KONGSBERG MARITIME

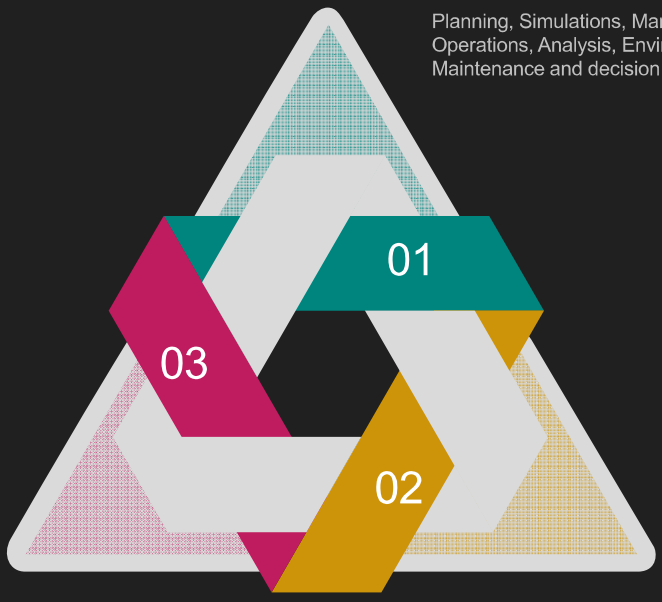
W2W, K-WALK CONCEPT

Shipping-klubben, 13th Feb 2017

CONCEPT OFFERING, Triangle initiative

OPERATIONAL EFFICIENCY

Planning, Simulations, Marine Operations, Analysis, Environment, Maintenance and decision support



HANDLING EFFICIENCY

Innovative new designs on deck handling, mechanical designs for towers, frames, eLARS and Gangway

ENERGY MANAGMENT

Energy efficiency, Hybrid functions, global protection, integrated functionality

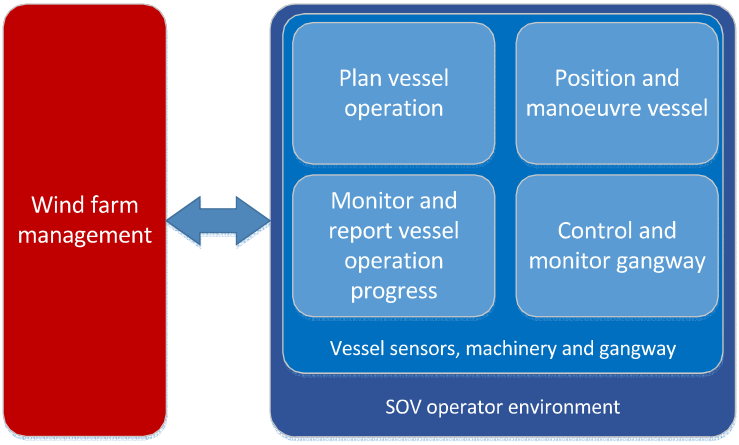
Offshore Wind Power

Operation and maintenance costs constitute to a significant part of the total costs of offshore wind power.

Therefore, the development of improved and new solutions for operation and maintenance (O&M) of offshore wind turbines and wind farms is an important contribution to make offshore wind power more cost-effective.

CONCEPT

Walk 2 Work (W2W)



SOV OPERATION CONTEXT

The SOV is a participant in a logistics operation planned and managed by the wind farm administration.

«Planning» on board the SOV means finding the optimal route between turbines and the most favourable position for transfer of personnel and cargo when at the turbine

The order in which turbines are to be visited is primarily a consideration made by the administration based on priorities – dynamically influenced by changes in weather and events during operation

