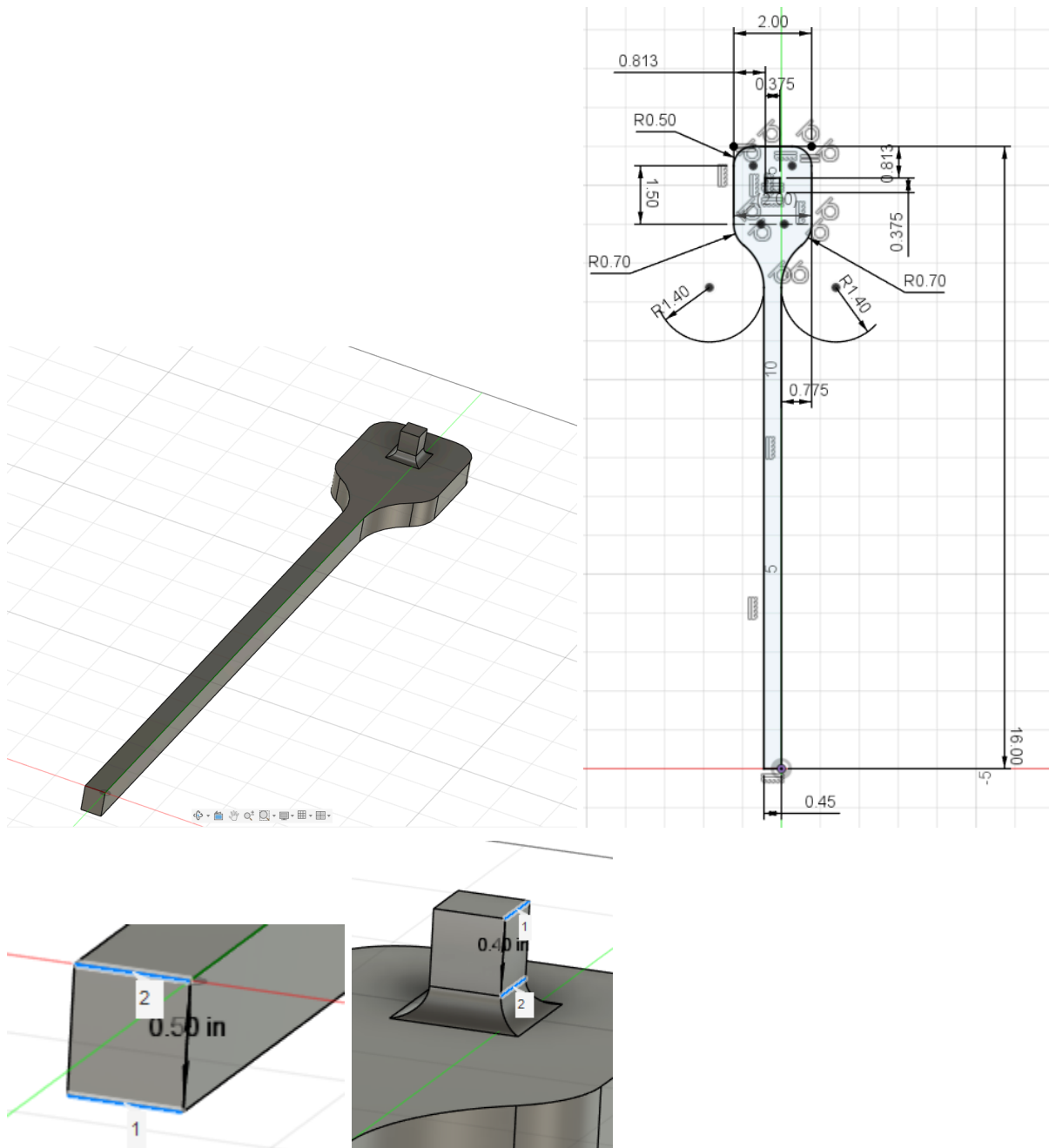# 5.2.1 Results

1. Image(s) of CAD model. Must show all key dimensions.

2. Describe material used and its relevant mechanical properties.

I am using Stainless steel, martensitic, 17-4PH, cast, H900. It has a high yield strength and toughness.
