MP101 - Manufacturing Processing
Lab #1 Mechanical Properties of Materials

Name: _____ **Lab Section:** _____ **Date:** _____

Objective: To acquaint the student with the procedure associated with determining the basic mechanical properties of materials by tensile testing and hardness testing.

Part A: Tensile Test

Procedure:

1. Observe the setup for Tensile Testing as demonstrated by the instructor.

2. Record the following pre-test data:

   a. Specimen material _____
   b. Initial diameter D_o = _____ in
   c. Initial gage length L_o = _____ in

3. Record the following observed test data:

   a. Final diameter D_f = _____ in
   b. Final gage length L_f = _____ in

Analysis:

1. Obtain a copy of the Force-Strain curve and determine the following calculated data (See formulas on page 2):

   a. Initial cross sectional area A_o = _____ in^2
   b. % elongation %elong = _____ %
   c. 0.2% Offset yield strength S_y = _____ psi
   d. Ultimate strength S_u = _____ psi
   e. Modulus of Elasticity E = _____ psi
   f. Breaking Strength S_b = _____ psi

Part B: Hardness Testing

PROCEDURE:

1) Set up and take Rockwell Hardness readings for 2 different items or materials (as given by instructor). Compare readings between the A and B scales.
(Take 5 readings on each scale, each item, then take the average.)

   Set up and take Brinell Hardness readings for the same 2 different items (as given by instructor).

Material	Rockwell R_A	Average	Rockwell R_B	Average	Brinell BHN

2) Compare the Rockwell R_A and R_B average readings, do they agree with the hardness reading comparison chart?

   Compare the values between Brinell Hardness to the Rockwell B hardness.

   How do the values on the hardness reading comparison chart relate to the values of the tensile test?

Formulas

1. Initial cross-sectional area (A_o) $A_o = \left(\frac{\pi}{4}\right) D_o^2$
2. % elongation $\%elong = \left(\frac{L_f - L_o}{L_o}\right) \times 100$
5. Modulus of Elasticity (E): Let σ = Stress and $\in$ = Strain

$$E = \frac{\sigma_2 - \sigma_1}{\varepsilon_2 - \varepsilon_1}$$

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