

**Name and picture:**

Amrit S. Verma (PhD student)

**Title:**

Development of explicit response-based criteria for operability assessment for installation of offshore wind turbines using floating vessels

**Short ingress:**

In view of the movement of offshore wind industry into deeper waters and the limitation of jack-up vessels, floating crane vessels are now being developed and used for installation of bottom-fixed wind turbines and also floating wind turbines (for example spar wind turbines). However, the big challenge is the motions of floating crane vessels, which may lead to contact/impact between the objects and therefore damages in the critical components (blades, nacelle or pre-assembled rotor-nacelle-tower) in particular in the lift-off and mating operations. In order to obtain an accurate estimate of the operability to reduce the cost for such operations, it is crucial to develop response-based criteria by explicitly assessing the damages in the wind turbine components in case of contact/impact. The purpose of this study is to develop the numerical methods for response and damage assessment of critical wind turbine components during installation and to derive the operational limits in terms of sea state parameters ( $H_s$  and  $T_p$ ) for operability assessment. Case studies for installation of individual blades and integrated rotor-nacelle assembly onto bottom-fixed foundations and floating foundations using floating installation vessels will be considered. Active winch control to reduce or avoid the contact/impact during lifting operations will also be considered.

**Industrial goals:**

- To reduce costs in the installation of OWTs by using floating installation vessels.
- To develop explicit motion and structural response-based criteria for floating installation vessels

**Scientific questions:**

- What are the criteria for operability assessment in terms of allowable vessel motions or allowable structural responses (maximum stress or allowable damage) of the critical components (blades, rotor-nacelle assembly) during installation?

**Innovations:**

- A new way to determine the operational limits for floating installation vessels using response-based criteria

**Cooperating company:**

Statoil  
DNV-GL

**Supervisor: Zhen Gao**

**Co-supervisors: Torgeir Moan, Karl Henning Halse, Rune Yttervik**