

Battery Simulation Model for Electric Ships

SUMMARY

This project will involve in-depth research on developing different types of battery simulation models and comparing their accuracy based on actual ship operational profiles and conditions.

THE ROLE

Batteries on board ships have several applications, such as ramp support, spinning reserve, peak shaving or fully electric power. Depending on the application, required optimal battery chemistry may also be different. As an example, full electric ferries often have several charge/discharge cycles in just one round trip or a Dynamic Positioning system on mid-size vessels may have to deal with large peaks of discharge power in a very short time. Thus, it is important to have accurate simulation models of different types of cell chemistries, so that the dynamic behavior of batteries can be predicted during the design phase of the vessels. This includes accurate calculation of State of Charge (SOC), battery health degradation and thermal performance.



Figure 1: Example of a fully electric ship from DAMEN [1].

KEY ACCOUNTABILITIES

As a graduate at Electrical and Automation department of Damen RD&I you will face multiple aspects of applying advanced measurement and simulation methods in various phases of electrical system design of a ship. To carry out these measurements and simulations various tools and equipment are available to achieve your research goal. You will be responsible from day one for the planning and execution of your research project. You are expected to deliver a detailed in-depth analysis of your research problem and meanwhile be able to communicate the results and conclusions to other departments.

COURSES

- 1A: Power Electronic converters (recommended)
- 2B: Power Electronic Systems (recommended)

SKILLS & EXPERIENCE

- Electrical engineering student pursuing a Master's degree.
- Proficient in simulation skills of MATLAB and Simulink.
- A bit of practical experience with measurement equipment (like oscilloscope and impedance analyzer) and electrical systems.
- Good command of English, especially in writing.

WHAT DOES DAMEN OFFER

A monthly allowance will be paid for the duration of the assignment. Flexible working hours can be discussed and proper mentoring at academic level will be available throughout the internship.

[1] DAMEN. (25-09-2023) *Damen to introduce fully electric Service Operations Vessel for offshore wind farm sector* [Online]. Available: <https://www.damen.com/insights-center/articles/damen-to-introduce-fully-electric-sov-for-offshore-wind-farm-sector>

CONTACT

Anand Krishnamurthy Iyer (a.k.iyer@utwente.nl)

Peter Rampen (peter.rampen@damen.com)

Thiago Batista Soeiro (t.batistasoeiro@utwente.nl)

