

# Bachelor's Thesis

## Thermal Model of Electric Machines

### Motivation

One development trend of electric machines is to increase the output density. In this context, an accurate thermal model of the electric machine is very important. The main problem to find such a precise model is to find correct heat exchange parameters. This can be done by measurements. In our case we have an existing thermal model and a synchronous machine with a large number of thermal couples.

### Research Questions

- What measurements are necessary to find all heat exchange parameters?
- What is the minimum number of thermal nodes to get valid results?
- Is there a way to transfer the thermal model by scaling to other power ranges?

### Tasks

- Start up the test stand (inverter fed synchronous machine with thermal couples).
- Check the thermal model (MATLAB program)
- Adapt the thermal model to the machine (heat exchange parameter)

### Organizations Matters

- Start: immediately.
- Workplace: Electric Drives and Machines Institute, Graz University of Technology.

### Contact

Dr. techn. Dipl.-Ing. **Johann Bacher**  
Electric Drives and Machines Institute  
Graz University of Technology  
Inffeldgasse 18, A-8010 Graz, Austria  
Tel: +43 (316) 873-8601  
E-mail: [johann.bacher@tugraz.at](mailto:johann.bacher@tugraz.at)  
[www.eam.tugraz.at](http://www.eam.tugraz.at)

Univ.-Prof. Dr.-Ing. **Annette Mütze**  
Electric Drives and Machines Institute  
Graz University of Technology  
Inffeldgasse 18, A-8010 Graz, Austria  
Tel: +43 (316) 873-7240  
E-mail: [muetze@tugraz.at](mailto:muetze@tugraz.at)  
[www.eam.tugraz.at](http://www.eam.tugraz.at)