09
Normal ZZ	-8.614E-09	9.285E-09
Shear XY	-4.455E-09	4.161E-09
Shear YZ	-8.499E-09	6.464E-09
Shear ZX	-6.356E-09	7.919E-09
Contact Force		

Total	0.00 N	0.00 N
X	0.00 N	0.00 N
Y	0.00 N	0.00 N
Z	0.00 N	0.00 N

Safety Factor

Safety Factor (Per Body)

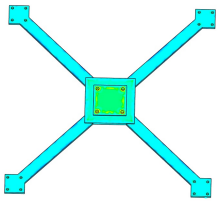
0.00 8.00



Stress

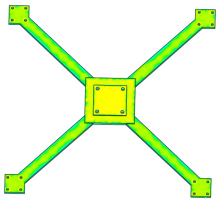
von Mises

[MPa] 0.00E-05 1.845E-05



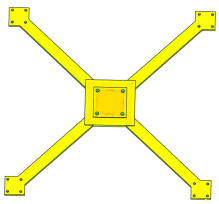
1st Principal

[MPa] -2.143E-05 3.634E-05



3rd Principal

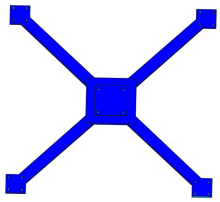
[MPa] -3.752E-05 1.975E-05



Displacement

Total

[mm] 0.00E-08 1.936E-08



Study 3 - Hover Load

Study Properties

Study Type	Static Stress
Last Modification Date	2025-07-18, 11:52:14

Settings

General

Contact Tolerance	0.10 mm
Remove Rigid Body Modes	No

Mesh

Average Element Size (% of model size)	
Solids	10
Scale Mesh Size Per Part	No
Average Element Size (absolute value)	-
Element Order	Parabolic
Create Curved Mesh Elements	Yes
Max. Turn Angle on Curves (Deg.)	60
Max. Adjacent Mesh Size Ratio	1.5
Max. Aspect Ratio	10
Minimum Element Size (% of average size)	20

Adaptive Mesh Refinement

Number of Refinement Steps	0
Results Convergence Tolerance (%)	20
Portion of Elements to Refine (%)	10
Results for Baseline Accuracy	von Mises Stress

Materials

Component	Material	Safety Factor
Body1	Polycarbonate, Bronze	Yield Strength

Polycarbonate, Bronze

Density	1.200E-06 kg / mm^3
Young's Modulus	2275.00 MPa
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Yield Strength	62.01 MPa
Ultimate Tensile Strength	68.90 MPa
Thermal Conductivity	1.370E-04 W / (mm C)
Thermal Expansion Coefficient	6.750E-05 / C
Specific Heat	1256.10 J / (kg C)

Contacts

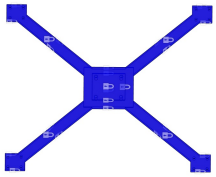
Load Case1

Constraints

Fixed1

Type	Fixed
Ux	Fixed
Uy	Fixed
Uz	Fixed

Selected Entities

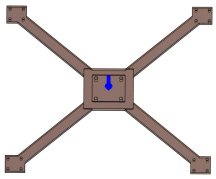


Loads

Gravity

Type	Gravity
Magnitude	9.807 m / s^2
X Value	0.00 m / s^2
Y Value	0.00 m / s^2
Z Value	-9.807 m / s^2

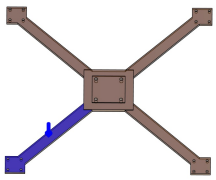
Selected Entities



Force1

Type	Force
Magnitude	0.309 N
X Value	0.00 N
Y Value	0.00 N
Z Value	-0.309 N
Force Per Entity	No

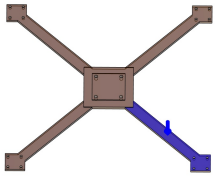
Selected Entities



Force2

Type	Force
Magnitude	0.309 N
X Value	0.00 N
Y Value	0.00 N
Z Value	-0.309 N
Force Per Entity	No

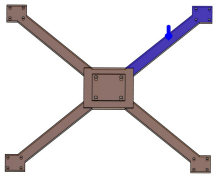
Selected Entities



Force3

Type	Force
Magnitude	0.309 N
X Value	0.00 N
Y Value	0.00 N
Z Value	-0.309 N
Force Per Entity	No

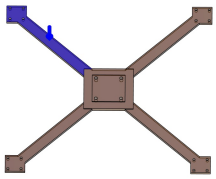
Selected Entities



Force4

Type	Force
Magnitude	0.309 N
X Value	0.00 N
Y Value	0.00 N
Z Value	-0.309 N
Force Per Entity	No

