

Evaluation of stability and z-axis scale of surface roughness calibration system in KRISS

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The purposes of this article are to determine the stabilities of three roughness measurement instruments in KRISS and to evaluate uncertainty and compare the z-axis scale in each instrument in order to determine the accuracy of them. Two kinds of stylus instruments manufactured by Taylor Hobson Co., which are Form Talysurf Series 2 and Nanostep II, are used for measurement of step height and surface texture^{1, 2}. The other is an optical profiler (Wyko NT8000) manufactured by Veeco³.

The Form Talysurf and Nanostep always calibrated with the reference step heights before use. The step gauge, Mitutoyo Code No. 178-610, consist of five steps with nominal heights are 1, 2, 5 and 10 μm . These step heights are measured by gauge block interferometer, and certainly traceable to one of the wavelength realization of the meter definition.

To determine the stability of each instrument, we measured periodically the other reference step height specimens. They have difference nominal steps: 8 μm (serial 4343-26-11); 2.166 μm (serial 19631); 940nm (serial 4761-20-23); and 88nm (serial 4761-31-19). Step heights are evaluated five times according to the measuring plan with 5 positions. The results will be tabulated and analyzed according to the standard calibration procedure.⁴

In order to compare the z-axis of each instruments, we compared the individual measured values in each specimen with the nominal values to determine the accuracy of each instrument. After that, we are calculated the uncertainties for them.

References

1. The Form Talysurf Series 2, Operator's Handbook
2. Operator's handbook for NanoStep 2
3. Wyko NT8000 Series Profilors, Setup and operation Guide
4. Standard Calibration Procedure of Roughness Standards with Stylus Profilometer