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Pioneering Spirit reaches lift beam milestone

Photo: Allseas

A full set of giant lift beams is now in place on the twin bows of the vast platform decommissioning catamaran *Pioneering Spirit*. Adrian Cottrill has been aboard to see what all this work involves and to get up to date on an eventful year since the hull's January arrival in Rotterdam.

At its Netherlands fitting-out anchorage in the outer reaches of Rotterdam's harbour area, the world's mightiest offshore construction vessel has just reached the point of "full visual impact". As well as its vast twin hulls, the most obvious defining feature of Allseas new flagship *Pioneering Spirit* is the array of huge beams at the ship's forward end for that all-important job of lifting whole platform topsides.

The last of those complex motion-compensating beams was slid aboard the vessel on 26 September. Or more precisely, all 12 of the beams needed for the first commercial contract are now in place.

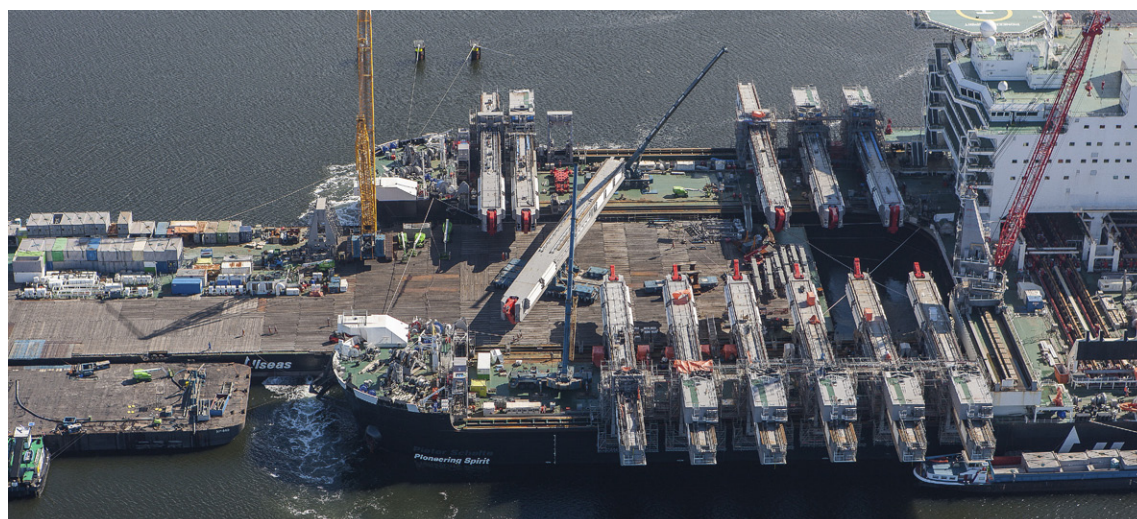
Although *Pioneering Spirit's* eventual full complement will be 16 of these 3000 tonne lift capacity beams, Allseas has decided to concentrate on commissioning and testing the six pairs that can easily serve



FULL SET: Late in September the giant lift vessel was finally able to boast a dozen beams in place.



BEFORE THE BEAMS: The hull arrived in Rotterdam in January after seven and a half weeks of sailing from South Korea, with disappointingly good weather all the way.



LAST ONE IN: The twelfth beam moves along the deck of the work barge sited between the vessel's twin bows, ready to slot into its appointed place.

to remove the 15,000 tonne Yme platform from the Norwegian North Sea early next summer.

The final two pairs of beams need not be fitted to the €2.5 billion (\$2.8 billion) vessel straight away. They will not be called for until the second decommissioning contract — lifting off the 23,500 tonne topsides of Shell's Brent D platform in the UK sector — now also scheduled for next summer, after the Yme operation.

A unique project like the

construction of *Pioneering Spirit* was always going to be subject to delays and cost escalation as it progressed, and the topsides lift beams have been no exception. Originally, the plan had been to install all 16 of them within four months of the ship's arrival in Rotterdam from South Korea in January this year.

Then the fully-equipped vessel was to go on to sea trials and a series of offshore test lifts, followed by the Yme operation

for client Repsol/Talisman before the end of this summer.

However, as Allseas founder and president Edward Heerema concedes, “we underestimated the complexity of the work that was yet to be done on the topside lift beams. Then there were some late deliveries of components by our suppliers, and we also discovered some manufacturing errors that called for rework.”

