

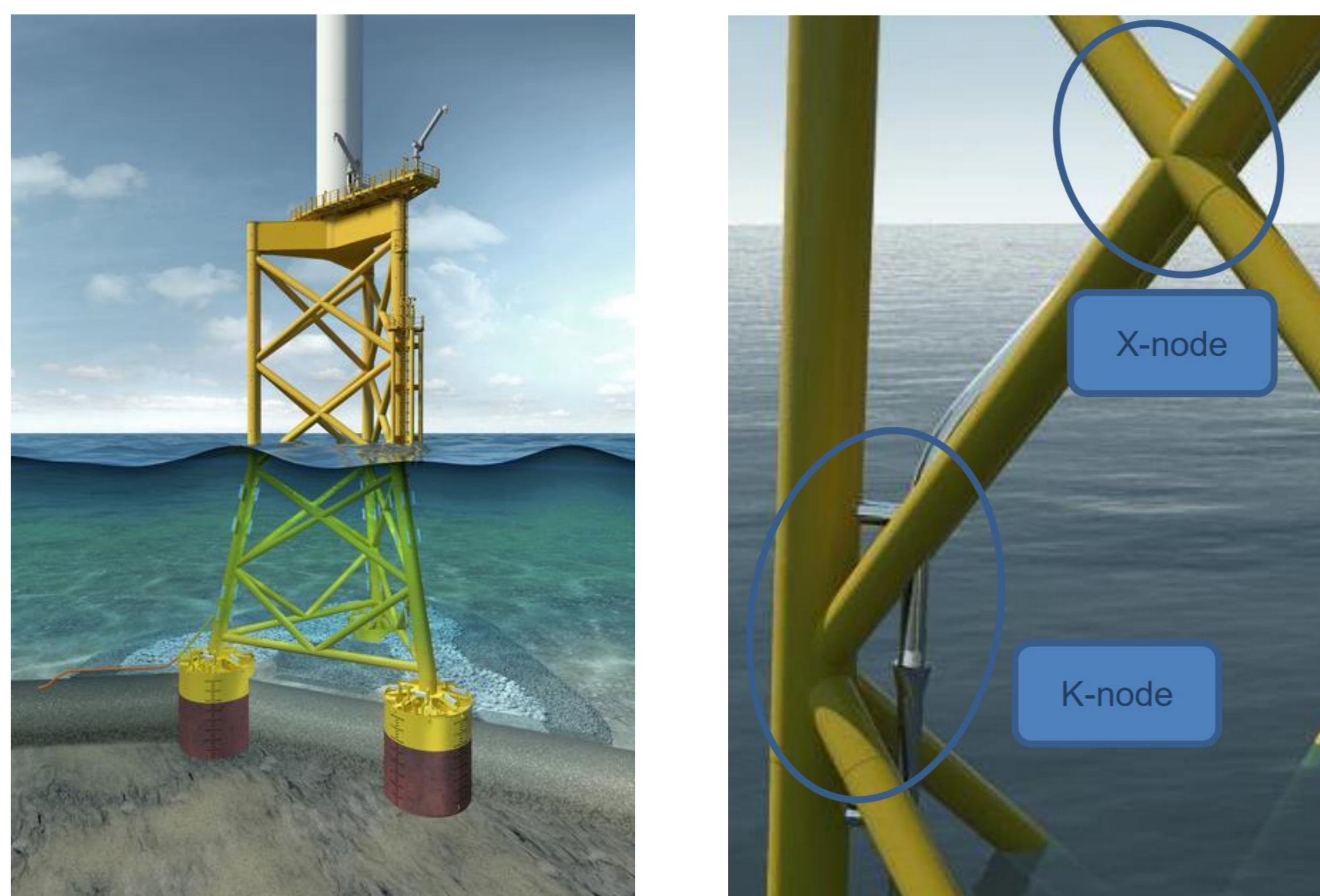
# A Novel Node Design using High Strength Steel for Jacket Structures

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## Background

As the size of offshore wind turbine generators get bigger and the available water depth increases, the weight and cost of traditional monopile foundations will increase substantially. Instead, jacket foundations can be used as they perform better in deeper waters. However, the connections between the tubular legs and cross stiffeners in the jackets, also called nodes, are prone to high loads and fatigue damage thus resulting in a heavy and expensive node design.

To decrease the cost of tubular jacket structures, a novel node design using high strength steel will be developed with special attention to the stochastic manufacturing parameters, fatigue methods and post-weld treatment.