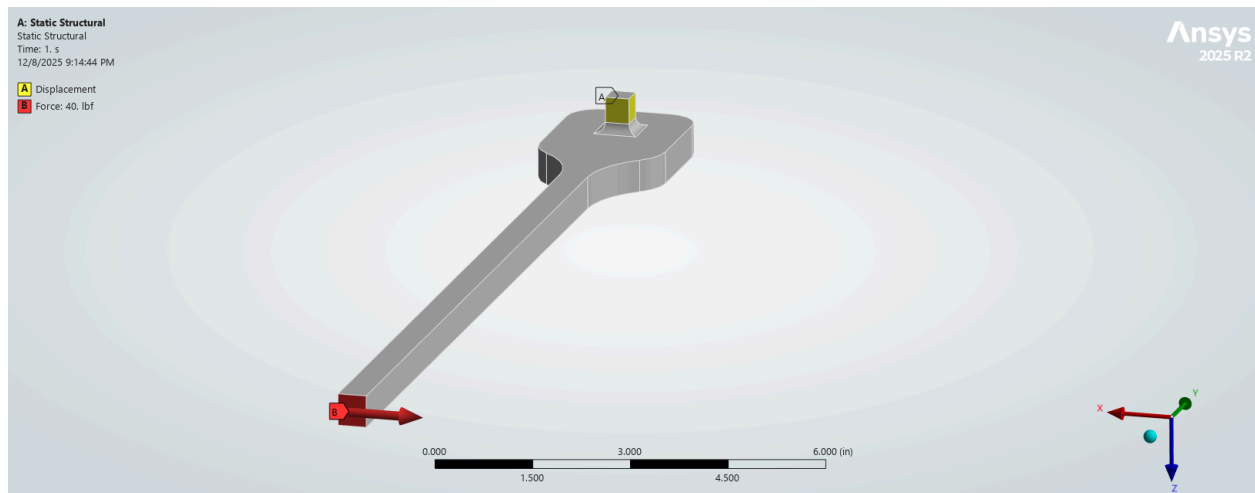
```
E = 300.E5; % Young's modulus (psi)

nu = 0.281; % Poisson's ratio

su = 199.e3; % tensile strength use yield or ultimate depending on material
(psi)

KIC = 87.e3; % fracture toughness (psi sqrt(in))