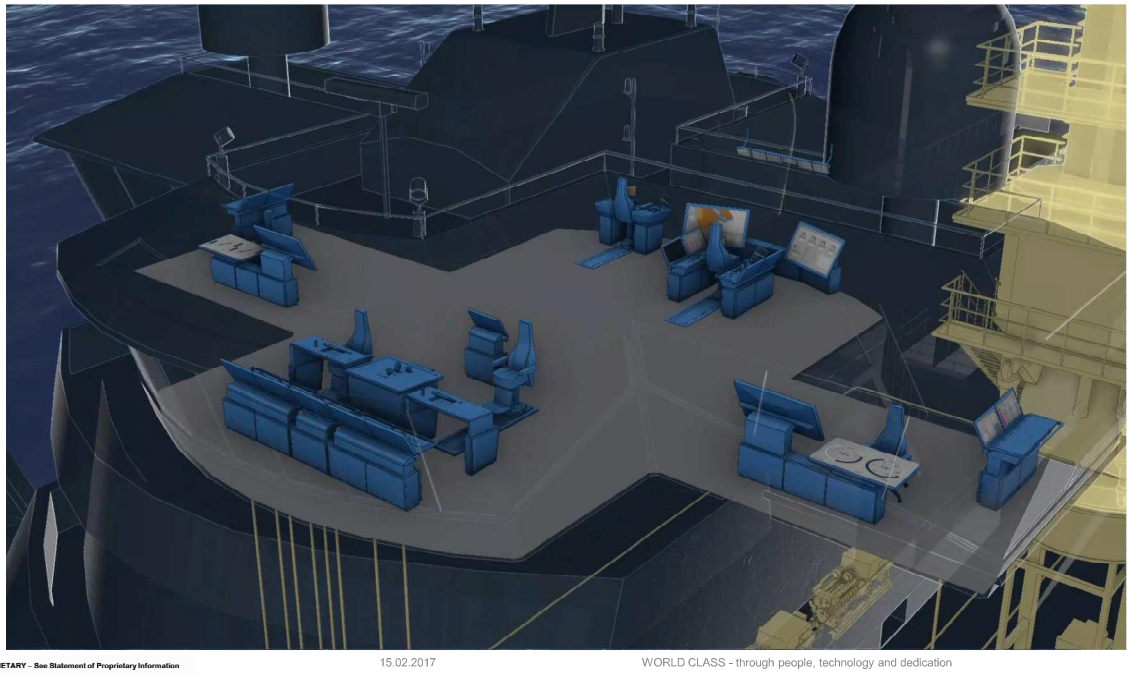
K-IMS

Kongsberg **I**nformation **M**anagement **S**ystem

Open, **Secure** and **Collaborative** Digital Platform

OPERATIONAL EFFICIENCY

Condition based operator environment(W2W)

