Determining the Health of eDCT gearboxes using a data-driven approach

Document status and date:
Published: 02/10/2023

Document Version:
Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:

• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
• The final author version and the galley proof are versions of the publication after peer review.
• The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

Download date: 17. Nov. 2023

Public Summary

Punch Powertrain manufactures and delivers many automotive transmissions to customers annually. These transmissions endure a wide range of dynamic load conditions over their operational lifespan. Factors like driver behaviour, dynamic torque demands, road conditions, and manufacturing variations contribute to the variability in these conditions. As a result, tracing failures in the transmissions and their components becomes challenging and unpredictable. Gear shifts and sudden accelerations during vehicle operation can lead to stress concentrations within the transmission, making it difficult to accurately anticipate potential failures. To address these issues, the goal of diagnostics in automatic transmissions is to enhance system availability in case of component failure. However, the existing diagnostics software lacks the capability to store a history of failures or faults in the transmission.

To enhance transmission reliability and reduce maintenance costs, this project aimed to develop a predictive maintenance system for automotive transmissions. The objective was to monitor extreme operating conditions, predict potential failures, and prompt preventive maintenance of the transmissions. The Condition Monitoring Model identified crucial indicators from various signals within the transmission system. These indicators were continuously monitored using a thresholding system applied to signals from sensors and actuators within the transmission. Subsequently, a Predictive Maintenance Model was created, leveraging machine learning techniques to detect anomalies and predict potential failures based on historical test bench data.

This project laid the foundation for improved transmission health monitoring, making significant contributions to vehicle safety and reliability. In summary, the project introduced a method to enhance the reliability of automotive transmissions by proactively detecting faults and facilitating timely maintenance. This system not only elevates vehicle safety and longevity but also enhances the overall driving experience, delivering substantial benefits to both manufacturers and end-users.