Development of Cloud Computing Based Intelligent Integrated Manufacturing System

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Abstract
A cloud computing based intelligent integrated manufacturing system was proposed. In order to develop an intelligent integrated manufacturing system, it is necessary to build up many database servers, which makes the system very expensive. To overcome this problem, we developed a cloud computing based system for quality analysis of the intelligent integrated manufacturing system. The architecture of the system contains: i) Cloud database structure; ii) Quality analysis engine; iii) Real-time human-machine interface. We use Microsoft SQL Azure as the cloud database to scatter and store data on redundant disk arrays. The quality analysis engine contains 12 quality input factors and 16 prediction outputs. It is used to predict manufacturing quality using neural networks. ASP.NET was used to program a human-machine interface with real-time data updating, providing a real-time data display available anytime, anywhere through the interface. Through experiments we found that that by using many database servers, improvement in a general traditional manufacturing system can be realized. The proven advantages of low cost, performance scalability, mobile management and maintenance facilities, make it important to develop a cloud computing based intelligent integrated manufacturing system using the analysis engine to predict manufacturing quality.

Keywords: Intelligent Integrated Manufacturing, Quality Analysis Engine, Neural Network, Cloud Computing.

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1. INTRODUCTION
For integrated manufacturing systems, system integration is primarily focused on information synchronization and process automation to improve manufacturing efficiency and reduce costs. The intelligent manufacturing system was developed by the intelligent approach of manufacturing systems for remote monitoring, performance evaluation, fault diagnosis, quality prediction and real-time maintenance.

In 2008, Wilson Wang [1] used expand neural fuzzy (ENF) to do prediction training, and compared the neural fuzzy system with intelligent fuzzy device state detection. Most machinery deterioration history consists of three periods: (1) the normal operation period (2) the failure stage and (3) monitoring thresholds for initial and advanced damage, respectively. In 2009, Zhou and Zhang [2] presented a new concept called iDiagnosis - an intelligent diagnosis, prognosis, manufacturing system condition and job execution capability assessment system based on the Internet, web services and agent technologies. In 2010, Zhai and Hu [3] designed and implemented a CNC machine remote monitoring control system based on embedded internet. Based on the embedded ARM Cortex-M microprocessor LPC1114 and Ethernet controller ENC28J60, an embedded Ethernet communication module was constructed to facilitate the field monitoring, controlling host and the various CNC machine tools. The system can perform NC machine tool remote monitoring and controlling. In 2008, Huang

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