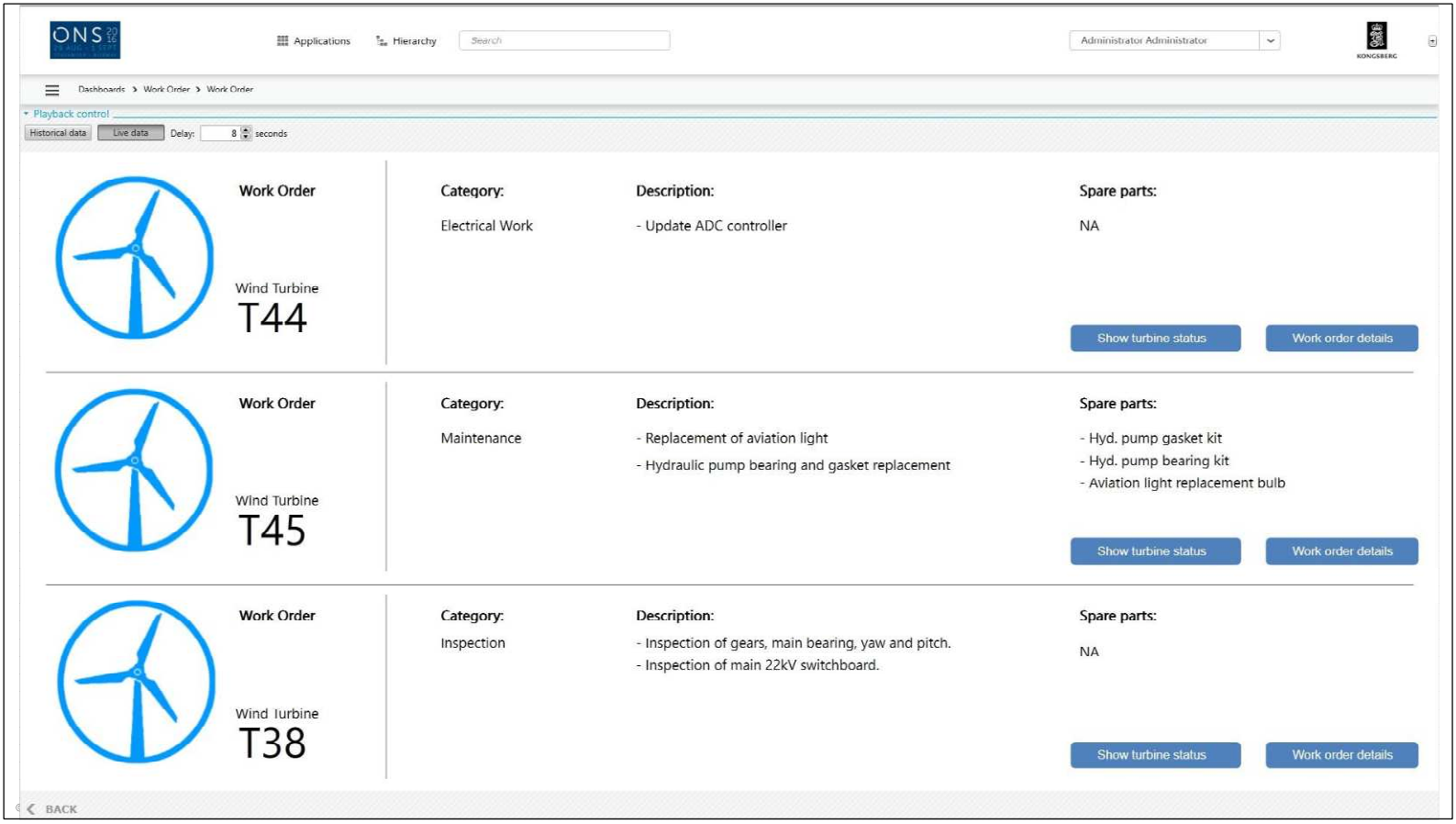


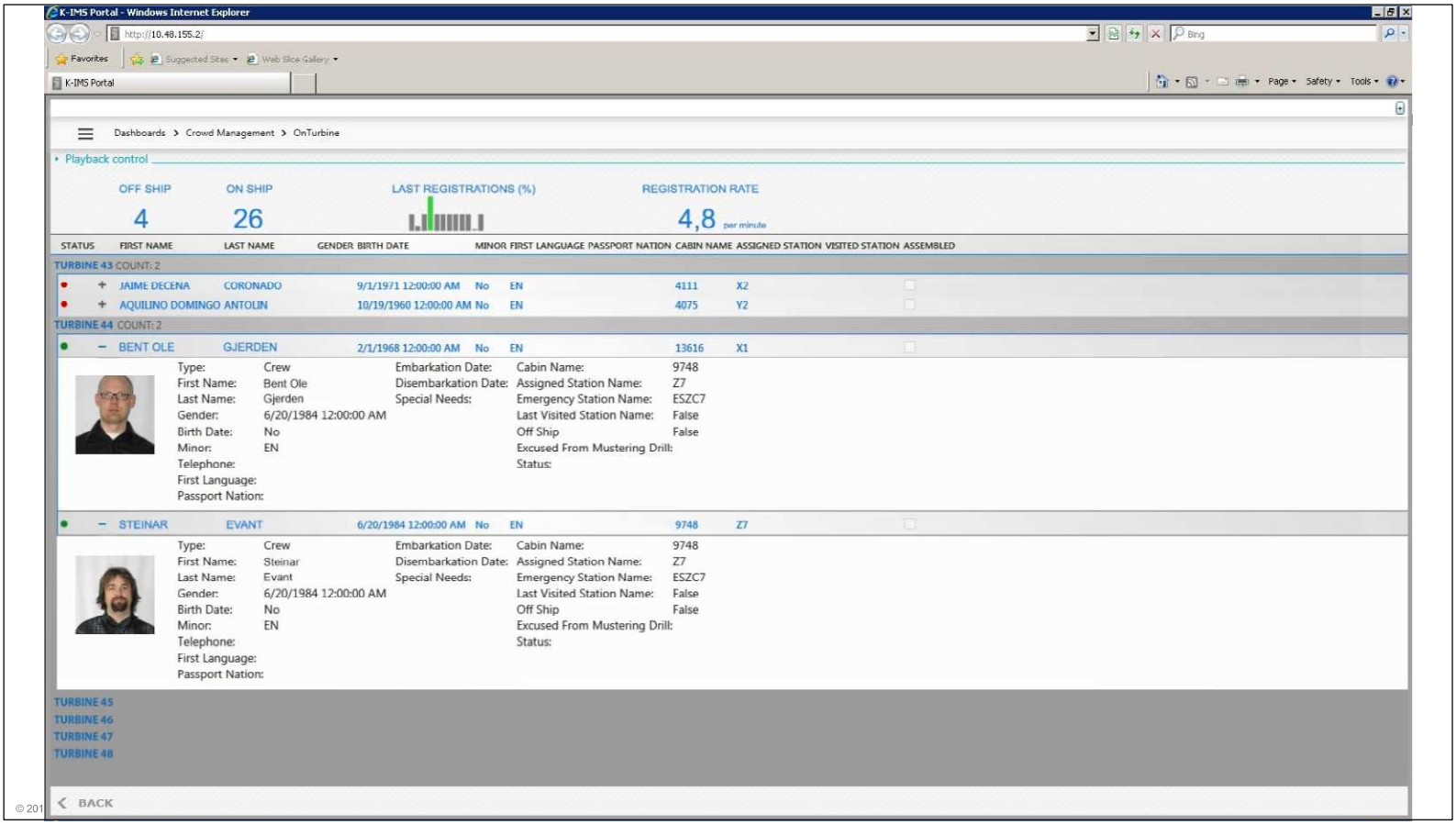
INTEGRATED BRIDGE SYSTEMS

- DP operation
- Automated Hook up of Gangway
- CCTV visuals of Hook-up Process
- Energy control “Wheel” with energy utilization and efficiency tools
- K-IMS
- Planning tool

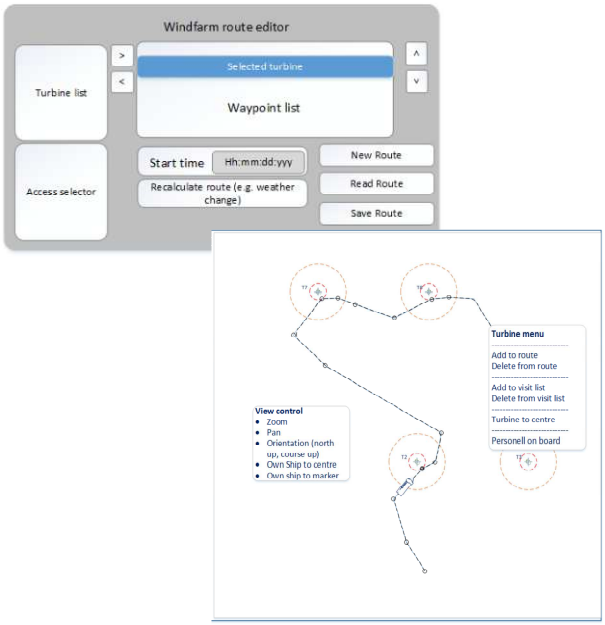
BENEFIT

INCERASED OPERABILITY with NEW condition based operator environment with minimal training requirements


