

STRUCTURAL OPTIMIZATION AND SUSTAINABLE MANUFACTURING OF A HARMONIC DRIVE

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TECHNISCHE
UNIVERSITÄT
DARMSTADT



BACHELOR THESIS



MASTER THESIS



ADP



AERO SPACE ENG.



MECH. ENG.

- Robots
- Light weight design
- Additive Manufacturing



Motivation

The objective of this thesis is to apply new manufacturing techniques to deal with the unique characteristics of the primary component of harmonic drive, i.e. flexspline, for high torsional rigidity and high radial flexibility. More specifically, sustainable manufacturing approaches, such as 3D printing methodologies should combine various green material choices to efficiently reach an optimized shaping of the primary components. With software-based design approach, the student will evaluate the impact of lightweight materials on efficiency, load capacity, costs, safety, and lifetime, while maintaining high precision and compactness. Thesis will be performed **remotely** with UNINA, Naples.

Tasks

- Literature research
- Influence of the lightweight material and geometry on the transmission performance

Desirable:

- Experience in structural design
- CAD/FEM basic knowledge

Start

September 2025



UNIVERSITÀ DEGLI STUDI DI NAPOLI
FEDERICO II