sfatigue = 78.e3; % fatigue strength from Granta for 10^6 cycles
```
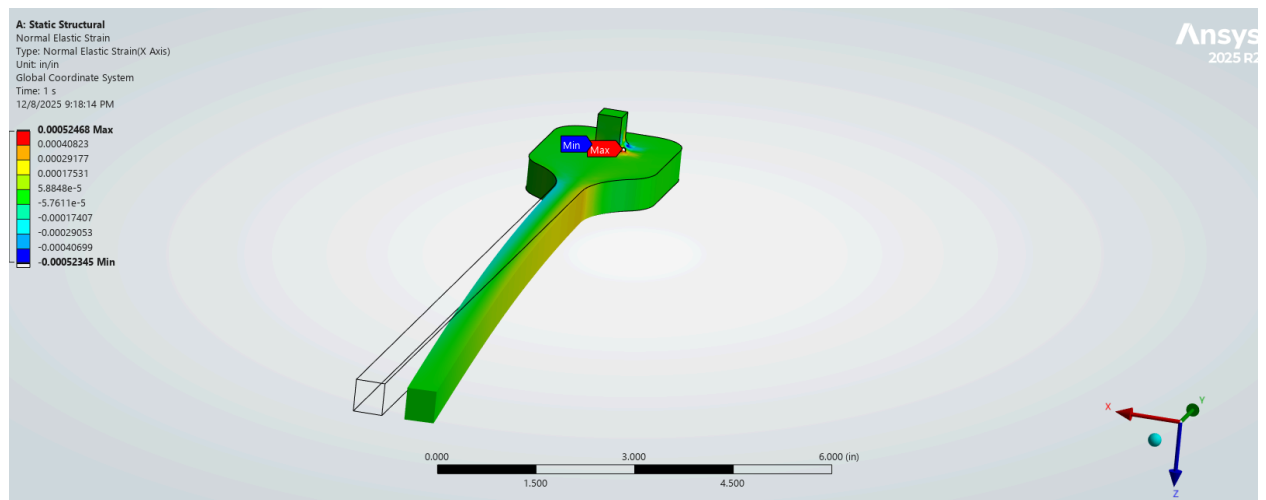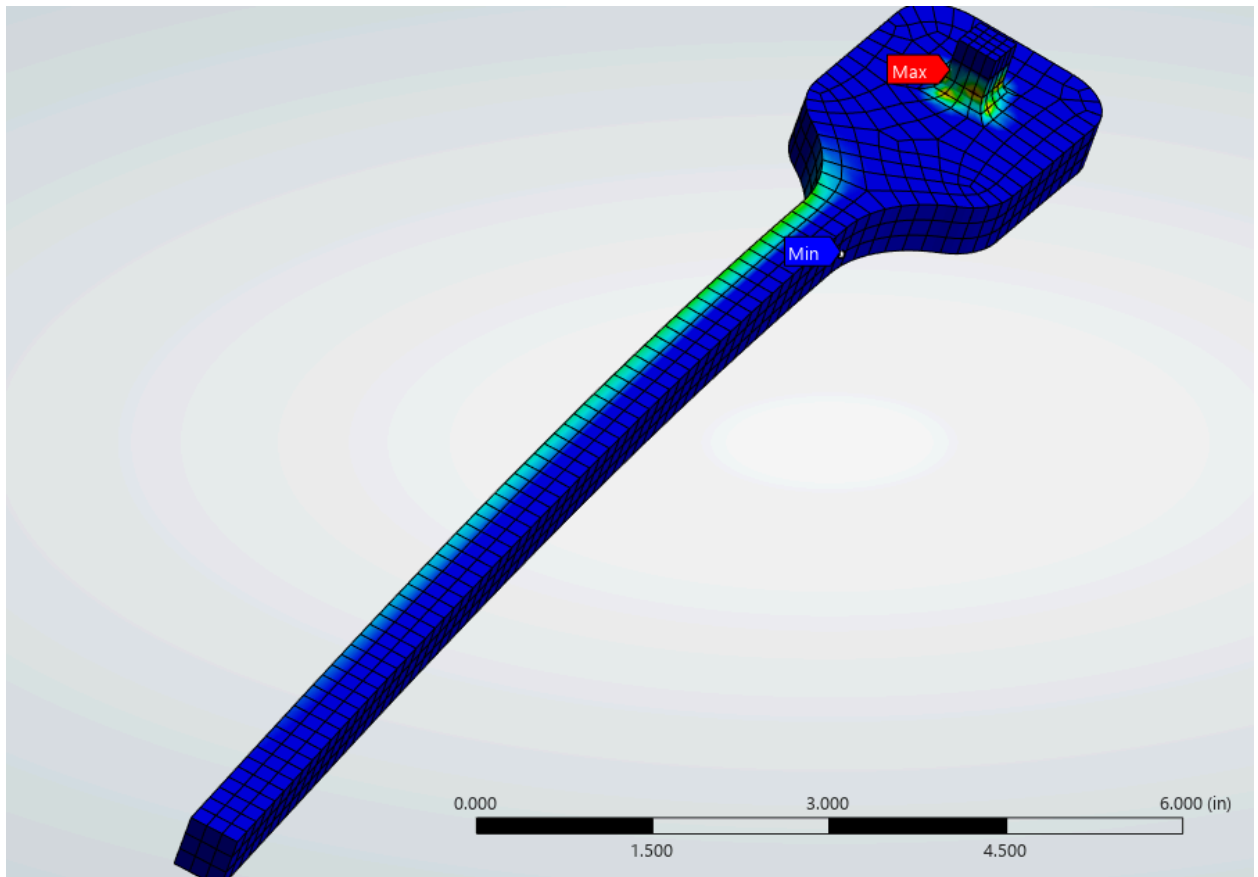
3. Diagram communicating how loads and boundary conditions were applied to your FEM model.