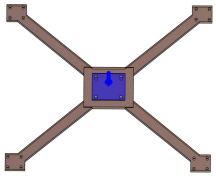
Selected Entities



Force5

Type	Force
Magnitude	2.18 N
X Value	0.00 N
Y Value	0.00 N
Z Value	-2.18 N
Force Per Entity	No

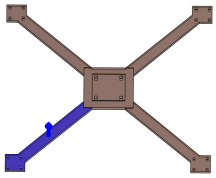
Selected Entities



Force6

Type	Force
Magnitude	0.931 N
X Value	0.00 N
Y Value	0.00 N
Z Value	0.931 N
Flip Direction	Yes
Force Per Entity	No

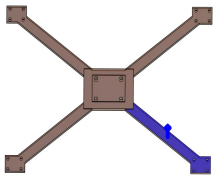
Selected Entities



Force7

Type	Force
Magnitude	0.931 N
X Value	0.00 N
Y Value	0.00 N
Z Value	0.931 N
Flip Direction	Yes
Force Per Entity	No

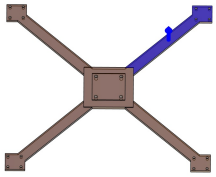
Selected Entities



Force8

Type	Force
Magnitude	0.931 N
X Value	0.00 N
Y Value	0.00 N
Z Value	0.931 N
Flip Direction	Yes
Force Per Entity	No

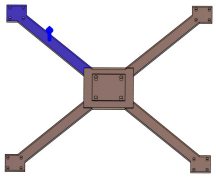
Selected Entities



Force9

Type	Force
Magnitude	0.931 N
X Value	0.00 N
Y Value	0.00 N
Z Value	0.931 N
Flip Direction	Yes
Force Per Entity	No

Selected Entities



Results

Result Summary

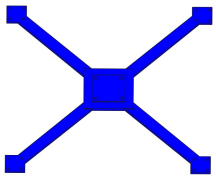
Name	Minimum	Maximum
Safety Factor		
Safety Factor (Per Body)	15.00	15.00
Stress		
von Mises	0.00 MPa	1.612E-05 MPa
1st Principal	-1.426E-05 MPa	2.843E-05 MPa
3rd Principal	-2.376E-05 MPa	1.690E-05 MPa
Normal XX	-1.433E-05 MPa	1.691E-05 MPa
Normal YY	-1.424E-05 MPa	1.722E-05 MPa
Normal ZZ	-2.375E-05 MPa	2.843E-05 MPa
Shear XY	-1.788E-06 MPa	2.118E-06 MPa
Shear YZ	-5.059E-06 MPa	4.540E-06 MPa
Shear ZX	-8.490E-06 MPa	7.401E-06 MPa
Displacement		
Total	0.00 mm	1.312E-08 mm
X	-1.466E-09 mm	1.450E-09 mm
Y	-1.420E-09 mm	1.330E-09 mm
Z	-1.310E-08 mm	0.00 mm
Reaction Force		
Total	0.00 N	0.016 N
X	-3.416E-05 N	3.429E-05 N
Y	-3.532E-05 N	4.030E-05 N
Z	-0.008 N	0.016 N
Strain		
Equivalent	0.00	1.283E-08
1st Principal	0.00	1.026E-08
3rd Principal	-1.188E-08	0.00
Normal XX	-2.224E-09	1.409E-09
Normal YY	-1.610E-09	1.303E-09
Normal ZZ	-5.676E-09	6.795E-09
Shear XY	-2.169E-09	2.569E-09
Shear YZ	-6.137E-09	5.507E-09
Shear ZX	-1.030E-08	8.979E-09
Contact Force		

Total	0.00 N	0.00 N
X	0.00 N	0.00 N
Y	0.00 N	0.00 N
Z	0.00 N	0.00 N

Safety Factor

Safety Factor (Per Body)

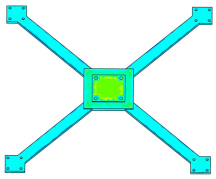
0.00 8.00



Stress

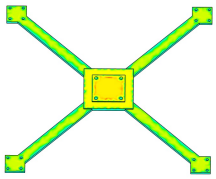
von Mises

[MPa] 0.00E-05 1.612E-05



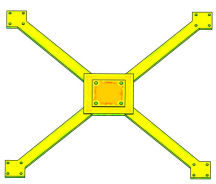
1st Principal

[MPa] -1.426E-05 2.843E-05



3rd Principal

[MPa] -2.376E-05 1.69E-05



Displacement

Total


[mm] 0.00E-08
1.312E-08