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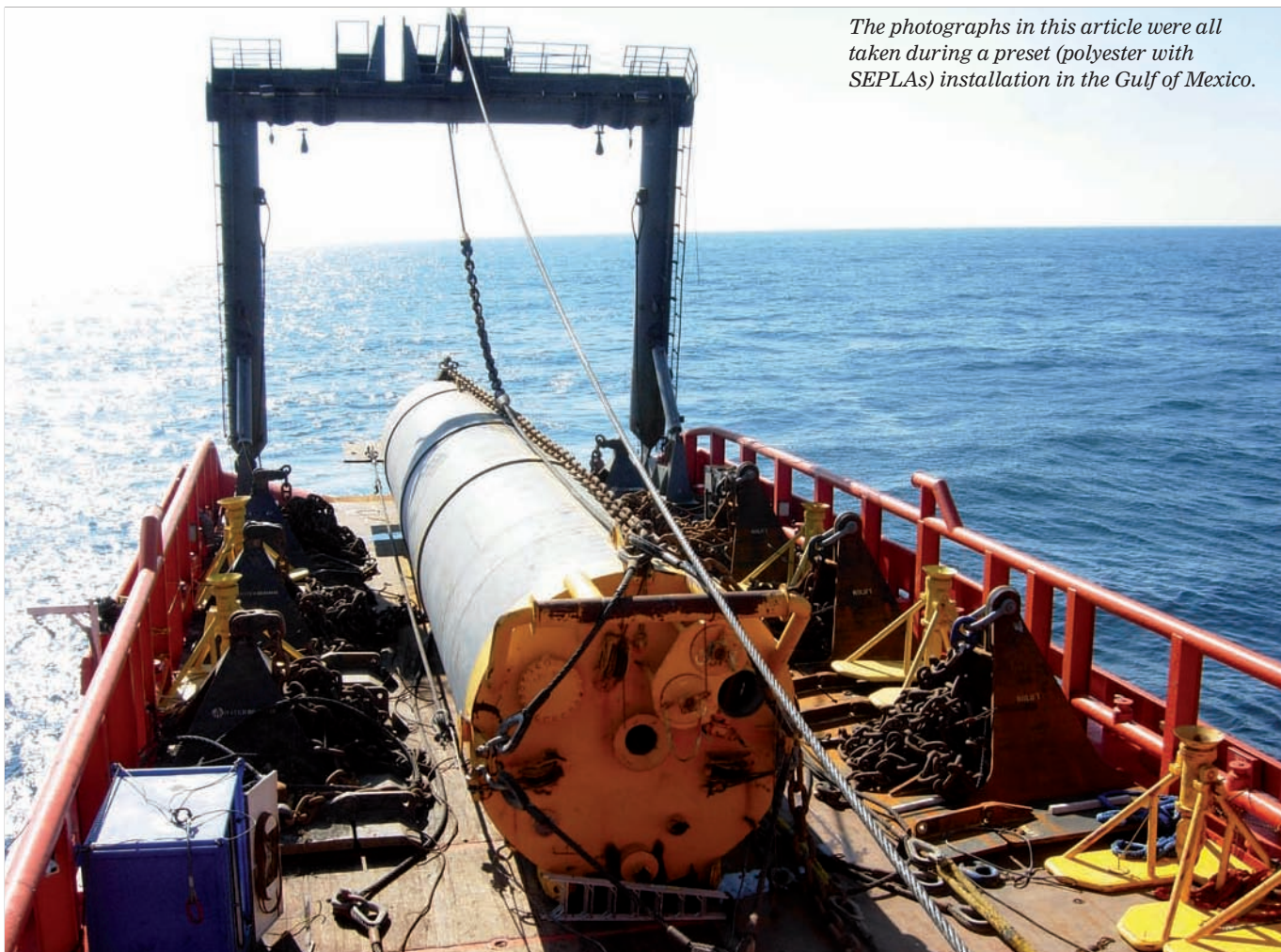
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PLUS: HOW THE 'BIG CREW CHANGE' HAS TAKEN A BACK SEAT TO SHIFTING SOCIETAL PERCEPTIONS



The photographs in this article were all taken during a preset (polyester with SEPLAs) installation in the Gulf of Mexico.

The pros and cons of presetting

With the help of offshore mooring and anchoring specialist Todd Veselis, a senior project manager with InterMoor, **Bill Clewes** looks at the arguments surrounding the use of preset moorings for deepwater drilling rigs.

