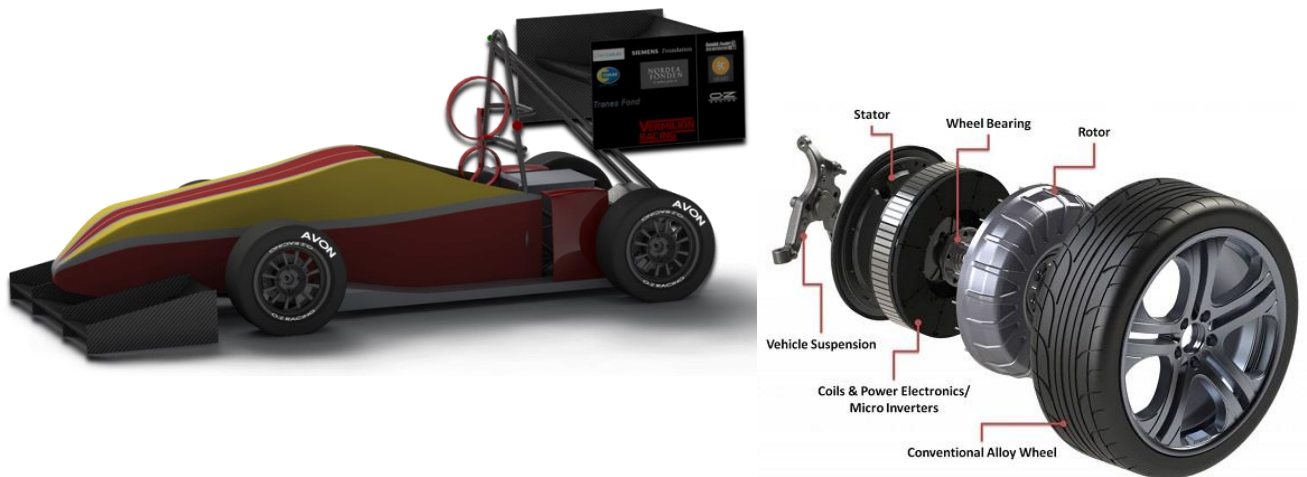


Thermal study of hub (in-wheel) motor and liquid cooling system development for electric student Formula race car

Master thesis/Special Course

Background:

The aim of BlueDot E Venture project and with it student Formula DTU team is to develop and nurture student activities at DTU related to the ongoing green transformation of the energy system into a sustainable, cost-effective and reliable energy system. As a part to the BlueDot E Venture project, DTU student have an opportunity to take part in prestige international engineering competitions related to eMobility. Currently 20+ students are taking part in designing and building student Formula electric race car (CAD illustrated in the Figure below) with aim to compete in Silverstone UK in July 2019.



Project description:

In this project student will work on the analysis and development of liquid cooling system for in-wheel traction motor used in the formula race-car. The primary goal of the project is to examine the heat development in the motor and proposed the circulation of the cooling fluid path which will ensure motor design with high values of motor torque density and efficiency. Particular focus of this project will be CFD analysis of liquid coolant with practical validation. The project will evaluate the benefits of introduction of liquid cooling while having in mind the pumping loss and motor peak efficiency target >96%.

Tasks: Depending on the student's ambitions, the project can consist from following steps

- Literature and market review of liquid cooled (LC) PMSM machine topologies
- Develop parametrized PMSM CFD flow model (2D, static, transient, 3D static),
- Evaluation of key performance indicators of cooling
- Apply optimization to motor topology (casting) to improve motor efficiency
- Integration of motor design and cooling into the wheel in collaboration with mechanical student team
- Contribution to construction and experimental validation of motor prototype

Student: Individual or group of students

ECTS: Depending on the need of the students, this project can be tailored as a special course or MSc project

Period: As soon as possible

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