Baseline Mechanical Testing Characterization

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Baseline Mechanical Testing Characterization
Using ASTM E4 Standard, 5KN Proving Ring and 50KN Proving Ring for the study
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Objectives:
• Collect all the previous ASTM E4 verification data for 5KN and 50KN proving ring
• Verify the ASTM Error data calculation if it conforms with ASTM E4 standards
• Trends the full-scale error data to show how the proving rings have performed over time

Method:
• The previous verification data for the indicated force (A) and applied force (B) were obtained for the different proving rings.
• The data obtained was used to calculate the force percent error and its full-scale error.
• Force percent error \( (E_p) \) was estimated using the formula below:
  \[
  E_p = \left( \frac{A - B}{B} \right)
  \]
  Where A is the force indicated and B is applied force (ASTM)
• The full-scale error was estimated using the formula:
  \[
  E_{full-scale} = \left( \frac{A - B}{5000} \right) 
  \]
  for 5KN proving ring
  \[
  E_{full-scale} = \left( \frac{A - B}{50000} \right) 
  \]
  for 50KN proving ring
• The full-scale error is graphed, and the average full-scale error and its standard deviation are estimated to examine the wear of the proving ring over time.

Conclusion:
• The error trend per date of verification for the 5KN proving ring was inconsistent; hence it was difficult to give a definite conclusion if the proving ring is wearing with time, but the average full error shows there is wear in the proving ring.
• The error trend per date of verification in the 50KN proving ring the show wears with time, but the average full-scale error is still below 0.3%; hence it is working fine.

Keyword:
ASTM: American Society for Testing and Materials
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