4. Normal strain contours (in the strain gauge direction) from FEM.

5. Contour plot of maximum principal stress from FEM.

6. Summarize results from FEM calculation showing:
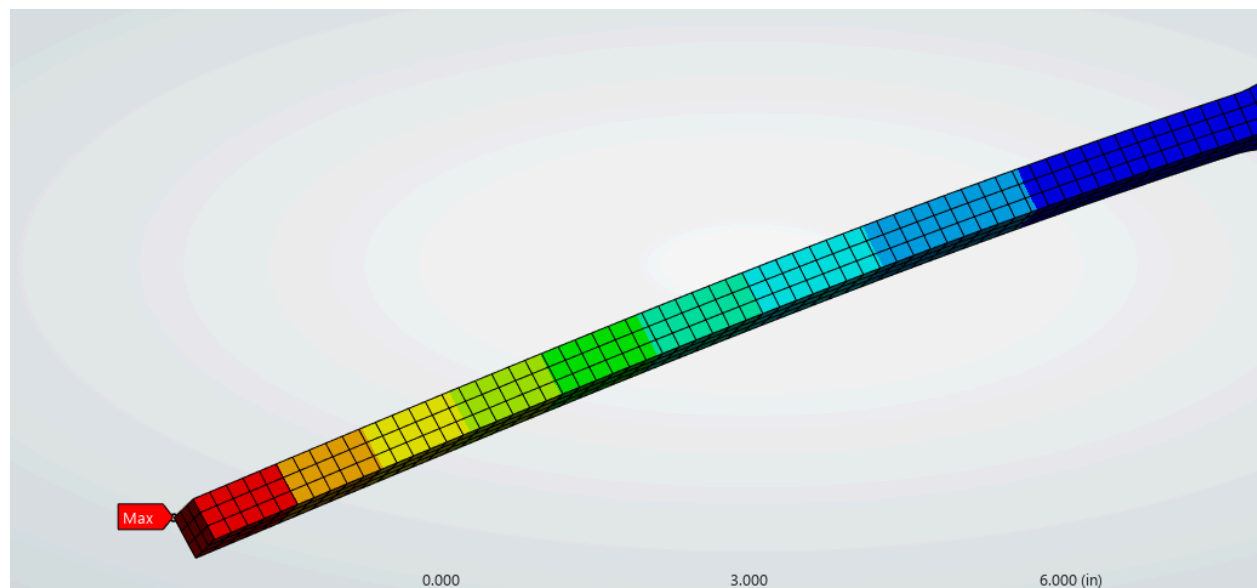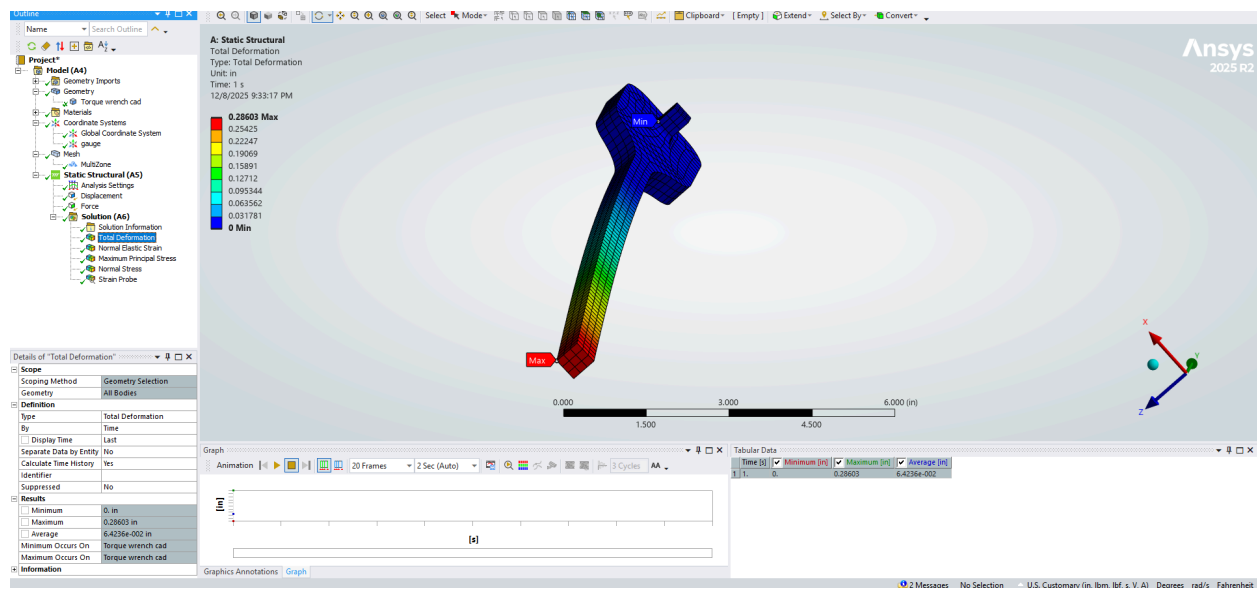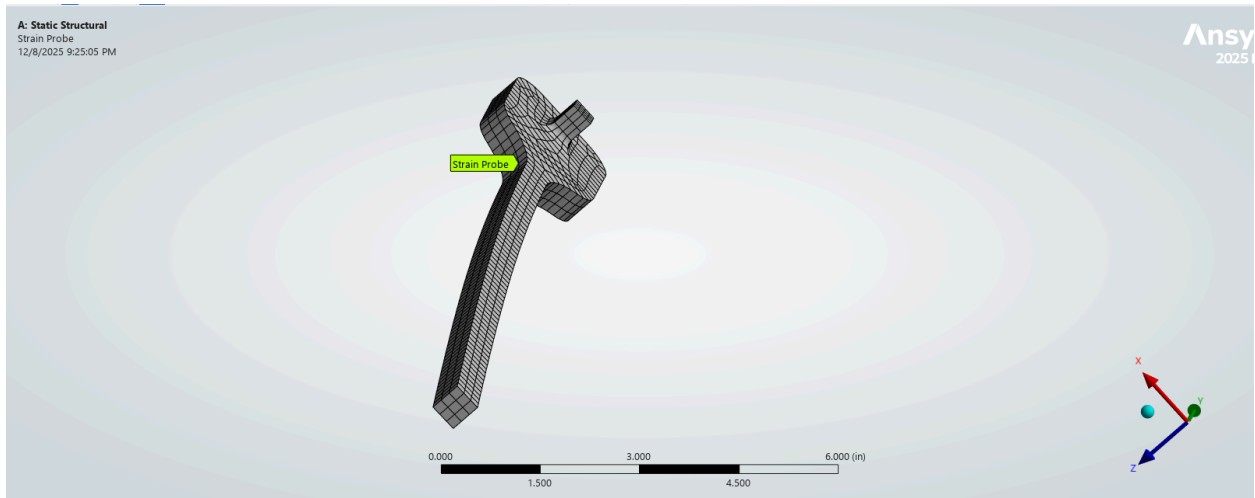   ○ Maximum normal stress (anywhere)

