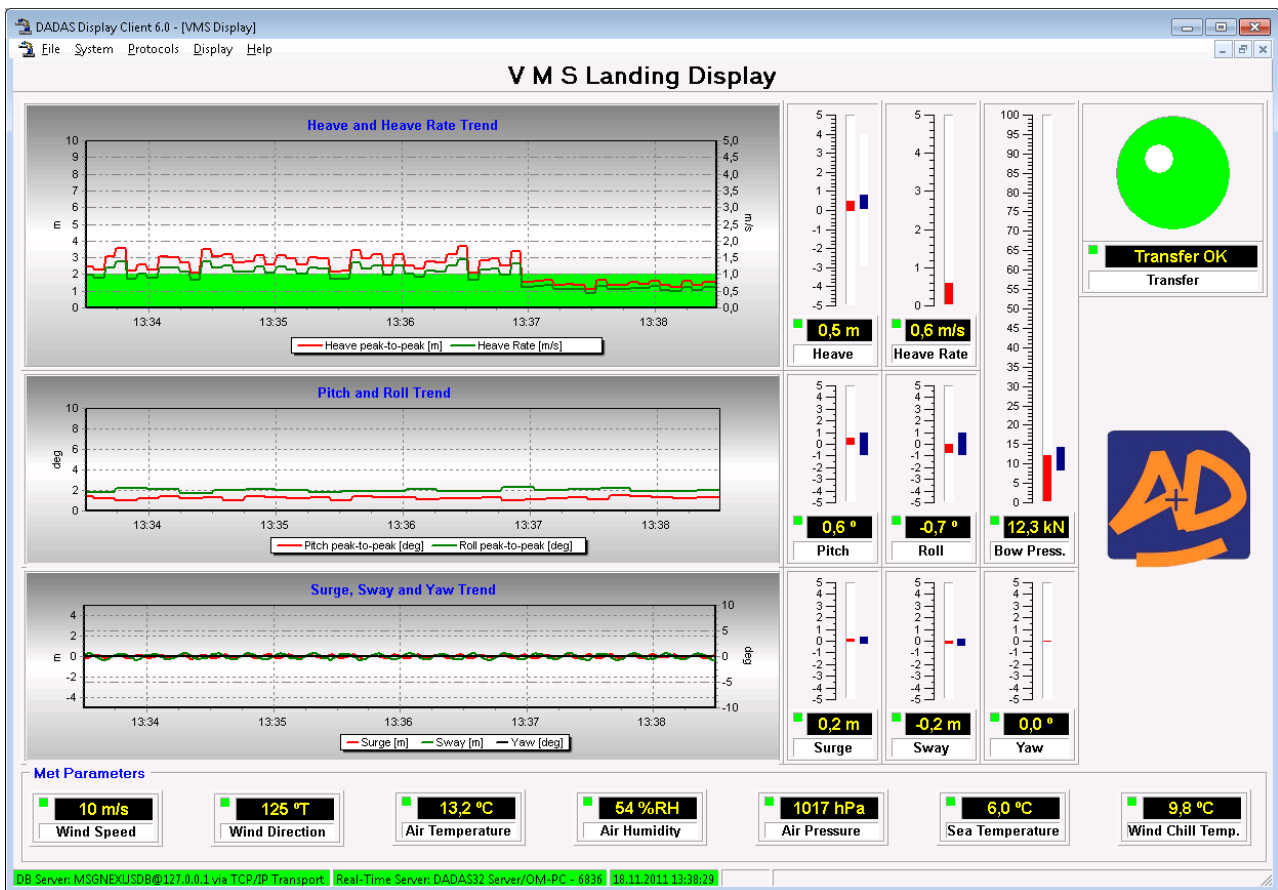


# VESSEL MOTION MONITORING SYSTEMS

## MOTION MONITORING FOR WIND FARM WORKBOATS



A+D VMS-systems is designed to be used as a reliable tool for safer vessel operations as well as dedicated HSE tool. The VMS-system can significantly increase the safety level during critical operations and can also be used to collect data for later analysis for statistics purposes as well as storing data for incident and accident investigations.

Vessel motion is the main limiting operational and safety parameter when operating workboats offshore. Accurate Motion Monitoring during critical operations can increase the operational window significantly. It can be the main factor leading to a successful operation.

Meteorological parameters and other relevant information can be added as an extra feature.

The VMS will allow the user to monitor and focus on motion parameters rather than significant wave height as the main limiting factor.

