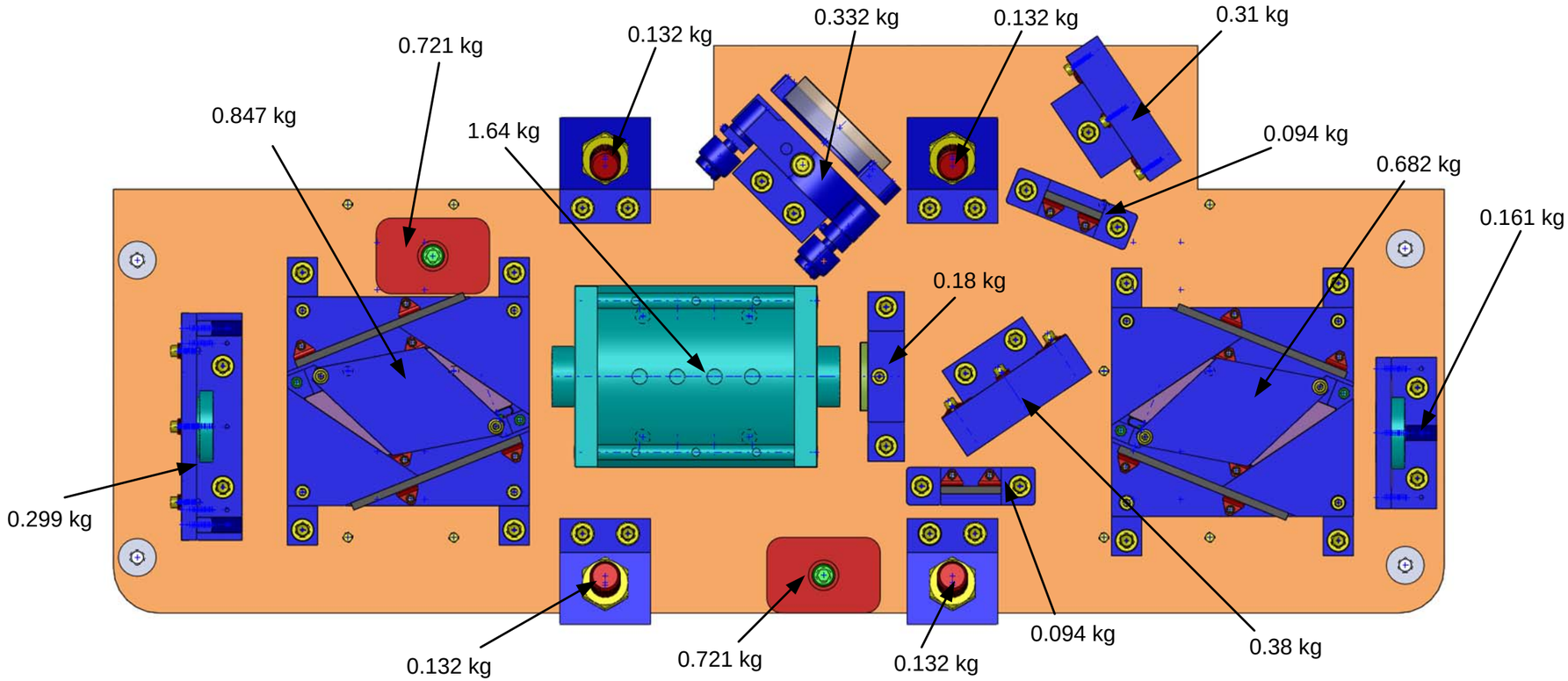