He avoids being specific about the problems. “There were a

multitude of deliveries that were very complex and difficult for the suppliers — there is not one particular party you could point to.” He notes that although continuous attention was paid to the beams, “I think perhaps their timing should have had better attention”. This is partly explained by the great concentration on getting the ship completed in South Korea and moving it to Europe.

“Overall, there are no

Photo: Allseas

Photo: Allseas

VERTICAL MUSCLE: At the inner end of each beam sit the mighty hydraulic cylinders designed to compensate vertical motions and then make the fast lift. Each beam has a 3000 tonne capacity.



Photo: Adrian Cottrill

» fundamental problems at all,” Heerema continues. It is simply complexity that has caused the current delays. “There is such a multitude of things that have to be done on 16 beams,” he says, “installing all the equipment inside them, pulling all the cables, testing all their complex functions, then testing the beams in co-operation with each other. It’s just a long sequence of things, really nothing else than that.”

The result of all this is that Allseas is now working to an altogether kinder schedule. “We think that in the course of this winter everything can be ready,” says Heerema. “In the early spring we should be able to install our offshore test platform in the southern North Sea and become comfortable with the motion compensation system.”

“Then, say in early summer, we go out to do Yme,” he continues. “Meanwhile, the final four beams are being worked on simultaneously. But if we can be ready a little bit quicker with 12 beams only, we’ll sail out that way.”

As Heerema notes: “We are

very lucky that we do not have nervous clients for our early contracts. Fortunately for us, and for them, there is no pressure from having to meet a first oil or gas date. So we are in the luxury position of getting everything right before we do their work.”

Transit from Korea

Upon completion of the hull at the South Korean yard of shipbuilder Daewoo, *Pioneering Spirit* began its journey to Europe last November. Until June, the choice of destination had remained open between Netherlands, France or Italy, where the beams were being fabricated.

The selection of Rotterdam brought considerable satisfaction to the port authority there, enabling it to boast this unique vessel as the first into its new Prinses Alexiahaven sheltered area, reclaimed relatively recently from the North Sea. The authority went on to dredge a pit to accommodate the vessel at its deepest draft of 26 metres.

Travelling under its own steam, *Pioneering Spirit*



Photo: Adrian Cottrill

COMPLEX INNARDS: Internal fitting out of beams has been carried out at the Broekman yard, nearby in Rotterdam.

completed the journey from South Korea in seven and a half weeks of sailing. It did so without incident and solid as a rock in weather that ship’s master Carlo Floor describes as “beautiful all the way”.

Such weather was something of a disappointment to all concerned. Says Edward Heerema: “I was hoping to get some rough response of the

ship but it was all much too easy”.

Within two weeks of *Pioneering Spirit*’s 8 January arrival in Rotterdam the first lifting beam had been transferred onto the vessel. In the following month another five beams followed in a push to provide a suitable spectacle by the time of the ship’s christening ceremony.

Impressive christening

That ceremony was about as spectacular an event as can be imagined. For the christening on 27 February, 600 guests from oil and gas companies and the like were ferried out to a floating auditorium that had been slotted between the vessel’s twin bows for the occasion.

There they witnessed a stunning show that had been more than two years in the planning by Edward’s wife Poulien Wolfswinkel and the Allseas public relations department, and which drew on the cream of Dutch expertise in this area.

The huge stage featured such



FILLING THE SLOT: Transport barge *Iron Lady* has provided a working surface for beam installation work

effects as a vast LED screen, flames, fountains, a giant beating heart, and a multitude of costume players. Then the celebrations continued another two days to embrace a further 3400 Allseas employees and supplier company representatives.

The emotional heart of the christening was the single central speech by Edward Heerema, made all the more so by his decision just three weeks earlier to change the vessel's name.

Ever since the concept was first unveiled in 1987 this giant lift vessel had carried the name *Pieter Schelte*. This was in honour of Edward's father, who died in 1981, and his string of pioneering offshore achievements — not least the revolutionary move of introducing giant semi-submersible crane units in the late 1970s.

However, after the vessel's arrival in Rotterdam a number of groups campaigned vociferously that it should not carry that name because of the elder

Heerema's service during World War II as a Dutch officer in the *Waffen SS*. This included a petition to Shell about its giant contract with Allseas for removal of the Brent field platforms over the coming years.

