

Study Report



Analyzed File	Axis 5 v2
Version	Autodesk Fusion 360 (2.0.8609)
Creation Date	2020-07-01, 14:19:18
Author	Grędys Przemysław

Project Properties

Title	Studies
Author	Maciej

Simulation Model 1:1

Study 1 - Static Stress

Study Properties

Study Type	Static Stress
Last Modification Date	2020-07-01, 12:45:29

Settings

General

Contact Tolerance	0.1 mm
Remove Rigid Body Modes	No

☐ **Damping**

☐ **Mesh**

Average Element Size (% of model size)	
Solids	2
Scale Mesh Size Per Part	Yes
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	6
Results Convergence Tolerance (%)	5
Portion of Elements to Refine (%)	40
Results for Baseline Accuracy	Von Mises Stress

☐ **Materials**

Component	Material	Safety Factor
LEGO_44294 v2:1	ABS Plastic	Yield Strength
LEGO_3648(gear 24) v2:1	ABS Plastic	Yield Strength
LEGO_(axle triple pin) v2:1	ABS Plastic	Yield Strength
LEGO_(axle triple pin) v2:2	ABS Plastic	Yield Strength
LEGO_4019(gear 16) v2:1	ABS Plastic	Yield Strength

☐ **ABS Plastic**

Density	1.06E-06 kg / mm ³
Young's Modulus	2240 MPa
Poisson's Ratio	0.38
Yield Strength	20 MPa
Ultimate Tensile Strength	29.6 MPa
Thermal Conductivity	1.6E-04 W / (mm C)
Thermal Expansion Coefficient	8.57E-05 / C
Specific Heat	1500 J / (kg C)

☐ **Contacts**

☐ **Bonded**

Name
[S] Bonded1 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded2 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded3 [LEGO_44294 v2:1 LEGO_3648(gear 24) v2:1]
[S] Bonded4 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded5 [LEGO_44294 v2:1 LEGO_(axle triple pin) v2:2]
[S] Bonded6 [LEGO_44294 v2:1 LEGO_(axle triple pin) v2:1]
[S] Bonded7 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded8 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded9 [LEGO_44294 v2:1 LEGO_3648(gear 24) v2:1]
[S] Bonded10 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded11 [LEGO_44294 v2:1 LEGO_(axle triple pin) v2:2]
[S] Bonded12 [LEGO_44294 v2:1 LEGO_(axle triple pin) v2:1]
[S] Bonded13 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded14 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded15 [LEGO_44294 v2:1 LEGO_3648(gear 24) v2:1]
[S] Bonded16 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded17 [LEGO_44294 v2:1 LEGO_(axle triple pin) v2:2]
[S] Bonded18 [LEGO_44294 v2:1 LEGO_(axle triple pin) v2:1]
[S] Bonded19 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded20 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded21 [LEGO_44294 v2:1 LEGO_3648(gear 24) v2:1]
[S] Bonded22 [LEGO_44294 v2:1 LEGO_4019(gear 16) v2:1]
[S] Bonded23 [LEGO_44294 v2:1 LEGO_(axle triple pin) v2:2]
[S] Bonded24 [LEGO_44294 v2:1 LEGO_(axle triple pin) v2:1]

☐ **Mesh**

Type	Nodes	Elements
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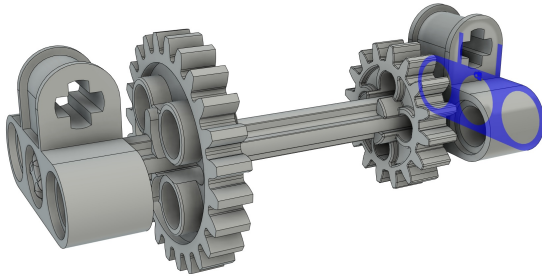
[-] **Load Case1**