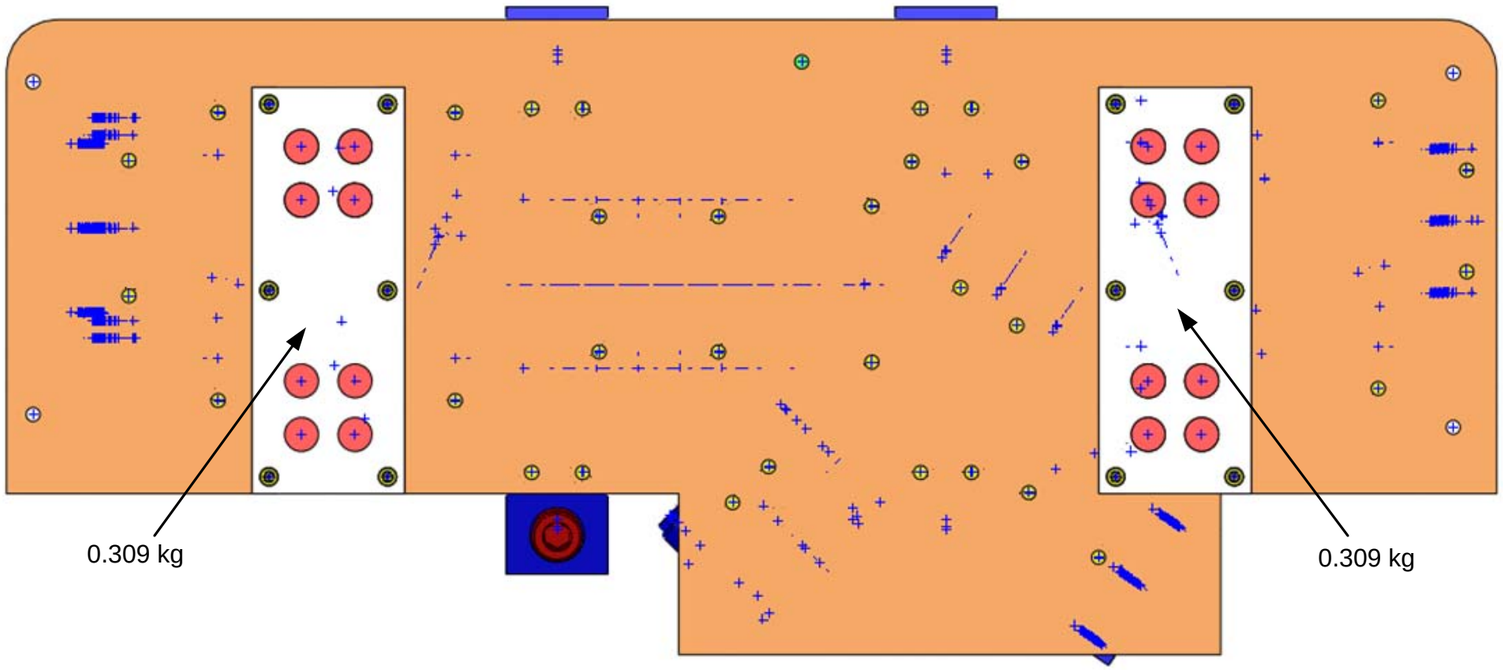
