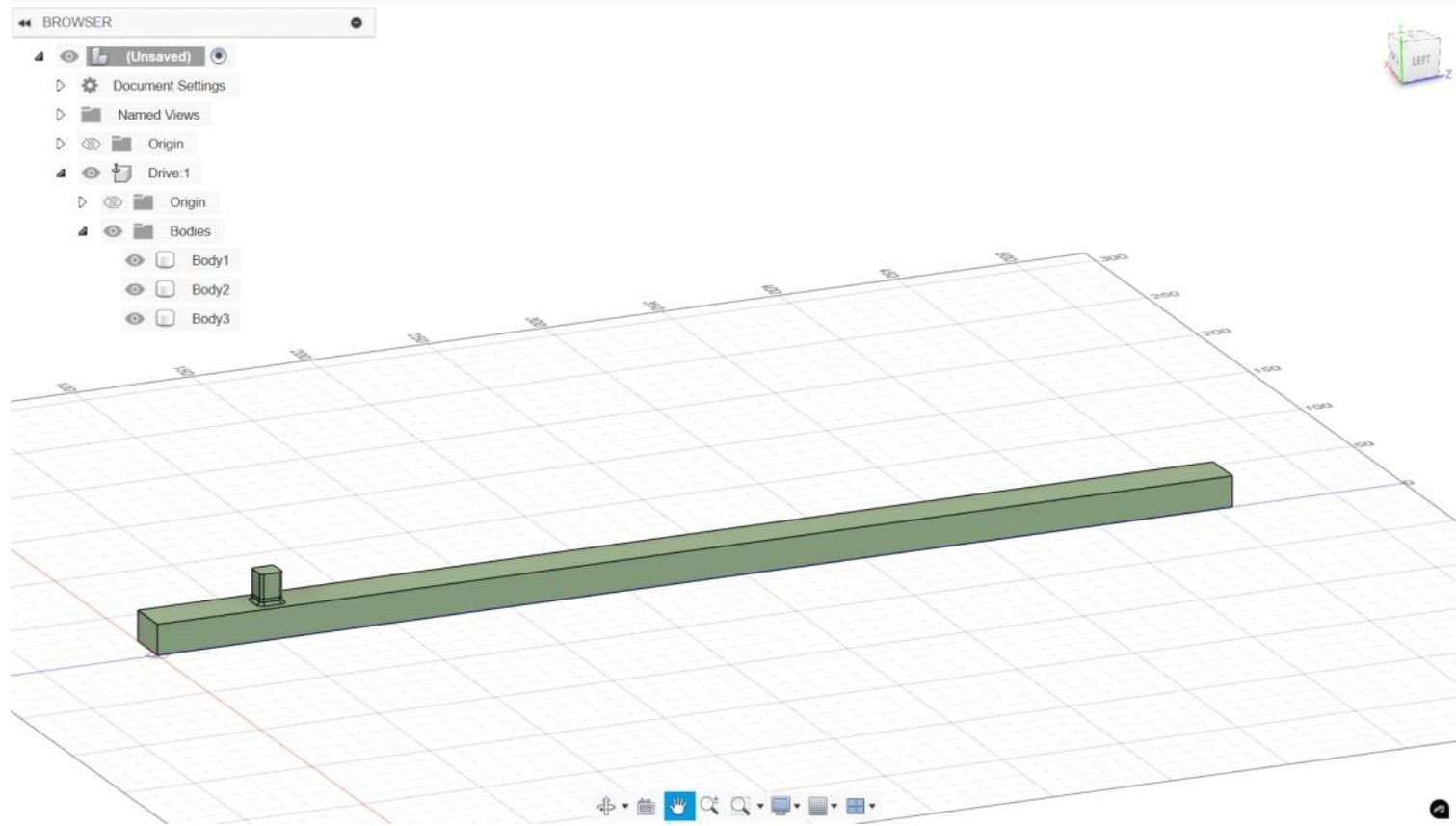


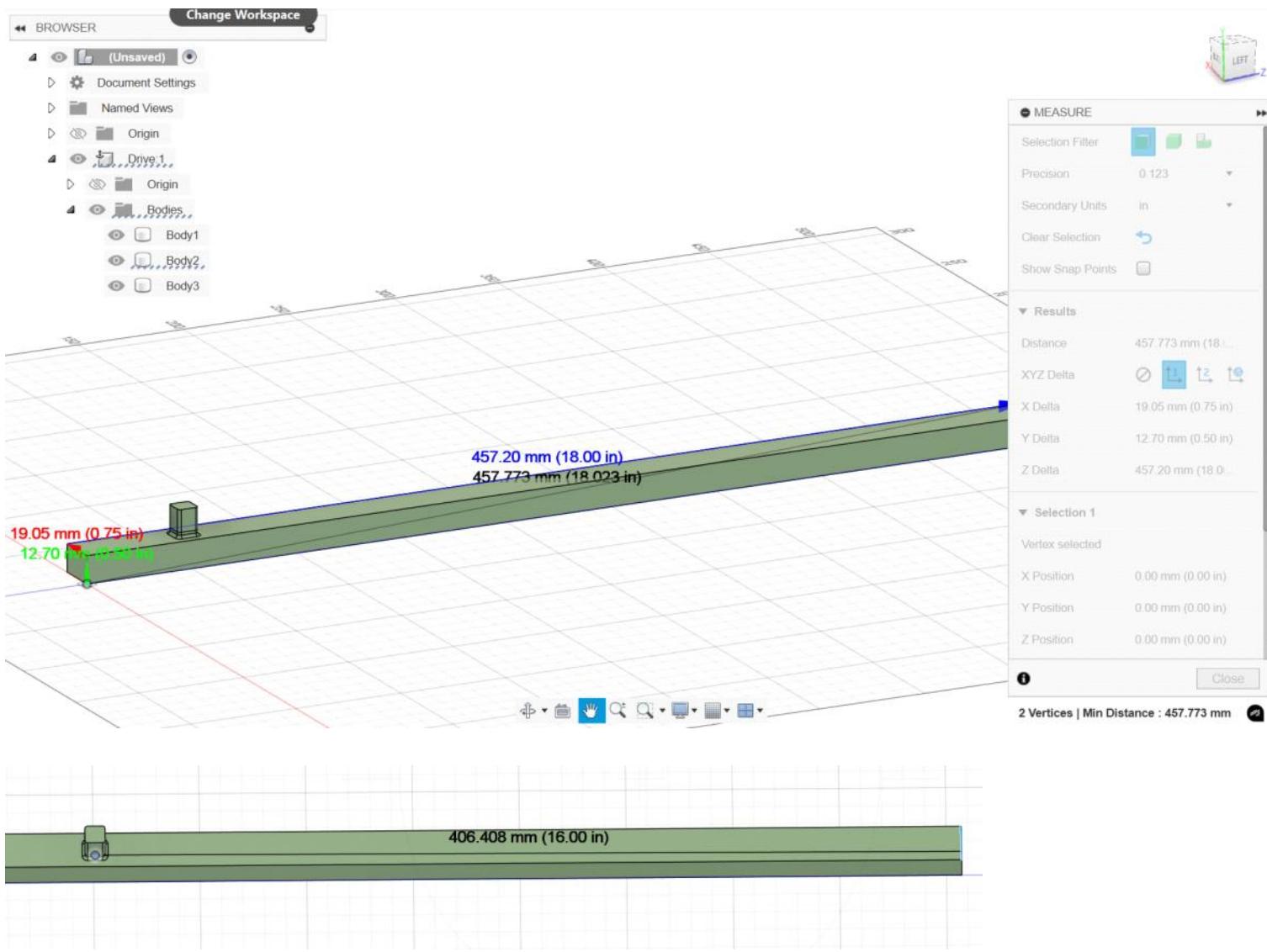
Final Homework part 2

Monday, December 8, 2025 12:12 AM

Torque Wrench Project

1. CAD Images with Dimensions





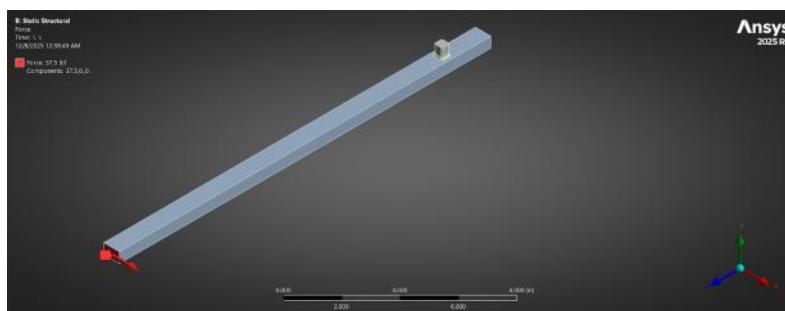
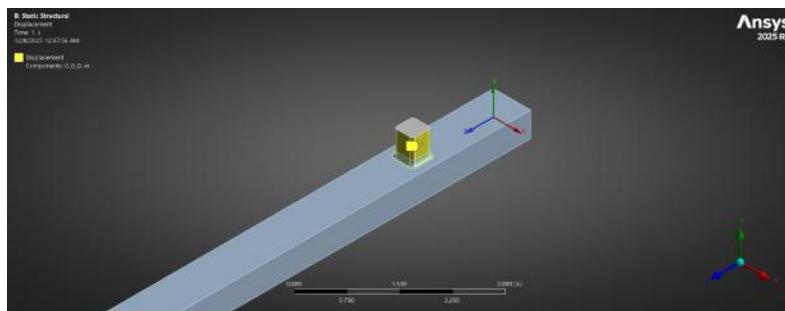
2. Material Used and Mechanical Properties

