

Air cooling on motors

OUR PROJECT

Formula Electric Belgium is a student-run electric race team which competes in Formula Student, the world's largest competition for engineering students. We aim to push the limits of performance, innovation and sustainability within electric racing every year, which is only possible with the help of our Thesis students. These pioneers are responsible for performance-defining innovations within the team, and we would love for you to join our team of highly ambitious and motivated engineers. As a Thesis student, you will research, design, prototype and test your innovations alongside the full-time members which make sure the team pushes itself and the car to new heights.

AIM AND OBJECTIVE

The aim of this master's thesis is to design and analyze an air-cooled thermal management concept for the electric motors of a Formula Student electric race car, replacing the existing water-cooling system. The primary objective is to ensure safe and reliable motor operation by maintaining component temperatures within allowable limits while reducing system complexity and mass under competition-relevant operating conditions.

The focus of this work is on the thermal and fluid-dynamic design of the air-cooling architecture surrounding the motor. Computational Fluid Dynamics (CFD) simulations will be used to evaluate airflow behavior, convective heat transfer, and temperature distributions, enabling the identification of hot spots and cooling limitations. Key design challenges include achieving sufficient heat dissipation using air as the cooling medium and optimizing airflow paths, duct geometry, and surface features while minimizing pressure losses.

Where feasible, numerical results will be supported by experimental testing through temperature measurements on the motor or housing to validate the simulations and assess the feasibility of implementing air-cooled motors in the Formula Student vehicle.

PROFILE

- Interest in **mechanical design and structural analysis**
- Interested in **CFD simulations**
- Has a background in **mechanical, electromechanical, or automotive engineering**
- Analytical mindset and pays attention to **model assumptions, boundary conditions, and validation**
- Interested in **material selection, lightweight design, and thermal behavior** of mechanical components

RETURNS

- Unique experience within a racing team
- Genuine work experience to carry with you into your career
- Exposure to cutting edge technology and software

INTERESTED?



Send us your contact details and field of interest to

recruitment@formulaelectric.be