

# Impact of Signal Features on Machine Learning-Based Tool Condition Classification in the Milling Chipboard Process

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This study investigates the impact of various signal features on machine learning-based tool condition classification in the milling chipboard process. Different machine learning models such as XGBoost, Gradient Boosting, Decision Tree and Random Forest have been applied and the signal features have been ranked based on their importance. The highest ranking signal was 'DataLow\_0', contributing over 16% of the total ranking. 'DataCurrent\_2' and 'DataLow\_1' were identified as the second and third most influential signals. On the contrary, 'DataCurrent\_1' was found to be the least influential. It's essential to consider that the relative importance of these signals can vary depending on the specific tool condition and classifier used. Although signal importance rankings provide a relative understanding of these signals, further studies applying exploratory analysis and model interpretation techniques are recommended for an explicit understanding of the nature of the relationships between these signals and the target classification. In conclusion, understanding the influence of signal features is vital for effective design and optimization of machine learning models for tool condition classification in the milling chipboard process.

**Author:** Prof. KUREK, Jarosław (Warsaw University of Life Sciences, Institute of Information Technology, Department of Artificial Intelligence)

**Co-authors:** Dr SZYMANOWSKI, Karol (Warsaw University of Life Sciences, Institute of Wood Sciences and Furniture, Department of Mechanical Processing of Wood); Mrs PRZYBYŚ-MALACZEK, Agata (Warsaw University of Life Sciences, Institute of Information Technology, Department of Artificial Intelligence)

**Presenter:** Prof. KUREK, Jarosław (Warsaw University of Life Sciences, Institute of Information Technology, Department of Artificial Intelligence)

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