Remote Survey Services

The newly developed FANSSRTmtechnology facilitates safe and secure connections to offshore survey systems from anywhere on the globe. A new range of remote services (see Figure 1) is based on this technology, making it possible to remotely monitor, control and QC offshore operations. Savings in operational costs for clients, minimised risks of operational delays and reduced exposure to health, safety and environment (HSE) risks for offshore staff are the major benefits.<P>

Around 4,000 years ago, thePhoenicians were the first to achieve offshore navigation by the use of primitive coastal maps and observations of the sun and stars to determine their course. In the subsequent centuries, marine charting and navigation equipment only slowly developed and seafaring was mainly limited to coastal navigation. With the arrival of the compass, the first nautical charts and scientific instruments such as the astrolabe (1295), ship log (1575) and sextant (1730), sailing the open sea became more common. Further developments with gyrocompass (late 1880s), radar (1930s) and, finally, GPS made accurate navigation and positioning possible.

During all these centuries – and, in fact, until today – the common factor in the art of navigation at sea is that it is a job carried out on the vessel by the sailors themselves. It is only the developments in internet communication in the last decade that have made it possible to approach the issue of offshore navigation and positioning from a different – remote – perspective.

Positioning Floating Assets

In the present day offshore industry, the positioning of floating assets is considered to be a given fact. Depending on the type of operation, metre, decimetre or even centimetre accuracy is required. With near-shore engineering work such as, for example, the construction of foundations for bridges and offshore wind farms, but also with support work as supplied by tugs and standby vessels, positioning with varying ranges of accuracy is of utmost importance. Especially in the oil and gas industry during the different development stages of hydrocarbon reservoirs, positioning of floating assets is of vital importance. In the early stages, drill rigs need to know where to place their anchors and where to drill. Subsequently, construction support and pipe lay vessels need to know where to place the subsea installations, pipelines and umbilicals. Accurate positioning is also required during the installation of the anchors or piles for floating production storage and offloading (FPSO) (see Figure 2) systems and tension leg platforms (TLP), which are being used increasingly more for deep-water developments. Moreover, once the FPSO or TLP is installed, it can be of vital importance to monitor and record positioning data in order to have insight in the excursion zone of the object in relation to asset management.

Surveyor Always Onboard

It is common practice that for these navigation and positioning activities survey specialists are required onboard to provide assistance during these, mostly critical, operations (see Figure 3). When these critical phases have been completed, the surveyors are usually not required anymore and they are demobilised until the next time they are needed. During the surveyors' absence, however, plans might change and there can be an instant requirement for survey services. In these situations, it is difficult to fulfil those requirements due to the lack of availability of personnel at short notice or due to the complexity of mobilising personnel in time to some remote countries and locations. Moreover, current developments in the offshore personnel market are making it increasingly difficult to find competent personnel, let alone at short notice.

Reconsider Mobilisations

The whole industry would benefit if the necessity of mobilising survey or QC personnel could be reconsidered for noncritical tasks. Why send somebody across the globe, arrange a complicated transfer by vessel or helicopter and subsequent basket (see Figure 4) to operate certain equipment, when this can be done remotely in real-time? Fugro has developed a simple and safe service to reduce the number of personnel mobilisations and offshore transfers. This service is based on FANS® Technology and can be used in various situations, a few of which are explained here.

Remote Monitoring

Once installed, floating assets such as FPSOs, FSOs or TLPs do not alter their position very often, but still need position monitoring. This monitoring is used increasingly as a tool for risk and asset management during installation, hook-up and operation of the floating asset. For example, it can provide the positional data critical to the process of ensuring riser integrity.
Instead of having a dedicated surveyor on board permanently, remote motion monitoring can be performed from any location with an internet connection. Office personnel can remotely access the continuously logged data on a daily basis and generate complete position reports from any office desk, even, if needed, from a different continent.