Finally, on 9 February, Edward Heerema found himself announcing the change in name to *Pioneering Spirit*. Born in 1947, he "has expressly disassociated himself from his father's sympathies in WWII", and stated that "his wartime past remains difficult and painful for his family and for many others".

He made the name change, he says, "out of respect for Shell, which as a public company is so much more vulnerable than we are. Shell was so fair to us, they never put me under pressure, they just told me how difficult this situation was for them, and I was sensitive to that. But otherwise I would never have changed the name — you cannot look only at the war story, you have to look also at the accomplishments of this great offshore pioneer in the 35 years that followed."

At the vessel ceremony, he



INSHORE TRANSFER: In normal service, the 200-metre long *Iron Lady* will be used for handover of topsides to or from *Pioneering Spirit*.

stated: "My father made me the engineer I am today, with his credo of 'vision, daring, skill'. And it is that credo that resulted in this vessel and that is why it bore his name."

Beam sequence

With *Pioneering Spirit* christened, beam installation was clear to continue. After construction in Italy by fabricator Cimolai, the 65-metre long bare steel box structures came first to Rotterdam's Broekman yard. There they saw about three and a half months of work to

install and test the complex internal equipment that brings total beam weight to about 1700 tonnes.

Then, one by one, each beam has gone out to *Pioneering Spirit* by barge, transferred aboard on a multi-wheel carrier system, and slotted into its appointed position. Hook-up and pressure checks take about four days, followed by extensive commissioning and testing of all components.

The new Statoil installation contract has prompted two of the beams to be extended by five

Photo: Adrian Cottrill

IN PLACE: Removing transporters after a beam has been slotted in.

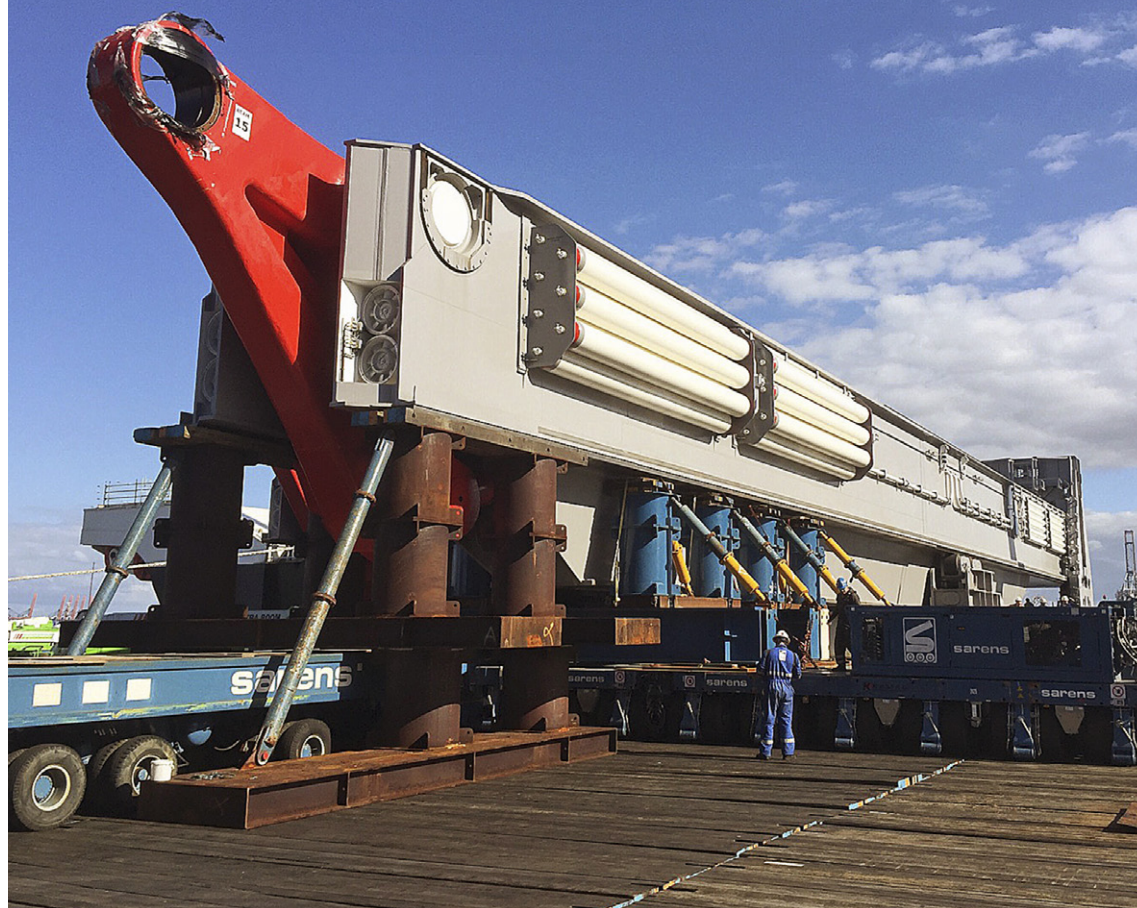
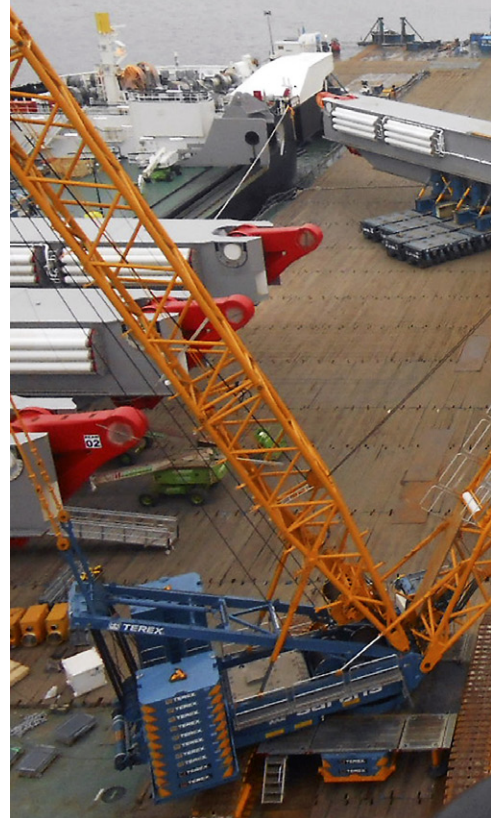


