Semi-Automatic Measurement System for Drivetrain Characterizations

Public Summary

EngD Thesis: Semi-Automatic Measurement system for Drivetrain Characterizations: Design & Implementation

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The EngD thesis titled *Semi-Automatic Measurement system for Drivetrain Characterizations: Design & Implementation*, was completed in collaboration with and for Philips R&D at Drachten. Philips Grooming and Beauty Innovation department at Drachten focuses on developing hair removal appliances for the consumer market like shavers, trimmers and epilators. These appliances must have a good performance and reliability, all fitting within a nice design to be successful in the consumer market. The appliances need to be understood accurately to be able to make good trade-offs of cost and quality. In the case of the drivetrain of these appliances, this accurate understanding translates to the accurate and reliable measurements of the drivetrain characteristics.

The goal of the EngD project was to design and build a new measurement system for the drivetrain modules like motors, gears, seal cups and cutting elements. This project investigated alternatives for the high-level system architecture, like Benchtop systems and PXI based systems. This project also investigated the design and integration of various hardware systems like Power supply units, Voltage-current-speed measurement systems, DC load controller, Speed controller and Relay switching systems. This project also developed a software controller based on Python to automate the electronic instruments for the measurement process.

This project had various challenges and initially required quick mastering of the theoretical aspects and collaborative works with experts to derive the measurement principles. The most challenging aspect was to gain the required practical skills to integrate the relevant hardware to achieve final level of accuracy in the measurements.

The verification of the system proved it to be a great success in terms of achieving an accurate and reliable system enabling the final objective of drivetrain characterizations. From the results, the system is also found to be a strong baseline measurement system that is scalable in the future to characterize the drivetrain modules enabling better trade-off decisions during the product development.