Monitoring System for Platforms and Offshore

The Application: METOCEAN Monitoring System for Offshore Structures and Wind Parks. Suitable for Helipad operation and operational safety assessment.

1. Buyer requirements:

- A complete monitoring system (Turn-key Solution) with extended meteorological and hydrological measurements to allow safe transport of personnel & goods from sea as well as helipad usage.
- High data accuracy with state-of-the-art equipment, senssors approved/certified for aviation.
- Water level, tide and wave measurement range of up to 30 meters.
- Remote data transmission, control and alerting.
- Integration in existing SCADA system.
- A system that is robust, requires little repair and maintenance, and requires only an annual inspection & maintenance. Zero tolerance for lost data! System should be reliable under extreme conditions like high seas, high winds, frost, storms.
- A system that is easy to manage and provides easily comprehensible data.
- A single contractor to offer the whole system, installation, commissioning and training.

Technologies for harsh offshore and maritime environments.

System durability, reliability and low total cost of ownership.

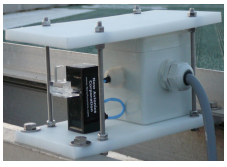
2. Seller deliverables:

- Complex system with various measurement technologies and data formats requires intensive system integration as well as hardware and software system customization.
- Providing a system that is extremely robust, is not affected by any kind of interference from buyer's personnel. Any such human errors should not affect the critical system operations.
- The seller's experienced personnel have to be able to work under difficult, time-constrained and harsh conditions. Personnel's thorough understanding of the system, experience with offshore installations and safety training are crucial.
- Shipping, custom issues can present huge efforts, costs and delays. Offshore construction in remote regions presents a logistics problem.
- Robustness and reliability of such systems are of paramount importance as these can be hard to access offshore locations. Each part of the system needs to be reliable under maritime usage to ensure hassle free uninterrupted operation for a number of years.

General Acoustics e.K., Am Kiel-Kanal 1, 24106 Kiel, Germany
Tel.: +49(0)4315808180, Fax: +49(0)4315808189, info@GeneralAcoustics.com , www.GeneralAcoustics.com

3. Results:

The system components were the following:

<table>
<tr>
<td>Ultrasound LOG_aLevel sensors
- 30 meters measurement range
 
• Water Level
• Tide
• Wave Parameters (Hs, H1/3, H1/10, Hmax and Ts)</td>
<td>Ultrasonic 2D-compact Offshore Wind Sensor
 
• Wind speed
• Wind direction
• Virtual air temperature</td>
<td>ADCP
- 100m offshore cable for communications and power
- Anchor and base
 
• Water current profiles
• Directional Wave analysis from the ADCP data</td>
</tr>
<tr>
<td>Data logger
 
• Data backup for 12 months of recordings (not susceptible to any radio communication problems)</td>
<td>Barometric sensor
 
• Atmospheric air pressure</td>
<td>Water and air temperature sensors
  
• Air Temperature
• Water Temperature</td>
</tr>
<tr>
<td>Ceilometer
 
• Certified for Aviation
• Cloud height up to 7 km
• Cloud Height and vertical visibility</td>
<td>Rain Gauge
 
• Rain detection</td>
<td>Humidity
- heated and ventilated for reliable offshore operation
  
• Air Humidity</td>
</tr>
<tr>
<td>Visibility /light-sensor /Brightness
  
• xxxxxxx</td>
<td>Optical Ice Accumulation Sensor
 
• Ice detection</td>
<td>Solar Radiation
 
• Solar radiation</td>
</tr>
</table>

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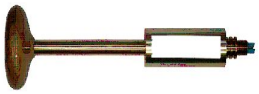
Scour detection ??????	**GPS Antenna**  • GPS date and time information	
Electronics Housing  • Housing for the electronic components on the platform that provides adequate protection	**Inductive 2D Current Meter** - Alternative to ADCP (the inductive 2D current meter was not delivered for this project !)  • Current direction	**Radio Communication**  Offshore LAN, Satellite To shore 5GHZ, satellite to station (logging , viewing) for logistics

The system has been running 24/7 since 2012. In this time the system has proven very stable and an annual maintenance has proven adequate to keep the system in very good condition. The LOG_aLevel ultrasound sensor array was positioned in a measurement distance of 30 meters from the mean water level. The LOG_aLevel system fully resolves all waves to provides highly accurate wave parameters and tide data. The ADCP system was deployed using tha platform crane and was positioned without problems (tilt & pitch ≈ 3 degrees). Since continuous profiling and directional wave data was required from the ADCP, a submerged cable was used to connect the ADCP to the platform electronics and serves for data communication and electricity.

