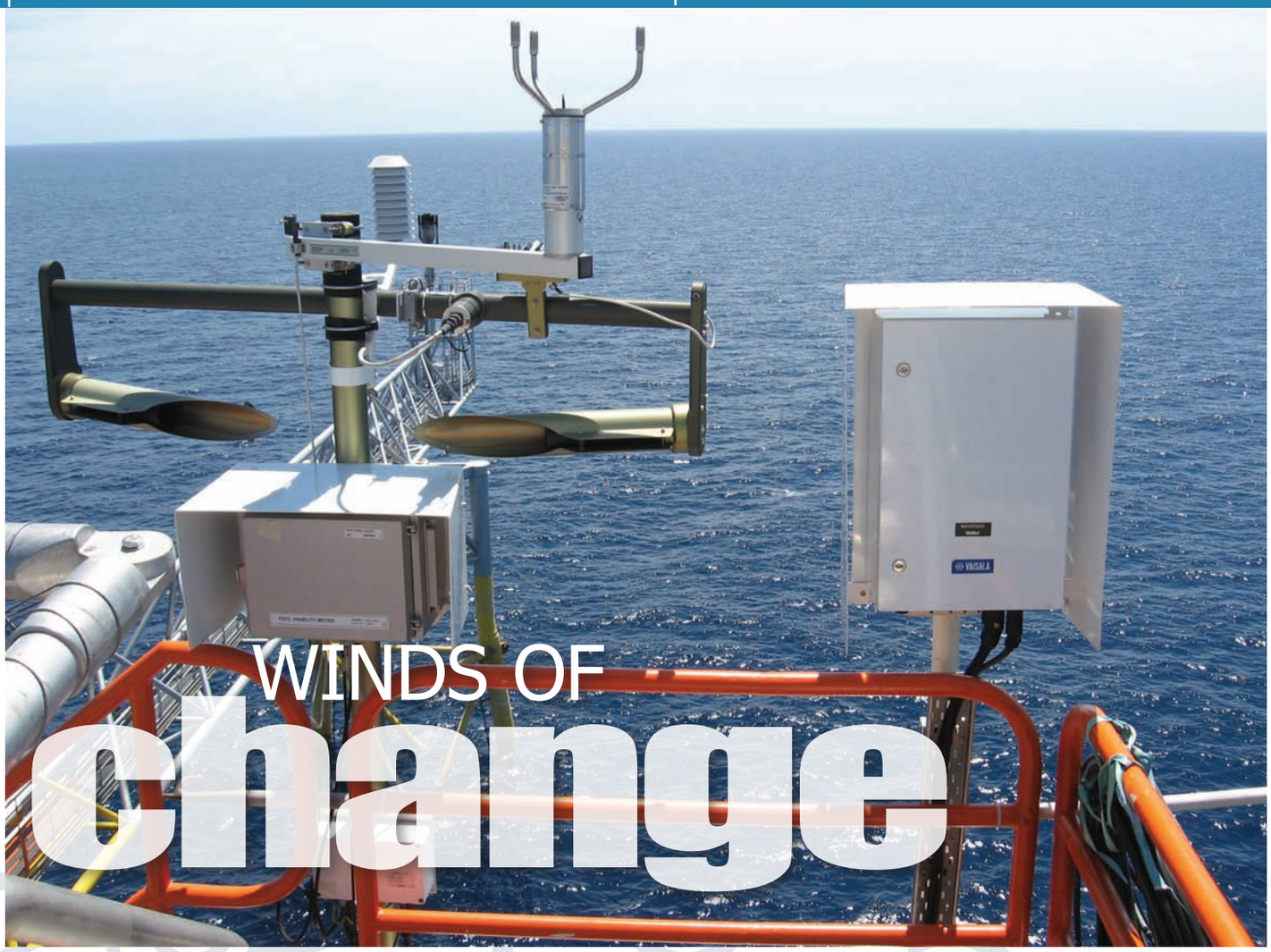

WINDS OF change

Risto Haimelin and **Juha Paldanius** discuss the 'new winds' that are blowing through the marine meteorological measurements market

The wind measuring equipment on board should be regarded as navigational equipment that provides wind information necessary for safe navigation, in addition to serving as a general meteorological instrument. The wind measuring equipment is one of the most important equipment onboard a ship as it gives wind condition required for safe navigation. It is therefore important that the wind measuring equipment is in well functioning order and can be relied upon to provide sufficient, correct and reliable information.

The above is stated in the IMO Sub-Committee on Safety of Navigation work programme proposal for developing new provisions and performance standards on wind measuring equipment. The proposal demonstrates the status of meteorological instrumentation in maritime use. While everyone agrees that knowing weather and its behaviour is one of the core skills needed on sea, the industry regulations and implementation of weather instruments are frequently failing to meet the need. Too often mariners are making their decisions based on information that they know is suspicious due to unreliable instruments or compromised installation of the equipment.

