PERFORMANCE ENHANCEMENT OF HARMONIC DRIVES THROUGH TOOTH PROFILE OPTIMISATION

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BACHELOR THESIS | MASTER THESIS | ADP

AERO SPACE ENG. | MECH. ENG.

- Sustainable Use of Resources
- Clean Energy and Process Engineering
- Future Automotive Systems
- Digital Based Production and Robotics

Motivation

At VIAME, we are developing new concepts for lightweight design in several sectors (transportation, energy, machining,…). This research project will be focused on detailed investigations on the tooth profile, Regarding influence of tooth profile parameters on harmonic drive performance, not only macro parameters but also micro parameters, such as surface roughness and contact geometry of the tooth on lubrication will be considered. More specifically, a detailed model for harmonic drive will be established, considering factors of lubrication, relative velocity, meshing point load, tooth contact geometry and surface roughness, etc. Based on design of various harmonic drive prototypes, tooth profile modifications and their impact will be evaluated with both simulations and additional experiments The thesis will be performed remotely at Ecole Central de Lyon, France.

Tasks

- Modelling approaches and optimisation solutions for harmonic drives
- Investigating the impacts of parameters on kinematic and dynamic behaviour of harmonic drives
- Experimental validation of the selected modelling approach and the optimisation solutions of tooth profile

Desirable

- Experience in FEM simulation
- Experience in metamodelisation

Start

September 2025

CENTRALE LYON