

Tensile Test Assignment

For Sessions 803, 804, and 805

Assigned: Thursday, 10/05

Due: Thursday, 10/12

For Sessions 801 and 802

Assigned: Tuesday, 10/10

Due: Thursday, 10/17

A load-extension (deformation) curve from the tensile test of a test coupon was measured by the MTS machines located in Southwick Hall Room 122, as shown in Fig. 1. You are provided with the following information about the test coupon.

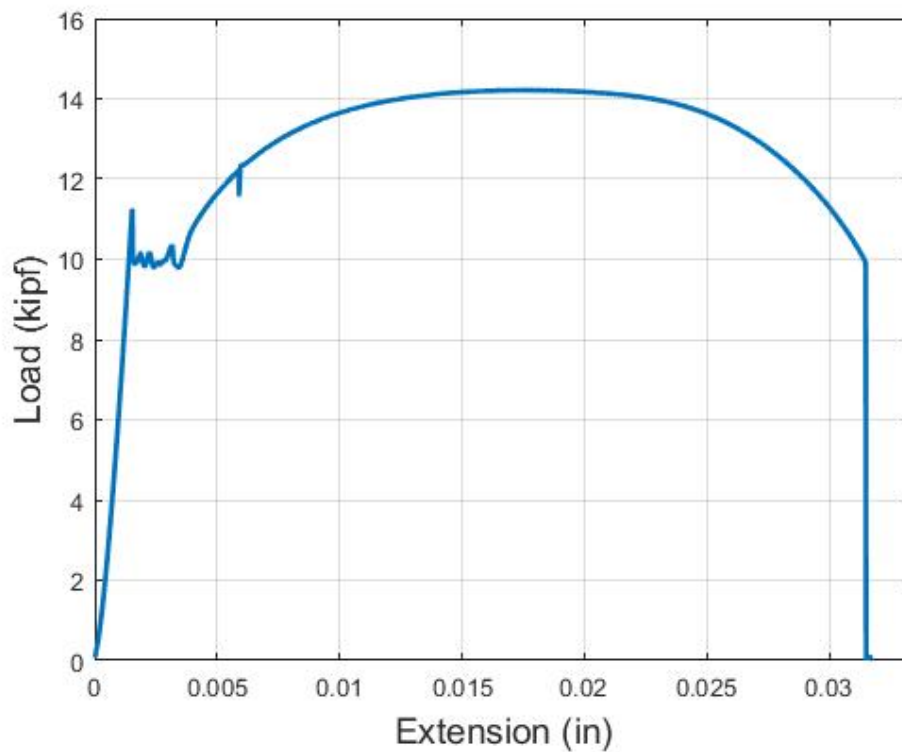


Figure 1: Load-extension (deformation) curve

- The tensile test coupon is made of steel.
- The original cross sectional area is $A_0 = 0.2 \text{ in}^2$.

- The final cross sectional area is $A_f = 0.057 \text{ in}^2$.
- The original length of the coupon is $L_0 = 0.87 \text{ in}$.

With the information provided, there are twelve questions regarding the tensile test result of the coupon.

1. What is the engineering stress (σ_e) and engineering strain (e) of the test coupon when the load = 10 kips?
2. What is the true stress (σ) and true strain (ϵ) of the test coupon when the load = 10 kips?
3. What is the percent reduction in area?
4. What is the percent elongation?
5. What is the Young's modulus of the test coupon?
6. What is the 0.2% offset yield strength (σ_y)?
7. What is the modulus of resilience of the $\sigma - \epsilon$ curve?
8. What is the ductility of the $\sigma - \epsilon$ curve?
9. What is the toughness of the $\sigma - \epsilon$ curve?
10. What is the proportional limit of the coupon?
11. What is the ultimate tensile strength (σ_u)?
12. What is the fracture strength (σ_f)?