Maritime – Cranes

Boom Lock

The company High Wind develops new installation techniques to install offshore wind turbines at higher wind speeds. High Wind has developed the Boom Lock system. The Boom Lock is a smart tool that allows an offshore crane to install wind turbine components in high wind speeds. This leads to a significant decrease of the weather downtime and results in a full year working possibility. The Boom Lock consists of a trolley that can travel up and down the crane boom to catch and secure the crane hook. With the Boom Lock movements of the load can be made with high precision.

Model Based Design

During the use of the Boom Lock, high bending forces can be exerted on the boom. High Wind therefore turned to Controllab to build a model that would allow studying the dynamics of the system. With this dedicated model of the crane, simulations were carried out to investigate the loads under various weather conditions. This type of development is called model based design.

Controller Design

In close collaboration with High Wind, Controllab also developed the control system for the Boom Lock. The control system will run the winches of the Boom Lock and the

The Boom Lock in action.

guiding lines in such a way that the load is transported safe and stable throughout the lift.

Special care was taken with the testing of the Boom Lock control system. The simulation model was coupled to the control system to test all operations in virtual reality first. This technique is called Hardware-In-the- Loop (HIL) simulation and is a special expertise of Controllab. HIL simulation allows to test all kinds of scenarios, even those which in reality could potentially damage the crane. During these test any errors that were found could

Training simulator of the Boom Lock.

be solved before the system was implemented on the real crane.

Use

The Boom Lock system has been successfully brought into operation and is now being used to install offshore wind turbines. Meanwhile High Wind requested Controllab to turn the simulation models into a training simulator. Because this simulator is based on sound physical systems models and uses the original control system of the crane, it is very accurate in predicting the real behaviour of the system. It is now used to train crane operators to use the Boom Lock system and test new lifting operations.

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