

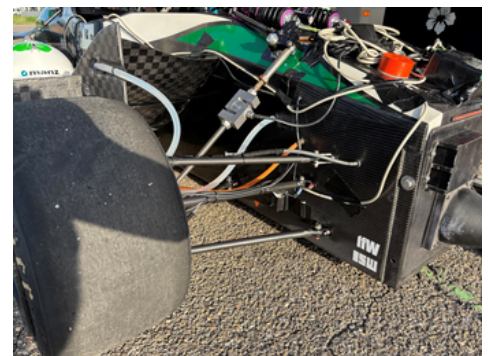


MECHANICAL DESIGN/FEASIBILITY STUDY OF WISHBONES/PUSHRODS MADE OF CFK

Topic

The thesis focuses on the development, optimization, and experimental validation of CFRP suspension control arms for a Formula Student race car. The work combines aerodynamic and structural design, numerical simulation, manufacturing, and experimental testing.

The overall objective is to develop a lightweight, structurally efficient, and manufacturable suspension control arm concept and to validate its performance through numerical simulations and experimental testing.



Tasks:

- Aerodynamic optimization of the suspension control arms
- Development and evaluation of different interface and attachment concepts for the monocoque and wheel carrier
- Structural design and optimization using Classical Laminate Theory (CLT) and Finite Element Analysis (FEA)
- Development of linear and nonlinear buckling models in HyperMesh/OptiStruct
- Definition of suitable load cases and assessment of the structural performance of the control arms
- Development of an experimental test program for the validation and correlation of the numerical models
- Tensile and compression testing of the current control arms to establish a performance baseline
- Investigation and evaluation of alternative composite manufacturing processes, such as braiding and Resin Transfer Moulding (RTM)
- Design and manufacturing of test specimens and prototype components
- Planning and execution of component-level tensile and compression tests
- Analysis and interpretation of experimental results and correlation with FEA predictions



Requirements:

- Passion for Motorsport, Lightweight Engineering and Structural analysis
- Basic CAD Skills
- Basic FEM experience
- Basic Experience with CFK
- Basic Knowledge about fluid mechanics and CFD beneficial