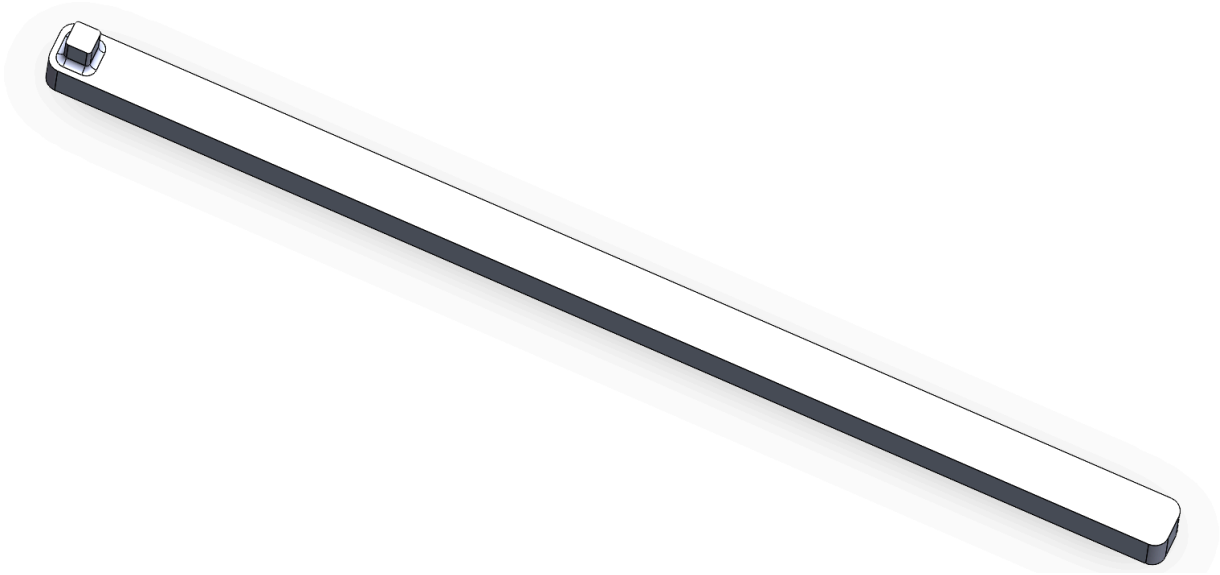
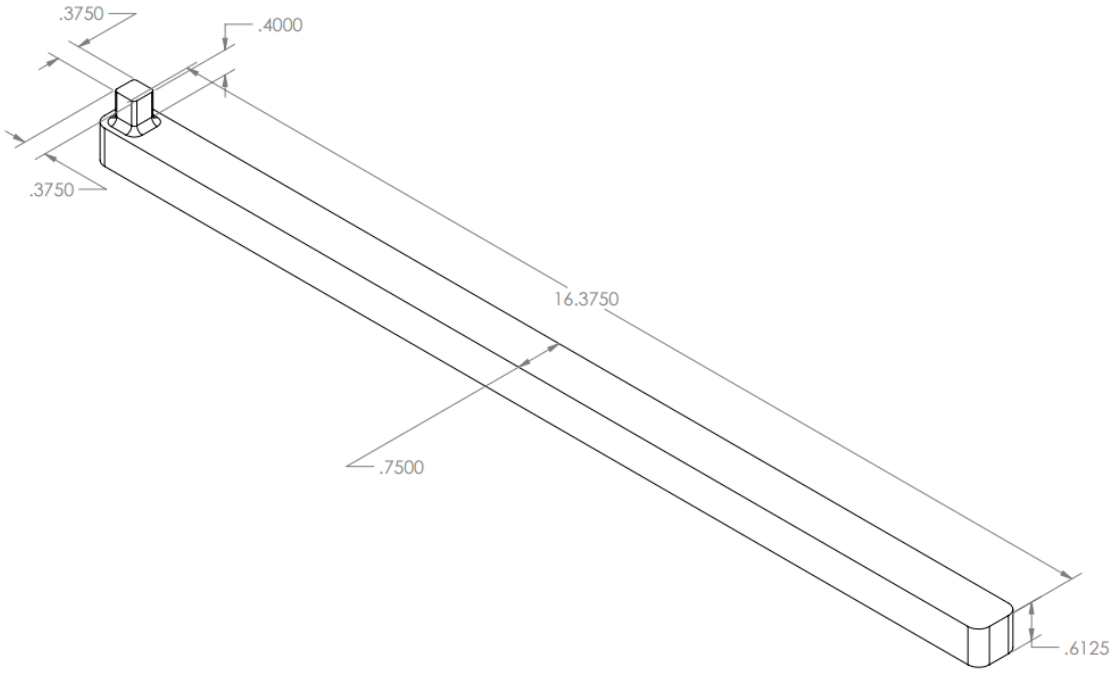
5.2 Your Design

