Delft University of Technology

Formula Student team Delft

Free Minor Accumulator Design - Electrical Engineering

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February 22, 2017

Introduction

Since 2011 Formula Student Team Delft has been building an electric powered race car. Its energy is supplied by a self-developed high voltage accumulator (battery pack). This accumulator typically consists of a large set of Lithium Polymer battery cells. On a conceptual level, the global parameters of the accumulator hugely affect the vehicles final performance. For instance, the energy contained within the Accumulator determines the average power to be used over a given time, and therefore the vehicles speed and acceleration performance. On a more detailed level, structural design and material selections influence the weight of the accumulator and the internal packaging of the accumulator has an effect on the cars cooling performance. Being subjected to a large set of regulations, the design of the accumulator also involves many safety aspects. Designing an accumulator is a very multidisciplinary task. Areas of interest may include Electrical systems design, composite structures design and thermodynamic analysis, among others.

The minor students will get the responsibility to lead the design of the accumulator system. The difficulty of this work, and the time required to successfully fulfil this task will accredit to the 12 (EC) credits listed for this project. The assessment will be done by a final presentation, where focus should be put on the process applied and lessons learned. A paper needs to be written which will get a fail or pass result.

The idea behind the set-up of this minor is that several students working on different disciplines have 2 courses in common to ensure a basic level of understanding of project- and process management and decision making. This should enable the students to work more independently, while still performing as desired. The remaining ECTS will be gathered by following courses relevant for the discipline the student is working on, in this case a combination of structural and electrical design. The courses suggested for the accumulator design minor are a combination of the following:

Course	**ECTS**	**Motivation**	**Period**
SPM6102 Process Management and Decision Making	5	A well-structured process and good decision making are of vital importance in such a high-paced project as Formula Student.	Q2
CT3101 Project Management Basics	5	Project management skills are a big plus in such a complex, multidisciplinary project.	Q1
ET3365TU-D1 Introduction to Electrical Power Engineering part 1	3	An overall introduction to electronic systems engineering	Q1
ET4119 Electronic Power Conversion s	4	A more in-depth course on high-voltage and power electronics.	Q2

To fulfil the requirement of 12EC project work and 18 EC of study work, the masterclass SL4161TU given in the minor Communication Design for Innovation at Applied Physics can be added to the 4 chosen courses. Since our team is an international one, valuable skills can be acquired in this masterclass.