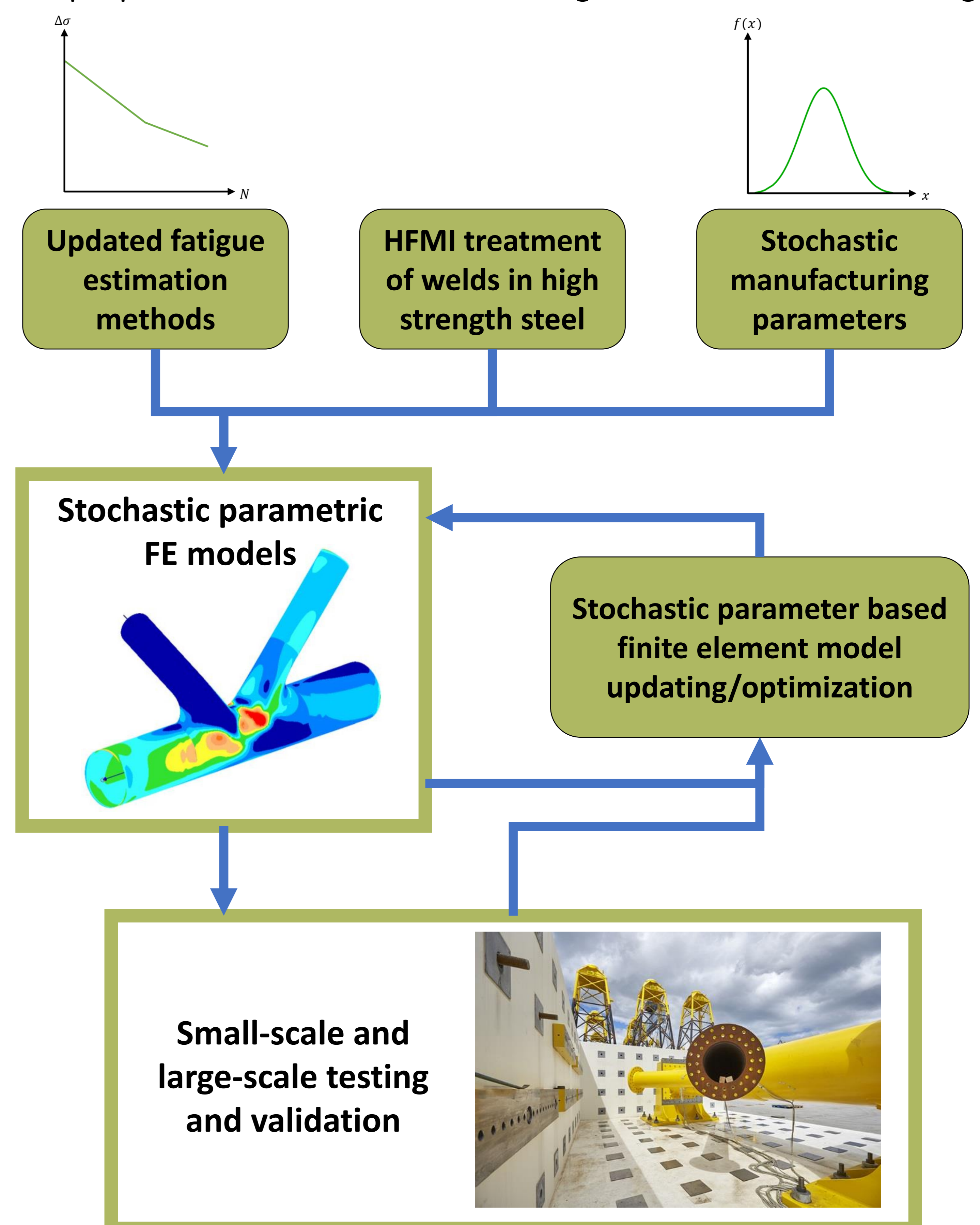


To increase the fatigue properties at the welded connections post-weld treatment, such as high-frequency-mechanical-impact (HFMI) treatment, will be used. The node will be optimized using the finite element method, considering fatigue constraints and probabilistic design variables.

## Objectives

The main objective of the project is to develop a novel high strength steel node for offshore jacket structures. To accomplish this it is planned:

- To develop parametric stochastic finite element models
- To optimize the FE models based on probabilistic manufacturing parameters and fatigue constraints
- To investigate and update current fatigue estimation methods
- To investigate and numerically analyse the effect of post-weld treatment (HFMI)
- To validate the FE results and investigate the high strength steel properties with small-scale and large-scale mechanical testing



## Collaborative partners

This PhD project is funded by the EUDP and is a collaboration between SDU and key-stakeholders in the offshore industry.