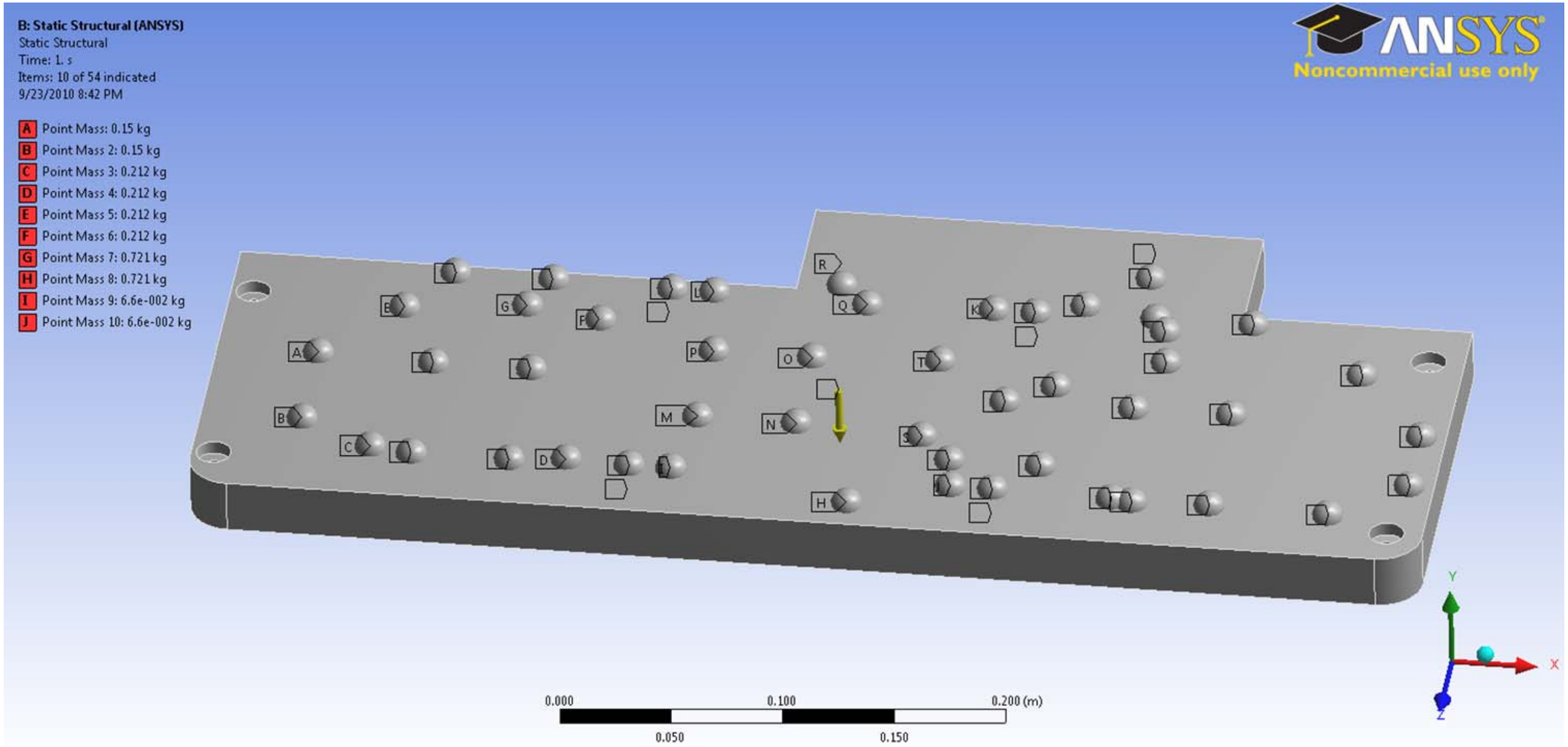
LIGO-T1000558-v1