Photo: Allseas

DRIVING FORCE: Another beam is manoeuvred into position, moving around with its 1700 tonne weight supported at centre of gravity by Sarens multi-wheel transporters.



» metres, to accommodate strong point positions on the Sverdrup topsides.

With the topsides lift beams loaded onto *Pioneering Spirit*, Allseas has the whole winter to get them properly in shape for their huge — and also hugely delicate — task.

That task is to be able to connect onto a platform topside weighing up to 48,000 tonnes, compensate for the relative motion between the stationary target topside and the moving hull of *Pioneering Spirit*, and then perform a fast lift of a metre or two in just a few seconds to ensure no re-impact of the topsides when the vessel has taken the full weight but still moves in the waves.

This motion-compensation challenge means the beams have to be ready to move instantaneously in three dimensions, driven by an intricate mix of mechanical, pneumatic and hydraulic power which all takes its cue

Photo: Allseas



INAUGURATION VENUE: For the vessel's christening on 27 February, the bow slot was occupied by a vast temporary auditorium and reception facilities for the 600 guests who were ferried out that day, and the further 3400 who followed in the next two days.

from a uniquely sophisticated computer control system.

Adjustments in the horizontal plane are catered for by fore-and-aft movement along rails in the ship's deck, while lateral movement is dealt with by the beams shunting back and forth in their housings. Vertical motions are handled by the huge

hydraulic rams and swivel-arm system at the beam's end.

Static proof testing will first involve a lift by each single beam to 10 % above its 3000 tonne rated capacity. In operation, the beams will be linked in pairs, jointly connected to a large support structure. That structure can be fitted with either a yoke, to push

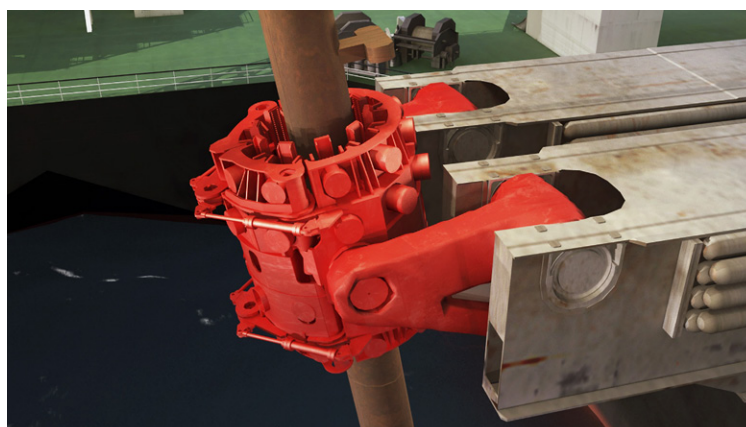
up against the underside of a topside, or a clamp, to grip a leg. (Yokes will be used on both of the first two platforms.)

