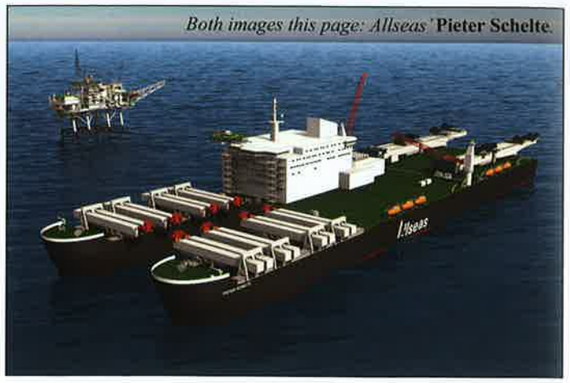
# A cheaper, faster, cleaner, safer option

**The decommissioning of oil and gas platforms is the topic of the moment in both the offshore and salvage circles. Here, Jeroen Hagelstein, manager, Allseas, The Netherlands, describes for *IT&S* readers the design, capabilities and purpose of the dynamically positioned platform installation/decommissioning and pipelay vessel *Pieter Schelte*.**



*Both images this page: Allseas'* **Pieter Schelte.**

***Pieter Schelte*, named after the offshore heavy lifting pioneer Pieter Schelte Heerema (1908–1981), is a vessel for single-lift installation and removal of large offshore oil and gas platforms and installation of oil and gas pipelines. It was designed in-house by Netherlands-based company Allseas and is expected to be built, delivered and ready for offshore operations in three years' time.**

Due to its large lifting capacity, ***Pieter Schelte*** will reduce the amount of offshore work associated with platform installation or decommissioning, moving this work to shore where it is less costly, faster, cleaner and safer.

Executing topsides removal in a single lift will significantly reduce the man-hours spent offshore cleaning, partitioning, installing lifting points and rigging platform modules. This in turn, reduces health and safety risks. Avoiding offshore cleaning and purging of process facilities will reduce environmental risk. Separating modules offshore requires a large amount of piping to be cut, which carries a risk of oil and chemical residue leakage; such risks are removed with single-lift removal because there is no chance of leakage.

In single-lift topsides installation, offshore hook-up activities are minimised as units can be transported offshore in very large sections; entire platform topsides up to a weight of 48,000 tonnes can be installed in one piece, entirely pre-fabricated onshore. This can lead to significant field development cost savings.

Conventionally, large platform jackets need to be cut up into small sections suitable for crane lifts, requiring lengthy and complex subsea cutting operations. ***Pieter Schelte*** will be able to remove large jackets weighing up to 25,000 tonnes in a single lift, thereby limiting subsea work and associated risks.

The ability to sail under its own power at a high transit speed, coupled with its dynamic positioning system and in-house developed motion compensation system, make ***Pieter Schelte*** capable of working in hostile areas at high speed. Its light Ice Class will extend the period that it can operate in polar regions.

The vessel's large ship size gives it a good wave response behaviour, superior to semi-submersible crane vessels in operational wave conditions; topsides and jackets can be installed or removed in significant wave heights of up to 3.5m.

The pipelay equipment makes it possible to install heavy pipelines from shallow to ultra-deep water, and achieve high lay rates. The tensioner capacity of 2,000 tonnes, doubling the capacity of the world's largest pipelay vessel, Allseas' ***Solitaire***, may mean that ***Pieter Schelte*** pushes pipelaying boundaries even further.

## Vessel dimensions and capability range

The new vessel will be 382m long and 117m wide. At the bow of the vessel is a slot, 122m long and 52m wide, where topsides are lifted using eight sets of horizontal lifting beams. Two tilting lift beams for the installation or removal of jackets are located at the vessel's stern. These tilting lift beams are also used for regular crane lifts, such as for the installation or removal of modules, bridges, etc.

The vessel will be equipped with eight main diesel generators providing a total installed power of 95MW, driving 12 azimuth thrusters for full dynamic positioning and for propulsion. The maximum speed will be 14 knots under favourable wind and wave conditions. The accommodation has room for 571 persons in two-berth cabins.

