Modified heavy-lift system facilitates rapid completion of decommissioning project

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Versabar’s VB-10K heavy-lift system has been deployed several times to the Gulf of Mexico, where it has removed more than 70,000 tons of decommissioned structures since 2010. A recent decommissioning project proved to be one of the company’s most challenging to date, and also served to highlight aspects of the innovative engineering.

The VB-10K’s ability to reduce offshore exposure by performing single-piece decommissioning is highly valued by offshore operators, and in 2014 Versabar secured a contract for the removal of a field of four production topsides with an aggregate weight of nearly 5,500 tons. The smallest was a 190 ton four-pile, and was removed by the VB-10K in its conventional fashion, using wire rope slings and shackles to hook to pad-eyes on the structure, lift it off its jacket, and deposit it on a materials barge for transport to a shore-based salvage facility.

The initial plan was for the other three much larger topsides to be removed in a similar fashion, but there was one significant complication. The installation of pad-eyes would require the cutting and removal of numerous sections of piping around the upper legs and the truss rows. Due to the nature of the reservoir, this piping contained significant levels of heavy metal contaminants. The cost associated with the prepping of the topsides, exposure to personnel, and mitigation of environmental issues associated with the contaminants was significant.

Therefore, the development of an alternative lift method was proposed that would safeguard the environment while reducing the client’s offshore exposure and cost. Unable to affix pad-eyes to the upper structure of the topsides, and committed to minimizing topsides preparation, Versabar engineers determined that the legs of the topsides represented structural hardpoints which could be used to perform the lift. The question then became how best to adapt the VB-10K’s versatile rigging applications to a leg-based lift.

The solution was the Claw. Built in 2011, it was engineered primarily as a subsea lifting device which uses curved arms equipped with tines to slide beneath and cradle loads that are considered too badly racked or damaged to be lifted by conventional methods. For this project, Versabar engineers performed an important modification, installing spacer pipes in the Claw’s upper rigging that increased the span between the arms by 40 ft to provide adequate clearance to encircle the 100 ft wide topsides and reach the legs underneath. The next step was to find a way for the Claw arms to connect with the legs in order to lift the load in a safe and level fashion.

Given the wide array of lift packages handled by the VB 10K, in 2015 engineers had designed and fabricated a pair of 175 ft-long box girders which featured multiple pin holes and slots to provide a number of lift point options. After removing the tines from the Claw, engineers used adapter plates to pin these girders to the Claw arms and provide the span needed to interface with the legs of the topsides. Plate hooks were then welded to the girders in accordance with the spacing requirements of the legs — four hooks on each girder for the two eight-pile topsides, three hooks for the six-pile.

As this work was going on, Versabar field staff were busy offshore with the platform-based preparations, which were comparatively straightforward: 16 ft beneath the ceil deck, welders cut one-foot-wide by four-foot-high slots into each leg. Through the slots on a longitudinal axis, 16-in. pins were installed. The lift would be achieved by guiding the plate hooks on the girders into the slots on the legs and raising the Claw arms to engage the pins. Remote cameras were installed on the beams to assist VB-10K operators in guiding the pins into the slots.

As with all Versabar offshore projects, the next step was systems integrated testing, or ST. At its berth in Sabine Pass, Claw arms and girders were installed and a water-filled barge was situated under the VB-10K’s twin gantries. The rigging assembly was then lowered into position to engage the hooks with pins that had been welded onto the barges, and a 2,100-ton test lift was performed. With the rigging load tested and all components working smoothly, the VB-10K was ready to depart.

The VB-10K arrived on site in the early hours of July 10, dropped its towsline and entered the field. Using the system’s eight 1,000-hp thrusters, operators initiated procedures for the first of the three topsides to be removed. As the lift system approached, welders on the structure removed clips holding the precast legs. Once the welding crew disembarked, the lift system maneuvered into position over the topsides.

Due to the presence of quarters buildings, helidecks, and flare booms, clearances on all three topsides were tight, but the VB-10K’s DP-3 system assured a precise and steady line of approach. When the VB-10K was centered above the first topsides, the Claw was lowered to bring the beam with its hooks in line with the legs.

Using the remote cameras and positioning stand-by vessels and tugboats to act as spotters, VB-10K operators now began the process of aligning the 6-in. beam hooks with the leg slots. Within 45 minutes, all eight hooks were in the slots and snugged up against the pins. The main hoist blocks were then engaged and the first topsides, weighing 1,608 tons, was lifted from the jacket. VB-10K operators then maneuvered the system and lowered the topsides onto a materials barge that was inserted beneath the gantries. Once welding was accomplished, the barge was removed so that the VB-10K could be positioned over the second topsides while final sea-fastening on the first deck was completed. By 6:45 pm, the 1,756-ton second topsides had been lifted in the same fashion and set on the materials barge, which remained under the system until sea fastening was completed.

Promptly at 9:30 am the following morning, after final cuts had been made, the VB-10K was positioned over the third and largest topsides, where the Claw/beam rigging combination engaged the 1,756-ton load, which was lifted off the jacket and deposited on a materials barge within 90 minutes. At 3:00 pm, when sea-fastening was complete, the barge was towed away bound for a specially-prepared salvage yard. In a span of just 30 hours, using purpose-engineered rigging, the VB-10K, operating safely and efficiently, had removed three decommissioned topsides totaling 4,534 tons and safeguarded the environment throughout the process.