



## TU Delft, together with leading offshore firms, initializes a research on Multiaxial Fatigue Analysis of Welded Structures.

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### “Multiaxial fatigue analysis for ships and offshore structures are highly relevant”

A Joint Industry Project “4D-Fatigue” is being initialized to improve fatigue assessment and automatic screening of welded joints in ships and offshore structures which are subjected to multi-axial and variable-amplitude loading.

Improvement of fatigue assessment has a large influence on maintenance and repair costs, operational downtime, and potential lifetime extension. It is also essential to ensure required safety levels with respect to crew, passengers, society, environment, asset, cargo and a better structural design.

Fatigue is a complex and progressive form of local damage which is influenced by many factors such as magnitude, direction, phase and frequency of the loads causing cyclic stress; material imperfections and environmental conditions (cryogenic, arctic, hyperbaric, sea water). The existing multiaxial fatigue design methods can overestimate fatigue lifetime of welded structural details by more than a factor of ten and predict lifetime of 30 years whereas the actual fatigue lifetime is three years only. Therefore, there are large interests of Dutch and International ship and offshore companies to enhance the knowledge by a thorough fundamental approach and participating by supporting this project financially.

The results of the research will be used in practical design and lifetime extension of ship and offshore structures and to potentially modify the current rules and regulations. The main objective of the 4D-Fatigue experimental research program is defining the most simplified approach to estimate fatigue lifetime of welded details subjected to multi-axial, non-proportional and variable-amplitude stresses. The approach should be applicable for welded details in ship and offshore structures and should predict the fatigue lifetime with an accuracy of at least 50 percent.

If you are interested in joining this 4D-Fatigue JIP please contact Prof. Mirek Kaminski of TU Delft [m.l.kaminski@tudelft.nl](mailto:m.l.kaminski@tudelft.nl) or our office at [info@hmc.nl](mailto:info@hmc.nl)



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