Next will come proof testing of each pair of beams and then of various combinations of pairs. The test load for this work will be provided by connecting to *Iron Lady*, the purpose-built 200-metre long barge that in normal life will transfer topsides to shore after they have been lifted by *Pioneering Spirit*.

Lively offshore tests

Then comes the lively part of the test programme. With luck, around March next year the ship will go offshore to a test platform that is being installed in 30 metres of water nearby in the Dutch sector. Last year, Allseas acquired the 1600 tonne module support frame of the now-decommissioned NW Hutton platform to form this and will found it on suction piles. The "topside" will be a 5000-tonne system of water-filled cylinders.

"We want to practise with



CLAMP OPTION: In operation the beams are joined in pairs, supporting a single connector which can be either a clamp, as above, or a yoke.



YOKE OPTION: The first two contracts will employ yoke connectors, as illustrated here pushing up beneath a topside just after completion of the fast lift at a concrete gravity base.

Pioneering Spirit for several weeks,” says Heerema. “We will go out and set and pick up the topsides, first in fairly good weather, then wait for more challenging conditions and do it again. We probably want to do it a dozen times in varying weather to feel comfortable.

“It would be good to be doing this in March,” he continues, “because it’s early season, with the chance of a bit of rough weather, even if it is only in the southern North Sea. Previously these tests were planned for summer 2015, when we ran the risk that it would all be too smooth.”

Crew members are already starting to prepare for test platform operations using a new simulator set up at Allseas’ engineering headquarters in Delft. There, as well as handling the controls, they can look at a full-scale view from the bridge window as they manoeuvre the vessel, deploy and connect the beams, perform the lift, and back out.

The lift itself involves first

pre-tensioning the beams to about 80% of load — as much load as is possible without the risk of lift-off. Then the huge vertical hydraulic cylinders are activated for a fast lift to raise the topsides clear of its supports.

At this point, the cylinders use most of their four metre stroke in just nine seconds. *Pioneering Spirit*’s bow will go down by about 0.5 metres in the case of a 30,000 tonne topsides. Then four ballast tanks high in the vessel’s bow can dump some 11,000 tonnes of water in a mere three or four minutes to raise the load even further.

When ballasted down for a very low topsides, *Pioneering Spirit* will reach a world-beating displacement of 1 million tonnes. This compares with 600,000 tonnes for Shell’s (admittedly longer) *Prelude* floating LNG platform, and is equal to about 10 US aircraft carriers. »