Applications
Hierarchy
Search
Administrator Administrator
KONGSBERG
Dashboards > Work Order > Work Order
Playback control
Historical data
Live data
Delay: 8 seconds
Work Order
Wind Turbine
T44
Category:
Electrical Work
Description:
- Update ADC controller
Spare parts:
NA
Show turbine status
Work order details
Work Order
Wind Turbine
T45
Category:
Maintenance
Description:
- Replacement of aviation light
- Hydraulic pump bearing and gasket replacement
Spare parts:
- Hyd. pump gasket kit
- Hyd. pump bearing kit
- Aviation light replacement bulb
Show turbine status
Work order details
Work Order
Wind Turbine
T38
Category:
Inspection
Description:
- Inspection of gears, main bearing, yaw and pitch.
- Inspection of main 22kV switchboard.
Spare parts:
NA
Show turbine status
Work order details
BACK


K-IMS Portal - Windows Internet Explorer
http://10.48.155.2/
K-IMS Portal
Dashboards > Crowd Management > OnTurbine
Playback control
OFF SHIP
4
ON SHIP
26
LAST REGISTRATIONS (%)
REGISTRATION RATE
4,8 per minute
STATUS FIRST NAME LAST NAME GENDER BIRTH DATE MINOR FIRST LANGUAGE PASSPORT NATION CABIN NAME ASSIGNED STATION VISITED STATION ASSEMBLED
TURBINE 43 COUNT: 2
JAIME DECENA CORONADO 9/1/1971 12:00:00 AM No EN 4111 X2
AQUILINO DOMINGO ANTOLIN 10/19/1960 12:00:00 AM No EN 4075 Y2
TURBINE 44 COUNT: 2
BENT OLE GJERDEN 2/1/1968 12:00:00 AM No EN 13616 X1
Type: Crew
First Name: Bent Ole
Last Name: Gjerden
Gender: 6/20/1984 12:00:00 AM
Birth Date: No
Minor: EN
Telephone:
First Language:
Passport Nation:
Embarkation Date:
Disembarkation Date:
Special Needs:
Cabin Name: 9748
Assigned Station Name: Z7
Emergency Station Name: ESZC7
Last Visited Station Name: False
Off Ship False
Excused From Mustering Drill:
Status:
STEINAR EVANT 6/20/1984 12:00:00 AM No EN 9748 Z7
Type: Crew
First Name: Steinar
Last Name: Evant
Gender: 6/20/1984 12:00:00 AM
Birth Date: No
Minor: EN
Telephone:
First Language:
Passport Nation:
Embarkation Date:
Disembarkation Date:
Special Needs:
Cabin Name: 9748
Assigned Station Name: Z7
Emergency Station Name: ESZC7
Last Visited Station Name: False
Off Ship False
Excused From Mustering Drill:
Status:
TURBINE 45
TURBINE 46
TURBINE 47
TURBINE 48
BACK

PLANNING TOOL
Walk 2 Work (W2W)



ADD VISIT TO PLAN (Route editor) AND CALCULATE ROUTE

Applies **«auto routing».** That is, when the list of turbines to be visited is entered or updated, additional waypoints are calculated and inserted to make the route navigable.

The calculation uses default values for approach legs and considers the weather forecast to determine the most favourable access point. Significant change in weather conditions may motivate a recalculation

All waypoints and turbine visits beyond the currently active waypoint can be updated at any time, and the route recalculated

The predicted vessel position for gangway connection is calculated based on known geometry, but the actual connection position will be established when approaching the turbine

ETA at turbines is estimated based on route and prediced connection times and updated when progressing along the route

PLANNINFG TOOL
Walk 2 Work (W2W)

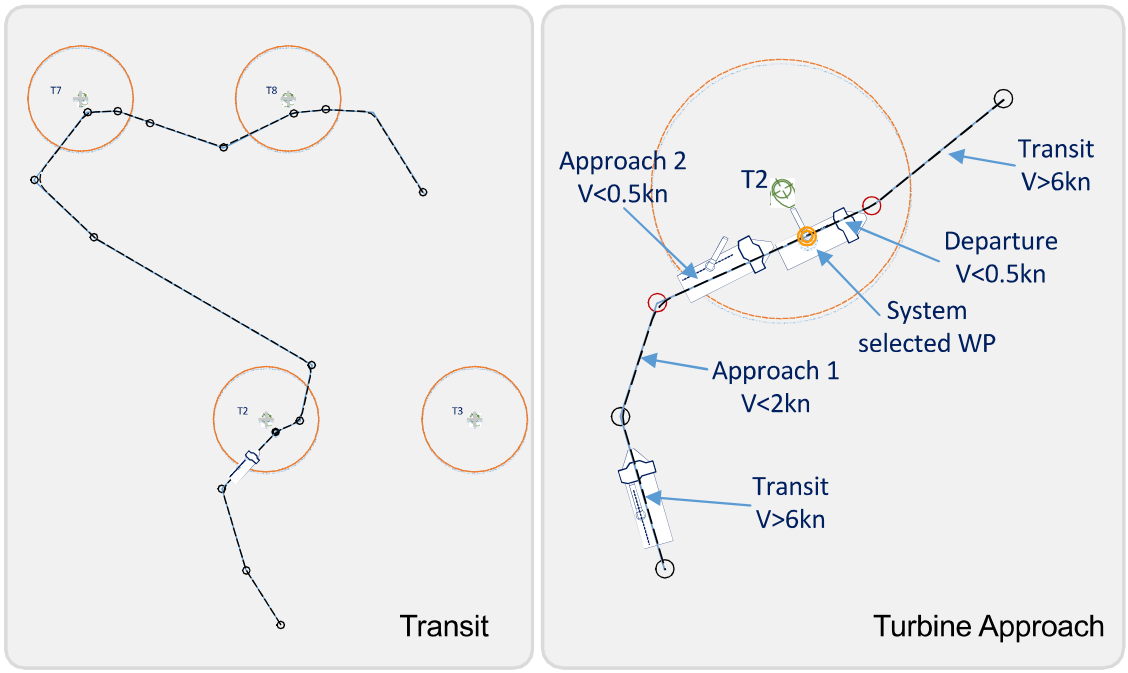
INTEGRATED MISSION PLANNING

BENEFIT

INCREASED PRODUCTIVITY & EFFICENCY by finding the most preferred route planning for increased service capability within the wind farm

