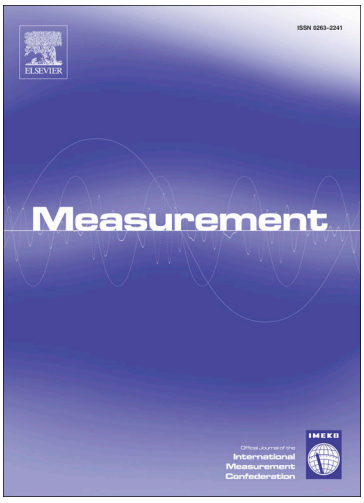

Study of CCD Vision-based Monitoring System for NC Lathes

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Study of CCD Vision-based Monitoring System for NC Lathes

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Abstract: Reliability of machining system plays an important role in product quality. Although the modern numerical control tools that have their own sensors to do condition monitor, could do a kinds of tasks with high accuracy, but accident defects still are unavoidable and unpredictable, such as deformation in spindle and workpiece due to great force, heat and vibration. It sometimes results in heavy production quality problem, particular for some important parts or components with high precise requirement. To address this difficulty, a vision based online monitoring system is proposed. In this system, an object called as "mark" that is set up on the moving components of the cutter is used to help to locate its position during machining, and a laser is set up and applied to trace the change of position of workpiece center axis. Since the mark always is seen by the camera (optical sensor) in whole cutting procedure, current position of the cutter at any second can be recorded for the monitoring purpose. Considering that the path of the mark obtained from the sequences of images should match the desired one in fault-free condition, the accident fault can be recognized by checking their consistency. To demonstrate the validation, a numerical experiment is carried out for the verification in theory, and a test part is used to validate the proposed approach in practice.

Key words: condition monitoring; machining; calibration; optical measurement.

1. Introduction

In any manufacturing industry, machine tools play a very important role in the production of products. The dimensional and geometrical accuracy and surface finish

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