Knowing weather and its impact to operations is an essential part of operative decision making. Different kinds of applications emphasise different weather phenomena and information:

- A modern vessel with dynamic positioning system automatically collects wind information from wind sensors. Such an automated system requires robust machine-to-machine interfaces and a lot more information is passed forward than just the measurement data to ensure reliable and safe operations.

- A helideck monitoring system provides real time weather information to helicopter pilots carrying passengers and cargo to offshore vessels. The helicopter pilots are trained to use weather data, which is formatted according to aviation industry standards. Again reliable measurement data is a given, but without correct aviation coding and units it may be almost useless to its users.

- A ship approaching a harbour in challenging weather

conditions needs approval for docking from the harbour master. Discrepancy on the ship wind data and the harbour information may cause unnecessary delays and financial losses to both parties. Given that the sensors used are giving correct figures, the discrepancy comes from the local installation of the systems.

These applications and others alike illustrate that knowing the weather conditions at sea is not just a matter of weather instruments, but relates to the entire design of the system. This combination of measurement instruments, communication devices, software and their on-board implementation is as reliable as its weakest link. A measurement from an excellent sensor can be ruined by wrong sensor parameters or improper installation; and on the other hand an economical sensor can provide good data when installed properly.

Apart from research vessels, weather instrumentation is rarely specified in a detailed manner, which would help the integrators installing the systems to emphasise the importance of the quality of the whole data chain. Typically the integrators' main field of expertise is not with meteorological instruments, and therefore they rely on recommendations of the consultants that are drafting the specifications. The consultants in turn may base their designs on past experience (old equipment) or incomplete standards. As an outcome, new technologies are being adapted slowly, and gains from them delayed. A practical example of such phenomenon is the adaptation of ultrasonic wind sensors.

Several tests show that the ultrasonic sensors outperform the mechanical ones in data consistency and accuracy, particularly in cold climates and turbulent environments. The digital output of the ultrasonic sensors and the excellent agreement with geometrical functions also allow real-time correction of the data in high roll or pitch situations, with fairly simple algorithms. One very important justification for ultrasonic technology in marine and offshore applications is that the sensors are practically maintenance free because they have no moving parts. The bearings of the mechanical sensors require frequent maintenance in a maritime environment, which is an additional thing to worry about when maintaining a vessel. The slow degrading of the bearings won't often be recognised, and the measurements start showing slower wind speeds than before, if maintenance is neglected. In cold climates, freezing can cause similar effects since heating is much more difficult to arrange on light cups or propeller wings of the mechanical sensors than on the ultrasonic transducers. Digital sensors can also be directly integrated into bridge systems without any signal converters, which makes the true wind calculation with speed and heading from the navigation system easier.

Even the best equipment can provide in improper measurements, if the siting and installation is not properly done. For example, ships and offshore installations are a very challenging environment for wind sensor siting. It is hard to find a spot where the wind fields would not be obstructed by masts, cranes, lights, antennas or by any other obstruction found on modern vessels. These obstructions cause turbulence and speed differences in the wind field. Finding a good site requires understanding of the wind behaviour, and even then it might be impossible to site a single sensor in such way that it gives good reliable data in all conditions. Instead of making questionable compromises on installation, a simple solution would be to install more than one sensor to cover all wind directions.

The global trend to increase the integration of automatic systems extends to the meteorological information systems as well. Beside the on-board weather data, there is plenty of weather information available from sources available on the internet. The on-board measurement information can be integrated to these data sources to improve the quality and coverage of data. Broadband information systems also allow automatic sharing of meteorological data between vessels. The sharing of data puts additional emphasis on data quality, because the data from all individual users becomes visible to all users of the integrated system.

> To increase the reliability of weather information in maritime traffic and offshore operations, the vessel buyers and builders should pay more attention the importance of proper meteorological measurement, and consider the whole instrumentation from sensors to displays as one entity

To increase the reliability of weather information in maritime traffic and offshore operations, the vessel buyers and builders should pay more attention the importance of proper meteorological measurement, and consider the whole instrumentation from sensors to displays as one entity. The design, manufacturing, siting and installation should all be done in a professional manner by persons who have experience on the systems, rather than the maritime consultants or telecom system integrators who lack adequate training in maritime weather measurement. ❖

Risto Haimelin and Juha Paldanius

Risto Haimelin is application manager, maritime and Juha Paldanius, offering manager, new weather markets, at Vaisala. Vaisala is a global leader in environmental and industrial measurement. Building on 75 years of experience, Vaisala contributes to a better quality of life by providing a comprehensive range of innovative observation and measurement products and services for chosen weather-related and industrial markets. **For further information, visit: www.vaisala.com.**