PLANNING TOOL

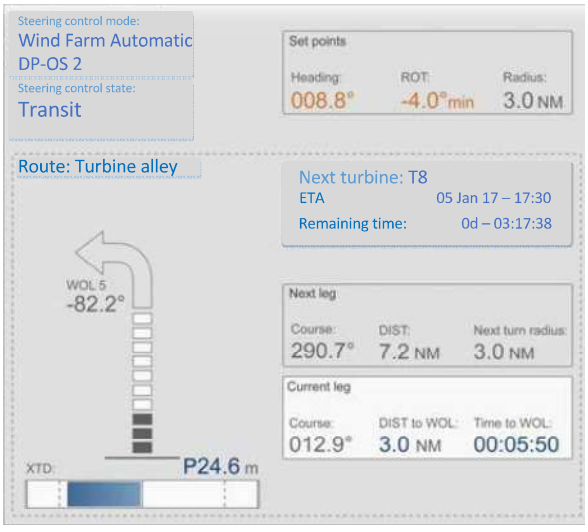
Walk 2 Work (W2W)



VESSEL PLAN = SAILING ROUTE

PLANNING TOOL

Walk 2 Work (W2W)



EXECUTE ROUTE

Route planning is independent of route execution method:

- Manual transit
- Atomatic transit using K-POS DP control system in joystick mode or all speed auto track mode

The vessel will be monitored vs the route (cross track, distance to WP, ETA turbines) as long as a route is established

Automated, coordinated, turbine approach and gangway operation is based on route execution with the K-Pos DP auto track mode.

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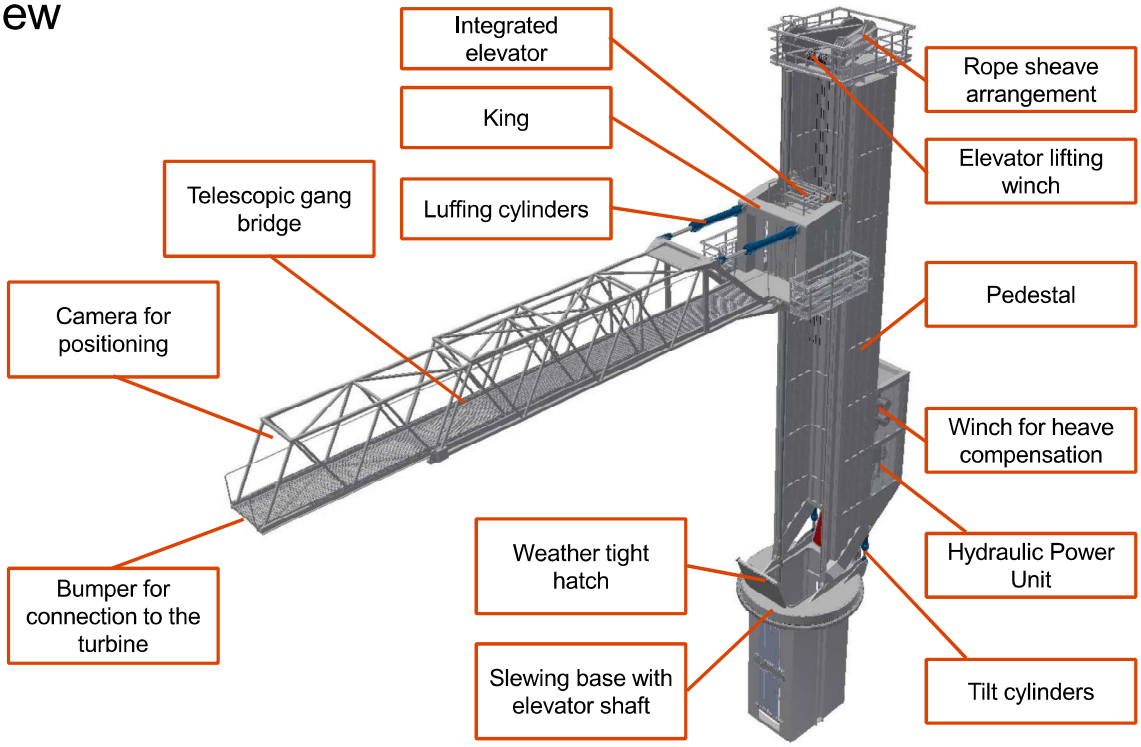
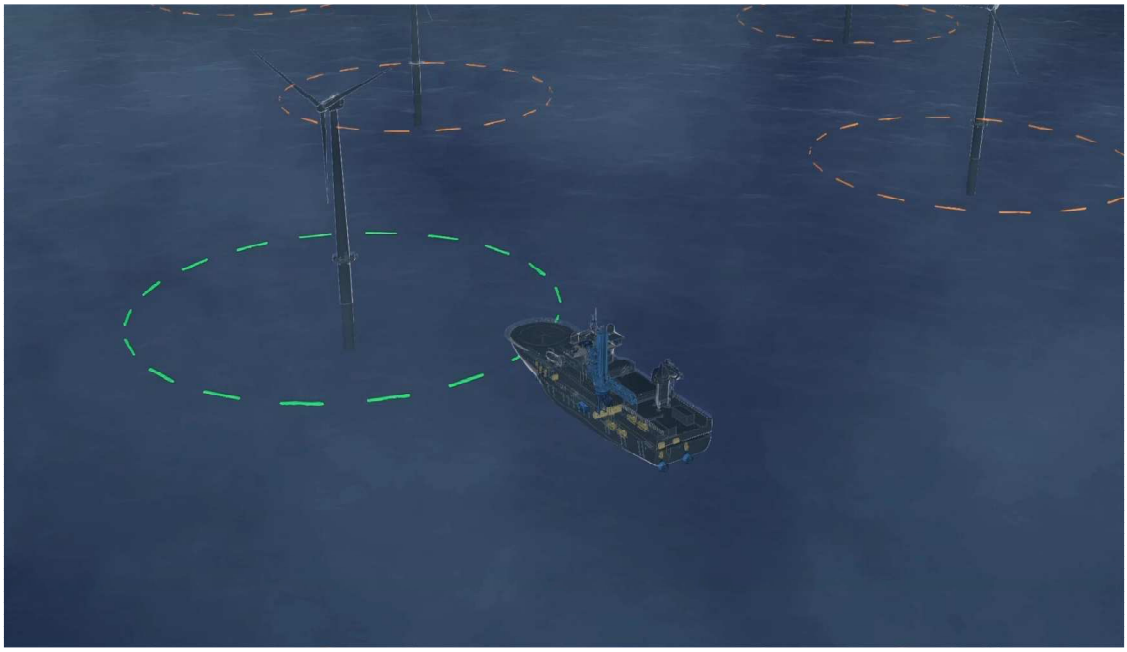
Overview



