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A New Proficiency Testing (PT) Evaluation for Conformity Assessment of Roughness Measuring Instruments

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Surface finishing is an important process for manufacturing industries. Precise surface roughness measurement is crucial as it has a direct effect on surface quality. In Thailand, the National Institute of Metrology of Thailand (NIMT) provides reference roughness standards and roughness measuring instruments. NIMT also conduct Proficiency Testing (PT), which is an important process for conformity assessment. PT assesses a laboratory's ability to perform a measurement and is one way to improve the measurement quality of laboratories. In this work, PT was conducted based on a portable roughness tester as a standard measuring instrument. There were seven calibration laboratories from Thailand that participated in the PT with a technical protocol that was designed by NIMT. The roughness tester was provided by NIMT. Two roughness standards with different roughness values ($R_a \leq 1$ and $R_a > 1$) were prepared by each calibration laboratory. The PT measurands were common roughness parameters such as R_a , R_z and R_{sm} . As the roughness measuring instrument is based on LVDTs, we propose here a new proficiency testing evaluation which involves the calibration of the measuring instrument in the PT evaluation procedure. The PT results, according to ISO/IEC 17043, shows that six out of the seven participating laboratories indicated satisfactory performance ($|En| \leq 1$) where the measurement uncertainty was based on a 95% confidence level. The PT results and evaluation procedure for conformity assessment of the roughness measuring instrument are presented. Finally, measurement techniques to improve measurement quality are recommended.

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