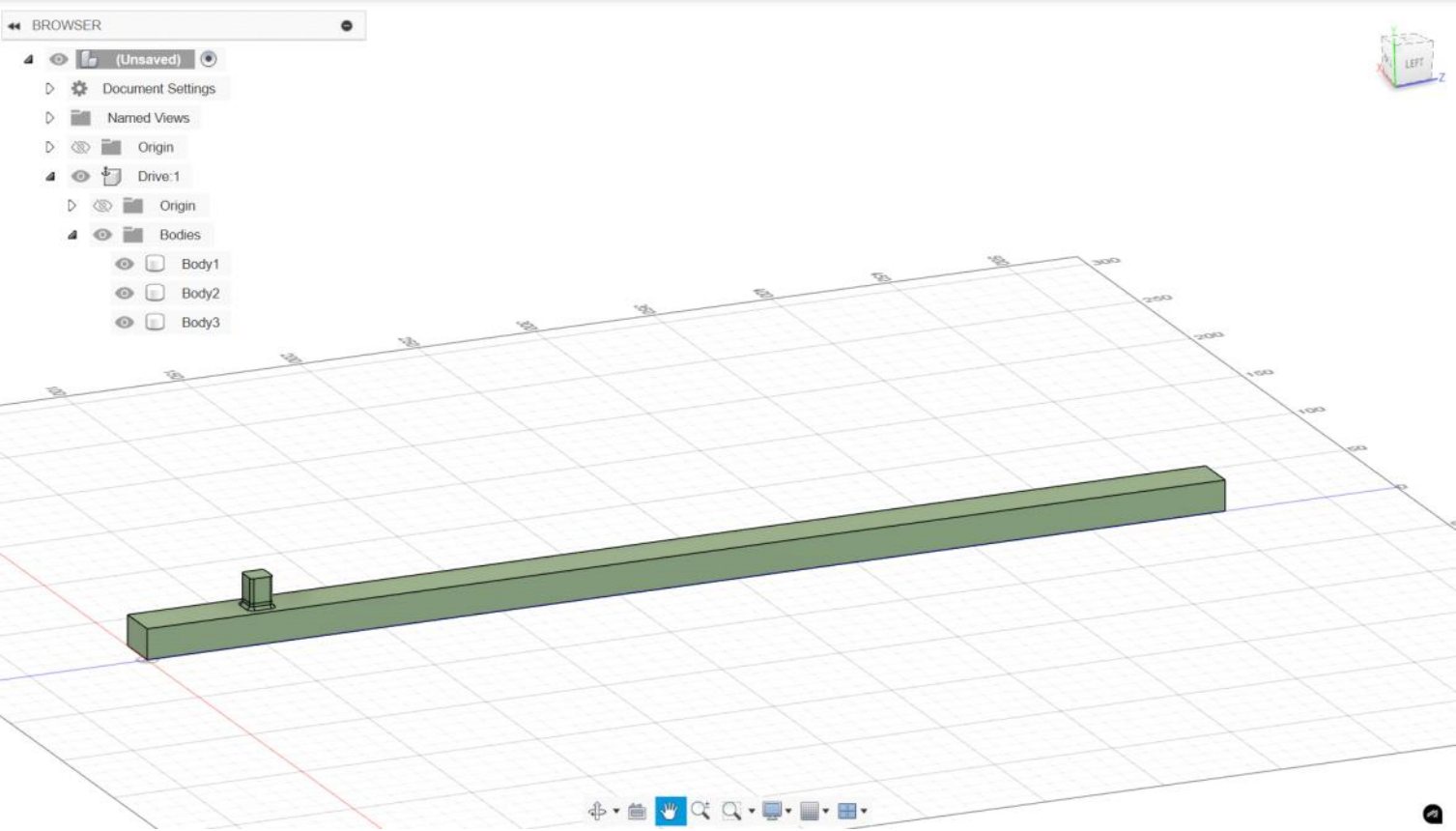


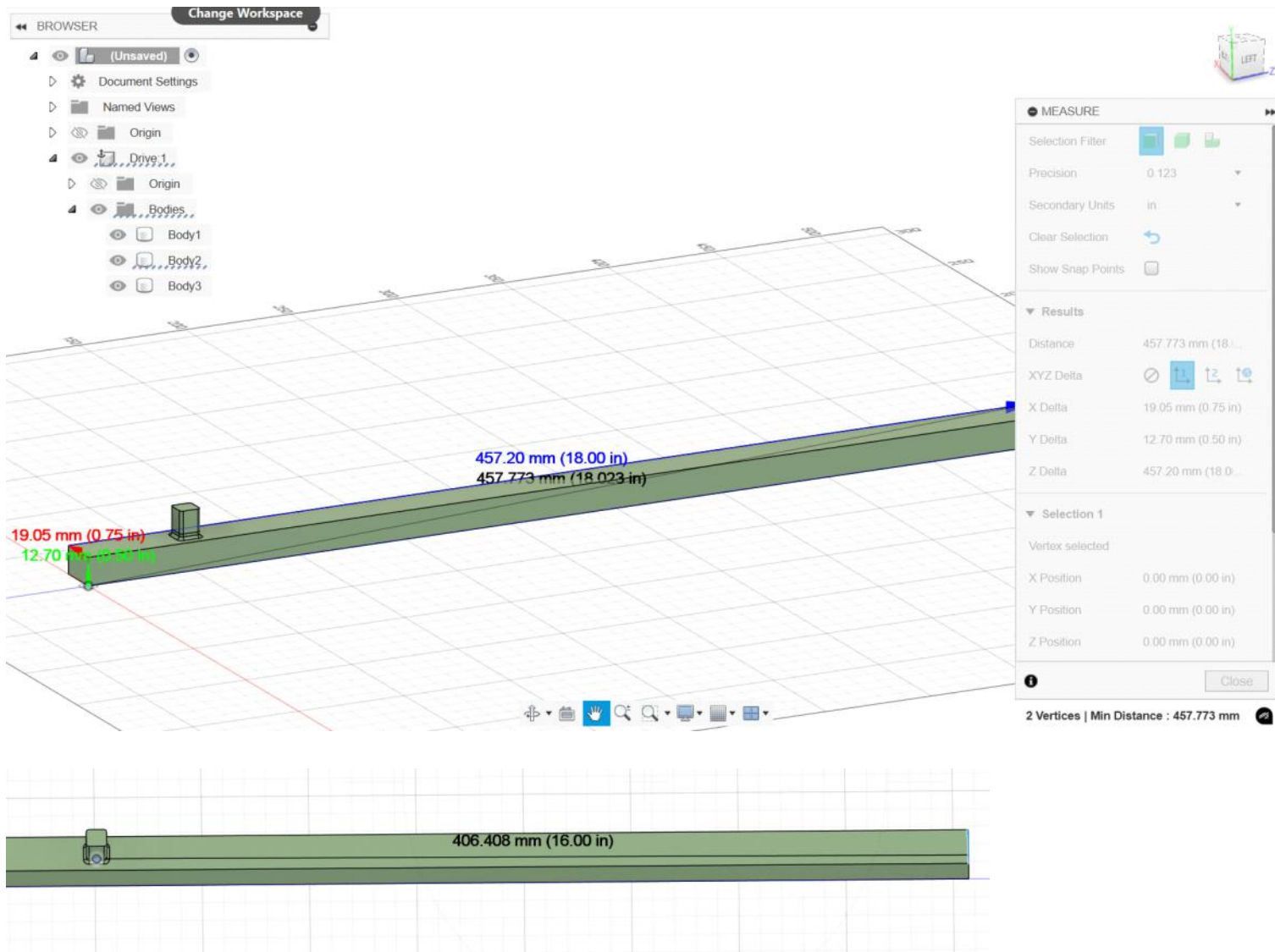
# Final Homework part 2

Monday, December 8, 2025 12:12 AM

## Torque Wrench Project Dylan Mies (DJM494@cornell.edu)

### 1. CAD Images with Dimensions





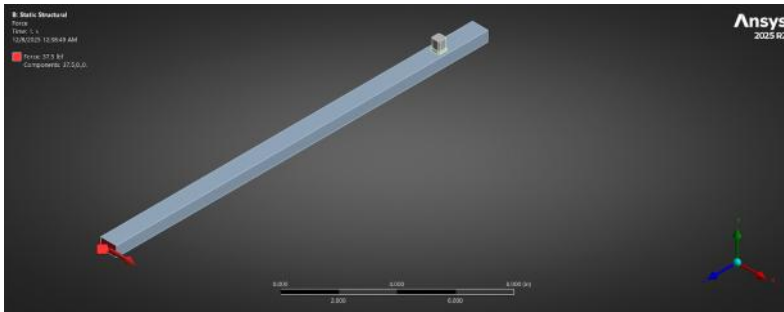
