New vessel design extends installation, decommissioning capabilities

A vessel due out in 2013 not only will tackle decommissioning projects, it will be the largest pipelay vessel in the world.

By JUDY MAKSOUD MURRAY, Editor

Offshore pipe laying, subsea construction, and decommissioning make up a substantial part of the offshore business. Pipelay, in particular, has been the core business for Swiss-based Allseas since 1985.

According to Edward Heerema, president of Allseas, the company now is taking a significant step forward with its newbuild, the *Pieter Schelte* platform installation/decommissioning and pipelay vessel.

"Within Allseas, we don't have any significant lifting capacity in our current fleet because so far Allseas has been engaged primarily in pipe laying," he said. The dynamically positioned (DP) *Pieter Schelte*, scheduled for delivery in late 2013, will change that.

"This vessel has a unique single-lift capacity for platforms that surpasses other existing crane vessels by far because it's an entirely different concept," Heerema said.

Pushing the limits with design

Allseas made the final decision to build the *Pieter Schelte* in January 2007. The following March, the company began ordering long-lead items like power generation equipment and thrusters, and in June 2008, Allseas ordered high-tensile steel for the topsides and jacket lift systems. The company awarded Daewoo Shipbuilding & Marine Engineering a €454.5 million (US $598.9 million) contract to build the *Pieter Schelte* in June 2010. The total budget for vessel construction is more than €1.3 billion ($1.7 billion).

"The investment was made on the strong belief that this is a unique concept with great potential and is likely to become very successful," Heerema explained.

The DP vessel will be 1,253 ft (382 m) long and 384 ft (117 m) wide, with topsides lift capacity of 48,000 metric tons and jacket lift capacity of 25,000 metric tons.

At the bow of the vessel is a slot that is 400 ft (122 m) long and 171 ft (52 m) wide, where topsides are lifted using eight horizontal lifting beams. Two tilting lift beams for jacket installation or removal are installed at the stern of the vessel. The lift beams also are used for regular crane lifts for activities such as installing or removing modules or bridges.

The vessel's large size provides good wave response behavior that the company says generally is superior to semi-submersible crane vessels in operational wave conditions. This means topsides and jackets can be installed or removed by the *Pieter Schelte* in significant wave heights of up to 9.8 ft (3.5 m).

Heavyweight capability

The *Pieter Schelte* is designed for removing large steel jacket-based platforms, primarily in hostile areas.

"In terms of platform and lifting work, this is a new step for Allseas," Heerema said. "But many people in our company come from a heavy-lifting discipline. My father originated the Heerema Company, so heavy lifting is a process we're quite familiar with."

The vessel will be able to maneuver topsides heavier than 10,000 metric

This artist's rendering shows the Pieter Schelte *which, upon completion, will be the largest pipelay vessel in the world. (Images courtesy of Allseas)*

The single-piece jacket lift method eliminates the need for cutting work at intermediate jacket elevations and dangerous or difficult hooking operations under water.

tons and jackets higher than 230 ft (70 m) and will be able to manage topsides and jackets that cannot be lifted in a single piece by existing crane barges.

Gravity-based topsides for which the leg spacing fits the vessel slot can be lifted with the aid of temporary modifications to the topsides lift system. Platforms with leg spacing up to 167 ft (51 m) can be accommodated.

Only a few of the widest gravity structures and jackets in the North Sea exceed the slot dimensions of the *Pieter Schelte*, which the vessel will be able to remove modularly using the portal frame system.

Topsides removal

Topsides will be lifted using the hydraulically operated lifting clamps mounted on eight beams at the bow of the *Pieter Schelte*. Before being employed in a lifting operation, clamps must be adjusted to the exact dimensions of the platform legs.

Although the vessel itself is in slight motion due to wave action, clamp motion relative to the platform is eliminated by engaging the active motion compensation system. This enables careful closing of the friction clamps around the platform legs, the natural strong points of the platform.

With the clamps connected, pretension in the lift system is increased gradually to transfer the weight of the topsides from the jacket to the vessel. In the final stage, a 6.6-ft (2-m) rapid liftoff eliminates the risk of re-impact between topsides and jacket.

Analysis has shown that in hostile environments such as the North Sea, a motion compensation system is essential on a single-lift vessel to eliminate impact forces on large topsides. In the absence of such a system, local damage can occur even when wave height is small and vessel motions are limited. The large motion compensation capacity (both vertical and horizontal) of the *Pieter Schelte* topsides lift units results in very low dynamic forces introduced in the topsides during engaging and pretensioning, even when working in less favorable sea states.

The lift system does not require accurate knowledge of the platform weight or the position of the center of gravity because the liftoff procedure is displacement-driven and ample lift capacity is provided.

When the *Pieter Schelte* has transported the structures to sheltered water, they are transferred to a cargo barge for final loading onto a quayside. A 656-ft (200-m) long cargo barge has been designed for this operation. Alternatively, if water depth is sufficient, the structures can be skidded directly from the vessel onto the quayside.

Jacket removal

Jackets will be lifted over the stern of *Pieter Schelte*. After cuts have been made in the legs of the jacket at seabed level or above the pile clusters, the tilting lift beams lift the jacket at the top of the main legs, preferably using quick-connect lifting tools. When the jacket has been rotated onto the vessel deck by the tilting lift beams, it is skidded further inboard.

The single-piece jacket lift method eliminates the need for cutting work at intermediate jacket elevations and dangerous hooking operations under water.

Another advantage of using the *Pieter Schelte* is that jacket removal can be performed directly upon completion of topsides removal and cutting of the pile footings without first requiring the vessel to offload the topsides.

One of a kind

The firing line, where lengths of pipe are welded together, is in the center line of this vessel. The 40-ft (12-m) pipe sections will be delivered to the vessel by supply boats and lifted onto the vessel by one of the pipe transfer cranes. Pipe will be fed into the pipe storage area on the main deck or into the double-joint factory. Maximum outside pipe diameter, including coating, is 68 in.

In the main firing line, pipe is held under tension by four 500-metric-ton tensioners. Pipe leaves the vessel over the 558-ft (170-m) long stinger, which is suspended in the slot between the bow sections of the vessel.

"The length of the firing line is longer than that of the *Solitaire*, our longest vessel, which to date is the largest pipelay vessel in the world," Heerema said. "As a pipelayer, the *Pieter Schelte* fits in our present fleet very nicely as an expansion of our capability in terms of volume, pipe size, and water depth."

With its broad capabilities, this vessel truly is one of a kind and likely is to remain so. "It's almost inconceivable that we will ever build another one of these in view of her high production capacity and the limited requirement for extreme lifts," Heerema said. E&P

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