OPERATIONAL EFFICIENCY

Walk 2 Work (W2W)



AUTOMATIC GANGWAY HOOK-UP

Integrated control with reference systems for completely AUTOMATED Hook-Up and Release functions

BENEFIT

INCREASING PRODUCTIVTY with the ability to serve more wind mills within the same time frame

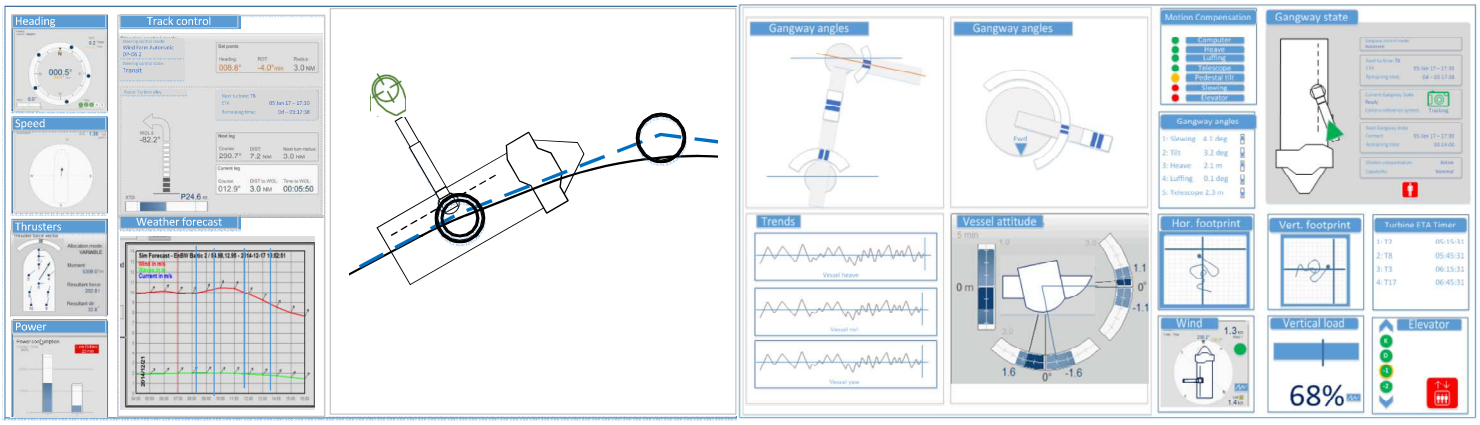
IMPROVED TIME EFFICEINCY

CONDITION BASED OPERATOR ENVIRONMENT

Walk 2 Work (W2W)

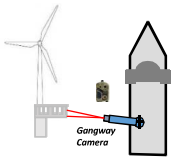
TOTAL SITUATION AWARENESS

All critical information easily available to the operator



TRACKING

Walk 2 Work (W2W)



CAMERA REFERENCE SYSTEMS - TECHNOLOGY

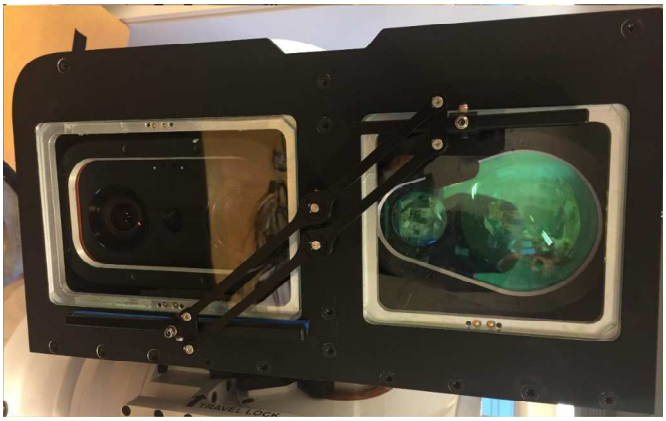
The Camera Reference System (CRS) is in addition to the MRU the main reference system for the Gangway control system (GWCS)