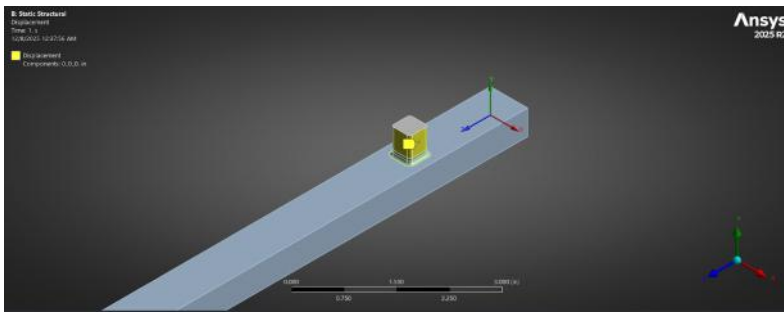
## 2. Material Used and Mechanical Properties

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

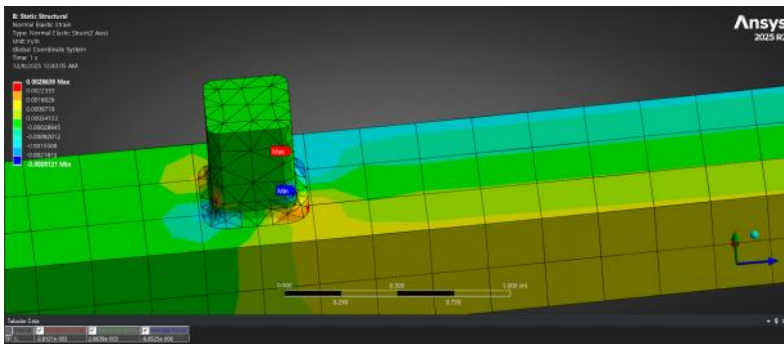
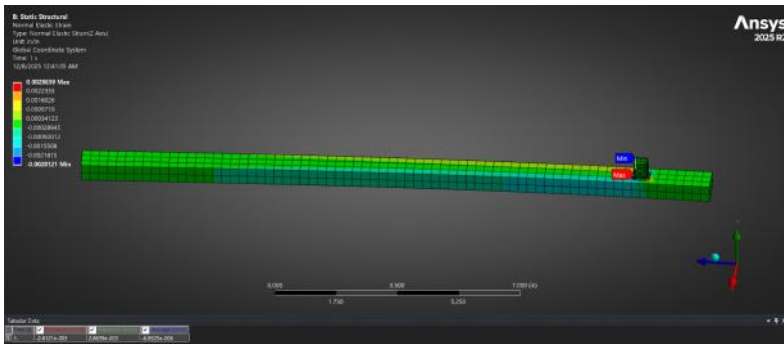
- i. Young's Modulus - 10.5E6 psi
- ii. Poisson's ratio - 0.33
- iii. Tensile Strength - 80E3 psi
- iv. Fracture Toughness - 24E3 psi  $\sqrt{in}$
- v. Fatigue Strength - 23E3 psi

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.

