



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:

$$E_{full-scale} = \frac{(A-B)}{5000} \quad \text{for 5KN proving ring}$$

$$E_{full-scale} = \frac{(A-B)}{50000} \quad \text{for 50KN proving ring}$$

- 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.

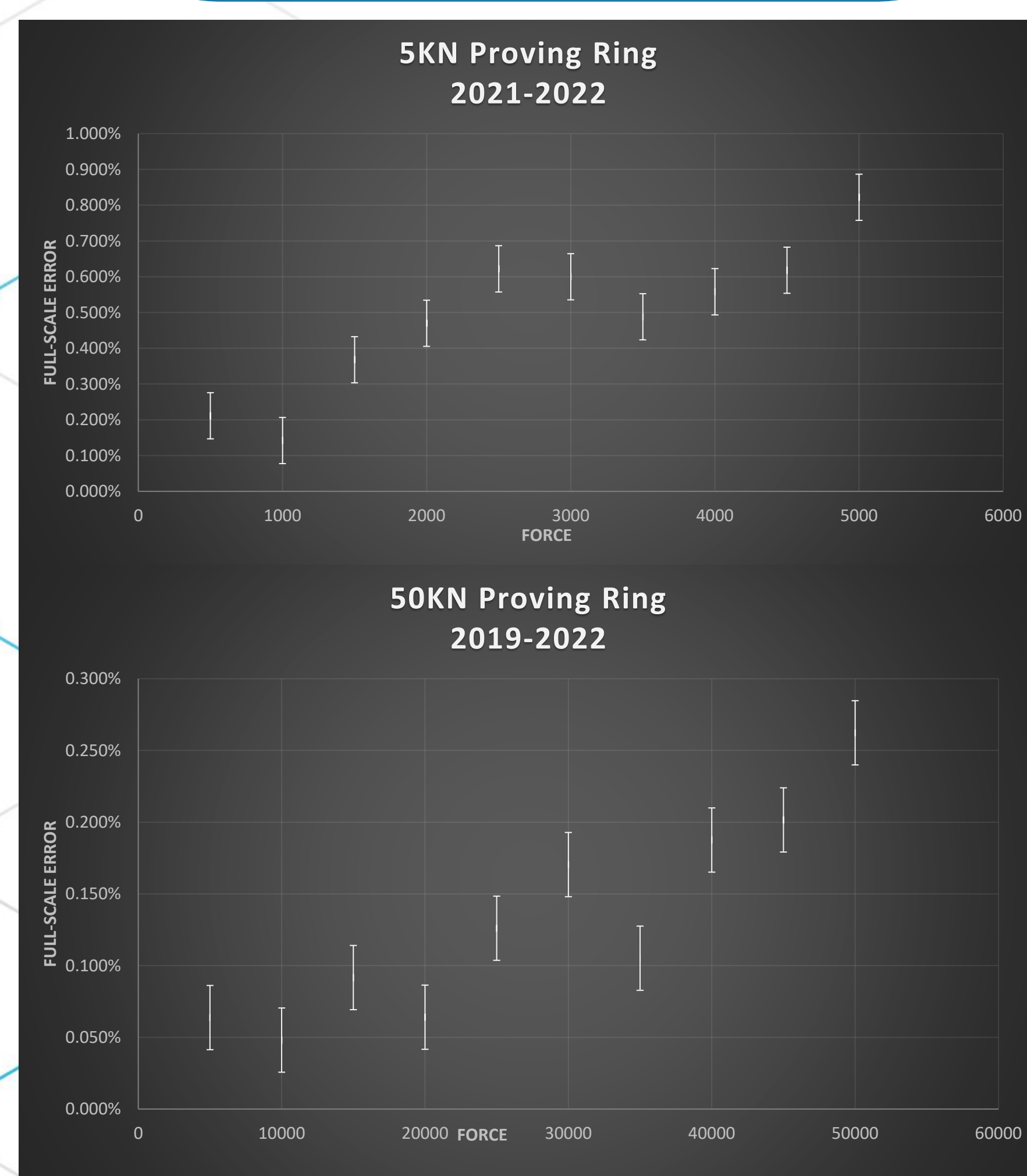


Fig 1: Shows the average of the full-scale error, and the error bars are the standard deviation.

