Mechanics of Materials I:

Fundamentals of Stress & Strain and Axial Loading

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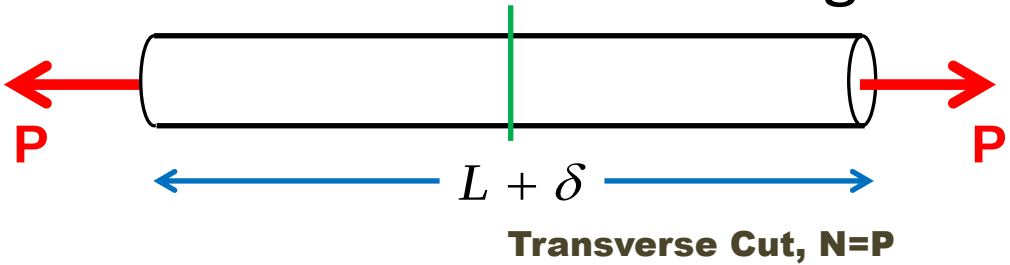
Module 9 Learning Outcome

- Define/Discuss Stress-Strain Diagrams

Axial Centric Loading



Transverse Cut, N=P

Normal Stress

Force per unit area perpendicular to the cut surface

Nominal Stress (Engineering Stress)

$$\sigma = \frac{N}{A_O}$$

True Stress

$$\sigma = \frac{N}{A}$$

Normal Strain

Elongation per unit length

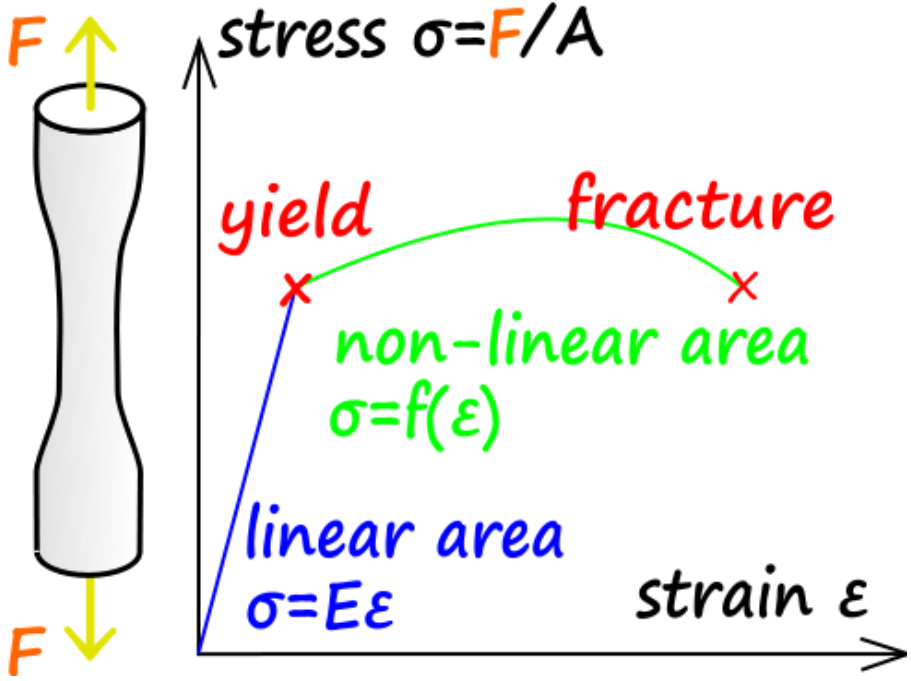
Nominal Strain (Engineering Strain)

$$\varepsilon = \frac{\delta}{L_O}$$

True Strain

$$\varepsilon = \frac{\delta}{L}$$

Tension Test



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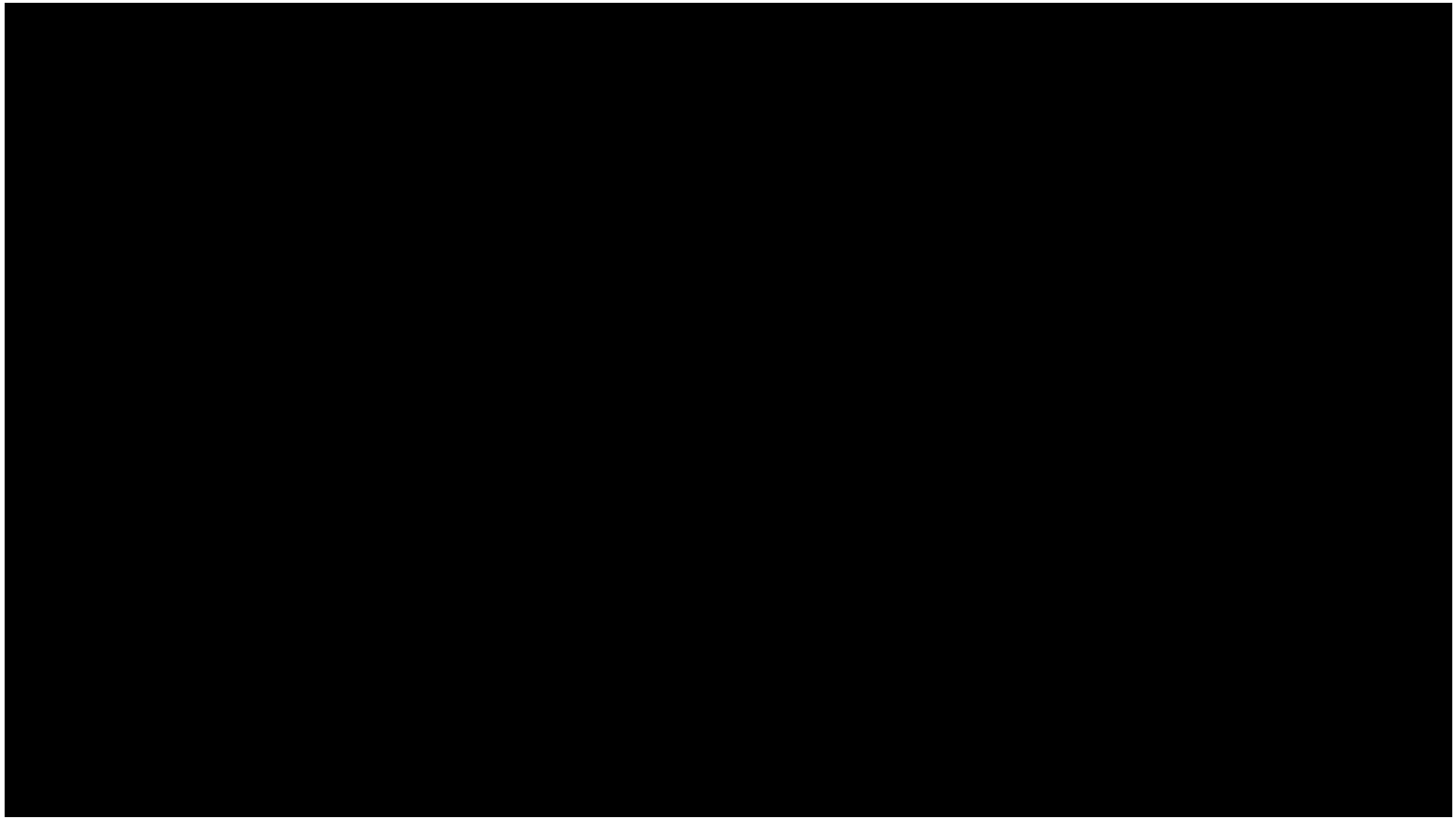
Tension Test

Normal Stress-Strain Diagram

Normal Stress-Strain Diagram