

## **Coordinate-Based Evaluation of Two Dimensional Artefact Calibration Value as the Reference Standards for Coordinate Measuring Machines**

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**Abstract:** Two dimensional standards are important materials which are used in the calibration and the verification of coordinate measuring machines. In several countries, the national metrology institutes or accredited laboratories provide the calibration services of the two dimensional standards such as ball plates, hole plates and grid plates. The metrological equivalence of the measurement standards among the calibration providers is validated through the key comparison program. In the previous key comparison for a ball plate and a hole plate, the equivalences among the participants' calibration results were verified on the distances between the No. 1 ball/hole (i.e., the origins of the workpiece coordinates) and other balls/holes on the plates respectively. The essential measurands of the two dimensional standards are the coordinates of the feature points, however, the measurement equivalences on them have not been verified. In this study, the authors propose the coordinates-based evaluation of the reference values and their uncertainty in two dimensional standard calibration comparison.

**Keywords:** Coordinate measuring machine; Calibration; Measurement equivalence; Calibration uncertainty