VISION:
Allseas founder
and president
Edward Heerema

Image: Allseas

Image: Allseas

Photo: Erik Means

» **Pipelay fit in parallel**

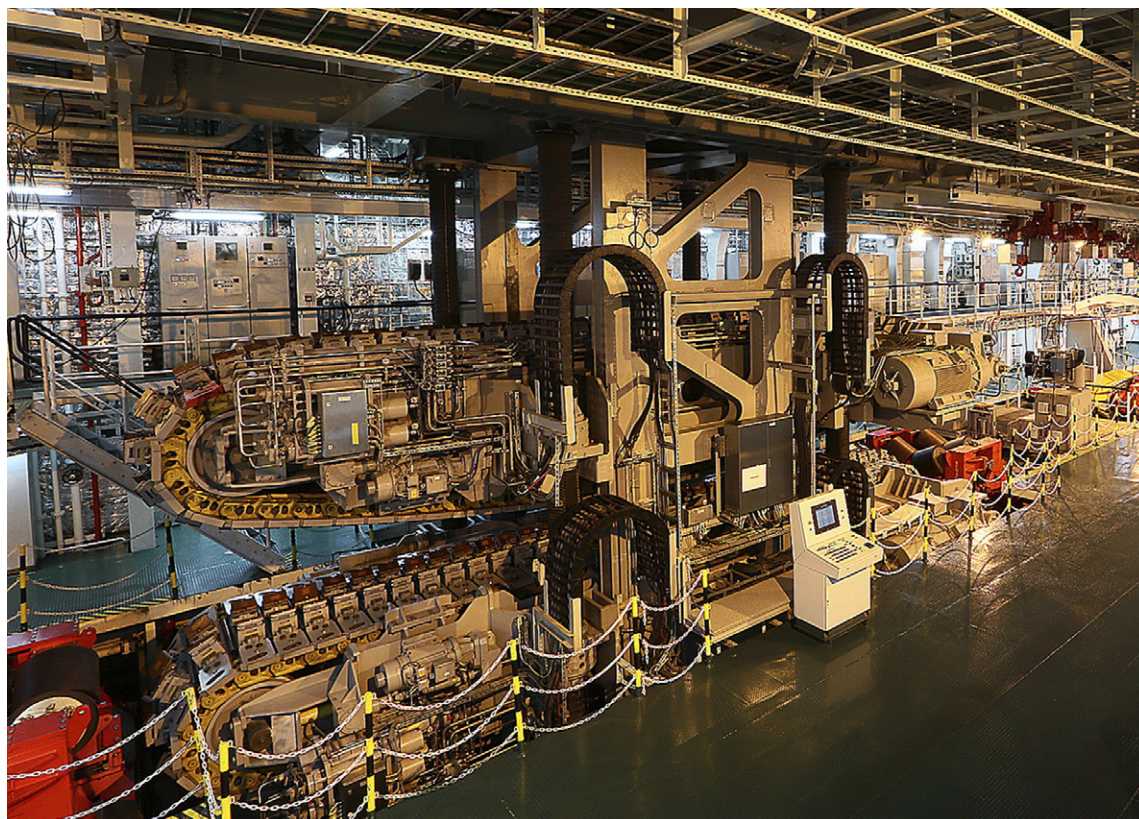
Installation of the vessel's ultra-deepwater pipelaying equipment has also been pressing ahead, even if it is now theoretically less urgent. In April last year, Allseas began to line up for what would have been the first project to employ that capacity.

The South Stream order from Gazprom called for nearly 900 kilometres of 32-inch gas pipeline to be laid in water as deep as 2100 metres across the Black Sea from Russia to Bulgaria. However, as South Stream became a casualty of the escalating political tension between Russia and the West, contracts were cancelled.

In December, it was replaced by another Gazprom project, Turkish Stream, with a western landfall in Turkey rather than Bulgaria. For Allseas, the status of this project remains up in the air. Given the amount of money already invested by Gazprom in landfall work and stockpiles of pipe for South Stream, and the world's ongoing appetite for gas, many observers feel that Turkish Stream will eventually push on to become a reality, but uncertainty may continue for several years yet.

Beyond this, the offshore pipeline business in general is also extremely quiet for everyone. "We've always had ups and downs in bidding," says Heerema, "but it's never been so quiet as now. We have almost no bidding activity, which is very unusual."

Nevertheless, Allseas is pushing ahead just as strongly with installation of pipelay equipment on *Pioneering Spirit* as for the lift beams. Below deck, the state-of-the-art firing line with its six welding stations for pipeline up to 68-inch outer diameter is visibly in place



MIGHTY GRIP: The firing line includes four 500 tonne tensioners, providing a world-beating capability when hanging heavy pipe in ultra-deep water.

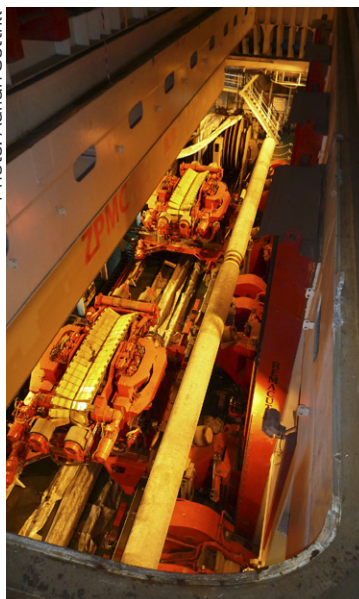
and producing trial lengths of pipeline. Above it, the pipe storage, handling systems and the double-jointing area are ready for action.

A dominant feature of the main firing line is the set of four pipe tensioners, designed in-house and hedged about with much industrial secrecy. These provide a world-leading combined tension capacity of 2000 tonnes to support the heaviest of pipe in very deep water.