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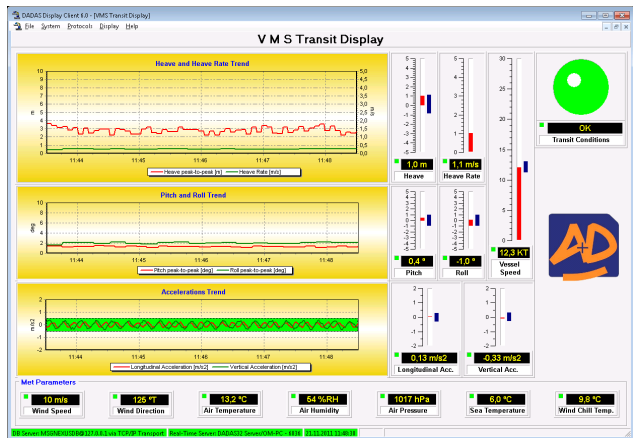
post@automasjon.no

# HOW CAN A VMS-SYSTEM IMPROVE SAFETY DURING CRITICAL OPERATIONS

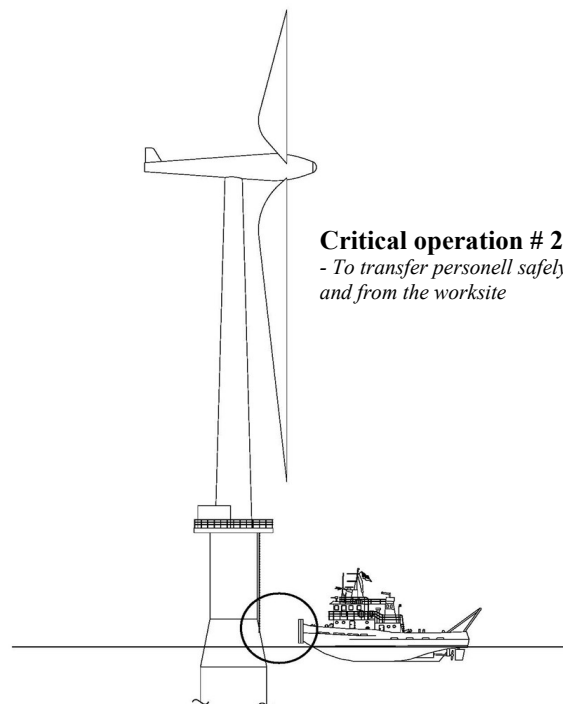
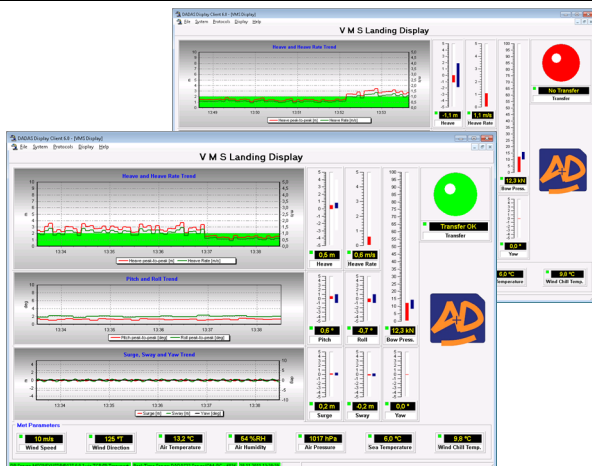
VMS for wind farms is designed specifically for the two operational phases: Transit phase from shore to the wind farm and the Landing phase when transferring personnel to the turbines. During the Transit phase the system can be used to reduce the problem of seasickness. During the Landing phase the system can be used to reduce the risk for injuries and accidents during the critical transfer operation by using a traffic light system as a simplified user interface.

**Critical operation # 1:**  
 - To make sure personell are fit-for-fight upon arrival at worksite

During transport of personell from shore to worksite or between worksites the motion trend displays can be used actively to reduce the motion discomfort that causes nausea and seasickness. This will make sure the personell arrives at site in good shape and ready to work. ”Traffic light signals” can be used as guidance.

