

## Evaluation of Fracture Behavior and Failure Criteria of Flax Fiber Reinforced Composites

(Theoretical/Literature)

**Background:** A cabin door of an ultralight helicopter was developed and built with a flax carbon hybrid design. These flax fiber composites have been characterized with experiments on coupon level regarding their tensile properties in various combinations in order to find the fiber/resin combination with the highest strength and stiffness. One of the findings of this study was the influence of resin type and autoclave curing process on the mechanical properties of the flax fiber. The strength and stiffness as well as fracture behavior seems to be highly dependant on these parameters.

This thesis shall investigate the fracture behavior of the flax fiber composite tensile tests by evaluating experimental test data and derive correlations regarding their influences. The findings shall be put into perspective regarding existing failure criteria and aviation standards.

### Work packages:

- Literature research on fracture behavior and failure criteria in regards to flax fiber composites for aviation
- Evaluation of experimental test data: tensile tests (stress-strain relations) and fractured specimens
- Derive correlations and determine influence on material behavior
- Analyze and conclude findings in thesis

**About us:** We are looking for an independent and highly motivated bachelor/master student who wishes to deepen their knowledge in the areas of helicopter design, natural fiber composite materials, structural mechanics. This thesis offer an excellent opportunity to participate in applied and industry-relevant research. If you are interested, please feel free to contact me personally.

**Requirements:** High motivation and the ability to independently familiarize oneself with new topics. Experience with fiber composite materials is advantageous.

**Language:** English/German

**Start:** from now on

### Contact:

Lukas Gaugelhofer

Institute for Rotorcraft and Vertical Flight

E-mail: [lukas.gaugelhofer@tum.de](mailto:lukas.gaugelhofer@tum.de)

Tel: +49 (0)89 / 289-16313