5.1.2 Reflections

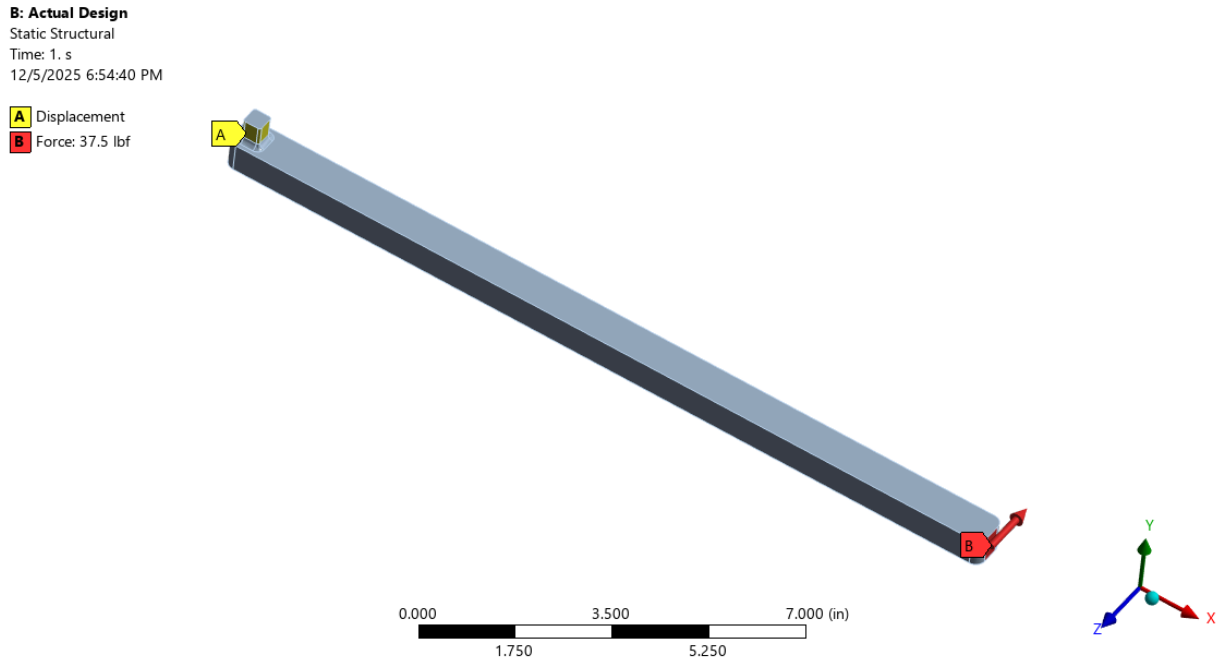
1. **Images of your CAD Model**



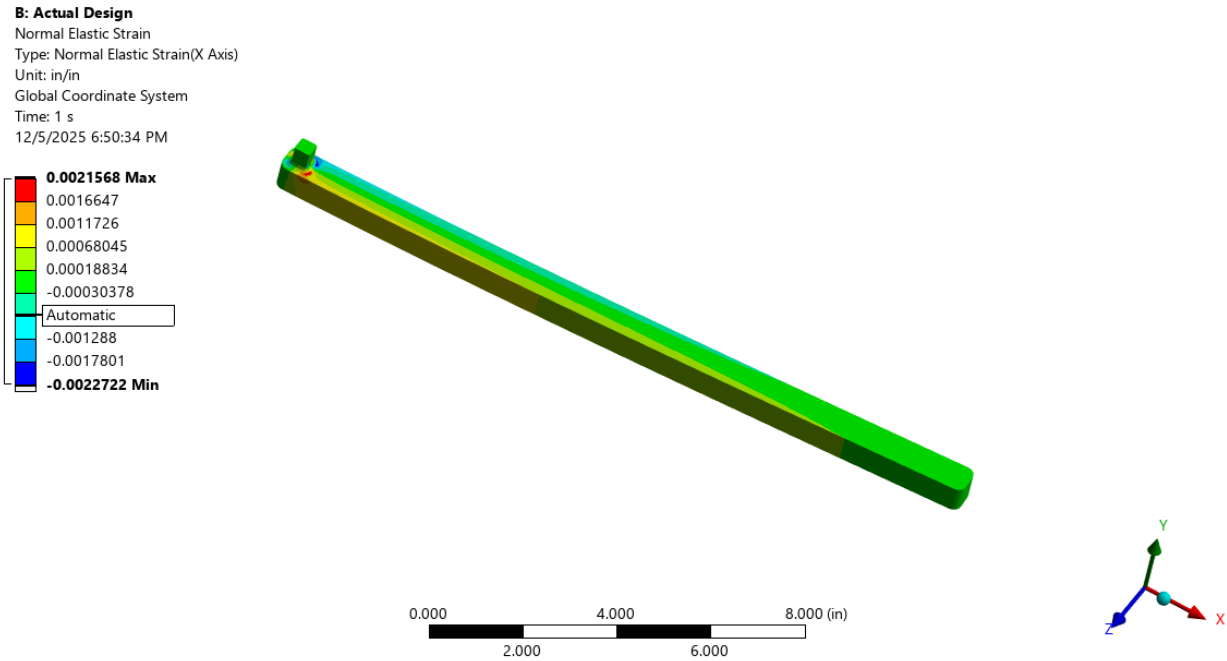


2. **Describe material used and its relative mechanical properties**
   Aluminum 6061 T6 was chosen, a common aluminum alloy with a relatively high modulus and yield strength. This alloy's properties were acquired from Granta – elastic modulus: 9.66 * 10 ^6 psi; Poisson's ratio: 0.325; yield strength: 42.1 * 10^3 psi. The rest of the material properties are in the above Matlab script.

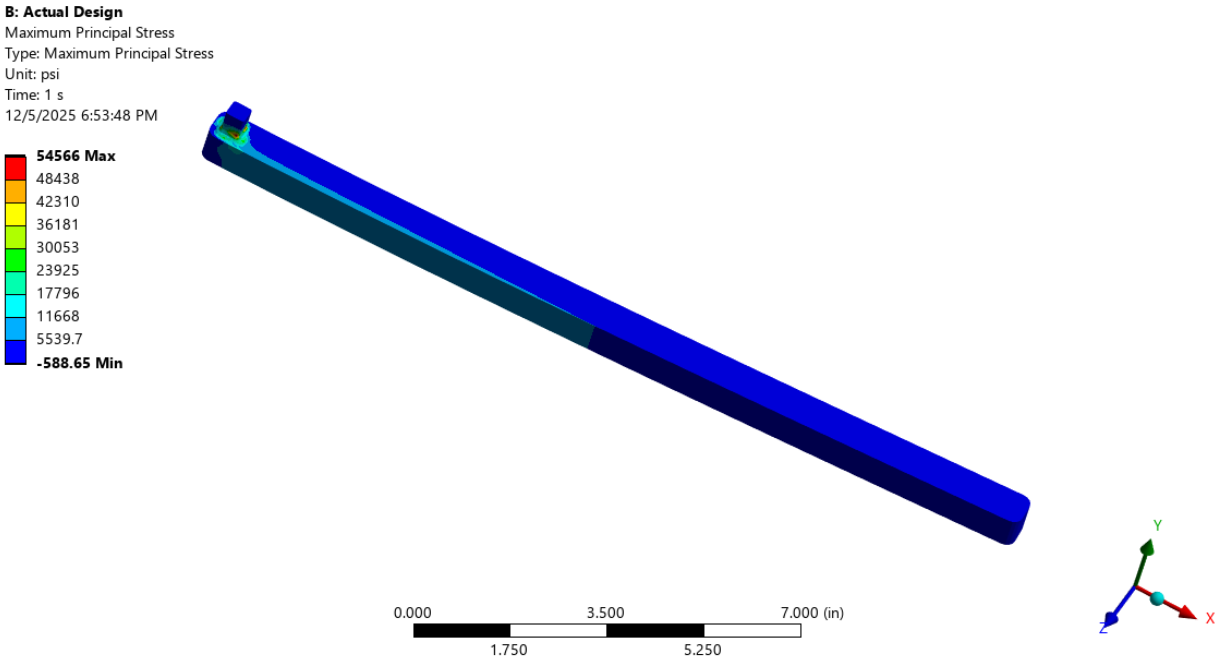
3. Diagram communicating how loads and boundary conditions were applied to your ANSYS model



4. Normal strain contours



5. Contour plot of maximum principal stress



6. Summarize results from FEM

FEM Results	
Strain at Gauge Location [microstrain]	988.7
Maximum Normal Stress [psi]	25064
Maximum Deflection [in]	0.3423

7. Torque wrench sensitivity

```
Sensitivity [mV/V] = gauge_strain [microstrain] /1000
                   = 988.7/1000
Sensitivity [mV/V] = 0.9887
```

8. Strain gauge selected

A rosette strain gauge will be used (0°, 45°, 90°) since it will provide an accurate reading of the torque wrench in multiple directions. The gage dimensions are 3mm by 1.7mm, and the carrier dimensions are 11mm by 11mm (0.433 inches), which will easily fit on the strain gauge, and the gauge can be bonded onto the flat surfaces of the shaft. Gauges with these dimensions are sold by DwyerOmega.