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A Control Scheme of Thermal Growth Compensator for Motorized Spindles

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Abstract

An improving control scheme of thermal growth compensation for motorized spindles is designed in this paper. In this approach, a dual displacement measurement meter is applied as a compensatory device for spindle thermal growth compensation, which can reduce the measurement error dramatically from single measurement device. It is an external direct checking device and has been considered as one of the best checking device of spindle thermal growth. However, the non-flat surface of spindle nose, fluctuating measurement distance and the tiny measurement meter can hardly be fitted rectangularly to spindle nose surface which creates a certain percentage of error when the single displacement measurement meter is applied. In this design, a differential amplifier will greatly enhance the linear output voltage fed back from dual measurement meter to the CPU and provide a high sensitive level of compensation. Based on this design, the machining tolerance can be improved greatly and machining time is reduced. Therefore, the quality of the machine and the cutting performance can be upgraded.

Key words : Differential amplifier; Measurement error;

Thermal growth compensation