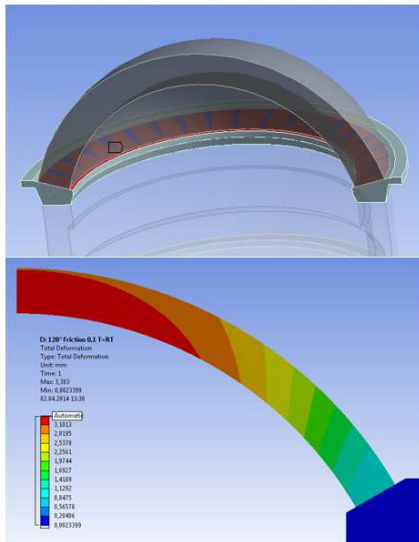


## Master thesis 2021 at DNV GL Section Underwater Technology

### Design Study of Acrylic Viewports for Application in Manned Submersible Pressure Hulls

The growing interest in the exploration of the deep sea by means of manned submersibles has created an increasing demand for state-of-the-art pressure hull designs mainly made of transparent materials to open the ocean to human eye. While the modern pressure hull design process is fully supported by CAD and FEA tools, the only recognized standard for the design and testing of Acrylic viewports was created in the 1970's and is based on experimental testing rather than on a calculation and analysis-based approach. In order to support the modern design and analysis process, Rules need to be in place which allow a calculation and analysis-based assessment of Acrylic viewports. The study of viewport designs, which are approved for application in manned submersibles, and of the complex non-linear contact and material behaviour, forms the basis of this master thesis. Ideally, calculation and analysis-based design guidelines can be derived from the investigation results for improvement of the DNV GL Rules for Classification of Manned Submersibles.

#### Master Thesis: Design Study of Acrylic Viewports for Application in Manned Submersible Pressure Hulls



#### Task

- Study of viewport designs, of non-linear contact and material behavior using FEA.
- Evaluation of numerical results and comparison with ASME PVHO-1 requirements.
- Improvement of the DNV GL Rules for Classification of Manned Submersibles.

#### Location:

DNV GL  
Hamburg  
Pressure & Underwater  
Technology Section