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”FLEET#4 - Results on Experimental Data Analysis of Independent Cart Systems in Non-Stationary Conditions”

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This paper presents an analysis of the vibration data obtained from an independent cart system. The study focuses on comparing the vibration data collected with and without the presence of outer race faults, while the 12 roller cart/mover maneuvers at different speeds. Vibration data was captured using accelerometers positioned along the system and acquired through the Beckhoff PLC and National Instrumentation data acquisition systems. The data acquisition process involved running the mover under no-load conditions with and without an outer race fault, at speeds of 500 mm/s and 3000 mm/s. The analysis revealed valuable insights into the behavior and characteristics of the signals under different conditions. Results indicated that envelope analysis in the frequency domain is effective in identifying fundamental frequencies related to the system’s dynamics. The calculated frequencies associated with the rotational speed of the mover and the outer race frequency provided a further understanding of the system’s behavior.Despite some frequency smearing due to the the non-stationary conditions, fault frequencies were identifiable. The maximum peak hold plots demonstrated that at low speeds, the fault-related frequencies were more susceptible to noise interference, while at higher speeds, the fault frequencies became more prominent and distinguishable. This study contributes to the overall understanding and diagnosis of potential faults within independent cart systems, with further analysis planned to precisely identify the fault frequencies.

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