The CRS is development together with Kongsberg Defence Systems (KDS)

Technology and algorithms reused from Kongsberg Defence Systems

KONGSBERG Protector (Remote Weapon System)
KONGSBERG Naval Strike Missile
KONGSBERG Remote Tower

TRACKING
Walk 2 Work (W2W)



CAMERA REFERENCE SYSTEMS - TECHNOLOGY

Consists of two physical color cameras to achieve depth vision

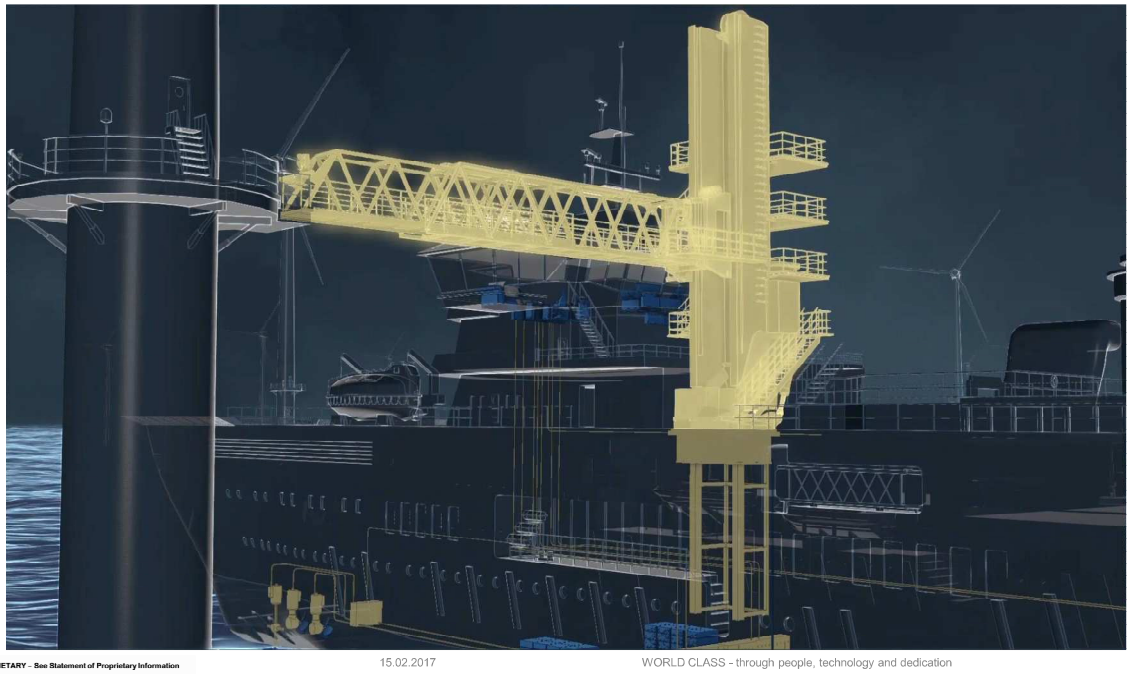
Fixed 70 deg Field of view (FOV)

Camera output
- Distance, Elevation, Azimuth
- Quality

Tracking algorithm
- Recognizing predefined structures (e.g. U-beam)
- Templates may improve the recognition

Will be used as watch dog to monitor the connection

INTEGRATED LIFT SYSTEM
Walk 2 Work (W2W)



INTEGRATED LIFT SYSTEM

Integrated Lift system for transfer of people and goods

Electric Trolleys (Under design) for movement of pallets across the gangway

BENEFIT

INCREASED PRODUCTIVITY by improving the time for mobility and also increasing safety for movement of goods

Applications Hierarchy Search Administrator Administrator

Reports > DailyReport

1H 6H 12H 1D 2D 08/23/2016 21:45:37 08/23/2016 22:45:37

DailyReport

ONS 2016 29 AUG – 1 SEPT STAVANGER – NORWAY

Daily Report
2016-08-23

Kongsberg Challenger

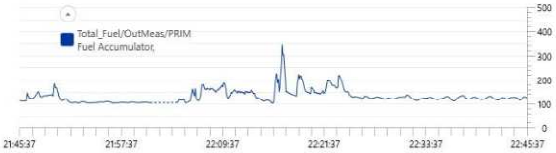
SUMMARY:

Work orders completed	11
Number of transfers	18
Turbines visited	13

STATISTICS:

	Connection time	Transit time
Min	1m 12s	18m 3s
Max	7m 33s	1t 10m 14s
Avg	2m 10s	32m 14s

FUEL USE:



VESSEL SPEED:

DETAILED LOG:

Work order: 145						
Turbine	44			No. of persons	2	
Direction	On WT					
Event	Transfer planned	Distance to WT	Vessel in position	Gangway connected	Transfer start	Transfer finished
Time	11:00	3,2nm	11:15	11:18	11:19	11:19
Remarks						

