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Report on research projects under the IDEA League Student Grant

Personal information

Full Name:

Anna Diews

Field of study:

Produktionstechnik

Degree pursued:

Master of Science

Current year of studies: 2

Home University:

RWTH Aachen University

Sponsoring professor at home university

Name:

Prof. Robert Schmitt

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Information about the research stay

Host University:

ETH Zürich

Sponsoring professor at host university

Name:

Prof. Konrad Wegner

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Dates of research stay

from: 03.09.2018

to: 28.02.2019

Summary of the research project
(200 words max.)

The Institute of Machine Tools and Manufacturing (IWF) at ETH is one of the leading institutes in the field of thermal compensation. At IWF an Adaptive Learning Control Algorithm has been developed, which allows to reduce the most dominant thermal deviation of the rotary axis significantly.

The aim of this research project is to develop an Input Selection Approach for the existing thermal error compensation model. The pre-existing module uses temperature sensor data (e.g. environmental temperature, cutting fluid temperature, etc.). In the course of this work the available data was extended by machine internal data (spindle speed, spindle and servo load etc.). Therefore, the machine control was accessed with the help of the interface libraries provided by Fanuc. With this setup the machine internal data were integrated in the computation environment.

The best model input for the compensation model was then selected on the basis of correlation coefficients. Taking into consideration not only standard correlation coefficients such as Pearson's linear correlation coefficient but also Spearman's and Kendall's rank coefficients and other fairly new coefficients such as Heller Heller Gorfine, Mutual Information and coefficients from the class of the maximal information-based nonparametric exploration.

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Experience report
Please tell us about your experience at the host university and give us an evaluation of the benefits of the research stay for the course of your studies

I had a wonderful stay at the Institute of Machine Tools and Manufacturing at ETH Zurich University. The thermal error compensation group gave me a warm welcome and I quickly felt like an integral part of the team. I worked together with some wonderful researchers, who were willing to share their comprehensive knowledge on the topic of thermal error compensation with me. Their passion for the research topic inspired and motivated me to deep-dive into the topic and completely devote myself on my research topic.

My supervisor at IWF was always approachable for questions and guidance, whenever needed and gave me access to needed machinery and measurement equipment, helping me to conduct all necessary experiments. To sum it up, my experience at ETH was very informative. I really learned a lot. I am sure this research stay will be beneficial for my future career.

Picture
Please provide a picture of you at the guest university
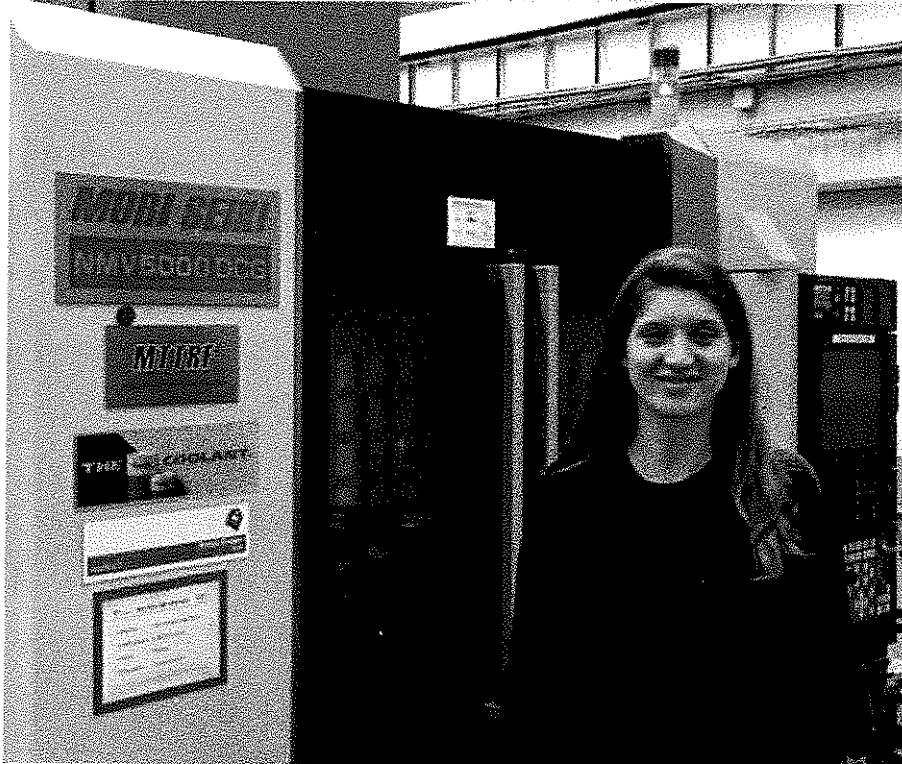
The report should be signed by both professors involved. (The signatures will be deleted when the template is published on the IDEA League web page.)

Anna Diews (Student)   Prof. Konrad Wegener (IWF)   Prof. Robert Schmitt (WZL)