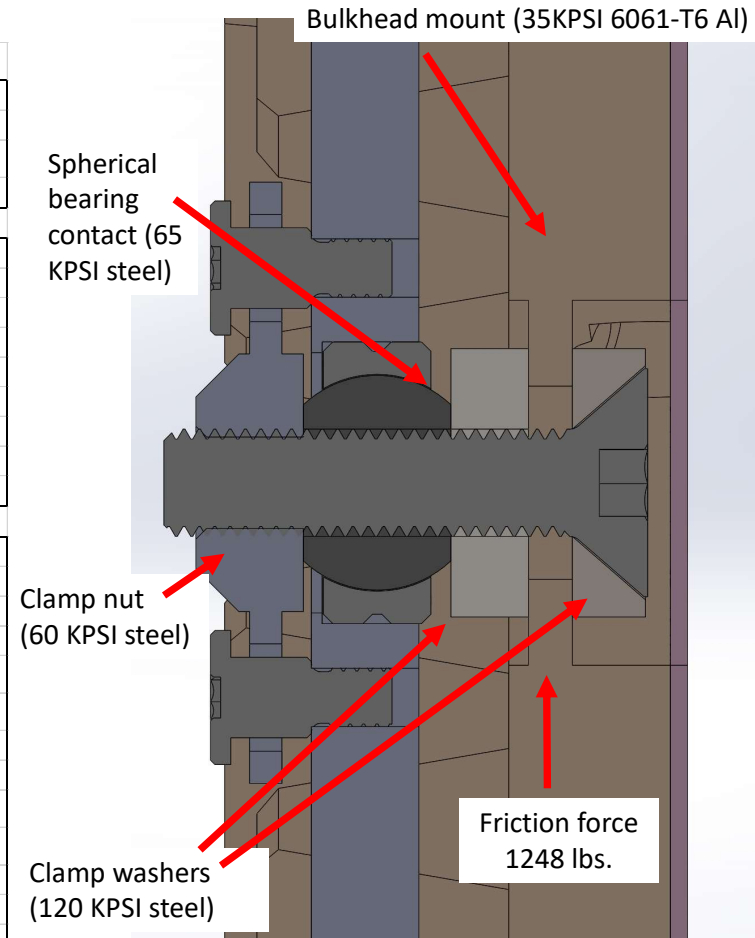


Chassis Rear Clamp Design Values

Rear Chassis Design Calculations			mrc 12/02/2020		
Constants					
Steel alloy screw size	1/4"-28		6061-T6 Yield	35,000	p.s.i.
Tightening torque (lubed)	28.75	in. lbs.*	Al vs Steel Friction coefficient	0.61	μ s
Clamp load (37% of grade 2 proof)	1023	lbs.**	440C Stainless Steel Yield (annealed)	65,000	p.s.i.
Rear chassis steel on Al contact clamp force			Spherical bearing surface steel on steel contact force		
Hole Diameter	0.45	inches	Hole diameter	0.250	inches
Hole Area	0.159	sq. inches	Hole Area	0.049	sq. inches
Washer diameter	0.625	inches	Bearing contact surface dia.	0.3638	inches
Washer Area	0.307	sq. inches	Bearing contact surface area	0.104	sq. inches
Surface area of overlap	0.148	sq. inches	Surface area of overlap	0.055	sq. inches
Clamp stress in p.s.i. on surface (well below aluminum yield point)	6924	p.s.i	Clamp stress in p.s.i. on surface (below steel yield point)	18647	p.s.i
Washer friction force			Screw clamp loss of force over temperature TCE difference		
$F_f = \mu s \times N$			Assembly to cold temp. Δ	-20	°C
Where:			TCE 6061T6	2.38E-05	cm/cm**C
F_f = Frictional force			TCE high strength steel	1.01E-05	cm/cm**C
μ s = Static frictional coefficient	0.61	μ s	Steel modulus	30,000	kpsi
N = Normal force between surfaces	1023	lbs.	Aluminum modulus	10,000	kpsi
Clamp friction force			Screw length in tension	0.704	inches
A washer F_f =	624.03	lbs.	Aluminum length	0.1025	inches
A&B washers F_f =	1248.06	lbs.	Change in aluminum length	-1.921E-06	inches
(clamp friction force is >60x chassis weight)			Change in equiv. steel length	-8.152E-07	inches
			Length difference over temp.	-1.106E-06	inches
			Change in clamp force	-47.12	lbs. (~ <4%)
*https://elginfasteners.com/resources/standard-and-specialty-fastener-material-strengths-part-1/					
** Screw is actually 120 KPSI alloy screw and can be tightened significantly more. Torque and clamp force is derated to provide over 300% material stress margin while providing 1250 lbs. of shear friction.					



Rear Clamp Cross-Section