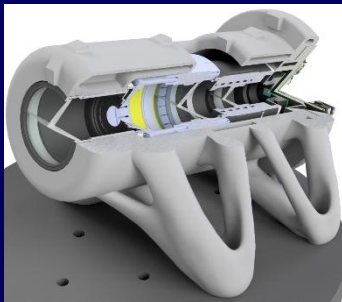


## Master thesis

Call for Proposals:  
10.12.2025

Start: Immediately



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## Experimental and numerical analysis of a particle damped camera housing for vibration sensitive optical systems

### Motivation

The Institute for Product Development and Device Construction is researching additive manufacturing processes aimed at functional and design optimization. A particular focus is on additively manufactured camera housings with integrated particle damping structures, which aim to improve the vibration behavior and image stability of optical systems for demanding applications.

In this master's thesis, the task is to develop and calibrate numerical models for two camera housing designs (one full material and one with integrated particle dampers) using existing experimental data. Building on existing beam experiments and an optical test setup, a finite element model will be used to link structural vibration behavior with optical performance under excitation.

### Potential Work Packages

- Literature research on
  - I. Modelling and calibration of damping in additively manufactured and particle filled structures with existing parameters
  - II. Methods for coupling structural dynamics and optical performance metrics
- Review and consolidation of existing experimental results from beam and housing tests
- Development of a finite element model of the camera housing for both design variants
- Integration of an equivalent damping model derived from beam experiments into the numerical model
- Comparison of simulated and measured frequency responses, identification and calibration of key modes
- Correlation of structural results with optical measurements from the vibration test setup, for example line of sight jitter

### Your Profile

- Solid knowledge of finite element methods and structural dynamics
- Interest in additive manufacturing, vibration and optical systems
- Strong interest in numerical simulation and modelling
- Experience with simulation tools, for example ANSYS or Abaqus, is an advantage
- Basic skills in MATLAB or Python for data processing and result evaluation
- Independent, structured and reliable working style
- Enjoyment of scientific work, analysis and writing

Have we sparked your interest? If so, we look forward to receiving your application.