

Lab 7: Tensile Testing and Mechanical Properties

Section U

Group 2

List of Materials:

The Elastic Modulus of Nylon Fishing Line

- Nylon fishing line

Tensile Properties of Steel, Aluminum and Fiber-Reinforced Polymer (FRP)

- Steel
- Aluminum
- Fiber-Reinforced Polymer (FRP)

List of Equipment:

The Elastic Modulus of Nylon Fishing Line

- Dial calipers
- Gallon jug of water

Tensile Properties of Steel, Aluminum and Fiber-Reinforced Polymer (FRP)

- INSTRU-MET Tensile Testing machine
- Dial Calipers

Detailed Procedure:

The Elastic Modulus of Nylon Fishing Line

- Nylon fishing line hung from the ceiling (approx. 115 in.)
- Measure diameter of fishing line three times using calipers and find the average diameter
- Measure distance from bottom of fishing line to floor and find the length of the line
- Add 1 gallon water jug and calculate elongation

Tensile Properties of Steel, Aluminum and Fiber-Reinforced Polymer (FRP)

- Acquire dimensions of the steel, aluminum and polymer samples
- INSTRU-MET Tensile Testing machine applies force to each sample
- Data for each sample is uploaded as a Stress vs. Strain diagram on Google Drive

Results and Observation:

The Elastic Modulus of Nylon Fishing Line

$$\text{Stress} = \frac{F}{A}$$

$$\text{Strain} = \frac{L_{\text{Elongated}} - L_{\text{Original}}}{L_{\text{Original}}}$$

$$E = \frac{\text{Stress}}{\text{Strain}}$$

$$\text{Area} = \frac{\pi d^2}{4}$$

$$\text{Force} = V \cdot \rho \cdot g$$

$$L_{\text{Original}} = 115 - L_{\text{Line}}$$

d1 (in.)	0.04
d2 (in.)	0.035
d3 (in.)	0.0395
average diameter (in.)	0.0382
Force (lbf)	81.10
Area (in^2)	0.0011
Stress (psi)	70885.69
Original Length (in.)	81
Elongated Length (in.)	82.5
Strain (in./in.)	0.0185
Young's Modulus (E) (psi)	3827827.51

Tensile Properties of Steel, Aluminum and Fiber-Reinforced Polymer (FRP)



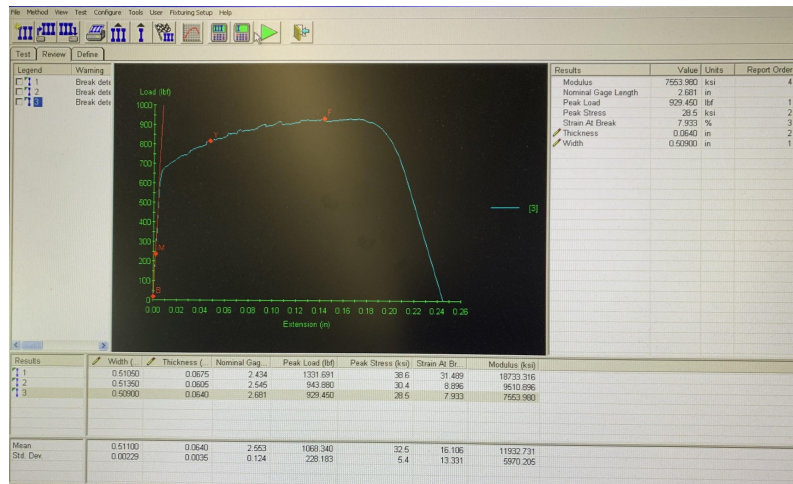
Before



Mid-Stretch



End-Result



Signature:

Bemin Shaker- Signed 11/04/21 11:09 am

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Alexander Gaskins- Signed 11/04/21 11:09am