

## **Combining GNSS and Inertial Navigation Systems in improved DP position reference systems**

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### **Abstract**

The role of GPS and DGPS as an accurate and reliable position reference system for DP operations is unchallenged today. The success of satellite-based navigation has led to a long range of initiative including WAAS/EGNOS, Galileo, Compass etc. that further will improve the situation. However, since the introduction of GPS to the offshore community during the eighties the demands and expectation for accurate and reliable navigation has increased with at least the same pace as system improvements.

Even with a large number of navigation satellites available there are concerns that some failure modes still will remain. Examples of such failure modes are installation shortcomings, interference from communication equipment, signal propagation, processing algorithms, DGPS networks and operator faults. Many failure modes will be common to different GNSS based systems and solutions since the underlying technology fundamentally are very similar. Therefore, there is a growing belief in the advantages of combining GNSS with a totally different technology like Inertial Sensors.

Today, there are different technologies available represented by e.g. Fiber Optics (FOG), Ring lasers (RLG), Micro Electro Mechanical Sensors (MEMS), Vibratory/Resonator - Coriolis and Quartz Resonating (QRA). The paper will present an assessment of advantages of integrating different Inertial Sensors with GNSS solutions and outline the most important potential improvements from the perspective of a DP Position Reference system. The most important pitfalls will also be covered including the foreseen impact on the DP operation. The assessments will be confirmed by analysis of recorded GNSS and Inertial Sensor data.

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