PdMe Masters project in industry proposal

Company name	**RigiTech** Home - RigiTech - Drone Delivery Solutions **with Laboratory for Processing of Advanced Composites (LPAC)** **and Photonic Materials and Fibre Devices Laboratory (FIMAP)**
Address	EPFL, STI-IMX/ GME, LPAC / FIMAP
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Project title or topic

"Design for manufacture of light-weight drone structures using advanced composite manufacturing technologies"

Context and background

PdMe master's project: Mechanical Engineering

This project run as a collaboration between EPFL (FIMAP and LPAC), RigiTech, and Coriolis Composites will explore novel drone designs using an integrated CAE approach. An agnostic perspective will be taken to materials and process selection generating candidate designs versus competing KPIs including drone build volume. An industrialization strategy including total product cost and associated investment in tooling, CAPEX and engineering time for different annual build volumes will be developed for the RigiTech platform.

The drone concept development phase study will assess alternate design solutions and airframe geometries including design for manufacture, cost modelling, and surrogate material rapid prototyping/flight tests. CAE tools will be used to assess alternate design solutions including topology optimization, structural FEA, aerodynamic simulations, followed by optimization of the design versus key performance indices including mass, vibration behavior, crash resistance, assembly time and cost, repairability, material cost, and tooling investment. Trade-off analyses will be performed versus these criteria.

The project will also examine the potential of advanced composite materials. Existing advanced composite and polymeric technologies will be assessed and compared to novel approaches including multi-material solutions integrating advanced fiber placement and additive manufacturing. One candidate process that will be examined is the introduction of multi-material functional fibers (F-fibers) into continuous fiber composites produced by additive manufacturing (AM) and robotic advanced fiber placement (AFP). The objective is to combine structure (via carbon fiber) with increased functionality (via multi-material F-fibers) for light weight structural composite parts. Functionalities that can be introduced include strain sensing, temperature and humidity measurement, and haptic functionalities at reduced system cost.

It is anticipated that high quality work will be published and presented accordingly.