Work order: 145						
Turbine	44			No. of persons	2	
Direction	Off WT					
Event	Transfer planned	Distance to WT	Vessel in position	Gangway connected	Transfer start	Transfer finished
Time	12:00	-	11:50	11:52	11:52	11:53
Remarks						

Work order: 146						
Turbine	50			No. of persons	2	
Direction	On WT					
Event	Transfer planned	Distance to WT	Vessel in position	Gangway connected	Transfer start	Transfer finished
Time	13:47	2nm	13:50	13:55	13:55	13:57
Remarks						

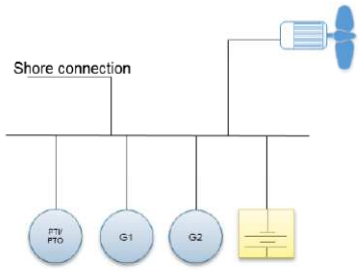
Work order: 146						
Turbine	50			No. of persons	2	
Direction	Off WT					
Event	Transfer	Distance to	Vessel in	Gangway	Transfer	Transfer

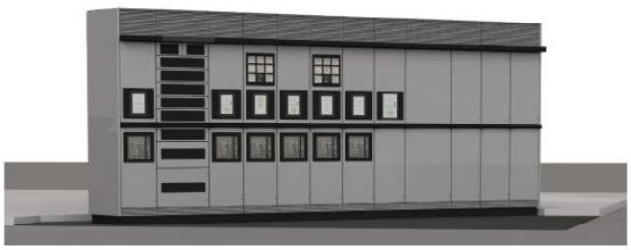
ENERGY SOLUTIONS

INTEGRATION & DIGITALISATION

The electrical solution with shaft generator suitable to run with variable RPM supported by a small battery package **will reduce the operational cost and bring the safety aspect to new dimension**

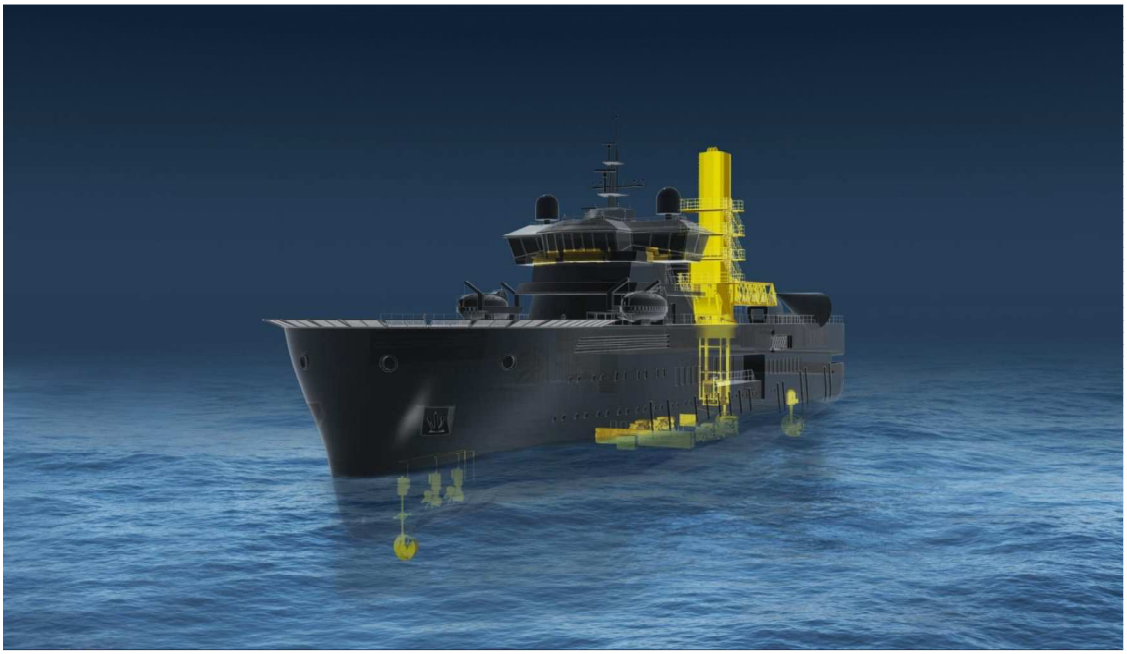
- Fast acting sensors with full access to breakers and drive configurations
- Fully DIGITAL swithboard
- Regeneration of power from Gangway
- Single Line Diagrams
- Local Operations
- Capability Plots
- Protection Settings (Local)
- KONGSBERG ON CALL
- Digital documentation





K-WALK CONSEPT CONCLUSION

Walk 2 Work (W2W)



OPERABILITY

- Condition based operator environment
- Reduced human interaction for Gangway operations
- Integrated mission planning and automated vessel maneuvering
- Improved the flow of required information

PRODUCTIVITY

- Faster hook-up to windfarm
- Time saving and slope-less transfer of people and equipment
- Increased weather window

ENERGY MANAGEMENT

- Improved efficiency through Hybrid AC design solution
- Integrated Energy control with advisory tools
- Integrated energy control reducing cables, commissioning and testing requirements

THANK YOU

Press release

First State-of-the-Art KONGSBERG Motion Compensated, Integrated 'Walk-to-Work' System to be installed on Olympic Orion MPSV

- *Integrated solution to provide safe, energy efficient transfer of personnel and materials between vessel and offshore wind turbines*
- *Contract includes integration with Kongsberg Information Management System (K-IMS) and upgrade of K-Pos DP software*