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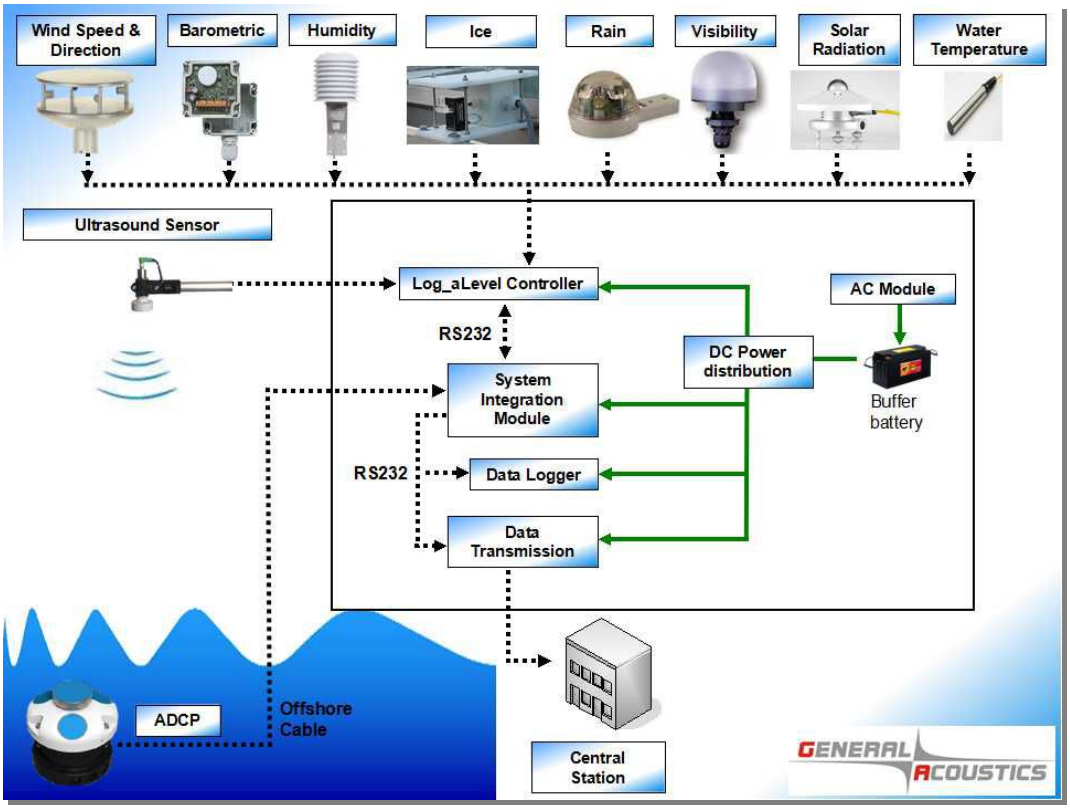
Remote sensing technology for excellent results, reliable operation and minimal requirements for maintenance.

The meteorological sensors have been performing within their hi-standard specifications and providing uninterrupted data streams. Apart from a visual inspection and checking of cable connections, there has been no further need during maintainable.

The data are analysed and graphically displayed for decision making on the platform regarding operations, sea transport and helipad usage. Data is shown in multiple locations on the platform (operations room, helidec, etc...) through the LAN on the platform. The analysed data are also transfered on land via a satellite system and presented on a website. Throught the satellite system the data can be made available to other users during operation, maintenance and decommisioning. Furthermore, an alarm and safety system was supplied that continously monitors the system health and alarming when components fail.

The end-user interface allows a good overview of all system components and data are presented in an easily understandable form. The system further allows easy report generation for quick and accurate information dissemination.



The system was optimized for very low maintenance, using remote sensing technology, sensors with no moving parts, special corrosion protection and extended temperature range of all electronic components. These parts require minimal maintenance, thus significantly reducing operation costs, and eliminating problems (in this case: no data). All sensors are calibration-free, making the system easy to install and maintain but also ensuring that maximum accuracy is always guaranteed. The overall system provides high accuracy sea state and meteorological information to enable a hassle free logistics for the offshore platform and has helped in the optimisation and safety of transport and construction works.

Options: AIS AtoN aid to navigation, redundancy of sensors, data loggers and data transmittion

Wave direction: can be measured with either the inductive 2D current meter or an ADCP

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