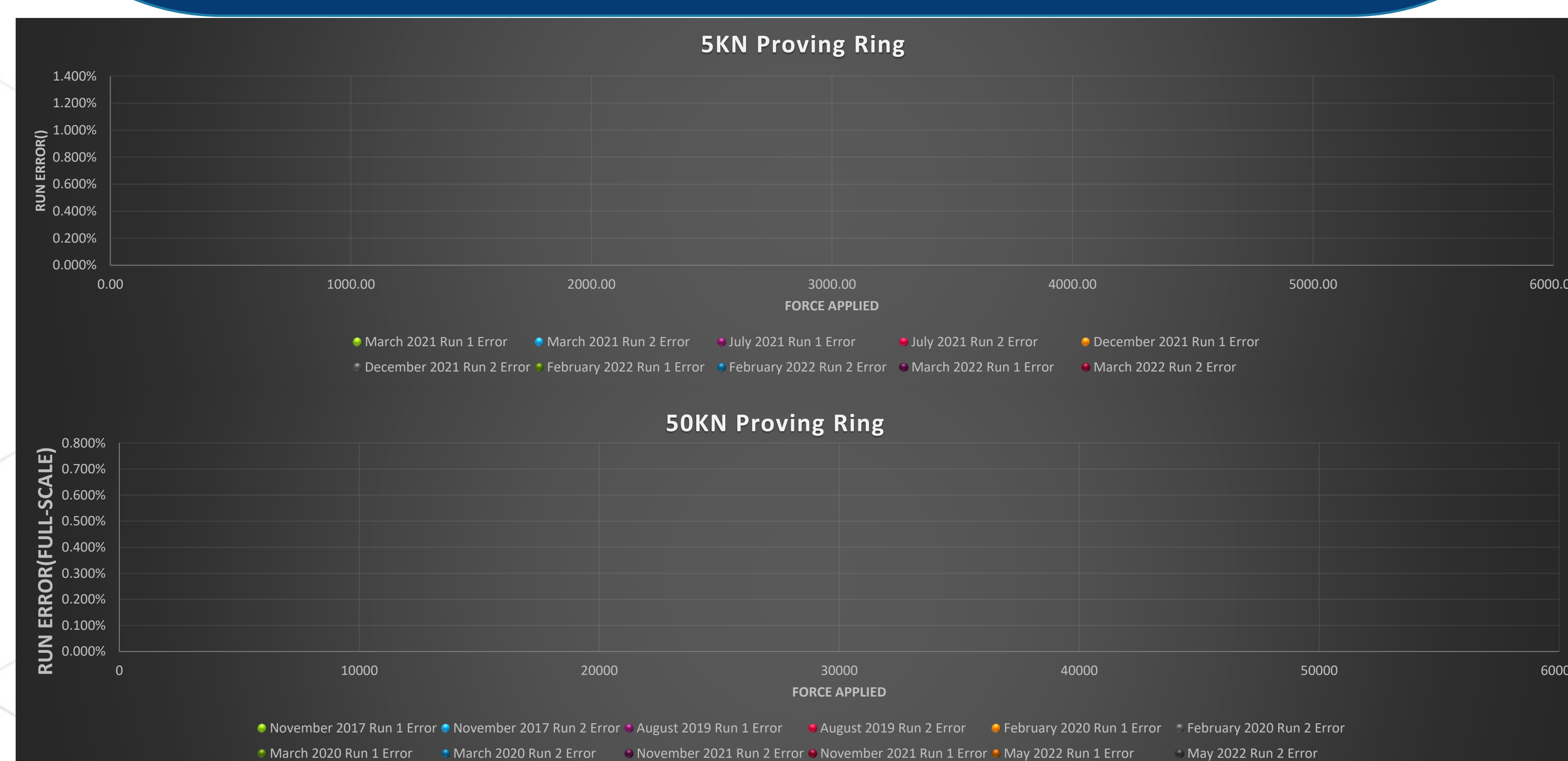


Fig2: Shows the full-scale error vs. force applied trend for the different date.

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
www.inl.gov

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INL Idaho National Laboratory