a. Material Used - Aluminum 7075 T6 (Aluminum alloy)

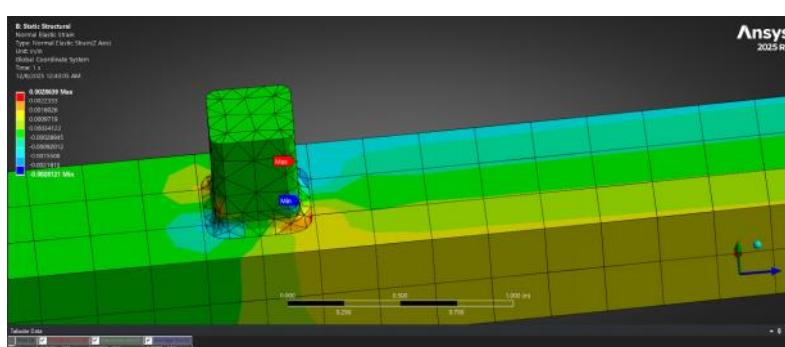
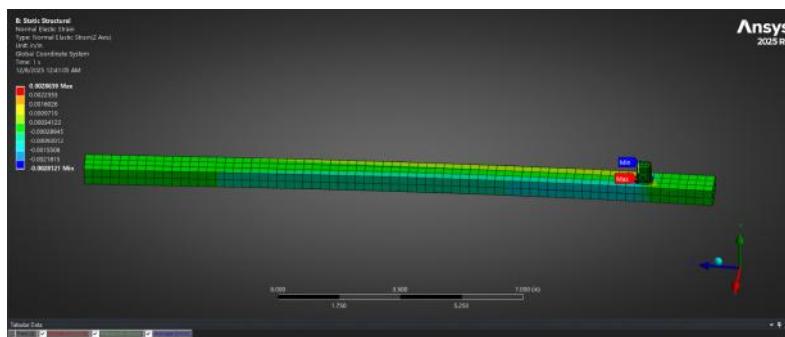
- i. Young's Modulus - 10.5E6 psi
- ii. Poisson's ratio - 0.33
- iii. Tensile Strength - 80E3 psi
- iv. Fracture Toughness - 24E3 psi $\sqrt{\text{in}}$
- v. Fatigue Strength - 23E3 psi

Description - Aluminum 7075 T6 is a high-strength, lightweight aluminum alloy, primarily alloyed with zinc. It is comparable in strength to many steels but with lower corrosion resistance.

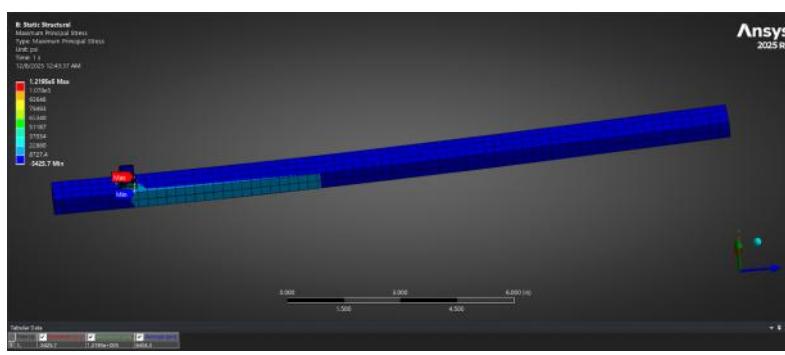
3. Photos showing Boundary Conditions and Load Application

