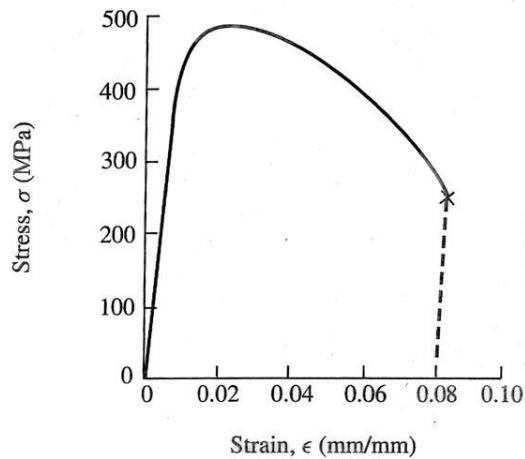


Stress Strain Curve Analyze

The stress-Strain (σ - ϵ) curve is given in the figure (at right), calculate E (Young's modulus), S_y (yield Strength), S_u (ultimate strength), and percent elongation at failure (i.e., ϵ upon removal of the load) for the aluminum 2024-T81 specimen. (Note: The stress from 0 to 300 MPa seems to be linear and can be used to determine E .)



Grading criterion:
 Young's modulus with units:
 Yield strength with units:
 Ultimate strength with units:
 Percent elongation at failure:

Pick a point $\sigma = 300 \text{ MPa}$, $\epsilon = 0.0043$

$$E = \frac{\sigma}{\epsilon} = \frac{300 \times 10^6 \text{ Pa}}{0.0043} = 70 \text{ GPa}$$

Use 0.2% offset $\Rightarrow S_y = 410 \text{ MPa}$ # Ans

$$S_u = 480 \text{ MPa} \quad \# \text{ Ans}$$

Strain @ failure is $\epsilon_f = 0.08$

$$\% \text{ elongation @ elongation} = 8\% \quad \# \text{ Ans}$$