

# Deformation Measurement using Photogrammetry

Student Thesis at eRC-System GmbH: Aerodynamics Team

We are looking for a motivated student to carry out a student thesis project on the topic of "Deformation Measurement using Photogrammetry". The aim of the project is to investigate the deformation of aircraft structures using photogrammetry techniques. Two possible use cases could be the deformation of the wing in flight or propeller blades in rotation (see Figure 1).

The successful candidate will be responsible for designing and conducting experiments to capture images of aircraft structures in various states of deformation. The student will also be responsible for the software to process the images to generate 3D models and measure their deformation.

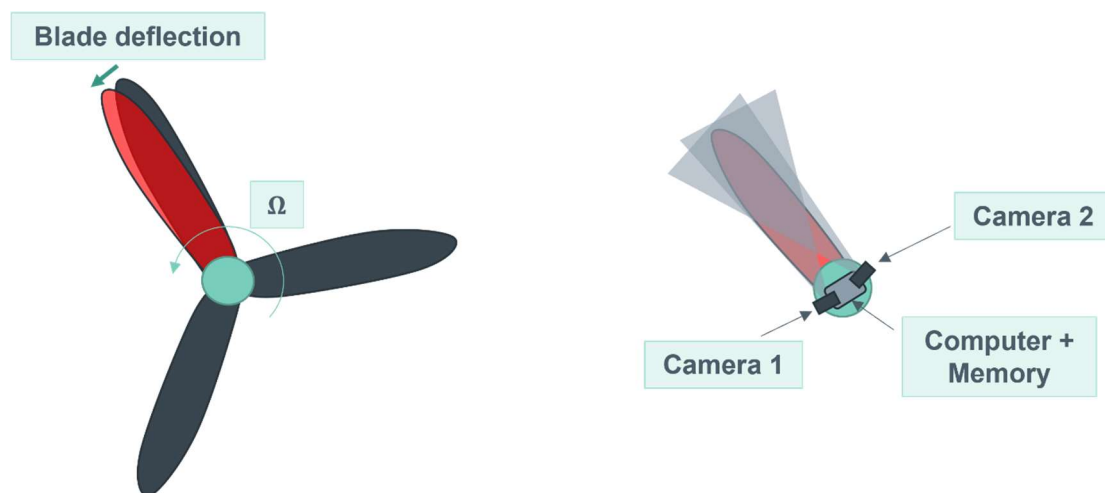


Figure 1: Sketch of one possible use case: propeller blade deformation and rotating photogrammetry setup.

## Requirements:

- Student in a relevant field such as mechanical engineering, aerospace engineering, or physics
- Familiarity with photogrammetry techniques and software
- Basic knowledge of aerodynamics and structural mechanics
- Ability to work independently and collaborate with a team
- Good written and verbal communication skills in English
- The study project is expected to take approximately 6 months and will be carried out at eRC-System GmbH in the Aerodynamics team. The successful candidate will receive guidance and support from experienced researchers.

## Work packages:

1. Literature review and specification sheet:  
Conduct a review of existing literature on photogrammetry techniques, deformation measurement techniques, and digital image pattern correlation software. Work on a specification sheet for the system to be developed.
2. Hardware setup:  
Design and build a test stand to capture images of static and/or rotating structures in various states of deformation. This includes the installation and calibration of cameras, lighting, and other necessary equipment.
3. Software development and Data processing:  
Develop a digital image pattern correlation software that can automatically detect and measure the deformation. Process the images and measure their deformation. This also includes the calibration of the photogrammetry software.
4. Experimental data collection:  
Conduct experiments to capture images under various loads and deformation conditions. This includes developing experimental protocols, carrying out experiments, and collecting data.
5. Analysis and interpretation:  
Analyze and interpret the experimental data using the results of the digital image pattern correlation. Quantify errors and deviations of the system components.
6. Report writing:  
Write a detailed report documenting the research findings, including the experimental procedures, data analysis, and software development.

**If you are interested in this opportunity, please send your application including a CV, a brief statement of motivation, and a transcript of records to Dr.-Ing. Florian Heckmeier ([heckmeier@erc-system.com](mailto:heckmeier@erc-system.com)).**