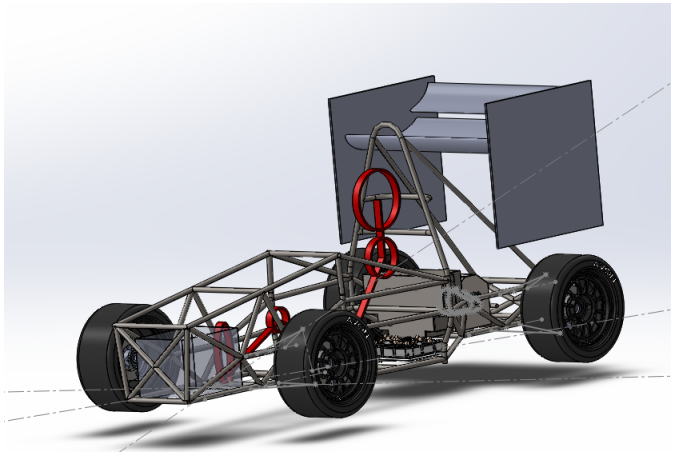
DESIGN OF REAR WING OF AN ELECTRIC RACE CAR



Steffan Johan Kirk – S170816
Carl-Emil Grøn Christensen – S170817
Department of Mechanical Engineering, Technical University of Denmark

Supervisor:
Jens Walther
Department of Mechanical Engineering, Technical University of Denmark

August 2018

Acknowledgements

We would like to thank our supervisors Jens Walther and Robert Mikkelsen, who allowed us to work on a project we hold very dear. The project let us perform incredibly well for a first time racer at the Formula Student competition in Silverstone, and the Vermilion Racing team will hopefully live on many years ahead.

Abstract

Race cars wooo! Formula studee3333nt

Contents

1

Introduction

Vermilion Racing is a newly started Electric race car team building their first vehicle: The Eevee [1]. The teams' purpose is competing against other Universities at the Silverstone race track from the 11^{th} to the 16^{th}. As members of the team, the purpose of this report is to document the design process of the rear wing of the first car, the Eevee, and provide an aerodynamic package documenting drag and downforce. The intent is to start a student organization, passing on the teachings of racecar mechanics for many years to come.

Aerodynamics is a major decider in racing today. Cornering, not top speed is the deciding factor amongst the teams, and aerodynamics is the key. Drag, lift and side force are the three cornerstones to vehicle aerodynamics. A car's ability to handle depends on the grip of the tyres, and downforce directly increases grip by increasing the downwards load on the tyres without adding a weight penalty. Additionally, drag directly decreases the speed of a vehicle by increasing air resistance, but is of less importance as the car's in this class have far more accelerative power than the tyres can handle. Designing the bodyworks of Eevee is therefore a dance of downforce [2].

1.1 Motivation

- Why are we designing this to begin with

1.2 Design Philosophy

- what are we designing for? low weight, high downforce. drag a bit neglegible due to high power motors.

1.3 Design restrictions

2

Theory

2.1 Aerodynamics

2.2 Vehicle Performance

2.2.1 Improvements in Top Speed

2.2.2 Cornering performance

2.2.3 Load Distribution

3

Simulation

3.1 Star-CCM+

3.2 Finite volume method

3.3 Mesh generation

3.4 The Wing

3.4.1 Multi-Element Wing Optimization

Wing was moved around to optimize lift. Here's the results changing the variables.

3.5 The Aerodynamics Package

3.5.1 Undertray, Diffuser, Front Wing and Driver

3.5.2 Everything together now

3.6 Results

4

Construction

4.1 Requirements

4.2 Prototyping

4.3 Material Selection

4.4 Molds

4.5 Assembly

4.6 Finish

FiXme Note: Hvad kræves af styrke fra konkurrencens side? Hvad ønsker holdet?

FiXme Note: Overvej CES (for flair jo)

5

Experiment

5.1 Equipment

5.2 Experimental Procedure

5.3 Results

6

Discussion

7

Conclusion

bla

Perspective

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