

Machinery and Manufacturing

 Title

Measurement device and method for geometric errors of linear stage

Abstract

In this patent, a positioning error measurement system based on geometric optics rather than interference principle is provided, However, when the stage moves along the linear stage, there will produce other geometric errors besides positioning error. Accordingly, the proposed measurement system is provided which can measure not only positioning error but multi-degrees-of-freedom geometric errors of the linear stage simultaneously. A geometric errors measurement system for linear stage consists of a fixed module and a moving module. The fixed module is set outside the measured linear stage. The moving module is placed on the measured linear stage. A laser beam emitted from the fixed module hits the moving module and returns position sensitive detectors (PSDs) on the fixed part. Through the movement of the linear stage, the laser beam will be deflected, and the PSDs can read the position changes and utilize the change in values in the mathematical model. Finally, the geometric errors of the measured linear guide can be calculated.

Benefits

The proposed measurement system is capable of measuring all multi-degrees-of- freedom geometric errors at the same time as a single measurement. Thus, it greatly reduces the measuring time. Furthermore, for machine tool manufacturers and the companies utilizing machine tools , the proposed system is the better option than laser interferometer because of the simple structure and higher cost performance ratio.

Industry Categories

The proposed measurement system can measure all geometric errors of linear stage , making it the ideal calibration solution for any manufacturing facility that utilizes machine tools.

Keywords

measurement 、 multi-degree-of-freedom geometric errors 、 linear stage 、 slanting angle 、 distance measurement

Patent No.

TW I739403 、 US 11,335,580

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