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The design and development of a force comparator standard machine to provide national traceability in force measurement to industry.

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Abstract content
   (Max 300 words)
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Precise force measurements are important in testing of materials, weighing and balancing of heavy structures such as aircrafts, ships and engineering structures. For these applications, force transducers (artifact) are used to measure the static force generated in the system. Calibration of the transducer is done against force standard devices of higher accuracy traceable, through an unbroken chain of calibrations to the reference standards of force. For South Africa, the national measurement standards for force are a range of force transducers with different capacities ranging from 20kN to 5000kN. These are maintained at the National Metrology Institute of South Africa (NMISA). Dead weight machines are commonly used to realize or generate static force with significantly lower uncertainty. However, they are expensive to procure and maintain. Alternatively force comparator machines can be used to disseminate traceability in force measurements at slightly higher yet acceptable uncertainty. A force comparator standard machine at NMISA was designed and developed to provide national traceability in force. It has been developed to disseminating the unit of force from national level to the user industries in the range of 2kN to 4500kN. This type of force machine is easy to operate and maintain and makes the calibration of commercial force transducers to be economical without significant compromise in the uncertainty. The calibration and measurement capability (CMC) expressed as an uncertainty for the standard force transducers by comparison using this comparator machine was found to be ± 0.03% in the range of 2kN to 200kN for tension and compression, ± 0.04% in the range of 500kN to 1000kN for compression only and ± 0.11 % in the range 1000kN to 4500kN for compression only. The CMC is stated as the standard uncertainty of measurement multiplied by coverage factor of k = 2 at a confidence level of 95.45%.

Apply to be
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No

Level for award
 (Hons, MSc,
   PhD)?

None

Main supervisor (name and email)
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NMISA

Would you like to
 submit a short paper
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 Proceedings (Yes / No)?

No

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