Why would you want to preset independent mooring lines to secure a mobile drilling rig equipped with a purpose-designed mooring system; and, moreover, one that you have already paid for? It's a reasonable question. A few years ago, there would have been a perfectly simple answer: depth.

In the dash to develop oil and gas reserves in ever-deeper water, preset moorings provided a convenient means of overcoming the depth limitations of

the available drilling rigs. It did not take long for the rig companies to catch up with field developers' needs, however, and simply extending the depth capability of a drilling rig is now rarely the prime reason for opting to preset its mooring system.

So, why have presets continued to gain favour in recent years among operators in various parts of the world? More pertinently, in what sort of situation, under what conditions, is presetting likely to offer the best mooring solution?

According to InterMoor's Todd Veselis, there are a number of factors to consider nowadays when deciding if it is going to be worthwhile to preset the mooring system for a drilling rig. Depth remains one of those factors, but lots of others come into play: the condition of the seabed; the presence of existing infrastructure; the environmental conditions; the local availability of mooring system components and anchor handling vessels; rig and vessel rates; and, not least, the nature of the planned drilling activities.



'Preset moorings undoubtedly offer significant benefits, but they need to be viewed as part of the moorings toolbox.'

Todd Veselis, InterMoor

'Unfortunately, there is not a formula to help you make the decision,' says Veselis. 'It is a matter of judgment, which has a lot to do with your attitude to both economic and operational risk. Part of the mooring company's job is to help unravel and balance the various arguments on an individual basis. This should not be about pushing preset mooring systems but helping rig owners and operators find the mooring solution that best meets their particular needs.'

Congested seabeds

With more and more production equipment being installed subsea, especially in deeper water, the seabed conditions around many offshore oilfields are becoming decidedly congested. Preset

moorings offer significant benefits here by generally reducing the chance of damaging existing seabed infrastructure. Installing moorings before the rig arrives on location enables them to be positioned more precisely, and hence safely, in the vicinity of any seabed infrastructure than when setting the rig's own mooring system once it is on location.

And there are variations on this theme. If during a field development a rig will need to be moved frequently between several close locations, it can make sense to permanently preset at least some elements of the mooring system. A good example is work done by InterMoor for Esso in Angola where as many as 20 suction-embedded plate anchors (SEPLAs) were permanently installed at

strategic points throughout the course of the development of one particular field. By using subsea connectors, it was possible to secure the rig on three to five critical preset moorings very efficiently each time it was moved, with little risk to the field's seabed architecture. Thereafter, the remaining, less-critical moorings were set conventionally. Deepwater operators in West Africa and Malaysia have adopted similar strategies for some of their development drilling programs, says Veselis.

Veselis believes another important advantage of preset moorings is the greater flexibility they offer in terms of anchor location and mooring layout. Not restricted by the fixed lengths of chain and wire carried on most rigs, he points out that it is possible to customize the mooring layout, and indeed the entire installation process, to provide the optimum restraint for the rig and match its operational needs. Again the advantages of being able to do this are greatest when working in congested areas.

Finally, there is the issue of proof-loading. All moorings are normally tested after installation, whether the moorings are being preset or laid conventionally. Clearly, though, problems at this stage, which might result in having to reset an anchor, are likely to be less of an issue – and give rise to less of a financial penalty – before the rig arrives, than if the rig and its accompanying spread is standing by.

Mooring performance

In recent years, preset mooring activity has grown for another major reason: the advent of polyester mooring lines, which, because of their bulk and relatively limited damage resistance, are rarely found onboard drilling rigs. Presetting is by far the most common way of installing them, to the extent that presetting has become synonymous with polyester moorings.

'The advantages of polyester moorings heavily outweigh their disadvantages, especially in deeper water,' claims Veselis. 'Their relatively low weight and high elasticity make them more efficient than wire and chain. Normally deployed as a semi-taut system, polyester lines typically provide greater overall mooring capacity and cut potential rig offsets. At the same time, their greater stretch has the effect of reducing any shock or spike loads, leading to improved performance in demanding environments. There is also less risk of infrastructure damage during installation with polyester than with wire and chain, and the weight loading on the moored rig is reduced, meaning that it can carry a greater drilling payload. Finally, should the





mooring fail, the risk of damage to any seabed infrastructure from dragging lines is likely to be lower with polyester than with wire and chain.'

Polyester preset mooring systems make good sense when faced with deep water, a congested seabed and extreme weather conditions, a combination of factors that occurs commonly in parts of the Gulf of Mexico. Not surprisingly, following the havoc caused by the major hurricanes suffered by the region in recent years, it is here where the arguments for preset moorings have probably had most airing.

