MANAGING COST THROUGH THE FIT FOR PURPOSE PRINCIPLE

Low Cost or Cost Effective?

When asked to do an article on low cost hydrography within the offshore construction industry the first word that sprang to mind was 'cheap'. However 'cheap' might not be 'cost effective' which is, or at least is supposed to be, the decision driver. For a private Company to remain in business it is essential that any external service hired, provides value for money. Hence all survey services within the private sector can be considered 'lowest cost'. There is however another critical factor that shall be considered. If a service impacts on installation spread efficiency, it might be worthwhile to spend extra if the overall gain exceeds the costs. This would translate in those solutions that are 'fit for purpose'. This approach within the Dutch offshore contractor, Heerema Marine Contractors (HMC) has lead to being one the first users of Sonardyne's new wide band technology but also to the implementation of WAAS/ EGNOS corrected Vector systems on the anchor handlers.

Offshore Installation Companies have to look at costs, risk management and optimisation of all resources within their installation spread. By adding tasks to a resource already available and by selecting the optimum combination of positioning equipment, important savings can be achieved without compromising the quality of the work.

Optimising Resource Utilisation

Working offshore, the major cost item in any survey is the supporting vessel. State of the art anchor handlers, if not fitted with a DP system, have as a minimum joy stick control and sufficient bed and work space for a small survey/ ROV team. By sharing the facilities used for anchor handling (shark jaws & stern roller etc) a towed geophysical spread can easily be mobilised onto these anchor handlers of opportunity, refer to Figure 1 showing the AHT Primus on contract to HMC and utilised as supporting vessel for geophysical and eyeball ROV activities. These activities typically comprise of localisation of existing infra-structures and/ or clearance surveys of the installation vessel's anchor pattern.

The lack of gate valves, moon tubes or other facilities of through hull deployment generally necessitate on over the side pole. Figure 2 shows a typical pole to deploy USBL head for tow fish tracking, Sub Bottom Profiler and echosounder.

As sonar contacts can be rather ambiguous, visual validation by ROV might be required. The ROV system that would provide optimum workability, a full blown eyeball ROV complete with launch and recovery system, interferes with the anchor handling tasks. The alternative of a manually deployed eyeball ROV was investigated and deemed feasible provided environmental conditions were favorable during the execution of the ROV work. Evaluating the advantages and disadvantages of both systems it was decided that removal of the ROV's launch and recovery skid prior to any anchor handling tasks would have a larger time critical impact than waiting for the optimum conditions given the environmental statistics in the area. Figure 3 show the ROV whilst running through the pre-dive checks. At present the spread has successfully performed surveys at several anchor locations and proved to be a cost effective solution.

On the other side of the spectrum, requiring work class ROV support in water depth approaching 3000m a DP class II anchor handler was outfitted with a deep water ROV system whilst conserving the vessel's anchor handling and installation capabilities. This spread shown in Figure 4 has been supporting the operations successfully since 2002. Similar to the geophysical spread described above also this spread is in compliance with the fit for purpose principle.

Positioning Systems

When GPS substituted terrestrial positioning systems around 1993 the SA (Selective Availability) signal prevented direct use of the satellite signals for survey purposes. Differential corrections were essential to obtain the accuracies and reliability required. These corrections were obtained from the same companies that used to provide the positioning chains. However with SA switched off in the spring of 2000 stand alone performance improved significantly and provided accuracies in the same order of magnitude as the longer range positioning system used for survey purposes in the late eighties. Everyone that has ever used a state of the art car navigation system or GPS handheld might recall the initial astonishment when these systems guide even a layman to within a few meters of the correct address or preset waypoint.

The last half decade has seen the introduction of free of charge signals which positioning performance is comparable to standard DGPS. Satellite DGPS or high precision DGPS services still provide a higher accuracy but this accuracy may not at all time be vital to the operation. Hence the end user now has to decide how much redundancy and/or accuracy is required and how vital the positioning system is to the vessel's operations.

On the two deepwater installation vessels, a purpose built DGPS system was installed to alleviate masking problems caused by the crane booms and J-lay tower. With GPS being a critical DP reference and in absence of other practical reference systems whilst on the move, the system is both redundant and reliable. Hence this solution is multi-receiver, multi-link and based on receiving standard and if required ionofree corrections through a signal provider that monitors the systems performance continuously. This solution has well proven itself over the past four years.

On the anchored crane vessel, which predominantly operates in shallower water, the level of redundancy at the same accuracy level is less critical. Back-up comprising a WAAS/ EGNOS DGPS or even standard GPS will be adequate. Most of the installation work has to be performed relative to existing structures which renders the vessel position less relevant. Since the installation is generally a mix of relative

and absolute installations, the vessel is equipped with one high precision Satellite DGPS system for absolute installations and a WAAS/ EGNOS back-up. The anchor handlers are also equipped with WAAS/ EGNOS systems including a heading sensor which is easy to install and provides all relevant vessel info from a single unit.
Both the above systems although hugely different in set-up and costs are fit for purpose and thus provide optimum value for money.

Back-up From Unexpected Side

Over the past decade the nautical part of the bridge has seen a dramatic change. Whereas in the old days all accurate positioning systems and navigation displays were provided and managed by surveyors, the nautical crew currently has almost the same tools at their perusal as part of their standard navigation equipment. Modern radars show the underlying nautical chart, have DGPS, Gyro and AIS interfaces and show all vessels complete with vessel heading and course within working range of the installation vessel. This system competes with the survey contractor provided tug management systems and is a viable substitute to the old (golf)laser systems .
On DP vessels the DP system provides facilities that are even more comparable to the survey contractorÃ¯Â¿Â½s navigation suite. If desired the APOS software can display a detailed CAD chart of the installation location and will allow for installation of structures at predefined locations on this chart. This does not imply that navigation suites have become obsolete altogether as APOS or Pharos for that matter, are very much focused on determining and displaying positions without additional interfaces. Hence they will support straightforward installation tasks but do not support any mixture of systems or extensive ROV interfacing. Figure 5 shows the Eiva/ Pharos wide band suite o/b one of the DP installation vessel which in addition to providing the navigation displays also interfaces and logs data form 2 work class ROVs, provides I/O data to other systems on the vessel out width the realms of survey.
Although the above described 'Tom Tom-erisation'/ 'Garmin-isation'/ 'Navman-isation' (depending on which continent you live), is likely to continue at a rapid pace it is important to realise that being technically capable does not automatically imply an instant switch is favorable. At present the local datum support within the system described above is limited. Hence in-depth knowledge of geodetic datums is essential in preparation of a project which plans on utilizing these systems only.
Applying the fit for purpose principle to the above it shall be obvious that sometime in the near future the nautical and survey systems will grow closer together and potentially merge to provide a more cost effective solution. At present the risks in particular with the geodetic datum support render these systems back-up solutions or suitable for those applications where absolute positioning is not an issue.

Future

Within the private offshore industry low cost is not as important as cost effectiveness. Specialists employed by most installation companies continuously monitor if standard solutions still meet the fit for purpose criteria. If not, solutions may be developed in-house in close cooperation with instrument manufacturers. New developments including areas out with the conventional hydrographic survey industry are being assessed regularly in the ever lasting quest for efficiency.