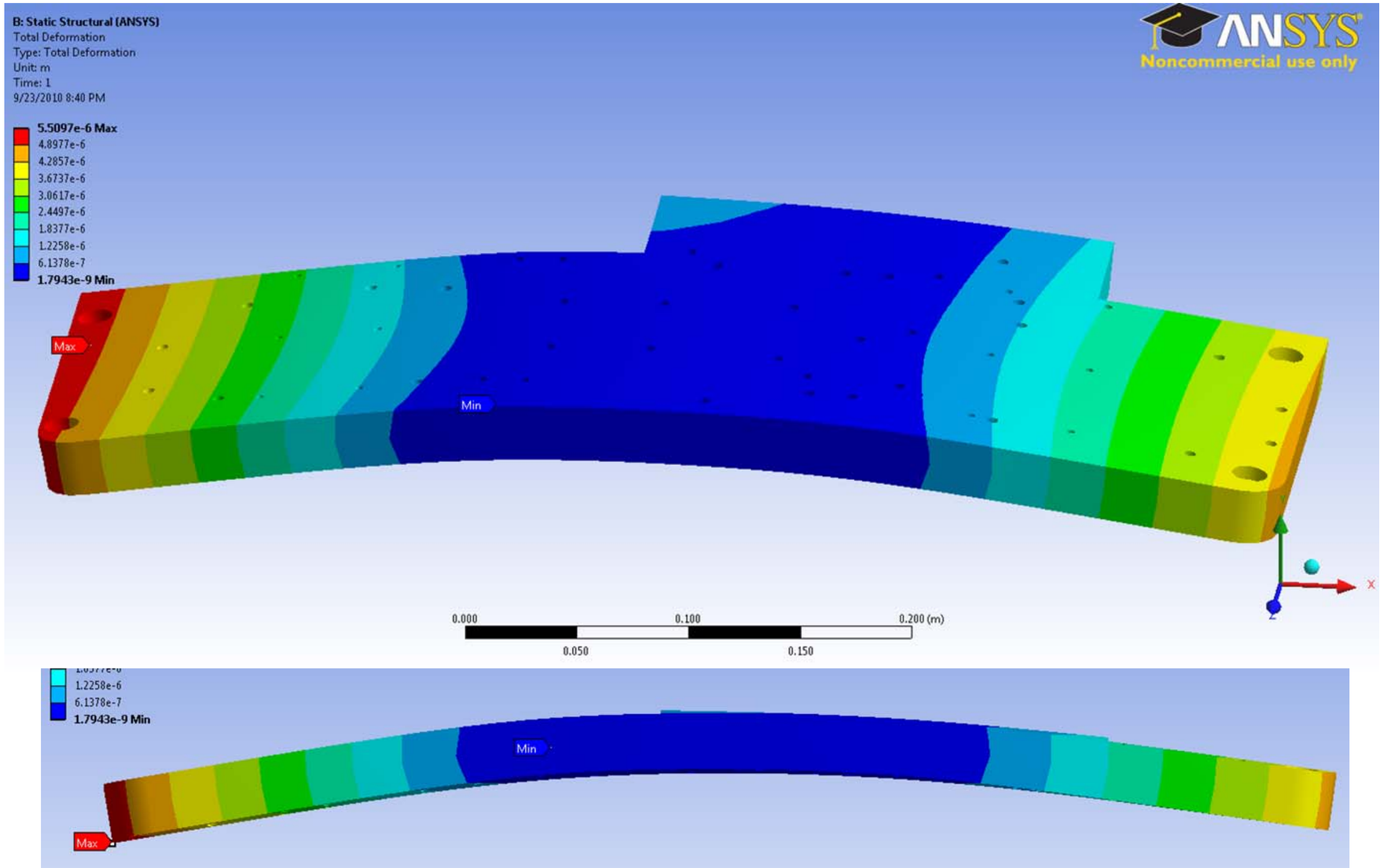




Total Mass of Payload Elements on the Table = 7.939 kg

Sum of mass break down = 7.607 (4% lower) due to not accounting for all fasteners


B: Static Structural (ANSYS)
Static Structural
Time: 1. s
Items: 10 of 54 indicated
9/23/2010 8:42 PM
A Point Mass: 0.15 kg
B Point Mass 2: 0.15 kg
C Point Mass 3: 0.212 kg
D Point Mass 4: 0.212 kg
E Point Mass 5: 0.212 kg
F Point Mass 6: 0.212 kg
G Point Mass 7: 0.721 kg
H Point Mass 8: 0.721 kg
I Point Mass 9: 6.6e-002 kg
J Point Mass 10: 6.6e-002 kg
ANSYS
Noncommercial use only
0.000
0.100
0.200 (m)
0.050
0.150
Y
X
Z

