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# Hybrid Approach for Onsite Monitoring and Anomaly Detection of Cutting Tool Life

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## Abstract

Data-driven prediction of machine tool downtime is key to improving the availability and effective life span of machine tools. However, existing methods lack the incorporation of domain-specific knowledge into recognition algorithms for feature extraction. To utilize this content-rich information flow from embedded sensors, a hybrid model prediction method based on deep learning is proposed herein. A deep residual network with wavelet packet transform is constructed to predict the remaining tool life and detect anomalies. Experimental studies using machining sound signals conducted on a four-axis micro-grinding machine tool have demonstrated the effectiveness of the proposed prediction method.

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