Rapid deployment mooring efficiency

The casual observer could be excused for thinking that deck machinery is not an area in which much technical innovation has taken place. Talking to several of the topic's leading exponents, Andy Smith learns that know-how and lateral thinking are, however, contributing to real progress. There is no better example than this interesting application explained by Blaine Dempke of Markey Machinery in Seattle.

Markey was recently approached by Oceaneering International of Houston, Texas, with an application involving the placing of a four-point mooring set for one of their new dive boats.

The mooring operation is simple enough in concept but not so simple in execution. Four anchors are placed in a spread pattern several 100m away from the centralised vessel operating position. The anchor lines are tensioned to maintain the vessel in that position whilst the vessel and its crew perform their services. Mooring operations start with dropping the first anchor at one corner then motoring the vessel several hundred metres to the next corner while paying out line for the set anchor.

The second, third and fourth anchors are dropped with the same motoring scenario with progressively more winches slacking and/or taking up lines from the set anchors. After the fourth anchor is set, the vessel moves into its approximate operating location by tensioning and slacking lines, then adjusting to its final operating location. The complication lies in anchor line tension management during deployment.

Slack lines have the potential of getting fouled with each other, on bottom structures or in the vessel propulsion itself. A given line can require either slacking or take-up, or both, during each leg of the set. Therefore each winch must be individually responsive to its line tension requirements. With a classic winch having a band brake and take-up drive, this could require individual operators for each winch to slack the brake and/or take up line intermittently during the operation.

In order to produce the most cost effective, efficient and safest system possible, Markey engineers performed an extensive analysis of the operation. Among the approaches that were considered were locally controlled winches with basic manually operated disc or band brakes and a more sophisticated system using a water-cooled dynamic tensioning brake.

The conclusion of these analyses was that the application was best served by Markey's Render/Recover® Technology. Each winch is equipped with remotely operated clutches and brakes along with an AC-VF drive. These combine to produce a system that allows for remote anchor dropping and line tensioning by the vessel operator from a single location in the wheelhouse. After each anchor is set, the operator can set the tension for each line then motor to the next corner.

This 'set and forget' feature allows the operator to focus on navigating the vessel and allow Markey's Render/Recover automated controls to manage the line tension of each winch. In the case of the oceaneering boat, all four winches are located on the forecastle deck in sight of the wheelhouse so that the operator can visually monitor the state of the winches while piloting the boat. When the vessel is adjusted to its final operating location, each winch is manually dogged to secure it.

Basic Render/Recover refers to the ability of a winch to pay-out (render) and reel-in (recover) line without loss or even significant changes in the line tension. Markey first developed this technology to meet the need for tug boats to reposition during an escort operation without loss of line tension.

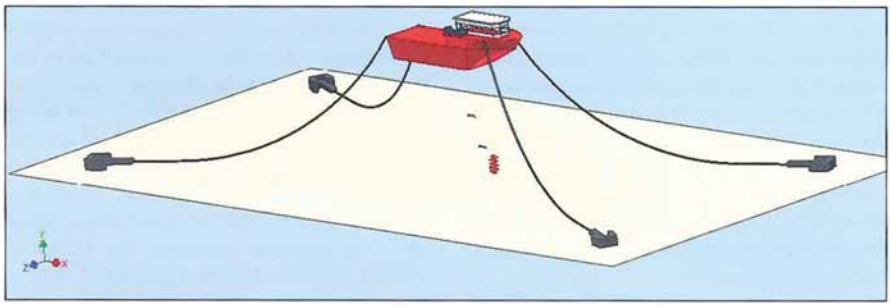
It was found that it could also help to maintain line tension when these tugs were subject to small swells where the relative motion between the tug and the tow was reasonably mild.

As more demands were placed on tug boats including ship assist and escort duty in exposed waters, Markey developed what they refer to as Asymmetric Render-Recover (ARR). This refers to a winch that is designed to handle rough water conditions where the wave action causes significant and often violent relative motion between the tug and the tow.

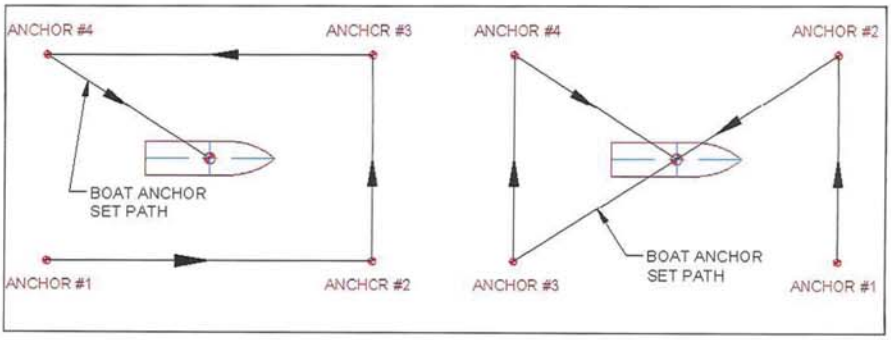
The ARR winch is capable of maintaining a nearly constant line pull as the tug is being forced away from the tanker then has a sufficiently responsive drive to maintain tension whilst retrieving the line as it is being forced toward the tanker. The line horsepower produced by the intensity of the pay-out in such an environment often exceeds the horsepower rating of the winch drive motor.

The term 'asymmetric' refers to this difference in line horsepower between that absorbed during the render phase and that produced during the recover phase. The line pull during pay-out produced by significant wave action is limited and the power generated is dissipated by means of mechanical brakes, clutches and/or dynamic motor braking.

The analysis and application of Basic Render/Recover to the oceaneering project is claimed to be just another example where Markey's 'engineered approach' to problem solving has advanced marine technology to produce operations that are more efficient, more cost effective and, importantly, with an increased level of safety. The company's proven Render/Recover technology has been employed successfully on over 120 vessels and is considered the standard for ship assist and escort service.



Mooring operation showing four anchors in spread pattern.



Two of many anchor set patterns.