***Pieter Schelte***'s primary area of focus is the removal (in accordance with OSPAR '98 regulations) of large steel jacket based platforms in hostile areas such as the North Sea, but also in more benign areas of the world. In particular, the vessel will target the decommissioning of topsides and jackets that cannot currently be lifted in a single section by crane barges. The aim will be for topsides heavier than 10,000 tonnes and jackets higher than 70m, although small platforms can be accommodated equally well.

Gravity-based topsides, for which the leg spacing fits into the slot between the bow sections of the vessel, can be lifted with the aid of temporary modifications to the topsides lift system.

Platforms with a leg spacing of up to 51m can also be accommodated. Only a few of the widest gravity structures and jackets located in the North Sea do not fit ***Pieter Schelte***'s bow slot; the topsides of these platforms can be removed modularly using the tilting lifting beams.

## Development schedule

**In June 2010, the contract for building *Pieter Schelte* was awarded to the Korean shipyard Daewoo.**

**Long-lead items, such as the power generation equipment, the thrusters and the DP system, were ordered in 2007. In 2008, the high-tensile steel for the jacket and topsides lift systems was ordered.**

**The detailed design of the hull was completed in May 2010, while the lift systems and the pipelay system are foreseen to be ordered in the spring and summer of this year.**

**Delivery of the completed single-lift and pipelay vessel is expected at the end of 2013, ready for offshore operations in early 2014.**





*Top images,* **Pieter Schelte** *removing topsides, and below, lifting them.*

## Topsides removal operation

Prior to ***Pieter Schelte***'s arrival, the topside support legs are cut, and further preparations are performed as required from the platform deck or using a support vehicle. When the vessel arrives on location, the topsides are lifted using a series of hydraulic clamps mounted on eight sets of beams at the vessel's bow. These clamps have been previously adjusted to the exact dimensions of the platform legs.

Whilst the vessel itself is in slight motion due to wave action, all motion of the clamps relative to the platform is eliminated by engaging the active motion compensation system. The friction clamps are carefully closed around the platform legs, the natural strong points of the platform (or, in the case of gravity based platforms, strong points mounted to the underside of the topsides specifically for the lift-off operation). With the clamps connected, pre-tension in the lift system is gradually increased in order to transfer the weight of the topsides from the jacket to the vessel. In the final stage, a 2m rapid lift-off eliminates the risk of impact between topside 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, due to the enormous weights involved. In the absence of such a system, local damage will occur even when the wave height is small and vessel motions are very limited. Due to the large motion compensation capacity (both vertical and horizontal) of ***Pieter Schelte***'s topsides lift units, the dynamic forces introduced in the topsides during engaging and pre-tensioning are very low, even when she is working in less favourable sea states.

## Jacket removal operation

Jackets are lifted over the stern of ***Pieter Schelte***, for which the vessel is re-positioned. After cuts have been made in the legs of the jacket at seabed level, or above the pile clusters as required, the tilting lift beams raise the jacket at the top of the main legs, preferably using quick-connect lifting tools. The jacket is rotated onto the vessel deck by the tilting lift beams, after which it is skidded further inboard.

Strength analyses for typical jacket types have shown that their integrity is ensured during lifting, rotation, skidding, transportation and off-loading by ***Pieter Schelte*** with no, or a minimum of, local reinforcements.

The removal of a jacket can be performed upon completion of the topsides removal, without first requiring the vessel to off-load the topsides.

## Platform installation

For platform installation, the reverse of the above procedures is applied. Capacities of the systems are the same for installation as for removal.

## Pipeline installation

The firing line on board ***Pieter Schelte*** is located along the vessel's centre line. 12m pipe sections will be delivered to the vessel by supply boats, lifted on board by one of its three pipe transfer cranes and fed into the pipe storage area on the main deck or into one of the double-joint plants. In the main firing line the pipe is held under tension by four 500 tonne tensioners. The pipe leaves the vessel over the 170m long stinger, which is suspended in the slot between the bow sections of the vessel. The maximum outside pipe diameter including coating, is 173cms.

In the event that ***Pieter Schelte*** is required for platform topsides installation or removal work, the stinger will be removed from the bow section of the vessel and stored on deck or on a cargo barge.

*Left to right: Lifting a jacket, tilting it, skid jacket on to* **Pieter Schelte** *and sea fasten.*