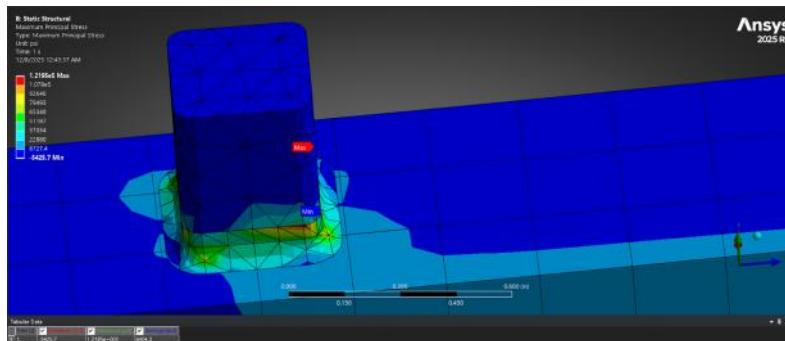


4. Normal Strain Contours



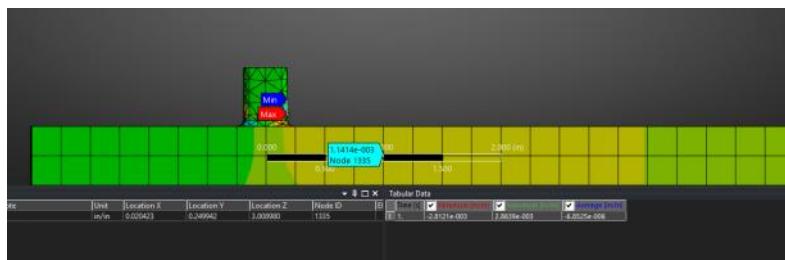
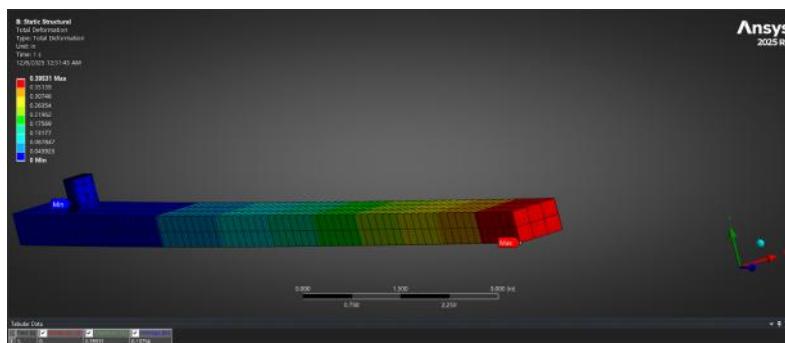
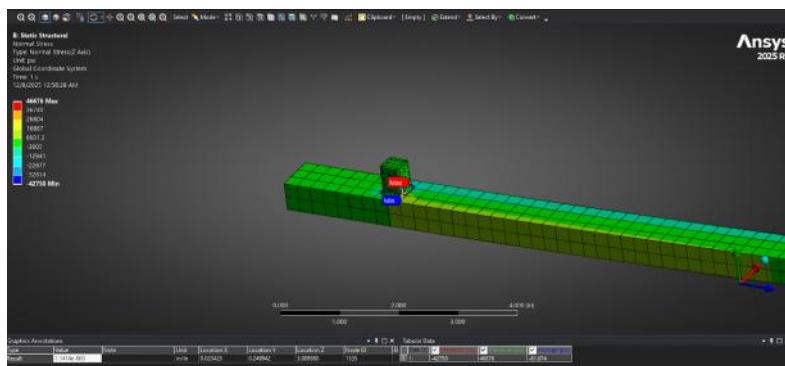
5. Maximum Principle Stress Contours





6. Additional Measurements

- Maximum normal stress (z-direction): 46.7 ksi
 - This maximum normal stress is located towards the bottom of the drive, near the top of the fillet
- Load point deflection: 0.395 in
- Strain at gauge: 1141.4 micro-strain



7. Torque Wrench Sensitivity

- 1.14 mV/V (FEM strain measurement of 1141 micro-strain)

8. Strain gauge information

I used a half bridge stain gauge with a Gain factor of 2. The

strain gauge is located 1 inch away from the drive