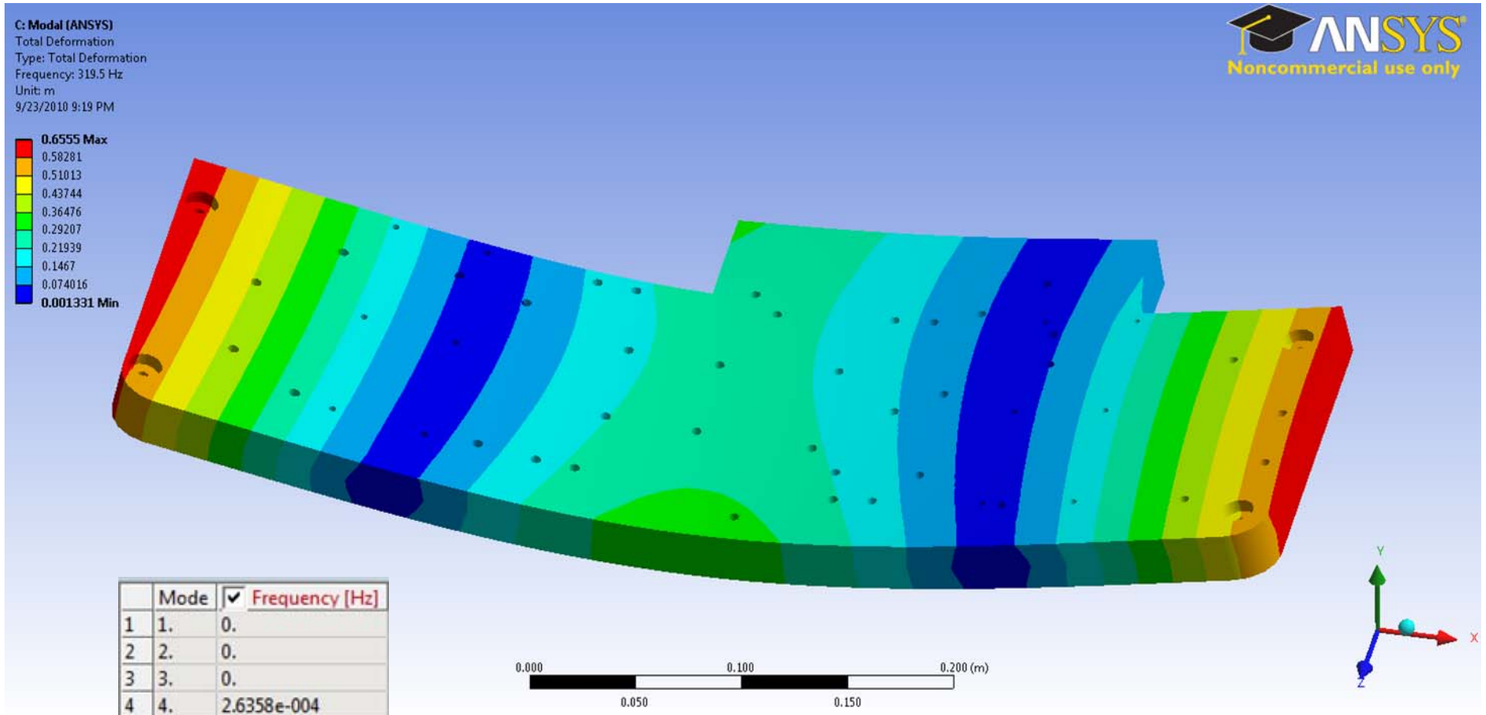


LIGO-T1000558-v1

STATIC DEFLECTION UNDER GRAVITATIONAL LOAD WITH THE 4 WIRE SUPPORT POINTS PINNED. THE MAXIMUM DEFLECTION IS 6 MICRONS. FAR LESS THAN THE 1 MM ALIGNMENT TOLERANCE. ALIGNMENT ON A BENCH WILL NOT CHANGE SIGNIFICANTLY WHEN SUSPENDED DUE TO TRANSLATIONAL DEFLECTION.

ANGULAR DEFLECTION (approximate, based on FEA deflection, assuming deflection of plate to an arc)

6.00E-06	deflection, d	m	
6.51E+03	radius, r	m	
8.59E-05	angle, Θ	rad	
1.72E-04	reflected angle	rad	
2	maximum lever arm	m	
3.44E-04	maximum reflected beam shift	m	



	Mode	Frequency [Hz]
1	1.	0.
2	2.	0.
3	3.	0.
4	4.	2.6358e-004
5	5.	1.6391e-003
6	6.	2.638e-003
7	7.	319.5
8	8.	544.2
9	9.	865.56
10	10.	1076.7
11	11.	1480.5
12	12.	1661.7

Finite Element modal analysis result is 319 Hz for the first frequency. This is close to simple analytical calculations for the first frequency assuming uniform distribution of the mass on a beam (280 Hz) and a rectangular plate (292 Hz).

Analytical formulas are from R. Blevins, Formulas for Natural Frequency and Mode Shape, Krieger Pub., cr 1979.

OUTPUT FARADAY ISOLATOR TABLE

RECTANGULAR PLATE (all edges free)			
22	0.5588	plate length, a	in, m
7	0.1778	plate width, b	in, m
	3.142857143	plate aspect ratio, a/b	--
	22	approx. eigenvalue λ^2 for a/b=3	--
1	0.0254	plate thickness, h	in, m
	0.33	Poisson's ratio, ν	--
	6.89E+10	elastic modulus, E	Pa
	7.56	plate mass	kg
	7.94	payload mass	kg
	15.5	total mass	kg
	156.0068055	areal density, γ	kg/m^2
	292	**1st frequency**	**Hz**
BEAM (free-free boundary conditions)			
	2.42802E-07	moment of inertia, I=bh^3/12	m^4
	27.73801002	lineal density, m	kg/m
	4.73	eigenvalue, λ	--
	280	**1st frequency**	**Hz**