22362 psi

   ○ Load point deflection
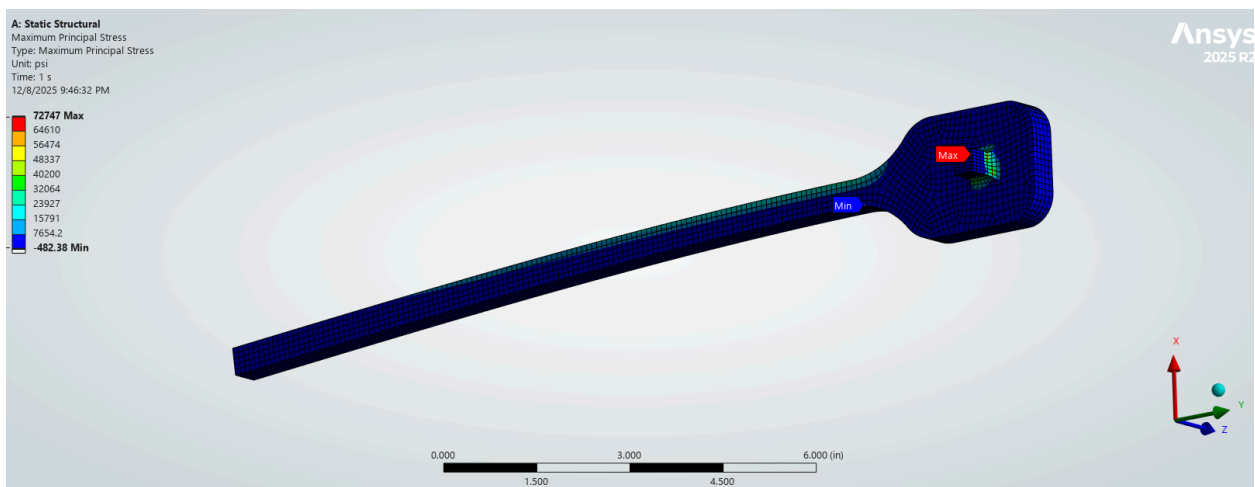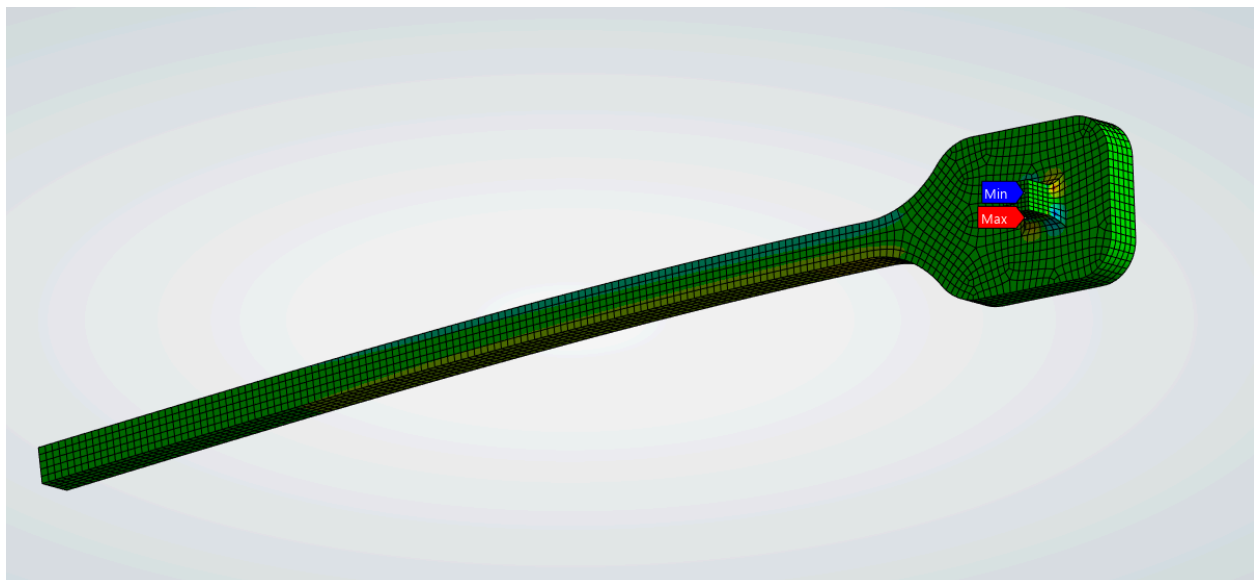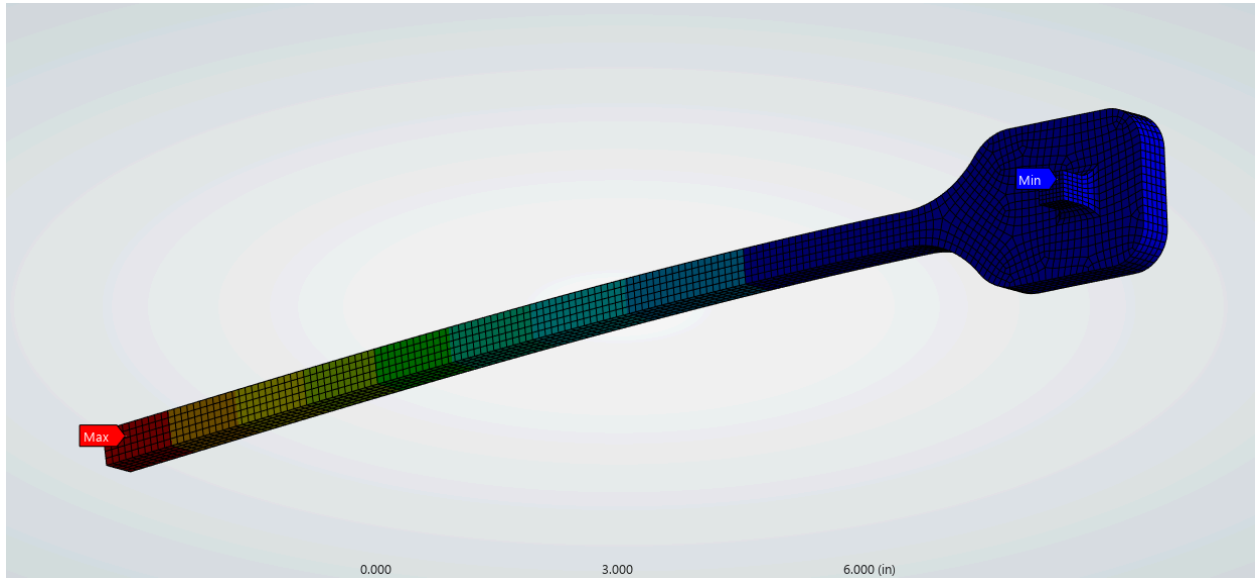
0.286 in

   ○ Strains at the strain gauge locations

2.4e-4 mV/V

7. Torque wrench sensitivity in mV/V using strains from the FEM analysis.

A: Static Structural
Strain Probe
12/8/2025 9:25:05 PM

A: Static Structural
Total Deformation
Type: Total Deformation
Unit: in
Time: 1 s
12/8/2025 9:33:17 PM

0.28603 Max
0.25425
0.22247
0.19069
0.15891
0.12712
0.095344
0.063562
0.031781
0 Min

A: Static Structural
Maximum Principal Stress
Type: Maximum Principal Stress
Unit: psi
Time: 1 s
12/8/2025 9:46:32 PM

72747 Max	
64610	
56474	
48337	
40200	
32064	
23927	
15791	
7654.2	
-482.38 Min	

A: Static Structural
Normal Stress
Type: Normal Stress(X Axis)
Unit: psi
Global Coordinate System
Time: 1 s
12/8/2025 9:46:54 PM

29219 Max
22726
16233
9739.3
3246
-3247.2
-9740.5
-16234
-22727
-29220 Min

8. Strain gauge selected (give type and dimensions).

- Note: Design must physically have enough space to bond the gauges.

I would select a rosette gauge that is small enough to fit on the handle of my torque wrench.