Every steel structures that are exposed on the seawater environment are subjected to corrosion degradation. When we are dealing with ships during the exploitation time, the locked cracks could exist as well. Both of this phenomenon are significantly influencing the strength of ship structure, which is composed of the stiffened plates. Additionally, these processes are random and prediction of them is not easily obtained.

Influence of these effects on the compression capacity of stiffened plates was previously investigated experimentally and with the use of computer simulations. Usually, there were dealing with only one effect and there were limited to the small number of samples. From that type of investigations, there was unable to derive more general conclusions and how different effects can influence combined.

The aim of this project is to analyze systematically influence of both corrosion and locked cracks (non-propagating ones) on the ultimate strength of stiffened plates. In the first stage of investigations, there will be conducted experiments that will show the influence of most critical governing parameters such as:

- Material properties;
- Initial distortions and residual stresses due to a lower quality of welding process;
- Structural degradation including locked cracks and corrosion.

For this purpose, there will be conducted small specimens tension tests and then the compression tests of big (about one-meter size) specimens of stiffened plates, where all relevant data will be collected and properly analyzed.

On the next stage - the computer simulations validated with experimental results will be followed. Then the systematic analysis will be covered, where all input parameters will be modelled as random variables using Monte Carlo method.

On the last phase experimental results will be used to create a mathematical model which will be capable to show the influence of all relevant parameters on the ultimate strength of stiffened plates. For this purpose - the modern methods will be used, mainly the machine learning algorithms (e.g. artificial neural networks).

This project will lead to new knowledge about the influence of all relevant parameters on the ultimate strength of stiffened plates.