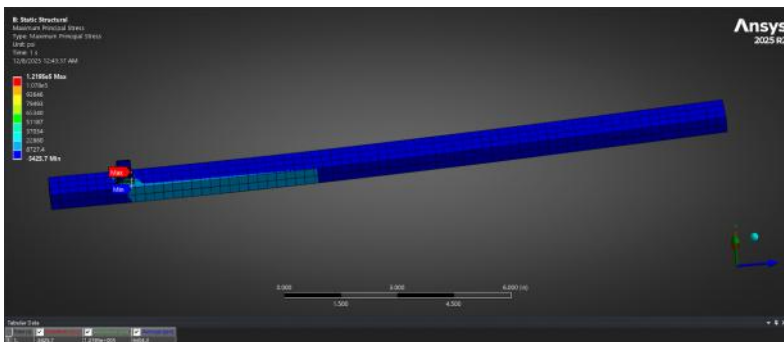
## 3. Photos showing Boundary Conditions and Load Application

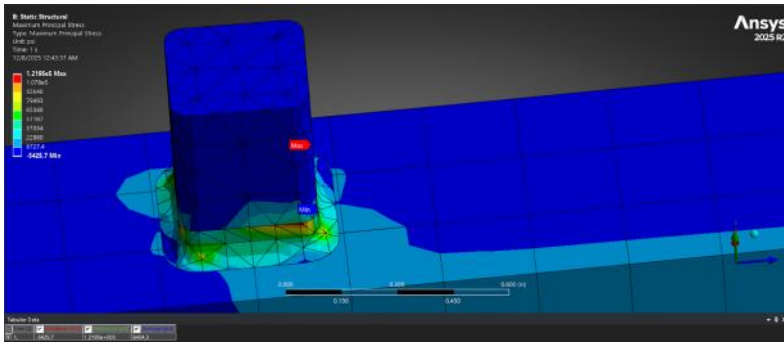


#### 4. Normal Strain Contours



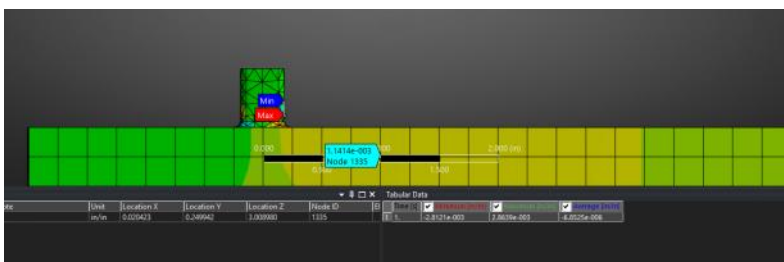
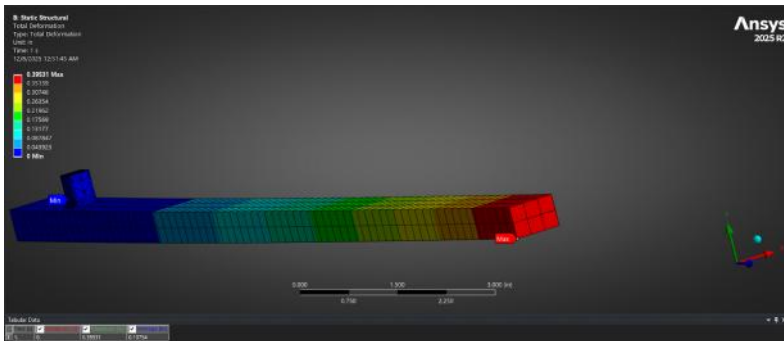
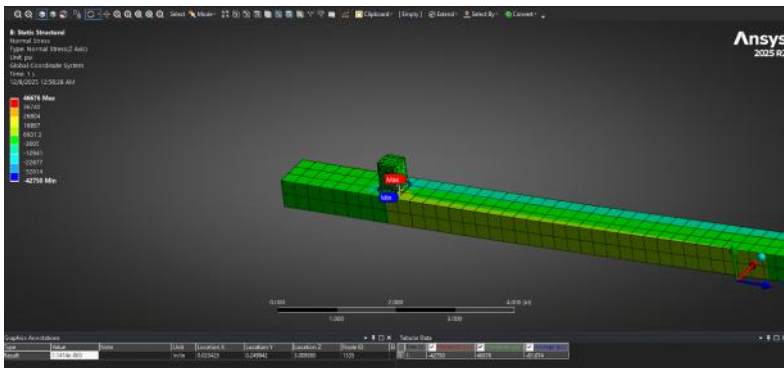
#### 5. Maximum Principle Stress Contours





## 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 strain gauge with a Gain factor of 2. The

strain gauge is located 1 inch away from the drive