Contribution ID: **47** Type: **Oral**

Characteristics of Linear Variable Differential Transformer(LVDT) Probe for Gauge Blocks Calibration.

Thursday 25 May 2017 09:35 (15 minutes)

The LVDT probe is a very important component used in gauge blocks calibration via a mechanical comparative method. The probe is used to determine the central length difference between a reference gauge block and gauge block under-tested (UTC). Typically, an UTC and a reference gauge block have the same nominal length. However, some gauge blocks UTC are specially made for specific purpose where the reference gauge blocks with the same nominal length are not commercially available. Various reference gauge blocks are wrung in order to provide nominal length the same as that of the UTC. Wringing process is the troublesome step and causes larger measurement uncertainty. The lower accuracy is higher number of gauge block used to create reference gauge block, in order to improve accuracy of measurement, the LVDT probe was used at the longer range where the reference gauge block and the UTC don't need to be the same nominal length. In this paper, characteristics of LVDT probe was investigated as it is related to the accuracy of the measurement result. Errors of LVDT probe came from non-linearity, calibration factor, retrace error, repeatability and maximum difference in length. A pair of gauge block, calculated by the Twyman-Green interferometer, length different range 5 μm to 250 μm was used in the study. Non-linearity of LVDT is evaluated by a simple linear regression model. The non-linearity of LVDT probe, calibration factor, retrace error, repeatability and maximum difference in length are 25 nm, 1.0003, 3 nm, 6 nm and 80 μm, respectively. Therefore, by using this technique, central length difference between the 2 gauge blocks up to 80 μm can be calibrated with the uncertainty due to non-linearity of 15 nm The experiment shows the large error of retrace closes to 0.15 μm at 250 μm. This can be determined the maximum difference in length to calibrate gauge blocks at difference nominal lengths. The measurement uncertainty of non-linearity is evaluated and it is close to 15 nm.

Author: Mr PEINGBANGYANG, Samana (National Institute of Metrology (Thailand))

Co-author: Mr WONGSAROJ, Jedsada (National Institute of Metrology (Thailand))

Presenter: Mr PEINGBANGYANG, Samana (National Institute of Metrology (Thailand))

Session Classification: A8: Instrument I

Track Classification: Instrumentation, Metrology and Standards