Identifiant de la contribution : **224** Type : **non spécifié**

”FDP1#2 - CANCELLED - Cyclic monitoring of the Remaining Useful Life RUL for the Bearing fault prognosis”

mardi 11 juillet 2023 14:20 (20)

Over the last decades, Prognostics has played a dominant role in preventive maintenance in manufacturing. It usually involves estimating the Remaining Useful Life (RUL) or the Time to Failure (TTF) of mechanical systems. In Prognosis, the analysis could often be purely data-driven (Trend Analysis). It requires a vast data set and offers the double benefit of being both applicable in many systems and being relatively precise. The published works demonstrate that the Trend analysis tends to be the most adopted method in prognosis, most notably for bearing fault. Nonetheless, other learning techniques such as Bayesian Network, Convolutional Neuronal Network or the Support Vector Machine (SVM) [1] are also applied to predict the evolution of the bearing’s degradation and forecast the exact time of its failure in hours and minutes. In this paper, we implemented the « Threshold Data » approach, considering the limited amount of run-to-failure data and the fact that the Bearings’ features are suitable for a degradation model creation [2]. Moreover, this study sheds light on Cyclic Prediction Method, intending to prove that cyclic monitoring could also estimate the RUL for the bearing fault with the integrity of data, and precisely track the degradation. Firstly, different filters are compared: Simple Moving Average (SMA), Cumulative Moving Average (CMA) and Exponential Moving Average (EMA). After that, both the Principal Component Analysis (PCA) and Model Fitting are deployed in order to construct a degradation model and fit the exponential function to the last n data. Finally, using the selected indicators, we managed to estimate the RUL of the bearing cyclically, thus exhibiting accurate predictions throughout each phase of its life till failure. Keywords: Prognosis, Preventive Maintenance, Remaining Useful Life (RUL), Cyclic monitoring. References: Dong S., Luo T. (2013), €œBearing degradation process prediction based on the PCA and optimized LS-SVM model,€ Meas. J. Int. Meas. Confed, 46, 9, pp. 3143€“3152 Hai Q., Jay L., Jing L. (2006), €œWavelet Filter-based Weak Signature Detection Method and its Application on Roller Bearing Prognostics.€ Journal of Sound and Vibration, 289, pp.1066-1090

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Classification par session : Survishno 5 / Fault Diagnostics & prognostics 1