[-] **Constraints**

[-] **Fixed1**

Type	Fixed
Ux	Yes
Uy	Yes
Uz	Yes

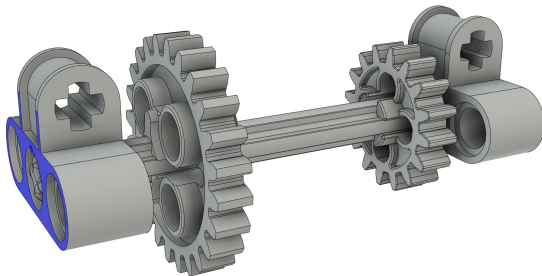
[-] **Selected Entities**



[-] **Fixed2**

Type	Fixed
Ux	Yes
Uy	Yes
Uz	Yes

[-] **Selected Entities**

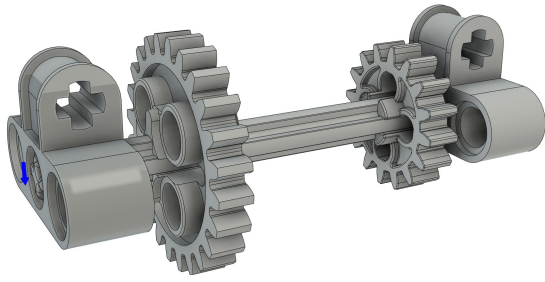


[-] **Loads**

[-] **Gravity**

Type	Gravity
Magnitude	9.807 m / s ²
X Value	0 m / s ²
Y Value	0 m / s ²
Z Value	-9.807 m / s ²

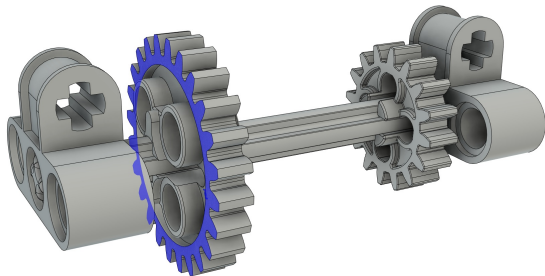
[-] **Selected Entities**



☐ **Moment7**

Type	Moment
Magnitude	375 N mm
X Value	375 N mm
Y Value	5.18E-14 N mm
Z Value	3.811E-14 N mm

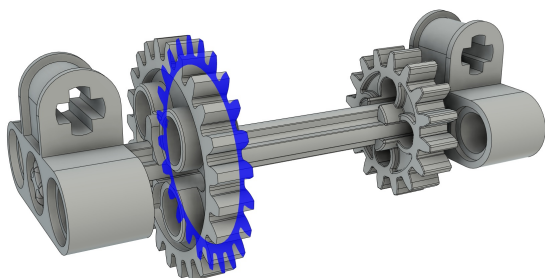
☐ **Selected Entities**



☐ **Moment8**

Type	Moment
Magnitude	375 N mm
X Value	-375 N mm
Y Value	-5.18E-14 N mm
Z Value	-3.811E-14 N mm

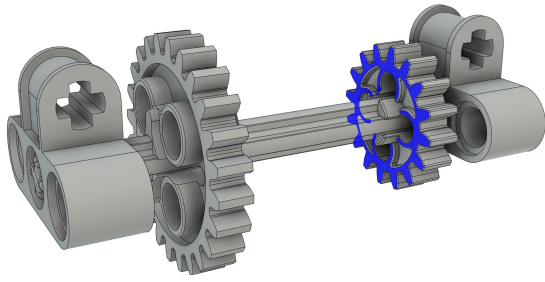
☐ **Selected Entities**



☐ **Moment9**

Type	Moment
Magnitude	-375 N mm
X Value	-375 N mm
Y Value	-5.768E-14 N mm
Z Value	-2.444E-15 N mm

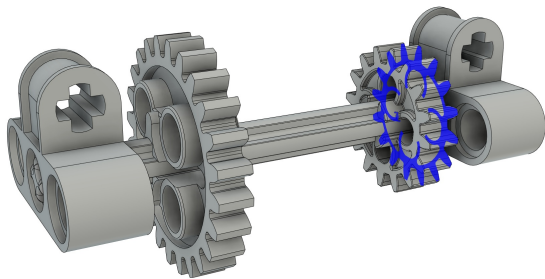
☐ **Selected Entities**



☐ **Moment10**

Type	Moment
Magnitude	-375 N mm
X Value	375 N mm
Y Value	5.768E-14 N mm
Z Value	2.444E-15 N mm

