

Faculty of Engineering

Summer Research Program 2024-2025

Project Title: Gearbox Topology Comparison – test, characterize and compare suitability of state of the art epicyclic and cycloidal gearboxes for electric traction and robotics applications

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Objectives

- Test and characterize key gearbox parameters for a range of design topologies (Epicyclic and Cycloidal)
 - Load and speed dependent losses
 - Load and speed dependent noise frequencies and magnitudes
 - Backlash and compliance
 - Lubrication effects on losses
 - Wear and material fatigue behaviours (TBD)
 - Overload and failure behaviours (TBD)
- Model and compensate internal loss and inertia to maintain input : output linearity
 - Verify using steady state loaded and step testing
- Compare measured performance to assess suitability for electric traction and robotics application requirements

Project Details

Gearboxes are critical for many mechanical applications, allowing for speed and torque conversion in rotating systems. These are particularly prevalent in electric traction and robotics systems with different focuses, as electric motors benefit significantly from higher operating speeds due to the lower torque requirements. The ideal gearbox achieves a high reduction, balanced with low loss, wear, cost, size and noise. Additionally parameters like backlash, compliance, inertia and failure modes / predictability are also considered.

Prerequisites

Experience with powertrain testing, gearing, vehicle or physical robotic systems preferred.

Additional Information

N/A