Predictive Maintenance in Bearing Production based on Machine Condition and Product Quality Data using Machine Learning Approach

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Abstract

The Indonesian government has committed to build a strong manufacturing industry with the launch of Making Indonesia 4.0 in April 2018 to increase productivity and to improve Indonesia's competitiveness globally. The priority industrial sectors such as automotive industry are expected to implement industry 4.0 technologies in their production, such as the internet of things (IoT), big data analytics and artificial intelligence.

One implementation of Industry 4.0 solutions is predictive maintenance. There are two types of maintenance carried out in the manufacturing industry currently, namely corrective maintenance and preventive maintenance. Both types of maintenance have weaknesses, such as unpredicted machine breakdowns which causes production stop or unneeded replacement of machine spart parts which causes high maintenance cost. Therefore, it is necessary to apply predictive maintenance using sensor data that is analyzed by machine learning model.

Bearing industry is one of important suppliers to priority industrial sectors. Ball bearing production with critical machines needs to implement predictive maintenance, to be competitive and to fulfill customer quality requirements. This research aims to determine which machine learning approach to be implemented in the ball bearing production. The chosen model will be developed based on machine condition data from sensors and product quality information.

This research has focus on answering questions such as how machine learning models can ensure the manufacturing process to produce the product that meets quality standard. At the same time predictive maintenance is expected to reduce machine down time and maintenance cost compared to corrective and preventive maintenance.

Keywords

Industry 4.0, Predictive Maintenance, Condition Monitoring, Machine Learning, Deep Learning, Product Quality, Production, Bearing

Biographies

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