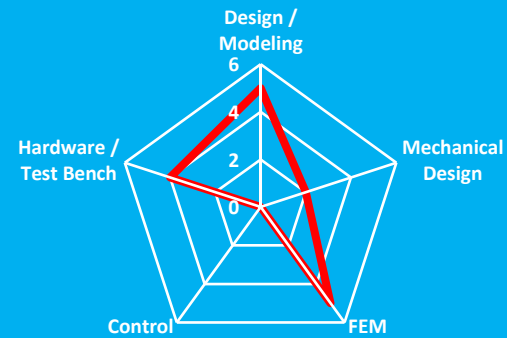




Design, construction and measurement of a WPT system for the inductive electrically excited synchronous machine

Unlike permanently excited synchronous machines (PMSM), electrically excited synchronous machines (EESM) do not require the use of rare earths. In addition, they have better efficiencies in the partial load range and in the field weakening range. This is why they are now used as traction drives by BMW, among others.

The major disadvantage of an EESM is the wear issue of the slip ring, which is necessary to transmit the current to the rotating rotor. Particularly due to the trend towards ever higher motor speeds, wireless power transfer (WPT) as a replacement for the slip ring is the focus of companies and research.

There are already a number of different concepts for wireless power transfer (WPT) for the use in the EESM. Fig. 1 shows such a setup. Within the scope of this student project, the design and optimization of such a WPT system has to be carried out. For this purpose, magnetic simulations are done in Comsol and electrical simulations in Plecs. Afterwards, the WPT system will be constructed and measured in the lab.

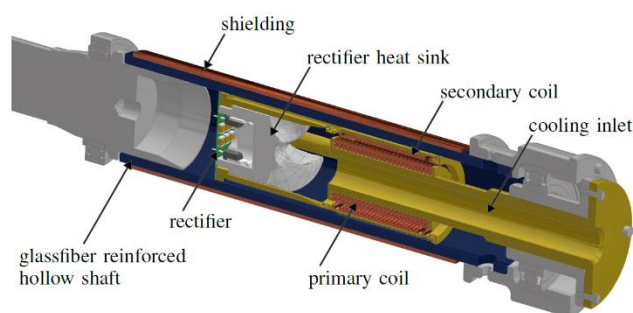


Fig.1: Structure of a WPT system in a hollow rotor shaft made of glass fiber reinforced plastic

Students profile

- You have a high interest in electric vehicles and electric mobility
- You work independently, self-motivated and have a systematic working method
- Previous knowledge of Matlab/Simulink/Plecs necessary
- Previous knowledge of Comsol or other FEM programs useful
- Motivation for practical setup

Work package and schedule

- Familiarization with the topic
- Modification of existing simulation models in Comsol and Simulink/Plecs
- Design and optimization of the transformer
- Construction of the transformer (coil system and rectifier)
- Measurement of the system