

Thesis on topological optimization of cruise ship structures demonstrated by means of an example of a transverse web frame

Mainly driven by stability requirements structural optimization targeting at a minimized steel weight is high on the agenda for cruise ships as it is linked to a significant commercial impact. Safety and reliability requirements but also comfort needs and production limitations are forming the challenging boundaries for any structural optimization of this ship type. Nowadays structural optimization is commonly performed by means of best practice and design experience application but not by execution of any formal optimization procedure.

Within the here offered thesis the application of a topology optimization approach on an existing cruise vessel design is to be generally investigated and demonstrated by a practical example. For the topology optimization approach reference is made to the Doctor Thesis "Implementierung struktureller Topologieoptimierung in das schiffbauliche Konstruktionsumfeld" prepared by Dr. Tschullik which is intended to act as the reference basis for the work to be carried out. More in detail the here offered thesis contains the following work steps:

- Familiarization with and investigation of the ANSYS software solution for structural optimization tasks in particular for topology optimization approaches including preparation and evaluation of some academic examples.
- Transfer of the ANSYS based topology optimization procedure to simple ship structure examples e. g. floor plates under consideration of the key boundary conditions and limitations. The examples will be provided by the University of Rostock.
- Application of the topology optimization approach on a typical transverse web of a cruise vessel under consideration of realistic boundary conditions, requirements and limitations regarding safety, reliability, comfort (noise & vibration) and production.
- Based on the obtained results and findings an estimation of the future potential of the investigated approaches for cruise ship structures as well as a summarization on areas for improvement is to be made.

The thesis will be jointly supported and supervised by **MV Werften, University of Rostock** and **DNV GL**. The work is intended to be carried out at the premises of DNV GL Maritime Headquarter in Hamburg.