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ML based process monitoring of semi-automatic drilling processes

Since one third of rivet holes during aircraft assembly are produced with semi-automatic drilling units, in this work reliable and efficient methods for process state prediction using Machine Learning (ML) classification methods were developed for this application. Process states were holistically varied in the experiments, gathering motor current and machine vibration data. These data were used as input to identify the optimal combination of five data feature preparation and nine ML methods for process state prediction. K-nearest-neighbour, decision tree and artificial neural network models provided reliable predictions of the process states: workpiece material, rotational speed, feed, peck-feed amplitude and lubrication state. Data preprocessing through sequential feature selection and principal components analysis proved to be favourably for these applications.

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Keywords

Process Monitoring, Machine Learning, Drilling, Aircraft Assembly

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