# Summary

FEM calculations are widely used for designing and dimensioning large scale equipment. They yield good stress results and enable the calculation of buckling factors. However, buckling calculations using FEM can be very time consuming due to a number of reasons. It might be beneficial if buckling calculations could be performed on known problem areas instead of only on the complete model. A problem that sometimes occurs is that the number of elements in a section of the model is insufficient to perform a buckling calculation. This means that the model needs to be re-meshed to create extra elements. It would be beneficial to have to re-mesh only an area that is as small as possible.

The goal of this research is to look into the problems mentioned above and at ways to speed up the buckling calculations. Two research questions were formulated for this research.

Research question 1: Can a single plate buckling calculation using data from a static calculation of the complete model be used instead of the complete plate field to calculate accurate buckling factors?

Research question 2: When re-meshing an area of interest for buckling calculations, can interpolation of the loads be used to reduce the total area that needs to be re-meshed?

A parametric model was created to use in this research. The model consists of nine plates with identical dimensions and thicknesses with stiffeners at there edges and centre lines. Three different ways of loading the single plate were devised and tested on the model to answer the first research question. The tests were performed on the model with large stiffeners and also with small stiffeners to see whether there is a difference in behaviour.

The same model with a coarser mesh was used for the second research question. The decision was made to use displacements to load the model instead of forces. This was done because there is no difference in outcome whether displacements or forces are used and displacements are easier to interpolate.

The results found can not be taken as proof because of the limited number of calculations that were performed here, but they do lead to some very plausible conclusions. Both research questions can be answered with yes, but some additional conclusions and observations have also been made which can be found in the conclusion section for each research question.