Zafar Hameed

Home country	: Pakistan
Year of birth	: 1975
Master's degree	: Mechanical Engineering
University	: Seoul National University South Korea
Graduation year	: 2008
Research group	: RAMS Group
Supervisor	: Jørn Vatn
PhD start	: October 2009
Phone	: +47 735 97102
E-mail	: zafar.hameed@ntnu.no
Home page	: http://www.ntnu.edu/ross/rams

Maintenance optimization of offshore wind turbines from design to operation (models, methods, framework)

Offshore wind energy has become an emerging area of research due to its rapid growth in the energy market. There are number of reasons of this trend due to environmental hazards being posed by traditional sources of energy like oil, gas and coal etc. From last three decades, wind turbines were installed on onshore with certain psychological impacts on the local community. To overcome the issues coupled with onshore wind turbines, the trend has been set to shift these wind turbines from onshore to offshore locations. While handling the impacts of land based wind turbines, new challenges have come in our ways to make the offshore wind turbines more reliable and efficient compared to onshore wind facilities. In the operations of offshore wind turbines, the important challenges are access, logistics and failure behavior.

The working environment of offshore is entirely different from the land based locations. For example, in case of failure, the repair is relative simple for onshore wind turbines but for marine location, the suitable vessel has to be arranged keeping in view the weather conditions. Then based on the nature of failure it may be required to transport heavy components to replace them with the faulted ones. There is another important challenge to understand the failure behavior of offshore wind turbines in marine environment which needs further investigation compared to onshore wind turbines. Keeping in view the issues of access, logistics, and failure patterns coupled with the operations of offshore wind turbines, it is necessary to address these demanding tasks to make them as a viable choice for power production compared with other sources of energy.

Keeping in view the intricacies related with the operations of offshore wind turbines, it is imperative to develop an overall framework to develop optimal strategies at the whole wind farm level. Additionally, there exists a need to understand the degradation mechanism of wind turbine components to decide which of them will follow condition based models and which ones are good to be repaired based on their age. The development of overall framework to handle different inspection, repair and renewal strategies at the wind farm level might be a gigantic task. To accomplish such a task, the development of an overall maintenance optimization framework is underway.