ELÄTTRA: High Tensile Steel Applications for Electric RoPax-ferries

Background and motivation

The *ELÄTTRA* project is a spin-off project from the *ELECTRIC LIGHT* project (illustrated in Figure 1), where high tensile steel (HTS) applications for the Stena Electra concept Ro-Pax vessel is to be investigated and designed. In the *ELECTRIC LIGHT* project a battery and electric drive Ro-Pax to traffic the Stena Gothenburg-Frederikshavn route was conceptualized and designed. One of the potential follow-up projects envisioned in the original project was the increased use of high-tensile steels in this type of ship construction. The *ELÄTTRA* project will investigate the potential of different components and sub-structures subjected to a high tensile steel re-design. Its effect on weight, cost, and environmental savings by the measure of CO2-equivalent. The ro-ro deck structures in particular will be studied in detail as MacGregor is a partner of the project.

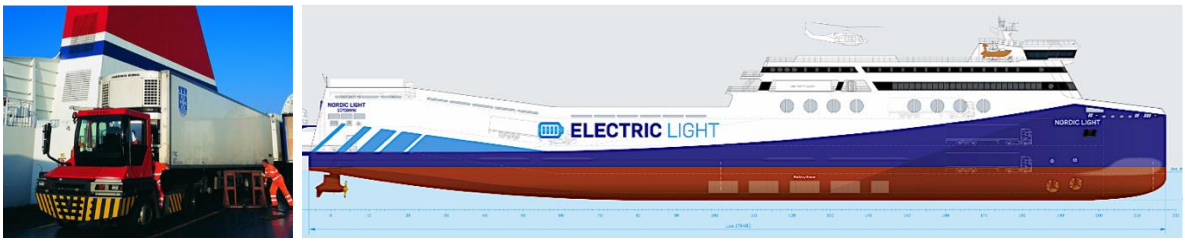

Figure 1. The concept ship design of STENA ELECTRIC LIGHT

Currently, HTS is only permitted in highly specialized applications on-board ships according to class rules. As an innovation experiment, the project aims at designing to the best of the steel's abilities and retroactively conveying a new practice to lawmakers i.e. flag and class.

Purpose and requirement

The project is joint industry research involving Stena, RISE, SSAB, MacGregor, and Chalmers. We invite two master thesis students to participate in the project in the spring of 2022. The students are expected to work on the thesis at one of the companies. Depending on the students' background and interest the thesis can be designed to investigate the following topics, alone or in combinations:

- Strength analysis of selected ship structures
- Fatigue analysis of selected ship structures
- Mapping and analysis of relevant regulations currently in conflict with design possibilities of high tensile steel.
- Design challenges of high tensile steels for ship structure applications.

Relevant background in the following subjects is of interest to the project e.g.: Naval Architecture, Fatigue and Strength analysis, Mechanical engineering, and LCA/LCC.

The MSc thesis project should incorporate the following tasks:

- Literature studies to define the state-of-the-art knowledge of the research subject.

- State of art: Ro-Ro desks, in particular, has been designed in a plethora of materials over the last 20 years, making an inventory of approaches
- Investigate which areas and structures are best suited for redesign with high tensile steels
- Detailed strength and fatigue analysis of novel designs selected in the project and by the prior task above
- Suggest regulatory changes based on the above results
- Writing of a thesis report and presentation of the work at a public seminar.

Contact persons:

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