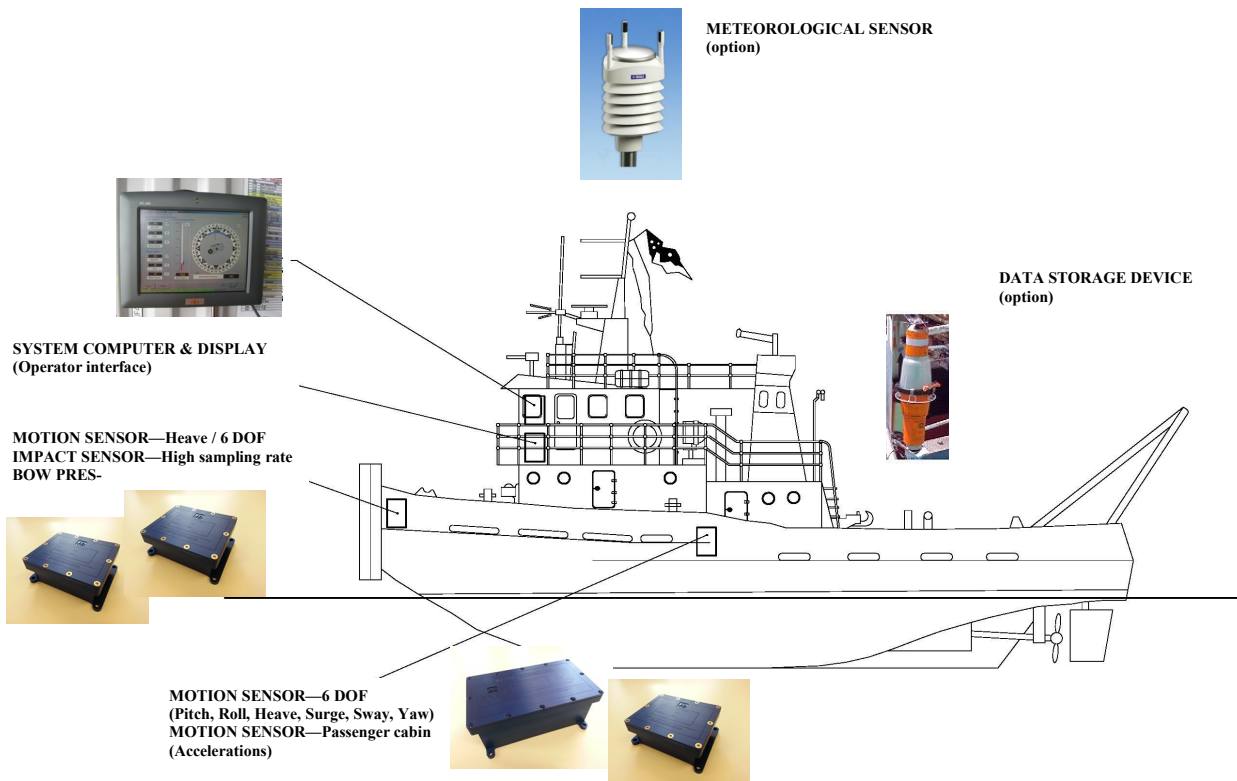


During landing operations and offloading of personell the motion trend displays, the Heave Rate values can be used actively to reduce the risk. ”Traffic light signals” can be set to stop operations at preset thresholds before dangerous levels are reached.



**Critical operation # 2:**  
 - To transfer personell safely to and from the worksite

# GENERAL SYSTEM CONFIGURATION



A basic VMS-system includes one, two or three motion sensors and a computer that measures, calculates and displays the critical motion parameters that is essential for the Captain to be aware of when making decisions during critical operation or not. Heave of the vessel can be measured at the landing point and the Heave Rate is calculated in real-time. Accelerations can also be measured in the passenger cabin for analysis of comfort parameters. Horizontal motions (Surge and Sway) as well as Impact forces, Bow Pressure, Hawser Tension and other landing forces are or can also be measured.

A “Traffic light signal” can be used for operator guidance or for access control with automatic switching or with the Captains supervision.

The system can also include accelerometers, inclinometers, meteorological sensors, downlooking radar for wave and air gap measurements, etc. but can also be expanded to include other structural and environmental sensors.

Smaller self-contained systems, including wireless data transfer, can be designed to meet specific needs.

Motion monitoring sensors can be integrated into or combined with other monitoring systems for on-line monitoring or long term data recording for future analysis.

Data can be sent to shore or other sites online for tracking and coordination purposes providing data lines or other communication lines are available.

Data can be stored in the system computer for later analysis for statistics purposes as well as for incident and accident investigations.

Other data storage devices such as free float data buoys can be added in order to implement safe “Black Box” functionality into the system.

The systems can be tailor-made to suit the clients specifications and can easily be expanded in the future to comply with new demands, rules and regulations.



A+D has been involved in a large number of Motion Monitoring projects for vessels and offshore platforms over many years. Applications includes Motion Monitoring Systems for all 6 Degrees Of Freedom (Pitch, Roll, Heave, Surge, Sway and Yaw), Vibration Monitoring, Inclination Monitoring, Wave Monitoring (with or without Heave compensation), Air Gap Measurements and many others. Heave Rate calculations for safer operation is included as a standard function.

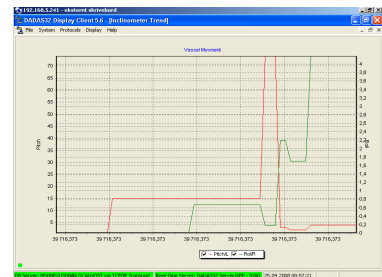
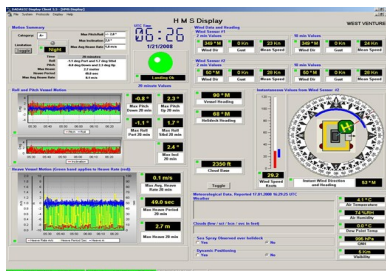
The systems can be tailor-made to suit the clients specifications and can easily be expanded in the future to comply with new demands, rules and regulations.

The VMS is based upon A+Ds more than 10 years of experience in building Helideck Monitoring Systems for offshore oil and gas vessels and platforms and the remarkable safety improvements these systems have led to. Used as a proactive tool for HSEQ work this will greatly improve the safety standards during critical offshore operations.

A+D has been involved in the process of setting such safety standards since the beginning and will be able to work as consultants or advisors whenever necessary.

A+D can provide design and engineering support, installation support, operation and maintenance services, calibration services and training of personnel as required by each individual customer.

Customer or application specific display examples below:



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