Survey QC From the Office

Most oil and gas companies have dedicated Survey QC Representatives on board their vessel or rig during critical positioning operations. This 'survey rep' monitors the surveyors' operations on behalf of the oil company and has to ensure that the positioning operations follow the standards of the oil company. In practice, this involves checking software settings, surveycalculation methods, data samples and reviewing information of various field reports for correctness.
Due to the technical expertise needed for this task in combination with flexibility regarding project timing, it is becoming increasingly difficult for oil companies to find suitable survey reps. However, if an oil company has the infrastructure in place to remotely connect to the vessel or rig offshore, it will no longer be required for the survey rep to physically go offshore. He can sit behind his desk, connect with the vessel via an internet link and follow the operations during the critical phases. All survey data can be accessed via a dedicated project dashboard (see Figure 5) designed as per the client's wishes. Via the dashboard, the survey rep can even open a real-time navigation screen to

monitor the ongoing operations live. Basically, all his tasks can be performed as though he were offshore: the survey team can publish reports for him to review and can make raw data available.
Communication between the survey rep and the survey team can be via telephone, e-mail and instant messaging. Therefore, there will be no limiting factor on the survey rep's execution of tasks and no longer will there be any need for him to go offshore. Or even better, he can be in control of more than one operation simultaneously, from anywhere in the world!

Remote Support for Standalone Navigation

During certain upstream activities such as subsea tree installations, it is common that survey personnel move between the multipurpose support vessel (MSV) and drilling rig. The rig that has just set the casing and started drilling the well will move away to a safe zone during the subsea tree installation and continue drilling after the tree has been installed by the MSV. This operation requires at least two in-field transfers of survey personnel, usually done by crane basket.

It is evident that it would save a lot of time, risk and HSE exposure if such a relatively simple rig navigation task could be controlled remotely from the MSV, even if it is still in transit and miles away. The surveyor on the MSV just simply needs to connect to the navigation system on board the rig and can be in full control remotely via the internet without having to transfer to the rig.
Such standalone navigation is ideally suited for all near-shore and offshore operations where a frequent but nonpermanent need for navigation support is required, for example, on jack-up work barges, rigs, tug boats, and support and construction vessels. Access to the navigation system, for example, to change waypoints or to update background files, can be done from an office or from a nearby vessel.

Conclusion

Recent developments in internet communication facilitate safe and secure connections to offshore survey and navigation systems. Once established, the internet-based remote survey services make it possible to reconsider the necessity of mobilising survey and/or QC personnel to offshore or other infield locations. By using remote services the risk of operational delays is minimised, HSE exposure during personnel transfers is eliminated and logistical issues faced when planning and allocating personnel are mitigated. Furthermore, QC capabilities are improved, due to easier access to real-time survey data from any office in the world, and, last but not least, personnel mobilisation costs are reduced or eliminated.
Would the Phoenicians have realised that when they started using coastal maps and celestial observations for nautical navigation they made such a great step forward? The value of that step only became clear much later, when subsequent developments proved they took the right path. Although the avalanche of technical achievements in the field of positioning and navigation in the last centuries makes it difficult to judge their separate value, the possibility to remotely connect to offshore survey systems and to control and QC offshore operations is definitely an interesting step forward.

FANS Technology

FANSSR^{Tm} (Fugro Advanced Navigation System) technology provides an infrastructure to remotely connect to offshore survey systems. The connection is achieved via the internet and the FANSSR^{Tm} hard- and software onboard the vessel or rig. The internet connection can be via VSAT or another communications link that supports internet IP traffic.
Security is managed by the FANSSR^{Tm} hard- and software. The FANSSR^{Tm} firewall and router protect the survey network against interference from other computers onboard and on the internet. The software, with 128-bit advanced encryption standard data encryption, enables a secure connection between the office and offshore operation.

In spite of the permanent internet connection needed, data rates are relatively small. In standby mode, only a few bits per minute are sent to monitor the connection and even in full use the system requires only 10–20 kbps of bandwidth. On average, less than 10 kbps is needed – a bandwidth similar to that required for a phone call.