When questioned about the economic issues surrounding the use of preset moorings, Veselis is prepared to outline the arguments but stresses that you can only weigh them up once you have a defined mooring requirement and location, and you have some idea of the availability of marine assets of one sort or another. He begins: 'Any examination of the economics of preset moorings has to be viewed in the light of the cost of hiring a deepwater drilling rig and its necessary marine support spread. This could be \$500,000 to \$1 million a day or more, depending on the location and the terms of the contract. The figure is important because it indicates the amount of money that may be saved or lost, depending on how smoothly a rig move is performed.

'Hiring a 12-leg polyester rope and SEPLA system will be relatively insignificant in comparison. To this, however, you have to add the cost of the anchor-handling vessel, rigging crew, survey and ROV services required for laying and then recovering the preset mooring system, operations that may take several weeks. Specifically hiring a boat on the spot market or on short-term charter can put a big dent in the budget. Conversely, having access to a boat already on long-term charter to the operator can mean that the boat's cost weighs less heavily in the financial calculations.

'A final factor in the economic case, one that favours preset systems, is that the installation and recovery of the moorings occur off the rig's critical path. Thus, any difficulties with either of these operations are unlikely to result in costly rig downtime. Further, there is

more likelihood of saving time during the actual rig move using preset moorings than losing it, though nothing can be guaranteed in this respect.'

Over the past several years InterMoor has been intimately involved in a long-term preset mooring campaign in the Gulf of Mexico for one of the region's biggest operators. The semisubmersible drilling rig in question, designed for harsh environments and water depths to 7000ft, undertakes a mixture of exploration and development drilling, and well intervention work. It has been moved at least eight times over the past three years between six different locations: three times in quick succession during one particularly busy six-month period. Each time, the rig has been moored with eight or 12 preset polyester lines, the latter during the hurricane season. InterMoor leased the operator enough polyester rope to make up as many as 24 mooring lines, and up to 24 SEPLAs. This enabled the rig to be moved from one location to another, even during the hurricane season, without having to transfer the moorings with it.

A rig move of this kind typically begins with a site investigation at the target location, which focuses on the water depth, the seabed conditions, the metocean data and any existing oil and gas infrastructure in the area. Then, taking into account the specified operational design criteria, engineers conduct a mooring analysis to determine the optimum mooring layout at the site. Detailed procedures are prepared for presetting the anchors and the polyester lines, and for hooking up the rig to the moorings. These go to the rig owner and the field operator before being submitted to the Minerals Management Service for approval.

Presetting each of the anchors at the new location takes 12-18 hours. The time for the whole operation depends on the



weather, the nature of the seabed and, naturally, the number of anchors to be installed. A single boat can typically sail with six to eight SEPLAs. The polyester lines are then preset and left on the seabed; setting the lines is far less weather-dependent than the anchor installation and it is normally possible to lay two lines per day. The rig is disconnected at the old location, moved and hooked up to the preset moorings at the new one. The times for these operations depend on the number of boats available, but two or three days at each end is not unusual, especially if there are 12 lines involved. The abandoned moorings are finally picked up. Retrieving polyester lines takes roughly the time it takes to set them; SEPLAs are recoverable in as few as four hours each. Assuming good weather, the whole pick-up generally takes one to two weeks with a single boat.

On balance

It is worth noting that there has hardly been a moment over the past three years when an InterMoor engineering team has not been considering or planning to move this rig, and the operations team has not been gearing up to set or pick up moorings. It cannot be disputed that moving a drilling rig around on preset moorings, although easier at the critical time when the rig is between stations, overall entails more effort, more time and more equipment, all possible sources of additional cost.

However, as is often the case offshore, risk is actually the central issue. There are risks to consider relating to schedules, the rig itself and its smooth operation, seabed assets and, not least, safety. All of these have associated financial implications. When these factors are taken into account, the case for preset moorings for drilling rigs may become compelling, and it is not difficult to see why many operators view preset moorings as the best way of optimizing the operation and movement of drilling rigs, especially in congested and ultra-deepwater areas.

Nevertheless, it would be quite wrong to advocate preset moorings unconditionally – and certainly Veselis does not do this. He concludes: 'It is important that we use our knowledge, experience and judgment to estimate the costs and evaluate the benefits of using a preset mooring system for a given location and mooring scenario. Preset moorings undoubtedly offer significant benefits. But they need to be viewed as part of the moorings toolbox – just one option when seeking to provide the best mooring solution to meet an individual set of operational requirements.' **OE**