

We are looking for master students to work on

# Effect of Manufacturing Tolerances on Electric Motor Performance Figures

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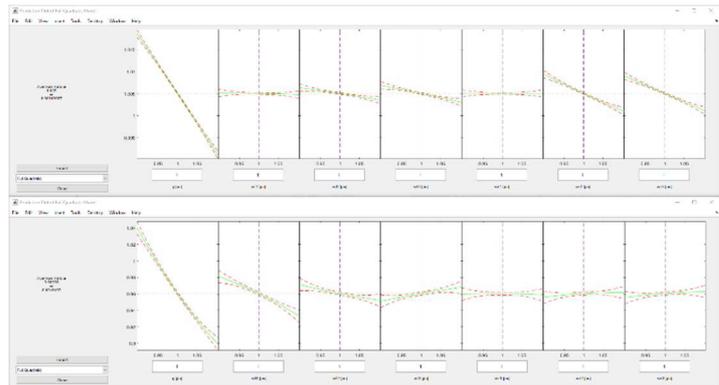
## Background

Manufacturing tolerances and material properties variations can affect the performance of an electric machine, with possible consistent differences between the expected outputs and the experimental measures.

A correct understanding of this phenomena and a good knowledge on how to mitigate it, can improve the electric motor design procedures by increasing the attention on some details and selecting proper geometries or materials, with reduced sensitivity to parameters variation.

In addition, the same technique can be also adopted to local optimizations of an existing design, improving the motor performance.

During the thesis, the candidate will study the state of the art in the field of the Design of Experiments (DoE), Robust Design and sensitivity analysis methodology (like Montecarlo Method), and implement the analysis process in the open-source framework SyR-e (<https://sourceforge.net/projects/syr-e/>), developed and maintained from some of PEIC members. Since the topic is wide, the cooperation with other students is possible.



## Your tasks

- Literature review of the most common methods to study the effects of manufacturing errors on output performance and selection of one preferred method
- Implementation of the selected methodology in an existing design framework (SyR-e) to study the parameters sensitivity
- Application of the developed procedure on a benchmark case, with the possibility to experimentally validate the results
- Implementation of the developed DoE engine in an optimization environment, to refine existing motor designs.

## Student Profile

- Electrical Engineering
- Good knowledge of Electric Machine Modeling
- Basic coding knowledge and Matlab skills
- No more than two exam left
- Good attitude for team working



## What you will learn

- Analyze state-of-the-art technical literature
- Basic techniques of Design of Experiments and Robust Design, applied to electric machines
- Basic knowledge of electric machines design
- Advanced Matlab scripting, interface between Matlab and external software
- Finite Element Analysis simulation: conditioning and post-processing

**Expected duration of the thesis:** 6 months, if no exam left.

## Contacts

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