☐ **Selected Entities**



☐ **Results**

☐ **Result Summary**

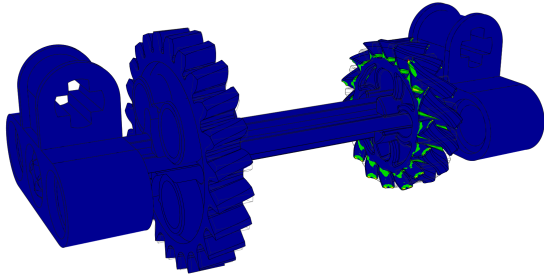
Name	Minimum	Maximum
Safety Factor		
Safety Factor (Per Body)	0.2809	15
Stress		
Von Mises	1.58E-06 MPa	71.19 MPa
1st Principal	-5.526 MPa	47.61 MPa
3rd Principal	-76.29 MPa	5.787 MPa
Normal XX	-10.53 MPa	9.782 MPa
Normal YY	-34.73 MPa	32.04 MPa
Normal ZZ	-47.53 MPa	24.09 MPa
Shear XY	-22.5 MPa	29.31 MPa
Shear YZ	-20.33 MPa	15.33 MPa
Shear ZX	-27.67 MPa	10.77 MPa
Displacement		
Total	0 mm	0.01281 mm
X	-0.003054 mm	0.00304 mm
Y	-0.00911 mm	0.01177 mm
Z	-0.00902 mm	0.009969 mm
Reaction Force		
Total	0 N	1.966E-04 N
X	-1.902E-04 N	1.789E-04 N
Y	-7.972E-05 N	9.249E-05 N
Z	-2.039E-05 N	9.222E-05 N
Strain		
Equivalent	1.394E-09	0.05551
1st Principal	-3.203E-07	0.04111
3rd Principal	-0.0561	-6.963E-10
Normal XX	-0.004218	0.009409
Normal YY	-0.007869	0.01061
Normal ZZ	-0.0136	0.009279
Shear XY	-0.02773	0.03612
Shear YZ	-0.02505	0.01889

Shear ZX	-0.0341	0.01327
Contact Pressure		
Total	0 MPa	0.5224 MPa
X	-0.35 MPa	0.3551 MPa
Y	-0.4337 MPa	0.4624 MPa
Z	-0.43 MPa	0.4574 MPa

☐ **Safety Factor**

☐ **Safety Factor (Per Body)**

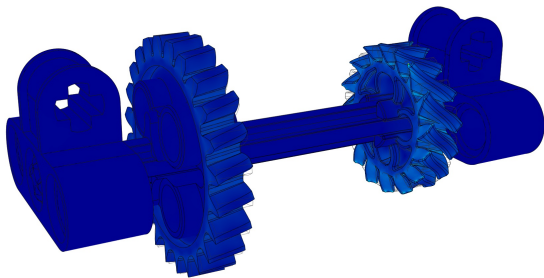
0  8



☐ **Stress**

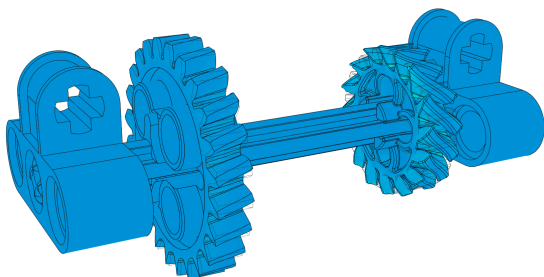
☐ **Von Mises**

[MPa] 0  71.19



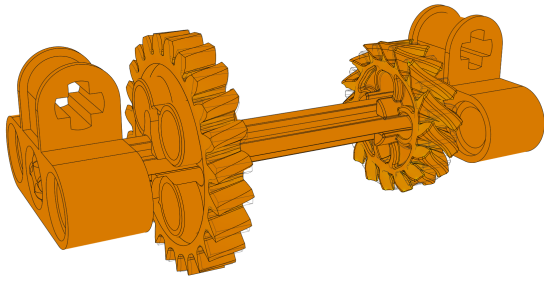
☐ **1st Principal**

[MPa] -5.53  47.61



☐ **3rd Principal**

[MPa] -76.29  5.79



Displacement

Total

[mm] 0  0.01281

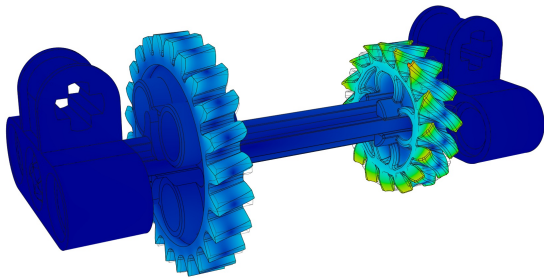


Image Width (pixels):