Technology Commercialization Opportunity

(CBTCM) Calibration-Based Tool Condition Monitoring System for Repetitive Machining Operations

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Background and Technology Description
Machining automation is one of the primary technology advancements that have assisted in achieving high production efficiency to meet the current demand of high-precision production in huge quantities. Although a lot of research works contribute significantly to achieve overall efficiency, a tool condition monitoring system is still needed to achieve reduced machine downtime and tooling costs.

Nowadays, machining processes performed in industrial scenarios are pre-programmed under very broad cutting conditions and various operation environments, and more and more types of cutting tools and workpiece materials are available to be selected based on specific applications of parts. Thus, the effective tool condition monitoring system requires large flexibility and adaptability to perform monitoring under above stated machining conditions. In addition, these application scenarios require a simple solution which can be employed with ease and low cost. Furthermore, it is realized that, even though large variations in machining operations exist, typically mass production facilities require repeatability in the process in order to increase productivity, reduce setup time and improve quality, which has not yet been utilized to simplify the monitoring process.

The present invention proposes a calibration-based tool condition monitoring system for repetitive machining operations to enable monitoring of cutting tool conditions. We use the combination of a calibration procedure and a condition similarity analysis, which can all be applied to various machine tools, cutting tools, workpiece materials, and complex toolpaths.

Keywords: Calibration-Based, Tool Condition Monitoring, Repetitive Machining Operations

Technology Readiness
The calibration-based tool condition monitoring system is currently at the concept stage.

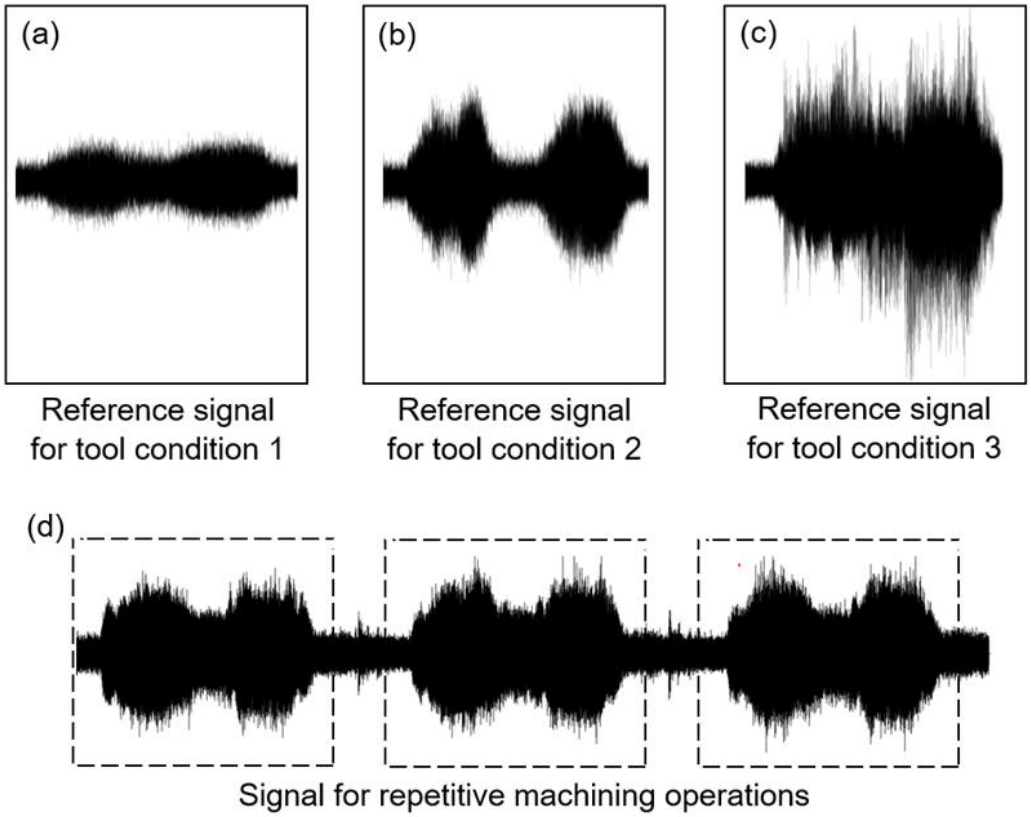
Idea	Concept	Prototype	Alpha Version	Beta Version	Released

RIT developers will work with licensees to move the design to a commercial product.

Intellectual Property
This technology is the subject of a US patent pending application.

Applications

The figure below presents one application of the calibration-based tool condition monitoring system.



Reference signals (a, b, and c) are generated by cutting tools with different conditions during the calibration procedure. By comparing the signal for actual repetitive machining operations (d) with the signals for different tool conditions (a, b, and c), it can be realized that the actual tool condition should be between tool conditions 2 and 3 and closer to the condition 2.

Target Customers

- Manufacturing companies, who use various types of machine tools
- Machine tool manufacturers
- Manufacturing monitoring development companies

Opportunity

RIT's Intellectual Property Management Office (IPMO) is interested in working with qualified parties who are interested in the commercialization of this novel tool condition monitoring system. Arrangement types include licensing the technology to existing organizations or to new organizations.

Contact

Those interested in learning more about this opportunity should contact:

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