

Validation of outrunner gearbox of a Formula Student race car



We are looking for motivated master students Engineering Technology

Project description:

Formula Electric Belgium (**FEB**) is a team of highly motivated engineering students that build an electric formula student race car. Just like Formula 1 the team builds a brand-new car each year to compete in multiple international competitions during the race season. Formula Student is the largest international engineering and design competition in the world. The competition is characterized by combustion vehicles, electric vehicles and since recently also autonomous vehicles. Formula Electric Belgium strives towards innovations and the raw performance of technologies. It is for this reason that the team will focus on the autonomous/electric race cars. Research and development applications will be made by postgraduate students in collaboration with thesis students from the KU Leuven and bachelor students from Thomas More.

Thesis description:

For a couple of years we have used 4 electric motors to drive our electric race car. The gearboxes are mounted in an upright connecting the motor to the wheel. This setup is called an inwheel design. The gearbox itself is a 1.5 staged gearbox consisting of a stationary ring gear, 3 planet gears connected to a rotating hub and carrier and a sun gear connected to the motor. The goal of the thesis is to design a new inwheel assembly called the outrunner. In this design, The ring gear is rotating and the planet gear assembly is being held stationary. This has the following advantages; compact design, no need for a rim center and an easy assemblage.

Previous year, the first steps were made by making designs in CAD. In this design hardpoints, collisions, strength, overall dimensions and mass were taken into account. Special care was taken to make the design and all its components producible and assemblable within the limits of the team.

The goal of this thesis is to validate this first design and optimise it by manufacturing and testing. This step is crucial to effectively install this design on the next FEB race car.

Thesis objective:

The goal of the thesis is to explore the outrunner and make a working design for the Formula Electric race car considering the hardpoints, collisions, mass and strength. This should be done by analysing the first design iteration and optimising it with testing to find weak points. FEB will support this thesis by providing partners to produce the different parts. Afterwards, test procedures will give information to make a second iteration of the design.

Profile:

- Interested in transmissions and drivetrains. Good knowledge of the course machine parts (machineonderdelen) and production technology (Productie technologie)
- Knowledge and interest of Siemens Nx for design and simulations
- Fast learner of different simulation programs (Kissoft, Bearinx, ...)
- Make and follow a tight time schedule

What do you gain?

- A unique engineering- and team experience where hard work and team atmosphere are central.
- Work with innovative technologies in a realistic environment/application.
- Create added value for your curriculum and the team

Are you interested? Please send your resume with accompanying motivation to:

recruitment@formulaelectric.be

Diestsesteenweg 692, 3010 Kessel-Lo