Likewise, elements of the huge stinger system are taking shape, to be hung off in the vessel's bow slot during pipelay contracts. So Allseas has in no way slowed down on readiness for pipelaying.

Explaining his philosophy, Heerema says: "Yes, we are

Photo: Adrian Cottrill



PIPELAY PUSH: Allseas is making *Pioneering Spirit* just as ready for pipelaying as it is for topsides lifting.

determined to get the ship complete and tried out in terms of pipelaying as well as lifting as soon as possible. You never know when it could suddenly be required."

He continues, "if you start saying 'well the market is depressed, we'll reduce our expenditures' then suddenly in a year or so from now you could be very sorry for that. So we just carry on as if it's urgent all the time — both on pipelay equipment and lifting equipment. If then you find the ship is going to be idle for a while after its first two projects — so be it."

The one area of outfitting where Allseas is choosing not to rush is the jacket lift system. This arrangement of tilting beams will occupy the stern of *Pioneering*

Photo: Allseas

Amazing Grace adopts a slower pace

Allseas does of course have an even bigger behemoth in prospect. In November 2013, it announced its intention to build a second giant catamaran, this time with a planned lifting capacity of 72,000 tonnes and a bow slot that, at 72 metres, is 13 metres wider than *Pioneering Spirit*'s.

At that time, the schedule was to be

operational by about 2021, and the cost estimate was at least €2.5 billion (\$2.8 billion). That figure is now put at more like €3 billion (\$3.4 billion).

The new vessel's name was announced as *Amazing Grace* at the same ceremony as its sister ship was christened. Building time is put at about three years. Currently,

the outlook is for it to be operational about two years later than the originally estimated 2020/21, says Edward Heerema. "That is mainly because of the depressed oil price," he explains. "We get less work, we make less cash flow, so we just don't accumulate the capital to start building earlier." [U](#)

Spirit and be able to raise or install complete steel jackets weighing up to 25,000 tonnes.

"This is indeed less urgent," says Heerema, "but as soon as we can concentrate on it we will build it, because also here you have to be ready, or one day you may be surprised that you want it half a year from now and it's not there." At present, he reckons the jacket lift system is likely to go on in 2018.

Contracts build up

Allseas received a major boost on 26 February when it sealed a contract with Statoil for the installation of three large topsides for the Johan Sverdrup development in the Norwegian North Sea. Weighing between 19,500 tonnes and 26,000 tonnes, they will be placed in 2018 and 2019.

This gratifying order rivals the scale of the first award won by *Pioneering Spirit*. In August 2013, it gained that all-important breakthrough for decommissioning at the UK's Brent field. That followed some

Image: Allseas



DUAL-PURPOSE: *Pioneering Spirit's* elaborate stinger system will be hung off in the bow slot when the vessel performs a pipelay contract.

four years of intense evaluation of the vessel by Brent field partners Shell and ExxonMobil.

The work involves removal of four platform topsides weighing between 16,000 tonnes and 30,000 tonnes, plus one steel jacket. It will run from 2016 to about 2022, starting with the Brent D topsides.

Three other projects have been in the news for the *Pioneering Spirit* order book, but only one of them is definite at present — the removal of the 15,000


tonne Yme platform, the vessel's commercial debut.

The other two prospects — for South Stream pipelaying and White Rose topsides installation — are both currently in suspension, with their outcome unclear. Yet even without these two, Edward Heerema is "extremely pleased with already so much work for an unfinished vessel".

The White Rose contract from Husky appeared close to confirmation around the middle of last year. It was for installation

of a 23,000 tonne platform topsides at this planned project off Newfoundland, Canada. Though the drop in oil price has put that on the backburner for the time being, the hope is that Husky may go ahead with it in perhaps a year or two.

Activity in the offshore oil business may be as low as seen for many years, but the seemingly imperturbable Heerema remains as calm as ever. "You have to look beyond today's situation of low oil price," he says. "We built this ship for 30 years so you must look beyond the few years in which the oil price is low."

And "the ultimate matter is whether it will work or not, and on that we have no concern whatsoever. The delay is irritating, more cost is very annoying, but as an engineer your prime concern is that it will do what it will have to do, and there is no signal whatsoever that it won't. The best element in this whole story is that so many people see with us that it will certainly work." 

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